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How Sustainable is Medicare?

A Closer Look at Aging, Technology and Other Cost Drivers in Canada's Health Care System

By Marc Lee

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Summary

A popular myth is that an aging population will render the public health care system unsustainable. This paper contributes to a public dialogue on health care sustainability by providing a better understanding of cost pressures in public health care and what they mean for the future in terms of sustainability.

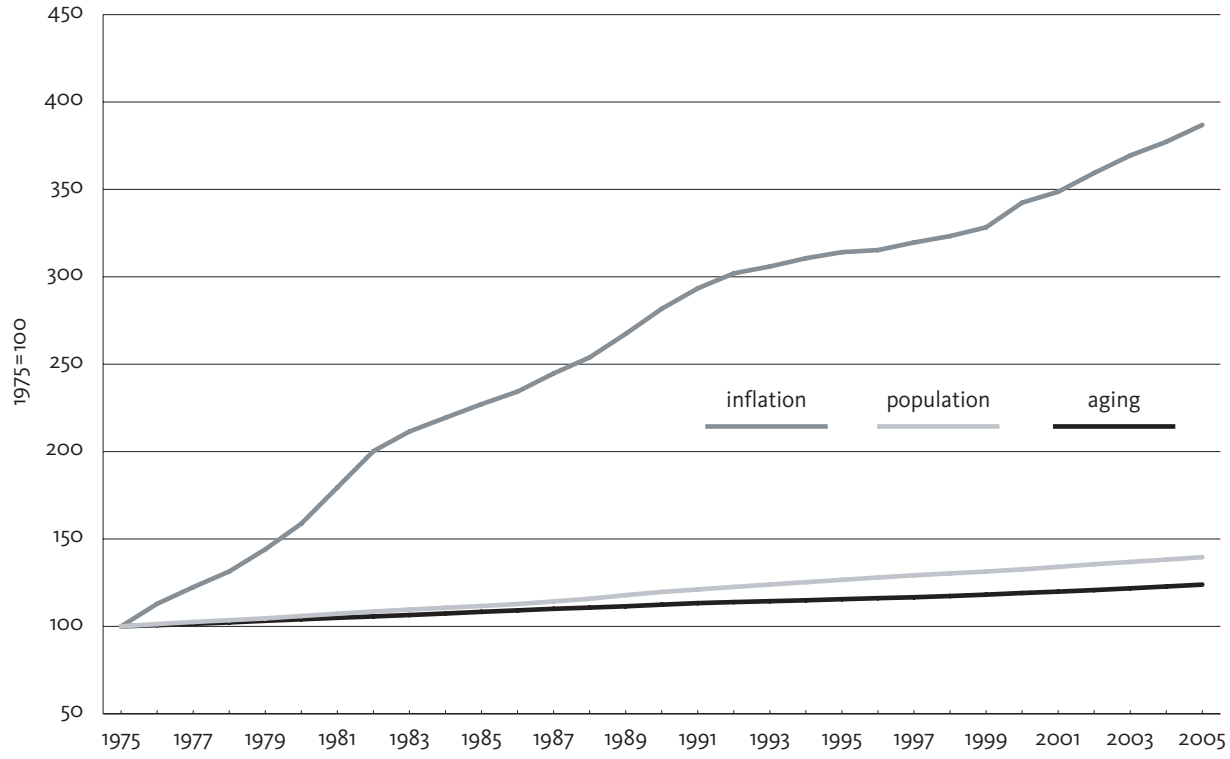
This paper finds that population aging, in and of itself, is but a small contributor to rising cost pressures in the health care system. Based on current projections there is little to suggest a demographic time-bomb about to go off. Instead, the real challenge for financing the health care system is advances in technological possibilities, broadly defined to include pharmaceutical drugs, new surgical techniques, new diagnostic and imaging technologies, and end-of-life care. These challenges can be addressed most efficiently and equitably in the context of a public system.

This paper finds that:

- Population aging has been a cost driver, but a very small one compared to other sources. The impact of population aging was 0.8% per year over the past decade. This is consistent with other studies of population aging.
- Inflation (as reflected in salary increases and higher cost of supplies) has been the biggest cost driver over the past decade, with increases averaging 2.5% per year, followed by population growth at 1.0% per year.
- The expansion (or "enrichment") of health care services over time (such as new technologies, long-term care, home care and pharmaceutical drugs) is also an important factor. The average Canadian receives more than one and a half times the health care services as his or her equivalent three decades ago.
- Research shows that the cost of dying is very high — one-third to one-half of a typical person's health care expenditures happen in the final year of life.

The paper then projects future health care costs based on the key cost drivers and situates those estimates in the context of economic growth. To accommodate future population growth, aging,

Comparison of cost drivers, 1975–2006



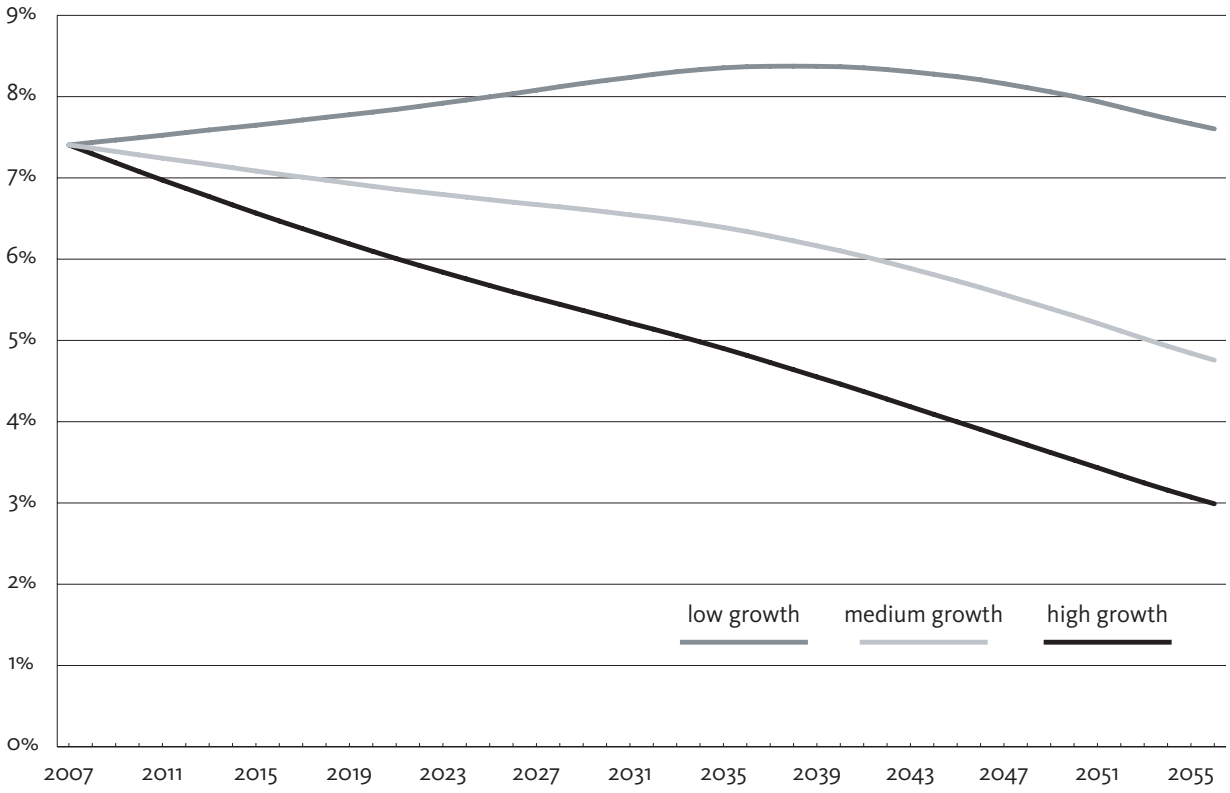
and inflation, health care expenditures must rise by 4.4% per year (in the medium term); that is, simply to stay at the same level of services. For three scenarios of economic growth, we find that population aging is manageable if we have reasonable rates of economic growth:

- In the high-growth scenario (6% nominal GDP growth per year), public health expenditures fall from 7.4% of GDP in 2006 to 3.0% in 2056.
- In the medium-growth scenario (5% annual growth), they fall to 4.8% of GDP by 2056.
- Even if the economy were to fare poorly by historical standards (4% annual growth), existing levels of service could be maintained with only a small increase in health care expenditures relative to GDP over the next three decades. Health care expenditures rise to 8.4% of GDP by 2038, when they hit their peak. After this, as population pressures ease, they fall back to 7.6% by 2056.

By simply dedicating the *same proportio*n of new economic output to health care — even after accounting for population growth, aging and health care inflation — we would also have scope for some modest expansion of services. Put differently, if economic growth rates in the future are consistent with those over the past decade (average of 5.6%) or two (average of 5.4%), we can easily maintain the existing level of public health care services.

The paper models two additional scenarios where the suite of health care services is enriched in the context of medium economic growth (5%

Public Health Care Expenditures Relative to GDP: Three Scenarios



annual growth in nominal GDP). The historical average enrichment rate is just under 2% per year over the 1975 to 2006 period. After the same adjustments for population growth, aging and inflation, the paper finds:

- A 1% annual enrichment rate would require an increase in public health care expenditures from 7.4% of GDP in 2006 to a peak of 8.5% by 2038, then falling back to 7.7% by 2056. It would enable the average Canadian to enjoy 63% more health care services by 2056.
- A 2% annual enrichment rate would require public health care expenditures to grow to 12.6% of GDP by 2056, but would provide 164% more health care services per person.

Thus, greater expansion or enrichment of public health care in the future is possible, but depends on societal willingness to pay more for more and better services, technologies and care.

The real challenge for future health care expenditures comes not from an aging population but the costs associated with a wide range of new technological interventions:

- Waiting lists remain an issue, in part because technology has increased the number of people who can avail themselves of such surgeries. Compared to 1990, an 80-year-old today is twice as likely to have a knee replacement, cataract surgery, or coronary bypass.
- Increases in the price of prescription drugs and shifts toward more expensive drugs are a large part of the growth of drug

expenditures, but have not necessarily been accompanied by improved health care outcomes. Cost efficiencies could be gained through a national pharmacare program.

- Expensive end-of-life treatments raise ethical dilemmas, particularly when they prolong life by days or weeks, but do little to restore health or enhance quality of life. Greater use of palliative care and "advanced health directives" and "representation agreements" may point to a future where the health care costs of dying are less than today.
- A thorough process of health technology assessment is required to ensure that new technologies provide benefits in accordance with their costs.

The good news is that the challenges facing public health care are not demographic factors beyond our control, but technological issues that, while profound, are suitable to a public process that is well within our control. In other words, like every other policy area, we need to make choices, and to do that we need a healthy democratic debate.

Introduction

A popular myth is that the public health care system is unsustainable. The health care apocalypse goes something like this: Health care costs are already spiraling out of control, and when those in the baby boom generation start to hit their senior years *en masse* the costs of providing health care will surely lead to the collapse of the public system. The alternative, we are told, is to allow much greater private provision of services and private health insurance.

This doomsday scenario sounds plausible because it is indeed the case that the population is getting older. In 2007, seniors (65+) account for 13.4% of the population. This share will be slightly more than double a half-century from now (27.1% in 2056). However, it should be noted that this change will happen gradually over time, and that the number of children relative to the working age population will decline modestly over this period (thereby reducing pressures on education and related children's expenditures). After about 2030, the demographic pressure begins to ease: the population share of 65–69 year olds peaks in 2029, then starts to decline, offsetting some of the increase in older groups; older groups peak at subsequently later years.

But while the demographic bulge is very real, does this in fact mean that public health care is unsustainable? This paper considers the evidence by reviewing the relative impacts of population aging and other cost drivers, and projecting health care expenditures forward based on the latest demographic estimates. It looks only at public health care expenditures (about 70% of total health care expenditures in Canada) because these are what our taxes pay for.

The paper finds that population aging is a cost driver in the system, but a very small one compared to other sources, and is easily manageable assuming reasonable economic growth. The real challenge for financing the public health care system is advances in technological possibilities, broadly defined to include pharmaceutical drugs (the fastest growing component of health care expenditures), new surgical techniques, new diagnostic and imaging technologies, and end-of-life care. Over the medium- to long-term, health care faces the prospect of numerous new innovations related to genetics and biotechnology.

These developments may or may not lead to better health outcomes, but they do tend to

› Health Care and Budgets: Beware of Deceptive Statistics

Some highly misleading statistics on public health care come from an annual report by the Fraser Institute, who have long argued for privatization of public health care. The 2006 report, *Paying More, Getting Less: Measuring the Sustainability of Public Health Insurance in Canada*, concludes, to no one's surprise, that public health care is unsustainable.

In the accompanying press release it is claimed that "Provincial government spending on health care will consume more than half of total revenue from all sources by the year 2020 and all revenue by 2050 in six out of 10 provinces if current trends continue."[1]

This scary picture is mistaken for a number of reasons. Health care spending has had its ebbs and flows over the past two decades. Beginning in the early 1990s, funding was slowed, then cut back in the mid-1990s, all part of the "war on the deficit" zealously advocated by the Fraser Institute, among others. By the late 1990s, when federal surpluses became impossible to hide, a series of "new deals" to save public health were negotiated between the federal and provincial governments.

The Fraser Institute projects forward this period when health care spending was recovering, and neglects the years prior to it when restraint was the order of the day. The other part of the equation is that education, social services, and other policy areas have not had sufficient funding increases. Education funding has been held to very small annual increases, while social services and other areas of the budget have seen devastating cuts in many provinces. Ultimately, the Fraser Institute is measuring the wrong thing — what matters is the share of our total income (or GDP) we spend on health care, not the share of the provincial budget.

This disingenuous tactic has unfortunately been remarkably successful. The BC government, who have been keen to press for private health care options wherever possible, adopted the Fraser Institute's framing of sustainability in launching a public Conversation on Health in September 2006. Their statistics went way beyond the Fraser Institute approach and were tortured to reach a confession that by 2017 health care will consume over 70% of the provincial budget.

If we are truly concerned about health care spending rising as a share of provincial budgets, a simpler option would be to enhance funding for the non-health care areas of those budgets. Given large federal and provincial surpluses, it is imperative that funding be increased to fight poverty, build affordable housing, address urban infrastructure issues, and strengthen the education system. These expenditures would lead to stabilizing, or even reduction, of the share of funding going to health care.

make health care more expensive. For example, technology applied at the end of life can add substantially to costs with minimal improvements in either length or quality of life. Technological possibilities thus raise some important questions about how a (largely) public system sets priorities when the sky is the limit for any particular ailment. These questions are ultimately ethical in nature and deserve a full democratic discussion, using evidence to evaluate the benefits of certain interventions relative to their costs.

The good news is that the challenges facing public health care are not demographic time bombs beyond our control, but technological issues that, while profound, are suitable to a public process that is well within our control. It is not the number of seniors that is the problem but finding a rational framework to ensure that spending per senior is the most effective it can be.

Population Aging and Health Expenditures

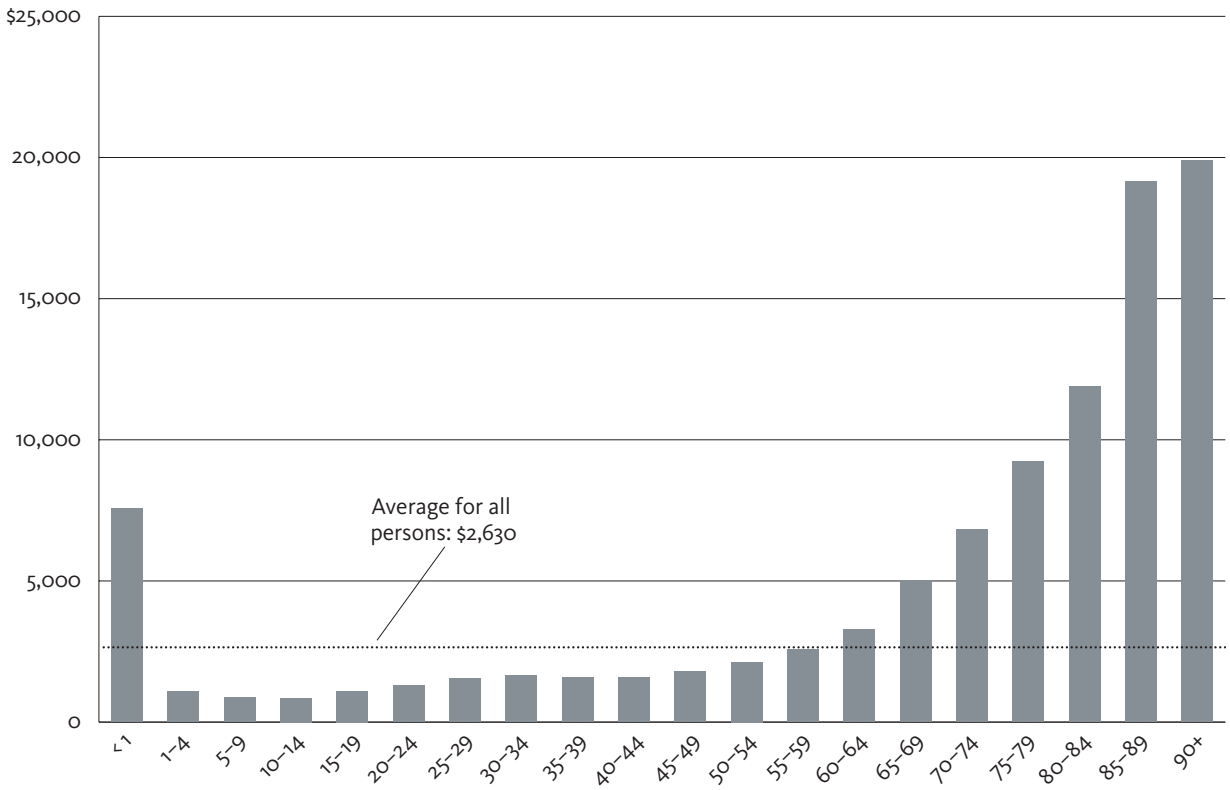
In 2004, we spent an average of $2,630 per person on public health care in Canada, including costs of physician and hospital services, nursing home care, home support services, public health measures, and administration. But as Figure 1 shows, the amount varies depending on age group. Per person expenditures rise from youth to old age, but are still below average for those under age 60 (one exception is infants under age one). Above age 60 expenditures increase sharply, to just under $20,000 per person for those over age 90. Another way of looking at this is the share of total expenditures going to seniors. In 2004, seniors over age 65 accounted for 13% of the population, but were responsible for 44% of the total public health care budget.[2]

But does this mean that the aging of Canada's population will bring the system to its artificial knees? Some caution is urged because this age-utilization pattern may be explained by the fact that one-third to one-half of a typical person's health care expenditures happen in the final year of life. That is, the pattern is not entirely due to population aging ("the cost of living"), but due to higher rates of mortality as the age group gets older ("the cost of dying").[3]

Research is not conclusive on this point: both factors are likely at play. If we exclude people not in their last year of life, health care expenditures rise from an average of $362 per year for men, and $429 for women, under age 65 to an average of $666 for men and $545 for women over age 65 (with little variation within each group). But costs for all ages *in the final year of life* are $29,181 for men and $50,956 for women — or between 50 and 100 times more than expenditures on those who are not in their final year of life.[4]

The implication for future health care expenditures is different if high costs of dying are predominant. If expenditures increase as a matter of course as people get older, there will be upward cost pressures associated with an aging population. But if people live longer and healthier lives, and the big costs are really associated with dying, the real issues relate to end-of-life care options. Indeed, there are research findings that the baby boom generation has a lower prevalence of certain health conditions than previous generations, so they are likely to be healthier seniors as well.[5] We return to this topic later in the context of expensive end-of-life technologies.

FIGURE 1 **Expenditures Per Capita By Age Group**



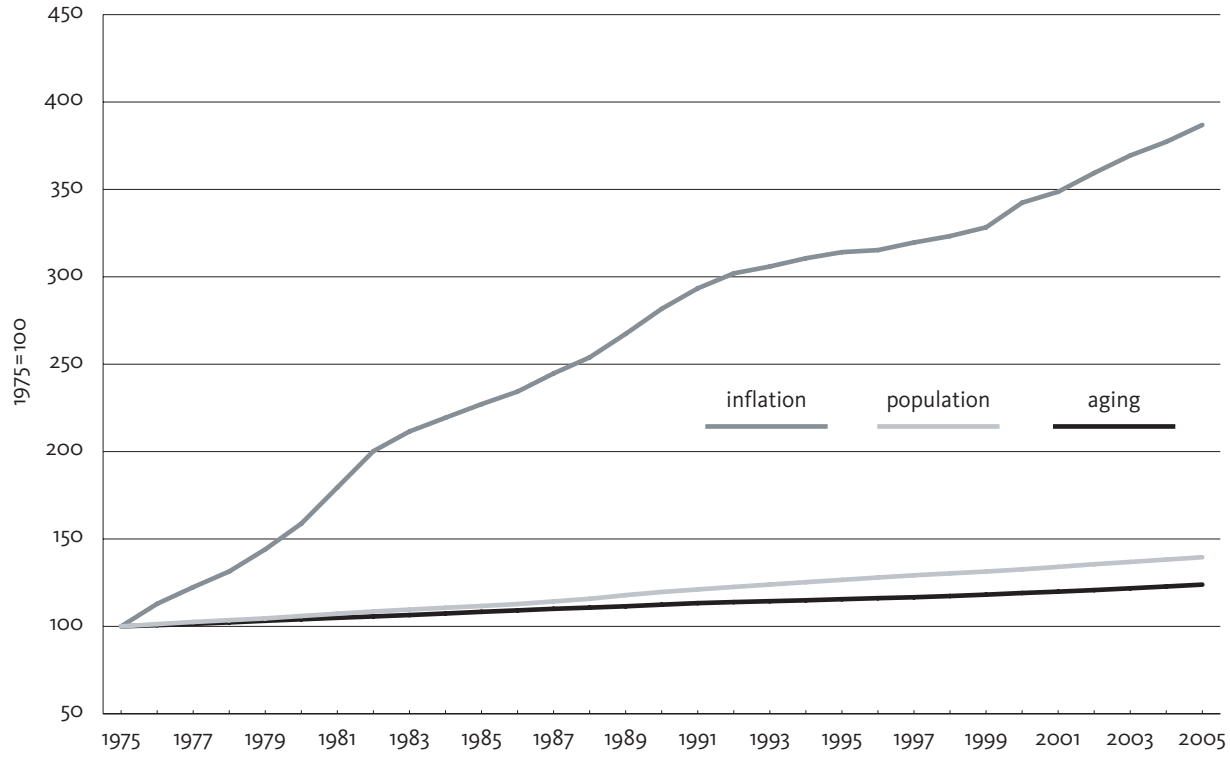
Population aging must be viewed as one of several factors behind rising health care expenditures. Other cost drivers include:

- *Inflation in health care costs*, the ongoing rise in the "price" of purchasing the same level of health care services. This includes the rising salaries of professionals and other workers, higher costs for supplies and equipment, and so on.
- *Increases in population size*, since the health care budget will rise in accordance with a bigger population. If the population doubles, we should expect health care expenditures to roughly double in order to maintain the same level of service.
- *The "enrichment" or expansion of health care services,* such as the addition of new surgical procedures or new pharmaceuticals, or the expansion of public coverage to additional health care sectors.[6]

Figures 2 and 3 show these factors visually. More detail on how these figures are derived can be found in the Technical Appendix. Leaving enrichment aside for the moment, Figure 2 isolates the impact of inflation, population growth, and aging for the 1975 to 2006 period. The biggest cost driver is inflation, with increases averaging 9.5% per year.[7] This covers a period of high inflation from the mid-1970s to mid-1980s. If we look just at the 1996 to 2006 period, the impact of inflation is less, at 2.5% per year.

Population growth is responsible for increases of 1.3% per year over the 1975 to 2006 period, and 1.0% per year over the 1996 to 2006 period. Increases in population do not necessarily affect

FIGURE 2 **Comparison of cost drivers, 1975–2006**



sustainability as they are generally offset by increases in economic activity, and thus growth of tax revenues to fund services.

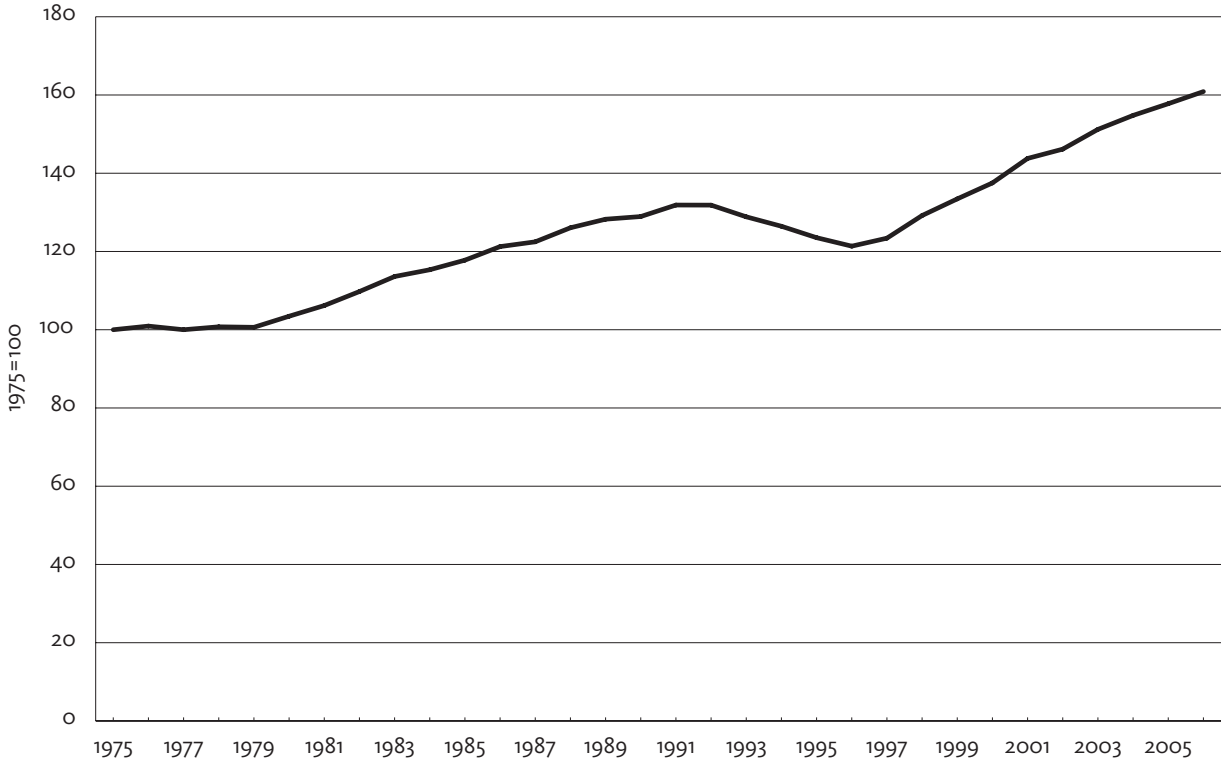
Population aging is the smallest factor of the three, responsible for increases of only 0.8% per year between 1975 and 2006 (and 1996 to 2006, as well). Projecting cost pressures forward, aging adds just under 1% per year to the cost of maintaining the status quo of health care services. These numbers are reassuring in that the magnitude is quite small. This result is consistent with a number of studies on the fiscal implications of population aging.[8]

If public health expenditures are adjusted for population growth, aging, and inflation, what is left is "enrichment." Figure 3 shows the enrichment of health care services going back to 1975.[9] There is a nearly continual expansion of health care services in Canada over the past three decades, albeit with a period of restraint in the early 1990s. The total increase in spending due to enrichment in 2005 is 61% above 1975 levels — that is, the average Canadian receives more than one and a half times the health care services as his or her equivalent three decades ago.

A caution on interpretation: enrichment is beneficial in the sense of more nursing homes, more comprehensive drug coverage, and new technologies. But health care services are not a typical economic good; rather, they are a response to ill health. Thus, more "health care services" are only better to the extent that they lead to improved health outcomes. Health analysts have developed a concept of quality-adjusted life years (QALY) as an objective measure of health gains.

In the late 1970s and 1980s, the expansion of public coverage of health care was in nursing

FIGURE 3 **Public Health Care Enrichment Index, 1975–2006**



homes and public provision of home support services. This built on the 1960s advent of public health insurance for hospitals and then doctor services. Since the early 1990s, however, there has been relatively little change in the scope of coverage. This suggests that enrichment seen in the late-1980s and late-1990s was about changes in the mix of services provided, and most likely represents the introduction of new surgical techniques, new pharmaceutical drugs, and other technological developments.

Is there a Looming Demographic Crisis?

Looking back, population aging has not been much of a concern. But the future challenge is the aging of the baby boom cohort. Using projections from Statistics Canada about population growth and aging, and estimates of health care inflation,[10] we can forecast health care costs to 2056 (assuming no enrichment of health care services). See the Technical Appendix for a more detailed look at how this is done.

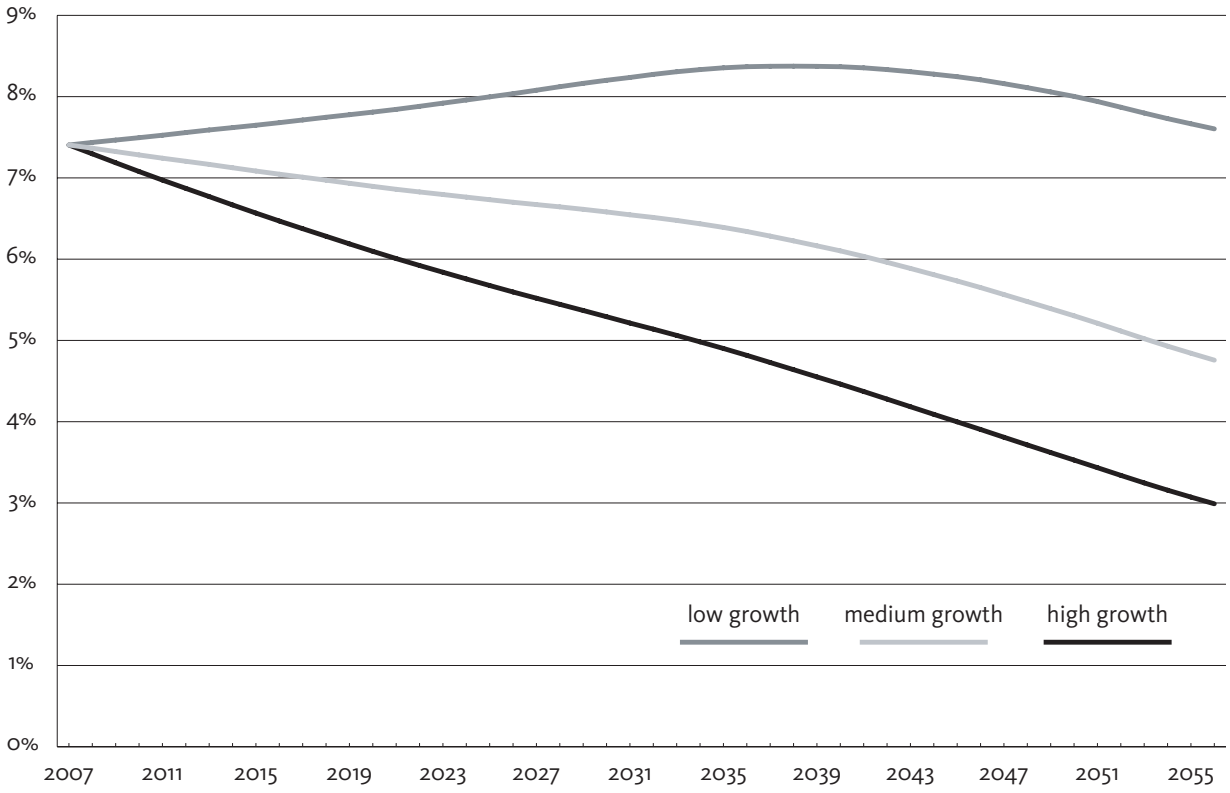
The combination of population growth, aging, and inflation amount to an annual increase in health care budgets of 4.4% per year (over the medium term) in order to stay at the same level of health services. This means all 85-year-olds in the future, though larger in numbers, are serviced at the same expenditure levels as today's 85-year-olds. By the mid-2030s, population aging pressures being to recede and the minimum annual increase falls to 3.1% by the early 2050s Based on these projections, we can expect total public health care spending to rise sevenfold by 2056.[11] On its own, this multiple is meaningless.

To put the numbers into context, we also estimate changes in total income, or Gross Domestic Product (GDP), to see what proportion health care will compose. Canada's nominal GDP growth rate averaged 5.4% over the past two decades and 5.6% over the past decade. Nominal growth rates are even higher over longer stretches of time, due to higher rates of inflation in the 1970s and 1980s.[12]

For our projections, three scenarios of GDP growth are considered: low growth of 4% per year (real GDP growth of 2% per year, plus 2% annual inflation, the middle of the Bank of Canada's target range), medium growth of 5% (3% real growth plus 2% inflation), and high growth of 6% (4% real growth plus 2% inflation). Given the historical rates above, the medium growth scenario is a conservative one.

Figure 4 presents the results. In the high growth scenario, public health care expenditures-to-GDP falls from the 2006 level of 7.4% to 3.0% by 2056. In the middle scenario, health care expenditures-to-GDP also falls, to 4.8% by 2056. Only in the low-growth scenario does the expenditure-to-GDP ratio rise, to 8.4% in 2038, but then falls thereafter back to 7.6% in 2056 as demographic pressures ease. But even at the peak, it is only one percentage point of GDP higher (put another way, it is much smaller than the impact of tax cuts in recent years).

FIGURE 4 **Public Health Care Expenditures Relative to GDP: Three Scenarios**

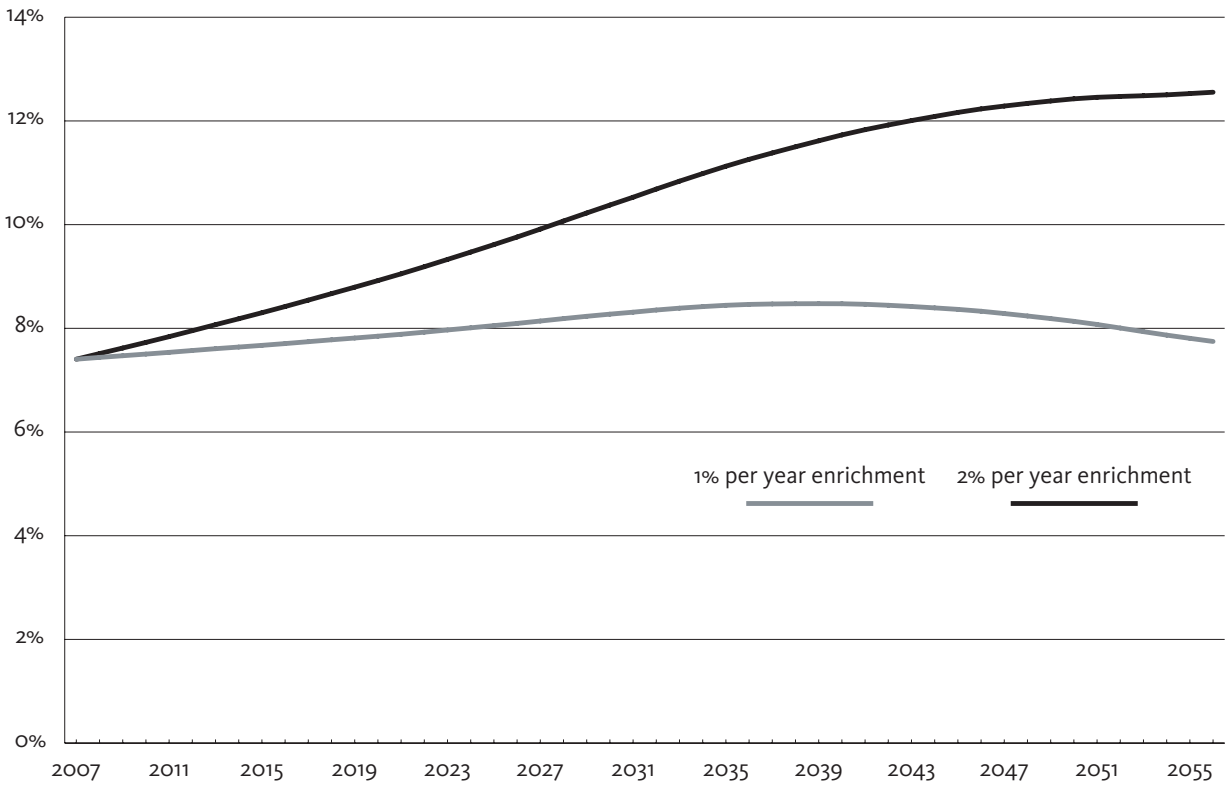


Thus, even if the economy were to fare poorly by historical standards, existing levels of service could be maintained without much difficulty even though the population is growing and aging. For the medium- and high-growth scenarios, this implies that by simply dedicating the same proportion of new economic output to health care we could not only cover the rising costs associated with population growth and aging, and the rising costs of providing health care services, but we would also have scope for some expansion of health care services. Future enrichment could include expansion of long-term care services, dental coverage, new surgical procedures, or universal, "first-dollar" public drug coverage. It is also reasonable to expect that health care resources will shift to reflect a more efficient allocation relative to the needs of an older population (such as more home care services, estimated to cost one-fifth as much as acute care services, and residential care facilities[13]).

Two additional scenarios are worth noting, each assuming medium economic growth plus enrichment of health care services of 1% and 2% per year. To put these rates in context, the historical average enrichment just under 2% per year over the 1975 to 2006 period. At a 1% annual enrichment rate, the average Canadian would enjoy 63% more health care services by 2056, and under a 2% annual rate, 164% more health care services by 2031. Such small annual changes, because of compounded growth, can accumulate to large changes over the course of decades.

There is a price to pay for expanding or enriching of services in these two scenarios. At a 1% annual rate, health expenditures rise as a share of GDP, though very gradually, from the current 7.4% to 8.5% by 2056. The challenge is greater with an

FIGURE 5 **Two scenarios with medium growth and enrichment**



enrichment rate of 2%, as expenditures increase to 12.6% of GDP by 2031. This enrichment growth rate is slightly larger than the historical experience of the past 30 years, during which time the system was greatly expanded.

Nonetheless, these thought experiments enable us to have a more rational sense of what is possible at what cost. To meet the 1% enrichment objective would require an additional penny per dollar of new income generated in Canada. A 2% enrichment rate might be dismissed for its cost but ultimately is simply a question of whether we are willing to pay to expand the scope of health care services. Much of this would simply shift health care costs from individuals (and private insurance) to the public sector. Finally, it is worth reiterating that the demographic pressures arising from seniors begins to abate after 2031.

The key conclusion is that demographic trends are not the looming disaster they are often made out to be in the media. We have lots of time to gradually respond to the challenges posed by an aging population, including a restructuring of health care services (such as home care and residential care) more consistent with an older population, and ideally a stronger emphasis on prevention and population health that will reduce the overall incidence of ill health. We can maintain existing levels of service without any difficulty, and can handle modest enrichment of services. Higher levels of enrichment are possible, but would likely depend on societal willingness to pay more for better services and care.

The Realm of the Possible

The real challenge for future health care expenditures comes not from an aging population, but the amount of spending per person as represented by a wide range of new technological interventions. Health care, as a discipline, is intimately intertwined with issues of technology and knowledge. In its modern form, health care is at most a hundred years old, built upon advances in knowledge in biology and related fields. As scientific know-how increases, there are likely to be more and more new possibilities available to treat medical conditions.

Key areas of technological development include: diagnostic imaging; telehealth; biotechnology; vaccines; pharmaceuticals; medical implants and external devices; genetic screening and gene therapy; surgical techniques; and organ transplants and grafts. While it is plausible that some of these innovations will save money, the universe of innovation that is possible in health care, together with a persistent demand for cures among the population, suggest that technology will be a cost driver.

Health economist Shelly Glied argues that the introduction and diffusion of new technology in health care is the main determinant of cost increases over the long term. There are two reasons cited:

> First, improvements in the health outcomes produced by a medical service mean that more patients can expect to obtain health benefits from the technology.... Second, innovations in medical care, especially cost-reducing innovations, often reduce the invasiveness and intensity of the treatment itself and thus reduce the pain, discomfort or time associated with treating a particular condition, even when outcomes do not improve....[which] also expands the size of the market.[14]

If budgets were unlimited and merely reflected the decisions by practitioners to use technology, the cost implications could be in excess of enrichment estimates made in the previous section. It is also very likely that new innovations would have diminishing returns in terms of improvement of health outcomes per dollar of new spending. In a constrained budget environment, there is a risk that new technological innovations will crowd out other services. We return to the issue of how we address these challenges in the

context of a public system, but first a few illustrations are in order.[15]

New Surgical Techniques

Lengthy waiting lists tend to be concentrated in a few procedures, such as orthopaedics (especially, knee and hip replacements) and cataracts, where the demand for these procedures has increased at a rate far beyond that of other surgical areas, and far beyond what would be expected from population growth and aging alone.[16] Due to less invasive surgical techniques, knee and hip replacements that were more problematic in the past are now routine and relieve chronic suffering on the part of patients (even if this means time spent on a wait list).

For example, the BC Ministry of Health reports that, compared to 1990/91, an 80-year-old today is twice as likely to have a knee replacement, cataract surgery, or a coronary bypass, and eight times as likely to have an angioplasty. Across a number of key areas, BC is performing substantially more surgeries than would result from population growth or aging alone. Between 2000/01 and 2005/06:

- total angioplasties performed are up 62%;
- knee replacements up 84%;
- hip replacements up 47%; and,
- cataract surgeries up 33%.

Population growth over this timeframe was just under 5%. In the case of knee surgeries, BC now performs almost three times as many surgeries as in 1990/91 (3,600 in 2003/04 and 1,300 in 1990/91), and most of this is due to performing more surgeries per capita compared to population growth or aging.[17] Despite the increase in surgeries, waiting lists are still an issue because technology has increased demand, or the number of people who can avail themselves of such surgeries. These trends drive oft-cited challenges in getting operating room time.

In response to these technology-driven outcomes, the above areas are precisely those where private services are making an incursion. Less invasive surgeries mean that they can be performed on a day-surgery basis, and do not require all of the overhead associated with a hospital. Private clinics have sprung up, such as the noted Cambie Surgery Clinic (run by new Canadian Medical Association President Brian Day), along with much rhetoric about how much more efficient private clinics are.

Specialized day surgery clinics may make good economic sense, but there is no reason why they only can be realized in a private sector context. Experience in many jurisdictions around Canada finds that the same efficiencies and cost savings can also be realized in the public sector, and other techniques can be brought to bear that greatly reduce surgical wait times in the public system.[18]

Diagnostics and Imaging

The number of diagnostic machines and scans performed in Canada has increased dramatically. The Canadian Institute for Health Information (CIHI) estimates annual growth of between 9 and 14% in the number of Computed Tomography (CT) and Magnetic Resonance Imaging (MRI) scans. In addition, Positive Emission Tomography (PET) scans have added a new dimension in diagnostic imaging possibilities. Growth has come at paces much faster than population growth or aging would require, but like new surgical techniques, demand for these services has grown even faster, leading to a persistent issue of wait times for diagnostics.[19]

While these new possibilities in assessing disease are, in many cases, a positive development, they are also another case of technology driving demand for services previously unavailable or much harder to access. The potential for a whole new suite of genetic testing and screening technologies raises additional important ethical

as well as economic and health issues about how the public system needs to address technological advances. A caution is that while such technological developments will almost surely be more costly, they may not provide more information than older technologies, and may be used more widely than certain cases that would actually benefit most from the technology.

A related innovation in this area is the development of 3D ultrasound technology that produces higher resolution images for monitoring fetal development (among other possibilities). Most parents would presumably want a high-resolution, 3D image of their baby-to-be over a traditional ultrasound, but it is not self-evident that, in most situations, 3D imaging would provide sufficient additional information to justify the higher cost.

Pharmaceutical Drugs

Drugs are the fastest growing part of health care, rising from 9.6% of total (public and private) health care expenditures in 1985 to 17.7% in 2004. Public coverage in 2006 paid for 45% of total prescription drug spending in Canada.[20] The rising cost of drugs overall is accounted for by both increased utilization of drugs — drug therapies are more prevalent and new developments can treat ailments that could not previously be treated — as well as the increasing cost of the drugs themselves due to new drugs under patent entering the market.[21] Increases in the price of prescription drugs and changes toward more expensive drugs are a large part of the growth of drug expenditures, but have not necessarily been accompanied by improved health care outcomes.[22] Another culprit could be over-prescriptions and inappropriate prescriptions on the part of doctors, the latter of which is one source of costly hospital admissions.[23]

Nation-wide, drugs and medical supplies have been increasing as a share of hospital budgets.[24] In the case of drugs this is considerably less than the increase in drugs as a share of public health expenditures overall. This latter point may be the result of much lower costs of acquiring and dispensing drugs in hospitals compared to pharmacies. Nonetheless, the combination of higher drug costs and technology costs overall may mean hospitals are being squeezed in other aspects of their budgets by more than is evident from hospital spending numbers. McGregor and Brophy (2005) make the case that these new technological possibilities have enabled enhanced services to be provided in hospitals, and this has come at the expense of other aspects of hospital budgets. While this is a compelling explanation, macro data on the impact of drugs and technology on hospital budgets are hard to come by.

Moving to first-dollar public coverage through a national Pharmacare program would deepen incentives for cost-control. Dr Joel Lexchin estimates that a national Pharmacare program would cost between $3 billion and $4 billion more than existing public expenditures.[25] A 2006 progress report to Health Ministers under the National Pharmaceutical Strategy set additional costs to the public sector for a catastrophic drug coverage plan as ranging between $1 billion and $4 billion depending on the formula used.[26]

As part of a coordinated national plan, numerous policy initiatives could be implemented to better control drug costs. The federal government could restore compulsory licensing to enable greater generic drug production for the Canadian market, enhance funding for new drug development that would be put in the public domain, engage in bulk purchasing, and determine a common formulary that would be covered in all provinces. It could also limit the challenges posed by direct-to-consumer advertising of drugs.[27]

Finally, BC's reference drug program has been successful in containing costs for a very limited number of drug categories by paying only for the lowest cost drug that is therapeutically equivalent. Annual savings as a result of the program

are in the $24 million to $42 million range from the time the program was introduced in 1995 up to the end of the decade.[28]

End-of-Life Care

As pointed out earlier, a large proportion of health care expenditures occur in the last year of life. What is important is the impact on the margin of additional health care dollars spent. For example, billions could disappear into extremely expensive end-of-life treatments that prolong life by days or weeks, but do little to restore health or enhance quality of life.

This raises some deep ethical questions about opportunity costs. This money might be better spent, from a population perspective, on prevention and public health measures, or on public dental and eye care, or expanding public coverage of pharmaceuticals or home support services.

It is not obvious that expensive end-of-life treatments are what are desired by dying seniors nor that such interventions improve quality of life. In contrast, palliative care options have been suggested that assist people to die with dignity at home or in a home-like setting rather than in hospital. The Canadian Hospice Palliative Care Association (2001:3) comments:

> Experience shows, however, that when people die within a system that provides good hospice palliative care, the patient, family members and health professionals express a high degree of satisfaction. Leading research…found that patients experienced significant improvements in their physical and psychological well-being within one week of being admitted to a palliative care unit. Despite approaching death, improved quality of life was experienced.

Interventions related to end-of-life care include "advanced care directives" and "representation agreements" that allow older people and their families to choose a suitable level of medical intervention if serious illness develops, may point to a future where the health care costs of dying are less than they are today.[29] The disability community has been critical of advanced care directives because it relies on instructions made in the past that may not be relevant to a particular situation, or that may be out of date. They prefer the representation agreement approach, where a legal document names a trusted person to make personal and health care decisions on their behalf.[30]

Technology: Who Decides?

The increasing cost of new technological interventions must be weighed against their benefits. Not every new technology will be justified, and there may be significantly diminishing returns to advances in technology. This discussion quickly becomes one of ethics: How much does society expend on an individual's care when the sky is the limit? This paper cannot answer that important question, one deserving of thorough public discussion and debate.

On this issue, US economist Paul Krugman wonders:

> Consider what happens when a new drug or other therapy becomes available. Let's assume that the new therapy is more effective…than existing therapies…but that the advantage isn't overwhelming. On the other hand, it's a lot more expensive than current treatments. Who decides whether patients receive the new therapy?
>
> We've traditionally relied on doctors to make such decisions. But the rise of medical technology…makes…medicine…in which doctors call for every procedure that might be of medical benefit, increasingly expensive. Moreover, the high-technology nature of modern medical spending has given rise to a powerful medical-industrial

> complex that seeks to influence doctors' decisions.... [D]rug companies in particular spend more marketing their products to doctors than they do developing those products... They wouldn't do that if doctors were immune to persuasion.
>
> So if costs are to be controlled, someone has to act as a referee on doctors' medical decisions.[31]

As Krugman alludes, the context into which technology enters the health care system is important, including the position of care providers and "consumers." UBC's Robert Evans cautions against idealizing technology, noting that doctors have a bias towards the use of new technology for a number of reasons, such as appearing to be doing something in the face of an ailment. As such they may resist efforts to evaluate outcomes or questionable practices.[32]

A review of new technology for the Romanow Commission argued for enhanced health technology assessment and a renewed federal role in technology regulation to ensure the appropriate application of new technologies and to shape the development of new technologies at an early stage.[33] This approach is common in European health care systems.[34]

There are also important ethical and social considerations with regard to new technology that must be considered (for example, in cloning, stem cell research, genetic screening, and end-of-life interventions). This context will be important in the future in order to balance innovation with cost-containment (ultimately, whether a new technology should be covered by public health insurance), and ensure that new technologies provide benefits in accordance with their costs. McGregor and Brophy (2005) argue for health technology assessment processes at the hospital level, not just by senior governments distanced from professionals making decisions.

The Romanow report concludes that:

> Health technology assessment is a comprehensive and systematic assessment of the conditions for and the consequences of using health care technology. It provides relevant information to managers, decision makers, and health care providers on the safety, economic efficiency, clinical effectiveness, as well as the social, legal and ethical implications of using new and existing technologies. Indeed, health technology assessment should be about what is best for the patient — medically and economically — and not about technology for technology's sake. The assessment is intended to help health policymakers, providers, and especially, health organization managers make decisions about whether to purchase and use new technologies, whether to replace old technologies with new ones, and what benefits they can expect to see.[35]

Having these decisions made in a public context is important. It is important to recognize that technology also changes the boundary between publicly insured services and private services. As a research team from the University of Toronto notes:

> Canada's distinctive way of defining the boundary between public and private finance has had its own particular vulnerability. As technological changes have shifted services out of hospital, care has migrated from a world of universal, first-dollar coverage to a world in which private finance plays a much larger role.[36]

Health researcher Marcy Cohen argues for increased democratic participation in health care based on more participatory models from other countries that could be applicable to health care in Canada.[37] In the context of technology, an attractive option could be public representation on technology assessment committees, and greater

participation in establishing formularies for drugs to be publicly covered. At any rate, greater public involvement will make a more transparent connection between tax dollars collected and how money is spent in the health care system.

Conclusion

This paper finds that population aging, in and of itself, is a contributor to rising cost pressures in the health care system, but a relatively small one. Based on current projections there is little to suggest a demographic time-bomb about to go off. In the context of reasonable economic growth, the health care system can accommodate increases in population and an older population while preserving, and even increasing, the existing level of services (including new technological options).

The public health care system is providing a broader suite of services than it did in the past. The possibilities offered by new technology have to date been accommodated by the public system. While some cracks are apparent, such as with surgical waiting lists for certain procedures, it is important to note that the health care system has expanded a great deal from its early days.

This paper does not suggest what should be an optimal amount of public health care spending as a share of GDP — arguably, we could aim for an interim target such as 8%, and sustain that level. But the paper does conclude that we can sustain what we have, while accommodating the coming demographic bulge.

A future challenge will be to ensure that new money in the system is directed to areas with the highest marginal benefit. While new technologies are sexy, in many cases we have little good empirical data on whether they are effective or whether they justify their cost. The capacity to come up with new technological innovations may be limitless, although only a few may prove worthwhile additions. The opportunity cost of spending more on the latest technology may be increased expenditure on measures such as improvements in population health, community care or the expansion of public coverage to include dental care services.

In other words, like every other policy area, we need to make choices, and to do that we need a democratic public debate. This is the essential benefit of a public health care system: we pay collectively and must decide collectively on the available choices. We can afford to continue to provide the services we have today and to expand them, but we still need to make choices.

Technical Appendix

Methodological inspiration for this study, in particular the concept of decomposition of expenditures to determine enrichment, comes from an analytical paper published by Finance Canada by Jackson and McDermott (2004).

Historical data and future projections in this paper draw on two major sources: health care data published by the Canadian Institute for Health Information in its annual *National Health Care Expenditures* publication and accompanying dataset; and, historical (CANSIM table 051-0001) and projected (table 052-0004) population data from Statistics Canada.

CIHI data include estimates of public health care spending for Canada in nominal terms and real terms, and in per capita terms. To determine the impact of population aging, we take CIHI's series on per capita utilization by age group (Table E.1.6) for 2004, the last year for which data are available. We then use historical population data to estimate what health care spending would have looked like if we had the population age structure prevailing in, say, 1975 (assuming the 2004 per capita by age group amounts). For example, per capita expenditures in 2004 were $2,630 but if the (younger) 1975 age structure had been in place, they would have been $2,099 per person. From this we can calculate an index that reflects the pure impact of population aging on health care expenditures.

These figures for 1975 to 2006 allow us to determine indices for population growth, aging and inflation for comparative purposes. The residual portion of public health care spending not accounted for by these three factors is enrichment, also converted to an index. Another way of thinking about enrichment is that it is the change in real, per-capita, age-adjusted public health care spending.

For projections of future health care spending, we use population growth and aging estimates from Statistics Canada. There are a number of such estimates based on different assumptions of growth and aging. We use a middle estimate, the Scenario 2 forecast, which reflects the medium growth estimates based on recent trends in birth and death rates and immigration patterns.

Like the historical data, we can then calculate the impact of population growth, and, by again using the per capita utilization by age group data, the impact of population aging. These are estimated as growth factors and are multiplied by

estimated public health expenditures in 2007. To estimate a health care inflation factor, we assume that the rate of inflation of the 1997 to 2006 period prevails in the future. Notably, this covers was a period of reinvestment in public health care after several years of restraint.

Multiplying these three adjustment factors together gives us projections of nominal health care expenditures that just meet the needs associated with demographic factors and inflation. No enrichment is assumed, which means the number of knee replacements, for example, rises in accordance with a growing and aging population but no more. Thus, these numbers tell us what budget is required to minimally maintain the public system, as is.

To put future numbers in context, and therefore to assess sustainability, we need to compare them to growth in GDP. Some confusion among politicians often occurs on this point, as GDP estimates are typically reported in real terms, while health care expenditures are typically reported in nominal terms. We thus want to estimate nominal GDP, and do so under three scenarios of low, medium and high economic growth rates. These create linear projections, even though we know that there will typically be ups and downs due to economic cycles, so they are best thought of as long-run averages.

The final estimates remove the assumption of no enrichment. They take the medium economic growth series, and then forecast the impact of two scenarios of enrichment of health care expenditures.

Notes

1 Skinner, 2006.

2 Data cited above are from CIHI, 2005, Table E.1.6 (supplemental electronic tables). The last available data year for this series is 2004.

3 Hogan and Pollock, 2001. The authors find one-half of expenditures occur in the last year of life, but note that other studies set estimates closer to one-third.

4 Pollock, 2001. Another study relevant in the BC context is McGrail et al. (2000), who find that costs of care do rise with age, but that proximity to death is a more important determinant of cost.

5 Summarized in Hogan and Hogan, 2002.

6 Finance Canada researchers Jackson and McDermott (2004) use the term enrichment. This paper follows their methodology for determining enrichment as a residual after adjusting for other cost drivers. The term "enrichment" arguably better captures the notion of changes in the nature of health care services and technology over time, in addition to quantitative expansion of services.

7 Inflation in the context of health care raises some methodological issues. According to CIHI (2001): "The National Health Expenditure (NHEX) database uses separate price indexes to calculate public and private sector expenditure at constant prices. The indexes are the GDP implicit price indexes (IPI) for government current expenditure on goods and services in the public sector and the health component of the consumer price index (CPI) in the private sector." A comparison of indices in this report found that that health inflation (a weighted composite of the two indices above) was slightly higher than GDP inflation between 1975 and 1990, but since then the two have increased at almost identical rates.

8 For reviews of this literature, see Evans et al (2001) and Hogan and Hogan (2002).

9 Presented as an index to show the percentage change over time.

10 The estimate of inflation assumes the 1996 to 2006 average annual inflation rate projected forward to 2056.

11 Given the discussion in the previous section on the cost of dying as opposed to aging-driven cost increases, these estimate should be considered an upper bound that overstates the impact of population aging. For instance, Evans et al. (2001:169) comment: "A projection of hospital use made in 1969 based on assumed constant age-specific use rates would have been not merely erroneous but wildly so — triple the

actual value for the BC population at the end of the century."

12 Nominal GDP growth rates from CANSIM Table 380-0002. The impact of an aging population on GDP growth is ambiguous. GDP growth will be lower to the extent that labour force participation declines, and higher if productivity rates can be improved.

13 Based on estimates from the BC Ministry of Health, cited in Evans et al., 2001.

14 Glied, 2003, pp.134–5.

15 These examples are principally related to seniors. Expensive technological interventions also occur at the beginning of life, such as treatments for increasingly premature babies.

16 McFarlane, 2005.

17 Figures from BC Ministry of Health, 2005 and 2006.

18 Preist, Rachlis and Cohen, 2007.

19 CIHI, 2006

20 CIHI, *Drug Expenditure in Canada, 1985 to 2006*.

21 CIHI, 2003.

22 Evans et al., 2001.

23 See Canadian Association on Gerontology, 1999. Among other things, it reports that 19 to 36% of drug-related hospital admissions are the result of prescribing errors.

24 CIHI, *Hospital Trends in Canada 2005*.

25 Lexchin, 2001. He cites the additional cost at $3.2 billion. In this paper, the figure has been altered to between $3 billion and $4 billion because original figures were derived from 1996 drug cost data and were not adjusted for inflation.

26 Federal/Provincial/Territorial Ministers Task Force, 2006, p. 32.

27 Morgan and Hurley (2002) argue that direct-to-consumer marketing of technology developments, particularly to the aging baby boomer cohort, will be an important cost-driver. Research by Barbara Mintzes et al. (2003) suggests direct-to-consumer advertising is having detrimental impacts on the nature of treatment.

28 As surveyed by Cassels, 2002.

29 National Advisory Council on Aging, 2000.

30 BC Coalition of People with Disabilities, 2006.

31 Krugman, 2005.

32 Evans, 2003, p. 20.

33 Lehoux, 2002.

34 According to Glied, 2003.

35 Romanow Commission, 2002, p. 83.

36 Flood et al, 2004.

37 Cohen, 2005.

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