DataWatch

Medical Technology In Canada, Germany, And The United States

by Dale A. Rublee

Major medical technology has had a profound impact on modern medicine and promises even greater impact in the future. Yet, in the past two decades, a desire has emerged to slow technology's growth because of high overall cost, possible waste resulting from overuse, and apprehension over safety.[1] Differences of opinion on these complex issues notwithstanding, there is widespread agreement on two general points in most Western countries. First, it is imperative that technology be prudently used and effectively controlled by society. Second, most Western countries have been less successful in implementing controls than in bringing into being a remarkably complex, on balance beneficial, and powerful technological order, one whose fruits are widely enjoyed and largely taken for granted. There are, however, signs that in recent years some countries have taken steps toward controlling the character and numbers of "big-ticket" items arising from the world's expanding technological capacity.

In most of the West, these control mechanisms are pluralistic and do not seem to be based on a comprehensive and sound understanding of the nature and ramifications of technology—in particular, of medical technologies that are both quality enhancing and cost saving (for example, computerized diagnosis and lithotripsy). That is to say, most countries try to react responsibly to the upsurge of technology and consequent demand, but there does not seem to be any rational long-term planning.[2] European countries, such as the Federal Republic of Germany and France, which depend largely on social health insurance, have little governmental control over the adoption and diffusion of major technology.[3] Publicly funded systems such as those in Canada and the United Kingdom attempt to limit acquisition through controls over the level of funding for hospital services and limits on technology adoption in ambulatory settings.[4] In the United States, government has practically no

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powers of control.[5]

This DataWatch shows the availability of certain major technologies in the United States in comparison with other countries. This comparison is particularly relevant given the current U.S. interest in examining the national health systems of other countries.

Regarding the data reported here, two caveats should be noted. First, technology availability data are difficult to obtain; in no country is there systematic documentation of the issue. Second, much of the statistical data that do exist across countries are out of date and not comparable. Hence, this DataWatch has modest empirical goals, using available evidence from a variety of interviews in Europe and North America, correspondence, reference documents, books, and articles.

Results

For this DataWatch, I assembled information on the availability of six technologies from the United States, Canada, and Germany. Canada and Germany were selected because their overall health care resources are fairly comparable to the United States, although the resources are deployed somewhat differently. By Western standards, Canada is an example of a country that has taken a tough stance on slowing the introduction of major technologies; Germany is one that has taken a few small steps in that direction; the United States has done practically nothing. The six technologies have wide medical applicability, yet involve high capital and operating costs. They are open-heart surgery, cardiac catheterization, organ transplantation, radiation therapy, extracorporeal shock wave lithotripsy, and magnetic resonance imaging (MRI). These technologies were selected for study because they were the only ones for which comparative data could be found. No claims are made for these six as being a representative sample of technology availability overall. Most Canadian figures are for 1989; most of the German and all of the U.S. figures are for 1987.

Exhibit 1 presents the number of units of each technology in each country and, to adjust for population differences, the number of inhabitants per unit. Not surprisingly, the United States has more availability of the studied technologies, on an aggregate as well as a population-adjusted basis, than does Canada or Germany. With the exception of organ transplantation and open-heart surgery, Germany's availability of the studied technologies is greater than Canada's

Per capita comparisons are also depicted in Exhibit 1. The largest differences between the United States and the other two countries are in MRI, open-heart surgery, and cardiac catheterization. Germany has

Exhibit 1
Comparative Availability Of Selected Medical Technologies

	Canada (1989)			Germany (1987)			United States (1987)		
	Number of units	Persons per unit (1,000)	Units per million persons	Number of units	Persons per unit (1,000)	Units per million persons	Number of units	Persons per unit (1,000)	Units per million persons
Open-heart surgery	32	813	1.23	45[a]	1,355[a]	0.74[a]	793	307	3.26
Cardiac catheterization	39	667	1.50	161	379	2.64	1.234	198	5.06
Organ transplantation	28	929	1.08	28[a]	2,178[a]	0.46[a]	319	764	1.31
Radiation therapy	14	1,857	0.54	191	319	3.13	967	252	3.97
Extracorporeal shock wave lithotripsy	4[a]	6,500[a]	0.16[a]	11	2,904	0.34	228	1,069	0.94
Magnetic resonance imaging	12[A]	2,167[a]	0.46[a]	57	1,070	0.94	900	271	3.69

Sources: Canada: Canadian Hospital Association, Ottawa, Ontario; Canadian Association of Radiation Oncology, Vancouver, British Columbia; University Hospital, London, Ontario; and Canadian Medical Association, Ottawa, Ontario. Germany: Der Bundesminister fur Jugend, Familie und Gesundheit, *Gesundheitswesens in der Bundesrepublik Deutschland* (Deutsche Krankenhaus Gesellschaft, 1988). United States: American Hospital Association, Division of Technology Assessment, *Hospital Statistics* (Chicago: AHA, 1988).
[a] 1988

almost the same number of radiation therapy units per capita as the United States, and almost six times as many as Canada. Germany has more than twice the per capita availability of MRI and lithotripsy as Canada. Canada has more than twice the availability of organ transplantation as Germany. Key comparisons between Canada and the United States include: (1) nearly eight times more MRI and radiation therapy units per capita in the United States than in Canada; (2) over six times more lithotripsy centers per capita in the United States; (3) roughly three times more cardiac catheterization and open-heart surgery units per capita in the United States; and (4) slightly more availability of organ transplantation units per capita in the United States.

Discussion

These findings show a greater proliferation of some major technologies in the United States relative to Canada and Germany. American physicians, with a universe of modern technology at their fingertips, are the envy of the world's physicians. German and Canadian physicians, too, are well-equipped technologically, but do not, on the basis of these data, have as much major technology with which to work as Americans do.

The variations reflect differences in the general availability of facilities

for investigation and surgery, and may also reflect the differing views of physicians and patients about the indications for the procedures. It is unlikely that differences in the disease/demographic profile in the United States compared to Germany and Canada account for much of the variability. Of course, the findings reflect only the capacity for treatment and do not indicate rates of, or access to, medical treatment.

Given the differing approaches to constraining technological adoption, it is not surprising that. there are significant differences between countries in the extent of technological availability. This is particularly the case in Canada where some major technologies, for example, MRI, are prohibited outside of hospitals. However, it is important to avoid possible misinterpretations. The differences can be interpreted to suggest overprovision in the United States rather than underprovision in Canada or Germany. Indeed, all levels could be optimal for the countries concerned, given different social values for technology in each of the countries concerned.

Thus, the problem with importation of the Canadian model to the United States is not that Canada's system may be unable to provide adequate levels of sophisticated technical support to physicians. Rather, it may be that the dynamics of U.S. society and its health care system are not compatible with the egalitarian principles underlying Canada's health care system. Therefore, the differences in levels of major technology, in themselves, indicate little about the overall effectiveness, achievements, and weaknesses of the health care systems of any of the three countries studied. Additional research would be needed to address these issues.

NOTES

1. L. Thomas, "On the Science and Technology of Medicine," *Daedalus* (Summer 1988): 299–316.
2. O.W. Anderson, "Introduction," *International Journal of Technology Assessment in Health Care* 4 (1988): 169–170.
3. R.K. Schicke, "Trends in the Diffusion of Selected Medical Technology in the Federal Republic of Germany," *International Journal of Technology Assessment in Health Care* 4 (1988): 395–405; and J.F. Lacronique, "Technology in France," *International Journal of Technology Assessment in Health Care* 4 (1988): 385–394.
4. R.B. Deber, G.G. Thompson, and I? Leatt, "Technology Acquisition in Canada," *International Journal of Technology Assessment in Health Care* 4 (1988): 165–206; and B. Jennett, "A U.K. View: Appropriate High Technology-A Painless Prescription?," in *Health Care Provision Under Financial Constraint: Need, Demand and Resources,* ed. T.B. Binns and M. Firth (London: Royal Society of Medicine Services, 1988), 27–35.
5. H.D. Banta, "A U.S. View," in *Health Care Provision Under Financial Constraint,* 143–148.