

# TRENDS

## Cross-National Comparisons Of Health Systems Using OECD Data, 1999

The United States continues to lead the world in health spending, thanks in part to two driving forces: population aging and economic development.

by **Uwe E. Reinhardt, Peter S. Hussey, and Gerard F. Anderson**

**ABSTRACT:** This paper presents selected components of the most recent (1999) Organization for Economic Cooperation and Development (OECD) Health Data. Previous trends in spending for health care, supply and use of health care resources, and health status are updated for the thirty industrialized countries in the OECD. In 1999 the United States spent 53 percent more on health care than any other OECD country spent. The paper reviews two possible reasons for the difference: economic development and population aging. It discusses spending, supply, and utilization for specific categories of health care services: pharmaceuticals, physicians, hospitals, and high-technology services. The paper concludes with a consideration of the strengths and weaknesses of using OECD data to compare health systems.

**I**NCREASINGLY, health care and health policy have become global enterprises, for they respond to a common set of human problems and, with the aid of modern information technology, rely on a globally shared body of clinical and health services research. Many countries have become increasingly interested in the lessons they might learn from one another's experiences. Responding to an interest among policymakers in comparative cross-national information on health care, the Organization for Economic Cooperation and Development (OECD) for years has gathered and disseminated annual information on the availability of health resources, on national outlays for health care, and on certain health

status measures.<sup>1</sup> In this paper we present selected components of the most recent OECD Health Data (1999), along with some commentary. This paper also updates some previously reported trends using new data from the OECD Health Data 2001 release.<sup>2</sup>

### Total National Health Spending

Exhibit 1 presents data on health spending by the thirty industrialized countries included in the OECD Health Data, along with data on the percentage of the population age sixty-five and older and on total health care employment per 1,000 population.<sup>3</sup> The data on health spending per capita are expressed in purchasing power parity (PPP)-adjusted U.S. dollars

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**EXHIBIT 1**  
**Health Spending, Population Age, And Health Employment In Thirty OECD Countries, Selected Years 1990–1999**

	Health spending per capita (\$PPP)		Real annual growth in health spending per capita (national currency units at 1995 GDP prices)			Percent of GDP spent on health	Percent of population age 65 or older	Total health employment per 1,000
	1990	1999	1970–1980	1980–1990	1990–1999	1999	1999	1999
Australia	1,682	2,085 <sup>a</sup>	–	2.7%	3.7% <sup>a</sup>	8.6 <sup>a</sup>	12.2	31.2
Austria	1,538	2,014	7.4	1.4	3.2	8.2	15.5	–
Belgium	1,592	2,181	8.1	3.4	3.5	8.8	16.8	21.1 <sup>b</sup>
Canada	2,142	2,463	3.0	4.0	1.7	9.3	12.4	25.2 <sup>c</sup>
Czech Republic	735	983	–	–	4.1	7.4	13.8	21.6
Denmark	1,855	2,275	–	0.8	1.8	8.4	14.9	26.2 <sup>d</sup>
Finland	1,649	1,547	4.5	4.8	–0.2	6.8	14.8	46.7
France	1,940	2,115	5.4	3.6	2.1	9.3	15.9	26.4 <sup>c</sup>
Germany	2,045	2,361 <sup>a</sup>	6.1	2.1	1.8 <sup>a</sup>	10.3 <sup>a</sup>	16.8	42.3 <sup>a</sup>
Greece	902	1,198 <sup>a</sup>	5.4	2.6	2.7 <sup>a</sup>	8.4 <sup>a</sup>	17.0	11.8 <sup>f</sup>
Hungary	652 <sup>g</sup>	762	–	–	1.6 <sup>g</sup>	6.8	14.6	16.1 <sup>e</sup>
Iceland	1,756	2,287	7.6	4.2	2.5	8.7	11.6	33.6 <sup>f</sup>
Ireland	1,016	1,534 <sup>a</sup>	8.5	1.1	5.6 <sup>a</sup>	6.8 <sup>a</sup>	11.3	19.8
Italy	1,681	1,832	6.3	3.6	1.1	7.9	17.6	19.1
Japan	1,381	1,796 <sup>a</sup>	7.0	2.7	3.7 <sup>a</sup>	7.5 <sup>a</sup>	16.7	21.2
Korea	474	868	–	–	6.2	5.4	6.8	–
Luxembourg	1,897	2,543	7.2	4.3	4.2	6.1	14.3	13.0
Mexico	332	419 <sup>a</sup>	–	–	3.5 <sup>a</sup>	5.3 <sup>a</sup>	5.3	6.7
Netherlands	1,791	2,259	–	2.2	2.4	8.7	13.6	23.8 <sup>d</sup>
New Zealand	1,196	1,505	2.0	2.7	2.9	8.1	11.7	–
Norway	1,740	2,388	9.1	3.1	3.8	8.5	15.4	71.4 <sup>e</sup>
Poland	329	535	–	–	5.3	6.2	12.0	–
Portugal	784	1,203 <sup>a</sup>	11.5	4.1	5.2 <sup>a</sup>	7.7 <sup>a</sup>	15.1	13.1 <sup>a</sup>
Slovakia	–	668 <sup>a</sup>	–	–	–	6.3 <sup>a</sup>	11.3	–
Spain	1,040	1,189 <sup>a</sup>	6.9	4.7	2.7 <sup>a</sup>	7.0 <sup>a</sup>	16.6	15.7
Sweden	1,904	1,732 <sup>a</sup>	4.4	1.0	–0.1 <sup>a</sup>	7.9	17.8	35.3 <sup>a</sup>
Switzerland	2,275	2,853 <sup>a</sup>	4.2	2.8	2.7 <sup>a</sup>	10.4 <sup>a</sup>	15.2	53.7 <sup>d</sup>
Turkey	218	316 <sup>a</sup>	–	3.6	6.1 <sup>a</sup>	4.8 <sup>a</sup>	5.3	3.3
United Kingdom	1,236	1,569	4.1	3.1	3.3	6.9	15.7	29.9
United States	3,495	4,358	4.4	5.5	3.0	12.9	12.3	32.6 <sup>h</sup>
Median	1,592	1,764	6.2	3.1	3.0	7.9	14.7	23.8

**SOURCE:** Organization for Economic Cooperation and Development, *OECD Health Data 2001* (Paris: OECD, 2001).

**NOTES:** The calculation of the median includes only countries with available data; see Note 6 in text. PPP is purchasing power parity (U.S. dollars). GDP is gross domestic product.

<sup>a</sup> 1998 or 1990–1998.

<sup>b</sup> 1992.

<sup>c</sup> 1994.

<sup>d</sup> 1995.

<sup>e</sup> 1997.

<sup>f</sup> 1996.

<sup>g</sup> 1991.

<sup>h</sup> 1993.

of the respective years.<sup>4</sup> In 1999 total health spending per capita in the United States was \$4,358. Switzerland had the next highest level of health spending at \$2,853 (67 percent of the

U.S. spending level), followed closely by Luxembourg, Canada, and Germany.<sup>5</sup>

Exhibit 1 also shows the average real (inflation-adjusted) annual compound growth rate

for 1990–1999. These rates have been calculated from spending data expressed in constant-value units of each country's own currency (not in PPP \$U.S.). Finland and Sweden had negative rates of average annual growth in real health spending per capita in 1990–1999. Countries with higher levels of health spending in 1990 tended to have slower health spending growth in 1990–1999 (correlation =  $-0.52$ ).

Finally, Exhibit 1 shows the percentage of gross domestic product (GDP) that each nation spent on health care in 1998 or 1999, as indicated. That percentage ranges from a low of 5.3 percent for Mexico and Turkey to a high of 12.9 percent for the United States, with a median of 7.9 percent for all countries.<sup>6</sup>

The considerable variation in per capita health spending shown in Exhibit 1 calls for an explanation of the sources of this variation. Two prime candidates have been suggested as explanatory factors: a nation's ability to pay, and the percentage of a nation's population that is age sixty-five and older.

■ **Health spending and GDP.** Health services researchers have been aware for decades that the most powerful explanatory variable for international differences in per capita health spending is per capita GDP, a proxy for ability to pay or “income.”<sup>7</sup> Using simple regression analysis to explain variation in total health spending by changes in GDP (both variables per capita and in terms of PPP-adjusted U.S. dollars), the result is that, on average, an increase in GDP per capita of \$10,000 is estimated to raise health spending per capita by \$966.<sup>8</sup> If one compares the actual data to the regression estimate, it is clear that most countries are on or near the estimated income/spending line, with the exceptions of Luxembourg, situated far below the line, and the United States, far above it.<sup>9</sup> With its spending level of \$4,358 in 1999, the United States spent \$1,300 more per capita on health care than would have been predicted by GDP per capita alone (\$2,952).

An interesting research question is, What can account for this extra \$1,300? A clue can be had from a research project undertaken in the mid-1990s by the McKinsey Global Insti-

tute—an in-depth analysis of the real resources costs used in the United States, the United Kingdom, and Germany to treat a set of standard illnesses. In that effort, the McKinsey team was advised by a group of distinguished American economists, including Nobel laureate Kenneth Arrow.<sup>10</sup> The study focused on the year 1990, when the United States spent roughly \$1,000 more per capita on health care than Germany spent. On the basis of its microanalysis, the study team concluded that if the real resources used for health care in the two countries had been priced at U.S. prices, then Americans actually used about \$390 per capita less health care (hospital days, physician visits, drugs, and so on) in 1990 than did their German counterparts. Since clinical outcomes were judged by the team to be roughly equivalent, the team attributed the spending differential to what it called “superior U.S. clinical productivity.” At the same time, the study also found that Americans spent \$737 more per capita on health care than Germans spent because the prices for real health care resources were that much higher in the United States than in Germany.<sup>11</sup> Furthermore, Americans spent \$360 more per capita on administration in 1990 than Germans spent, along with another \$259 more on “other”—that is, items not specifically identified in the study.

In other words, the McKinsey team concluded that almost all (92 percent) of the savings from the allegedly superior clinical productivity of the U.S. health system were absorbed by the U.S. system's greater administrative overhead—and more than 100 percent, if any of the “other” costs reflected administrative overhead as well. This finding might suggest to U.S. policymakers that along with research on “evidence-based medicine,” they should fund more research on “evidence-based administration” in U.S. health care. Just as, at the margin, the added benefits from added health care may not be worth its added cost, so the added benefits from more choice and the attendant administrative complexity may not be worth their cost, either.

■ **The GDP elasticity of health spending.** The slope of the estimated equation of log-

arithm GDP per capita versus logarithm health spending per capita can be viewed as a first, rough approximation of the so-called GDP elasticity of per capita health spending, defined as the percentage change in health spending per capita divided by the corresponding percentage change in GDP per capita. An elasticity above 1 implies that the percentage of GDP absorbed by health spending tends to rise with increases in GDP per capita.

If one regresses the logarithm of health spending per capita on the logarithm of GDP per capita across the thirty countries in the OECD data set, one obtains an estimated per capita GDP elasticity of per capita health spending of 1.32 if the United States and Luxembourg (the outliers) are included in the sample, and 1.36 if they are not.<sup>12</sup>

Taken at face value, these estimates suggest that, other things being equal, an increase in GDP per capita of 10 percent tends to increase health spending per capita by 13–14 percent. In the jargon of economics, the estimate suggests that health care is a “superior” good—one on which spending tends to rise disproportionately faster than does disposable income or, here, GDP per capita.<sup>13</sup>

Earlier studies of the relationship simply between GDP per capita and health spending per capita have led to similar estimates of the GDP elasticity of health spending.<sup>14</sup> With a few exceptions, these estimates have fallen into the range of 1.2 to 1.6, although they do appear to vary with the degree of a nation’s economic development, with poorer countries having lower elasticities.<sup>15</sup>

Over the past two decades, however, health services researchers have performed more-sophisticated multivariate analyses of this relationship, which control for factors other than income that may drive health spending. The findings of that body of research have been ably summarized by Ulf Gerdtham and Bengt Jönsson.<sup>16</sup> In a nutshell, these more elaborate studies have led, in these authors’ words, to

the “extremely robust” conclusion that even after statistical control for many other factors, “the effect of per capita GDP (income) on expenditure is clearly positive and significant.”<sup>17</sup> At the same time, however, the range of available estimates is still wide. Depending on the methodology used and the variables included in the equation, these estimates range from less than one to more than one. The authors admonish the reader that research in the deter-

minants of cross-national variation in per capita health spending “is still in its infancy and has raised more questions than it has answered.”<sup>18</sup> At this stage, it certainly cannot be taken as an immutable law of economic nature that the percentage of GDP going to health care must rise with GDP per capita at all times and in every nation.

In this connection, it may be noted that a moderately rising proportion of GDP absorbed by health care does not inevitably spell actual reductions in the enjoyment of the other good things in life. For example, even if health care did absorb the currently projected 16.7 percent of U.S. GDP in 2010, the real (inflation-adjusted) nonhealth GDP per capita left over for all other goods and services would be still close to 12 percent higher in 2010 than it was in 2000.<sup>19</sup>

Thus, the issue for the United States—and for other countries as well—is not whether the economy can sustain the observed GDP elasticities of health spending for the foreseeable future, but whether the added health care used in the coming decade is worth its added cost in terms of the loss of the other goods and services that will be sacrificed for the sake of the added health care.<sup>20</sup> This is one of the most important research questions facing health policymakers in every nation.

■ **Aging and health spending.** It is well known that after the onset of middle age, per capita health spending rises sharply with age.<sup>21</sup> Therefore, it seems natural to conclude that a nation’s per capita health spending will rise

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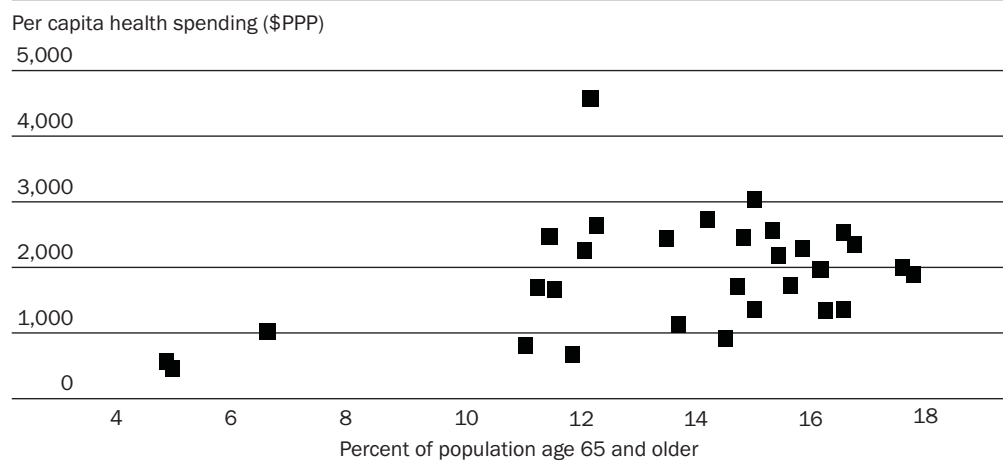
significantly as the average age of its population rises and that cross-national variations in health spending per capita are driven significantly by cross-national variations in the percentage of the population that is age sixty-five and older. However, neither hypothesis is supported by the data.

Many other nations with populations much older than the U.S. population spend considerably less per capita on health care (Exhibit 2).<sup>22</sup> In 1997, for example, the United States spent an estimated \$12,090 per elderly person on health care. Canada, the second-highest spender, spent only \$6,764 per elder (just 56 percent of the U.S. spending level). The comparable number for Germany was \$4,993 (41 percent of the U.S. level) and for the United Kingdom, \$3,612 (30 percent of the U.S. level).<sup>23</sup> More sophisticated, multivariate analyses of cross-national data that can control for the influence of other variables on health spending (including GDP per capita) also have consistently failed to reveal a statistically significant effect of demographic factors on per capita health spending.<sup>24</sup>

Actuaries will not be surprised by this finding. To isolate the effect of aging by itself on

U.S. health spending, Sally Burner and colleagues calculated what the United States would have spent on personal health care in 1990 if it had had the population age structure that was being projected for 2030.<sup>25</sup> That number turned out to be \$728 billion, or 24 percent more than was actually spent in 1990 (\$585 billion). Although that may seem like a large increase, it represents compound growth of only 0.54 percent per year. At the same time, however, the authors projected that total personal health spending in 2030 would be \$14.8 trillion, which implies an compound growth rate of 8.4 percent per year over the forty-year period. It follows that aging itself was estimated to contribute only one-sixteenth of the projected annual growth rate in actual spending. The forecasters attributed the bulk of that 8.4 percent growth rate to factors other than aging, such as overall population growth, increased use of health care by any age group (including use of expensive new medical technology), general price inflation, and additional inflation in the prices of medical services above general price inflation.

## EXHIBIT 2 Population Age And Total Per Capita Health Spending In Thirty OECD Countries, 1999



**SOURCE:** Organization for Economic Cooperation and Development, *OECD Health Data 2001* (Paris: OECD, 2000).

**NOTES:** The data on health spending per capita in this exhibit are from Exhibit 1; accordingly, some 1998 figures have been substituted where 1999 data are not available. See Note 8 in text. PPP is purchasing power parity, in U.S. dollars.

## Individual Spending Components In 1999

■ **Pharmaceuticals.** Exhibit 3 reports spending on pharmaceuticals and other non-durable medical supplies, hereafter referred to simply as “drugs.” Drugs accounted for 11 percent of total U.S. health spending in 1999, compared with an OECD median of 14.9 percent. Because the denominator, health spending per

capita, varies so widely among nations, perhaps more illuminating is the percentage of GDP spent on drugs (data not shown). Although the ratios of individual countries vary considerably about the OECD median, it is remarkable how closely the U.S. trend follows that median. In 1970 the United States spent 0.9 percent of its GDP on drugs, compared with an OECD median of 0.8. Both have slowly risen to 1.4 and 1.3 percent, respectively, in

**EXHIBIT 3**  
**Spending On Pharmaceuticals And Other Medical Nondurables In Twenty-Six OECD Countries, Selected Years 1970–1999**

	Amount spent (\$PPP)	Drugs as percent of total health spending	Drug spending as percent of GDP	Real annual drug spending growth, national currency units at 1995 GDP price levels	
				1970–1999	1990–1999
Australia <sup>a</sup>	237	11.4%	1.0%	2.8%	7.0%
Belgium <sup>b</sup>	318	16.1	1.4	3.0	4.2
Canada	378	15.4	1.4	4.1	5.2
Czech Republic	265	27.0	2.0	–	7.0
Denmark	205	9.0	0.8	–	3.9
Finland	234	15.1	1.0	3.8	5.2
France	484	22.9	2.1	3.7	3.7
Germany <sup>a</sup>	300	12.7	1.3	2.5	0.4
Greece	211	14.7 <sup>a</sup>	1.4	2.1	4.3
Hungary	212	27.8	1.9	–	1.7 <sup>c</sup>
Iceland	351	15.4	1.3	4.7	2.3
Ireland	172	9.9 <sup>a</sup>	0.7	2.3	4.8
Italy	405	22.1	1.7	5.3	1.5
Japan <sup>a</sup>	301	16.8	1.3	–	0.6
Korea	125	14.3	0.8	–	–0.5
Luxembourg	299	11.7	0.7	3.4	1.5
Netherlands	249	11.0	1.0	3.1 <sup>c</sup>	4.7
New Zealand <sup>b</sup>	193	14.4	1.1	3.3	2.9
Norway <sup>b</sup>	195	9.1	0.7	6.1	7.4
Portugal <sup>a</sup>	310	25.8	2.0	9.5	5.6
Spain	239 <sup>b</sup>	20.5 <sup>a</sup>	1.5 <sup>b</sup>	–	4.7 <sup>b</sup>
Sweden	220 <sup>b</sup>	12.8 <sup>a</sup>	1.0 <sup>b</sup>	4.5 <sup>b</sup>	6.7 <sup>b</sup>
Switzerland <sup>a</sup>	217	7.6	0.8	–	1.8
Turkey <sup>d</sup>	60	31.6	–	–	–
United Kingdom <sup>b</sup>	229	16.3	1.1	3.9	6.0
United States	478	11.0	1.4	3.9	5.0
Median	238	14.9	1.3	3.7	4.3

**SOURCE:** Organization for Economic Cooperation and Development, *OECD Health Data 2001* (Paris: OECD, 2001).

**NOTES:** Austria, Mexico, Poland, and Slovakia are not shown. Cells without values represent unavailable data. Data are for 1999 unless otherwise indicated. PPP is purchasing power parity (U.S. dollars). GDP is gross domestic product.

<sup>a</sup> 1998 (for real growth ranges, 1970–1998 and 1990–1998).

<sup>b</sup> 1997 (for real growth ranges, 1970–1997 and 1990–1997).

<sup>c</sup> 1972–1999.

<sup>d</sup> 1994.



1999, with only small deviations in the twenty years of tracking.

■ **Physicians.** The ratio of physicians to population increased steadily since 1960 for both the United States and the OECD median (data not shown). In 1960 the U.S. ratio was higher than OECD median, but the U.S. growth rate was slightly lower in the period 1960–1999. Beginning in 1990 there were fewer physicians per capita in the United States than in the median OECD country. Recently, there have been suggestions that the United States should expand the number of medical students it trains.<sup>26</sup>

Although the United States now has relatively fewer physicians per 1,000 population than the OECD median, its total national spending on physicians as a percentage of GDP is double the OECD median (2.9 percent in 1999, compared with an OECD median of 1.3 percent). U.S. physician spending peaked in 1991–1992 at 3.0 percent after steadily rising from 1.7 percent in 1980. Since 1992 spending has more or less hovered around 3 percent. OECD median spending has been mostly flat over the entire period, hovering between 1.1 and 1.4 percent of total spending. As a dollar amount, U.S. per capita spending for physician services was the highest in the OECD in 1999: \$988, compared with an OECD median of \$342. Physician services accounted for 22.7 percent of total U.S. health spending in 1999, compared with 15.2 percent in the median OECD country.

Physicians' incomes are much higher in the United States than they are in other OECD countries. In 1996, the most recent year for which data are available for multiple countries, the average U.S. physician income was \$199,000.<sup>27</sup> The comparable OECD median physician income was \$70,324. The ratio of the average income of U.S. physicians to average employee compensation for the United States as a whole was about 5.5. Germany's was the next highest, at only 3.4; Canada, 3.2; Australia, 2.2; Switzerland, 2.1; France, 1.9; Sweden, 1.5; and the United Kingdom, 1.4.

One can think of several reasons why physician compensation in the United States is rela-

tively more generous than elsewhere. First, physicians in most other nations face a powerful single buyer (monopsony) for health services. As the McKinsey Global Institute and Mark Pauly have shown, market power (or regulation) translates into relatively lower prices for health services, including the services of physicians.<sup>28</sup> Second, U.S. physicians must make a larger financial investment in their education than their counterparts in many other countries do; they must recover the debt they incur as part of the educational process. Third, the incomes of highly skilled health care workers—notably physicians—are determined partly with reference to the incomes that equally able and skilled professionals can earn elsewhere in the economy. Because the U.S. distribution of earned income for all occupations is wider than it is in most other OECD countries, the relatively high incomes offered skilled professionals in the United States may well have served to pull up the incomes of American physicians relative to the incomes of their peers abroad.

■ **Hospitals.** The United States spent an average of \$1,850 per acute hospital bed day in 1999—more than double the \$788 per day spent in Canada, the next most expensive country, and almost three times the OECD median (Exhibit 4). Three factors may explain some of this difference. First, the United States had fewer hospital admissions per 1,000 population in 1999 than the corresponding OECD median (119 versus 176). Second, the United States had a relatively lower average length of acute care hospital stay (5.9 days versus the OECD median of 6.5 days). Third, staffing ratios in U.S. hospitals were much higher than the OECD median (4.6 staff per acute care bed versus the OECD median of 2.1).

Even so, the truly huge cross-national differences in hospital costs should stand as a challenge to U.S. health services researchers and hospital managers. As Donald Berwick, an internationally recognized authority on the quality of care, wrote after a visit to Haukland Hospital in Bergen, Norway:

It is a first-rate academic, high-tech referral center where equipment, access, ambiance and service seem at

**EXHIBIT 4**  
**Hospital Spending, Utilization, And Staffing In Twenty-Nine OECD Countries, 1999**

	Hospital spending		Acute care hospital bed days per capita	Acute care hospital costs per day (\$PPP)	Average length of acute care hospital stay (days)	Acute care hospital staff-to-bed ratio
	Spending per capita (\$PPP)	Percent of total health spending				
Australia	726	43.3% <sup>a</sup>	1.0 <sup>a</sup>	726 <sup>a</sup>	6.2 <sup>a</sup>	2.4 <sup>a</sup>
Austria	–	–	1.7	–	6.5	2.1
Belgium	–	34.6 <sup>b</sup>	1.3 <sup>b</sup>	–	8.8 <sup>b</sup>	1.5 <sup>c</sup>
Canada	803	42.3	1.0 <sup>a</sup>	788 <sup>a</sup>	7.0 <sup>a</sup>	2.7 <sup>d</sup>
Czech Republic	315	35.1	1.6	197	8.6	–
Denmark	702	53.9	1.0 <sup>a</sup>	675 <sup>a</sup>	5.3 <sup>a</sup>	3.5 <sup>b</sup>
Finland	500	40.7	0.9	556	4.5	2.1 <sup>e</sup>
France	695	44.0	1.1	632	5.5	1.1
Germany	632 <sup>a</sup>	34.0 <sup>a</sup>	1.9	333 <sup>a</sup>	10.4	1.5
Greece	–	–	1.2 <sup>f</sup>	–	–	1.4 <sup>d</sup>
Hungary	–	52.4 <sup>g</sup>	1.8	–	8.2	1.3
Iceland	988	55.7	1.1 <sup>f</sup>	715 <sup>f</sup>	5.9 <sup>f</sup>	–
Ireland	–	–	0.9	–	6.5	3.1
Italy	–	41.3	1.3 <sup>a</sup>	–	7.2 <sup>a</sup>	2.2 <sup>a</sup>
Japan	526 <sup>a</sup>	37.6 <sup>a</sup>	–	–	–	1.0
Korea	–	28.9	–	–	10.0	–
Luxembourg	–	29.8	1.8 <sup>g</sup>	–	7.7 <sup>a</sup>	–
Mexico	–	–	–	–	–	–
Netherlands	656	52.7	0.9	729	9.5 <sup>a</sup>	2.5 <sup>b</sup>
New Zealand	439 <sup>h</sup>	–	0.3 <sup>a</sup>	–	4.9 <sup>a</sup>	–
Norway	734	39.5	1.0	734	6.1	4.1
Poland	–	–	–	–	–	–
Portugal	371 <sup>f</sup>	–	0.9 <sup>a</sup>	464 <sup>f</sup>	7.3 <sup>a</sup>	3.1 <sup>a</sup>
Spain <sup>g</sup>	479	44.9	0.8	599	8.0	1.6
Sweden	–	–	0.8 <sup>g</sup>	–	6.0 <sup>a</sup>	–
Switzerland	884 <sup>a</sup>	50.3 <sup>a</sup>	1.7 <sup>a</sup>	520 <sup>a</sup>	11.4 <sup>a</sup>	2.0 <sup>e</sup>
Turkey	–	29.3 <sup>a</sup>	0.4	–	5.4	1.5
United Kingdom	–	–	1.0 <sup>b</sup>	–	5.0 <sup>b</sup>	3.7 <sup>a</sup>
United States	1,295	40.5	0.7	1,850	5.9	4.6
Median	676	41.0	1.0	653	6.5	2.1

**SOURCE:** Organization for Economic Cooperation and Development, *OECD Health Data 2001* (Paris: OECD, 2001).

**NOTES:** Slovakia is not shown. Cells without values represent unavailable data. Data are for 1999 unless otherwise indicated. PPP is purchasing power parity (U.S. dollars). GDP is gross domestic product.

<sup>a</sup> 1998.

<sup>b</sup> 1997.

<sup>c</sup> 1991.

<sup>d</sup> 1994.

<sup>e</sup> 1992.

<sup>f</sup> 1995.

<sup>g</sup> 1996.

<sup>h</sup> 1993.

least as good as any comparable American facility familiar to me. What is unfamiliar is its cost. Although the figures are elusive, Haukland Hospital seems to be operating for 25–40 percent lower cost per unit of service than a U.S. facility would...So why are teams of American managers and clinicians not crawling all over Haukland Hospital to seek clues to solve their local problem of cost and quality?...We [Americans] stand to

harvest lessons of immense value from the serious study of organizations and systems far from our own...When awareness of our differences impedes our learning [from other nations], we pay a high price in missed opportunity.<sup>29</sup>

In their two-country study of hospital care



in the late 1980s, Joseph Newhouse, Geoffrey Anderson, and Leslie Roos found that Canada then spent about 50 percent less per capita on hospital care than the United States spent, which led the authors to wonder “what, if anything, the United States bought for that additional expenditure.”<sup>30</sup> In a more recent comparative study of the use of cardiac procedures and outcomes in elderly patients with myocardial infarctions, Newhouse and colleagues found that U.S. patients received far more resource-intensive treatments than Canadian patients received. But while the thirty-day mortality rate was slightly lower in the United States than it was in Canada (21.4 percent versus 22.3 percent), the one-year mortality rates were identical.<sup>31</sup>

One would think that the U.S. Congress, whose members worry incessantly about the fiscal future of the federal Medicare program, would have a keen interest in gaining a better understanding of these cross-national differences in hospital costs. Curiously, Congress has not so far been inclined to call for or to fund major research on these differentials; nor, by the way, has it ever shown any interest in understanding equally wide cross-state variations in hospital spending and total spending per Medicare beneficiary.<sup>32</sup>

■ **The use of technology.** Although the U.S. health system is more generously endowed with imaging equipment than the OECD median and its propensity to perform high-tech medical procedures exceeds that median, several countries are even more generously endowed with magnetic resonance imagers (MRIs) and computed tomography (CT) scanners than the United States is, and a number of them also show an equally high or even higher propensity for high-tech procedures (Exhibit 5). It is remarkable that Japan, which spends only 7.9 percent of its GDP on health care, reports having three times as many MRI machines per capita and more than six times as many CT scanners as exist in the United States. The use rate of dialysis in Japan also is almost twice the U.S. rate.

■ **Health status.** Detailed exhibits on life expectancy at birth, infant mortality rates, and

potential years of life lost per 100,000 life years have been published in our previous *Health Affairs* reports on OECD spending.<sup>33</sup> Because the numbers and rankings on health status indicators do not vary much from year to year, we have not included these details for 1999.

As in prior years, U.S. life expectancy at birth was slightly below the OECD median for both males and females in 1999, while U.S. life expectancy at age sixty virtually coincides with the OECD median, which means that half of the countries (including Canada) rank better than the United States does on this measure.

Part of the reason for relatively short longevity in the United States appears to be premature mortality, defined in the OECD data as mortality that occurs before age seventy, due to causes for which mortality is considered preventable if appropriate and timely medical treatment had been performed. Potential years of life lost due to premature mortality were significantly higher in the United States than the OECD median for both males and females in 1999.

### Quality Of The OECD Data

The OECD database contains information on a great variety of measures describing the health systems of thirty industrial countries. Assembling these data is a daunting task, and not one that can be accomplished without errors of observation. For some of the variables, it is difficult to collect comparable data in all thirty countries because the data are collected for operational rather than research purposes, using country-specific definitions and data systems that can vary among countries.<sup>34</sup> This is true even within nations. For example, U.S. health care spending data must be estimated (and sometimes “guesstimated”) from a highly complex web of money flows triggered by the nation’s equally complex, pluralistic health insurance system. It is inevitable that such estimates are beset by errors.<sup>35</sup> While other nations with simpler, more uniform health systems may not encounter these problems with their spending data, they may have less accurate readings of other health care indica-

**EXHIBIT 5**  
**Medical Technology And Use Of High-Technology Medical Procedures In Thirty OECD Countries, 1999**

	MRIs per million people	CT scanners per million people	Coronary bypass procedures per 100,000 people	Coronary angioplasty procedures per 100,000 people	Patients undergoing dialysis per 100,000 people	Bone marrow transplants per 100,000 people
Australia	4.5	20.8 <sup>a</sup>	93 <sup>b</sup>	97 <sup>b</sup>	31.5	5.1
Austria	10.9	25.7	40 <sup>c</sup>	53 <sup>c</sup>	35.9	4.7
Belgium	3.2 <sup>d</sup>	16.7 <sup>e</sup>	157 <sup>b</sup>	201 <sup>b</sup>	32.9 <sup>e</sup>	4.9 <sup>f</sup>
Canada	1.8 <sup>d</sup>	8.2 <sup>d</sup>	65 <sup>b</sup>	70 <sup>b</sup>	42.2 <sup>b</sup>	3.9 <sup>b</sup>
Czech Republic	1.6	9.1	44 <sup>a</sup>	6 <sup>e</sup>	38.6 <sup>e</sup>	4.1
Denmark	5.5	10.2	64	82	36.3	0.7 <sup>d</sup>
Finland	9.3	12.8	65	-	21.3	2.2
France	2.5 <sup>d</sup>	9.7 <sup>d</sup>	35 <sup>c</sup>	73 <sup>c</sup>	37.0 <sup>e</sup>	-
Germany	6.2 <sup>d</sup>	17.1 <sup>d</sup>	38 <sup>e</sup>	86 <sup>c</sup>	58.5 <sup>b</sup>	-
Greece	1.2 <sup>f</sup>	6.1 <sup>f</sup>	61 <sup>a</sup>	28 <sup>a</sup>	48.2 <sup>e</sup>	-
Hungary	1.5	5.2	68	27	12.5 <sup>e</sup>	1.0
Iceland	7.2	21.6	40	167	12.6	2.5
Ireland	-	-	24	44	9.9 <sup>e</sup>	2.0
Italy	6.7	19.6	46	67	31.6 <sup>e</sup>	6.8
Japan	23.2	84.4	-	-	155.7	-
Korea	4.3	22.9	-	-	-	-
Luxembourg	2.3 <sup>b</sup>	23.8 <sup>d</sup>	-	12 <sup>c</sup>	60.1	-
Mexico	0.3	2.0	1	2	28.8	0.2
Netherlands	3.9 <sup>a</sup>	9.0 <sup>c</sup>	60 <sup>c</sup>	72 <sup>c</sup>	26.4 <sup>e</sup>	1.6 <sup>d</sup>
New Zealand	2.6 <sup>b</sup>	8.9	72	56	27.7 <sup>h</sup>	2.8
Norway	-	-	73 <sup>f</sup>	49 <sup>c</sup>	6.1 <sup>e</sup>	-
Poland	0.4 <sup>d</sup>	0.4 <sup>d</sup>	17 <sup>d</sup>	5 <sup>c</sup>	119.7	-
Portugal	2.8 <sup>d</sup>	12.3 <sup>d</sup>	33	42	30.3 <sup>e</sup>	2.0
Slovakia	0.4 <sup>b</sup>	0.6	-	-	-	2.3
Spain	4.6	11.6	15 <sup>c</sup>	20 <sup>c</sup>	43.7	5.8
Sweden	6.8 <sup>a</sup>	13.8 <sup>c</sup>	54 <sup>b</sup>	-	25.4 <sup>e</sup>	1.8
Switzerland	13.2 <sup>b</sup>	19.0 <sup>b</sup>	60 <sup>c</sup>	65 <sup>c</sup>	26.5 <sup>e</sup>	1.0 <sup>b</sup>
Turkey	0.6 <sup>f</sup>	7.2	-	-	23.4	0.3
United Kingdom	4.5	6.1	41 <sup>f</sup>	35 <sup>f</sup>	27.0	-
United States	7.6 <sup>b</sup>	13.2 <sup>b</sup>	203 <sup>b</sup>	339 <sup>b</sup>	86.5 <sup>b</sup>	3.1
Median	4.1	12.0	54	55	31.6	2.3

**SOURCE:** Organization for Economic Cooperation and Development, *OECD Health Data 2001* (Paris: OECD, 2001).

**NOTES:** Cells without values represent unavailable data. Data are for 1999 unless otherwise indicated. MRI is magnetic resonance imaging. CT is computed tomography.

<sup>a</sup> 1995.

<sup>b</sup> 1998.

<sup>c</sup> 1993.

<sup>d</sup> 1997.

<sup>e</sup> 1994.

<sup>f</sup> 1996.

<sup>g</sup> 1992.

<sup>h</sup> 1991.

tors. As the comparisons move away from dollars and into inputs versus outcomes, the difficulties associated with comparisons become even more severe.

The OECD data are beset by the added problem that spending data assembled in national currencies must be translated into PPPs expressed in U.S. dollars.<sup>36</sup> Although over time

PPP exchange rates are much more stable than the highly variable spot exchange rates used by accountants to aggregate the financial reports of multinational firms, movements over time in the PPP exchange rates could nevertheless introduce changes in displays such as Exhibit 1, even if there had been no changes in the underlying data expressed in national currencies.

One can, however, be too apologetic about the potential for measurement errors in the OECD data. By the standards of statistical reporting routinely accepted by decisionmakers in business, finance, and government for other areas of economic activity, the data reported by the OECD appear to be quite robust. Government statisticians, for example, now agree that important macroeconomic quantities for the later 1990s—such as industrial production and average productivity gains—were vastly overstated when they were first reported, which undoubtedly helped fuel the “irrational exuberance” Federal Reserve chairman Alan Greenspan attributed to the financial markets in those years.<sup>37</sup> Even more problematic are the annual financial reports routinely issued by business firms to furnish the basis of taxation, of government regulation, and of investment decisions in the financial markets. Here the “profits” achievable with bad accounting appear to have driven out good accounting. As *Business Week* lamented in a November 2001 cover story, “Confused about Earnings?,” American firms are now “making up their own ways to calculate earnings until they find one that shows profits.”<sup>38</sup>

Undue concern over the shortcomings of the OECD data could easily blind one to their usefulness. As Gerdtham and Jönsson argue persuasively in their assessment of these data, they are not intended as normative benchmarks on which to judge diverse health systems.<sup>39</sup> Cross-national health services research has moved away from the age-old normative question, “Which country has the best health system?” to more narrowly focused, positive questions about the apparent effect of particular facets of the health care infrastructure—for example, payment methods, gatekeeping, the integration of ambulatory and inpatient care,

disease management, workforce endowments, and so on—on health spending and outcomes. In spite of their evident limitations, the OECD data can help to raise and focus such questions in the minds of health services researchers and the policymakers who engage them.

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#### NOTES

1. Organization for Economic Cooperation and Development, *OECD Health Data 2001: A Comparative Analysis of Twenty-nine Countries* (Paris: OECD, 2001). Data in this study are from 1999 (and from 1998 for a few countries, as noted throughout). This database can be obtained from the OECD Information Center, Suite 605, 2001 L Street, NW, Washington, DC 20038-4922, tel: 202-785-6323, fax: 202-785-0350, e-mail: washcont@oecd.org.
2. See, for example, G.F. Anderson and P.S. Hussey, “Comparing Health System Performance in OECD Countries,” *Health Affairs* (May/June 2001): 219–232; and G.F. Anderson et al., “Health Spending and Outcomes: Trends in OECD Countries, 1960–1998,” *Health Affairs* (May/June 2000): 150–157.
3. Although the OECD database nominally includes thirty countries, there is a good deal of heterogeneity in how complete the data tables are and in the comparability of the data. Recent additions to the OECD database, such as Slovakia, can be expected to be missing many data values and have data that are less comparable data to those of other OECD countries. The OECD defines “total health employment” as follows: “Number of full-time equivalent persons employed (including self-employed) in health services, including ‘contracted out’ staff and excluding pharmaceutical and medical equipment manufacturing employees. Administrative staff, private for-profit and non-profit medical benefit insurers are included. Health professionals working outside health services are excluded (e.g. physicians employed in industry). Full-time equivalent conversions vary across countries but are taken, unless otherwise noted, to be 35 hours or more per week.”
4. PPPs are used to adjust for differences in cost of

- living across countries by comparing prices for a fixed basket of goods. The basket of goods used here is broad-based, not health-based.
5. Data for Switzerland are from 1998, the latest available year. The quality of health spending data varies because some countries have adopted National Health Accounts.
  6. These figures may be somewhat lower than those reported in previous years, because of changes in the way GDP is calculated. Throughout the text and tables, the OECD median is calculated for comparison with individual country results. The median was chosen instead of the mean to minimize the influence of outliers. Interpretation of the median should account for the heterogeneity among the thirty countries in the database. For example, if the countries with GDP per capita less than \$15,000 (PPP \$U.S.) are excluded from the calculation of the median for total health spending in 1999, the median is \$2,050; it is \$1,764 with all thirty countries included. The excluded countries are the Czech Republic, Hungary, Mexico, Poland, Slovakia, and Turkey.
  7. U.-G. Gerdtham and B. Jönsson, "International Comparisons of Health Expenditure: Theory, Data, and Econometric Analysis," in *Handbook of Health Economics*, Vol. 1A, ed. A.J. Culyer and J.P. Newhouse (New York: Elsevier, 2000), 11–53.
  8. The R-square value is .787. The income-elasticity coefficient estimated from such a cross-section may not be a good guide to the income elasticity obtained from a time series within each country. The data on health spending per capita for the regression are from Exhibit 1; accordingly, some 1998 figures have been substituted where 1999 data are not available. Data for 1998 for both variables were used for Australia, Germany, Greece, Ireland, Japan, Mexico, Portugal, Slovakia, Spain, Switzerland, and Turkey.
  9. The Luxembourg exception is a measurement issue related to the banking industry. The authors thank an anonymous reviewer for this insight.
  10. McKinsey Global Institute, *Health Care Productivity* (Los Angeles: McKinsey and Company Inc., 1996), Exhibit 5.
  11. In this connection, see also M. Pauly, "U.S. Health Care Costs: The Untold True Story," *Health Affairs* (Fall 1993): 152–159. Pauly also concludes that, on average, Europeans use more real health care resources per capita but pay much lower prices for them.
  12. If both the United States and Luxembourg are included in the sample, the estimated equation is  $\ln(\text{Health Spending/Capita}) = -5.75 + 1.32\ln(\text{GDP/Capita})$ ,  $R^2 = .92$ .  
If the two outliers are excluded from the sample, the estimated equation is  $\ln(\text{Health Spending/Capita}) = -6.13 + 1.36\ln(\text{GDP/Capita})$ ,  $R^2 = .96$ .
  13. An alternative term often used in economics is "luxury good," although that term might suggest to noneconomists that health care is not a basic necessity. To economists, the term merely means that the income elasticity of demand is greater than 1.
  14. J.P. Newhouse, "Medical Expenditure: A Cross-National Survey," *Journal of Human Resources* 12, no. 1 (1977): 115–125; and T.E. Getzen, "Aggregation and the Measurement of Health Care Costs" (Paper presented at the Center for Health and Wellbeing, Princeton University, 8 November 2001).
  15. World Bank economists George Schieber and Akiko Maeda, for example, estimated that the elasticity is about 1.0 for low-income, developing countries; 1.19 for middle-income countries; and as high as 1.46 for high-income, developed countries. G.J. Schieber and A. Maeda, "A Curmudgeon's Guide to Financing Health Care in Developing Countries," World Bank Discussion Paper no. 365, in *Innovation in Health Care Financing*, ed. G.J. Schieber (Washington: World Bank, 1997), 1–40; and Gerdtham and Jönsson, "International Comparisons of Health Expenditure."
  16. Gerdtham and Jönsson, "International Comparisons of Health Expenditure."
  17. *Ibid.*, 45.
  18. *Ibid.*
  19. The Centers for Medicare and Medicaid Services (CMS) actuaries project health spending per capita to rise from \$4,681 in 2000 to \$8,708 in 2010. The corresponding numbers for GDP per capita are \$35,667 and \$55,019. See "National Health Expenditures Projections: 2000–2010," Table 1, [www.hcfa.gov/stats/NHE-proj/proj2000.default.htm](http://www.hcfa.gov/stats/NHE-proj/proj2000.default.htm) (21 February 2001).
  20. Over the very long run, there is bound to be an upper limit on the percentage of GDP that future societies will be willing to allocate to health care. Logically, the absorption rate cannot exceed 1, and it is not likely ever to come close to 1. Most modern economies, however, may be able to proceed for decades with a GDP-elasticity of health spending of 1 to, say, 1.4. It should be noted that people have identified an upper limit on health spending for the past three decades.
  21. D.M. Cutler and E. Meara, "The Medical Costs of Young and Old: A Forty Year Perspective," NBER Working Paper no. 5614 (Cambridge, Mass.: National Bureau of Economic Research, 1997).
  22. The data in Exhibit 2 on health spending per capita are from Exhibit 1; accordingly, some 1998 figures have been substituted where 1999 data

- are not available. See Note 8.
23. G.F. Anderson and P.S. Hussey, *Health and Population Aging: A Multinational Comparison* (New York: Commonwealth Fund, October 1999), Chart III-1.
  24. Gerdtham and Jönsson, "International Comparisons of Health Expenditure," 46; J. Gruber and D. Wise, "An International Perspective on Policy in Aging Societies" (Paper presented at the Council on the Economic Impact of Health System Change conference on Policy Options for an Aging Society, Lansdowne, Virginia, 21-23 October 1999); and T.E. Getzen, "Population Aging and the Growth of Health Expenditures," *Journal of Gerontology* 47, no. 3 (1992): 98-104.
  25. S.T. Burner, D.R. Waldo, and D.R. McKusick, "National Health Expenditures through 2030," *Health Care Financing Review* (Fall 1992): 1-29.
  26. F. Mullan, "The Case for More U.S. Medical Students," *New England Journal of Medicine* (20 July 2000): 213-217; and R.A. Cooper et al., "Economic and Demographic Trends Signal an Impending Physician Shortage," *Health Affairs* (Jan/Feb 2002): 140-154.
  27. The OECD definition of physician income is "average professional earnings net of deductible practice expenditure, before taxes and including social security contributions (salaried and/or self-employed)." However, calculation of physicians' incomes varies by country. Surveys, tax returns, and other methods are used to determine these figures. Accordingly, they are of limited comparability. Readers are encouraged to consult the country-by-country definitions in OECD Health Data 2001 before using these data for further comparisons.
  28. McKinsey Global Institute, *Health Care Productivity*, Exhibit 5; and Pauly, "U.S. Health Care Costs."
  29. D.M. Berwick, "The Globalization of Health Care," *Quality Connection* (Newsletter of the Institute of Quality Improvement) (Spring 1996): 1-2.
  30. J.P. Newhouse, G. Anderson, and L.L. Roos, "Hospital Spending in the United States and in Canada: A Comparison," *Health Affairs* (Winter 1988): 7-16.
  31. J.V. Tu et al., "Use of Cardiac Procedures and Outcomes in Elderly Patients with Myocardial Infarction in the United States and Canada," *New England Journal of Medicine* (22 May 1997): 1500-1505.
  32. J.E. Wennberg and M.M. Cooper, *The Quality of Medical Care in the United States: A Report on the Medicare Program, The Dartmouth Atlas of Health Care 1999* (Chicago: AHA Press, 1999), chaps. 1 and 6.
  33. See especially Anderson and Hussey, "Comparing Health System Performance in OECD Countries."
  34. J.P. Poullier, "Health Data File: Overview and Methodology," *Health Care Financing Review* (Annual Supplement 1989): III-194; and Gerdtham and Jönsson, "International Comparisons of Health Expenditure."
  35. There remain troubling discrepancies between health spending estimates in the National Health Accounts developed by the CMS and corresponding estimates based on the Medical Expenditure Panel Survey, maintained by the Agency for Healthcare Research and Quality (AHRQ)—both agencies of the U.S. Department of Health and Human Services. See T.M. Selden et al., "Reconciling Medical Expenditure Estimates from the Medical Expenditure Panel Survey and the National Health Accounts, 1996," *Health Care Financing Review* (forthcoming).
  36. A spot exchange rate is determined every moment through international trade in goods, services, and securities. A PPP exchange rate is an analytic construct formed by pricing out the given basket of goods and services in two countries' currencies.
  37. F. Norris, "The Good Old Days Were Not as Good as We Thought," *New York Times*, 30 November 2001, C1.
  38. N. Byrnes and D. Henry, "Confused about Earnings?" *Business Week*, 26 November 2001, 76-84. This is the reason why the ratio of the market value that investors attribute to a corporation's stock to the book value per share that accountants attribute to it typically differs from 1 and can easily exceed 10 or be far below 1.
  39. Gerdtham and Jönsson, "International Comparisons of Health Expenditure."