

# **9. Medical Technology in the Health System of Iceland**

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## ICELAND: COUNTRY DESCRIPTION

Iceland is a Scandinavian republic of 224,000 population (1978) located in the North Atlantic near the Arctic Circle. It is a country of almost no trees and has a rugged volcanic landscape.

Iceland has one of the world's lowest population growth rates, lowest infant mortality rates (11.3 per 1,000 live births, 1978; 9.5 per 1,000 live births, 1977), and longest life expectancy (male 73.0 years, female 79.0 years, 1975-76). Demographic trends between 1850 and 1975 are shown in figure 1. The proportion of the total population of males and females in 5-year age groups is shown in figure 2.

The population is spread along the coast, with 100,000 people living in the capital city of Reykjavik and surroundings. (See table 1.) Reykjavik has the same growth of population as other Scandinavian capitals do. The proportion of persons over the age of 67 is growing faster in Reykjavik than in other parts of the country. (See table 2.)

Iceland has a high per capita gross national product (GNP) and a per capita income of \$9,470 (1978). There are no very rich and no very poor. Inflation, which in past years has averaged 30 percent, was up to 69 percent in November 1979. Because of this high inflation, people tend not to save money but to invest immediately in houses and automobiles. There-

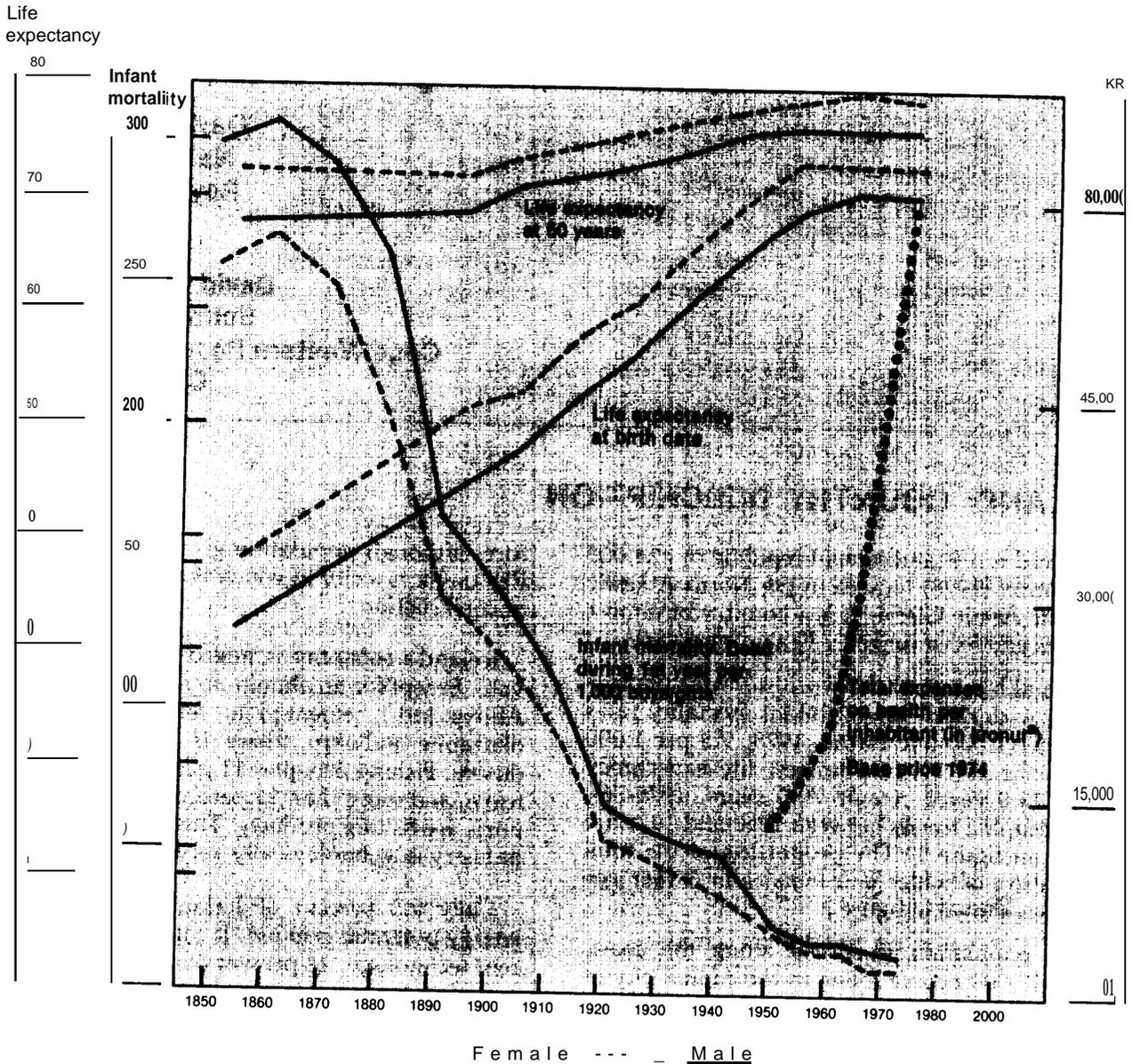
fore, although population growth is not great, Reykjavik is a city in which there is a great deal of construction.

Iceland's economy is mixed—public and private. Except for an aluminum refinery (Icelandic Alloys, Ltd.), cement plant, fertilizer plant, and diatomite industry, there is little heavy industry. Fishing occupies 11 percent of the labor force, and more than 75 percent of Iceland's exports are fishing products. The country's fishing industry is technologically very advanced.

Only 9.5 percent of Iceland's hydroelectric energy potential is in use. If calculated with current technology, 12 percent of the profitable potential is being realized. Geothermal energy is used to heat all of Reykjavik and many other places.

Iceland is a republic. It has the oldest parliament in continuous existence and no fewer than 224 elected municipal councils. Parliament (Al thing) is divided into an Upper Chamber and a Lower Chamber. The chief of state is an elected President without political power. The political parties are the Independence Party, the Progressive Party, the Peoples Alliance, and the Social Democratic Party. In foreign policy, the major issue on which these parties disagree is that regarding the continued presence of an

Figure 1.—Demographic Trends in Iceland (1850-1975)



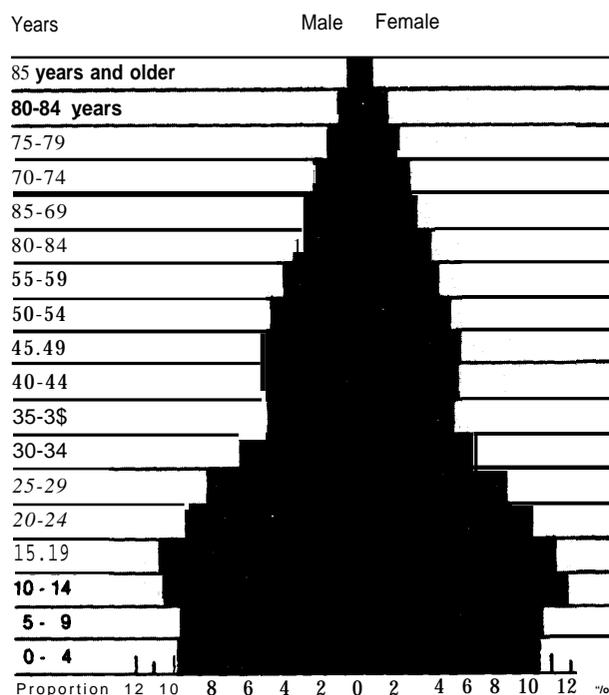
\*400 Icelandic kronur = \$1.00 (U. S.)

SOURCE: Framkvæmdastofnun Ríkisins (Economic Development Institute), *Mannfjöldi, mannafli og tekjur* (Reykjavík, 1979) (2)

American air base an hour's drive from Reykjavik. Iceland has no army.

National funds come from a 22-percent sales tax, export/import duties, and from income tax. The highest income tax rate is 50 percent. Municipal funds come from a 10- to 12-percent income tax and real estate taxes.

Family ties in Iceland are still very strong, and as a rule, primary social assistance is rendered by the family. Iceland's few inhabitants, the country's distance from other countries, and the homogeneity of its population result in close personal contacts across occupations and work places.

**Figure 2.—Proportion of Iceland's Total Population of Males and Females in 5-Year Age Groups (1977)**

SOURCE: Framkvaemdastofnun Ríkisins (Economic Development Institute), *Mannfjöldi, mannali og tekjur* (Reykjavík, 1979) (2).

**Table I.—Distribution and Growth of Iceland's Population (1970-78)**

Year	Iceland Total population	Reykjavik		Reykjavik area	
		Number of inhabitants	Percent of total population	Number of inhabitants	Percent of total population
1978	224,384	83,092	37.2%	119,054	53.00/0
1977	222,470	83,387	37.7	118,422	53.2
1976	220,918	84,493	38.3	118,241	53.5
1975	219,033	84,856	38.7	117,736	53.8
1974	216,628	84,772	39.1	116,410	53.7
1973	213,499	84,333	39.5	114,453	53.7
1972	210,775	83,977	39.8	113,276	53.7
1971	207,174	82,892	40.0	108,770	53.5
1970	204,344	81,561	39.9	—	—

SOURCES: Hagfræðideild Reykjavíkur (Economic Department of the City of Reykjavík), *Árbók Reykjavíkurborgar 1979* (Reykjavík, 1979) (4); Hagstofa Íslands (Statistical Bureau of Iceland), *Hagtiðindi 71-79* (Reykjavík, 1979) (5); and Seðlabanki Íslands (Central Bank of Iceland), *Hagtiður mannaðarins 74-79* (Reykjavík, 1979) (10).

**Table 2.—Distribution and Growth of Iceland's Population Over Age 67(1970.78)**

Year	Percent of population over age 67	
	Iceland	Reykjavik
1978 . . . . .	8.5%	10.7%
1977 . . . . .	8.3	10.3
1976 . . . . .	8.0	10.0
1975 . . . . .	7.9	9.5
1974 . . . . .	7.9	9.3
1973 . . . . .	7.9	9.1
1972 . . . . .	7.8	8.8
1971 . . . . .	—	8.5
1970 . . . . .	7.6	8.3

SOURCES: Hagfræðideild Reykjavíkur (Economic Department of the City of Reykjavik), *Árbók Reykjavíkurborgar 1979* (Reykjavik, 1979) (4); Hagstofa Íslands (Statistical Bureau of Iceland), *Hagiðindi 71-79* (Reykjavik, 1979) (5); and Seðlabanki Íslands (Central Bank of Iceland), *Hagiðindur mannaárinna 74-79* (Reykjavik, 1979) (10).

## HEALTH SERVICES

In 1978, Iceland spent about 7 percent of its GNP on health—a little less than the percent of GNP spent by Sweden or the United States (8.9). Iceland's health service is almost entirely funded within the government sector. In 1974, a new health law was issued in Iceland. The law's main emphasis is on advancing outpatient and community services.

The Minister of Health is a member of the government and is usually a Member of Parliament. The Secretary General is the senior civil servant for health. The Chief Medical Officer is the next most senior post. The country is divided into eight local health government areas, and local health governments are appointed by the municipal councils and boards of institutions in each area.

Key decisions in the Ministry of Health are: 1) hospitals' per diem rate, 2) physicians' cavitation and fee rates, and 3) patient payments. Patient payments for outpatient visits do not change often and are not a major issue. The per diem funding rate for municipal hospitals is decided by a joint committee composed of both national and municipal authorities.

Since the patient day charge is based on the costs of salaries, positions, and supplies for the previous 3-month period, a snowball effect tends to increase costs.<sup>1</sup> All hospital workers,

<sup>1</sup>inflation, however, tends to keep spending down.

including physicians, are unionized. The unions, which are organized by occupation, negotiate with the Ministry of Finance for pay scales.<sup>2</sup> The National Government pays the municipality for hospital care on the basis of (0.92) times (patient days) times (agreed upon patient day charge). When a patient from one municipality is hospitalized in another, there is a transfer payment to the second municipality. If the patient is hospitalized at the National Hospital (discussed below), however, no transfer payment is made.

The municipal council, among other things, appoints the administrator of the local hospital and approves the hospital's budget. If major capital expenditures are being considered, National Government approval is sought to ensure that 85 percent of the investment funding is obtained this way. If the National Government refuses to approve a project and provide funding, however, the municipality can, if it chooses, finance the project itself.

Perhaps because of rising health care costs, the municipalities' central organization has asked for municipalities to be relieved from paying for their hospitals. There is now a political debate over whether the National Government

<sup>2</sup>Pay within job categories varies according to seniority, but not by performance. At one hospital in Reykjavik, Landakotsspítali, however, doctors are paid on the basis of their performance.

should take over the funding and management of all the hospitals.

Iceland has 21 general hospitals. The largest three are in Reykjavik. The National or University Hospital (Ríkisspítalar) has a total of 1,082 beds and is the largest hospital in the country. The Ríkisspítalar organization includes, for administrative purposes, a 238-bed psychiatric hospital (including beds for alcoholism), a 184-bed hospital for the mentally handicapped, a 76-bed hospital for chest disease, and a 76-bed nursing home (in the north of Iceland). The main hospital, Landspítali, has 508 acute care beds, including beds in maternity, gynecology, psychiatry, neurology, and pediatric departments. The National Hospital is the primary teaching hospital of the University Medical School. Unlike other hospitals, the National Hospital has a fixed budget and receives almost 100 percent of its funding from the National Government.

The second largest hospital in Iceland is the Reykjavik City Hospital. This institution, like all other local hospitals in Iceland, receives 92 percent of its operational funds from the National Government and 8 percent from the local government. The third largest hospital, Landakotsspítali, was founded by a Catholic Order of Sisters from East Germany. In 1976, the National Government bought the hospital and handed it over to an independent board of trustees. Both these hospitals are funded by a per diem rate.

A number of health clinics are being built with 85-percent national funding and 15-percent

local funding. These clinics are operated with both national and local funds.

Ambulatory care is largely provided outside of hospitals by private practitioners. Private practitioners receive most of their income from the National Government, partly by cavitation and partly per visit. The patient pays 2,000 Icelandic kronur (\$4.30) per visit. Pharmacy services are paid for by the National Government, and the patient pays about 2,000 Icelandic kronur (\$4.30) per prescription. There are some small fees paid by ambulatory patients going to hospitals for X-rays or other procedures unavailable in physicians' offices, but there is no charge to patients for inpatient care.

Iceland is probably educating more doctors per capita than any other country in the world. For the years 1975 to 1979, Iceland graduated an average of 21.6 doctors per 100,000 inhabitants each year (6). As of January 1, 1979, Iceland had 651 licensed medical doctors, or 290 doctors per 100,000 inhabitants (1,6).

Physicians who work 75 percent or less of their time in a hospital may pursue private practice as much as they wish. Physicians who spend more time in the hospital are limited to 6 hours of work per week outside the hospital. Nearly all Icelandic physicians do some private practice, so a sharp separation between hospital and nonhospital doctors does not really exist.

<sup>6</sup>For conversion of Icelandic kronur to U.S. dollars, the exchange rate used was 430 Icelandic kronur = \$1.00 (U.S.).

## MEDICAL TECHNOLOGY

Being a small country, Iceland has no medical technology industry of its own. The country's close contacts with other Scandinavian countries, the United States, and England, however, guarantee that medical technology know-how gets to Iceland fast. At any one time, about one-third of Icelandic physicians are abroad, some of whom are obtaining medical specialization in specialties unavailable in Iceland.

Because of Iceland's excellent population records, which go back 150 years, medical research often relies more on those and clinical population studies than on elaborate laboratories with expensive technology. Research outside the University is funded by the Cancer and Heart Societies, which obtain some money for research from the National Government and some from yearly lotteries and donations. The

University Medical School does not provide research funds, but faculty may use spare time in the National Hospital for clinical research. Most of the teaching facilities and equipment for medical research are provided by the National Hospital. The major source of funds for construction of the University Medical School is the University lottery.

Studies in health economics are becoming increasingly common and are gaining interest among Iceland's decisionmakers. A number of senior doctors in Iceland are interested in cost-effectiveness studies of health care programs. Excellent evaluations of some programs have already been conducted. A program to reduce smoking by high school youths, for example, received a careful evaluation (7). An evaluation of the cost of automobile accidents and their prevention has also been done (3). Decisions about programs and new technology that are based on analysis of costs and effectiveness are well received. As in other countries, however, decisions in these areas are generally influenced by political forces.

Consistent with the informality of a small country, there are no detailed regulations pertaining to the safety and efficacy of medical technology, quality of medical care, etc. There are strict regulations for electrical equipment in general, however, and medical equipment must adhere to these. At the National Hospital there is a physical technical department, which most of the other hospitals consult when choosing or approving apparatus. There is a national drug formulary, but a hospital may obtain other drugs and special drugs for research. The list of

approved drugs in Iceland is maintained by a committee of the Ministry of Health.

Health planning at the national level is the responsibility of the Ministry of Health. For major decisions, however, local involvement results in formal negotiation. Such decisions include capital expenditures and the addition of hospital beds. If a technology requires special expenditures, the matter will be debated and decided upon through the budgetary process—first with approval at the hospital level, then at the level of the Ministry of Health, and then by review of the Ministry of Finance and approval by Parliament. It would not be unusual for a local hospital administrator or doctor to discuss the subject with the local parliamentary member, who might be a neighbor, former schoolmate, second cousin, or all three.

During the years, it seems, the National Government has had difficulties in controlling both capital and operational expenditures. The building of health centers in the south of Iceland is an example. Initially, there were plans to build only four centers. When the politicians in Parliament had had their say, however, there were seven, three of which had no permanent doctors.

There is no utilization review. Hospitals employ chiefs of service who are responsible to the Chief Medical Officer. These individuals are responsible for assuring efficient utilization and quality of care in their service as are chiefs of service in Sweden or England. This control mechanism is better developed in the larger hospitals.

## SPECIFIC TECHNOLOGIES

Given Iceland's small population, the country's medical care technology is modern and extensive. Most specific technologies have been established as soon as technological knowledge has become available in the country.

### CT Scanners

As of September 1979, Iceland does not have a computed tomography (CT) scanner. Doctors

at both the National Hospital and at the Reykjavik City Hospital, however, believe there is an urgent need for one.

The two matters at issue are the location and type of scanner. Doctors at each of these institutions have been developing their justification for having a scanner at their own hospital. Part of the problem is that neurology is at the City

Hospital and neurosurgeon-y is at the National Hospital.

Reykjavik City Hospital doctors argue that they need a scanner there because they run the major emergency service for the city, and some trauma cases need a head scan as soon as possible. Doctors at the National Hospital argue that they need a body scanner there because they have neurology, oncology, and radiation therapy departments, and doctors in these departments do 200 tests per year (such as pneumoencephalography) which a body scanner would replace. Further, they suggest, an additional 200 to 400 tests that are not done now because doctors prefer to avoid the risky, unpleasant procedures available probably would be done if a CT scanner were available.

The National Hospital doctors worked through an analysis of the value of the body scanner. They argue that there are certain cancers which are detectable by body scanner only, retroperitoneal cancer being the primary example. They also argue that the body scanner, by more accurately locating a tumor, will increase the chances of radiating all the cancer and lower the chances of radiating noncancerous tissue.

The doctors at the National Hospital feel somewhat discouraged in pursuing their analysis, however, because they believe that political lobbying will determine which hospital gets a scanner. If the Reykjavik City Hospital gets a scanner, the city must pay 15 percent of the purchase cost; if the National Hospital gets it, all the costs will be paid through the National Government.

The final decision concerning the purchase of a CT scanner will be made by the Parliament during the budgeting process. Because of the high cost of buying a scanner, Parliament is interested in buying only one, and it is relying on the doctors and administrators in the two hospitals to cooperate.

In the meantime, the Icelandic Government does pay for some CT scanner examinations abroad. Some Icelanders go abroad and pay for this test themselves.

## Renal Dialysis

At any given time, there are three or four patients needing dialysis. This number has reached a high of eight patients. There are four dialysis machines at the National Hospital in Reykjavik, and these have been available for several years.

## Coronary Bypass Surgery

As of September 1979, coronary bypass surgery is not being performed in Iceland. Patients needing this procedure, about 35 a year, are sent abroad at the expense of the National Government. They generally go to Hammersmith or Bromton Hospital in London, institutions chosen because of personal contacts between Icelandic surgeons and the surgeons at these hospitals.

Whether bypass surgery should be performed in Iceland has been debated at some length over several years. A committee of doctors was appointed by the Ministry of Health to make a decision about it. It is recognized that the volume of patients would not be very large—perhaps double the current number. This volume might not be enough to maintain a high-quality service. One senior government official in the Ministry of Health, however, said the Ministry would be willing to accept a slightly higher operative mortality rate in order to achieve “medical independence.” Having bypass surgery in Iceland, it was argued, would eliminate the need for having Icelandic patients go for the procedure to a foreign country, where they would not feel as comfortable as they would at home. It was also argued that existence of capacity for this surgery would improve other aspects of the country’s surgical and medical care.

The committee of doctors appointed by the Ministry produced a report with some analysis and decided that coronary bypass surgery should be started at the National Hospital. An Icelandic physician in Sweden is becoming proficient in this procedure and will return to Iceland to start it. An existing operating room is to be set aside for specific periods in the year for coronary bypass surgery. Experienced nurses and a surgeon are to come from abroad during these periods, at least during a transition period until proficiency is achieved locally.

The committee's analysis reflects careful thought given to fixed costs, capital expenditures, proficiency of the surgical team, and other effects of the committee's decision. Some Icelandic physicians, though, are still unsatisfied with the decision. They maintain that they themselves would prefer to go abroad for this procedure. If coronary bypass surgery is performed in Iceland, the National Government will no longer pay for this procedure abroad.

In February 1980, the Minister of Health decided that coronary bypass surgery will be started at the National Hospital in the beginning of 1981.

## CONCLUDING REMARKS

Perhaps the most striking feature of Icelandic health policy decisionmaking, the result of the small size of the country, is the frequency of contact between politicians, administrators, and

## Cobalt Therapy

This procedure has been available since 1969 at the National Hospital. It was provided as a gift from the International Order of Odd Fellows, a men's benevolent organization, the Cancer Society, and several individual gifts.

## Automated Laboratory Testing Equipment

High-volume testing machinery such as the SMA12 or SMA16 is not currently in use. The volume of tests seems sufficiently small at any one location, however, that there appears to be no pressing need for it.

doctors. A second notable feature is the implicit balancing, as in the case of coronary bypass surgery, of medical quality and medical independence.

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