

# The Growth of Physician Services for the Elderly in the United States and Canada: 1987-1992

Steven J. Katz  
University of Michigan  
W. Pete Welch  
Congressional Budget Office  
Diana Verrilli  
Radiology Management Sciences

*The authors compared the growth of expenditures, prices, and volume and intensity of physician services delivered to the elderly in the United States and Canada from 1987 to 1992 using claims-level data from U.S. Medicare and from Ontario, Quebec, and British Columbia. Services were classified into clinical categories and per capita annualized expenditure, price, and volume growth ratios were calculated for each category. The expenditure growth rate is higher in the United States than in Canada for evaluation and management services (8.8 percent versus 4.5 percent), but it is lower for procedures (2.9 percent in the United States versus 4.8 percent in Canada). For procedures, prices decreased 2.4 percent per year in the United States but increased 1.0 percent per year in Canada, while volume increased faster in the United States (5.4 percent versus 3.8 percent in Canada). In both countries, high volume growth rates are observed in categories containing newly emerging procedures. Although policies to control prices appear easier to implement than policies to control the volume and intensity of medical care, their success in controlling expenditures is uncertain. Nonetheless, Canada has been more successful at controlling the growth in the volume of procedures than the United States.*

As prospects for national health reform have faded, the federal government is still seeking ways to curb the growth of Medicare spending. Despite pro-

*Medical Care Research and Review*, Vol. 54 No. 3, (September 1997) 301-320  
© 1997 Sage Publications, Inc.

gress in slowing the rate of growth in physician services, overall Medicare expenditures continue to increase at a rate that many consider unaffordable. Since the early 1980s, Medicare has been one of the fastest-growing federal spending programs, with overall expenditures rising at 9.9 percent annually between 1984 and 1994 (Health Care Financing Administration 1996). The Congressional Budget Office estimated recently that Medicare expenditures for physician expenditures would continue to increase at annual rates of 9.9 percent and 11.0 percent from now until 2006 (Congressional Budget Office 1996).

The factors contributing to the high rate of physician expenditure growth include increases in the number and average age of beneficiaries, increases in physician fees, and increases in the volume and intensity of services (Berenson and Holahan 1992). The largest components of growth, however, are the number and the intensity of services used per capita (Physician Payment Review Commission 1991; Zuckerman and Holahan 1992). For example, using Medicare claims data for 1986 through 1989, Zuckerman and Holahan found that 60 percent of the total growth in expenditures was due to increases in the volume and intensity of services.

The Canadian health care system continues to draw the interest of U.S. policy makers as expenditures per capita continue to diverge between the two nations. By 1994, the absolute difference in expenditures reached its largest gap of 4.6 percentage points (9.7 percent of gross domestic product [GDP] in Canada versus 14.3 percent of GDP in the United States). Several studies have shown that this gap results from much lower prices in Canada (Fuchs and Hahn 1990; Redelmeier and Fuchs 1993) and, to a lesser degree, lower volume and intensity of procedure-related services (Welch et al. 1996). Although between-country differences in levels of spending on medical care have been well studied, much less is known about differences in the growth of spending. Indeed, no studies have examined directly how changes in prices and service volume and intensity affect expenditure growth in the United States relative to Canada.

---

Support for this research was provided by the Robert Wood Johnson Foundation to the Urban Institute and University of Michigan. Dr. Katz is a Robert Wood Johnson Generalist Faculty Scholar. When this research was conducted, both Dr. Welch and Ms. Verrilli were at the Urban Institute. The views expressed here are those of the authors and do not necessarily represent the views of the institutions with which they are affiliated. We would like to acknowledge assistance provided by the Health Ministries in Ontario, Quebec, and British Columbia and by the United States Health Care Financing Administration. We thank John Holahan and Stephen Zuckerman for helpful comments on earlier revisions of the article. We also appreciate the coding assistance of Robert Seeman. This article, submitted to *Medical Care Research and Review* on November 20, 1996, was revised and accepted for publication on March 22, 1997.

In this study we examine the determinants of differences in the growth of spending for physician services for the elderly between the United States and Canada from 1987 to 1992 by answering three questions. First, how do between-country differences in the growth of prices and service volume and intensity contribute to higher average annual increases in health expenditures in the United States compared with Canada? Second, how do expenditure, volume and intensity, and price changes in each country vary by type of physician service? Third, while prior studies have documented large absolute differences in service use for certain procedures, are levels of service use in Canada and the United States converging, diverging, or moving in parallel directions over time?

### **NEW CONTRIBUTION**

This study is unique in several respects. First, it is the first study to directly quantify and compare the growth in expenditures for medical services for the elderly in the United States and the three largest provinces in Canada (accounting for about 70 percent of the Canadian population). Second, it examines how changes in prices and the volume and intensity of services affect expenditure growth differences between countries. Finally, the study examines between-country differences in expenditures, prices, and volume and intensity trends by clinical category using a unique clinical classification system.

## **DATA AND METHOD**

### **DATA**

We measured expenditure and service volume and intensity growth using a 1 percent random sample of elderly beneficiary claims data from Medicare's National Claims History System for 1992. Since a similar claims file did not exist for 1987, we used data from the Procedure File, which is drawn from the Part B Medicare Annual Data (BMAD) file. This file contains a summary of 100 percent of the claims received by all Medicare beneficiaries, including the elderly and nonelderly disabled persons. Comprising about 10 percent of the Medicare population, the nonelderly disabled population accounts for about 10 percent of all physician expenditures. To correct for the inclusion of nonelderly disabled persons in this file, we adjusted for differences in the age composition by age and sex adjustment. This process is described below.

Both files were edited in a number of ways such as omitting claims for nonphysician services (i.e., durable medical equipment and drugs). To esti-

mate expenditures and service volume and intensity on a per beneficiary basis, we used information from the 1987 Medicare Denominator Files. Since claims for Medicare beneficiaries enrolled in HMOs are not reported in our claims files, we omitted these persons from our beneficiary counts.

Service volume and expenditure data for Canada represent 100 percent of physician claims received by provincial ministries of health of Ontario, Quebec, and British Columbia in 1987 and 1992. The one exception was 1987 claims data for Ontario for which file size consideration necessitated a 25 percent random sample of claims for elderly persons. To estimate service volume and intensity and expenditures on a per-elderly-person level, we used population census data for each province.

Most types of physician services are included in the analysis, with the exception of imaging, dialysis, pathology, anesthesia, and oncology. These types of services are omitted because of either large differences in payment methods or variations in how services are defined or reported in each province and Medicare. For instance, imaging services are excluded, in part, because the provinces typically include these services in hospital global budgets. Therefore, physicians are not typically paid directly for these services. Oncology services are excluded for similar reasons. Dialysis services are excluded because of problems with how these services are reported in the United States. Finally, clinical laboratory services are excluded because it was not possible to identify similarly defined services in the provincial coding systems.

## **CLASSIFYING TYPES OF SERVICES**

To investigate between country differences in expenditure and service volume and intensity rates, we used a type of service classification system that was developed originally to analyze Medicare claims with clinically meaningful service groupings (Berenson and Holahan 1992). This system assigns each Medicare service code, as defined by the American Medical Association's Current Procedural Terminology (CPT), to a unique service category. Although CPT codes are used extensively in the United States, each Canadian province has a unique coding system, with at least 2,500 codes. We used the same classification criteria we used for Medicare to assign each provincial code to a unique service category.

The service classification system we used defines three distinct service categories: evaluation and management services, procedures, and physician tests. For purposes of this article, we used subsets of these three categories, which consisted of 18 broad categories and 54 more detailed categories of physician services. We used the broad categories to investigate general patterns of services use, and we used selected detailed categories to investigate

narrow issues such as differences in the volume and intensity growth of coronary angioplasties.

More specifically, the evaluation and management service category was divided into six categories: office, hospital, emergency room, home and nursing home, specialist services, and consultations. The first four of these categories pertain to visits, as distinguished by where the service takes place. The specialist category includes specialty-specific evaluation and management services, including services provided by ophthalmologists, allergists, and psychiatrists.

The procedure category was delineated into six categories: three major procedure categories (general, cardiovascular, and orthopedic surgical procedures that are typically provided on an inpatient basis), two ambulatory procedure categories (eye and other procedures that are typically provided on an outpatient basis), and an endoscopy category. Finally, the physician test category includes cardiac stress tests, electrocardiographic monitoring and other diagnostic tests (e.g., nerve sensory conduction tests).

Using this classification system, a physician member of our team (Katz) assigned each provincial code to a unique service category. These classifications were reviewed by a physician consultant and another member of our team (Verrilli). Ambiguities were typically resolved through phone conversations with representatives from the relevant Ministry of Health.

## **MEASURING PRICE AND VOLUME AND INTENSITY GROWTH**

To assess between country differences in price and volume and intensity growth, we decomposed the growth in spending in each country into the growth in prices and the growth in the volume and intensity of services. To measure Canadian and Medicare price growth, we used a Laspeyres index, which is based on a fixed set of services. The index is computed by first calculating the ratio of each service code's 1992 price to its 1987 price. Each service code's price ratio is then weighted by its 1987 service volume to compute an overall estimate of price growth for the service category.

To measure volume and intensity growth we used another fixed-weight index called a Paasche quantity index. This index provides a measure of the change in volume and intensity of services per elderly using fixed prices. This index equals the ratio of each service code's 1992 service volume to its 1987 service volume, weighted by each service's price in 1992. The weights recognize the fact that each fee code can have different intensities as reflected in the 1992 price. Volume growth was therefore calculated indirectly as a function of expenditure growth and price growth.

The intensities used as weights are obtained differently for the two countries. For Canada, intensity for each service was calculated as the 1992 price for that service. For the United States, since the U.S. Health Care Financing Administration sets fees using relative value units (RVUs), which are based on resource costs, we also calculated intensity for each service as the price. However, in the case of Medicare, price is determined by multiplying each code's total number of RVUs by the 1992 Medicare conversion factor. The conversion factor is a dollar amount that converts the RVUs into monetary units. We used the 1993 Medicare fee schedule to assign RVUs to physician services because it was more complete and consistent than the 1992 fee schedule. We used total RVUs that are the sum of work, practice expense, and malpractice expense RVUs (Federal Register 1993).

Although the analysis focuses on the growth in expenditures, prices, and the volume and intensity of physician services, we needed to know both the 1987 and 1992 level of service volume and intensity to determine whether levels of service volume and intensity in the United States and Canada are converging, diverging, or moving in parallel over this period. Since we did not have a measure of service volume and intensity for Canada in 1987 (i.e., only service volume was available), we used levels of volume and intensity for 1992 and the growth rate in volume and intensity for 1987 through 1992 to back out a level of volume and intensity for 1987.

The 1992 Canadian service volume and intensity data we used are from a study by Welch and colleagues, which measured levels of volume and intensity directly using RVUs. This study assigned Medicare RVUs to provincial fee codes in each of the data sets we use in this analysis (Welch et al. 1996). Using these data for 1992, we estimated what volume and intensity would have been in 1987, given the volume and intensity growth we estimated for 1987 through 1992.

To summarize the provincial-level service volume and intensity estimates, we weighted each province's service volume and intensity estimates by its share of the total elderly population. The relative weights used were about one-half (Ontario), one-third (Quebec), and one-sixth (British Columbia).

Expenditure and volume and intensity estimates per elderly person were adjusted using indirect standardization to address differences in the underlying age and sex composition in each province, and the U.S. Medicare data for 1992 were used as the reference group. Within each type of service category, mean RVUs and expenditures per elderly were calculated for 10 age-sex cells to derive age-sex adjusted RVUs and expenditures per elderly. To adjust for the presence of nonelderly persons in the 1987 Medicare data, an age category for the nonelderly was included. Expenditures and RVUs in each type of service category were then divided by the adjustment factor.

## RESULTS

Table 1 shows the overall results of decomposing the rate of growth of U.S. and Canadian physician expenditures for all physician services and three broad types of service categories. For all services, the annual growth in expenditures between 1987 and 1992 was 6.1 percent in the United States and 4.7 percent in Canada. Across broad service categories, differences in expenditure growth between the two countries varied markedly.

For instance, the expenditure growth rate for evaluation and management services was higher in the United States than in Canada (8.8 percent versus 4.5 percent). In contrast, the expenditure growth rate for procedures was actually lower in the United States (2.9 percent versus 4.8 percent in Canada). Expenditure growth rates for physician tests were more similar between countries (7.8 percent in the United States versus 9.7 percent in Canada).

Since prices increased slowly during this period, expenditure growth in both countries can be explained largely by increases in service volume and intensity. More important, volume and intensity grew more than twice as fast in the United States than in Canada (4.9 percent annually versus 2.6 percent in Canada). Between-country differences in volume and intensity growth were largest for evaluation and management services (4.5 percent in the United States versus 2.1 percent in Canada), followed by procedures (5.4 percent in the United States versus 3.8 percent in Canada). The physician test category was the only service category where volume and intensity growth was higher in Canada than in the United States (9.7 percent in Canada versus 8.0 percent in the United States). This greater increase in volume and intensity in the United States drives the expenditure growth difference between the two countries.

In each country, the interplay between price and volume and intensity in explaining expenditure growth varies substantially by broad service category. In both countries, growth in prices and volume and intensity contribute equally to the growth of expenditures for evaluation and management services. In contrast, expenditure growth for procedures and tests are almost entirely due to volume and intensity growth in both countries.

### VOLUME AND INTENSITY GROWTH RATES BY TYPE OF SERVICE CATEGORIES

Table 2 shows the growth in volume and intensity of physician services by more detailed categories. Volume and intensity are measured in terms of RVUs per elderly and are age and/or sex adjusted. Differences in the volume and intensity growth rates in each country indicate that for some service catego-

TABLE 1 Growth<sup>a</sup> in Expenditures, Prices, and Volume and Intensity of Physician Services, by Type of Service, United States Versus Canada, 1987-1992

Type of Service Category	United States			Canada			United States-Canada		
	Expenditures	Price	Volume	Expenditures	Price	Volume	Expenditures	Price	Volume
All services	6.1	1.1	4.9	4.7	2.0	2.6	1.4	-0.9	2.3
Evaluation and management	8.8	4.2	4.5	4.5	2.3	2.1	4.3	1.9	2.4
Procedures	2.9	-2.4	5.4	4.8	1.0	3.8	-1.9	-3.4	1.6
Physician tests	7.8	-0.2	8.0	9.7	0.0	9.7	-1.9	-0.2	-1.7

a. Age-sex adjusted growth rates, annualized, percentage.



ries, levels of service use in Canada and the United States are becoming more comparable, that in other categories they are becoming more divergent, while still others remain generally unchanged. Variations in each country's volume and intensity growth rates and differences in the levels of 1987 service volume and intensity can lead to large absolute differences in service volume and intensity in 1992 depending on the type of service category.

For categories where the 1987 baseline volume and intensity are lower in the United States than in Canada, higher U.S. growth rates results in convergence of levels. This is the case for evaluation and management services. In five out of six of the evaluation and management categories, U.S. volume and intensity growth rates were substantially higher than the rates for Canada. Indeed, there was at least a twofold or greater difference in between-country volume and intensity growth for office visits, emergency room visits, and specialist services in the United States compared with Canada. For example, the growth in specialist services was 11.8 percent in the United States compared with 5.7 percent in Canada.

For categories where the 1987 baseline service level is higher in the United States than in Canada, a higher growth rate results in further divergence of levels. This is the case for most procedure categories. For example, the volume and intensity growth rate for cardiovascular procedures was 7.3 percent in the United States and 4.1 percent in Canada. Given the higher 1987 base rate in the United States (1.05 RVUs versus 0.73 RVUs per elderly in Canada), the absolute increase in procedure volume and intensity in the United States was 2.4 times that of Canada, resulting in further divergence of rates between countries. For physician tests, both the baseline volume and intensity and growth were more similar in the two countries, leading to generally comparable levels of service volume and intensity in 1992.

While the growth in service volume and intensity varied by service category in each country, it was the case that where volume and intensity growth for a service category was relatively large in Canada, it was also relatively large in the United States. For instance, within the broad evaluation and management category, volume and intensity growth rates in both countries were highest for visits to specialists and consultations. Further, within the broad procedure category, growth in the volume and intensity for general procedures (e.g., colectomy or hysterectomy) is quite modest (1.3 percent in the United States versus 0.3 percent in Canada); on the contrary, growth rates for cardiovascular procedures and endoscopy procedures are respectively 7.3 percent and 7.8 percent in the United States and respectively 4.1 percent and 6.1 percent in Canada. Finally, ambulatory procedures and eye procedures were also important sources of service growth in both countries.

TABLE 2 Growth in the Volume and Intensity<sup>a</sup> of Physician Services in the United States and Canada by Type of Service, 1987-1992

Type-of-Service Category	United States			Canada		
	Volume 1987	Volume 1992	Volume Growth <sup>b</sup>	Volume 1987	Volume 1992	Volume Growth
All services	21.62	27.18	4.9	28.31	32.24	2.6
Evaluation and management	12.92	15.78	4.5	21.39	23.43	2.1
Office visits	4.83	6.07	4.7	7.47	8.49	2.4
Hospital visits	4.53	4.81	1.2	5.35	5.53	-1.7
Emergency room visits	0.59	0.76	5.4	2.11	2.03	-0.8
Home/nursing home visits	0.78	0.73	-1.4	3.22	3.10	-2.3
Specialist evaluation and management	1.01	1.64	11.8	1.14	1.45	5.7
Consultation	1.19	1.75	8.0	2.11	2.83	6.1
Procedures	8.13	10.58	5.4	6.40	7.99	3.8
Major-general	1.49	1.60	1.3	1.34	1.58	0.3
Major-cardiovascular	1.05	1.49	7.3	0.73	0.90	4.1
Major-orthopedic	0.84	1.04	4.2	0.75	0.90	3.4
Ambulatory-eye	1.74	2.32	6.0	1.12	1.52	6.2
Ambulatory-other	2.11	2.83	6.0	1.60	1.95	4.0
Endoscopy	0.89	1.30	7.8	0.85	1.15	6.1
Physician tests	0.57	0.83	8.0	0.52	0.81	9.7

Note: Numbers may not exactly sum and growth rate estimates may not be derived exactly because of rounding.

a. Service volume is measured in terms of relative value units (RVUs) per elderly and is age/sex adjusted.

b. Age/sex-adjusted growth rate, annualized, percentage. Since each service code is weighted by each service's price, the estimated change in volume and intensity cannot be derived by computing an average annual growth rate (i.e., the ratio of 1992 volume and 1987 volume).

To quantify this similarity in volume and intensity growth between countries, we calculated the correlation between each country's volume and intensity growth rate, where the unit of analysis is the type of service category. The correlation coefficient was statistically significant for all broad service categories: 0.82 for evaluation and management categories ( $t$  value 2.45[4],  $p < 0.05$ ),

0.87 within procedures ( $t$  value 3.55[4],  $p < 0.05$ ) and 0.77 for all services (including physician tests,  $t$  value 3.94[11],  $p < 0.05$ ).

To assess the underlying variation in volume and intensity growth rates within the procedure categories, Table 3 further disaggregates the five broad procedure categories: major general procedures, major cardiovascular procedures, major orthopedic procedures, ambulatory eye procedures, and endoscopies. Despite large between-country differences in the 1987 and 1992 volume and intensity levels, the growth in volume and intensity for each country was similar in Canada and the United States. In both countries, volume and intensity grew more slowly for procedures that might be considered to be more routine or well established. These include major breast procedures, cholecystectomy, colectomy, hernia repair, abdominal aortic aneurysm repair, and hip fracture repair.

In contrast, volume and intensity growth rates for services that might be considered emerging or more technologically intense were relatively high in both countries. These include coronary artery bypass graft (8.1 percent versus 9.5 percent in Canada), coronary angioplasty (25.8 percent versus 28.3 percent in Canada), knee replacement (9.2 percent versus 12.4 percent in Canada), ambulatory eye procedures (6.0 percent versus 6.2 percent in Canada), arthroscopy (11.3 percent versus 16.2 percent in Canada), and colonoscopy (13.4 percent versus 9.2 percent in Canada).

For all of these procedures, however, the 1987 baseline of volume and intensity was higher in the United States than in Canada. Thus, despite similar relative growth rates for these procedures, levels of volume and intensity in 1992 continued to be substantially higher in the United States. For example, although the growth in volume and intensity of coronary angioplasty was similar in the two countries, 1987 volume and intensity increased from 0.04 to 0.14 in 1992 in the United States and increased from 0.01 to 0.05 per elderly person in 1992 in Canada. This resulted in a further divergence in the levels of volume and intensity of coronary angioplasties in Canada and the United States in 1992.

For some service categories, however, higher volume and intensity growth in the United States resulted in convergence of volume and intensity levels between the two countries in 1992; for other categories, higher volume and intensity growth in the United States led to larger between-country differences in levels of volume and intensity in 1992. To illustrate this point, the extent to which levels of volume and intensity either converged or diverged between countries from 1987 to 1992 is shown for selected procedures in Figure 1.

As shown in the figure, relatively larger increases in the volume and intensity of total hip replacements in Canada compared with the United States

TABLE 3 Growth in the Volume and Intensity of Selected Procedures in the United States and Canada, 1987-1992

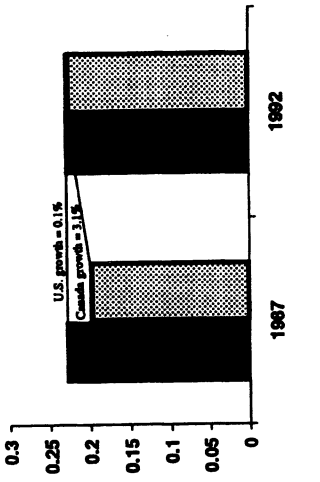
Type-of-Service Category	United States			Canada		
	Volume 1987 <sup>a</sup>	Volume 1992	Volume Growth <sup>b</sup>	Volume 1987	Volume 1992	Volume Growth
Major-general	1.49	1.60	1.3	1.34	1.58	0.3
Laminectomy	0.08	0.14	11.3	0.05	0.06	3.8
Cholecystectomy	0.16	0.17	1.4	0.14	0.15	1.4
Breast	0.09	0.09	0.8	0.06	0.07	2.0
Colectomy	0.17	0.16	-0.8	0.10	0.10	0.3
Hysterectomy	0.08	0.07	-2.0	0.06	0.07	2.0
Major-cardiovascular	1.05	1.49	7.3	0.73	0.90	4.1
Coronary angioplasty	0.04	0.14	25.8	0.01	0.06	28.3
Coronary artery bypass graft	0.29	0.43	8.1	0.12	0.19	9.5
Pacemaker insertion	0.07	0.08	4.8	0.04	0.06	6.0
Abdominal aortic aneurysm repair	0.06	0.06	0.4	0.08	0.08	-1.6
Major-orthopedic	0.84	1.04	4.2	0.75	0.90	3.4
Knee replacement	0.18	0.28	9.2	0.12	0.22	12.4
Femoral fracture repair	0.22	0.25	2.5	0.25	0.26	1.1
Hip replacement	0.23	0.23	0.1	0.20	0.23	3.1
Ambulatory-eye	1.74	2.32	6.0	1.12	1.52	6.2
Cataract extractions	1.16	1.50	5.2	0.81	1.06	5.6
Endoscopy	0.89	1.30	7.8	0.85	1.15	6.1
Colonoscopy	0.23	0.43	13.4	0.15	0.24	9.2
Arthroscopy	0.04	0.07	11.3	0.03	0.06	16.2
Upper gastrointestinal endoscopy	0.24	0.35	7.9	0.24	0.30	4.5
Sigmoidoscopy	0.10	0.09	-1.3	0.08	0.08	-1.4

Note: Numbers may not exactly sum and growth rate estimates may not be derived exactly because of rounding.

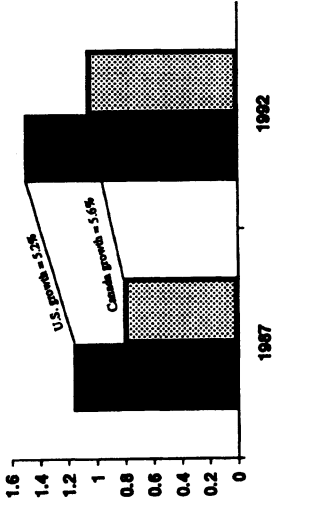
a. Service volume is measured in terms of relative value units (RVUs) per elderly and is age/sex adjusted.

b. Age/sex-adjusted growth rate, annualized, percentage. Since each service code is weighted by each service's price, the estimated change in volume and intensity cannot be derived by computing an average annual growth rate (i.e., the ratio of 1992 volume and 1987 volume).

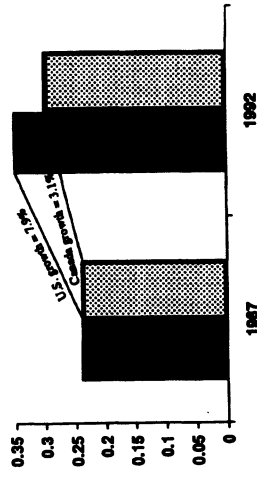
### Hip Replacement



### Cataract Extraction



### Upper GI Endoscopy



### Laminectomy

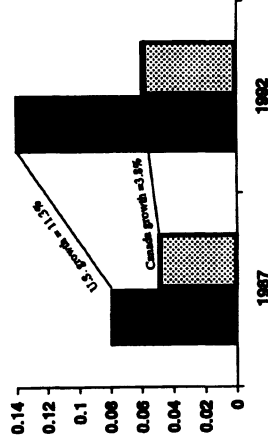


FIGURE 1 Volume and Intensity Growth of Selected Procedures in the United States and Canada, 1987-1992

Note: Volume and intensity are measured in terms of relative value units per elderly person and are age/sex adjusted.

led to more comparable levels of hip replacements in both countries in 1992. However, similar increases in the volume and intensity of cataract extractions in both countries resulted in little change in the large volume and intensity differential in the two countries in 1992. For example, in 1987, there were 43 percent more cataract extractions in the United States than in Canada and in 1992, this differential dropped slightly to 41 percent. Large differences in the magnitude of volume and intensity growth in the United States relative to Canada for upper gastrointestinal endoscopy and laminectomy categories drove the large between-country gap in 1987 volume and intensity levels even higher in 1992.

## COMMENT

### EXPENDITURES

We found that during the period from 1987 to 1992, the United States was generally less successful than Canada at containing the growth of per elderly spending for physician services. This finding is particularly interesting because price growth was lower in the United States than in Canada during this time frame. Thus, Canada's success in controlling spending is entirely the result of substantially lower growth in the volume and intensity of services per elderly.

### PRICES

The small price changes observed in both countries reflect the success of price control policies. In the United States, efforts to constrain increases in physician fees include limiting increases in the Medicare Economic Index, which is used to adjust fees for inflation. And under the *Omnibus Budget Reconciliation Act of 1987, 1988, and 1990* (Physician Payment Review Commission 1992), specific cardiovascular, orthopedic, ophthalmologic, and endoscopic procedures considered overpriced were reduced. Further price reductions occurred under the Medicare Fee Schedule in 1992. The growth in prices we observed during the study period is lower than that observed for periods prior to the implementation of these policies. For instance, Medicare prices grew 3.6 percent per year during a period from 1983 to 1985 (Holahan, Dor, and Zuckerman 1990).

In Canada, fees have been constrained for two decades through negotiations between provincial payers and the medical associations (Katz, Zuckerman, and Welch 1993; Lomas, Charles, and Greb 1992). More recently, provincial

governments have negotiated global expenditure limits, whereby exceeding a negotiated target results in extracting funds from physicians through across-the-board fee reductions or onetime payback in concurrent or subsequent years. These global expenditure policies have been in place in the provinces under study for at least 6 years.

## VOLUME AND INTENSITY

The growth in the volume and intensity of services has become the driver of per elderly spending growth in both countries. The volume and intensity growth rate for all services is 88 percent higher in the United States than in Canada. This difference is largely a result of a more than twofold difference in growth rates for evaluation and management services. Although the between-country difference in higher growth rates for procedures is more modest, in absolute terms this growth is more impressive because 1987 baseline volume and intensity were already 27 percent higher in the United States than in Canada. This is particularly striking for cardiovascular and ambulatory eye procedures.

## PROCEDURES

For cardiovascular procedures, a higher relative growth rate (7.3 percent versus 4.1 percent in Canada) resulted in a much larger increase in absolute terms (0.44 RVUs per elderly versus 0.17 in Canada). Even for angioplasty where the relative growth rate was slightly higher in Canada, the much higher 1987 base rate in the United States translated into a much greater increase in absolute terms in the United States. Similarly, while there was virtually no between-country difference in growth rates for eye procedures, the much higher baseline rate in the United States resulted in a 42 percent greater increase in the per elderly volume and intensity of these procedures in the United States compared with Canada.

Although procedure growth rates are higher in the United States than in Canada, the pattern of growth in the two countries is quite similar across procedure categories. For instance, the volume and intensity of medically advanced procedures such as cataract extractions, knee replacements, coronary artery bypass grafts, arthroscopies, and colonoscopies are quite similar between countries. The robust growth of cardiovascular procedures and knee replacements in Canada, in part, may be the result of responses to growing queues for these procedures during the study period. For instance, in Ontario and British Columbia, open-heart surgery capacity was increased in the early

1990s in response to growing queues for these procedures (Katz, Mizgala, and Welch 1991; Naylor et al. 1992). Regardless of these local issues, the similar pattern of procedure volume and intensity growth suggests that the diffusion of medical innovation is a dominant factor in expenditure growth for procedure services in both countries (Newhouse 1987, 1993; Physician Payment Review Commission 1993).

We can only speculate about how differences in policies might explain differences in the magnitude of these procedure growth rates in the two countries. In the United States, there is a policy, the Volume Performance Standard system, which is aimed at limiting the volume of services provided to Medicare beneficiaries. This system is designed to curb the rise in Medicare spending by linking payment levels to the growth in the number and mix of services per beneficiary. The first performance standard was set in 1990. In contrast, Canadian provinces have several policy levers designed to limit the growth in volume of services.

First, the capacity for intensive care unit beds, operating rooms, and technicians is limited by prospective global operating budgets and the regulation of hospital and clinic capital expansion (Katz, Mizgala, and Welch 1991). These mechanisms limit the availability of specific surgical services such as total joint replacement, angiography, and other cardiovascular procedures (Ruble 1994). For example, in 1993, the number of open-heart surgery units in Canada was 1.3 units per million persons compared with 3.7 units per million persons in the United States (Ruble 1994). In contrast to Canada, from 1989 to 1993, the number of open-heart surgery units per million persons in the United States increased at twice the rate from 793 units in 1987 to 945 units in 1992 (Ruble 1994).

Second, the number of specialists is limited through the management of medical school and residency slots (Stoddart and Barer 1992). Third, since the late 1980s, many provinces including those in the study have implemented global physician expenditure limits. These policies, which are negotiated between provincial medical associations and the government, might influence service volume and intensity if physicians change their practice pattern in response to these global constraints. Indeed, the impact of these policies on physician practice patterns has been a contentious focus of debate between specialty groups within the provincial medical associations (Katz et al. forthcoming).

## **EVALUATION AND MANAGEMENT SERVICES**

Because the 1987 baseline volume and intensity of evaluation and management services was much lower in the United States compared with Canada,



the higher U.S. growth rate somewhat diminished between-country differences in volume and intensity levels. Even though volume and intensity growth was two times larger in the United States than in Canada, the initial 40 percent lower service volume and intensity in the United States precluded the United States from "catching up" to comparable volume and intensity levels in Canada. Thus, there were still 30 percent fewer evaluation and management services per elderly person in the United States than in Canada in 1992.

There are two possible reasons why Canadian elderly continue to receive more evaluation and management services than elderly Americans. First, there is a greater number of physicians in Canada who provide primary evaluation and management services. For example, in 1992, general and family practitioners constituted half of Canadian physicians—in the United States, they comprised 14 percent of all physicians. Second, Canadian elderly are responsible for lower levels of cost sharing than the elderly in the United States. In Canada, there is virtually no user fee for primary physician services and medications are generally covered for the elderly. Although U.S. elderly often have supplemental insurance, it does not always cover balance billing or co-payments. Studies have shown that higher out-of-pocket costs reduce the demand for office visits (Manning et al. 1987).

## LIMITATIONS

This study has several limitations. First, we have excluded some types of services from the analysis that may have influenced our assessment of expenditure growth. The most important service category that was omitted was imaging services. Prior studies investigating sources of growth in Medicare expenditures found that imaging procedures account for a substantial portion of overall volume and intensity growth. In a study using Medicare data for 1985-1989, Zuckerman and Holahan found expenditures for advanced imaging services (e.g., magnetic resonance imaging [MRI] and computerized axial tomography [CAT] scans) grew at the fastest rate. In fact, 80 percent of the nearly 24 percent increase in expenditures for these services was due to increases in service volume and intensity. Thus, the inclusion of this category in our analysis would have resulted in different overall estimates of both expenditure and volume and intensity growth rates.

Second, the age and sex adjustment we used to correct for the presence of claims for nonelderly persons in our 1987 Medicare file may not have been perfect. The inability to eliminate accurately claims for this cohort of patients may have resulted in an overstatement of volume and intensity growth for some types of service categories. In particular, since disabled nonelderly patients tend to be high users of evaluation and management services, the

growth rates for this broad service category may be overestimated.

Third, changes in the coding of physician services in Canada and the United States may have led to increases in service volume and intensity that do not reflect actual changes in service use but simply changes in the service codes used to report the service. Finally, our Medicare data did not capture services rendered to seniors enrolled in HMOs. However, the proportion of elderly enrolled in HMOs during the study period remained less than 5 percent (McMillan 1993).

## CONCLUSION

These results suggest that Canadian policies to control the volume of certain procedures may have contributed to smaller increases in expenditures than the United States. While Medicare has a policy to control fees, its policies to control volume are not as elaborate as those used in Canada. Although policies for financing of physician services for the elderly have historically followed a similar course in the United States and Canada, newer policies are now beginning to diverge. During the study period, physicians in both systems were predominantly paid on a fee-for-service basis, and expenditure control policies primarily limited fee growth. Since 1992, U.S. Medicare enrollment in managed care plans has more than doubled (from 5 percent in 1992 to about 10 percent in 1996) (Zarabozo, Taylor, and Hicks 1996). This growth is likely to continue into the next decade. Our results suggest that managed care plans will ultimately need to incorporate strategies to limit the growth in the volume and intensity of medical services into their cost-containment efforts. In contrast, in Canada, managed care proposals are in their infancy (Lomas, Charles, and Greb 1993). Rather, provincial payers, including all of the study provinces, have moved aggressively to cap total physician expenditures. An important objective of future research will be to measure the impact of these divergent policies—global budgets versus managed care—on expenditure growth and its components.

## REFERENCES

- Berenson, R., and J. Holahan. 1992. Sources of the growth in Medicare physician expenditures. *Journal of the American Medical Association* 267:687-91.
- Congressional Budget Office. 1996. *Baseline: Medicare*. Washington, DC: Congressional Budget Office.
- Federal Register. 1993. *Medicare program; fee schedule for physicians' services for calendar year 1993*. 55914-56167.

- Fuchs, V., and J. S. Hahn. 1990. How does Canada do it? A comparison of expenditures for physicians' services in the United States and Canada. *New England Journal of Medicine* 323:884-90.
- Health Care Financing Administration [HCFA]. 1996. *Medicare: A Profile*. Baltimore: Department of Health and Human Services.
- Holahan, J., A. Dor, and S. Zuckerman. 1990. Understanding the recent growth in Medicare physician expenditures. *Journal of the American Medical Association* 263 (12): 1658-61.
- Katz, S. J., J. Lomas, C. Charles, and H. G. Welch. Forthcoming. Physician relations in Canada: Lessons for American colleagues. *Journal of Health Politics, Policy, and Law*.
- Katz, S. J., H. F. Mizgala, and H. G. Welch. 1991. Bypassing the queue in Canada: British Columbia sends patients to Seattle for coronary artery bypass surgery. *Journal of the American Medical Association* 266:1108-11.
- Katz, S. J., S. Zuckerman, and W. P. Welch. 1993. Comparing physician fee schedules in Canada and the United States. *Health Care Finance Review* 14 (1): 141-50.
- Lomas, J., C. Charles, and J. Greb. 1992. The price of peace. The structure and process of physician fee negotiations in Canada. Working paper no. 92-17, McMaster University Center for Health Economics and Policy Analysis, Hamilton, Ontario.
- Manning, W. G., J. P. Newhouse, N. Duan, E. B. Keeler, A. Leibowitz, and M. S. Marquis. 1987. Health insurance and the demand for medical care: Evidence from a randomized experiment. *American Economics Review* 77:251-77.
- McMillan, A. 1993. Trends in Medicare health maintenance organization enrollment: 1986-1993. *Health Care Financing Review* 15 (spring): 135-46.
- Naylor, C. D., C. M. Levinton, R. S. Baigrie, and B. S. Goldman. 1992. Placing patients in the queue for coronary surgery: Do age and work status alter Canadian specialists' decisions? *Journal of General Internal Medicine* 7 (5): 492-98.
- Newhouse, J. P. 1987. Cross national differences in health spending. What do they mean? *Journal of Health Economics* 6:159-62.
- . 1993. An iconoclastic view of health cost containment. *Health Affairs Supplement* 12 (supp.): 152-171.
- Physician Payment Review Commission. 1991. *Annual report to Congress*. Washington, DC: Physician Payment Review Commission.
- . 1992. *Annual report to Congress*. Washington, DC: Physician Payment Review Commission.
- . 1993. *Annual report to Congress*. Washington, DC: Physician Payment Review Commission.
- Redelmeier, D. A., and V. R. Fuchs. 1993. Hospital expenditures in the United States and Canada. *New England Journal of Medicine* 328:772-78.
- Ruble, D. A. 1994. Medical technology in Canada, Germany, and the United States: An update. *Health Affairs* 13:113-17.
- Stoddart, G. L., and M. L. Barer. 1992. Toward integrated medical resource policies for Canada: Promoting change—General themes. *Canadian Medical Association Journal* 146:697-700.

- Welch, W. P., D. Verrilli, S. J. Katz, and E. Latimer. 1996. A detailed comparison of physician services for the elderly in the United States and Canada. *Journal of the American Medical Association* 275:1410-16.
- Zarabozo, C., C. Taylor, and J. Hicks. 1996. Medicare managed care: Numbers and trends. *Health Care Financing Review* 17 (spring): 243-61.
- Zuckerman, S., and J. Holahan. 1992. Measuring growth in the volume and intensity of Medicare physician services. *Inquiry* 29 (4): 391-402.