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The Management of Medical Technology in Canada

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CANADA: COUNTRY DESCRIPTION

Canada has a population of 23 million people.² Although its land area is second only to that of the Soviet Union, it is basically an urban country, with 56 percent of its population in metropolitan areas of over 100,000 population. Most of Canada's population lives along the "fourth North American coastline," the Saint Lawrence River and Great Lakes, and on the Pacific coast, and much of the prairie population lives fairly close to the Canadian/U.S. border.

Settled initially by both the French and British, Canada in the 18th century was an arena of imperial competition between them. The country continues to have separate French- and English-speaking communities, each with its own educational, social, and religious institutions, and is officially bilingual. For many years, the English-speaking community has dominated the national economy. Even in Quebec, where the French community is concentrated (approximately 80 percent of the population is franco-phone), the English were economically dominant until recently. There has been extensive immigration to Canada and the country is ethnically diverse, but the split between the English- and French-speaking communities remains a central factor in Canadian society. It has been

accentuated in recent years by the growth of the Quebec separatist movement and election of a separatist government in that Province.

Canada is a confederation made up of 10 Provinces and 2 Territories. Confederation, agreed to in 1867 and embodied in the British North America Act, was an essential compromise necessary to address the political conflict between the French and English communities and to pave the way for independence from England.³ Governments at both the Federal and Provincial levels are parliamentary in form. Compared to the constitutional division of responsibilities in the United States, the constitutional division between the Federal Government and the Provinces in Canada is more clearly defined and more strictly observed. In addition to the formal wording of the British North America Act, social and political factors create continued pressures to maintain this separation.

Social programs, including health programs for the general population, fall within the sphere of activities reserved for the Provinces.⁴ In order to overcome the constitutional bar to Federal administration and bring Federal resources to bear on social problems, a pattern has developed in Canada in which the Federal Govern-

¹The author gratefully acknowledges the invaluable assistance of Roger LeCompte of Lewin and Associates, Inc.

²According to Statistics Canada (14), the estimated population of Canada in 1974 was 2,334,000. The two largest Provinces were Ontario, with a population of 8,063,000, and Quebec, with 6,119,000. The next largest Province was British Columbia, with only 2,382,000. The smallest was Prince Edward Island, with 116,000. Two territories—the Yukon and Northwest Territories—combined had an estimated population of 56,000.

³Canada is an independent nation, but its constitutional ties to the United Kingdom are still strong. For example, the Queen of England is formally head of state and appoints a Governor-General to represent her. The constitution, the British North America Act, is at Westminster.

⁴Formal Federal responsibility for health care is limited to such public protection activities as food and drug regulation, regulation of radioactive materials, quarantine, and providing health services to special groups such as Indians and Eskimos.

ment shares the costs of many provincially administered social programs. Federal legislation defines the services for which costs will be shared, the population that must be covered, other conditions of participation, and the cost-sharing formula. Provincial legislation is enacted consistent with the Federal conditions.

The Canadian economy is a diversified private enterprise economy, with manufacturing,

THE HEALTH CARE SYSTEM⁵

The Canadian health care system—with both private and public components, in which private providers of care and public financing predominate—is similar to that of the United States. In 1975, personal health expenditures in Canada were \$452 per capita (14). Of this amount, 46 percent went to the country's approximately 1,200 hospitals, and 18.5 percent went to the country's approximately 35,000 physicians (157 per 100,000 population). Expenditures on personal health care were 6.2 percent of the gross national product (GNP), compared to 7.6 percent for the United States in the same year.

Almost all hospitals are nonprofit institutions. A substantial number of the hospitals have been established by local governments, under separate board of trustees, with local responsibility for budget deficits. In 1975, there were 6.8 beds per thousand population, 5.2 acute care beds, 1.5 long-term beds (3). Average length of stay was 11.5 days overall, 8.8 days in acute care units. Admissions to acute care units were 162.4 per thousand population, and total days of care in these units were 1,445 per thousand. Average acute bed occupancy was 76.1 percent.

⁵Much of the overall presentation on the Canadian health care system that appears here is based on the following study conducted by the author and others: Lewin and Associates, Inc., *Government Controls on the Health Care System: The Canadian Experience, 1976* (11). The information from that study has been updated to reflect changes in financing and other events since the study was completed. Extensive interviews were conducted in several Provinces for the 1976 study. For the paper presented here, Ontario and Quebec were revisited to assess changes in patterns of technology management and to review specific technologies.

finance, farming, trade, and extractive industries comprising major areas of economic activity. Within the private enterprise economy, there is acceptance of government ownership at both the Federal and Provincial levels. In general, there is greater public acceptance of government efforts to direct economic activity in Canada than there is in the United States.

The development of national health insurance and the organization of Provincial activities to manage the health care system are briefly reviewed in the discussion that follows. Each Province exercises considerable autonomy in the health area, and in the remainder of this chapter, Ontario and Quebec are used as principal examples.^b

National Health Insurance

Over the past 25 years, the major change in the Canadian health care system has been the introduction of national health insurance. National health insurance was debated immediately after the Second World War, but no action was taken at the time. A program of national health grants for health facility construction and manpower training was enacted in 1948, however, and it is likely that this program helped create pressure for health insurance by developing a supply of health care resources which the private insurance programs could not adequately finance.

Health insurance was enacted piecemeal—hospital insurance was enacted first in 1957 and

^bThe use of Ontario and Quebec as principal examples is not meant to imply that their experience is typical. Those familiar with Canada have indicated since the first draft of this paper that the experience of other Provinces has been different both because of their smaller, more manageable health care systems and the availability of more complete data. Ontario and Quebec were selected for focused study because of the author's previous work (11) and because they are the largest Provinces. (Their combined 14 million population constitutes over 60 percent of the total population of Canada (1).) It was also believed that Ontario and Quebec would have the most complex technology issues and be applying more resources than other Provinces to their resolution.

medical insurance a decade later in 1966. In both cases, rising costs were critical factors in the decisions to develop government programs. Several economists have noted that the major increase in supply of hospital beds and physicians occurred before the programs were enacted (1).

The patterns of development of the hospital and medical insurance programs were similar. In the period from 1945 to 1950, after proposals for a national health insurance program had been shelved, three Provinces, Saskatchewan, British Columbia, and Alberta, independently developed their own hospital insurance programs. A fourth, Newfoundland, had a partial insurance program. By 1955, a consensus for hospital insurance had developed, and discussion of the topic at a Federal-Provincial conference being held at the time was requested by the Provinces.

In 1956, the Federal Government made a concrete proposal for a phased-in insurance program, beginning with insurance for hospital care. This proposal received the general support of the Provinces, and the Hospital Insurance and Diagnostic Service Act was enacted in 1957. Five Provinces entered into the program at its inauguration in 1958, the four with existing programs and Manitoba. Prince Edward Island, Nova Scotia, and Ontario entered in 1959, and Quebec in 1961.

Medical insurance developed in a similar manner, although there appears to have been less consensus among the Provinces to take this next step in the phased-in program that the Federal Government had proposed in 1956. In 1961, a Royal Commission on Health Services (the Hall Commission) was appointed to review the medical insurance situation. Several Provinces acted on their own before the Hall Commission reported. Saskatchewan introduced compulsory Provincial medical insurance in 1962, and although this led to a physicians' strike, a compromise that retained the public program was reached. In 1963, Alberta increased the regulation of the contents of medical insurance contracts and provided premium subsidies for those unable to pay. This program covered 70 percent of the population. The Government of British

Columbia began making nongroup medical coverage available in 1965, when the only nonprofit carrier providing this type of coverage failed.

In 1965, the Hall Commission released its report calling for the establishment of a Federal program. The Medical Care Act was passed in 1966 for implementation in 1968. In July 1968, only two Provinces—Saskatchewan and British Columbia—were prepared to enter the Federal program. In 1969, five more entered—Newfoundland, Nova Scotia, Manitoba, Alberta, and Ontario. Quebec and Prince Edward Island joined in 1970, and New Brunswick in 1971.

Both the hospital and medical insurance programs follow the general Canadian policy of establishing minimum standards to make a Provincial program eligible for cost sharing but leaving the actual administration of the program to the Provinces. Compared with the detailed programmatic and administrative requirements that are imposed in U.S. Federal-State programs such as medicaid or aid to families with dependent children, the conditions imposed for cost sharing in Canada are limited and general. The Hospital Insurance Act and regulations combined are only 19 pages; the Medical Insurance Act is 9 pages. Although there are requirements that specific administrative functions (such as setting payment rates, licensing and inspection of hospitals, planning and development of hospital resources) be performed, and that the agreement with the Federal Government describe the arrangements for them, the Federal regulations do not specify or place conditions on how these activities are to be carried out. The greatest detail is in the sections detailing the costs that would be eligible or excluded from Federal cost sharing, which in each program were to be approximately 50 percent of the Provincial costs. Beyond establishing the general framework of the programs and cost-sharing formula, Federal involvement has been limited to establishing mechanisms for coordination and joint Federal-Provincial program review, and to providing technical assistance to Provinces when they request it.

¹The cost-sharing formula for both programs involved some redistribution of costs to the poorer Provinces, with the medical insurance formula more favorable than the hospital insurance formula.

During the rapid inflation in health care costs in the late 1960's and early 1970's, the Federal Government became increasingly uneasy over its fiscal exposure in a program whose costs it could not control. After several years of negotiation and considerable conflicts with the Provinces, the cost-sharing formula was changed. Beginning in 1977, the basis of Federal contributions to the hospital and medical insurance programs was shifted so that Federal contributions effectively were indexed to the rate of growth in GNP.¹ These arrangements have increased the flexibility of the Provinces in allocating medical care funds among services, but also put the Provinces completely at risk for expenditure increases higher than the growth of the Federal contribution.

Several other general trends have developed with respect to Federal involvement in the health care system over the past several years. One is a growing concern over manpower issues, particularly increases in immigration policy. A second trend has been toward major emphasis on health promotion and disease prevention activities. The rationale for this emphasis was outlined in a 1974 report by the Minister of Health Marc Lalonde (10).

Provincial Management of the Health Care System

Provincial involvement in the Canadian health care system is extensive. Provincial responsibilities include manpower licensure, public health activities, and direct provision of some health services. In terms of expenditures, the Province's primary involvement is in administering the hospital and medical insurance programs.

Organization for Health Systems Management

Largely as a result of the hospital insurance program, the Provinces play a large number of

¹The mechanisms to introduce this indexing involve transfers to the Provinces of Federal income tax credits, with equalization among the Provinces and some cash payments. Additional cash contributions to the Provinces are to be made to contribute to Provincial programs for nursing home care, adult residential care, the conversion of mental hospitals, home care, and ambulatory services.

roles for institutional providers of health care. They are regulators and inspectors, providers of consultant services, and health system planners. There are nine major functions that the Provinces perform:

- budget review and financial management consultation;
- administrative consultation to improve general management and performance in special areas such as dietary, nursing, and laboratory;
- inspection of facilities;
- institutional bed need planning;
- other health services planning and project review;
- review of construction plans and supervision of construction;
- research and statistical analysis;
- medical review of the appropriateness of institutional care; and
- health sector labor relations.'

Most commonly, a Province groups the functions of budgeting, administrative consultation, planning, and inspection into an institutional or hospitals division. This is what Ontario has done. Under this type of arrangement, the research and statistics functions and medical consultation office are outside the institutional division as general service and support activities for the entire health department program.

Quebec has a radically different arrangement from Ontario's. The Quebec Ministry of Social Affairs is a combined health and social services department. A functional organization was adopted in a reorganization of activities in 1970. Health and social service orientations were to be integrated within each function. Thus, the major divisions for both health and social programs were planning, operations and programing, finance, labor relations, and inspection. A more recent reorganization has modified this slightly, establishing separate units for the areas of health, social programs, and income security, along with separate planning, programing, fi-

²Most Provinces have only recently become involved in labor relations issues, and the situation in this area is in flux. In Ontario, for example, the Ministry's personnel unit has been involved with the issues, but has not sat at the negotiating table.

nance, labor relations, and capital budgeting functions for each.

Despite considerable variation among Provinces in the administration of the hospital insurance, medical insurance, and nursing home benefit programs, in each Province there initially was substantial decentralization. As the Provinces have begun viewing their individual health activities as elements of a general strategy toward ensuring adequate health services, however, they have attempted to bring the units administering these activities into greater proximity.

The degree of integration of these activities within each Province reflects in part the degree of acceptance within the Province of the concept of the Provincial government as medical system administrator. In Quebec, this concept has been eagerly embraced. In Ontario, the concept has been generally accepted, but Provincial responsibility is viewed as being shared with the medical community and public. Indeed, since extensive political pressure forced the Ontario Ministry of Health to back away from ordered bed closings in 1974 and 1975,¹⁰ the Ministry has hesitated to take actions to direct the development of the hospital system, relying instead on general budgetary and fiscal constraints to control institutional demand for new beds and services, and on its consulting process to encourage change.

The key to the programs of institutional control with respect both to overall expenditures and service levels and investment in new or upgraded services and equipment is the Provincial system for reimbursement.

Hospital Budgeting Arrangements

The Canadian Provinces have been administering hospital insurance programs for approximately 20 years. At the start of the hospital insurance program, the intent was to leave the hospitals privately managed and free to make

¹⁰This was done in such a way that some of the projected savings accrued to the Province. In some cases, beds were closed. In others, beds remained open, but an amount estimated to equal the savings was taken from institutional budgets. In still other cases, the closings were canceled.

independent decisions about administration and services they would offer. Hospital budget review by Provincial governments was designed only to forecast the costs of the hospital insurance program and to exclude costs not covered by the Hospital Insurance Act.

This arrangement proved unstable. Provincial governments quickly came to review every detail of administration to assure that Provincial moneys were to be well spent. Budgets were reviewed and set on a line-by-line basis. Each staff position had to be justified in the operating budget, and the basic operation of any department was subject to review. In the capital budget, the purchase of a new wing, a sterilizer, or a desk might require Provincial approval. Hospitals could not deviate from the approved budget without Provincial authorization.

To administer the wide range of oversight responsibilities, Provincial hospital insurance programs recruited staffs with expertise on each phase of hospital administration. Provincial staffs included financial experts and accountants, general administrators, nurses, and dietitians. These individuals, generally called "consultants" by the Provincial governments, served as budget review personnel, as health service planners, as consultants to hospitals on operations, and as Provincial licensing inspectors.

In the late 1960's, many Provinces began to feel that the existing budgeting systems were awkward to administer and unduly restrictive to hospital management. Efforts were made to develop systems that would allow hospital administrators and boards greater flexibility in running their institutions. The systems that were developed have been called generically "global budgeting." Under global budgeting, an institution can shift funds among categories of expenses, so long as its overall budget is not exceeded. In some Provinces, the initial global budget or parts of it are still fixed by detailed line-by-line review; in others, flat percentage increases are applied to previous budgets or costs.

In the 1960's, Provincial governments generally made funds readily available for hospitals. Hospital programs were popular, because hospitals were visible and could serve as

sources of local employment, and the Federal Government paid half the costs. Since funds were readily available, if an institution could make a reasonable case for new staff or a remodeled wing or some other expenses, the request was usually granted. Budgets were determined prospectively, but it was understood that funds would generally be available at the end of the year if difficulties were encountered; risk, therefore, was minimal. This decade was also a period of catchup for hospital employees' wages, a process in which few Provinces interfered.

A growing concern over the costs and effectiveness of hospitals and health care began to emerge in the late 1960's. The health insurance plans had become the largest component of the Provincial budgets, and the rapid inflation in the health sector burdened Provincial revenues and hindered initiatives in other areas. In response to these problems, the Federal Government initiated a study of the costs of health services in Canada. The report of the Task Force on the Costs of Health Services in Canada, completed in 1969, discussed a wide range of issues, including the dispersion and utilization of new technology (8). Almost every Province did comparable studies, examples being the study of the Commission of Inquiry on Health and Social Welfare (Castonguay-Nepveu Commission) in Quebec, the Manitoba White Paper, the Llewellyn-Davies-Weeks Studies in New Brunswick, the report of the Health Planning Task Force in Ontario, and the Foulkes report of the Health Security Program Project in British Columbia.

Beginning about 1970, partly as a result of these studies and partly concurrently with them, Provinces began implementing hospital constraint programs. The introduction of global budgeting was accelerated by the concern over costs. By applying an overall increase to budgets that matched or was lower than the projected inflation rate, Provinces could avoid debating individual line-item cuts. They could encourage greater efficiency without being required to identify areas where it could be achieved. Generally, the inflation estimates were tight but realistic. The hospital constraint programs the Provinces introduced appear to have had a sub-

stantial impact on the rate at which resources float into the health care system. As table 1 demonstrates, the percentage of GNP directed toward personal health services in Canada has declined slightly since peaking in 1971.

Each Province developed its own constraints, but Ontario's mechanisms are typical of the range of approaches available. Introduced over a period of 4 to 5 years, these controls have included:

- refusing to budget for inpatient volume increases, except in areas of rapid population growth;
- refusing to budget for additional laboratory and radiology services for inpatients;
- refusing to budget for increases in outpatient volume;
- imposing a moratorium on physical plant construction and renovation;
- requiring hospitals to find the funds for new, approved services within their existing global budget;
- mandating bed closings;¹¹
- limiting the amount of a salary and pension increase that would be funded by the Province;¹²
- reducing each hospital's budget in 1 year by an amount equal to 60 percent of depreciation and in another year imposing a 2-percent reduction in the base;¹³ and
- manipulating the inflation projection.¹⁴

Some Provinces, including Alberta (which has extensive oil revenues), have continued to fund extensive hospital programs. In other Provinces, including Ontario and Quebec, how-

¹¹Not all beds ordered closed in Ontario were actually eliminated. Political pressures kept some open and funded. In other cases, the hospital agreed to have an amount equal to the estimated cost of operation removed from its budget base if it would be allowed to operate the beds within its reduced budget. Other beds were closed voluntarily in an effort to meet the budget limits imposed.

¹²In one labor dispute, however, the Province pressured the hospital to grant a larger increase than the hospital wished to.

¹³Provincewide general decreases were requested by the Ontario Hospital Association rather than increases targeted at individual hospitals.

¹⁴In 1974, the Ontario Treasury Board required the Ministry of Health to utilize an inflation estimate below any realistic projection. At year's end, the Province was required to provide supplemental funds to cover major deficits.

Table I.— Percent of GNP Directed to Personal Health Care in Canada and the United States (1960-76)

Year	Personal health care		Hospitals		Physicians	
	Canada ^a	United States ^b	Canada	United States	Canada	United States
1960	4.62	4.69	1.65	1.80	0.93	1.12
1965	5.13	5.44	2.04	2.03	0.98	1.24
1970	6.16	6.69	2.65	2.83	1.20	1.46
1971	6.37	6.83	2.70	2.92	1.31	1.51
1972	6.27	6.91	2.57	3.03	1.31	1.49
1973	5.96	6.87	2.57	3.00	1.19	1.48
1974	5.84	7.14	2.62	3.17	1.12	1.50
1975	6.21	7.61	2.85	3.41	1.15	1.63
1976 ^c	6.21	7.78	2.89	3.52	1.09	1.63

^aInstitutional care, professional services, drugs, and appliances

^bHospital care, nursing home care, professional services, eyeglasses, appliances, drugs and drug sundries, other health services.

^cPreliminary estimates for Canada.

SOURCES: Canada: Health and Welfare Canada, *Review of Health Services in Canada, 1974*, 1974 (7). Updated by personal communication, 1979 (6).

United States: R. M. Gibson, "National Health Expenditures, 1978," *Health Care Financing Review* 1(1), summer 1979 (2)

ever, hospitals have confronted a decline in the amount of real dollars available for public programs. It is in this more restrictive context that most discussions of expanded technology have occurred.

The specific trends in capital financing and service development show similar patterns. In the 1960's, capital investment by the Provinces was heavy,¹⁵ with most of this investment going into renovations or bed construction to match population growth. There was little effort to improve the efficiency of capital use by limiting construction to increase occupancy levels. It is difficult to judge whether specialized services were expanded to the point of oversupply, because there are no general inventories of units or overall assessments of their efficiency. Discussions with Provincial authorities and hospital administrators, however, suggest that efforts within individual Provinces to avoid extensive duplication were generally successful, although there was some duplication of highly prestigious services.

As part of the more recent effort to constrain costs, the Canadian Provinces have begun looking much more critically at capital expansion.

¹⁵The Federal Government did not share the cost of construction or fixed equipment as part of the hospital insurance program. It did establish some direct grant programs for construction of hospitals, medical education, and research facilities, however, and did share the cost of movable equipment.

Construction has been curtailed, in some cases sharply.¹⁶ Provinces that had previously routinely approved all capital funds requested have had either partial reductions, or in some years, all new projects cut from the budget. Hospitals have been told no funds would be available for new services—and that such services would have to be begun within the global budget. In the capital budgeting process, the Provinces are trying to move from single-year to multiple-year projections. Some of these trends and the management of capital investment in technology are discussed further in the next major section of this chapter.

Physician Reimbursement

The primary mode of physician reimbursement in Canada is fee-for-service payment. Initially, the Provinces adopted a modification of the existing fee schedule established by the medical societies and generally used for Blue Cross reimbursement. In all Provinces but Quebec, increases in overall fee levels and other conditions of participation are negotiated between the Province and medical associations. In Quebec, physicians are represented by three unions, one for general practitioners, one for specialists, and

¹⁶In Quebec, for example, the new Minister of Social Affairs entered office in 1970 and ordered all health construction—with a total value in excess of \$400 million—halted. After a lengthy review, a limited number of projects were allowed to continue.

one for residents and interns. The negotiations have been marked by varying degrees of conflict from Province to Province and year to year:

The size of fees for individual procedures are generally developed by the Provincial medical

association, although this too can vary. The treatment of new procedures is discussed in the context of regulation and reimbursement in the next section of this chapter.

MECHANISMS FOR MANAGING MEDICAL TECHNOLOGY

Canada has a large and well-trained medical community, and the medicine practiced is technically advanced. The major issue in the management of medical technology in Canada is the speed of diffusion of cost-increasing technology that appears to offer some potential benefit to patients. Although fiscal constraints introduced over the last several years have made this issue more acute, nowhere in Canada have medical services been withheld because the associated expense would be too high.

In reviewing Canada's experience with regard to managing medical technology, four points are critical to providing a context for understanding the operation of the system:

- The Provinces' protection of their authority against Federal encroachment has left almost all decisions in this area at the Provincial level. Even in the area of technical assistance, Federal activity is limited and conducted cooperatively with the Provinces.
- Most technology management decisions related to the diffusion of technology are made in the context of the hospital budgeting process. Indeed, for the hospitals, the technology issues are subordinate to the budgeting process. In recent years, because of economic conditions, most Provinces have introduced considerable fiscal constraints into their programs. Thus, unlike supply controls in the United States, which operate independently of the financing system in an environment in which funding is relatively easy to obtain, supply controls in Canada are initially linked to fiscal control, and—particularly in Ontario and Quebec—have recently operated within an environment of extremely limited resources.

- Canadian hospitals have basically accepted the legitimacy of Provincial controls and constraints on resources. The hospitals generally accept that these decisions are political, so any challenges they mount are usually political.¹⁷ Furthermore, the hospitals have accepted the responsibility for rationing services that is implicit in the fiscal constraint programs and have begun developing an internal capacity for such rationing.
- Decisionmaking is informal, closely tied to budgeting, and often involves interested parties. Standard-setting and planning are closely related to current decisions and do not generally take place apart from and prior to such decisions. There are few requirements regarding formal procedures or public access to the decisionmaking process.

The management of medical technology in Canada is reviewed in three subsections below. The first reviews R&D efforts by the Federal and Provincial governments and by national voluntary agencies. The second examines the guidelines and procedures used to evaluate new medical technology. The third and largest subsection examines the operation of regulation and reimbursement as they influence medical technology.

Research and Development

In 1973, an estimated \$94 million was spent on health sciences research¹⁸ in Canada, representing 5 percent of total health expenditures

¹⁷Ontario's hospitals sued and won a decision on provincially mandated bed closings, but no such legal challenge was made in Quebec, and there have been no lawsuits over the tight budgets.

¹⁸Actually, \$94 million is an underestimation of total spending, because it does not include research by pharmaceutical companies and may exclude university- or hospital-provided overhead.

(5). Federal expenditures accounted for approximately \$69 million. Over half of these Federal health research funds were spent through the Medical Research Council, an independent body reporting to Parliament through the Department of National Health and Welfare. Most of the remaining Federal funds were directly provided by the Department of National Health and Welfare, and a substantial portion of these went to manpower development and construction of research facilities.

The other Federal support for extramural medical research came from the Department of Veterans Affairs for support of research on chronic diseases, the National Research Council, and the Defense Research Board. The Department of National Health and Welfare also pursued a modest intramural research program in areas including pharmacology and pharmaceutical chemistry, nutrition, pesticides, food additives, clinical laboratory procedures, epidemiology, and physical fitness. In recent years, Federal support for medical research has declined because of a general tightening of Federal spending that has affected all Federal research activities.

In addition to the Federal Government, some Provinces support medical research. The most stable Provincial support is in Quebec. The Quebec Medical Research Council receives much of its revenue from the Quebec Medical Insurance Board, which is mandated to pay the Research Council 0.2 percent of the total amount paid Provincial physicians.

Another major *source* of medical research funds in Canada are national voluntary agencies. These include the National Cancer Institute, Canadian Arthritis and Rheumatism Society, Canadian Cystic Fibrosis Foundation, Canadian Association for the Mentally Retarded, Muscular Dystrophy Association of Canada, and Multiple Sclerosis Society of Canada. Such voluntary agencies attend meetings of the Interdepartmental Committee on Medical Research, which provide a forum for sharing information on medical research support (7).

Evaluation

The evaluation of new medical technology in Canada, like that in the United States, is substantially a matter of independent clinical research and experience reported through the professional literature and discussed at professional meetings. Indeed, Canadian clinical evaluation activities are integrated with U.S. activities through the literature and professional meetings, and because of the difference in size between the U.S. and Canadian medical systems and research efforts, Canada draws substantially on research done in the United States. For the most part, work has focused on assessments of efficacy. An increasing but still limited amount of work, however, is focusing on cost-effectiveness and cost-benefit assessments.

Two types of evaluations that are particularly important in terms of the decisions that Provinces address on a daily basis are discussed below. First are assessments of the appropriate rate and degree of diffusion of medical technology. Second are evaluations of the appropriateness of individual pieces of equipment.

Guidelines for Special Services

Provinces have felt a need for Federal assistance in developing guidelines for reviewing proposals for new and expanded services in hospitals. Their primary need has been for guidance on the appropriate organization and physical space and equipment needs for a new service. Their second need has been a basis for assessing how many units are needed in an area.

In accord with the general pattern of developing a joint Federal-Provincial committee or working party to address these types of issues, a working party on special services was created in 1972. This group had representation from the Federal and Provincial agencies administering the hospital and medical insurance programs.

The first guidelines prepared by the Working Party on Special Care Units in Hospitals were published in 1975 and covered nine units or programs—intensive care, coronary care, dialysis,

cardiac surgery, nuclear medicine, physical rehabilitation medicine, narcotic addiction treatment, patient hostel, and burn (9). Guidelines have since been developed for additional services, and some of the original guidelines have been revised. A list of the guidelines currently available is presented in table 2.

For the development of guidelines on a specific service, a task force of several Federal officials, several Provincial officials, and medical

Table 2.—Guidelines for Special Services in Hospitals

The following guidelines have been prepared by the Federal-Provincial Working Group on Special Services in Hospitals. These guidelines were requested by the Federal-Provincial Advisory Committee on Health Insurance, Ottawa. Some of the guidelines are updated versions of guidelines previously published by the Working Group.

Expected publication date—November/December 1979

- burn unit
- Day surgery unit
- Dental care units in hospitals
- Detoxification unit
- Diabetic day care unit
- Narcotic day addict ion treatment unit
- Nuclear medicine in hospitals
- Patient hostel unit
- Rehabilitation medicine unit
- Respiratory technology services unit

Expected publication date—December/January, 1979-80

- Diagnostic ultrasound facilities in hospitals
- Geriatric day hospital
- Geriatric unit in a hospital
- Intensive care unit
- Total parenteral nutrition

Expected publication date—April/May 1980

- Adult psychiatric services provided by general hospitals
- Child and adolescent psychiatric services provided by general hospitals
- Cardiac care facilities and services:
 - Ambulatory electrocardiography monitoring
 - Cardiac care
 - Cardiac catheterization
 - Cardiac surgery
 - Cardiovascular nuclear medicine
 - Cardiac pacemaker
 - Cardiac stress testing
 - Echocardiography
 - Intermediate cardiac care
 - Noninvasive laboratories
 - Phonocardiography
- Perinatal intensive care unit
- Regional renal failure program
- Spinal cord injury unit

NOTE. A report on emergency services in Canada is also available.

SOURCE: Health and Welfare Canada, Ottawa, personal communication, 1979, (6)

consultants is formed. A typical guideline has 10 components:

1. patient load;
2. bed requirements;
3. recommended distribution on of units;
4. administrative policy, procedures, and control;
5. staff establishment and coverage;
6. staff training and qualifications;
7. specific supporting departments and services;
8. space allocation, utilization, and specific design features;
9. equipment; and
10. relationship with other departments and services.

As this list makes clear, considerable emphasis is given to issues of organization, staffing, and program quality. Planning guidance is usually contained in the discussion of patient loads and recommended distribution of units. In some cases, the recommendation is quite specific. In other cases, the guideline is more general. None of the guidelines explicitly considers the economics of alternative configurations of services.

Once the Federal-Provincial guidelines are developed, the Provinces are free to adopt or modify them as they see fit. Ontario and Quebec have both made many changes in individual guidelines, and such changes have served as the basis for subsequent revision by the Federal-Provincial working party.

The introduction to the Ontario guidelines, published in 1976, describes the process used in the Province (13):

In considering the means by which the guidelines might be reviewed, it was evident that a conventional task force approach would repeat much of the work done by the federal-provincial working party. It was decided that the ideal situation would be evaluation and modification based on the comments of all those directly involved—clinically or administratively—in the operation of the units throughout the province. If this could be achieved, the degree of multi-disciplinary involvement would be maximal and

¹⁹The original nuclear medicine guideline, for example, called for a three-tiered system of centers, with the highest tier serving a population of 1 million.

province-wide participation would be assured. A questionnaire was devised to evaluate the guidelines for each unit. With the endorsement of both the Ontario Hospital Association and the Ontario Medical Association, all of the active treatment hospitals in Ontario were invited to participate in the evaluation process. The acceptability of the approach was indicated by a response rate which ranged from 88 percent up to 100 percent for the various types of units.

The task force used the responses as the basis for modification of the guidelines. A provincially acceptable adaptation—not a rewrite—was the intended goal. The degree of acceptability of the guidelines varied according to the unit. For some, only minor changes were required. In the case of nuclear medicine, the responses indicated that the guidelines would require major revision for use in Ontario; therefore the Task Force sought the assistance of the OMA. The section on nuclear medicine appointed an ad hoc committee which, guided by responses of 46 departments of nuclear medicine, drafted a new set of proposed guidelines. These were then recirculated to the hospitals and the resulting comments were used in preparing the final version.

To adapt the Federal-Provincial guidelines or to assess appropriate service distribution independently, a Province will often establish a study committee. Such committees are usually expert professional panels charged to address specific planning or operational issues (e. g., the appropriate distribution of units for a given service) or to conduct an assessment of existing hospital programs and recommendations on programs to be closed,

The performance of these study committees has been mixed. In Quebec, for example, a committee comprised of nuclear medicine specialists (a separate specialty from radiologists in Canada) concluded that nuclear medicine was an established, proven, and basic diagnostic service that should be available in all institutions with over 100 beds and with adequate staff, and that 80 to 100 new cameras should be added within the Province.

The Quebec Government had strong reservations about the committee's findings. Provincial officials felt that, although the committee had been charged with assessing whether nuclear medicine was a basic diagnostic service or a re-

ferral service, the committee had given this question short shift. The Province had also wanted an assessment of the relative efficiency of nuclear medicine vis-a-vis other imaging services, but that assessment was not provided.

Currently, there is a freeze on the expansion of nuclear medicine in Quebec, although existing units have been allowed to upgrade equipment on the basis of the recommendation of a separate committee. The Provincial government would like to resolve the issue and allow more diffusion if it is appropriate, however, and will probably take several steps in this direction.

First, it will probably form another study committee, this one including radiologists, internists, and surgeons, that is, representatives of alternative specialty services and of the principal "consumers" of these services. One clear lesson of the earlier experience is that advisory committees should be organized in such a way that conflicts and differences in professional judgment are surfaced rather than hidden.

Second, it will probably tie approval of a new nuclear medicine unit to the creation within the hospital of an imaging department that will combine the radiology, nuclear medicine, and ultrasound capacities. The creation of imaging departments that combine these capacities, coupled with the continued fiscal pressures that force hospitals to budget more tightly, is seen as one way of moderating the competition among specialties and encouraging the development of an appropriate mix of service capacities by making the tradeoffs and overlaps among alternative techniques clearer.

Third, Quebec will probably require the creation of a formal evaluation protocol for the nuclear medicine service to provide information on the appropriate use of the service and its role relative to other services. This was an idea that was suggested 4 years ago, but never implemented. The expressed view of the Provincial planning officials was that a formal evaluation process as was originally conceived is almost impractical for a new technology such as nuclear medicine, because the technology itself is undergoing development and change, and because physicians using the technology are learning

and continually modifying their practice patterns. Provincial officials believe that evaluation for purposes of assessing the extent of appropriate diffusion is possible, but that it should be limited in scope, geared to incremental assessment (of the impact of the procedure and judgments on diffusion), and repeated as appropriate over time. Critical to the process of evaluation is framing the questions to ensure that the right issues are addressed at the proper level of detail.

Selection of Specific Equipment

Somewhat removed from the question of overall services distribution or rate of diffusion is the question of the specific equipment that should be purchased for a unit. This becomes an issue, because since a Province reimburses capital expenditures, it must approve the specific selection.

Most Provinces have an equipment specialist whose primary responsibility is to review individual equipment requests. These individuals are often quite knowledgeable and may also have access to technical experts in such areas as radiology or laboratory; however, the information they have about the relative operational performance of different equipment may be limited.

One advantage of the development in some Provinces of regional bodies to review capital budget requests (which is discussed in the next section of this chapter) has been the provision of additional information to hospitals making equipment decisions. In Ontario, for example, the Province requires all laboratory equipment purchases over \$5,000 and all general equipment purchases over \$20,000 to be reviewed by local organizations. These local organizations have generally set up provider advisory committees to review the requests, and the experts on these committees will often share their experiences and discuss alternative equipment choices as part of the review. Comparable discussions take place in Quebec.

Several years ago, a proposal was circulated calling for the establishment of a Federal unit to compile information on the performance of al-

ternative equipment and to serve as a referral center for questions from individual Provinces. Such a unit was never developed. In part, that was because of a lack of funds and a general retreat by the Federal Government from the operational details of the insurance programs when the cost-sharing formula was changed. Also, questions have been raised about the ability of such a unit to provide accurate, current assessments in a market in which upgrading and product modification occur at rapid rates.

Regulation and Reimbursement

As noted above, most direct controls on the health care system are imposed at the Provincial level, and these controls generally operate as part of the reimbursement system. For this reason, the concepts of regulation and reimbursement are linked in the discussion below. The process and content of health planning at the Provincial level, the budgeting process and its impact, controls on physicians relative to new technology, and utilization controls are described following a brief review of regulation at the Federal level.

Federal Regulation of Drugs, Medical Devices, and Nuclear Materials

Direct Federal regulation is limited to three areas—drugs, medical devices, and nuclear materials. The Federal Government regulates both the manufacture and distribution of drugs in Canada.²⁰ The conditions under which drugs are to be manufactured are described in the manufacturing facilities and control regulations. The regulations pertain to facilities, employment of qualified personnel, quality control procedures, maintenance of records, and maintenance of a suitable system to enable a complete and rapid recall of any batch of drugs from the market. Plants manufacturing biologicals such as serums and vaccines must be licensed according to specifications of the Health Protection Branch, whether they are located in Canada or abroad. Pharmaceutical plants are regularly visited by inspectors.

²⁰This description is adopted from Health and Welfare Canada, Health Economics and Statistics Division, *Review of Health Services in Canada, 1974, 1974* (4).

When a new drug is to be placed on the market, the manufacturer is required by law to provide specified information, including a quantitative list of all ingredients, evidence of clinical effectiveness, the formulation of dosage forms, and reports of any adverse effects. This information is evaluated by the Health Protection Branch to assess whether the drug is safe and effective.

Once a new drug is on the market, its sale can be banned by the Health Protection Branch if the adverse drug reaction program indicates that the drug is unsafe and injurious to health. The drug quality assessment program aims at producing objective evidence on the quality of drugs already on the Canadian market and disseminating this information to members of the health professions, governments, and the general public.

Another major activity of the Health Protection Branch is designed to allow greater price competition for drugs. This activity involves inspecting manufacturing facilities, assessing claims and clinical equivalency of competing brands, and providing information to concerned professionals and to the general public.

Also, the Health Protection Branch has a Bureau of Medical Devices that conducts a program for medical devices analogous to that of the U.S. Food and Drug Administration (FDA). Unlike the U.S. program, which includes an extensive premarketing approval process, however, the Canadian program is principally a postmarketing effort. The difference between the two countries' programs in part reflects the fact that the United States is a manufacturing country, whereas Canada is an importing country.

The postmarketing system in Canada is judged by those operating it to function well. It involves responding to user concerns, some literature review, and contact with U.S. regulators, since problems generally appear in both countries. The program is not bound by specific procedures, and when problems are identified, the Canadian Government may require modification or withdrawal of the product. Hospitals are generally alerted to identified problems.

Program administrators feel that a strict post-marketing approach may be inappropriate with respect to new technology. For certain types of new products, they are requesting voluntary participation of manufacturers in monitoring the scope of diffusion and identifying clinical investigators studying these products. The products subject to this premarketing review include implants, cardiac pacemakers, intrauterine devices, intraocular lenses, and long-wear contact lenses.

All Canadian applications of radioactive isotopes are controlled and licensed by the Atomic Energy Control Board (AECB).²¹ The Radiation Protection Bureau of the Department of National Health and Welfare serves as a health and safety advisor to AECB. Medical approval of license applications is required from the Bureau. The physician named on the license is personally responsible for the use of particular radionuclides. Each license is set out for the physician, specifying—on the basis of AECB'S assessment of the training and qualifications of the individual physician—the types of radionuclides the physician can use, their application, and their dosage.

Provincial Health Planning Processes

The Canadian Provinces have not invested resources in health services planning separate from the regulatory processes. Most efforts to develop bed need projections, criteria for special care units, or statements of Provincial goals with respect to the organization and distribution of specific services have been made in response to project applications. As has happened frequently with U.S. health planning agencies, the first request in a given area triggers the process of developing standards and criteria and a Provincial plan for the service.

The standards development process, as noted above in the section on guidelines for special services, involved both joint Federal-Provincial efforts and strictly Provincial activities. It also tended to be informal and to involve Provincial

²¹The description that follows is adopted from Health and Welfare Canada, Working Party on Special Care Units in Hospitals, *Special Care Units in Hospitals*, 1975 (9).

officials and selected medical consultants. The general public has had little opportunity for participation or comment, but that situation is changing somewhat. The three largest Provinces—British Columbia, Quebec, and Ontario—all have some local regional organizations that are involved in both planning and review of specific project requests. The organizations' level of activity and degree of involvement vary in each Province.

British Columbia was divided into regional districts in 1957, and regional planning boards (essentially councils of municipal government) were established in each. One subfunction of these regional planning boards was health. In 1967, "regional hospital districts" coterminous with the general planning districts were created as administrative mechanisms to authorize bonds to support hospital construction and establish taxes to repay the bonds. (A separate organization was required constitutionally to allow for taxing authority.) The regional hospital district boards and the regional planning boards are identical, although most districts have established advisory committees of hospital representatives and, in some cases, laypeople.

The net effect of the establishment of these boards in British Columbia appears to be that greater attention is devoted to regional health planning. The districts have been developing regional plans specifying the role of individual institutions, and in the absence of a Provincial health plan, these serve as key planning documents. Most boards have little independent health planning capacity and rely heavily on Provincial government staff for advice and support. Only two districts have their own staffs and are particularly active. One of these, Greater Vancouver, has reported some conflict with the Province over specific projects.

The Province of Quebec has been divided into 12 regions, and each region has a regional health and social services council (CRSSS). The regional councils began operation in 1972, their first responsibility being to oversee the elections for a provincially mandated reorganization of hospital boards. The responsibilities of the councils are conceived as evolving to include consider-

able authority over the regional medical and social service system.

Initially, the councils were involved in planning for emergency medical services, handling consumer complaints about health services, assisting institutions to establish common services and group purchasing, and reviewing and commenting on individual institutional projects and Department of Social Affairs' statements of regional and Provincial health and social service priorities.

Beginning in 1976, the regional councils' scope of authority was dramatically increased. Quebec changed the basis for financing capital (discussed below) and gave the councils authority over the expenditure of substantial funds. Several of the councils, most notably that in Montreal, have responded not only by reviewing specific project requests, but also by developing more general mechanisms for reviewing patterns of service delivery and encouraging change. These efforts have generally been dominated by hospital representatives sitting on a separate commission within the council structure. The program of fiscal constraints and the potential cost savings associated with consolidating services, however, have helped the councils achieve some restructuring.²²

Quebec's regional councils are currently involved in a major planning initiative mandated by the Provincial legislature. This is an examination of the distribution of medical staff expertise and activities among teaching hospitals, a two-phase project in which the councils are working with the hospitals and universities and in which the Quebec Ministry by law cannot participate. The first phase has required the university-affiliated hospitals to specify a medical staff organization and identify the range of services and expertise they have available. During the second phase, these plans will be reviewed and recommendations will be made concerning adjustments to the distribution of

²²In Montreal, for example, where the council employs three biomedical engineers, obstetric and pediatric services were realigned and consolidated. Hospitals and the council resisted public demonstrations and picketing to keep the closed units open, which were held for a year-and-a-half following these decisions.

medical expertise and services, with concomitant proposals for shifting staff.

The planning initiative in Quebec is being pursued deliberately and with extensive participation from all parties. Such an effort is virtually inconceivable in any other Province. Apart from the integrating effect of the medical schools, one factor that makes this planning initiative possible in Quebec—and unlikely in other Provinces—is the legal domination of hospitals by the Quebec government. The passage of legislation mandating a complete restructuring of hospital governance in Quebec reflects a level of acceptance of Provincial control that is unmatched in other Provinces. Furthermore, in Quebec, there has developed general acceptance by both physicians and government of the legitimacy of negotiations between them regarding not only insurance payment rates, but other conditions of work. In other Provinces, the legitimate scope of negotiation is often viewed as more limited.

It should be noted that the initial development of 12 councils with advisory power in Quebec represented a weakening of a more extensive decentralization proposal. The original proposal was for three regions with extensive authority to determine institutional operating and capital budgets. After considerable debate about whether Provincial authority should be delegated, a legislative compromise was reached. Since then, the Provincial government has delegated authority on an administrative basis.

A similar debate occurred in Ontario, where district health councils are currently being organized. In 1972, the Ontario Ministry of Health was reorganized to achieve one goal—the development of a capacity to develop integrated community health delivery systems and planning capacity. Central to the development of such a capacity was the concept of local bodies with extensive health planning and health systems management responsibility that would receive staff support and expertise from the Provincial level. This concept became enmeshed in a general Provincial debate on regional government. Because the local organizations were not established, the Ministry was reorganized again that same year to reestablish

centralized centers of activity. Since then, efforts have been underway to establish district health councils with advisory responsibilities. The first district council was established in January 1974, and approximately 20 district councils have now been formed.

There is no district health council established in Toronto. Two hospital organizations share what would be the council's responsibilities—the University Teaching Hospital Association for university-affiliated hospitals, and the Hospital Council of Metropolitan Toronto for community hospitals. These organizations share an executive director and staff. That hospital associations are playing the role of district health councils in the largest Provincial metropolitan area, although not a comment on the quality of work done by these organizations, is indicative of Ontario's attitude regarding the importance of public participation (as well as Toronto politics regarding the selection of appropriate public representatives).

The district health councils in Ontario were conceived of as providing advice in the areas of personal health and hospital services, community health services, mental health, environmental health, and linkages to social services. Their potential role as managers of the local health system was left undefined, but they were to be given considerable authority to review local capital spending plans.

The Ontario Ministry of Health did not want the councils to become bureaucratic, so it attempted to avoid the development of extensive staffs in each district. Each council has an executive director. To provide technical staff support and to provide contact points within the Provincial government, the Ministry established area planning coordinators and created area health teams. The area teams consist of individual members of the staffs of each Ministry division who have been assigned responsibilities for specific districts or groups of hospitals.

Because of their involvement in other functions, area planning coordinators have not served as an effective bridge between the district health councils and area health teams. The area teams appear to have been effectively estab-

lished, however, and are a major source of formal organizational linkage across functional lines. One effect of this has been to facilitate hospitals' access to the Ministry on the operational level by establishing clear contact points.

Ontario's district health councils have not yet assumed the full range of activities or role in the system originally contemplated for them. They are doing almost no planning separate from reviewing and making recommendations on service and capital expenditure requests. Although the Province has approved many of the changes developed for Windsor, approving not only the perinatal unit, but also development of two chronic care units and the purchase of a new computed tomography (CT) scanner, the guidance the district health councils have received from the Ministry on reviewing service and capital expenditure requests has been late—and because of the fiscal constraints, no action has been taken on the councils' recommendations.

Hospital Budgeting and the Diffusion of Technology

As noted above, the hospital budgeting process is the central process in which resource allocation decisions are made. This process has two components. One is establishing the operating budget for the hospital, which may contain an adjustment to provide additional operating funds for new services or to staff new equipment. The second is establishing the capital budget, with provision for spending on plant, fixed equipment, and movable equipment.

There is enormous variation in the methods different Provinces use to provide funds for capital investment. Part of the reason for this variation is that the Federal Government has not shared the cost of construction and fixed equipment through the hospital insurance program. Although separate funds have been available from the Federal Government for hospital construction and construction to support medical education, the costs of plant and fixed equipment have generally been Provincial responsibilities. Movable equipment has been eligible for cost sharing, and Provincial governments have had the option of expensing grants each year or paying depreciation.

Each of the two Provinces that have been the focus of this study, Ontario and Quebec, uses a unique approach to capital financing.²³ Ontario provides two-thirds of the approved capital cost of new construction or renovations of a community hospital or health care facility.²⁴ Health science centers and university teaching hospitals are paid Provincial grants of 100 percent of approved capital costs.

Hospitals in Ontario may fund a project totally, using the hospital's capital funds, provided that additional operating costs will not result from it. There are several possible sources of these funds: philanthropy, local government, operating surpluses, endowment, endorsement, and contributions are the most important. The two-thirds/one-third split historically has been the relative value of plant and land, so a new facility essentially has had to have the land contributed to obtain the funds for a new plant. With this method of funding, the Ministry's planning procedures must still be adhered to, with plans approved by the Ministry. Funds for movable equipment are provided through depreciation, but the hospital must provide the initial purchase funds itself. These are often generated from public or private contributions or operating surpluses.

Over the last several years, the Ontario Ministry has provided only limited capital funds to the hospitals in Ontario. In 1973, the Province agreed to a 10-year development program for teaching hospitals, pledging \$95 million in real dollars over that period. Teaching hospital projects have been approved under that program, but in many cases, capital funds have not been allocated during the year of approval. Instead, the Province has authorized the hospitals to borrow the funds and pledged to reimburse them for the loans and interest. Hospital construction has been authorized in rapidly growing areas and to address safety issues, but under few other circumstances.

²³For a full description of Provincial approaches to financing, see Lewin and Associates, Inc., *Government Controls on the Health Care System: The Canadian Experience*, 1976 (11).

²⁴If the hospital or health care facility is located in northern Ontario, and the population of the municipality is not more than 12,000, the Ontario Ministry's share increases to five-sixths of the approved capital cost of new construction or renovation.

Almost no funds have been provided for equipment projects and new services in Ontario. The Province has approved acquisitions but told hospitals that they will not have their depreciation or operating expenses increased to reflect the addition, a situation characterized as "approved but not funded." Of the seven approved CT scanners in metropolitan Toronto, for example, only two were funded by the Ministry. The remainder had to be funded out of global budgets or philanthropy.

One exception, in terms of the provision of capital funds, has been a program under which the Ontario Ministry will provide 100 percent of the capital funds for projects that will recover their costs in operating fund savings within 5 years. The hospital's operating budget, however, is reduced by the savings. To make it more attractive, the program will be changed so that if a hospital provides the initial capital funds, it will be allowed to recover these plus interest, and subsequent operating savings will be shared on an equal basis between the hospital and the Province.

In Quebec, until 1976, all capital funds were provided directly by the Province. As part of the 1976 delegation of authority to the regional health and social services councils, there was major restructuring of capital financing that shifted some financing to the regional councils and hospitals themselves. Until 1976, hospitals had been reimbursed by the insurance program at a standard ward rate. When patients voluntarily sought semiprivate or private rooms, they would be charged separately for them.²⁵ In establishing hospital budgets, Quebec had used the revenues from preferred accommodation charges to offset the amount needed from the Provincial hospital insurance program. Under the restructured system, hospitals were required to place 45 percent of these funds into a special fund for capital expenditures. Another 45 percent was to go to the regional council, and 10 percent went to the Provincial government to redistribute to regions with less of this revenue.

²⁵Blue Cross and other insurers remain active in a market for insurance covering these charges and other medical charges not covered by the insurance program.

Hospitals in Quebec are expected to finance minor equipment purchases out of the funds generated by those preferred accommodation charges or contributions. Construction and other renovations under \$1 million and purchases of specialized equipment are to be reviewed by the regional council, and approved requests are funded jointly out of the council funds and hospital funds. The council can contribute no more than 80 percent of the cost of renovation of equipment and may in fact contribute less, requiring the hospital to fund up to the entire amount of the project itself.

Certain types of equipment purchases, although they will be funded through the council, must be approved by the Province. Included in this category at one time were purchases of diagnostic radiology, therapeutic radiology, nuclear medicine, data processing, laboratory automation, and anesthesia and recovery equipment. The category now includes only purchases of computer applications and data processing equipment.

Construction projects over \$1 million in Quebec are funded entirely by the Province. These projects must be reviewed by the regional council and approved by the Province. Funds needed for the operating expenses associated with new capital or service charges are also reviewed and could be added to the global budget by the Provincial government. Over the past 4 years, however, no additional funds were added.

General construction funds have been tight in Quebec over the last several years. In 1975-76, they were \$42 million. The accommodation charge generated an additional \$20 million. When the new financing system was put into place, the Province estimated the amount that was being spent on equipment and renovation under \$1 million (the expenditure classes to be funded by these charges) and set the charges to realize this level of revenue. The charges have since been increased but there has been no systematic analysis of whether current changes provide a sufficient level of funding.

Discussions with individuals in Quebec suggest that the accommodation charge is providing only a marginal amount of funds. The 10-

percent fund for reallocation has been inadequate and the Provincial government has augmented it. The Montreal Council estimated that it received \$40 million per year in requests, divided evenly between renovations and equipment, of which it authorized \$15 million and directly contributed \$6 million to \$7 million. It is receiving \$3 of special equipment requests for every dollar it authorizes.

Limited funds have required Provinces and regional bodies to establish priorities among projects. A variety of mechanisms have been employed. In Ontario, beginning with fiscal year 1978, hospitals were asked to submit their proposed capital projects and proposed new and expanded services to the district health councils. No guidance was provided to the councils on the priorities they should employ for their review.²⁶ In addition to this lack of guidance on priorities, the councils received no information from the Province specifying which projects from the previous year, if any, had been funded and which should be reconsidered in the current year. Because of these problems, for fiscal year 1981, the University Teaching Hospital Association refused to carry out a priority-ranking process for new and expanded programs.

The Province of Ontario has expressed conflicting attitudes on the degree of autonomy the district health councils will have. On the one hand, it has reserved the right to change the priorities coming from the district councils. Along this line, Provincial staff indicate they have developed their own priority-ranking system, including a set of numerical weights that applies to project ranking. This system has not been shared with the district councils or Provincial hospitals, but its general shape can be surmised from the guidance the Province has given the districts. The guidance on capital spending established 10 project categories: 1) correction of hazards, 2) conversion from active treatment to chronic care, 3) regional bed shortage, 4) improvements in services, 5) consolidation in serv-

ices, 6) investments that reduce operating costs, 7) cancer treatment services, 8) crippled children's services, 9) energy-saving investments, and 10) other. Priority was to be given to projects in the first, third, and sixth categories.

Although the Province has reserved the right to change district health councils' priorities and has established its own ranking system, however, Provincial staff indicate that, in reviewing the councils' priorities for funding in 1979-80, they selected the top three to five projects from each council in order to assure that the top priorities from each would be represented, and then established a ranking among these. Indeed, no one contacted in the Ministry or hospital community cites any case in which district council priorities have been modified. There is, however, one footnote to this priority-setting exercise. For 1979-80, no new funds were made available for new or expanded services, so all projects approved in that year, regardless of rank, had to be funded out of individual institutions' global budgets.

In Quebec, because of the local council funding and institutional autonomy over spending on specific activities, the arrangements for establishing priorities are different from those in Ontario, but their effect is comparable. Having received guidance from the regional council on its funding priorities, hospitals submit their equipment and renovation priority lists to the council. In Montreal, the lists are initially reviewed by a commission within the council consisting of two representatives each of the medical schools, teaching hospitals, community hospitals and chronic hospitals, and one representative of the psychiatric hospitals. This commission makes the final decisions within the council on projects under \$100,000. For projects over \$100,000, the commission makes recommendations, but the council makes the final decisions.

The commission within the Montreal council has conducted or sponsored studies on a variety of issues. These have ranged from mundane but economically costly issues of storm window replacement in hospitals to a review of regional nuclear medicine facilities to determine which departments would be allowed to update their

²⁶In the first year, guidelines were issued only 2 months before submissions from the district councils were due, a time when the process was well underway and after many councils had established their own priorities. This timing led to considerable complaints from the councils. The next year, this situation was similar.

equipment. (Following the nuclear medicine study, the council arranged for group purchase of equipment at a discount.) The priority-setting process during the first 2 years of its operation was reported by some participants to be extremely disordered and inequitable, in part because of council weaknesses, in part because the hospitals failed to set priorities effectively. There was a feeling that the process had improved, however, and that despite the low proportion of funded projects to total requests, the hospitals were substantially satisfied with the results.

As in Ontario, the Quebec government reserves the right to change recommendations from the regional councils. There have been only a few cases in which it has exercised its right, partly because the councils have participated in the process by which the planning parameters were set.

In closing this discussion, two outstanding issues should be noted. The first is that the lack of new program funds has been a major problem for Provincial hospitals. Despite discussion of changes in the reimbursement system, the global budgets of most hospitals have remained substantially unadjusted for several years, and in real terms, the base has in fact declined. This, more than the capital limits, has affected the institutions' capacities to mount new programs. Although the lack of funds has encouraged internal economies, service adjustments, and consolidation of service as a means of coping with tight resources, it has also prevented some consolidations by not providing a structure for shifting resources to hospitals that have received the consolidated programs.

The second issue is that the Provinces have not developed a long-term basis for determining the level of resources in health care. Indeed, a global approach to this problem is not necessary. Some Canadians, for example, decided that, in light of perceived excess capacity and inefficiencies and in view of other Provincial priorities, funds to the health system would be restricted. They did not attempt to determine the optimal level, but instead began reducing services at the margin. Although this approach is reasonable, as implemented it suffers from the

lack of any assessment of the marginal impact of these decisions.

Those in Canada regularly point out that decisions concerning the health system, particularly resource decisions, are political. The introduction of assessment methods would not change this. By highlighting the effect of the current decisions, however, it might inform judgments concerning how these decisions should be modified in the future. There is the risk for government that such evaluations, if public, would fuel pressures for higher spending. The Provincial governments are sensitive to constituent pressures on these issues, and several individuals in Ontario and Quebec reported increasing public pressure to expand resources in the health sector.²⁷

If decisions are made to increase the capital funds available to the health sector, the formal systems for establishing priorities to allocate these funds appear to be in place in these Provinces. Until now, however, especially in Ontario, constraints have been so tight that choices among priorities have been more formal than substantive. One question confronting these systems is whether they can in fact operate in an environment of real allocation decisions, or whether the increased funds and greater relevance decisions would generate a higher level of conflict than the systems could absorb. Related to this, a second question is whether Provinces can marginally increase the level of investment and cost growth, or whether, unable to do this, they will move from famine to feast as they moved from feast to famine in the early 1970's.

Hospitals' Responses to Investment and Service Constraints

The fiscal constraints in general, and capital and service constraints in particular, have significantly changed the environment in which hospitals operate. Hospitals have reacted to this in a wide variety of ways, some supporting public policy, some attempting to undercut it. Five

²⁷The front page headline in the July 24, 1979 Toronto Star, for example, played to public concerns by announcing "Our Hospital Nightmare: You Could Die Waiting." The next day, the Health Minister's response was headlined "I'll Fight for Needy Hospitals—Timbrell."

aspects of hospitals' responses in the technology area are particularly notable.

First, in addition to attempting to achieve greater efficiencies to adjust to the constraints and create internal funds for capital and service expansion, hospitals have tightened the management of their capital and operational budgeting system. To respond both to the overall constraints on available funds for capital and new operating expenses and to the requirement that they present formal lists of priorities to regional bodies, hospitals have had to define their priorities clearly.

One approach that hospitals have used to define priorities has been to establish budgeting committees that include physicians from the major departments, such as medicine, surgery, radiology, and pathology. Such committees change the decisionmaking process from one in which the hospital's administrators must respond to departmental requests individually to one in which the competing claims on limited resources are reviewed and resolved in discussions that include physicians representing the different interests. Thus, the establishment of hospital budgeting committees represents a major reordering of decisionmaking in these institutions. Among its effects are to reduce staff alienation from the budgeting process, to broaden the range of the expertise and perspectives brought to bear in assessing relative priorities, to enable more effective challenge of planning assumptions and project justifications, and sometimes to generate unexpected solutions to problems. A main force assuring the effectiveness of such committees, however, is the reality of the external constraints.

A second element in the hospital response has been an increasing acceptance of service consolidations and shared-service arrangements. The obstetrics and pediatrics consolidation in Montreal and Windsor have already been noted. Other examples that are cited by Canadians are arrangements for the shared use of a CT scanner by radiologists at Toronto General Hospital and Mount Sinai Hospital (these facilities are across the street from each other) and a similar shared-use arrangement between the anglophone McGill-affiliated Jewish General Hospital and

francophone University-of-Montreal-affiliated Hotel de Notre-Dame. Also cited is a growing interest among hospitals in referring highly specialized laboratory tests to other hospitals rather than duplicating the capacity. Efforts in Hamilton, Ontario, where hospitals have developed an in-common laboratory and agreed to consolidate special services such as neurosurgery, cardiac surgery, and burn treatment at individual institutions, represent a notable example of this.

Within this small but growing movement toward consolidation, the medical schools have played mixed roles. There is general acceptance in Canada that highly specialized services should be centralized at teaching hospitals, but the medical schools have varied significantly in the degree to which they have acted to try to achieve coordination of services among their teaching affiliates. McGill and Laval in Quebec were cited as examples of schools which had actively promoted coordination and consolidation. The University of Toronto and University of Montreal were noted to be far less involved. An area of fruitful future inquiry would be to understand the factors that have led to these differences.

A third element that can be noted among some Canadian hospitals is a renewed growth in philanthropy and private development campaigns. Several hospital administrators view efforts in these areas as increasingly important; they consider it a major need and challenge to explain to the public why, even with a government insurance program, private contributions are necessary. Philanthropy has made acquisitions possible when government funds were not available. In Quebec, for example, funds for all CT scanners in the Province were made available either by private philanthropists or from hospital endowments. Purchases in Quebec were all made with Provincial approval. In Ontario, by contrast, not only approved scanners were purchased with philanthropic funds, but several unapproved scanners, as well.

The fourth notable element of hospital response is the acquisition of unauthorized equipment. Such acquisition has occurred primarily in Ontario, where in Toronto, for example,

there are three unauthorized CT scanners. Similarly, it was reported that when this Province delayed decisions on ultrasound equipment, many hospitals simply purchased it. The situation in Ontario in part reflects the fact that since hospitals *were* being asked in most cases to fund such purchases out of their global budgets with no increase in funds, obtaining approval offered no financial advantage. It also reflects hospitals' belief that certain services are critical to maintaining quality and staff. (The hospitals with the unauthorized CT scanners have referral neurology and neurosurgery services.) Finally, it reflects their belief that the Province will not attempt to discipline or penalize the hospitals that make unauthorized purchases. The Province of Ontario has never ordered a hospital to sell off or discontinue an unapproved service, and political pressures might make such an order infeasible. Furthermore, the Province continues to pay radiologists the professional component of their fees, and this practice further undermines belief in the Province's will to crack down.

Individuals in Quebec indicated that in that Province a similar situation involving the acquisition of unauthorized equipment was extremely unlikely, because the Provincial government has previously demonstrated considerable willingness to deal aggressively with hospitals, and because regional councils' control over renovation and equipment funds provides a clear disciplinary mechanism.

Finally, a fifth element of hospitals' response is represented by hospitals' attempting to shift expenses from their global budget outside to other aspects of the health insurance system. As part of their constraint programs, Ontario and Quebec stopped adjusting hospital outpatient budgets for higher volume. (In Ontario, however, the Province has given slightly higher across-the-board budget increases to the outpatient budget than the inpatient budget. This is intended to encourage and promote shifts from inpatient to outpatient care.) One institutional reaction has been to refer ambulatory patients to nearby private physicians for tests that will be covered under the medical insurance program. These referrals have generated some interest among physicians in developing noninsti-

tutional nuclear medicine facilities. Efforts to expand the reimbursement in the medical insurance program to cover these facilities have been resisted.

Professional Fees and the Issue of Freestanding Units

The process by which professional fees are set was described in the section on the health care system in Canada. Several people involved in the fee-setting process were sensitive to the issue that fees can create incentives for higher utilization or abuse of services. To some extent, this pressure is countered by the general concern within the medical societies that incomes by specialty be equalized, and by the existence of one interspecialty group that reviews the relative fees for new procedures.

The Ontario Medical Association indicated that, as a general rule, it tries to set an initial fee that is based on the recognition that as the procedures become more routine, there will be less physician effort. It also identified some procedures, such as chronic dialysis, for which the original fee was reduced, and others for which the fee increases were kept below average until a more appropriate relative value was reached.

As noted above, the fiscal constraint program has led to some interest among Canadian physicians in developing freestanding units for such services as CT scanning, nuclear medicine, and ultrasound. The principal Provincial control over this private proliferation of high technology is the fee system, since unless there is a technical component to the fee as well as a professional component, the Provinces will not reimburse equipment and technician costs. In general, Provinces have held the line against such freestanding units.

It can be argued that the development of freestanding units should not be resisted because such units can better respond to outpatient needs and may operate more efficiently. For the Provinces to allow this development, however, they would have to be assured that inappropriate utilization could be prevented and that the insurance programs would realize some of the

financial benefits of a shift of diagnostic services to an outpatient setting.

Utilization Controls

Utilization controls in the Provincial insurance system are limited. Most focus on outpatient care and are designed to identify fraud or

high-billing physicians. Similarly, the in-hospital review systems run by the Provinces are limited. Despite the fact that the global budget incentive is to reduce length of stay and unnecessary admissions, many Canadians believe that current hospital utilization is unnecessarily high, and some hospitals have therefore begun implementing internal review programs.

SPECIFIC TECHNOLOGIES

The preceding sections of this chapter have attempted to present an overview of the management of medical technology in Canada, including the issues being addressed in the system and the formal and informal processes involved in making the technology decisions. In this section, an effort is made to shed additional light on the earlier discussion through examinations of specific technologies. The reviews presented are not comprehensive, but do provide information on the number of units, basic planning approaches, and Provincial experiences that illuminate the technology management process.

CT Scanners

The original Federal-Provincial guidelines for special care units did not address CT scanners. In March 1977, a member of the Federal-Provincial working party drafted a report on CT scanning citing the EMI standard of one unit per 500,000 population. A definitive standard was not attempted, however, because it was felt that changes in the technology would quickly outdate it. Although an interim report was prepared, the working group recommended that, because CT scanning technology had raised a number of issues in radiology and nuclear medicine, the report not be issued and that a national symposium on diagnostic imaging be held. A symposium took place in October 1978. Since that conference, a group has been working on a draft guideline on CT scanning, and it was scheduled to complete this work in May 1980.

The delay in Federal-Provincial guidelines left the Provinces to address the issue of diffusion. Most Provinces adopted an initial standard of one unit per 1 million population or one per

100,000 population. In 1978, there were 20 to 25 units in Canada. Among the major unresolved issues for the Provinces in addressing the diffusion of the technology are: 1) how to reconcile the population and volume-based projections of units with patterns of neurological and neurosurgery practice and the demands for scanners at hospitals providing these services, 2) how to assess the relative utility of this CT equipment vis-a-vis other services, and 3) how to assess the utility of a whole-body scanner relative to a head scanner. In general, while attempting to obtain answers for these questions, most Provinces have moved conservatively, but not dogmatically, in limiting CT scanner services.

Ontario had 17 authorized scanners as of January 1, 1979. As of that date, three had not been installed. The pattern of authorized expansion of scanner services was as follows:

	<i>Total authorized scanners</i>
1974	1
1975	2
1976	6
1977	8
1978	10
1979	17

Recently, a joint Ministry /Ontario-Medical-Association committee revised the criterion to one per 500,000 population and recommended adding several additional scanners. Five of the approved scanners are located in Metropolitan Toronto. Two of these have restricted use—one at the Hospital for Sick Children, the other at the Princess Margaret Hospital, which is the Provincial cancer center. As noted above, in some cases, patterns of sharing CT scanners have developed.

In addition to the approved scanners operating in the Toronto area, there are three unauthorized scanners. Unauthorized scanners have developed in Ontario for several reasons:

- Only two of the approved scanners in the Toronto area were funded by the Ontario Ministry; the others had to be financed out of global budgets. The hospitals that installed unauthorized scanners were therefore at no more financial risk than the hospitals that installed approved scanners. Furthermore, one unauthorized scanner was donated and the benefactor guaranteed that operating expenses would be met; a second scanner was purchased used, therefore at reduced cost.
- Hospitals expect that at some point the Ontario Ministry will pick up the operating expenses on the unapproved scanners.
- With the Ministry considering hospital closings or definitions of hospital roles, possession of a scanner is viewed as important in terms of allowing an institution to remain in the forefront. Hospitals believe their position in a restructured system will be based on the equipment and services they offer—regardless of whether the equipment and services have been approved.
- Ontario continues to reimburse radiologists for the professional component of their fees for CT scanning even at unapproved scanners, thereby making use of these scanners attractive to radiologists.
- Scanners are attractive to hospitals in terms of maintaining physician staff loyalty. Unlike cardiac surgery, a service which requires a cardiac surgeon, scanning is a basic diagnostic technique that many physicians want to have available.

The Ontario Ministry's actions toward unauthorized scanners in Toronto have been inconsistent. The three hospitals with unauthorized scanners were ordered to set up a separate cost center for the scanner and segregate the costs associated with it; the hospitals complied. Reportedly, CT scanner expenses are being excluded from their global budgets. (One hospital with an unauthorized scanner announced that it

would make referral scans from other regional hospitals available free of charge. Since the hospitals with approved scanners in the city are charging for referral scans, this was seen as one way of creating pressure on the Ministry.) When one hospital with an approved scanner had to close its scanner for several months and contracted with a hospital with an unapproved scanner to provide scanning services, however, the Ministry sought an amendment to the Provincial law establishing scanners at specific hospitals to permit reimbursement to the hospital with the unapproved scanner for the provision of scanning services of the approved hospitals.

There is reported to be a 2-month backlog for outpatient referral scans in Ontario. One observer thought that this backlog was an artifact resulting from inadequate operating funds for the scanners. Noting that many scanners are operating only 8 hours a day because of staff limitations, that observer suggested that the backlog could be significantly reduced or eliminated if the scanners were operating for longer periods.

Quebec has maintained tight control over scanners. There are only seven units in the Province, with two on order. The Montreal Neurological Institute has two—one head, one body. Of the remaining units, all are body scanners. There are procedures for referral and sharing among hospitals. The pattern of scanner expansion in Quebec has been as follows:

	Head	Body	Total scanners	in use
1973	1	0		1
1974	1	0		1
1975	1	0		1
1976	1	2		3
1977	1	4		5
1978	1	6		7

After receiving requests for three additional scanners, the Province conducted a general review of its policy. Officials felt particularly uneasy regarding two questions—the relationship of scanning to other diagnostic services and the true utility of the whole-body scanner. Quebec has therefore decided to limit the scanners in the Province to the current units and will not consider adding to these units until the six have an average annual volume of 2,800 examina-

tions each, and a rigorous evaluation of scanning from both a health and economic perspective is completed, either in Quebec or some other location. Both Ontario and Quebec are considering sponsoring such an evaluation.

Renal Dialysis

Federal-Provincial guidelines and assessments of renal dialysis place it in the overall context of treatment of end-stage renal disease. Those documents place an emphasis on home dialysis to maximize autonomy, and on kidney transplants as a major service that should be available.

The Federal and Ontario planning guidelines call for a hospital-based unit to support 25 to 50 new patients a year, a planning estimate that requires approximately six beds (9). The original Federal guidelines state that the program should be based on a population of no less than 1 million and that "depending upon criteria for selection and the aggressiveness of the case-finding programs, this population base may be expected to yield at least 25 new cases per year, and possibly many more" (9). The guidelines further note (9):

If the treatment were wholly successful, the program would obviously grow until patients began to die of old age, or other causes. Assuming a death rate of 10 percent per annum of those at risk, a program based on 25 new patients per annum would increase to a total of more than 200 patients in 15 years and would not stabilize until 250 patients were on treatment.

A revised Federal-Provincial Guideline on Regional Renal Failure Programs has been completed and is awaiting publication. The revised guideline expands the discussion of renal transplantation and organ retrieval requirements.

In 1979, Ontario had 10 hospitals with inpatient dialysis units. Sixteen hospitals, including some with important programs, provided home dialysis. In the period from April 1, 1978 to March 31, 1979, 9,394 outpatients and 1,854 inpatients received dialysis services. There were 201 transplants.

The Quebec planning documents analyze the current dialysis and transplant programs in the Province and call for specific changes (12). In

1978, there were 16 hospital-based chronic dialysis units, with 97 dialysis machines. There were three acute dialysis units in other hospitals. All of these were inpatient based; there were no outpatient dialysis units (12). Three other centers provided for home dialysis and had 52 dialysis stands. There are six hospitals in Quebec doing approximately 125 transplants a year.

Quebec's dialysis goal established in 1978 was to increase the proportion of home dialysis from 20 percent to 30 to 40 percent by 1981, a figure comparable to rates in Ontario, the United States, and Europe. This was to be done by expanding the efforts of the three centers for home dialysis. Outpatient dialysis was to be substituted for inpatient dialysis, with one center serving as a pilot project. The existing hospital units were viewed as sufficient, particularly if home dialysis and outpatient dialysis were developed. Transplants in Quebec were projected to increase to 145 in 1981; the six transplant units were viewed as sufficient to meet this demand. Indeed, by some planning standards, that is more than the number of transplant facilities needed, but the Province announced as policy a decision not to seek a regrouping of the current centers. In short, the Provincial plan called for shifts in the modes of treatment for end-stage renal disease, but no regrouping of the hospitals providing these services.

Since Quebec's planning was completed, the demand for dialysis services has increased. Current facilities are, by general agreement, saturated. The Province has not yet determined whether the prevalence of end-stage renal disease is increasing or if indications for dialysis have changed. It seems prepared to meet the needs imposed by the unexpectedly high demand, but views home dialysis and outpatient dialysis as the areas to emphasize.

Cardiac Surgery

Coronary bypass surgery has been increasing in both Ontario and Quebec. In Ontario, in 1977, there were 1,675 reported cardiac revascularization procedures; in 1978, this number grew to 1,947. In Quebec, in 1977, there were 1,678 bypass procedures and 2,412 other open-

heart procedures; in 1978, there were 1,891 and 2,690, respectively. A study of the effect of the surgery in Quebec showed that of those receiving the surgery, 55 percent returned to activity but 45 percent did not. The increase in this surgery was noted in both Provinces, but in neither Ontario nor Quebec was the increase viewed as a major problem.

More concern was expressed over the appropriateness of the distribution of cardiac surgery units and the quality of care they render. Implicitly, it is assumed that appropriate controls on the proliferation of units will control marginal surgery. The appropriateness of care at established units has been the subject of several studies in each Province.

In Ontario, the problem has been treated primarily as a quality issue. Along this line, guidelines have been established for a minimum of 150 operations per year per unit; a staff of two surgeons, two cardiologists, and 24-hour coverage by residents or others; and affiliation with a health sciences center. The guidelines in use were reviewed and revised by a 1973 task force on cardiovascular surgery. The task force consisted of three surgeons, two internists, a pediatrician, and three Ministry of Health staff. It recommended the closing of one unit in Windsor and the establishment of a second unit in London. Both these recommendations were followed,

Currently, there are 10 hospitals in Ontario at which cardiac surgery is performed; 4 are in Toronto. Only one, at Sudbury, is not a teaching hospital. The Sudbury unit was established in 1967, and its performance has been closely monitored. A 1976 task force reviewed its performance, complication and mortality rates, and approved the continuation of surgery there for 2 years, but recommended that the team stop elective valve surgery. Several other units with low volumes are also examining the referral of elective valve surgery.

A task force on cardiovascular surgery in Toronto that will soon complete its work is expected to report that facilities there need to be upgraded. If this task force follows the pattern set by others, it will also have specific recom-

mendations for each unit concerning the deficiencies that should be addressed. A conclusion by this task force that services need to be expanded or upgraded will create pressures in the Province for additional spending.

In Quebec, there are currently 11 cardiac surgery units. Cardiac surgery has been the subject of three task force reports by the Province. The first task force, consisting of cardiac surgeons, was appointed in 1970 or 1971. Its report justified the existence of each cardiac surgery unit in the Province, including two with workloads well under 100 operations per year. One impact of this report was to increase the Ministry of Social Affairs' distrust of the medical community, discouraging for several years the use of practicing Provincial physicians on government studies of medical services.

The most recent study was completed by a task force chaired by a McGill University cardiologist and former dean of the medical faculty. That report set out criteria for evaluating units, but made no recommendations on whether specific units should be closed. On the basis of that report, the Quebec Ministry sent letters to two hospitals requesting that they terminate their cardiac surgery activities. One hospital terminated this service. At the other, two additional surgeons were recruited, and the rate of surgeries went up over the 100-per-year level.

Radiotherapy

The situations regarding radiotherapy are substantially different in Ontario and Quebec. In Ontario, the expansion of radiotherapy has been strictly controlled. The Canadian Cancer Treatment Foundation, a nonprofit organization with Federal, Provincial, and voluntary support, conducts a cancer research program and has been given responsibility for coordinating treatment within the Province. In the treatment area, it operates seven treatment centers in the Province. Radiotherapy and implants are centralized at five centers. Other hospitals may do chemotherapy, surgery, and limited implants.

The Canadian Cancer Treatment Foundation has always budgeted its own centers, including

selecting and purchasing equipment, and is not reimbursed on a fee-for-service basis by the insurance programs. The foundation has usually had a tight limited budget, so it has tended to impose internal budgeting constraints. The Ontario Ministry is not involved in reviewing its budget, but is convinced that the foundation has handled its resources well. The Canadian Cancer Treatment Foundation has been a major coordinator of cancer treatment facilities in Ontario.

In Quebec, as of March 1977, there were nine hospitals with megavoltage radiotherapy services (most with orthovoltage equipment as well) and one hospital with orthovoltage equipment only. Three of the hospitals offering megavoltage services were outside the Montreal region, the rest within it. Of the megavoltage equipment, 19 of 25 pieces of equipment were cobalt 60 units. There were eight linear accelerators. After reviewing the number and quality of radiotherapy units in the Province, the Quebec Ministry concluded that there was sufficient capacity in the area outside of Montreal to meet the projected needs of new patients there. No additional centers or equipment were to be authorized there. (Subsequent to arriving at this conclusion, the Ministry reconsidered the assumptions it had made regarding the utility of existing orthovoltage equipment; it has not yet published a modification of its conclusions.)

In Montreal, the Ministry concluded 'that some units were underutilized, others operating at full capacity. It called for a reorganization of radiotherapy units to consolidate them into units that would be able to better handle the service demands and to regroup staff medical resources to upgrade both medical education and treatments. The plan for this reorganization was to be developed in consultation with the regional council and the universities, and a survey and analysis by the regional council are underway.

Clinical Laboratory Equipment and Automation

Detailed information was not available on the number and distribution of automated laboratory equipment in either Ontario or Quebec.

Neither Province has formal policies regarding the appropriate equipment levels in laboratories or points at which automation should be allowed. Prior to the creation of regional review bodies, decisions regarding both were made by the equipment specialists in the institutional units of the Provincial Ministries and were influenced by the relative availability of funds. As a result, until the fiscal constraint program was introduced, most projects that were even marginally justified were approved. One study done in Quebec estimates that laboratory facilities are used at approximately 64 percent of capacity.

The fiscal constraint program has introduced additional discipline into the system, although noneconomic decisions continue to be made. With few new funds available to pay for additional equipment, facilities have been reviewing their needs more closely. The equipment specialist in Ontario reported that hospitals have slowed their purchases of new equipment and have been retrofitting or replacing modules in autoanalyzers to upgrade the equipment. The limited budgets encourage automation where it is less expensive, and in Quebec, unions are becoming concerned with the threat of automation and job reductions encouraged by the constraint program.

Another accommodation that has emerged is the development of in-common laboratories, in which hospitals share the expense of joint facilities for some tasks. The lab in Hamilton has been held out as a successful model. The Toronto in-common laboratory, however, has not been a success. This laboratory was reported to have management difficulties. In addition, a major function the Toronto laboratory was serving was to identify laboratory capacity for specific procedures in individual hospitals and to arrange for transportation of samples from other hospitals that needed those tests; once the network was established, the laboratory organization was not necessary to manage the process. In both Quebec and Ontario, there is resistance to the network concept, and activities to develop networks remain limited.

The introduction of the regional councils into decisionmaking on this equipment has added another element to hospital decisionmaking. In

Ontario, the Province requires requests for all pieces of laboratory equipment over \$5,000 to be reviewed by the local council. In Toronto, this requirement has led to the creation of an Advisory Committee on Laboratory Services made up of pathologists from each of the major hospitals. The committee has functioned reasonably well, in part, because it has also become a source of consulting expertise to the individual hospitals. Pathologists are able to share their experiences with specific equipment and to direct individual hospitals away from equipment with which they have been dissatisfied or which does not really meet their need. There has been some opportunity to review programmatic needs, but this has been less systematic and effective than the sharing of experience on specific equipment.

CONCLUDING REMARKS

This review of the management of medical technology in Canada underscores several aspects of this issue as it has developed in that country. The first is that there is no separate medical technology policy. The factor that has influenced the introduction and expansion of technology is the overall level of funding of hospital services. The funding level, in turn, has been determined in a political context in which health services have been in competition for resources with other government programs and with the private sector. Capital spending has been limited and new technology rationed, but only because of these general constraints—not because of programs specifically designed to limit new investments.

A second aspect of the experience of Ontario and Quebec is the general acceptance of the legitimacy of resource decisions being made in the public sector. There is conflict over the level of funding, but for the most part hospitals and the public accept the government's role in determining it. There are exceptions to this, however. The most notable example is evidenced by the existence of unapproved CT scanners in Toronto. Another is evidenced by hospitals' increasing efforts to review and expand philanthropy. Significant constraints on hospital financing have

The consultation is not completely successful. A survey of hospitals in the Toronto area revealed that these hospitals purchased many items of equipment whose purchase had been recommended against.

In Quebec, although final approval of laboratory equipment is at the Provincial level, the regional councils review and advise on purchases. As a result, and given the involvement of hospital administrators in this review, comparable opportunities for commenting on equipment choices and programmatic needs exist. Respondents could cite only one case in which a piece of equipment was obtained after a negative recommendation.

been introduced only over the past 7 to 8 years, and it remains to be seen whether augmentation of government funding represents a permanent new feature of the financing system or is a short-term reaction that is part of a period of adjustment from times of generous to times of more restrictive levels of public funding.

A third aspect of the Canadian experience is the role that medical schools have played as integrating forces in consolidating services. That role has been facilitated by the apparent acceptance in Canada of a hierarchical relationship among university-affiliated hospitals and between university-affiliated and community hospitals. In the United States, where similar hierarchies do not exist, community hospitals are often in competition with teaching hospitals for new technology and sophisticated services.

Finally, it should be noted that the fiscal constraint program has had an influence on the decisionmaking processes in hospitals, a situation that must exist if any long-term changes in the hospital system are to occur. Among the most notable changes is the structured involvement of key members of the medical staff in the internal review and evaluation of alternative uses of capital funds. The medical community is increasingly participating in establishing priorities for

capital spending by hospitals and appears to be accepting responsibility for the impact of these

choices on medical practice and the availability of medical services.

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