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# HEALTH AND SURGICAL OUTCOMES IN CANADA AND THE UNITED STATES

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**Prologue:** *The health care system of every nation bears its own unique signature. Three decades ago, the systems operating in Canada and the United States were quite similar—reflecting in part our common culture and, for the most part, common language. Since then, Canada’s provinces created publicly financed health insurance plans that provide universal coverage while constraining spending and largely protecting the clinical autonomy of physicians. Divergence of the two systems reflects the values that underlie the two societies, including Canada’s greater willingness to entrust health financing to government. One dimension of the two systems that has not been thoroughly compared is how patients fare when they seek treatment for similar conditions. The Bush health plan misinterpreted earlier research on surgical outcomes in New England and Manitoba, emphasizing that “post-operative mortality . . . is 44 percent higher in Canada than in the United States for high-risk procedures.” As this paper shows, much of the short-term mortality differential is explained by the special problems of transferring hip fracture patients in sparsely populated Manitoba. The overall findings are dramatically different. Adjusting for case-mix, long-term survival after nine of ten procedures in fact favors Manitoba over New England. Leslie Roos, who holds a doctorate in political science from the Massachusetts Institute of Technology, is on the faculty of medicine at the University of Manitoba. Elliott Fisher, a graduate of Harvard Medical School, is affiliated with Dartmouth’s Center for Evaluative Clinical Sciences. Ruth Brazauskas is a research assistant at the Manitoba Centre for Health Policy and Evaluation. Sally Sharp is a research associate at Dartmouth. Evelyn Shapiro, who chaired the Manitoba Health Services Commission from 1982 to 1988, is a professor of medicine at the University of Manitoba.*

The ongoing escalation of U.S. health care expenditures threatens both individual incomes and corporate competitiveness. At the same time, an ever-increasing number of Americans are finding adequate health insurance beyond their reach. Two broad policy responses to the crisis are apparent. The first focuses on reform of the financing system. A second major thrust of both government and corporate health policy, however, is to better define value in health care. The critical assumption is that prudent purchasing—whether by consumers or by large organizations—will lead to lower costs and better health.

Many have looked to Canada for insight not only on the organization and financing of the health care system, but also on the value of services provided. For example, U.S. advocates of single-payer systems point to Canada's lower overall costs, administrative efficiency, and higher satisfaction with the health care system.<sup>1</sup> At the same time, those concerned with preserving the U.S. health insurance market point to Canada's waiting lists for surgery or, as in George Bush's Comprehensive Health Reform Program, Canada's alleged inability to provide adequate care for certain conditions.<sup>2</sup> The latter is a distortion of our previous work comparing short-term surgical outcomes in New England and Manitoba.

This paper reports findings on three-year mortality rates following common surgical procedures undergone by residents of Manitoba and New England over age sixty-five.<sup>3</sup> We show that for low- and moderate-risk surgical procedures, short-term outcomes differed little, but three-year survival was substantially better in Manitoba. For certain high-risk procedures, short-term outcomes favored New England, but three-year survival was similar. Overall population mortality among the elderly is lower in Manitoba than in New England. These findings raise important questions for those considering reform of the US. health care system, and also for those striving to define value in health care.

Long-term analyses raise questions as to the overall health of the population, which may be reflected both in the longevity of patients coming to surgery and in the longevity of individuals not receiving a given treatment. In the mid-1980s) Canadian life expectancy at age sixty was 23.3 years for females and 18.4 for males, compared with 22.5 years and 17.9 years for American females and males, respectively. Among thirty-three countries with vital registration systems, Canada ranked considerably better than the United States, both in life expectancy at birth (76.5 versus 75.0 years) and in all-cause, age-adjusted death rate per 100,000 population.<sup>4</sup>

**Background on Manitoba and New England.** The populations of both Manitoba and New England are primarily of European origin. Manitoba's population includes about 5.4 percent Treaty Indians and

about 0.5 percent blacks. In the 1986 census, 71.3 percent of Manitobans reported English as the mother tongue and 4.3 percent, French, with 18.6 percent reporting a nonofficial language and 5.8 percent giving a multiple response. As of 1985, about 4.3 percent of New Englanders were black, with smaller numbers of Hispanics and Asians.<sup>5</sup>

Both the United States and Canada provide universal insurance coverage for the elderly, and Manitoba and New England have similar numbers of physicians and hospital beds per capita, but the health care systems differ in several important ways. Although differences in purchasing power make comparisons only approximate, New England elderly would presumably have benefited from higher regional levels of health care expenditures. In 1987, the United States spent \$2,051 (U.S.) per capita on health care, with Canada at \$1,483 (U.S.).<sup>6</sup> New England's nonfederal hospital expenditures per capita in 1987 were 18 percent higher than the American mean.<sup>7</sup> In Manitoba, per capita hospital expenditures are near the Canadian mean.<sup>8</sup>

In contrast to Canada's higher proportion of generalist physicians, specialists predominate in the United States. Although Canadians use considerably more physician services overall than Americans, these services primarily involve patient evaluation and management. With a few exceptions (such as cholecystectomy), surgical rates in the United States are generally higher than those in Canada. American programs supporting home care and nursing homes are largely oriented toward short-term recovery, while the Canadian focus is more long-term. Manitoba and other provinces provide home care services without charge, while nursing home care is insured with a room and board charge less than the minimum pension. Canadians use more inpatient days per capita but have roughly similar pharmaceutical expenditures per capita.<sup>9</sup>

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## Study Methods

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**Data sources.** Both U.S. Medicare and the Manitoba Health Services Commission databases contain computerized information on hospital discharges and patient enrollment in the respective insurance systems. The hospital files include patient and hospital identifiers, admission and discharge dates, and data on diagnoses and procedures. The enrollment files include individual identifiers and specify a date of death, regardless of whether that death occurred inside or outside a hospital.

In Manitoba, all hospital and medical care, with a few minor exceptions (such as private room, cosmetic surgery, and some out-of-province care), is without user fees or limitations on use. The Manitoba health insurance database contains information on all individuals registered in

the province. New England Medicare data were based on the hospital claims file (Medicare Part A) and the enrollment file.

Both the Manitoba and New England data sets are population based, containing information on almost all residents age sixty-five and older, regardless of where their care was received.<sup>10</sup> New England mortality statistics were generated using a 20 percent sample of all Medicare enrollees who were alive, residents of New England, and age sixty-five or older on 31 December 1984. Population mortality for the Manitoba elderly was taken from life table calculations by Statistics Canada.<sup>11</sup>

**Procedures selected.** The procedures selected were relatively common, contributed significantly to health care costs, and were well defined using administrative data; some postsurgical mortality is associated with each condition. Except as noted below, the primary procedure on the discharge abstract defined the operations. To minimize potential case-mix differences, we selected relatively homogeneous groups of surgical patients. Patients who received concurrent valve replacement/bypass surgery were analyzed separately. Both diagnostic codes and procedure codes were used to construct the groups for total hip replacement (no hip fracture diagnosis) and for hip fracture repair procedures (hip fracture diagnosis and "surgery for repair" performed). Prostatectomy cases with diagnoses of cancer of the bladder or prostate were excluded (22 percent of the total), as were cholecystectomy cases with cancer of the gallbladder (1.5 percent).

**Definition of variables.** We selected covariates for case-mix adjustment based on our previous work. They included age, sex, the absence or presence of high-risk diagnoses that independently predict mortality, and type of operation ("emergency," "scheduled," or "delayed").<sup>12</sup> The high-risk diagnoses were malignant neoplasm, old myocardial infarction, peripheral vascular disease, chronic obstructive pulmonary disease, diabetes, dementia, moderate or severe chronic liver disease, renal failure, and ulcers. Operations were defined according to the number of days between admission and surgery. Emergency operations were those occurring on the date of admission. Scheduled operations were generally performed within two days of admission. Patients hospitalized three or more days prior to surgery were classified as having delayed operations; these may be high-risk cases requiring further diagnostic procedures or sicker patients whose condition must be stabilized before surgery. Length-of-stay before transurethral prostatectomy differed to such an extent between Manitoba and New England that the "type of operation" variable was not included for this procedure.

**Statistical methods.** Because of the small numbers of certain procedures performed in Manitoba, we also grouped procedures into three

categories according to mortality in the year following surgery: low (mortality rates below 9 percent), moderate (9-18 percent), and high (above 18 percent). To generate adequate numbers of cases, more years of data are used for Manitoba. The main analyses compare mortality after Manitoba surgery performed between 1980 and 1986 with mortality after New England surgery done in 1984 and 1985.

As used here, the odds ratio is an estimate of the probability of death in Manitoba in a given time period, compared with the probability of death in New England in the same time period. Adjusted odds ratios are calculated from logistic regression models.<sup>13</sup> Logistic regression is particularly suitable for calculations using a dichotomous dependent variable (individual dead/alive at thirty days, six months, and so on, after surgery) and generates odds ratios that adjust for case-mix. A ratio greater than 1.0 indicated higher mortality in Manitoba; a ratio lower than 1.0 showed higher mortality in New England.

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## Results Of The Comparisons

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Our analyses emphasize the importance of considering long-term, postsurgical mortality (Exhibit 1). Considerable mortality within three years of surgery is found for almost all procedures performed on the elderly; for both groups, only patients with hip replacements, simple cholecystectomies, and open prostatectomies show 15 percent mortality or less over these three years.

Exhibits 2 and 3 show how the Manitoba survival advantage for low- and moderate-risk procedures widens over time. Survival after the two high-risk procedures converges by three years after surgery (Exhibit 4). Some simple calculations using the unadjusted data highlight the relative number of deaths that might be postponed. If three years after surgery the proportions of New England deaths were the same as those in Manitoba, there would have been 1,102 fewer deaths among New England elderly patients having low-mortality procedures and 223 fewer deaths among those having moderate-mortality procedures. Fifty-four additional deaths would be recorded among the New England elderly undergoing high-mortality procedures.

The case-mix-adjusted odds ratios between Manitoba and New England for thirty-day, one-year, and three-year mortality are generally similar to the unadjusted data (Exhibit 5). Both low- and moderate-mortality procedures show significantly better long-term survival for Manitoba elderly than for New England elderly. On the other hand, the New England patients' advantage in thirty-day survival for the high-mortality procedures diminishes greatly by the end of a year.

**Exhibit 1**  
**Risk Of Death By Type of Procedure, Patients Age 65 And Older, Manitoba And New England**

Procedure	Number of procedures		Thirty-day mortality		One-year mortality		Three-year mortality	
	Manitoba	New England	Manitoba <sup>a</sup>	New England <sup>b</sup>	Manitoba <sup>a</sup>	New England <sup>b</sup>	Manitoba <sup>a</sup>	New England <sup>b</sup>
<b>Low mortality</b>								
Total hip replacement	1,563	5,163	1.28	0.97	2.87	3.95	8.35	10.56
Simple cholecystectomy	2,961	9,042	1.52	2.38	4.26	7.66	10.37	16.53
Open prostatectomy	1,004	1,235	1.10	1.05	5.78	4.13	15.64	12.23
Carotid endarterectomy	466	3,802	1.93	2.26	6.44	8.13	15.02	21.73
Transurethral prostatectomy	4,934	15,078	1.26	1.03	8.21	8.79	20.45	22.15
All low-mortality procedures	10,933	34,320	1.34	1.52	6.07	7.52	15.31	18.52
<b>Moderate mortality</b>								
Cholecystectomy with exploration of common bile duct	794	2,346	3.40	4.22	9.07	10.40	19.65	23.19
Coronary artery bypass graft surgery	732	5,152	5.33	5.57	8.47	10.33	12.43	15.99
Heart Valve replacement	212	1,231	6.60	7.88	12.74	16.08	19.81	24.94
All moderate-mortality procedures	1,738	8,729	4.60	5.53	9.26	11.16	16.63	19.19
<b>High mortality</b>								
Repair of hip fracture concurrent valve replacement/bypass surgery	101	435	20.79	12.18	22.77	20.92	27.72	29.43
All high-mortality procedures	4,687	16,671	8.32	5.77	24.30	22.36	41.82	41.50

**Source:** For Manitoba data, Manitoba Health Services Commission, admission/discharge abstracts and enrollment file. For New England data, Health Care Financing Administration, Medicare discharge abstracts.

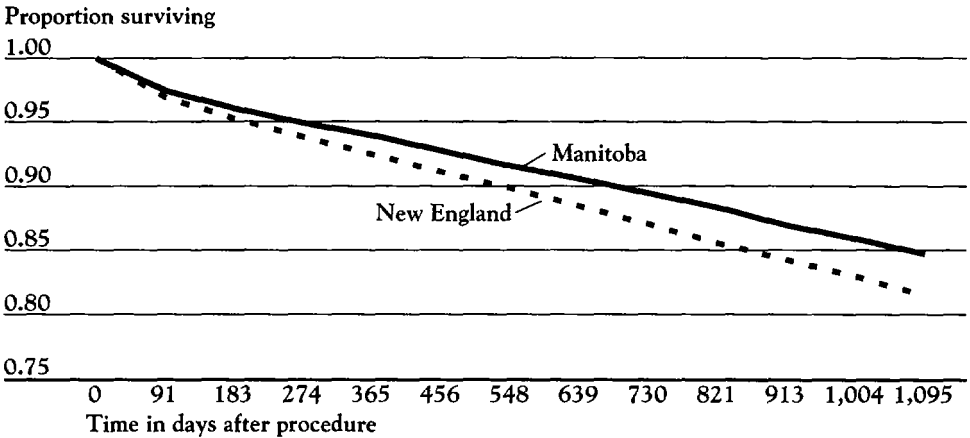
**Note:** Mortality rates express risk of death per 100 procedures.

<sup>a</sup> 1980-1986.

<sup>b</sup> 1984-1985.

Baseline comorbidity (comorbidity in the population) might better predict patient deaths in long-term follow-up than in the short term. Because the negative results of any single intervention (or illness) tend to occur in close proximity to the event, thirty-day mortality will be most affected by events shortly before, during, and shortly after surgery. Later mortality will be more affected by other comorbidity and general health status. A decline in adjusted odds ratios between thirty-day and three-year mortality—a pattern consistent both with Manitobans having lower presurgical comorbidity and with better support after surgery—was observed across all conditions: the odds ratio dropped from 0.93 to 0.76 for low-risk procedures, from 0.87 to 0.76 for moderate-risk proce-

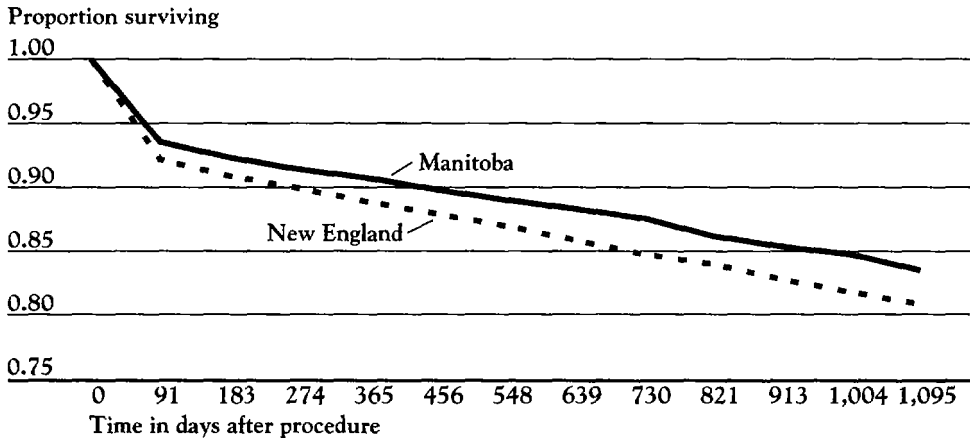
**Exhibit 2**  
**Postsurgical Survival For Low-Mortality Procedures, Age 65 And Older, Manitoba And New England**



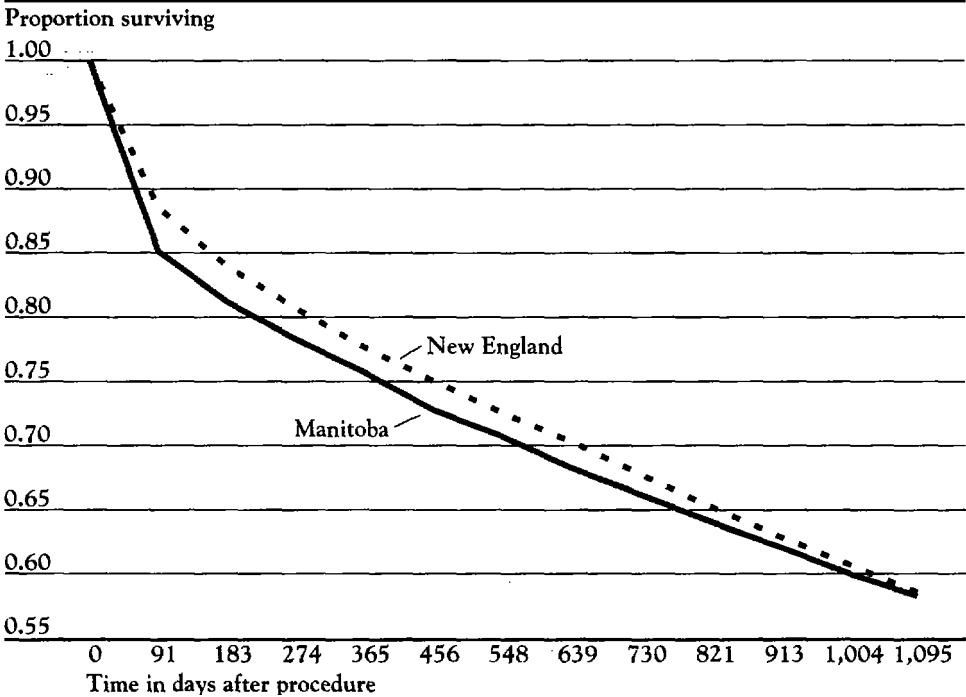
Source: For Manitoba data, Manitoba Health Services Commission, admission/discharge abstracts and enrollment file. For New England data, Health Care Financing Administration, Medicare discharge abstracts. Note: Manitoba data are for 1980-1986; New England data are for 1984-1985.

dures, and from 1.40 to 0.96 for high-risk procedures. Although adjusted odds ratios for three years after surgery favor Manitoba in nine of the ten comparisons, results for several specific procedures bear close scrutiny.

**Exhibit 3**  
**Postsurgical Survival For Moderate-Mortality Procedures, Age 65 And Older, Manitoba And New England**



Source: For Manitoba data, Manitoba Health Services Commission, admission/discharge abstracts and enrollment file. For New England data, Health Care Financing Administration, Medicare discharge abstracts. Note: Manitoba data are for 1980-1986; New England data are for 1984-1985.

**Exhibit 4****Postsurgical Survival For High-Mortality Procedures, Age 65 And Older, Manitoba And New England**

Source: For Manitoba data, Manitoba Health Services Commission, admission/discharge abstracts and enrollment file. For New England data, Health Care Financing Administration, Medicare discharge abstracts.

Note: Manitoba data are for 1980-1986; New England data are for 1984-1985.

### Specific Comparisons: What Can We Learn?

**Hip fracture.** Repair of hip fracture accounts for 97 percent of the high-mortality procedures (with the concurrent valve replacement/bypass operation making up the rest). Other analyses have shown that increased thirty-day mortality following hip fracture in Manitoba holds for all types of repair and all age groups. This short-term mortality appears influenced by the geographic distribution of patients and hospitals in Manitoba: 23 percent of Manitoba patients (and only 5 percent of New England patients) were transferred prior to hip fracture repair.

Manitoba patients first admitted to a smaller hospital and then transferred to a larger hospital for surgery had a higher thirty-day mortality rate (8.3 percent) than their counterparts who were not transferred (6.3 percent); hip fracture patients admitted to a hospital from a nursing home had the highest mortality (11.4 percent). Further analyses adjusting for case-mix showed only the latter to have a significantly higher

**Exhibit 5**  
**Unadjusted And Adjusted Comparisons Of Mortality (Odds Ratios) In Manitoba And New England**

Procedure	Thirty-day mortality		One-year mortality		Three-year mortality	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
<b>Low mortality</b>						
Total hip replacement	1.32	1.19	0.72 <sup>a</sup>	0.63 <sup>a</sup>	0.77 <sup>a</sup>	0.70 <sup>a</sup>
Simple cholecystectomy	0.63 <sup>a</sup>	0.77	0.54 <sup>a</sup>	0.63 <sup>a</sup>	0.58 <sup>a</sup>	0.67 <sup>a</sup>
Open prostatectomy	1.04	1.05	1.42	1.32	1.33 <sup>a</sup>	1.32 <sup>a</sup>
Carotid endarterectomy	0.85	0.90	0.78	0.81	0.64 <sup>a</sup>	0.66 <sup>a</sup>
Transurethral prostatectomy	1.11	1.27	0.93	0.98	0.90	0.94
All low-mortality procedures	0.89	0.93	0.79 <sup>a</sup>	0.76 <sup>a</sup>	0.60 <sup>a</sup>	0.76 <sup>a</sup>
<b>Moderate mortality</b>						
Cholecystectomy with exploration of common bile duct	0.80	0.83	0.86	0.86	0.81 <sup>a</sup>	0.82
Coronary artery bypass graft surgery	0.95	0.87	0.80	0.75 <sup>a</sup>	0.75 <sup>a</sup>	0.69 <sup>a</sup>
Heart valve replacement	0.83	0.87	0.76	0.73	0.74	0.72
All moderate-mortality procedures	0.82	0.87	0.81 <sup>a</sup>	0.80	0.84 <sup>a</sup>	0.76 <sup>a</sup>
<b>High mortality</b>						
Repair of hip fracture	1.48 <sup>a</sup>	1.38 <sup>a</sup>	1.11 <sup>a</sup>	1.05	1.01	0.96
Concurrent valve replacement/bypass surgery	1.89 <sup>a</sup>	1.93 <sup>a</sup>	1.11	1.13	0.92	0.89
All high-mortality procedures	1.48 <sup>a</sup>	1.40 <sup>a</sup>	1.11 <sup>a</sup>	1.05	1.01	0.96

**Source:** For Manitoba data, Manitoba Health Services Commission, admission/discharge abstracts and enrollment file. For New England data, Health Care Financing Administration, Medicare discharge abstracts.  
**Note:** Confidence intervals and p-values are available from the authors. An odds ratio greater than 1.0 indicates higher mortality in Manitoba; a ratio less than 1.0 indicates higher mortality in New England. Data for Manitoba are for 1980–1986 data for New England are for 1984–1985.  
 a Manitoba/New England differences were significant at  $p < 0.05$ .

thirty-day mortality.

Because most transferred patients incur additional presurgical hospital stays of one or two days, the time lag between fracture and surgery was undoubtedly greater in Manitoba than in New England. Although a delay in surgery to repair hip fracture may increase mortality, the differences in thirty-day survival among Manitoba patients labeled as “emergency,” “scheduled,” and “delayed” were minimal.<sup>14</sup>

Analyses of hospital size were only suggestive. Hip fracture patients in low-volume hospitals (thirty-nine or fewer repairs annually among the elderly) were only 1.15 times as likely to die in the thirty days after surgery as were their counterparts in higher-volume hospitals. One of five high-volume Manitoba hospitals had relatively high mortality rates.

**Cardiovascular surgery.** As stressed in the Bush proposal, thirty-day mortality for concurrent valve replacement/bypass surgery was signifi-

cantly higher in Manitoba than in New England (although the number of Manitoba cases was quite low-101).<sup>15</sup> Because of the “judgment call” made by the surgeon in deciding to perform the concurrent procedure, looking at the three open-heart operations (coronary artery bypass, valve replacement, and the concurrent surgery) is particularly informative. Considering the three procedures together, unadjusted thirty-day results favor New England (6.4 percent mortality versus 7.1 percent for Manitoba). While in both regions the number of deaths is greater by one year after cardiovascular surgery (933 deaths in the two regions, versus 511 at thirty days), Manitoba mortality is less than that of New England (10.7 and 12.1 percent, respectively). Manitoba’s advantage is even greater after three years—15.4 percent versus 18.5 percent in New England. Adjusted figures show an almost identical trend.

**Prostatectomy.** Because the results for open prostatectomy were inconsistent with those of the other procedures, we examined the type of procedure (open or transurethral) and the presence of an associated prostate or bladder cancer diagnosis. Two lines of evidence suggest that despite our statistical controls, New England males having open prostatectomies were healthier than their Manitoba counterparts. First, the open procedure is used at a much higher rate in Manitoba (14.9 percent of prostatectomies) than in New England (4.6 percent). Outcomes favored New England only for those having open procedures, with the greatest difference occurring among patients without an associated cancer diagnosis. Long-term survival among males having transurethral procedures favored Manitoba, with the larger difference for those with an associated cancer diagnosis. When all subgroups are combined, the adjusted odds ratios go from 1.08 at thirty days to 0.92 at three years.

Second, international comparisons show ninety-day and one-year age-adjusted Manitoba mortality figures close to those reported in Denmark and in Oxfordshire, England.<sup>16</sup> Among the four jurisdictions, New Englanders had the highest relative risk when transurethral prostatectomies were compared with the open procedures (an odds ratio of 2.18 for one-year mortality). Such findings are consistent with different selection criteria being applied in New England.

**Additional analyses.** Using 1980–1986 Manitoba information and pooling across all procedures, odds ratios for thirty-day mortality slightly favor New England. However, the odds ratios for three-year mortality favor Manitoba (0.84 to 0.91, depending on the statistical model); the Manitoba advantage increases even further (0.77 to 0.85) when repair of hip fracture (which has the largest number of cases) is not included.

Although fewer operations are available, Manitoba data from 1983–1986 are closer in time to the New England 1984–1985 data. Compari-

sons for these sets of years show slightly smaller Manitoba long-term advantages for low- and moderate-mortality procedures. On the other hand, the long-term comparisons suggest a Manitoba advantage following the high-mortality procedures; here, the adjusted odds ratios changed from 1.05 (1980–1986 Manitoba data) to 0.95 (1983–1986 data) for one-year survival and from 0.96 to 0.91 for three-year survival.

**Differences in life expectancy.** Life expectancy in Manitoba for those age sixty-five and older seems several months longer than the Canadian average, which is in turn slightly greater than the New England mean.<sup>17</sup> Manitoba death rates are consistently lower than those in New England for men and women ages sixty-five to eighty-five (Exhibit 6). Despite our statistical controls, these differences in the underlying population appear reflected in the surgical outcomes.

Our findings clearly raise more questions than they answer. Nevertheless, they have important implications, not only for those who consider the Canadian system either nirvana or anathema, but also for those trying to define value in health care in the hope that organizational changes or enhanced consumer choice will improve overall health.

### Why Do Manitoba Residents Live Longer?

What explains the better Manitoba long-term outcomes and improved population survival, regardless of the type of surgery and relative surgical rates? Population mortality might vary because of differential susceptibility (inherited biologic potential), individual lifestyles (health habits and behavior), physical environment (exposure to physical, chemical, and biological agents), social environment (aspects of social

**Exhibit 6**  
**Risk Of Death During The Next Year For Manitoba And New England Elderly**

Age	Manitoba <sup>a</sup>		New England <sup>b</sup>		Manitoba/New England ratio	
	Male	Female	Male	Female	Male	Female
65	2.29	1.11	2.61	1.43	.88	.78
70	3.58	1.79	4.15	2.14	.86	.84
75	5.45	2.86	6.86	3.00	.79	.95
80	8.12	4.70	8.75	5.53	.93	.85
85	12.59	9.19	14.43	9.22	.81	1.00

**Source:** For Manitoba, Statistics Canada, *Life Tables, Canada and Provinces*, 1985-1987, Catalogue 541-044 (Ottawa: Statistics Canada, 1989); and for New England, Health Care Financing Administration, Medicare enrollment files.

**Note:** Risk of death is expressed per 100 procedures.

<sup>a</sup> 1985v1957.

<sup>b</sup> 1985.

organization, particularly levels of social isolation, deprivation, stress, and powerlessness), and health services.<sup>18</sup>

Better health may largely depend on factors beyond the direct control of the health care system. The uniformity of the observed trends across type of surgery, similar causes of death in the two countries, and annual mortality rates favoring Manitoba at each age suggest that disease-specific factors are not responsible.<sup>19</sup> Although lifestyle surveys suggest that Canadians smoke more than Americans, Canadians exercise more.<sup>20</sup> Despite our statistical controls, Canadians' better outcomes may be explained by a lower preoperative risk of death. If an inadequately measured Manitoba advantage over New England in presurgical health is real, then in studying postsurgical mortality, the odds ratios should be adjusted in New England's favor. Unfortunately, we know neither the extent of such a statistical adjustment nor whether it should be made.

Health care systems may also contribute to the observed outcomes. The greater accessibility of both primary care and long-term care services in Canada is likely to promote improved health. In the United States, posthospital treatment for the elderly can be provided either at home or in skilled nursing facilities. However, Medicare restricts the duration of such services and requires patient cost sharing. Only the poorest elderly are covered for long-term care without restriction. In Canada, posthospital treatment and care is usually provided either at home or in a geriatric rehabilitation unit, without restrictions as to time or site and at no charge to the patient. These rehabilitation units, generally staffed by certified geriatricians, provide in-facility rehabilitation for as long as required and may continue to provide these services on an outpatient basis. Such services, along with the general freedom from worry about health care costs, no doubt underlie Canadians' greater satisfaction with their health care system.<sup>21</sup>

The outcomes of hip fracture in the two countries may be instructive. Since the role of physician discretion in deciding whether to operate is minimized, an important source of variation is essentially eliminated. The health status of patients suffering hip fractures should be similar (after controlling for age) in the two countries. Surgical rates for hip fracture repair were nearly identical in Manitoba (50.0 operations per 10,000 elderly) and New England (50.5). The patients' age (81.6 and 81.9 for Manitoba and New England) and percentage of high-risk diagnoses (22.9 and 25.0, respectively) are quite similar.

To a considerable extent, short-term survival will reflect the timeliness, intensity, and quality of medical care. Thus, the relatively poor thirty-day survival of Manitoba hip fracture patients may relate to the difficulty of bringing patients to surgery rapidly. Intensity of treatment

may also bring short-term (but not long-term) survival benefits.<sup>22</sup>

Both the cause of the higher acute mortality in Manitoba and the improved subsequent survival of Manitoba hip fracture patients bear further scrutiny. Comparisons between jurisdictions highlight areas where quality might be improved; the Manitoba short-term survival rates should not be seen as written in stone. Since the survival curves of New England and Manitoba patients do appear to meet—indicating at least equal long-term survival in Manitoba—the health care system may well contribute to improved longevity.

A robust relationship between socioeconomic status and health has been found in many studies and seems ubiquitous to industrialized countries. Thus, reducing inequalities in economic status may mitigate class differences in health status.<sup>23</sup> As a percentage of gross domestic product (GDP), public expenditures on health, family benefits, and unemployment insurance are higher in Canada than in the United States. Support for the poor elderly is probably greater in Canada, since American pension benefits are more related to earnings.<sup>24</sup> To the extent that Canada's social programs have reduced poverty, they should have improved health status and added to Canadian life expectancy.

On the other hand, factors other than social class also appear important.<sup>25</sup> Despite economic, social, and geographic similarities, male and female life expectancies in British Columbia exceed those in the state of Washington by between 1.5 and 2 years. Relatively long life expectancies in rural states such as Iowa point to the importance of lifestyle and physical environment.<sup>26</sup> Indeed, the variations in mortality rates across American states are larger than the differences between Manitoba and New England. Controlling for known prognostic factors—variables that measure individual patients' medical conditions—seems unlikely to be able to explain away a large part of these differences.<sup>27</sup>

The differences in life expectancy noted here are considerably larger in magnitude than the variations associated with many health promotion and medical treatment strategies. Thus, a "best-case" scenario associated with reduction of fat in the American diet leads to an increase in life expectancy of only three to four months.<sup>28</sup> From a different perspective, the expected outcomes of watchful waiting versus immediate transurethral resection for benign prostatic hypertrophy varied only 2.94 "quality-adjusted life-months" in an analysis of seventy-year-old men.<sup>29</sup>

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### How Might We Learn More?

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Competing explanations for our findings and their potential policy importance suggest several lines of inquiry. First, new data collection

might provide answers to such questions as, How healthy are Canadian and American patients before and after surgery? How many patients in each jurisdiction are served by home care after surgery? How does the frequency of transfer to a rehabilitation unit for further therapy in Manitoba compare with the frequency of transfer to a skilled nursing facility in New England? Second, adding census data on social class to existing administrative data would help sort out the potential impact of social supports. In Manitoba, recent research has found no statistically significant relationships between several measures of social class and poor health outcomes in the elderly.<sup>30</sup> If the Manitoba/New England mortality differences are concentrated in the lowest quintile in income distribution, explanations based on Canada's more generous medical and social programs would become more plausible.

Third, research on long-term treatment outcomes should consider baseline mortality rates across the catchment areas of cooperating hospitals.<sup>31</sup> Because the benefits and risks of different treatment alternatives vary with expected life span, the generalizability of findings will be affected by the baseline risks in the population.<sup>32</sup> Surgical therapies with short-term risks will generally have higher costs per quality-adjusted life year as mortality (baseline or patient-specific) increases; the average patient will have less time to "recover" the costs and risks of surgery.<sup>33</sup> Recent, well-publicized efforts to better inform patients about the outcomes of various treatment options should take into account local data on both short-term and longer-term mortality.<sup>34</sup>

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## Policy Implications

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Differences in per capita health spending of a magnitude similar to that observed between the United States and Canada are seen across the United States and within states.<sup>35</sup> The size of the observed differences in per capita expenditures and the absence of known benefits from higher spending levels suggest that substantial resources may be available within current U.S. health care spending for reallocation to meet currently unmet needs.<sup>36</sup> The lower health expenditures and the greater population longevity in Canada suggest that it may even be possible to achieve better population health for fewer dollars.

Our findings indicate that despite talk of a "health care crisis," there is no such crisis in Canada. Up until now, Canada has been relatively successful in controlling costs as a proportion of its wealth while providing universal access. With the Canadian economy in poor shape, the current challenge is to contain costs and further improve quality in a system that, all in all, has outperformed its American counterpart.<sup>37</sup>

Such goals can be met only if we begin to address the difficult questions of the determinants of population health. What is the appropriate mix of expenditures among ambulatory care, acute hospital care, and long-term care that is associated with the best long-term outcomes? What is the role of social programs in achieving improved survival among the elderly? What is the relationship between short-term outcomes and long-term health status? We recognize that posing trade-offs between health policy and social policy complicates matters greatly. However, the Canadian experience suggests that a comprehensive approach to the problem of health expenditures is warranted. As health care debates in both the United States and Canada continue, our study argues forcefully that we consider the following: Are we asking the right questions as we pursue value in health care?

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## NOTES

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