

FURTHER ANALYSIS OF FUTURE CANADIAN HEALTH CARE COSTS

Robert L. Brown* and Uma Suresh†

ABSTRACT

The Canadian public health care delivery system continues to experience growing needs for increased funding. The total health care delivery system today costs Canadians \$98 billion a year or about 9.7% of GDP. Of that total cost, 71% is paid by the government, which means the taxpayers. While that may pale in comparison to the costs in the United States, it does make the Canadian system one of the five most expensive health care delivery systems in the world.

While today's cost pressures are of major concern, of even more concern are the costs being projected by many participants in the current health care debate for the period when the baby boom makes higher demands on the Canadian health care delivery system.

Traditional projection methods, however, do not differentiate as to the use of health care systems between the elderly who survive the year versus those who die. This paper first looks at the impact that this differentiation could have on projected costs. It then looks at the impact that the wide use of advance directives might have on future health care costs and some of the issues surrounding their use.

1. INTRODUCTION

The Canadian public health care delivery system continues to experience growing needs for increased funding. The total health care delivery system today costs Canadians \$98 billion a year or about 9.7% of GDP. Of that total cost, 71% is paid by the government, which means the taxpayers. While that may pale in comparison to the costs in the United States, it does make the Canadian system one of the five most expensive health care delivery systems in the world.

The Canadian government-funded health care system is very comprehensive for procedures that are deemed to be "medically necessary." Coverage is first dollar. Administration of the system must be through public agencies. There are actually 10 provincial health care systems, not one federal system. However, the federal government

(which helps to fund the costs) has set universal standards through the Canada Health Act. Many "health" costs are not covered by most provincial plans, including (normally) long-term custodial care, dental care, vision care, and pharmaceutical drugs (some provinces have less than full drug coverage for those 65 and over).

While today's cost pressures are of major concern, of even more concern are the costs being projected by many participants in the present health care debate for the period when the baby boom is expected to make increased demands on the Canadian health care delivery system.

However, there are two factors, one methodological and the other a public policy issue, which could mean that many of today's projections are overstating future health care cost expansion. Further, many of these studies imply that the cause of these increased future costs is the aging of the population. This paper will question that basic assumption as have others (see, e.g., Evans et al. 2001).

This paper looks at two factors that may mitigate future cost pressures. First, it considers the impact on cost projections resulting from splitting the population data into survivors and decedents

* Robert L. Brown, F.S.A., F.C.I.A., A.C.A.S., Hon. F.I.A., Ph.D., is a Professor at the University of Waterloo, Department of Statistics & Actuarial Science, Waterloo, ON, Canada N2L 3G1, e-mail: rlbrown@uwaterloo.ca.

† Uma Suresh is an Actuarial Assistant at Equitable Life of Canada, Waterloo, ON, Canada N2J 4C7, e-mail: usuresh@equitable.ca.

at each age. This is a methodological impact. Second, it considers the potential impact that the widespread use of advance directives (also called “living wills,” explained in detail later) could have on future Canadian health care costs. This is a public policy issue.

The hope and purpose of the authors is to show that future health care cost increases may not be as great as some of the participants in the debate today would have us believe (see, e.g., Robson 2001). We believe that this paper can be used to shed more light on the ongoing debate in Canada around the financing of Canadian public health care delivery.

2. BACKGROUND

Many traditional models that are used to analyze the impact of population aging on future health care costs work as follows. First, one attains data as to age- and sex-specific health care costs in the recent past (this can be viewed as two vectors of cost data, one for each sex). Second, one builds or borrows (e.g., from the Canada pension plan actuary) a model of the future population of Canada. One then applies today’s constant age/sex-specific health care costs to future populations to analyze the impact that population aging will have on future health care costs. This method can be found in the work of Denton and Spencer (1995) and Robson (2001). Note that these projections show the impact of population aging, but, since they normally hold the age/sex-specific health care cost factors constant, they do not account for any future inflation in health care costs (for example, because of new technologies or more expensive pharmaceuticals). However, this is not a criticism of these studies, since these authors are attempting to isolate the impact of population aging on future health care costs.

Several authors, however, have pointed out a methodological error in these projections (Scitovsky 1984; Lubitz and Riley 1993; Van Weel and Michels 1997; Reese 2000; McGrail et al. 2000; E.U. Economic Policy Committee 2001). The fact is that average medical care costs, especially among the elderly, are a mixture of relatively low costs incurred by patients who survive the year of analysis and very high incurred costs for those who die in the year of analysis. These results are absolutely consistent in the six papers

cited, even though the studies are from many different parts of the world. Thus, it is argued, one can get a truer picture of the costs being incurred if one splits the data into those who survive and those who die in the period of observation. In particular, if one assumes that mortality rates are falling (i.e., life expectancy is improving), then this division of the cost data into a subgroup of survivors analyzed separately from a subgroup of decedents will give lower projected medical costs than a population where the average cost is applied to all members of the observed population. We will discuss this in more detail in a moment.

A second important factor explored in this paper is one presented by Reese (2000) and entails the concept of “advance directives.” An advance directive is a document in which a patient grants power of attorney over health care to a trusted person, agent, or proxy and provides guidance about his or her wishes as to the desired level of medical care intervention in the terminal period of life. Reese shows that, among patients who die in the hospital, those with advance directives cost only 32% as much as those without (Reese 2000, table 5). Again, we will discuss this concept in more detail in just a moment.

3. ANALYSIS OF FUTURE CANADIAN HEALTH CARE COSTS

We have identified two factors that could have an impact on projections of future health care costs in Canada: the division of data into survivors and decedents (a methodological factor) and the potential impact of the introduction of advance directives (a public policy factor).

Canada has a rapidly aging population (whereas 12.5% of the Canadian population is age 65+ today, that figure will be 25% by 2036: Brown 2001, p. 21). Much work has been done to attempt to project the impact that this population aging will have on the sustainability of the Canadian public health care delivery system over the next half century. Health care costs are a function of age (p. 23). McIntyre et al. (2003, p. 20) state that average per capita hospital costs for males 35–44 in 2001 was \$310, while it was \$4,885 for the 75–84-year-old age cohort and \$8,689 per capita for adults 85 and older (see also graph 4.1, p. 34, in the E.U. Economic Policy Committee Report 2001).

However, contrary to the impression created by age-specific profiles of average health care expenditures, research reveals that population aging has not been an important driver of aggregate levels of expenditure on health care. Jacobzone (2001) notes that, at the aggregate spending level, no link exists between levels of health care spending and the relative demographic age of the country. For example, Canada is a much “younger” country than the United Kingdom. However, Canada spends a much higher percentage of GDP on health care than does the United Kingdom (9.7% versus 6.3%, respectively). While the United States has the highest health care costs in the world, it is still demographically young (only one person in eight is over age 65).

Moreover, as many authors previously cited have pointed out, it is more correct to say that health care costs are a function of the year of death rather than age. It is the high expenditures on health care just prior to death (sometimes called “death costs”), combined with the higher probability of death as we age, that drives health care spending, not the pure age of the population (old patients who continue to survive do not cost us all that much, as will be seen in a moment).

Recent Canadian research on the impact of population aging on future health care costs seems to fall into two camps. One group says that while population aging will cause an upward pressure on the cost of health care delivery, they conclude that this cost pressure will be manageable in an economy that is growing. That is, the percentage of the economy that has to be taxed by the government(s) to pay for universal health care need only rise slowly and marginally in a growing economy to cover the increased costs brought on by population aging. Authors who fit into this philosophy include Fellegi (1988), Denton and Spencer (see, e.g., 1995), and Evans et al. (2001). That is also the tone taken by the recent Commission on the Future of Health Care in Canada, better known as the Romanow Commission (from the name of the head of the commission; see Government of Canada 2002).

In contrast, papers like that by Robson (2001) paint a picture of the inevitable bankruptcy of the Canadian health care delivery system as the baby boom ages. This is a concern echoed by several provincial premiers in negotiations with Ottawa on the future financing of Canadian health care.

Historically, the models used in Canada to project health care costs into the future were similar to those presented by Denton and Spencer (1995). That is, a set of health care costs broken down by age and sex from recent Canadian experience was then used to project the impact of population aging on future health care costs by simply applying a constant cost vector from a chosen base year through a series of projected population data. This was done using “average” costs by age and sex (not broken down for survivors and decedents) and does not include any potential impact of the potential existence of advance directives.

This paper presents three Canadian health care delivery system cost projections. Projection I follows the method of other work normally presented (what we will call a Denton-Spencer approach). We simply applied “average” health care cost data (sent to us by Denton and Spencer) subdivided by age and sex, but not by survivorship/death. The population model that was used in all of the projections presented in this paper is the model used by the OAS/CPP actuary for his actuarial valuations (see, e.g., OAS Valuation no. 5 or CPP Valuation no. 18 from OSFI 2001).

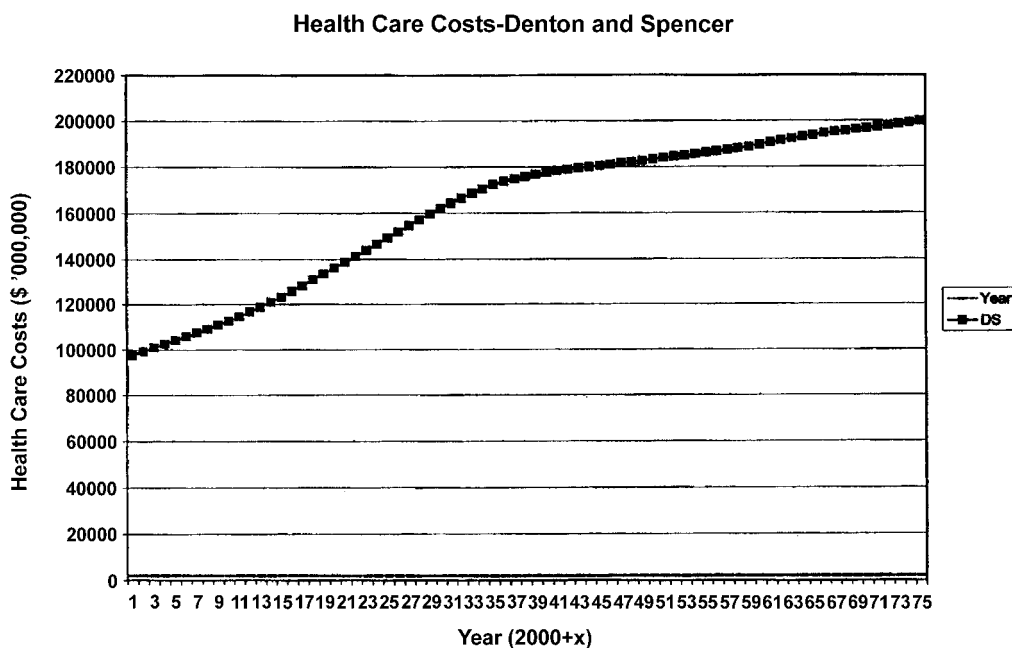
Projection I
Health Care Costs Projection Based on Average Age-Sex Health Care Costs

Year	Total Health Care Costs (Both Sexes, Billions of Dollars)	10-Year Average per Annum Growth Rate
2001	\$ 97.608	
2005	104.162	1.64% (4 years)
2015	123.221	1.69
2025	149.228	1.93
2035	172.299	1.45
2045	180.590	0.47
2055	186.060	0.30
2065	193.851	0.41
2075	199.976	0.31

Projection I shows the impact of population aging on future health care costs. All costs are in constant 2001 dollars. There is no economic inflation factor or medical care inflation factor in these costs. The growth is due solely to population aging.

Thus, we can see that solely because of population

Figure 1



aging, health care costs are projected to more than double over the 75-year projection period. We can also see that the most rapid period of growth because of the shifting demographics is in the early years of the projection period. On the other hand, the per annum growth rates presented seem to be affordable if the economy has a similar rate of growth and there is no “extra” medical care cost inflation.

Hogan and Hogan (2002) projected an expected 2.9% per annum increase in health care costs per capita between the years 1998 and 2030, but found that only 0.9% of that increase is caused by population aging. The rest is caused by health care cost inflation in excess of economic growth. In another recent study, McIntyre et al. (2003) projected real growth in health care costs of 2.6% per annum made up of 0.9% for increased per capita consumption/service levels, 0.9% for general population growth, and 0.8% attributable to population aging.

For Projection II, we subdivided the data into those who survive the year of observation and those who die in that year. We used the data presented in Reese (2000, p. 118) to break the average cost down to determine the survivor/decedent specific costs. These data are based on Table 1 (Reese 2000, Table 2).

We also had available to us highly similar data presented in a study by McGrail et al. (2000). This study was done in British Columbia, so it could be assumed to be more indicative of Canadian experience. Their Table 2 (p. 251) presented the results shown in our Table 2.

Obviously, the results of these two studies are very similar. In fact, McGrail et al. and Reese may be even more similar than they appear at first glance (at least for the younger ages). This is because each of the Reese data points (except age 90+) covers a five-year age range, whereas the McGrail data cover very specific (but varying) age ranges. The variance in the age ranges was in-

Table 1
**1988 Medicare Data: Payments by Survival
Status and Age**

Age	Average Cost per Decedent	Average Cost per Survivor	Ratio of Decedent Cost to Survivor Cost
65-69	\$15,436	\$1,455	10.6
70-74	15,778	1,845	8.6
75-79	14,902	2,176	6.8
80-84	12,838	2,403	5.3
85-89	11,422	2,578	4.4
90+	8,888	2,258	3.9

Source: *New England Journal of Medicine*, April 15, 1993.

Table 2
**Cost Ratio: Died*/Survived 1993 Costs of
 Medical and Social Care by Age**

Age Band	Cost Ratio: Died*/Survived
65	16.7
75–76	8.4
85–87	3.8
90–93	2.5

*Last six months of life.

tended to result in approximately the same exposure to risk in each data cell. Clearly the ratio of costs for those who die versus those who live falls sharply with age. Thus, where McGrail et al. have a ratio of 16.7 at age 65, the ratio would obviously not be that large by age 69. Thus, one might speculate that the McGrail ratio for age group 65–69 might be closer to 14.5 than 16.7, which would narrow the difference in the two data sources at the younger ages. At the older ages, McGrail shows smaller differences than does Reese. Thus, the total impact on projected costs, over all ages, would not be radically different whether one chose the McGrail or the Reese data. We decided to use the Reese data for one main reason—the Reese data come “ready to use” for ages 65 and beyond. Had we used the McGrail data, some distributional assumption for the missing ages would have to have been introduced.

As an aside, both Reese (2000) and McGrail et al. (2000; as well as Scitovsky 1984, Lubitz and Riley 1993, and the E.U. Economic Policy Committee 2001) also looked at data from historical periods of time as to the ratio of costs for those who die versus those who survive and found that these ratios in their jurisdiction of observation have changed little with time. That is, there is no indication in the data that the high costs of dying are a recent event or that intensity of care just prior to death has increased.

One will notice that neither study presented above provides data prior to age 65, so we were not able to project different costs under age 65 as to decedents or survivors (we just used the Projection I/Denton-Spencer method under age 65). Again, the impact of this omission would be small since mortality rates are so small prior to age 65. The OAS/CPP population model had mortality improvement built into it. The specific mortality improvement assumption is presented in the Appendix.

The mathematics required to complete Projection II can be found on pages 120–21 of the Reese paper (2000). Female and male costs were projected separately and then combined. The results of using the Reese data are shown as Projection II.

In Projection II costs do not quite double by 2075. However, there is only a 3.7% difference in the 2075 total cost figure between Projections I and II (i.e., 75 years out). Results of separating “death costs” in the European Union study (2001) showed greater cost savings.

Regardless, the theoretical point has been proven. Using average cost figures per age/sex grouping versus separate data by decedent/survivor, in a period of assumed mortality improvement, will overstate the projected costs. Again, however, the differences are small enough to con-

Projection II
**Health Care Costs Projection Split as to
 Survivor and Decedent Costs**

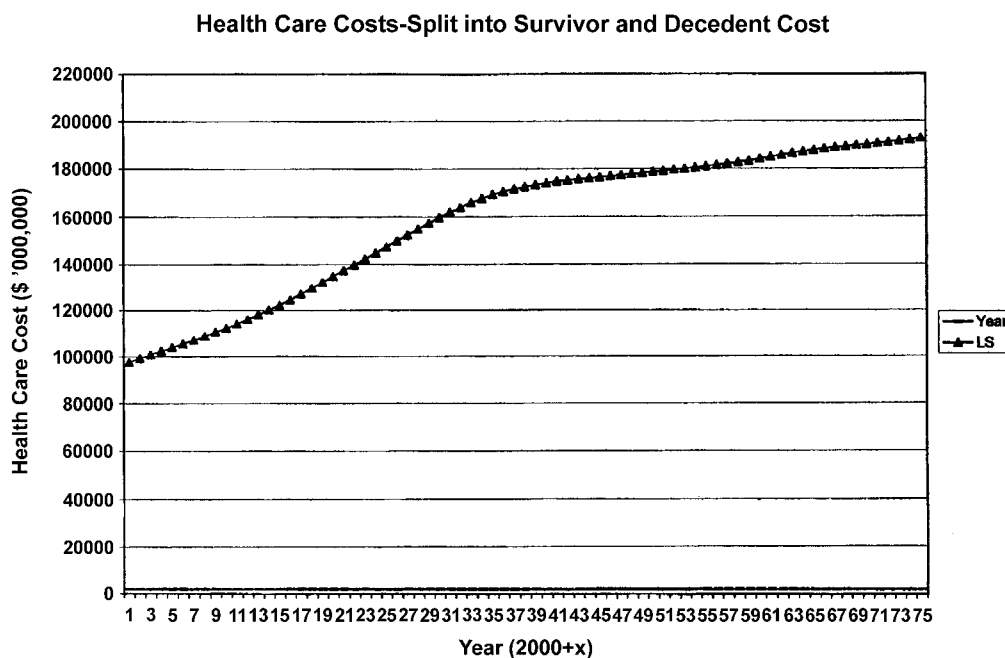
Year	Total Health Care Costs (Both Sexes, Billions of Dollars)	10-Year Average per Annum Growth Rate
2001	\$ 97.608	
2005	103.917	1.58% (4 years)
2015	122.285	1.64
2025	147.377	1.88
2035	169.307	1.40
2045	176.529	0.42
2055	181.005	0.25
2065	187.759	0.36
2075	192.768	0.26

clude that criticism of the overall indications of past studies may not be warranted.

Finally, we introduced the concept of the advanced directive as explained above. As stated earlier, the Reese data showing the impact of advance directives are based on in-hospital patients. We have no data on what the expected impact would be on those who die outside the hospital, although it would be logical to assume that the difference would be much smaller. As stated before, Reese (2000, table 5) shows that, among patients who die in the hospital, those with advance directives cost only 32% as much as those without.

In the United States, to receive reimbursement through Medicare and Medicaid programs, health

Figure 2



care organizations must comply with the Patient Self-Determination Act (PSDA) of 1990. Compliance with the PSDA requires that certain rules and procedures be followed, including the following:

- Patients must be given written information regarding advance directives upon admission to the facility
- Each adult patient must receive written policies explaining how the facility will implement the patient's right to an advance directive
- Documentation of any advance directives must be placed in the patient's medical record
- The patient must receive a written statement indicating that the facility will not condition the provision of health care on whether an advance directive has been executed.

While advance directives can exist in Canada, there is no legislative pressure for hospitals to promote the concept of the advance directive as exists under the PSDA in the United States. Reese (2000, table 5) shows that the introduction of the legislation resulted in an increase in the prevalence of advance directives (from 25% in 1990 to 34% in 1992). Obviously, no similar data exist for Canada.

From a recent Canadian study (McIntyre et al. 2000, p. 20) we determined that 80% of Canadi-

ans die while in a hospital, rather than at home. Thus, we only applied the projected savings resulting from advance directives for 80% of the deaths in any year.

We still faced two problems in analyzing the impact on Canadian health care costs of advanced directives. We do not know what percentage of Canadian patients might use advance directives today (although it must be small since their existence is hardly even known). We do not know what percentage of costs could be saved in the Canadian health care delivery system if an advance directive were used by a particular patient.

Note that not everyone using an advance directive in the United States wishes "no extraordinary intervention." Every advance directive could indicate a unique requested level of care. Thus, if one assumes that the "pattern" of requested care under future advance directives is the same as in historical advance directives, then the 32% factor could be argued to be one's best estimate.

We reran Projection II (in which decedents were separated from survivors and separately "costed"). In Projection III, however, we entered 32% of the cost for decedents as used in Projection II to the 80% of decedents who die in hospi-

Projection III

Health Care Costs Projection Assuming All Decedents Use Advance Directives

Year	Total Health Care Costs (Both Sexes, Billions of Dollars)	10-Year Average per Annum Growth Rate
2001	\$ 92.550	
2005	98.496	1.57% (4 years)
2015	115.858	1.64
2025	139.297	1.86
2035	159.202	1.34
2045	165.357	0.37
2055	169.745	0.26
2065	176.505	0.39
2075	181.377	0.27

tals. That 32% factor comes directly from the data presented by Reese (2000) as to the impact on health care costs for in-hospital patients who use advance directives.

Thus, we can see that, when compared to Projection II (which had costs split between survivors and decedents) we could attain a \$5.1 billion immediate savings if advance directives were mandated (and immediately used). This represents 5.2% in savings. By 2075 these savings, as modeled, have grown slightly to represent 5.9%.

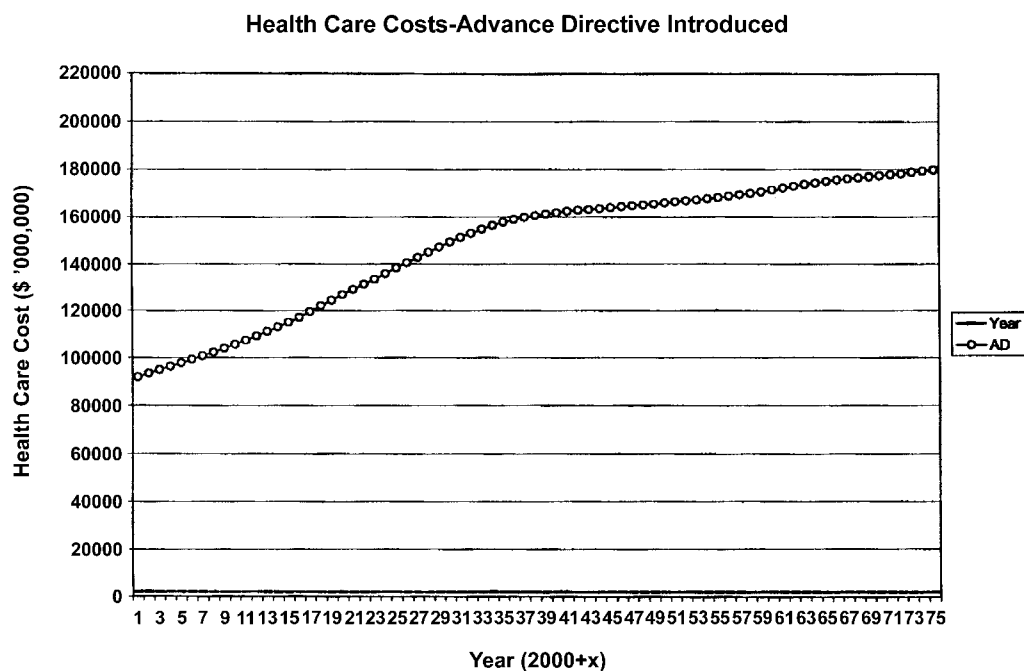
While these projections may be based on somewhat liberal assumptions, differences of this order of magnitude seem to be worthy of more study.

4. ISSUES WITH ADVANCE DIRECTIVES

If advance directives are to be mandated by legislation, we believe there will be a heated debate around the legal and ethical issues implied. Remember that with an advance directive the wishes of the patient, as dictated (possibly) many years earlier would override the wishes of family members present at the time of crisis in directing the medical team. This may mean that medical intervention will be ignored even if intervention is what the attending family members prefer.

In this regard, we argue that society needs to reevaluate its attitude toward life. Quality of life should have primacy over quantity of life. Legally, in both Canada and the United States, the courts have acknowledged that a person cannot be forced to accept care or treatment, even if death is the immediate consequence. For example, the courts recognize a patient's right to be disconnected from life support systems if he or she so requests (Klotz 2002). However, this may create an apparent conflict between what health professionals are trained

Figure 3



to do and what the law requires them to do. As Klotz (2002) says:

“Throughout their training and career, health care professionals are inculcated with the primary obligation to provide care and save lives. Strict obedience to the law is not always easy while watching a patient’s health deteriorate each day, unable to apply an existing medical solution because the person refuses to consent to it. It is one thing to know one’s legal obligations; it is quite another to have to apply them on a daily basis. In short, asking health professionals to refrain from taking certain actions may fly in the face of their training, education values and convictions” (p. 2).

This issue is further complicated by the fact that it is illegal to take part in euthanasia. Doctors cannot assist patients wishing to hasten their deaths. We submit that there will be cases where the line between not taking any action in the face of death versus acting in a manner that hastens death will be so fine as to require further adjudication and guidelines.

The time for this debate in Canada has arrived. As seen above, we could save significant amounts of money in delivering health care with the use of advance directives. We believe that it is possible to balance law and ethics when it concerns re-

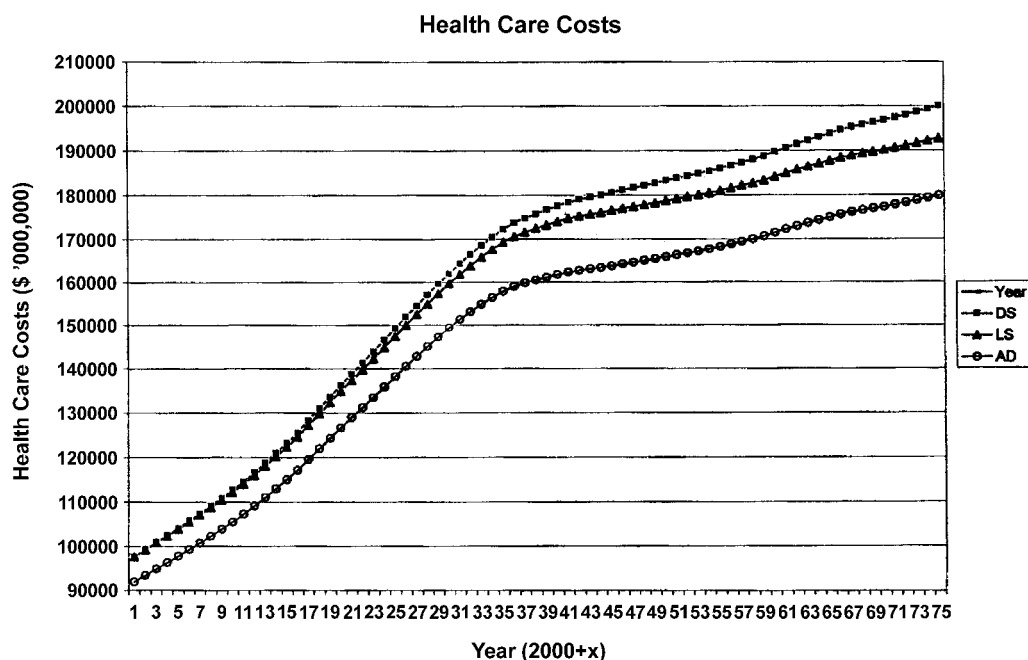
spect of human dignity, since the principle of human dignity is respected both by the law and by the code of ethics of physicians. These will be painful debates that may lead to painful decisions. However, the time for this open and public debate is now.

5. CONCLUSION

This paper has presented analysis of the future costs of the Canadian health care delivery system under three projections. Projection I used standard projection methods employed by most researchers who apply an average cost rate to age-sex groups in a population projection model.

Based on data from Reese (2000), Projection II then subdivided the population in the previous model into groups who survive the year of observation (and cost the health care system a relatively small amount of money) and those who die in the year of observation (and cost the health care system a relatively large amount of money). These costs were then applied to the CPP population model that assumes future improvement in mortality (i.e., an increase in life expectancy). While Reese’s hypothesis proved to be true (i.e., projected costs were lower in Projection II than in

Figure 4



Projection I), the differences were relatively small.

Finally, Projection III introduced the potential cost-saving impact of introducing advance directives to the Canadian health care delivery system. Projection III showed immediate cost savings of 5.2% (or \$5.1 billion) increasing to 5.9% by 2075. While advance directives may be politically controversial, this level of potential savings seems to indicate a need to have the requisite debate about their introduction at the earliest possible opportunity.

APPENDIX

OSFI MORTALITY ASSUMPTIONS FOR THE OAS/CPP POPULATION PROJECTION MODEL

The starting point for mortality rate projections for this report is the mortality rates from the Statistics Canada Population Life Tables, Canada and Provinces, 1990–1992. According to these tables, life expectancies at birth for males and females in Canada were 74.6 and 80.9 years, respectively. The 1995–97 Life Tables were not yet available for this report.

To reflect anticipated sustained improvements in life expectancy, the 1990–92 Canada and Québec mortality rates were projected to 1996 using the actual improvements in mortality experienced since 1991. This approach produced life expectancies at birth and at age 65 of 75.5 and 16.1 years for males and of 81.2 and 20.0 years for females, respectively, which compared reasonably well with figures published by Statistics Canada for 1996. Mortality rates thus obtained for 1996 were then further projected to the end of the projection period using the following annual rates of mortality improvement.

For 1997 to 2020, the annual rates of mortality improvement, varying by age, sex, and calendar year, were obtained by linear interpolation between the average improvement rates experienced in Canada between 1987 and 1996, and the fixed improvement rates described below in respect of the period 2021 and thereafter.

For 2021 and subsequent years, the assumed rates of improvement vary by age and sex only and not by calendar year. These ultimate rates

were derived from an analysis of the Canadian and U.S. experience over the last century and are generally consistent with the Alternative II assumption used in the 2000 Social Security Administration Old-Age and Survivors Insurance and Disability Insurance Trust Fund trustees report.

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- Discussions on this paper can be submitted until October 1, 2004. The authors reserve the right to reply to any discussion. Please see the Submission Guidelines for Authors on the inside back cover for instructions on the submission of discussions.*