The University of Chicago
Center for Health Administration Studies (CHAS)
1101 East 58th Street, Walker 111
Chicago, Illinois 60637
(312) 702-7104

WORKSHOP IN HEALTH ADMINISTRATION STUDIES

AUTUMN, 1990

LOLA JEAN KOZAK, Ph.D.
Health Statistician
Division of Health Care Statistics
National Center for Health Statistics
Hyattsville, Maryland

"Why the International Differences in Hospital Use?
A Six Country Comparison."

for

Thursday, December 6, 1990

Rosenwald 405

3:30 - 5:00

Why the International Differences in Hospital Use?
A Six Country Comparison
by Lola Jean Kozak

Introduction

International differences in hospital use have puzzled health researchers and policymakers for many years. Among the six countries in this study, rates of short-term hospital days varied by 94 percent. No such sizable differences were seen in the health status of the populations of the countries. Although there was a lack of uniformity in the definitions and procedures used to collect hospital data, "no amount of statistical massaging would crush the important intercountry variations observed," (Poullier 1989, 117).

Hospital care is very expensive. It accounts for the largest component of health care expenditures in the United States and other Western industrialized countries. In 1987 U.S. expenditures for hospital care reached $195 billion, or $773 per person (Letsch, Levit, and Waldo 1988, 117). Hospital use is an important factor in the cost of care and thus a major concern of health researchers and policymakers.

In this study, hospital use patterns were examined in case studies and comparisons of six countries: England, the United States, Sweden, Canada, Denmark, and France. The health services systems in these countries displayed a variety of characteristics. The U.S. health services system has frequently been compared with the systems in the other

countries. They have attracted U.S. attention because of their superior health status indicators, equity of health care provision, or success in controlling health care costs.

Framework

Previous research suggested that hospital use was the product of a complex interactive process between hospitals, doctors, and populations. The framework for this study is sketched in figure 1, and specific relationships expected between factors in the framework and hospital use measures are listed in table 1.

Three main characteristics of hospitals were included in the framework, the supply of hospital beds, hospital domain, and internal hospital organization. Domain issues included the extent to which hospitals provided long-term and ambulatory care and the extent to which these types of care were available outside of hospitals. Aspects of internal hospital organization examined were structural complexity, expected to slow hospital functioning, and the technical intensity of care, expected to increase the speed with which hospitals processed patients.

One characteristic of doctors examined was which doctors had access to hospitals. In systems with open staffing of hospitals, independent doctors could admit patients and provide inpatient care, but in closed systems decisions about hospitalization and inpatient treatment were the responsibility
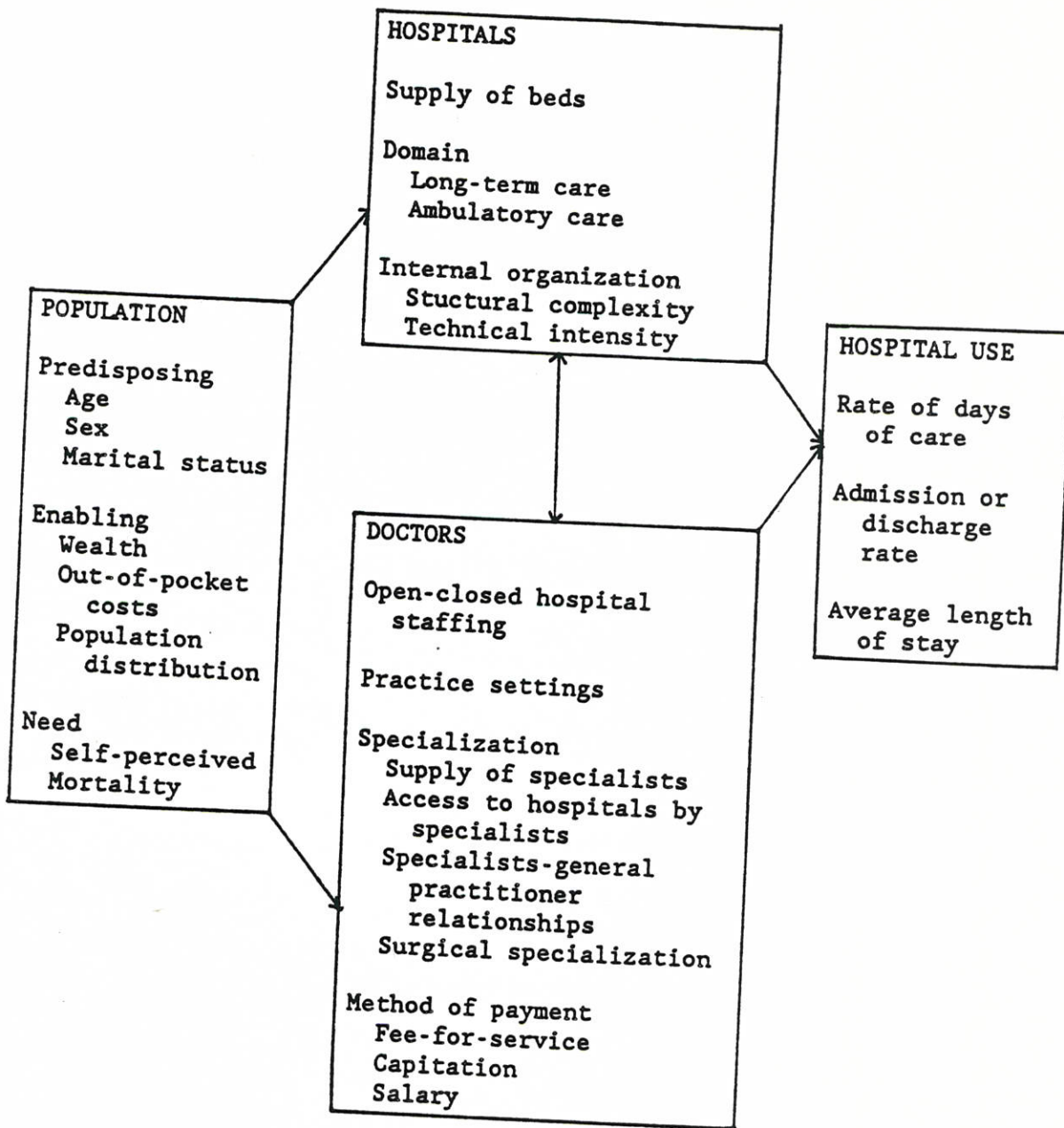
Fig. 1. Framework for cross-national comparisons of hospital use

Table 1

Summary of Relationships Expected Between Factors in Framework and Hospital Use Measures

	Rate per 1,000 Population		Average Length of Stay
	Days of Care	Admissions or Discharges	
Hospitals			
Supply of beds			
Beds per 1,000 population	Positive	Positive	Positive
Domain			
Beds in long-term units per 1,000 population	Positive	(a)	Positive
Extent of alternative long-term facilities and programs	Negative	(a)	Negative
Outpatient visits at hospitals per 100 population	(a)	Negative	Positive
Percentage of total doctor visits that take place at hospitals	(a)	Negative	Positive
Total doctor visits per person per year	Negative	Positive	Negative
Internal organization			
Average number of beds per hospital	(a)	(a)	Positive
Average number of departments per hospital	(a)	(a)	Positive
Average number of tests or procedures per discharge and hospital day	(a)	(a)	Negative
Average number of staff per bed	(a)	(a)	Negative
Doctors			
Open-closed hospital staffing			
Open systems	(a)	Positive	Negative
Practice settings			
Highly complex ambulatory care settings	(a)	Negative	Positive
Specialization			
Admitting specialists per 100,000 population	(a)	Positive	Negative
General practitioners per 100,000 population	(a)	Negative	(a)
Referral required to visit specialist	(a)	Negative	(a)
Admitting surgeons per 100,000 population	(a)	Positive	Negative
Method of payment			
Fee-for-service (open systems)	(a)	Positive	(a)
Fee-for-service (closed systems)	(a)	Negative	(a)
Capitation (closed systems)	(a)	Positive	(a)
Salary (closed systems)	Positive	Positive	Positive

Table 1-Continued

	Rate per 1,000 Population		
	Days of Care	Admissions or Discharges	Average Length of Stay
Population			
Predisposing characteristics			
Median age of population	Positive	Positive	Positive
Percentage of population 65 years of age and over	Positive	Positive	Positive
Percentage of population female and 15-44 years of age	(a)	Positive	Negative
Live births per 1,000 population	(a)	Positive	Negative
Percentage of adult population married	(a)	(a)	Negative
Percentage of adult population divorced	Positive	Positive	Positive
Enabling characteristics			
Gross national product per capita	(a)	Positive	Negative
Out-of-pocket costs	Negative	Negative	Negative
Percentage of population living in urban areas	Positive	Negative	Positive
Population per square kilometer	Positive	Negative	Positive
Need characteristics			
Percentage of population evaluating health as poor	Positive	Positive	Positive
Bed days or restricted activity days per person per year	Positive	Positive	Positive
Average life expectancy at birth	Negative	Negative	Negative
Infant deaths per 1,000 live births	Positive	Positive	Positive
Deaths per 1,000 population by cause	Positive(b)	Positive(b)	Positive(b)

(a) Relationship not suggested.

(b) For corresponding diagnoses.

of doctors employed by the hospitals. The complexity of the practice settings for ambulatory care was expected to affect the extent to which ambulatory care substituted for inpatient care. Specialization of doctors with access to hospitals was expected to increase the frequency but decrease the duration of hospital care, and surgeons were thought to be especially likely to be associated with frequent, short episodes of hospital use. Lower admission rates were expected where general practitioners were numerous and where referral from general practitioners was required to visit specialists. The effects of methods of paying doctors on hospital use levels were expected to vary for open and closed hospital systems.

The predisposing characteristics of populations expected to be associated with hospital use were age, sex (in particular, the size of the population in childbearing years, female and 15-44 years of age), and marital status. Wealth was one of the enabling characteristics examined, more affluent countries expected to have more discretionary hospitalizations. Out-of-pocket costs for hospital care were presumed to reduce hospital use. The more concentrated and urbanized a population the more total hospital use expected, though U.S. studies suggested the frequency of hospitalization would be higher in rural areas. The need characteristics were measured by self reports of health status and by mortality measures. The lower the health status in a country, the more hospital use expected.

The dependent variables were total volume (rate of days of care per 1,000 population), frequency (admission or discharge rate per 1,000 population), and duration (average length of stay in days) of short-term hospital use. Short-term hospital patients were those hospitalized for the diagnosis and short-term treatment of health problems. In half the countries (the United States, Canada, and Denmark) the use measures were for short-term hospitals. In the other three countries (England, Sweden, and France) use measures were not available by type of hospital but were for short-term hospital services.

Data

The data for the study were from annual hospital surveys; discharge reporting systems; household interview surveys; surveys and ongoing data files on doctors; population censuses, surveys, and registers; and birth and death certificates. The data were obtained primarily from reports published by government health and statistical agencies and private organizations involved in health care research, such as hospital associations. In some instances it was possible to obtain special unpublished tabulations that provided more precise information than that available in published sources.

The data could not be assumed to be comparable across countries. The countries exhibited considerable creativity in their approaches to the most routine statistics. Each country's data had to be evaluated, identifying differences in

data collection procedures, definitions, and categories used for presentation of published statistics. Previous work reviewing the status of hospital statistics and comparing health statistics across countries helped in the identification of problems (NCHS 1980, 1981, 1984, 1989). Statistical authorities in each of the countries shared important information about the characteristics of the data systems and problems to be avoided.

Adjustments were made to improve data comparability, but not all the methodological differences could be eliminated. Some differences were minor and did not affect the analysis. Others limited the ability to make substantive explanations of the findings. The data shown in tables 2-5 are generally comparable but should not be considered precise measures of all the characteristics examined.

Characteristics of Countries

In 1980 England was found to have the lowest total volume of hospital use. English patients were the least likely to be hospitalized and they stayed in the hospital for shorter periods than patients in any of the countries except the United States. France was at the other end of the range. It had the highest rate of days of care of the six countries. French patients were the most likely to be hospitalized and they stayed in hospitals for longer periods than patients in any of the countries except Canada.

The United States and Canada exhibited contrasting hospital use patterns. The U.S. rate of hospitalization was second highest among the countries studied, but because the United States had the shortest average length of stay, total hospital use was lower in the United States than in any country except England. Canada had the second lowest rate of hospitalization, but because it had the longest average length of stay, Canada's total volume of hospital use was fourth among the countries.

Sweden and Denmark were intermediate in hospital use. Sweden had the third lowest total volume of hospital use, the third ranked rate of hospitalization, and the third ranked average length of stay. Denmark ranked fourth on rate of hospitalization and average length of stay, fifth in total volume of hospital use.

Table 2 shows the short-term hospital use measures and measures of the characteristics of hospitals, doctors, and populations in 1980 or the year closest to 1980 for which available. The countries were ranked from low to high on each measure, and rankings by hospital use measures were compared to the rankings for the other measures. These comparisons suggested the following relationships.

Short-term hospital beds per 1,000 population: Positive relationships suggested to rate of days of care, admission or discharge rate, and average length of stay. The countries' rankings by rate of days of care and rate of short-term

Table 2

Cross-National Comparisons, 1980 (a)

	England	United States	Sweden	Canada	Denmark	France
Hospital Use						
Short-term days of care per 1,000 population	923	1,324	1,418	1,534	1,599	1,791
Short-term admissions or discharges per 1,000 population	111	169	160	147	166	175
Short-term average length of stay	8.3	7.8	8.8	10.4	9.7	10.2
Hospitals						
Short-term beds per 1,000 population	3.5	4.8	5.5	5.4	6.0	6.1
Long-term beds in short-term hospitals per 1,000 population	0.5	0.4	1.5	1.0	0.5	1.5
Percentage of total long-term beds in short-term hospitals	5	5	9	12	4	13
Beds in long-term hospitals per 1,000 population	3.8	1.3	3.7	2.1	2.2	3.8
Beds in nursing-home-type facilities per 1,000 population 65 years of age and over	31	60	70	57	67	48
Outpatient visits to hospitals per 100 population	96	92	120	101	64	54
Percentage of total doctor visits that take place at hospitals	22	13	47-50	12	9	7
Total doctor visits per person per year	5.4	4.8	2.7-2.8	3.3	6.3	5.2
Average number of beds in short-term hospitals	176	168	621	126	308	198
Average number of departments in short-term hospitals	(b)	3.9	9.7	3.7	4.2	3.0
Average number of personnel per bed	2.0	3.0	2.7	2.4	2.4	1.6

Table 2-Continued

	England	United States	Sweden	Canada	Denmark	France
Doctors						
Doctors per 100,000 population	161	196	203	183	218	230
Predominant medical staffing pattern	Closed	Open	Closed	Open	Closed	Closed
Percentage of doctors employed by hospitals	47	24	68	25-30	59	34
Complexity of ambulatory care settings	Inter-mediate	Inter-mediate	High	Low	Inter-mediate	Low
Referral required to visit specialists	Yes	No	No	No	Yes	No
General practitioners per 100,000 population	51	27	(b)	78	56	122
Specialists per 100,000 population	72	140	171	105	142	108
Admitting specialists per 100,000 population	72	140	151	105	128	49
Ratio of specialists to general practitioners	1.4	5.2	(b)	1.3	2.5	0.9
Surgeons per 100,000 population	26	46	50(c)	27(c)	24(c)	26(c)
Percentage of specialists that were surgeons	36	34	30(c)	35(c)	36(c)	34(c)
Population						
Median age of population	34.6	30.1	36.2	29.3	34.4	32.5
Percentage of population 65 years of age and over	15.1	11.3	16.3	9.5	14.4	13.9
Percentage of population female and 15-44 years of age	20.6	23.4	20.3	24.0	21.2	21.1
Live births per 1,000 population	13.3	15.9	11.7	15.4	11.2	14.9
Percentage of population 15 years of age and over married	62.7	61.1	53.4	63.4	56.6	61.5
Percentage of population 15 years of age and over divorced	3.4	5.8	6.8	2.7	6.1	3.2
Gross national product per capita in U.S. dollars	7,920	12,000	14,240	10,680	13,120	11,900

Table 2-Continued

	England	United States	Sweden	Canada	Denmark	France
<u>Population-Continued</u>						
Out-of-pocket costs for hospital care	Minimal	Usual	None	Minimal	None	Some
Percentage of population living in urban areas	76	74	72	76	70	73
Persons per square kilometer	355	24	20	3	119	100
Average life expectancy at birth						
Male	70.8	70.0	72.8	71.9	71.2	70.2
Female	76.9	77.5	78.8	79.0	77.3	78.4
Infant mortality rate	12.0	12.6	6.9	10.4	8.4	10.0

(a) Data are for 1980 or the year closest to 1980 for which available.

(b) Not available.

(c) Excludes doctors in residency programs who were included in total specialists.

hospital beds were very similar. England had the lowest, and the United States the second lowest rates of both days and beds. Sweden and Canada were intermediate in both sets of rankings, and Denmark and France had the highest rates of both hospital days and beds. The countries' rankings by rate of short-term beds and admission or discharge rates were similar except for the United States, whose low bed rate differed from its high admission rate. The only major difference in rankings by rate of short-term beds and average length of stay was that Canada had a moderate bed rate and the longest average length of stay.

Percentage of total long-term beds in short-term hospitals: Positive relationship suggested to average length of stay. Total long-term beds included beds in long-term units of short-term hospitals, beds in long-term hospitals, and beds in nursing homes or other similar facilities that provided long-term care to the elderly. England and the United States ranked low on both proportion of total long-term beds in short-term hospitals and average length of stay. Sweden was intermediate on both measures, and Canada and France ranked highest on both. Only Denmark's rankings on the two measures were inconsistent.

Outpatient visits to hospitals per 100 population: Negative relationship suggested to admission or discharge rate. France, Denmark, and the United States had the three lowest

rates of outpatient visits per 100 population and the three highest admission or discharge rates. England, Canada, and Sweden ranked four, five, and six by rate of outpatient visits and one, two, three by admission or discharge rate.

Percentage of total doctor visits that take place at hospitals: Negative relationship suggested to rate of days of care. The countries' rankings by proportion of total doctor visits that took place at hospitals were generally the inverse of their rankings by rate of days of care. The proportions were low in France and Denmark where rates of days of care were high. England had one of the higher proportions of visits at hospitals and the lowest rate of days of care. Sweden, however, had the highest proportion of total doctor visits at hospitals and only an intermediate rate of days of care.

Doctors per 100,000 population: Positive relationships suggested to rate of days of care and admission or discharge rate. A relationship was not hypothesized between the total supply of doctors and hospital use because general practitioners and specialists were expected to have different effects on use levels. However, the countries' rankings by rate of total doctors were generally similar to their rankings by rate of days of care and admission or discharge rate. England had the lowest rate of doctors and use rates. The supply of doctors and use rates were high in Denmark and France.

General practitioners per 100,000 population: Positive
relationship suggested to average length of stay. The
countries' rankings by rate of general practitioners were
similar to their rankings by average length of stay. The
United States and England had the lowest rates of general
practitioners and shortest average lengths of stay. France and
Canada had the largest supply of general practitioners and the
longest lengths of stay.

Average life expectancy at birth for females: Positive
relationship suggested to average length of stay. The
countries' rankings by average life expectancy at birth for
males were not associated with rankings by hospital use
measures, but two of the three shortest average life
expectancies at birth for females were in the United States and
England, which had the two shortest average lengths of stay.
Canada and France had the two longest average lengths of stay
and two of the three longest average life expectancies at birth
for females.

Relationships Within Countries

Along with the cross-national comparisons, relationships
were examined between hospital use measures and available
measures of the characteristics of hospitals, doctors, and
populations in geographic areas within each country. In

England relationships were explored in the fourteen health authority regions. Variables were examined across the fifty States and District of Columbia in the United States. The twenty six countries and municipalities that have primary responsibility for health care were studied in Sweden, ten Provinces and two Territories in Canada, fourteen counties and two municipalities that carry out the functions of counties in Denmark, and twenty two regions in France.

Simple correlation coefficients were used to quantify relationships between use measures and other variables within the countries. Product-moment correlations were calculated for the United States, but because the numbers of areas examined in the other countries were small, Spearman's rho was used to gauge associations in them. Table 3 summarizes the associations between hospital use measures and variables examined. For each variable, the number of countries in which the tests of associations were done is shown along with the number of relationships that were significant at the $p < .05$ level. The variables highlighted below had significant relationships with one or more use measure in half or more of the tests conducted.

Short-term hospital beds per 1,000 population. In five of the six countries, significant positive relationships were found between rate of short-term beds and both rate of days of care and admission or discharge rate. The relationships were not significant in Canada. Average length of stay was

Table 3

Summary of Associations Between Short-Term Hospital Use Measures and Selected Variables in Geographic Areas Within Countries, 1980 (a)

		Significant Relationships(b)		
	Number of Countries(c)	Rate of Days of Care	Admission or Discharge Rate	Average Length of Stay
Hospitals				
Short-term beds per 1,000 population	6	+5	+5	+4
Beds in long-term units of short-term hospitals per 1,000 population	3	+1	+1, -1	+2
Beds in long-term hospitals per 1,000 population	3	0	0	+1
Beds in long-term hospital services per 1,000 population	3	+1	0	+1
Beds in nursing-home-type facilities per 1,000 population 65 years of age and over	5 (d)	-1	-1	-1
Hospital outpatient visits per 100 population	5	+3	+2	+2
Emergency visits	4	+2	+2	+2
Other visits	4	+3	+2	+3
Average size of short-term hospitals	4	+2	+1, -1	+2
Laboratory tests per day of care	2	0	0	0
Radiology exams per day of care	2	-1	-1	-2
Surgeries per day of care	2	-1	-1	-1
Costs per day of care	2	-1	-1	0
Laboratory tests per discharge	2	0	+1, -1	+1
Radiology exams per discharge	2	+1	0	+1
Surgeries per discharge	2	0	-2	+2
Costs per discharge	2	+1	0	+2
Hospital personnel per bed	5	0	+1, -1	-1
Nursing	4	0	-2	+1
Medical	4	+1	0	+1
Professional and technical	4	0	-1	0
Other	4	0	-1	+1
Doctors				
General practitioners per 100,000 population	5	+1	+1	+1
Specialists per 100,000 population	6	+5	+4, -1	+4
Admitting specialists	6	+5	+4, -1	+4
Office specialists	4	+2	+1	+2
Medical specialists	2	+1	-1	+2
Surgical specialists	2	+1	-1	+2
Other specialists	2	+1	-1	+2

Table 3-Continued

	Number of Count-ries(c)	Significant Relationships(b)		
		Rate of Days of Care	Admission or Discharge Rate	Average Length of Stay
Population				
Median age of population	6	+2	+1	+3
Percentage of population 65 years of age and over	6	+3	+2	+2
Percentage of population female and 15-44 years of age	6	-1	-1	-1
Live births per 1,000 population	6	-3	0	-3
Average income or other measure of wealth	5 (e)	+1	+1,-1	0
Percentage of population living in urban areas	5	0	-1	0
Population density	5	+1	+1	+1
Deaths per 1,000 population	5	+3	+2	+2
Under 45 years	4	0	0	-1
45-64 years	4	+2	+2	+1
65 years and over	4	+1	+1	+2,-1
Infant mortality rate	6	+2	+2	-1
Other mortality measures	2	0	0	0

(a) Data are for 1980 or year closest to 1980 for which available.

(b) Relationships significant at p < .05 level of probability. Plus sign indicates positive relationship and minus sign negative relationship.

(c) Number of countries in which association of variable with hospital use measures tested for statistical significance.

(d) Two tests in France, none in England.

(e) Two tests in the United States and Denmark, none in England.

positively related to rate of short-term beds in all the countries except Canada and Sweden.

Beds in long-term units of short-term hospitals per 1,000 population. Although data were only available for three countries, in two of the three significant positive relationships were found between rate of beds in long-term units of short-term hospitals and average length of stay.

Hospital outpatient visits per 100 population. The cross-national comparisons suggested an inverse relationship between rate of outpatient visits and admission or discharge rate, but outpatient and inpatient use were positively related within countries. Positive relationships were found between rate of days of care and rate of outpatient visits in three of five countries examined. Rate of nonemergency outpatient visits was positively related to rate of days of care and average length of stay in three of four countries examined and to admission or discharge rate in two of four countries.

Average size of short-term hospitals. Significant positive relationships were found between the average bed size of hospitals and rate of days of care within two of the four countries where tests were done. Hospital bed size and average length of stay were also positively related in two of four countries.

<u>Measures of intensity of hospitalization</u>. The data available to measure the technical intensity of hospital care varied from country to country. Information on laboratory tests and radiological examinations were obtained for two countries. Data on surgical procedures were available for two, and average costs of hospital care were included for two countries. Eight relationships were tested between ratios of tests, procedures, or costs per discharge and each of the hospital use measures. In six instances, significant positive relationships were found between the intensity measure and average length of stay. Three negative relationships out of a possible eight were found between each hospital use measure and ratios of tests, procedures, or costs per hospital day.

<u>Nursing personnel per bed</u>. Associations were generally not found within countries between ratios of total hospital personnel or specific types of personnel per bed and use measures. The only relationship found more than once was a negative association between ratio of nursing staff per bed and admission or discharge rate seen in two of four countries.

<u>Specialists per 100,000 population</u>. In all the countries except Canada, significant positive relationships were found between rates of total and admitting specialists and rate of days of care. Admitting specialists were those who could admit patients to hospitals. Rates of total and admitting specialists were positively related to average length of stay

in four countries. Positive relationships were found between admission or discharge rate and rates of total and admitting specialists in four countries, but a negative relationship was found in Canada. The rate of office-based specialists was also positively related to rate of days of care and average length of stay in the United States and France but not in Denmark and Sweden. Relationships between rates of specific types of specialists and use measures were explored in the United States and Canada. In both countries rates of medical, surgical, and other specialists were positively related to average length of stay. Rates of all three types of specialists were positively related to rate of days of care in the United States and negatively related to discharge rate in Canada.

Population age measures. Positive relationships were found between the median age of the population and average length of stay within three of the six countries. Also in three of the six countries, the percentage of the population 65 years of age and over was positively related to rate of days of care.

Live births per 1,000 population. Within three of the six countries, negative relationships were seen between birth rate and rate of days of care and between birth rate and average length of stay.

<u>Death rates per 1,000 population</u>. Positive relationships were found between total death rates and hospital use measures, but total death rates were highly related to the age structure of the population, and the relationships found were identical to those between percentage of the population 65 years of age and over and use measures. Positive relationships were seen in two of four countries tested between the death rate of persons 45-64 years of age and both rate of days of care and admission or discharge rate. In two of four countries, the death rate of persons 65 years of age and over in an area was positively related to the area's to average length of stay, but one negative relationship was also found.

Trends

Trends in hospital use during the 1970s and 1980s were examined and trend data were obtained for other variables, mainly the supply of health resources and population data. In some instances the trend data were not as comparable as the 1980 estimates because it was not possible to make the adjustments in the data for a series of years that could be made in 1980 estimates. The percent change in measures over time are shown in table 4. Most of the data refer to a 17-19 year period, usually from 1970 or 1971 to 1986, 1987, or 1988.

<u>Hospital use</u>. The rate of days of care has been decreasing in all six countries (figure 2). Admission or

Table 4

Trends in Six Countries, 1970-89 (a)

| | Percent Change in Measure | | | | | |
	England	United States	Sweden	Canada	Denmark	France
Short-term days of care per 1,000 population	-22	-21	-22	-9	-12	-15
Short-term admissions or discharges per 1,000 population	+21	-11	+16	-14	+30	+31
Short-term average length of stay	-36	-12	-33	+6	-32	-36
Hospital beds per 1,000 population	-27	-35	-10	-30	-31	-3
Short-term	-23	-7	-24	-12	-17	-13
Psychiatric	-38	-73	-53	-77	-64	-20
Other long-term	0	-75	+69	-9	-75	+56
General practitioners per 100,000 population	+24	-2	(b)	+65	+52	+58
Specialists per general practitioner	+13	+56	(b)	-14	+39	+51
Specialists per 100,000 population	+41	+53	(b)	+42	+112	+138
Medical specialists	+46	+84	(b)	+48 (c)	+38 (c)	+48 (c)
Surgical specialists	+28	+30	(b)	+4 (c)	+43 (c)	+33 (c)
Other specialists	+50	+49	(b)	+38 (c)	+39 (c)	+64 (c)
Percentage of specialists in surgical specialties	-9	-15	(b)	-18 (c)	+2 (c)	-9 (c)
Median age of population	+3	+15	+8	+24	+13	+6
Percentage of population 65 years of age and over	+16	+24	+30	+37	+24	+5
Percentage of population female and 15-44 years of age	+14	+13	+7	+12	+10	+9
Live births per 1,000 population	-18	-14	-3	-14	-24	-17
Percentage of adult population						
Single	+20	+6	+25	-3	+32	+14
Married	-13	-9	-21	-4	-19	-8
Divorced	+350	+166	+136	+258	+100	+96
Widowed	-3	-10	+9	+3	+8	-9

Table 4-Continued

| | Percent Change in Measure | | | | | |
	England	United States	Sweden	Canada	Denmark	France
Gross national product per capita based on 1980 currency	+38	+34	+31	+57	+35	+45
Average life expectancy at birth						
Male	+4	+7	+3	+5	+1	+5
Female	+3	+5	+3	+4	+1	+6
Infant mortality rate	-48	-50	-47	-62	-47	-57

(a) Data are for years available in the period from 1970 to 1989.

(b) Not available.

(c) Data do not include all specialists and are for shorter time period than trends for all specialists.

discharge rates have been decreasing in the two North American countries but increasing in the four European countries (figure 3). Average lengths of stay have been decreasing in all the countries except Canada (figure 4).

Hospitals. The rates of total hospital beds, short-term beds, and psychiatric beds were decreasing in all six countries. Decreases in rates of short-term beds were similar in size to decreases in rates of days of care, except in the United States where the bed rate decreased considerably less than the rate of days. The rate of long-term hospital beds decreased in three countries, but did not change in England and increased in Sweden and France.

Doctors. The supply of general practitioners grew in England, Canada, Denmark and France, but changed very little in the United States. Trend data on doctors were not obtained for Sweden. Rates of total specialists increased across the countries, and except in Canada, increased more rapidly than rates of general practitioners. As a result, the number of specialists per general practitioner increased, except in Canada. All three types of specialists were increasing, but except in Denmark, rates of surgeons grew less rapidly than rates of other specialists, so the percentage of specialists who were surgeons declined, except in Denmark.
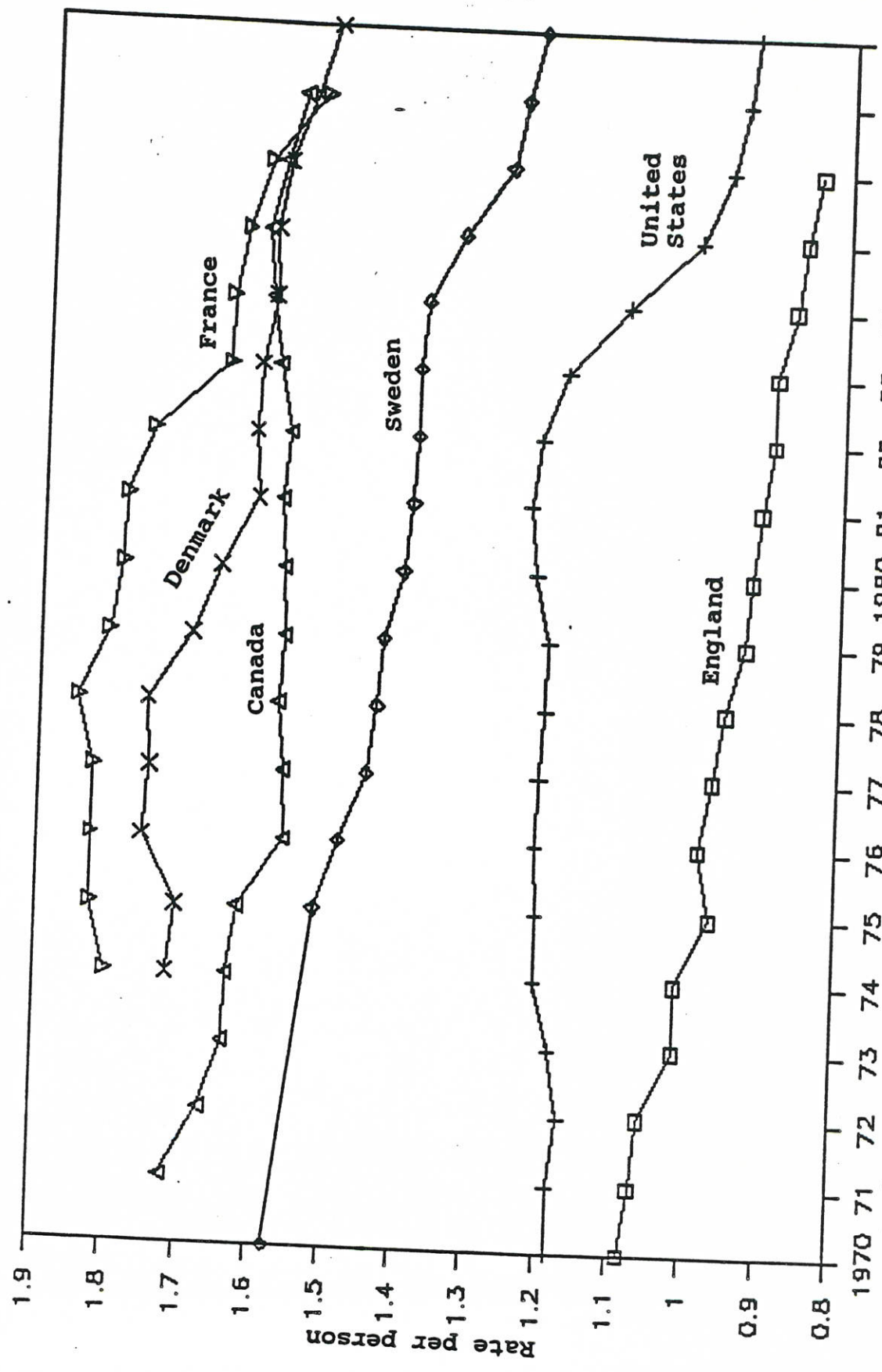
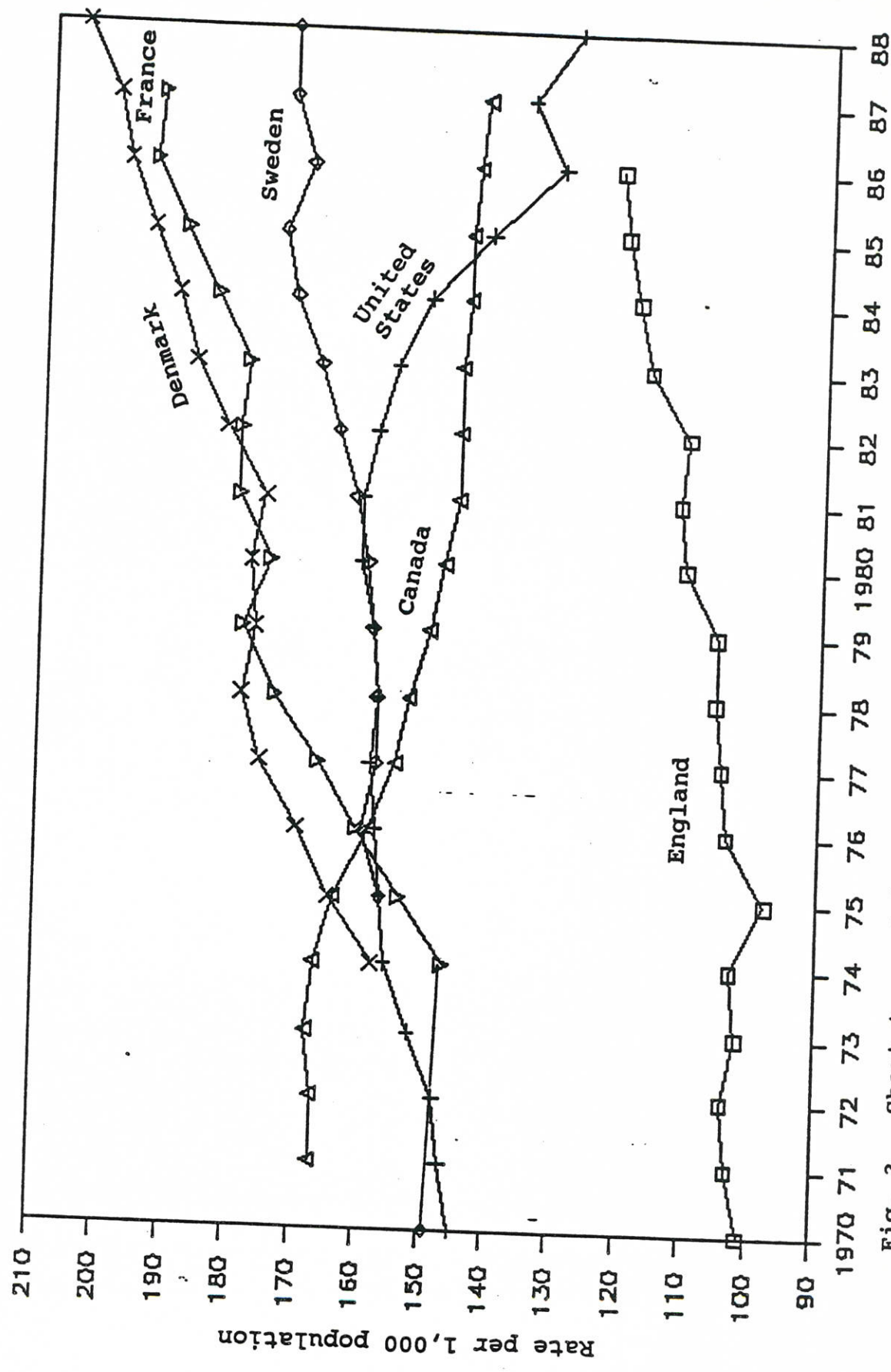Fig. 2. Short-term days of care per person in six countries, 1970-88.

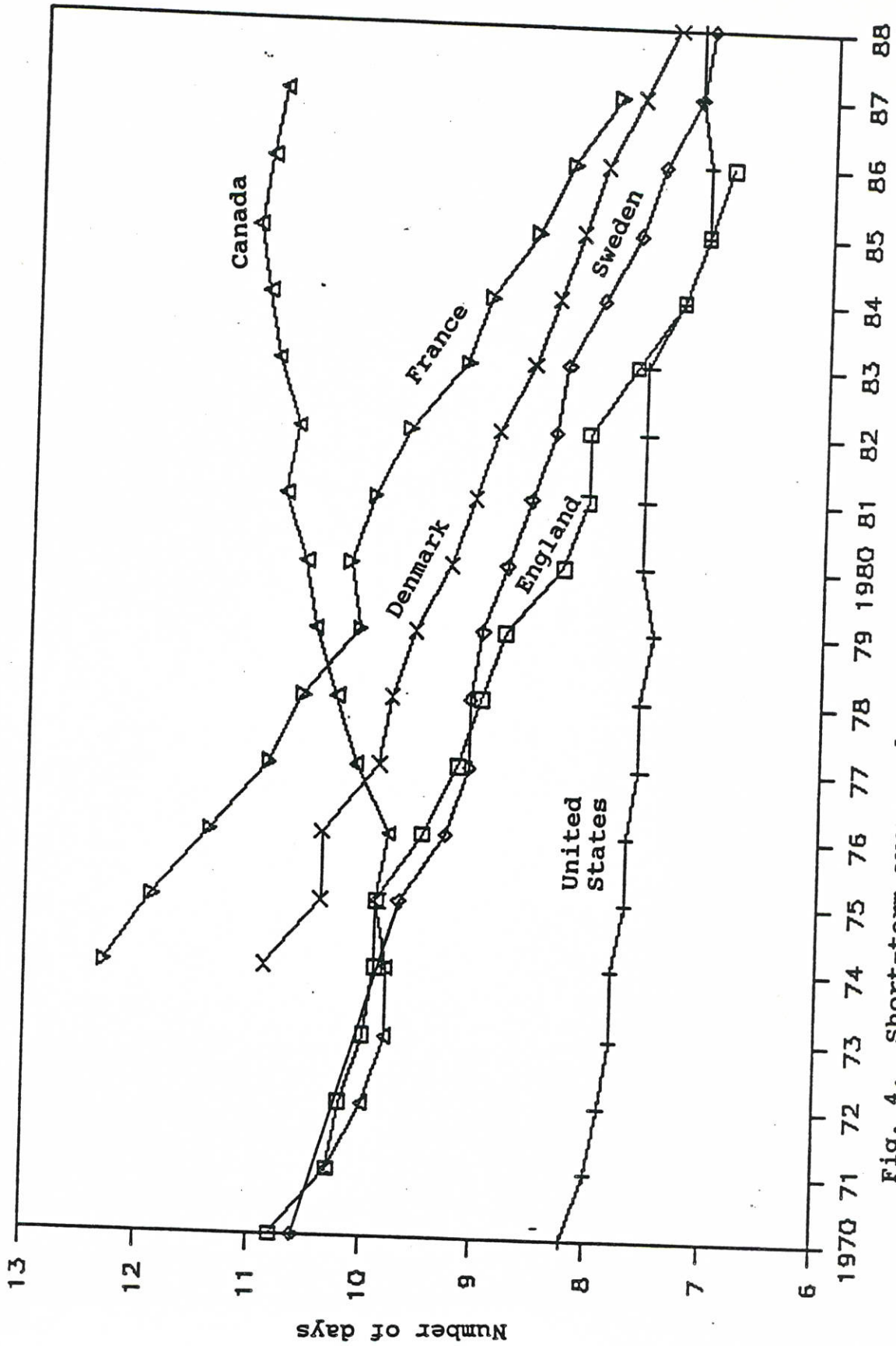Fig. 3. Short-term admissions or discharges per 1,000 population in six countries, 1970-88.

Fig. 4. Short-term average length of stay in six countries, 1970-88.

Population. The populations in all six countries were aging. The median age and proportion of the population 65 years of age and over increased in each country. The proportions of populations that were female and 15-44 years of age also increased across the countries, but birth rates fell. In all six countries adults were less likely to be married and more likely to be divorced in the late 1980s than in the early 1970s. Single persons made up increasing proportions of adult populations, except in Canada. The proportion of persons who were widowed increased somewhat in Sweden, Canada, and Denmark, but decreased somewhat in England, the United States, and France. Gross national product per capita based on constant 1980 currency increased in all six countries, as did average life expectancies at birth for males and and females. All the countries had large decreases in infant mortality rates.

Most Recent Data

The similarities in the trends across the countries make it difficult to evaluate the separate effects of each individual change on hospital use. Additional information about factors affecting hospital use was obtained by examining relationships between hospital use measures and characteristics of hospitals, doctors, and populations in the most recent year for which data were available, 1986-89.

The most recent data showed that substantial differences remained in rates of days of care for the six countries. The

highest rate was 85 percent greater than the lowest rate. As in 1980, England, the United States, and Sweden had the first, second, and third lowest rates of days of care. The rates in the other three countries had converged, differing by less than 3 percent.

The main change from 1980 in admission and discharge rates was the drop in the U.S. rate from second highest to second lowest among the six countries. The discharge rate reported for Denmark was higher than the most recent French admission rate, but these rankings would probably have been reversed if newborn infants had been excluded from the Danish data as they were form the data for the other countries.

Short-term average lengths of stay have been converging for all the countries except Canada. The most recent average stays for the other five countries were within a day, 6.9 to 7.9 days. The most recent average stays were slightly lower in England and Sweden than in the United States, but U.S. data were for short-term hospitals, which included some long-term services. The Swedish and English data were for short-term services only.

The countries' most recent hospital use measures and most recent measures of other variables examined over time are shown in table 5. As was the case with the 1980 data, the measures were ranked from low to high and comparisons were made between rankings by the hospital use and other measures. The comparisons suggested the following relationships.

Table 5

Cross-National Comparisons, 1986-89 (a)

	England	United States	Sweden	Canada	Denmark	France
Short-term days of care per 1,000 population	842	935	1,227	1,559	1,515	1,529
Short-term admissions or discharges per 1,000 population	122	129	173	143	205	193
Short-term average length of stay	6.9	7.2	7.1	10.9	7.4	7.9
Short-term beds per 1,000 population	3.1	3.9	4.4	5.3	4.9	5.4
General practitioners per 100,000 population	56	27	(b)	100	65	135
Specialists per 100,000 population	77	161	(b)	120	171	153
Ratio of specialists to general practitioners	1.4	6.1	(b)	1.2	2.7	1.1
Surgeons per 100,000 population	27	51	(b)	28	30	29
Percentage of specialists that were surgeons	35	31	(b)	31	36	38
Median age of population	36.2	32.5	38.2	32.4	36.6	34.3
Percentage of population 65 years of age and over	15.4	12.4	17.8	11.1	15.4	13.6
Percentage of population female and 15-44 years of age	21.8	23.8	20.9	24.2	22.2	22.2
Live births per 1,000 population	13.2	15.9	13.3	14.5	11.0	13.8
Percentage of population 15 years of age and over married	58.4	58.7	47.8	61.9	51.2	57.2
Percentage of population 15 years of age and over divorced	5.4	7.7	8.5	4.3	7.6	4.7
Gross national product per capita in U.S. dollars	10,430	18,560	15,630	15,160	15,000	12,790
Average life expectancy at birth						
Male	71.9	71.5	74.0	73.0	71.8	72.0
Female	77.7	78.4	80.0	79.7	77.7	80.3
Infant mortality rate	9.1	10.1	5.8	7.2	7.5	7.8

(a) Data are for most recent year available in the 1986-89 period.
(b) Not available.

Short-term hospital beds per 1,000 population: Positive relationships suggested to rate of days of care, admission or discharge rate, and average length of stay. The countries' rankings by most recent short-term bed rate were similar to their rankings by most recent hospital use measures, especially rankings by rate of days of care. England, the United States, and Sweden ranked first, second, and third by rates of days and beds. Canada, Denmark, and France had higher rates of days and beds. Canada ranked higher by rate of beds than by discharge rate, and Sweden's ranking by bed rate was higher than its ranking by average length of stay.

General practitioners per 100,000 population: Positive relationships suggested to rate of days of care and average length of stay. The countries' rankings by most recent rate of general practitioners did not change from their 1980 rankings. As was the case in 1980, rankings by rate of general practitioners were similar to rankings by average length of stay. Rankings by rate of general practitioners also had become similar to rankings by rate of days of care in the most recent data.

Ratio of specialists to general practitioners: Negative relationships suggested to rate of days of care and average length of stay. Canada and France had the two lowest ratios of specialists to general practitioners and two of the three highest rates of days of care and average lengths of stay. The

ratio of specialists to general practitioners was high and the rate of days of care and average length of stay low in the United States.

Average life expectancy at birth for females: Positive relationships suggested to rates of days of care and admission or discharge rate. In the most recent data, England and Denmark still had the shortest average life expectancies at birth for females, but France and Canada had reverse rankings. Females could expect to live the longest in France, followed by Sweden, and then Canada. With the exception of Denmark, the countries' rankings by most recent average life expectancy at birth for females were similar to their rankings by most recent rate of days of care and admission rate. This contrasts with 1980 when average life expectancies for females appeared to be related to average length of stay.

Infant mortality rate: Negative relationships suggested to rate of days of care and admission or discharge rate. Sweden continued to have the lowest infant mortality rate and the U.S. rate remained the highest in the most recent data. The main change in rankings was that the infant mortality rate in Canada dropped below the rates in Denmark and France becoming second lowest. The United States and England had the highest infant mortality rates and the lowest rates of days of care and admission or discharge rates.

Summary

The variable most consistently associated with hospital use measures was the supply of hospital beds. The countries ranked similarly by rate of beds and hospital use measures in 1980 and the most recent data. Significant positive relationships were found within most of the countries between rate of beds and use measures. As rates of hospital days and average lengths of stay decreased in the 1970s and 1980s, so did the supply of hospital beds. However, admission and discharge rates increased in four of the countries as their bed rates decreased.

Use patterns also may be associated with other hospital characteristics. Evidence was found that including long-term care or ambulatory care in hospitals' domains affected use levels, although the amount of ambulatory and long-term care available outside of hospitals did not. Within the countries, the intensity of an episode of hospital care increased with average length of stay. This could result from more seriously ill patients having longer stays and requiring more services, or it could suggest that more intensive care uncovers additional health problems or has adverse effects that require longer treatment.

A number of relationships were found between hospital use measures and the supply and specialization of doctors, but the relationships were not always consistent. Within most of the countries the rate of specialists was positively related to all

three use measures, but the rate of specialists and the ratio of specialists to general practitioners increased while rates of days of care and average lengths of stay decreased in most countries. Across the countries, a positive relationship was suggested between the rate of general practitioners and average length of stay in 1980, and between rate of general practitioners and both average length of stay and rate of days of care in the most recent data. The ratio of specialists to general practitioners appeared to be negatively related to average length of stay and rate of days of care in the most recent data.

Other characteristics of doctors did not appear to affect hospital use. Surgeons did not have any different effect on hospital use patterns than other types of specialists. No relationship was seen between open or closed staffing of hospitals and use measures. In fact, neither of the open systems (Canada or the United States), currently display the high discharge rate together with a short average length of stay expected of open systems.

Measures of aging were the main population variables associated with use levels. Within half the countries positive relationships were found between median age and average length of stay, and in half the proportion of the population 65 years of age and over was positively related to rate of days of care. All the countries' populations were aging, however, as rates of days of care and average lengths of stay decreased. Birth rates were falling along with these use measures, and rates of

days of care and average lengths of stay were negatively related to birth rates within half of the countries. Neither enabling characteristics nor health measures were consistently associated with hospital use measures across or within the countries. The decreases in infant mortality rates and increases in average life expectancies could be considered evidence that improving health levels have been a factor in the decreases in hospital use over time.

Why the international differences in hospital use? These findings suggest that much of the variability may be due to differences in the supply and organization of the countries' health services.

References

Letsch, Suzanne W., Katharine R. Levit, and Daniel R. Waldo. 1988. National health expenditures, 1987. *Health Care Financing Review*. 10 (Winter): 109-22.

National Center for Health Statistics. 1980. The status of hospital discharge data in six countries, by Lola Jean Kozak, Ronald Andersen, and Odin W. Anderson. *Vital and Health Statistics*, series 2, no. 80. Washington, D.C.: U.S. Government Printing Office.

————. 1981. The status of hospital discharge data in Denmark, Scotland, West Germany, and the United States, by Lola Jean Kozak, Ronald Andersen, and Odin W. Andersen. *Vital and Health Statistics*, series 2, no. 88. Washington, D.C.: U.S. Government Printing Office.

————. 1984. Hospital use by children in the United States and Canada, by Lola Jean Kozak and Eileen McCarthy. *Vital and Health Statistics*, series 5, no. 1. Washington, D.C.: U.S. Government Printing Office.

————. 1989. Hospital use in France and the United States, by Lola Jean Kozak, Eileen McCarthy, Andree Mizrahi, Arie Mizrahi, and Simone Sandier. *Vital and*

Health Statistics, series 5, no. 4. Washington, D.C.:
U.S. Government Printing Office.

Poullier, Jean-Pierre. 1989. Health care expenditure and
other data: An international compendium from the
Organization for Economic Cooperation and Development.
Health Care Financing Review (Annual Supplement): 111-94.