The determinants of prescription drug expenditure … and what to do about them

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- Population based
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- Interdisciplinary
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CHSPR receives core funding from the BC Ministry of Health, and ongoing support from the University of British Columbia and the UBC College of Health Disciplines. This enables the Centre to focus on research that has a direct role in informing policy and health reform, and facilitates CHSPR’s continuing development of the BC Linked Health Database.

Our researchers are also funded by competitive external grants from provincial, national and international funding agencies. They include the Canadian Health Services Research Foundation, the Canadian Institutes of Health Research, the Commonwealth Fund, Health Canada, the Michael Smith Foundation for Health Research, and WorkSafeBC.

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1 Introduction

Pharmaceuticals are a major part of health care in Canada. They represent one of the largest and fastest growing components of health spending. Next year, Canadians will spend roughly $30 billion on pharmaceuticals in the community setting. This represents nearly two-thirds of what we will spend on hospital care (including drugs provided in hospitals) and 50% more than what we will spend on physicians’ services. It also represents three times what we spent on drugs ten years ago.

Drug spending may be viewed as an investment that is made by public and private payers with the intent to improve the health of patients and/or to reduce demands for other health care services. Given that current annual growth in Canadian pharmaceutical expenditure could otherwise pay for the services of 10,000 primary care practitioners (at $200,000/yr), one would expect that there was clear evidence and data to indicate that the increase in drug spending generates significant gains to our population health and the health care system. In this paper I review the historical context of drug spending in Canada and provide a summary of the literature describing the underlying causes of drug spending trends.

2 Evolution of Pharmaceuticals in Canadian Health Care

Figure 1 illustrates a historical view of prescription drugs spending in Canada. It bridges Statistics Canada’s historical data on manufacturers’ sales with more-recent data on retail spending. The figure depicts per capita spending adjusted for general inflation so that spending as far back as 1935 is expressed in terms of year-2005 purchasing power. The figure illustrates levels of spending on two
axes—for pre- and post-1975 data respectively—so that the trends in the early period may be ‘seen’ without being overshadowed by the scale of more recent drug spending.

**Figure 1: Inflation-adjusted prescription drug spending per capita, Canada, 1935 to 2005**

*(Year 2005 dollars per capita)*

Pharmaceuticals have risen in prominence in health care spending through three waves of significant change in the industry and, consequently, the health care sector. The first wave was set off by the anti-infective research conducted around the time of World War II. Ehrlich’s 1907 discovery of Salvarsan, Fleming’s 1928 discovery of penicillin, and Domagk’s 1932 discovery of prontosil (a derivative of sulphanilamide) had all given promising indications of what might be possible if anti-infectives could be produced and distributed on a mass scale. This was particularly true during wartime, when availability of anti-infective agents would convey a military advantage. Coincident with significant investment in production technologies, a “therapeutic revolution” also occurred through the mass-screening of chemical entities for therapeutic properties[^1-3]. Certain families of compounds (like the sulfa-drugs related to Domagk’s prontosil) held a large number of therapeutically valuable entities.

The medicines that were discovered just prior to and following the war would dramatically change the way a wide variety of conditions were treated in the years that followed. In addition to these
therapeutic changes, the market structure would change dramatically in the late 1950s with the advent of patent laws that allowed manufacturers to patent synthetic versions of otherwise naturally occurring substances (which most drugs were at the time). The pharmaceutical sector grew rapidly through the 1960s into the now-familiar industry of large firms that are integrated from “bench science” through to marketing and distribution\[1,4\].

Owing to the combination of technological and industrial change, the post-war therapeutic revolution created an era of prolonged and rapid increases in drug expenditure. Simply put, more Canadians were taking the newly-available medicines and they were taking them for the treatment of many conditions that would have previously gone untreated.

Early methods of pharmaceutical discovery—mass chemical screening—gradually yielded fewer new medicines over time. The industry would experience a ‘lull’ in innovation during the late 1960s and early 1970s that was also reflected in slower growth in drug expenditure during the mid to late 1970s. Fortunately for industry and patients, this lull in innovation would be short-lived. In the 1970s and 1980s, the era of “rational drug design” would dramatically alter drug discovery and development \[1,2,5\].

The era of rational drug design came about as a result of advances on several technological and basic scientific fronts. New imaging technologies had advanced to the point where scientists could begin to “see” mechanisms of human biology. Most notably, scientists were able to identify receptors and other structures involved in various biological activities. At the same time, the technology of chemical synthesis had also advanced to the point where chemists could build many chemicals ‘by design.’ As a result of the increased understanding of chemical synthesis and biological receptor theory, scientists would become more deliberate (“rational”) in their search for effective molecules. They would no longer blindly screen chemicals for therapeutic action. Instead, scientists would synthesize specific chemicals that should fit with receptors with the intent to either inhibit or promote the biological response those receptors were associated with (such as acid secretion in the stomach). The process was not without trial and error, but it was remarkably more efficient than mass chemical assays.
The results of this rational drug design revolution would hit the market in the late 1970s and throughout the 1980s. Among these would be drugs that established classes of medicine that still dominate the market today. Their names alone suggest the receptor theory underlying their technology: histamine₂-receptor antagonists (H₂RAs first launched in 1977); angiotensin-converting enzyme inhibitors (ACE-inhibitors, first launched in 1981); HMG CoA reductase inhibitors (statins, first launched in 1987); selective serotonin reuptake inhibitors (SSRIs, first launched in 1987); and proton pump inhibitors (PPIs, first launched in 1989). Drug utilization rose, as it had in the 1950s and 1960s, due to the fact that drug use was becoming the norm for previously untreated conditions. Along with the increase in drug utilization went drug expenditures from the mid 1980s through to the early 1990s.

The third wave of significant change in the pharmaceutical industry has occurred in the past decade. Since 1997, drug expenditure has risen faster (after adjusting for inflation and population growth) than any other period since World War II[6]. What separates this “revolution” from those earlier is that it was not one characterized by a wave of therapeutic advances. As had happened following the first therapeutic revolution, the pharmaceutical industry experienced a decline in innovation in the 1990s following the breakthroughs generated by the era of rational drug design. This lull in innovation has persisted despite increased investment in research and development activities, resulting in what analysts refer to as an innovation deficit: firms appear to be spending more on R&D yet generating fewer breakthroughs as a result [7-9]. While there have been significant advances in certain therapeutic areas, the sector has not experienced the widespread transformative changes characteristic of the other eras of rapid increases in drug expenditures.

What has changed is the pattern of drug use driven in part by increased marketing activities and changing expectations of an aging ‘baby boomer’ generation[6,10,11]. The current trends in the pharmaceutical industry are characterized by an increase in the “disease management” model of health care accompanied (and perhaps driven) by an increase in direct-to-consumer promotion of drug treatments. In this era, a driving force behind drug use has been the development and increased promotion of “test-treat-retreat” models of illness that will produce important health gains for only a minority of the patients who take related treatments for extended periods[12]. This model of treatment lies behind an increasing amount of drug use in categories of medicine such as antihypertensives, cholesterol lowering drugs, bone health or osteoporosis treatments, and even
hypoglycemics. The advertising that drives utilization of chronic disease treatments happens also to be specifically for brand-name, patented drugs that are often more costly than older therapeutic alternatives. As a result, both the level of treatment and average cost per case treated are on the rise. This is borne out in the results of recent studies of the causes of drug expenditures.

3 Causes of drug spending

There is a now significant body of literature on the cause of drug expenditure in Canada, within provinces, and in various national settings around the world. Researchers have sought to depict a variety factors that might be causing drug spending trends. Pharmaceutical spending is at one level the simple product of pills and tablets consumed multiplied by the prices paid for those pills and tablets. This is the way that traditional “economic” analyses would depict the causes of drug spending. At another level, pharmaceutical spending can be viewed as the number of conditions being treated multiplied by the cost per case treated. This is how an increasing number of analysts depict drug spending trends. The reason for this latter approach is that, owing to the unique nature of the pharmaceutical market, prescribers and patients may not be fully price-sensitive, which in turn could result in changes in the costs of treatment without commensurate changes in treatment outcomes. This portends the third way that pharmaceutical spending might be depicted. Drug spending is ultimately an investment in health and, as such, can be depicted as the product of the health benefits derived from treatment multiplied by the cost of drugs consumed to obtain those outcomes. This type of evaluation, though laudable, is sufficiently complex that it remains an as-yet uncalculated ideal for measuring the causes (and consequences) of trends in the sector.

The following sections review stylized facts drawn from the literature on drug expenditure trends. Though no one study reports results at such a fine level of detail, the sections below discuss cost-drivers as they might fall into several categories: needs for drug therapy, use of drug therapy, therapeutic choices, and price factors. Throughout this review, the underlying objective of meeting health needs is acknowledged. Specific attention is paid to the issue of whether a given determinant of spending might be related to increased “outcomes” generated through consumption or increased “cost” of those outcomes. Attention is also given to the extent to which policy might influence the given drivers of drug spending.
3.1 Needs for drug therapy

Cost-drivers characterized as “needs” include aspects of the population-level burden of illness that might be treated using prescription drugs. Population health needs are determined by demographics, including population size and its age/sex profile, and by the age/sex-adjusted incidence and diagnosis of disease. To the extent that costs are driven by needs per se, the underlying essence of the trend is an increase in the quantity of desired health outcomes sought through drug use at the prevailing cost of achieving those outcomes. Policy makers might wish to address the causes of increased need, but not to limit the access to needed medicines.

3.1.1 Demographics

A potentially important determinant of per capita expenditures related to need is the demographic composition of a population. The needs-related impact of population aging, in particular, has received considerable attention in the media and the literature on health care cost dynamics \[13-19\]. The cost-increasing forces of population aging, which are often conjectured to be both inevitable and powerful, provoke questions about the sustainability of modern health care systems because they may increase per-capita health care costs at a rate that outpaces the economic activity necessary to finance them \[20,21\].

Age can affect drug costs because older individuals have a greater average burden of morbidity: that is, older patients have more illnesses. Age also affects an individual’s resiliency and regenerative power, implying that older individuals may have greater “needs” for any given diagnosis. Elderly might, for example, require more costly drugs for the management of a given condition because the consequences of side effects may be greater for this population. Changes in drug expenditures that stem from age-related increases in the burden of morbidity are due to changes in the quantity of health outcomes sought through pharmacotherapy. Even age-related changes in the cost of treating a constant diagnosis, which may appear to be a change in the cost of obtaining constant health outcomes, ultimately reflect a greater complexity of outcomes being sought through drug use.

While some reports have argued that age has played a significant role in increasing drug expenditures \[22\], the majority of empirical evidence suggests that the impact of this factor should not be overstated. It is certain that an individual’s prescription drug use and costs increase dramatically with
age; seniors consume three to four times the value of prescription drugs than non-seniors\textsuperscript{[23-27]}. The steep gradient in individual prescription drug expenditures carries through to approximately age 85, thereafter per capita drug needs decline\textsuperscript{[26-28]}. At a population level, however, aging has a relatively modest effect on drug spending trends. For example, from 1986 to 1996, population aging explained only 0.52 percentage points of a 6.2 percent annual rate of real (inflation adjusted) drug expenditure growth in Belgium\textsuperscript{[29]}. More recent population-based data from British Columbia indicate that aging caused less than 1.0 percent growth in per capita drug expenditures from 1996 to 2002\textsuperscript{[26,27]}. Even amongst the seniors’ population, aging is a relatively modest contributor to expenditure growth\textsuperscript{[16,30,31]}.

The relatively modest contribution of age to drug spending at a population level is due in part to the fact that although individuals age one year at a time, whereas populations do not. The aging of a population is determined by the net impact of births, deaths, immigration, and emigration. Because a population moves through the pharmaceutical age-use profile more gradually than an individual does, the impact of population aging on aggregate drug expenditures is less than is often conjectured. Merlis\textsuperscript{[32]} illustrates the difference between population aging and the aging of individuals this in his review of selected drug expenditure studies. He estimated that, while aging of the US population would have caused per-capita drug expenditures to rise 1.3 percent per year between 1999 and 1998, aging of a constant cohort of insured individuals would have increased per capita costs by between 3 to 5 percent per year.

### 3.1.2 Disease Incidence, Diagnosis, and Complexity

Holding constant the rate at which given levels of health needs are addressed with prescription drugs, and the type, quantity, and cost of drugs used to meet those needs, an increase in the population’s age-adjusted burden of illness would increase drug costs by way of increasing the health outcomes sought through prescription drug use. A change in age-adjusted “needs” may be driven by changes in the actual prevalence of disease, or by changes in the rate at which diseases are diagnosed. The complexity of health needs may also play a role in determining per capita pharmaceutical expenditures. Individuals with multiple diseases may not only have higher rates of drug utilization, they may also require higher cost drugs per disease being treated. This is because the occurrence of co-morbidities may make it necessary for drug therapy to be carefully tailored to the needs of people with multiple co-morbidities\textsuperscript{[33]}. Consequently, changes in the prevalence and complexity of disease
amongst a population may have a significant impact on prescription drug costs by way of increasing the quantity of desired health outcomes sought with prescription drugs.

There is clear evidence that drug costs are highly concentrated amongst a minority of the population, and that these individuals likely have the greatest needs. Individuals in the top five percent of drug spending accounting for 25 or more percent of drug costs—five or more times their per capita share \[25,28,34,35\]. Furthermore, drug costs increase dramatically with the number of diseases a particular patient has. Mueller and colleagues found that elderly with one chronic disease had expenditures of $129, versus $519 for those with three or more \[24\]. Non-elderly had a similar gradient in average drug costs, increasing from $129 to $478. Finally, Anderson and Kerluke found a non-linear relationship between drug costs and the number of different drugs used by the elderly \[34\]. In their study, based on 1989 data for the British Columbia seniors drug plan, the average drug cost for seniors exposed to a single drug was $24, while average cost for those exposed to 11 different drugs was $843—a 35-fold increase in expenditures.

Despite the fact that changes in the burden of illness may genuinely affect the quantity of health outcomes sought through the use of prescription drugs, few studies have assessed disease/diagnosis prevalence as a source of drug expenditure trends. The National Institute for Health Care Management hypothesizes that the rising prevalence of chronic disease is one of the determinants of recent drug expenditure growth in the US, and that this is not merely a result of population aging but also due to less healthy diet and lifestyle \[36\]. Theory suggests, however, that the impact of these changes in population health needs would be more modest than individual-level experience might imply. As with demographic change, it may be the case that—excluding the advent (and marketing) of new disease concepts—changes in age-adjusted burden of illness contribute modestly to drug expenditures because the health of populations changes more gradually than that of an individual.

3.1.3 Needs and Pharmaceutical Policy

Needs-related determinants of drug spending are factors that primarily stem from outside the pharmaceutical sector. Demographic change, for example, is essentially immutable from the perspective of pharmaceutical policy makers. The most that policy makers can do about demographic change is plan for it by devising policies and allocating budgets in light of the increasing needs that demographics cause. However, policy makers must also be mindful that
changes in demographics beget changes in investments and economic activity that can change other determinants of age-adjusted needs per capita. By way of increasing the “market” of relatively affluent aging health care consumers, the advancement of the “baby boomer” generation into their years of increasing health care needs will influence research investment and other market dynamics that, in turn, affect drivers of age-adjusted, per-capita pharmaceutical costs \[10,37\]. Such changes may be viewed as a “multiplier effect” in the sense that aging of the population occurs along with and is a catalyst for significant increases in costs per age-adjusted use among particular cohorts.

The impact of changing morbidity also has an impact on population needs for drugs that comes from outside the pharmaceutical sector. For example, increased childhood obesity and overweight in our society may generate significant health care needs over the coming decades that would not have been experienced by generations before \[38,39\]. Drug policy makers must be cognisant of these and related morbidity dynamics so that they can plan for expected increases in demand. It is not, however, possible for pharmaceutical policy to directly alter the underlying causes of increased demand. The notable exception to this is the increased diagnosis of new medical conditions brought about by the advent of new drug treatments and, in particular, new forms of drug marketing. Increased awareness of specific conditions due to marketing activities has had a significant impact on the diagnosis and treatment of specific conditions—e.g., high cholesterol. Whether this is characterized as an increase in the burden of morbidity or a change in the rate of treating a constant (though previously undiagnosed) level of illness, a policy response to this phenomenon may be to ensure that accurate and balanced messages concerning conditions amendable to treatment are reaching the appropriate target audiences. Thus, monitoring and regulation of pharmaceutical marketing activities may directly influence this particular form of changes in a population’s perceived need for drugs.

### 3.2 Use of Drug Therapy

The “use of drug therapy” is the rate at which given levels of health needs are addressed through pharmaceutical use. A fairly consistent finding in the literature is that a significant amount of observed prescription drug expenditure increases is driven by increases in the quantity of drugs prescribed, be they new or existing drugs \[26,27,31,32,40-44\]. However, almost all of the research findings published to date report aggregate utilization patterns without measures of needs or appropriateness.
While “use of drug therapy” is a category of cost-driver that generally implies increased health outcomes sought through drug consumption, it is possible that increased utilization of therapy could reduce health outcomes if not safe and appropriate.

3.2.1 Physical Drug Consumption
Most of the research on drug utilization as a determinant of overall spending focuses on the number of prescriptions or pills and tablets consumed per patient. Data from Express Scripts, for example, show that increases in the number of prescriptions used by drug benefit plan enrollees accounted for 37.3 percent of drug expenditure increases between 2000 and 2001 [45]. Most of this increase was due to increased numbers of prescriptions purchased per user, rather than increases in the number of enrollees using at least one drug. Other studies have also found that increased numbers of prescriptions or physical amounts of drug purchased have accounted for a significant share—between 25 and 50 percent—of total expenditure growth in recent years [23,25,42,46]. These measures of utilization may confound increases in the rate of drug therapy use with some aspects of the intensity of use per “episode” of therapy.

3.2.2 Episodes of Therapy
Utilization of one or more drug from within a therapeutic class gives an approximation of an ‘episode’ of therapy, rather than a count of the physical units of drug consumed. This approach to measuring the use of drug therapy allows the analyst to consider how the rate of treatment for given conditions — such as diabetes, hypertension, or asthma — changes over time. Moreover, it can help to analyse changes in the cost or intensity of treatment for the respective conditions.

Leading classes in terms of absolute utilization (or exposure) growth include cholesterol-lowering drugs, psychotherapeutic agents, asthma drugs, diabetes treatments, and hormones [23,26,27,32,40,44,45,47-51]. Dubois and colleagues [40], for example, looked at the impact of changes in the prevalence of “identified and treated disease” for seven conditions amongst cohorts of privately insured Americans on drug costs in the mid 1990s. They found that increases in the rate of treatment was a major determinant of drug spending for hormone replacement therapies, lipid lowering drugs, and antidepressants. Wallack and colleagues estimated that between 1997 and 2000, there was an increase in the number of classes of drug from which elderly enrollees of private insurance in the United States purchased drugs [23]. Using 22 broad therapeutic classes to identify this trend, the study determined that the rate at which seniors received prescriptions from eight or more therapeutic
classes grew from 8.5 percent to 12.7 percent. Morgan estimated that the rate at which British Columbians received prescriptions from various categories of drug treatment has accounted for approximately 40 percent of the overall per capita cost growth during the past decade [26,48,50,51].

3.2.3 Poly-pharmacy
In addition to tracking the rates at which given conditions are treated over time, analysts can also assess the changes in the number of conditions that individual patients treat simultaneously. Concurrent use of drugs from multiple drug classes is referred to as poly-pharmacy or poly-therapy. As mentioned above, Anderson and Kerluke have found that drug costs for individuals who use multiple drugs simultaneously are disproportionately higher than costs for those who receive drugs from only one class [34]. Trends in multiple drug use over time may therefore have a significant impact on total spending per capita.

Morgan has investigated the degree to which use of treatments from multiple drug classes has affected spending in BC over time [26,27,50]. His studies track changes in the number of different therapeutic classes used per patient who fills at least one drug of any kind, and found that increases of such poly-therapy contributed substantially to drug costs over time. Increased utilization of drug therapy in BC has, in the past decade, been largely determined not by increased numbers of patients receiving their first treatment of any kind, but increases in the number of treatments received by the average patient [26,50].

3.2.4 Use of Therapy and Pharmaceutical Policy
The use of any drug to treat a diagnosed condition or conditions is influenced by many factors, including the availability of drugs, the expectations of patients, and the habits of prescribers. Decisions will also be influenced by the availability and consideration of non-drug treatment options. Because evidence has shown that financial barriers can be a substantive impediment to needed therapy, policy makers might focus on the assessment of prevailing levels of drug coverage and co-payments on access to needed therapies [52-54]. Benefits policy may either moderate or contribute to under or over utilization of drugs across different therapeutic categories. Similarly, as noted above, ensuring that target audiences receive balanced and accurate messages concerning conditions amendable to treatment may also improve the appropriateness of the rate at which diseases are treated with prescription drugs.
3.3 Therapeutic Choices

The “therapeutic choices” involved in the prescription drug utilization process include the choice of the type of treatment, the active ingredient, the specific product form, and the treatment regimen (dose/periodicity/duration). This class of cost-drivers lies in a grey area between the cost and quantity of health outcomes. To the extent that changes in therapeutic choices per course of treatment produce improvements in desired health outcomes, they represent real output or productivity from drug consumption. When changes do not increase the production of desired outcomes, they represent a driver of increased cost of care.

The literature on drug cost trends consistently finds—across different study populations and time periods—that product choices are a significant determinant of drug expenditures. These intra-therapeutic class dynamics, often referred to as product “mix,” have accounted for between 15 and 40 percent of drug expenditure changes in recent studies [23,26,27,30-32,36,43-45,48,50,51,55,56]. For example, in a study of expenditures for private drug benefit plan enrollees, Express Scripts reported that changes in the mix of products used, including the introduction of new products onto the market, accounted for approximately 27 percent of overall cost increases per member between 2000 and 2001.

Similarly, in a study of prescription drugs used by senior citizens in British Columbia over the period of 1985 to 1999, Morgan reports that substitutions among products within therapeutic categories were sufficient to double the cost of drug per senior over that 12-year period [51]. None of the major studies on overall drug expenditure trends have quantified whether the average quality of care per episode of pharmacological treatment increased in proportion to the increase in costs per episode of care.

Related to the issue of product selection are the explosive sales trajectories of new, “blockbuster” drugs. Much of the growth in prescription drug expenditure observed in recent years has been accounted for by a disproportionately small number of medications. Claims data from the United States from 2000-2001 has shown that half of the expenditure growth occurred in only nine categories of drugs, and half of the spending increase was driven by increases in the sales of 27 relatively new drugs [36]. Several studies have tried to isolate the cost-impact of “new” and “old” drugs [30,31,36,41,45,57]. For example, researchers from Brandeis University found that substitutions between new and old drugs accounted for 17.2 percent of total cost increases for those continuously
enrolled in with a private drug benefit manager from 1996 to 1999. Wallack and colleagues reported that, by 2000, drugs introduced after 1997 were almost twice as costly for private plan enrollees as those existing prior to 1997; these new drugs accounted for approximately one third of increased costs per enrollee. Recent analysis of public drug expenditures in Canada indicated that the sales growth of drugs during their first two years on the market accounts for between 19 and 44 percent of all cost escalation under provincial drug plans. Notwithstanding the often arbitrary distinctions between what constitutes “new” and what constitutes “old”, newer drugs often compete head-to-head with therapeutically similar products that have been on the market for some time. And while newer is not always better, newer is usually more expensive. A study using data for all prescription drug sales in BC found that, between 1996 and 2002, relatively new patented drugs deemed to be comparable to medicines brought to market prior to 1990 had accounted for 80 percent of expenditure growth in the province. Those new “me-too” drugs were an average of four times as expensive as older generic alternatives within the same therapeutic classes.

3.3.1 Therapeutic Choices and Pharmaceutical Policy
Pharmaceutical policy may address some of the cost-impact of therapeutic choices by addressing the financial incentives and information available to patients and prescribers at the time that these choices are made. Policy makers can use evidence-based coverage processes, such as the Common Drug Review, to inform decisions to pay for selected medicines. As US health economist Alan Garber has stated, the intention of evidence-based coverage is “to promote value in medical care by using reimbursement to favor the use of effective care and to avoid the use of ineffective care”. Thus, policies such as restricted listings and reference based pricing can encourage the selection of higher cost products only in cases where evidence suggests that such decisions are cost-effective. Policy makers can also help to ensure that therapeutic choices are based on best available evidence by providing patients and prescribers with balanced, evidence-based information at timely junctures (such as the clinical encounter) and in comprehensible formats.

3.4 “Price” Factors
“Price factors” are cost-drivers that increase the price of attaining pharmaceutical products. These factors include changes in the price of existing products as well as decisions that will generally influence the price of purchasing equivalent products without directly changing quantity or quality of treatment outcomes.
3.4.1 Retailer and Supplier
Choices concerning which manufacturers’ product to purchase and whether to purchase that from a
given retailer or by mail-order will influence the cost of a prescription. Some channels of distribution
offer lower costs per prescription filled than do others. Mail order pharmacies, for example, are
achieving gradual increases in market share. Driven in part by co-payment structures that give many
American patients incentive to use mail order pharmacies, mail order sales in the US doubled
between 1998 and 2001, increasing their share of total market sales from 9.8 to 12 percent \[^{36,61}\].
Notwithstanding this increase, the net impact of retailer choices on drug spending trends remains
small.

Generic drug use can also alter drug costs. When a prescription is written for a multi-source drug—
one that is available in both brand and generic forms—the patient may be free to choose which
suppliers’ product to purchase. Since the drug dispensed (in terms of chemical ingredient, strength,
and dosage form) does not change, switching from brand to generic drug products will generally
reduce costs without altering desired outcomes. Increased availability and consumption of generic
drugs has been shown to reduce the cost of drugs in many other settings \[^{23,26,45,51,62}\]. For example,
increased generic drug use per member of the Express Scripts sample of drug benefit plan enrollees
contributed to a 0.5 percent reduction in the cost per prescription between 2000 and 2001 \[^{45}\].
Similarly, over the period 1985 to 1999, increased rates of generic drug use by seniors in British
Columbia reduced per capita costs by approximately 20 percent relative to what they would have
been in the absence of generic competition \[^{51}\].

3.4.2 Prices
Changes in the actual price paid for individual drug products will have a direct effect regardless of
whether the products are branded or generic. A number of studies indicate that increasing
prescription drug prices are responsible for between approximately 5 percent to approximately 30
percent of total increases in prescription drug expenditures, depending on the population and years
in question \[^{26,27,31,36,41,42,44,46,51,58}\]. Compared to increases in utilization and changes in therapeutic
choices, however, the impact of price increases has been moderate. For example, in their study of
claims data from an insured American population over the years 1996-1999, researchers from
Brandeis University found that increased prices was the least important factor in prescription drug
expenditures increases, accounting for only 4.4 percent of the total increase and well behind the
effect of increases in the number of prescriptions per use (38.4 percent of the total expenditure
increase), increases in the duration of prescriptions (19 percent), and increases due to the
substitution of more expensive medications for older ones (17.2 percent) \[56\].

### 3.4.3 Price Factors and Pharmaceutical Policy

Despite the relatively modest impact that price changes have had on drug expenditures, any
increases in the price of unchanged products may be a concern to policymakers because, in a
competitive marketplace, the price of existing technologies typically falls over time. Prices fall due to
competitive pressures created when new technologies compete with old and as patents expire.

Computer processors illustrate how, in a competitive marketplace, advancing technology can place
downward pressure on the cost of existing technology. The cost of a given computer processor
(with a given processing speed) will fall precipitously as new processors come to market at much
faster speeds. Such competitive pricing forces do not characterize the pharmaceutical industry.

There is sufficient concentration of market power, particularly for brand-name patented products, to
enable firms in this sector to be price setters. Owing in part to the fact that insured patients and
prescribers may not consider relative prices of drugs used, pharmaceutical manufacturers compete
by differentiating their products from alternatives through marketing. With the exception of generic
manufactures, firms seldom compete by offering lower prices than their competitors. However,
pharmaceutical policy can encourage greater price competition though more intense price
negotiations, increased incentive to use generic alternatives, and even through price regulation. It has
long been acknowledged that creating a more price competitive marketplace today — one in which
consumers are given strong incentive to consider the relative value offered by time-tested generic
medicines available — should steer future drug research away from searching for yet another “me-
too” product within already crowded therapeutic classes toward more challenging but potentially
more rewarding research endeavours \[63\].

### 4 Conclusion

There is little doubt that pharmaceuticals are a critically important component of the health care
system. They have risen to prominence over the course of a half-century characterized by at least
three waves of significant change. Two eras of pharmaceutical revolution were characterized by
significant scientific innovation and therefore changes in the nature and extent of pharmaceutical treatments used by populations. These occurred in the postwar era and in the 1980s. The most recent revolution in the pharmaceutical marketplace has been one of changing patterns of pharmaceutical marketing and increases in the use of medicines from now long-since-established therapeutic categories aimed at managing chronic diseases.

Evidence concerning the determinants of drug spending suggests that, while a myriad of factors could be driving expenditures, most of the cost increases observed in recent years come from more frequent use of drugs to treat common conditions and from trends toward the selection of newer, more costly options for those treatments. Aging and the rising prevalence of chronic diseases (such as diabetes) contribute to drug spending, but explain only a minority of recent trends. Most of the increase is driven by changing treatment patterns and consumer expectations—irrespective of the age and health status of patients treated. Thus, to the extent that policy should focus on the impact of demographic change, it is well advised that it focus on ensuring that the aging population has ready access to accurate and balanced information about the pros and cons of treatments, particularly those for chronic diseases increasingly being treated pharmacologically. Perhaps the most pressing regulatory and policy issue related to this concerns maintaining Canada’s prohibition of advertising targeted directly at patients.

Because nearly half of drug expenditure trends are due to increased use of drug treatment, and most of that increased use is due to poly-therapy (people taking more treatments rather than more people taking just one treatment), it is paramount that policy makers invest in systems to ensure that drug use is appropriate. Access to appropriate medicines should be promoted through coverage policies that eliminate barriers and through systems that monitor drug use and related outcomes. Electronic prescribing systems will be particularly important insofar as they have potential to provide practitioners data about all medicines a patient is receiving along with unbiased information about recommended therapies for any additional diagnoses needing pharmacologic management. As yet, Canada lags behind comparable countries in the development and use of electronic medical records and prescribing aids [64]. This situation seems unacceptable given the billions of dollars spent each year on pharmaceuticals and the very significant potential benefits and risks associated with pharmaceutical use.
Much of the increase in drug spending is likely attended by improvements in health outcomes. However, third-party payment for prescription drugs, combined with therapeutic information that is often incomplete, imperfect and asymmetric (e.g., sellers know more than buyers, prescribers more than patients), implies that pharmaceutical consumption patterns (and firm revenues) will not always reflect value for money from a societal perspective. There may be drug utilization and product selection decisions that reflect under-investment as well as consumption patterns that reflect over-investment. The use of newer, relatively expensive patented drugs that are not superior to older therapeutic options is a particular policy concern. In addition to the fact that spending more for similar treatments is wasteful, newer medicines come to market with limited data regarding overall safety and efficacy. Information about how drugs work within ‘real world’ populations accumulates over time (and ideally with concerted efforts of professionals, researchers and policy makers). Older medicines can often be considered ‘tried and true’ when compared to newer products for which clinical data are limited. As such, regulators and payers should take a cautionary approach toward licensing and paying for new medicines in well-established therapeutic categories.

Utilizing the purchasing power of a public drug plan may help to bring greater price competition to therapeutic markets wherein there are many drug options. Such policy approaches can save significant sums: it is estimated that Canadian prices in leading therapeutic markets could fall by 50 percent or more through the use of organized purchasing policies. The use of these policies would generate savings that could be used to expand drug coverage into other therapeutic areas or to populations not currently receiving public benefit. Moreover, competitive, value-based pricing in the pharmaceutical industry would reduce the wasteful investments in imitative R&D required to bring ‘me-too’ products to well established therapeutic areas; it would also reduce the wasteful investment in marketing activities that are designed only to build differentiate such products through brand recognition and loyalty.

It is perhaps ironic that the component of health care in which private payment plays the most significant role is also the component in which costs are rising most rapidly without assurance that value for money is being attained. This may be because a “free market” in health care can result in sub-optimal outcomes. Public payers for health services—whether they be medical, hospital, or pharmaceutical care—can serve as an intermediary for patients. They can act as an “agent” for the patient, responsible for monitoring quality and managing prices and utilization. Provincial
governments, for example, not only pay for medical services on behalf of patients but also negotiate the terms of such payments on behalf of patients. Similarly, while public drug plans have evolved around the world to promote access to medicines and to reduce both the risks and inequities of financial burdens associated with ill health, they can also serve a “pharmaceutical management” role—promoting appropriate use, negotiating prices with suppliers, and otherwise managing the investment made by society in pharmaceutical care.

Owing to Canada’s fragmented (or pluralist) private/public payment for pharmaceutical products, there are fewer opportunities for pharmaceutical management strategies to be employed here—when compared to our medical and hospital systems or when compared to drug coverage systems in other countries, like the UK, Australia or New Zealand. This clearly suggests that there would be benefits from a universal, comprehensive and evidence-based drug benefit policy in Canada. Such a policy is, however, likely to be difficult to adopt, largely because concentrated private interests currently benefit from the disorganized status quo in Canadian pharmacare. The case for public pharmacare remains strong and should not be abandoned due to lack of leadership to champion the collective benefits of such. However, while we await such leadership, the very least that should be expected of Canadian policy makers is a concerted investment in monitoring who is using medicines, for what purposes, and to what effect on their health and health services use. Such information should immediately be integrated into electronic medical records and electronic prescribing systems to ensure that patients are getting the right drugs at the right times and in the right combination. Moreover, such information could inform policy aimed at ensuring that return on Canada’s investment in pharmaceutical care generates health outcomes at least as great as could be obtained by spending similar amounts on other inputs into the health of the population.
5 References


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