

Trends in Hospital Use by the Aged

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This article compares data from a variety of sources on the hospital utilization experience of persons aged 65 and over during the period 1963-71. These data show that, in the first 3 years following the inception of Medicare, use of hospital services by the aged—measured by days of care per 1,000 persons—increased at an average annual rate of 6-13 percent. Since 1969, however, hospital utilization by this age group has been declining 1-3 percent annually, mostly as a result of a decline in average length of stay. Comparison with similar data for persons under age 65 reveals that a significant redistribution of hospital care between this age group and those aged 65 and over has occurred since 1965. It is likely that aged persons increased their use of hospital services to some extent at the expense of persons under age 65.

MEDICARE's two coordinated programs of health insurance for the aged—a basic hospital insurance program (HI) and a voluntary supplementary medical insurance program (SMI)—went into effect on July 1, 1966. The primary goal of the Social Security Administration's Medicare program is to provide insurance protection to help persons aged 65 and over pay a major portion of their large expenses for hospital and medical care. The success of the Medicare program as a whole has been amply documented in a previous article.¹

Financial protection was the main focus of the program; however, it was apparent that the aged would probably increase their hospital utilization under the hospital insurance part of the program. Predictions about the probable size of the increase varied from 5-10 percent to 40 percent or more. This article measures part of the impact of the HI program by examining the existing sources of

data on hospital utilization by the aged since 1963. Several measures of utilization including admissions or discharges per 1,000 population, days of care per 1,000 population, and average length of stay are employed.

In order to assess the impact of the HI program, two questions are of particular interest:

- 1 How much increased use of hospital services was generated in the first year of the program compared with earlier periods?
- 2 What has been the continuing trend of hospital use by the aged in more recent years?

Although neither question can be answered with absolute precision, it is hoped that a comparison of the data from several sources will provide a range of values approximating the actual trend experience.

SOURCES AND LIMITATIONS OF DATA

The data used in this paper are derived from seven different sources.² A brief summary of the principal features of each source is presented in table 1, along with a discussion of some inherent differences between these surveys that tend to complicate the comparison of their results.

As table 1 shows, none of the surveys are completely alike. Generally speaking, the dissimilarities are of two types: differences in approach and design and differences of definition, in the broad sense of the term.

If classified according to their ultimate source of information, three distinct kinds of surveys are included here. Data were collected in both the Health Interview Survey (HIS) and the Columbia University Survey (CUS) from interviews of individuals in a probability sample of households. Data reported by both American Hospital Association (AHA) sources (Guide Issue and Hospital Indicators) were collected in mail surveys of hospitals registered by the Association. The remaining three surveys used individual case records: discharges in the Hospital Discharge Sur-

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¹Howard West, "Five Years of Medicare—A Statistical Review," *Social Security Bulletin*, December 1971.

²For a more detailed description of sources, see the Technical Note, page 11.

TABLE 1.—Principal characteristics of the seven survey data sources

Survey source	General description	Survey design	Sample size	Reference time period	Reference population	Institutional coverage	Non-response rate
National Center for Health Statistics, Health Interview Survey.	Annual general health data	Multistage probability sample of households within a sample of geographic segments	42,000 households containing 134,000 persons	Independent weekly samples in which respondents were queried about experience of previous 6 months. Data were aggregated to annual figures: fiscal years 1963-67, calendar years 1967-69	Civilian non-institutional population living at time of interview.	All general or other special hospitals or hospital unit of an institution except chronic, tuberculosis, or psychiatric	5 percent
National Center for Health Statistics, Hospital Discharge Survey.	Annual short-stay hospital use data	Multistage probability sample of discharge records within a sample of hospitals	Approximately 210,000 discharges from about 400 hospitals	Annual data accumulated on a monthly basis calendar years 1965-70	Civilian non-institutional population.	General and short-term special hospitals with six or more beds and average length of stay less than 30 days	10 percent
Columbia University Survey.	Measurement of the early impact of Medicare.	Multistage probability sample of individuals within a sample of geographic sampling units.	6,600 persons.....	Two independent samples interviewed in April-May 1966 and November-December 1967 in which respondents were queried about experience of previous 12 months	Old-age and survivors insurance beneficiaries.	All hospitals and extended-care facilities certified for participation in Medicare and nursing homes not participating in the program	12 percent
American Hospital Association, Hospital Indicators.	Monthly current data on community hospital utilization and finances	Single-stage stratified sample of hospitals	813 hospitals.....	Monthly survey. Annual figures are aggregated for both calendar and fiscal years, 1964-71.	Civilian resident population	Short-term general and other special hospitals (community).	Not available
American Hospital Association, Guide Issue	Annual statistics of hospital utilization and finances	Mail survey of all hospitals registered with the AHA in the U S	7,123 hospitals.....	Annual survey. Data generally refer to the 12 months ending September 30, 1947-70	Civilian resident population	All hospitals, including subgroups such as community hospitals	7 percent.
Social Security Administration, Current Medicare Survey	Monthly, quarterly, and annual statistics on discharges covered by the HI program, with days of care and charges	Single-stage stratified sample of all hospital admission notices	Approximately 30,000 hospital stays per year.	Records were sampled monthly. Annual figures are aggregated for both calendar and fiscal years, 1967-69	All persons enrolled in the HI program	All hospitals certified for participation in the HI program	3 percent
Social Security Administration, Medicare Control Records	Annual statistics of claims for hospital care covered under HI program.	Census of all claims records	100 percent.....	Claims data are accumulated continuously. Annual figures are aggregated for both calendar and fiscal years, 1967-71	All persons enrolled in the HI program	All hospitals certified for participation in the HI program	-----

vey (HDS), paid claims in the Medicare Control Records (MCR), and admission notices in the Current Medicare Survey (CMS) data.

Definitional differences among the surveys involve such questions as who is included in the survey, what is considered hospital utilization, and when the reported hospital use occurred. These surveys do not measure hospital utilization for the same population, nor do they have a single common hospital universe or even an identical time frame.

As a result the levels of hospital use estimated from different sources are not strictly comparable. Household survey data, for example, exclude the experience of persons who died in the hospital or who died after discharge but before the interview date. These data also contain substantial under-reporting (5-10 percent³) in the amount of hospital use by respondents. Thus the level of use

³ NCHS *Vital and Health Statistics*, Series 2, Nos. 6 and 7.

estimated from household data will not correspond with the results from other types of surveys.

For the purpose of comparing rates of change of hospital utilization over time, the situation is somewhat better. Since each individual survey has remained reasonably consistent during the period in terms of its design, techniques, and definitions, annual rates of change estimated from different sources should be approximately the same.

Rates of change cannot be expected to match exactly, however. In any given year, each survey measures the hospital utilization experience of a different group of people, in a different set of hospitals, during a different 12-month period. Such definitional differences will cause rates of change reported by different surveys to vary somewhat, although the size of the differences should be small.

A larger proportion of the disparities among the rates of change from various surveys is probably due to the inherent variability of survey data that results from errors of sampling and measurement. Naturally, the likelihood that a set of data will show distorted rates of change from year to year increases with the degree of variability. Unfortunately, very little information is available regarding the relative variability of each source's data. There are, however, reasons to believe that some of the survey data presented here tend toward greater precision than others.

Part of the variability of any survey estimate is due to nonresponse, reporting inaccuracies, and errors in processing. Although the amount of variability resulting from nonresponse and processing errors is probably similar for each type of survey, the amount due to reporting error is likely to be much greater for household interview survey data than for surveys using either hospital or claims records. Response accuracy in a household interview depends upon the ability and willingness of the respondent to recall past events. A survey of records, however, makes use of information compiled at the time of the event.

The remaining and most important source of variability is sampling error. Sampling variability results from the fact that repeated samples using identical techniques will provide different estimates. The standard error or relative error, which describes the dispersion of these sample estimates around the true value for the population,

has been published for the HDS, HIS, CMS, and CUS data. Although the relative errors range from 2.5 percent to about 6 percent, there is no conclusive evidence of a radical difference among surveys.

Neither the MCR nor the AHA Guide Issue data are subject to sampling variability since these are derived from a complete enumeration of the relevant universe rather than a sample. These data have limitations, however. MCR data for recent years are incomplete because of lags in the filing and processing of claims; AHA Guide Issue data do not provide utilization estimates for different age groups.

The seven data sources do not provide equally precise estimates of hospital use. A ranking of surveys in descending order of precision would probably begin with those based on complete enumeration (MCR and AHA Guide Issue data) and end with those based on household interviews (HIS and CUS data).

Variation in rates of change reported by the different sources makes comparison more difficult. The general trend and direction of change, however, can still be evaluated, although the degree of change resulting from the Medicare program cannot be precisely estimated.

MEDICARE'S INITIAL IMPACT

As noted previously, a large increase in hospital utilization by the aged was expected to occur in the early years of the program. When estimated levels of use during Medicare's first year are compared with corresponding estimates for the last year before the program went into effect, it is evident that a substantial increase in utilization did occur.

Table 2 compares CUS, HDS, and HIS data on the number of stays or discharges and days of care per 1,000 population and average length of stay before and under Medicare. As expected, the estimated utilization rates for both periods vary from survey to survey as a result of definitional and design differences already discussed. In addition the reference period for each survey is different. The "before" period covers April-May 1965 to April-May 1966 for the CUS data; it is calendar year 1965 for the HDS data and fiscal year 1966 for the HIS data. "Under Medicare" refers

TABLE 2.—Hospital utilization experience of persons aged 65 and over in short-stay hospitals, before and under Medicare, three sources

Survey and utilization measure	Before Medicare	Under Medicare	Gross percentage increase	Annual percentage increase ¹
Columbia University Survey ²				
Stays per 1,000 persons.....	222	247	11 3	7 3
Days of care per 1,000 persons..	3,143	3,924	24 8	16 0
Average length of stay (days)..	14 2	15 9	12 0	7 8
Health Interview Survey				
Discharges per 1,000 persons...	177	197	11 3	7 4
Days of care per 1,000 persons...	2,253	2,655	17 8	11 7
Average length of stay (days)..	12 7	13 5	6 3	4 1
Hospital Discharge Survey:				
Discharges per 1,000 persons...	264	289	9 5	4 6
Days of care per 1,000 persons...	3,444	4,066	18 6	8 9
Average length of stay (days)..	13 0	14 1	8 5	4 2

¹ Based on compound annual rates of interest

² Data from Regina Lowenstein, "Early Effects of Medicare on Health Care of the Aged," *Social Security Bulletin*, April 1971, table 4.

to November–December 1966 to November–December 1967 for the CUS data and calendar year 1967 for both the HDS and HIS data. Although HIS data for fiscal year 1967 are available, they are not appropriate for comparative purposes. Since the data collected in interviews are based on a 6-month recall period, figures reported for fiscal year 1967 include hospitalizations that actually occurred before the beginning of the Medicare program.

Because the length of time between reference periods is different in each case, gross percentage increase figures derived from these surveys are not comparable. In order to eliminate this problem, annual rates of increase have been computed.

The corrected annual rates derived from each survey indicate that days of care per 1,000 aged persons increased between 9 percent and 16 percent in the first year of the Medicare program. This growth reflects the combined effects of a rise in the stay or discharge rate of 5–7 percent and an increase of 4–8 percent in average length of stay.

Several factors could have accounted for such increases in utilization rates. Aged persons could have experienced a greater number of illnesses and more serious illnesses than usual in the first year of the program. Fluctuations in hospital use by the aged are related to some extent to outbreaks of upper respiratory diseases in winter and to prolonged heat spells in summer. Available evidence, however, does not indicate that the 18-month period from July 1966 to December 1967 was unusual in either respect.

A more plausible explanation for the increased

hospital utilization focuses on two effects of the Medicare program. First, more than 97 percent of all persons aged 65 or over were eligible for hospital benefits at the beginning of the program. A substantial number of these aged persons had no previous hospital insurance protection at all. Second, some of the increase may have come from admissions that were deferred until after the effective date of the program.

In 1962, gross enrollment under private health insurance for hospital benefits was estimated at approximately 12 million aged persons.⁴ When duplication resulting from multiple enrollment by some individuals was eliminated, the net number of different insured persons in this age group fell to slightly more than 9 million persons, or 54 percent of the population aged 65 and over. Although the percentage enrolled may have increased slightly between 1962 and 1966, it is clear that nearly half of those who became eligible for Medicare benefits on July 1, 1966, were previously uninsured. It is likely that many of these individuals came into the Medicare program with significant unmet medical needs. This factor alone could explain a substantial portion of the total increase of hospital utilization rates.

The second factor—postponement of hospitalization—affected not only those with no private hospital insurance but also those who had some insurance. Clearly, any person who expected to be eligible for Medicare benefits would have had an incentive to postpone hospital care where possible if his current benefits under private health insurance were less complete than those provided under Medicare. The extent to which hospitalization was actually postponed is unknown. That it did occur is suggested by the fact that the discharge rate among aged patients for the treatment of cataracts—generally considered elective care—rose 52 percent between 1965 and 1967.⁵

A major share of the increase in hospital utilization by the aged seems to be directly due to the impact of the Medicare program. If increased use had resulted solely from a temporary change in the incidence of illness, utilization rates could be

⁴ Marjorie Smith Mueller, "Private Health Insurance in 1970: Population Coverage, Enrollment, and Financial Experience," *Social Security Bulletin*, February 1972, table 8.

⁵ *Monthly Vital Statistics Report*, vol. 20, No. 7, October 8, 1971.

expected to level off or decline in later, more normal years. As described below, however, hospital use by the aged population continued to increase for several years following the initial period of program operation.

MEDICARE'S CONTINUING IMPACT

Because of the varying nature of the time periods covered by the different sources, the continuing trends of hospital utilization are evaluated by means of two separate comparisons. Table 3 presents rates of change in hospital utilization available from four sources for calendar years 1967-70. Similar trend data are given in table 4 for three surveys that provide estimates for fiscal years 1967-71.

Table 3 shows that hospital utilization rates continued to rise between 1967 and 1968, but that by the end of 1969 the period of rapid growth had come to an end. Total use, as measured by days of care per 1,000 persons, increased between 5 percent and 34 percent from 1967 to 1968 as a result of a rise of 4-14 percent in the discharge rate and a change ranging from -2 to 17 percent in average length of stay.

Rates of change derived from the HIS and CMS data for days of care per 1,000 persons and average length of stay must be qualified, however, by the following considerations: (1) Since the percentage change in either utilization measure in

TABLE 3—Annual rates of change in hospital utilization rates of the population aged 65 and over in short-stay hospitals, four sources, 1967-70

Year and measure	Percentage change from previous year			
	Health Interview Survey	Hospital Discharge Survey	AHA Hospital Indicators	Current Medicare Survey
Discharges per 1,000 population				
1968.....	14 1	4 0	1 5 4	8 5
1969.....	7 3	1 4	1 4 6	3 4
1970.....	-2 9	3 3	1 1 0	(*)
Days of care per 1,000 population				
1968.....	33 6	4 5	8 1	4 6 4
1969.....	9	1	1 8	4 2 0
1970.....	14 1	-6 1	-2 2	(*)
Average length of stay (days)				
1968.....	17 0	7	1 3 1	-2 2
1969.....	-5 7	-1 4	1 -3 0	-1 5
1970.....	-12 0	-6 5	1 -3 1	(*)

¹ Based on rate of admissions.

² Rates may be too low because of a change in the Census base used in estimating population data in 1970

³ Not available

⁴ Covered days of care under HI

⁵ Average length of covered stay per discharge.

TABLE 4.—Annual percentage change in hospital utilization rates of persons aged 65 and over in all hospitals, three sources, fiscal years 1967-71

Survey and utilization measure	Percentage change from previous year				Average annual percentage change	
	1968	1969	1970	1971	1969 from 1967	1971 from 1969
AHA Hospital Indicators ¹						
Admissions per 1,000 population...	3 6	5 6	2 4	1 2	4 6	1 8
Days of care per 1,000 population...	8 7	5 1	-9	-1 7	6 9	-1 3
Average length of stay (days).....	4 7	-8	-3 0	-3 1	2 0	-3 1
Current Medicare Survey ²						
Discharges per 1,000 population...	5 9	5 6	(*)	(*)	5 8	(*)
Covered days of care per 1,000 population.....	8 1	3 0	(*)	(*)	5 5	(*)
Average length of covered stay (days).....	2 0	-2 3	(*)	(*)	-7	(*)
Medicare Control Records ³						
Admissions per 1,000 population...	11 7	3 4	-3	1 0	7 4	.3
Covered days of care per 1,000 population.....	19 9	5 9	-3 8	-2 9	12 6	-3 4
Average length of covered stay (days).....	7 4	2 3	-3 8	-4 0	4 8	-3 8

¹ Community hospitals

² Based on covered utilization under HI in participating hospitals.

³ Not available

the HIS data is three or more times larger than the comparable rate from any other source, it seems unlikely that it describes the real trend accurately; and (2) although the HIS data may overstate the rate of change, the CMS data probably understate it. In the CMS data length of stay is based only on days of care covered by the Medicare program and does not include the effect of a 1967 amendment (effective January 1, 1968) providing a lifetime reserve of 60 days of covered hospital care for each enrollee. Before this change, an enrollee would have exhausted his benefits under the program on the 90th day of hospital care in a benefit period. After this change, however, such a person could obtain additional covered days of care by drawing on his lifetime reserve. Since the CMS data exclude days of care beyond 90 during a benefit period, actual covered days of care and average length of covered stay are understated in 1968 and subsequent years but are comparable with 1967 data. If days of care beyond 90 had been included, the rate of increase in days of care per 1,000 persons would have been somewhat higher, and average length of stay might have shown no change between 1967 and 1968.

Despite these qualifications, however, total hospital utilization by aged persons increased substantially between 1967 and 1968. This increase probably resulted from a combination of factors including an outbreak of upper respiratory dis-

ease (that occurred during the winter of 1968-69), some residual catching-up with previously unmet needs, or increasing awareness among aged persons of the benefits available to them. In addition, the lifetime reserve provision may have had some effect upon average length of stay and days of care. This change may also have produced a higher rate of multiple admissions of the same individual during 1968 and in subsequent years.

Between 1968 and 1969, hospital use by aged persons leveled off: the discharge rate increased more slowly and, more important, average length of stay declined. By the end of 1970, days of care per 1,000 persons had decreased as a result of the continuing and substantial decline in average length of stay.

The extent of the decrease in days of care per 1,000 persons between 1969 and 1970 reported in the HDS data is probably overstated. Utilization rates per 1,000 persons in 1969 were based on population estimates projected from the 1960 Census. Similar rates for 1970 were based on population estimates derived from the 1970 Census. When these figures are compared the estimated percentage increase in the population aged 65 and over between 1969 and 1970 is 2.9 percent—almost twice as much as in any earlier year. As a result the 1970 utilization rates are low in relation to similar rates for 1969.

The rates presented in table 4 exhibit substantially the same pattern for the period 1967-69 as those shown previously. Differences are mainly attributable to the fact that the rates in table 4 are based on fiscal-year data covering a somewhat earlier set of months than the calendar-year rates in table 3. The change in Medicare that caused the CMS data to understate the increase of hospital utilization between 1967 and 1968—the inclusion of the lifetime reserve—had the opposite effect on the MCR data. The MCR data are based on days of care covered under the program, including the lifetime reserve. Since days beyond 90, which were covered and therefore counted in 1968, were not covered under the program in 1967, the rates of increase in covered days of care and in average length of covered stay are overstated in relation to total days of care and to average length of stay actually used.

The average annual rates in table 4 indicate that the first 5 years of utilization experience

under the program include two distinct periods. During the first 3 years, utilization rates increased substantially but at a declining rate of increase each year. From 1969 to 1971 the trend reversed and total hospital use by the aged began to decline absolutely. Thus, during the second period, days of care per 1,000 persons declined at an average rate of 2-3 percent per year. To be sure, the discharge rate continued to increase at a rate of about 1 percent per year, but at the same time average length of stay was decreasing about 3-4 percent per year.

These trends probably resulted from the simultaneous interaction of several factors. The decline in average length of stay, for example, may reflect intensified utilization review activities. These activities may have had some impact on physician awareness of the high cost of hospital care and, ultimately, on their decisions with regard to length of stay. Other factors have undoubtedly contributed to the decline in average length of stay since 1968. Case-mix, for example, may have changed to include a higher proportion of less serious cases as the backlog of previously unmet needs was gradually eliminated.

The causes of the continuing increase in the discharge rate are less certain. There does not seem to be any evidence that the medical needs of the average aged person have increased in the last few years of the program. Instead, the large increases in the discharge rate between 1966 and 1969 may have represented a one-time step to a new equilibrium level of use that will prevail in the absence of changes in medical technology or benefit provisions of the program. The 1-percent annual rise from 1969 to 1971 may represent the beginning of a stable, long-term trend of slowly rising discharge rates resulting from changes in medical techniques that tend to reduce the risk associated with the treatment of specific disorders or that allow treatment of diseases that could not have been effectively dealt with before. Of course, slowly increasing discharge rates need not represent the beginning of a new trend; they may instead represent a return to a stable trend that may have existed before the initial years of the Medicare program.

Slowly rising discharge rates might also result as the hospital gradually replaces the physician's office as the center of the health care delivery system—not only for aged persons, but for the

general population as well. Other changes—such as the development of health maintenance organizations or the implementation of some form of national health insurance—can also be expected to have an impact on hospital utilization rates of all age groups.

Similarly, the impact of the HI portion of the Medicare program has not been limited to changes in hospital utilization by persons aged 65 and over.

PROGRAM SPILLOVERS: THE POPULATION UNDER AGE 65

During the first 3 years of Medicare trends in hospital use by the population under age 65 seem to have followed a pattern largely the reverse of that of persons covered under the program. Table 5 presents rates of change in hospital utilization per 1,000 persons under age 65 for the period 1965-70. Days of care and discharges per 1,000 persons both declined steadily from 1965 to 1969, rising again at the end of the period. The trend in average length of stay, however, was roughly similar over the entire period for both the Medicare and the non-Medicare age groups.

Since hospital utilization rates for persons under age 65 were declining at the same time that utilization rates of aged persons were increasing, the latter group may have received some hospital

TABLE 5.—Annual percentage change in hospital utilization rates of persons under age 65 in short-stay hospitals, three sources, 1967-70

Year and measure	Percentage change from previous year		
	Health Interview Survey	Hospital Discharge Survey	AHA Hospital Indicators
Discharges per 1,000 population.			
1966.....	¹ -0.8	-2.9	(?)
1967.....	¹ -2.5	-4.4	(?)
1968.....	-3.4	-2.3	² 0
1969.....	5.6	8	² 0
1970.....	3.4	8	² 5.6
Days of care per 1,000 population³			
1966.....	¹ -5.2	-1.0	(?)
1967.....	¹ 1.1	-2.9	(?)
1968.....	-6	-2.5	0
1969.....	4.8	-7	-6
1970.....	2.3	-2.3	3.7
Average length of stay (days)			
1966.....	-3.9	2.9	(?)
1967.....	4.1	1.4	(?)
1968.....	2.6	-1.4	² 0
1969.....	0	0	² -1.5
1970.....	-1.3	-4.3	² -1.5

¹ Based on data for fiscal years.
² Not available.
³ Based on admissions.

TABLE 6.—Percent of total discharges and days of care for patients under age 65, in short-stay hospitals, three sources, 1965-70

Year and measure	Health Interview Survey	Hospital Discharge Survey	AHA Hospital Indicators
Percent of all discharges in—			
1965.....	187.0	84.0	(?)
1966.....	187.1	82.8	(?)
1967.....	85.1	81.4	² 80.4
1968.....	82.7	80.3	² 79.4
1969.....	82.4	80.0	² 78.6
1970.....	83.2	79.8	² 79.4
Percent of all days of care in—			
1965.....	179.5	73.3	(?)
1966.....	179.8	71.5	(?)
1967.....	76.3	68.6	68.0
1968.....	70.4	66.9	66.2
1969.....	71.0	66.6	65.5
1970.....	74.3	67.0	66.6

¹ Based on data for fiscal years.
² Not available.
³ Based on admissions.

care that, in the absence of the Medicare program, would have been used by persons under age 65.

Partial evidence that some displacement may have occurred is given in table 6, which shows the relative share of total admissions or discharges and days of care received by the nonaged population for the period 1963-71. The percentage of both discharges and days of care received by persons under age 65 declined substantially during this period to approximately four-fifths of all discharges and two-thirds of total days of care.

As before, the causes of the redistribution of hospital care from nonaged persons to aged persons cannot be identified with certainty. It was noted earlier that from its beginning in 1966 the hospital insurance program has generated a substantial increase in demand for hospital care by aged persons. This rise in demand more than offset the concurrent decline in demand by persons under age 65. As a result, between 1965 and 1970 total demand as measured by per capita days of care increased about 11 percent. During this time, the capacity of the hospital system to render inpatient care, as measured by available per capita bed supply, increased only 7 percent.⁶ Thus, the demand for hospital care increased more rapidly than the supply of beds, with the result that hospitals were used more intensively than before. This is evident in that the national average occupancy rate (percentage of beds occupied during an average day during the year) in community hospitals increased from 76.0 percent

⁶ Percentage increases were estimated from AHA Guide Issue data for community hospitals.

in 1965 to an all-time high of 78.8 percent in 1969.

Thus Medicare had the effect of increasing the pressure on the capacity of the hospital system. As a result, physicians may have become more selective in the choice of patients to be admitted to the hospital. If doctors did in fact alter the case-mix of admissions to give priority to patients most in need of hospitalization, then average length of stay might well be expected to increase even though the discharge rate might decline. Cases that would have been admitted if beds were more abundant—less serious cases or those normally admitted for diagnostic tests—may have been treated in some other setting. The rationing hypothesis would explain the fact that average length of stay for patients under age 65 increased between 1965 and 1967 while their discharge rate declined.

Conversely, as the case-mix returned to normal after the initial period of the program and as the bed supply began to catch up with the demand for hospital care, the need for rationing may have decreased. This phenomenon might explain part of the decline over the last 2 years in average length of stay for all age groups, since the less seriously ill could again be admitted to hospitals.

Other hypotheses could also explain the pattern of change observed for the non-Medicare population. The decline in the birth rate between 1965 and 1968 may have contributed to the decline in the discharge rate and the increase in average length of stay for the population under 65. The largest decline in births during this period occurred between 1965 and 1966 when approximately 150,000 fewer births were recorded than in the previous year.⁷ If the decline had not occurred and each birth had been counted as an admission, however, they would represent only 0.6 percent of all admissions under age 65. Looked at another way, if the birth rate had not declined, the admission rate in 1966 would have been less than 1.0 per 1,000 higher. Had these admissions occurred, they would have added approximately 600,000 patient days—or only 0.4 percent of total days for persons under age 65—not enough to change the average length of stay statistic. Since the birth rate declines in 1967 and 1968 were much smaller (85,000 and 20,000, respectively),

⁷ "Annual Summary for the United States," *Monthly Vital Statistics Report*, National Center for Health Statistics, 1965-70.

this phenomenon alone cannot explain the decline in hospital utilization by persons under age 65.

Alternatively, increasing average length of stay and declining discharge rates could have resulted from the fact that the price of inpatient hospital care has increased much more rapidly since 1965 than per capita income. Between 1965 and 1970 the "hospital daily service charge" component of the Consumer Price Index of the Bureau of Labor Statistics increased approximately 88 percent.⁸ During the same period, per capita disposable money income increased only 37 percent.⁹ As prices have risen, more individuals may have decided to avoid hospitalization unless it became absolutely necessary. The result would be fewer admissions and longer stays because illnesses would tend to be more serious when the patient finally did seek treatment.

Those persons in the population under age 65 who have good health insurance coverage were affected only indirectly—through higher premium costs—by rising prices for hospital care. A sizable proportion (10-20 percent in 1969) of the non-aged population, however, is completely unprotected except through programs such as Medicaid (the federally aided State medical assistance program).¹⁰ Use of hospital services by these individuals may be particularly sensitive to rapidly increasing prices.

The above hypothesis cannot explain the reversal in the trend of the discharge rate for persons under age 65 that occurred in 1969 and 1970. It is possible that during the first few years the combination of rationing and rising prices produced the decline in utilization, since each would tend to have a negative effect. Once the need for rationing ended, however, the effect of rising prices could have been offset by the release of excess demand previously held in check by rationing. The increase of the discharge rate, in other words, may represent the return of the demand for hospital care by persons under age 65 to pre-Medicare levels.

⁸ This component measures the change in hospital charges for room, board, and routine care in urban areas of the United States.

⁹ *Economic Report of the President, 1971*, table C-16, page 215.

¹⁰ Marjorie Smith Mueller, "Private Health Insurance in 1970: Population Coverage, Enrollment, and Financial Experience," *Social Security Bulletin*, February 1971, table 8.

SUMMARY AND CONCLUSIONS

The data show that the hospital insurance program has had considerable impact on the hospital utilization rates of the aged population. After the initial large increases between 1965 and 1969, hospital utilization measured in days of care per 1,000 persons declined slightly, reflecting a substantial decrease in average length of stay. This slight decline in hospital use may represent a movement toward a new equilibrium trend.

The HI program also appears to have had a substantial indirect effect on the hospitalization rates of nonaged persons. All available data indicate that a redistribution of hospital care between those under age 65 and those aged 65 or older occurred between 1965 and 1970. During this period the proportion of total days of care received by aged persons increased from about one-fourth to roughly one-third, and the share received by the nonaged population declined similarly.

TECHNICAL NOTE

Sources of the Data

The Health Interview Survey.—Conducted by the National Center for Health Statistics, the HIS series—"Current Estimates"—has reported data annually since 1963 by age and sex of respondent on the number of short-stay hospital discharges and average length of stay, and, since 1966, on total days of care.

These data are derived from household interviews of the civilian, noninstitutional population of the United States living at the time of the interview. The multistage probability sample is designed so that those interviewed each week in approximately 800 households constitute a representative sample of the population. In any year the sample includes about 134,000 persons from 42,000 households. Those interviewed report on their hospital utilization experience in any hospital except those providing primarily chronic, tuberculosis, or psychiatric care during the 6-month period before the week of the interview.

Since HIS data are based on information received in household interviews, they represent a substantial understatement of the actual level of hospital use. They exclude the experience of per-

sons who either died in the hospital or were deceased after discharge but preceding the survey interview. The degree of understatement is further increased because of proxy response, response error, and related interview survey problems.

The Hospital Discharge Survey.—The National Center for Health Statistics also conducts the HDS, which provides statistics on the utilization experience of the civilian noninstitutional population in short-stay hospitals.

Since 1965 data have been collected on demographic characteristics of patients, their diagnoses, discharges, total days of care, and average length of stay. Only noninstitutional general and special hospitals with six or more beds and with average stays of less than 30 days are included in the survey. Military and Veterans Administration hospitals and hospital departments of long-term and custodial institutions are excluded. Since 1967, all federally owned hospitals have been eliminated from the sample.

HDS data are derived from a systematic sample of discharge records within about 400 hospitals selected from a stratified sample of the 6,965 hospitals in the master facility inventory. In any given year the sample includes about 210,000 discharge abstracts drawn from hospitals of all sizes in all regions.

*The Columbia University Survey.*¹¹—This two-part survey of the initial effects of Medicare was conducted in early 1966 and late 1967 by the School of Public Health and Administrative Medicine of Columbia University and by the National Opinion Research Center of the University of Chicago under contracts with the Social Security Administration. The CUS was concerned with the hospital utilization experience of aged persons in the 12 months preceding the week of the interviews. In both years data were collected by means of household interviews in an independent, multistage, stratified sample of 6,600 old-age and survivors insurance beneficiaries. The data included the number of stays, days of care, and average length of stay by age, sex, race, and income of respondent for all hospitals, extended-care facilities, and nursing homes. In the survey,

¹¹ Regina Lowenstein, "Early Effects of Medicare on Health Care of the Aged," *Social Security Bulletin*, April 1971.

TABLE A.—Health Interview Survey (National Center for Health Statistics): Hospital utilization experience and rates per 1,000 persons, by age, in short-stay hospitals, 1963-70

Year	Discharges (in thousands)			Days of care (in thousands)			Average length of stay (days)		
	All ages	Under age 65	Aged 65 and over	All ages	Under age 65	Aged 65 and over	All ages	Under age 65	Aged 65 and over
Number									
Fiscal year:									
1963.....	22,776	19,912	2,864	¹ 192,017	¹ 151,578	¹ 40,439	8 4	7 6	14 1
1964.....	23,799	20,564	3,235	¹ 192,676	¹ 153,646	¹ 39,030	8 1	7 5	12 1
1965.....	24,226	21,069	3,157	¹ 204,385	162,547	41,838	8 4	7 7	13 3
1966.....	24,187	21,077	3,110	195,664	156,069	39,595	8 1	7 4	12 7
1967.....	24,186	20,669	3,517	207,427	158,994	48,433	8 6	7 7	13 8
Calendar year:									
1967.....	23,756	20,213	3,543	201,861	153,999	47,862	8 5	7 6	13 5
1968.....	23,829	19,716	4,113	219,622	154,560	65,062	9 2	7 8	16 8
1969.....	25,617	21,026	4,491	230,308	163,558	66,750	9 0	7 8	14 9
1970 ²	26,522	22,079	4,443	227,604	169,194	58,410	8 6	7 7	13 1
Rates per 1,000 persons ¹									
Fiscal year:									
1963.....	124	120	170	¹ 1,048	¹ 912	¹ 2,398	-----	-----	-----
1964.....	128	122	190	¹ 1,037	¹ 910	¹ 2,293	-----	-----	-----
1965.....	129	123	183	¹ 1,085	950	2,420	-----	-----	-----
1966.....	127	122	177	1,026	901	2,253	-----	-----	-----
1967.....	126	119	197	1,078	911	2,711	-----	-----	-----
Calendar year:									
1967.....	123	115	197	1,044	878	2,655	-----	-----	-----
1968.....	122	111	224	1,124	873	3,647	-----	-----	-----
1969.....	129	118	241	1,167	915	3,678	-----	-----	-----
1970 ²	133	122	234	1,139	936	3,075	-----	-----	-----

¹ Based on unpublished data
² Unpublished and preliminary data

¹ Based on noninstitutional population
 Source: National Center for Health Statistics, Series 10, various numbers.

short-stay hospitals referred to all those that were certified for participation in the Medicare program and that had an average length of stay of less than 30 days.

As with other household interview surveys, the data reported in the CUS substantially underesti-

mate actual hospital use, because they exclude the experience of decedents and are subject to response error, and related problems associated with interview surveys.

The Hospital Indicators Survey.—The American Hospital Association in its journal, *Hospitals*,

TABLE B.—Hospital Discharge Survey (National Center for Health Statistics): Hospital utilization experience and rates per 1,000 persons, by age, in short-stay hospitals, 1965-70

Year	Discharges (in thousands)			Days of care (in thousands)			Average length of stay (days)		
	All ages	Under age 65	Aged 65 and over	All ages	Under age 65	Aged 65 and over	All ages	Under age 65	Aged 65 and over
Number									
1965 ¹	28,792	² 24,101	4,601	225,011	164,976	60,035	7 8	6 8	13 0
1966 ³	28,477	² 23,566	4,911	230,453	⁴ 164,682	65,791	8 1	⁴ 7 0	13 4
1967 ³	27,964	² 22,749	5,215	235,057	⁴ 161,329	73,728	8 4	⁴ 7 1	14 1
1968 ³	28,070	² 22,550	5,520	237,201	158,801	78,400	8 5	7 0	14 2
1969 ³	28,534	22,840	5,694	239,057	159,223	79,834	8 4	7 0	14 0
1970 ³	29,185	23,302	5,883	234,042	156,875	77,167	8 0	6 7	13 1
Rate per 1,000 persons ⁶									
1965.....	152	140	264	1,186	957	3,444	-----	-----	-----
1966.....	149	136	277	1,203	947	3,712	-----	-----	-----
1967.....	145	130	289	1,215	920	4,086	-----	-----	-----
1968.....	144	127	301	1,214	897	4,272	-----	-----	-----
1969.....	145	123	305	1,211	891	4,276	-----	-----	-----
1970.....	146	129	306	1,173	870	4,015	-----	-----	-----

¹ Data from NCHS *Vital and Health Statistics*, Series 13, No. 6
² Includes discharges with age not stated.
³ Data from *Monthly Vital Statistics Report*, Nos 4 and 7, 1971, and No 2, 1972

⁴ Estimated from published data
⁵ Unpublished provisional data
⁶ Based on noninstitutional population.

TABLE C.—Hospital Indicators (American Hospital Association): Hospital utilization experience and rates per 1,000 persons, by age, in community hospitals, 1963-71

Year	Admissions (in thousands)			Days of care ¹ (in thousands)			Average length of stay ² (days)		
	All ages	Under age 65	Aged 65 and over	All ages	Under age 65	Aged 65 and over	All ages	Under age 65	Aged 65 and over
Number									
Fiscal year									
1967.....	27,048	21,840	5,208	214,454	148,536	65,918	7.9	6.8	12.7
1968.....	27,465	21,960	5,505	221,891	148,798	73,093	8.1	6.8	13.3
1969.....	28,027	22,123	5,904	227,633	149,885	78,048	8.1	6.8	13.2
1970.....	29,247	23,110	6,137	231,643	153,070	78,573	7.9	6.8	12.8
1971.....	30,312	23,966	6,346	234,413	155,475	78,938	7.7	6.5	12.4
Calendar year									
1963.....	26,002	(*)	(*)	195,991	(*)	(*)	7.5	(*)	(*)
1964.....	26,557	(*)	(*)	201,266	(*)	(*)	7.6	(*)	(*)
1965.....	26,700	(*)	(*)	203,474	(*)	(*)	7.6	(*)	(*)
1966.....	26,963	(*)	(*)	208,589	(*)	(*)	7.7	(*)	(*)
1967.....	27,202	21,865	5,337	217,418	147,870	69,548	8.0	6.8	13.0
1968.....	27,768	22,057	5,711	225,562	149,245	76,317	8.1	6.8	13.4
1969.....	28,353	22,295	6,058	228,568	149,789	78,778	8.1	6.7	13.0
1970.....	30,137	23,920	6,216	235,390	156,876	78,514	7.8	6.6	12.6
1971.....	30,260	23,833	6,428	232,685	154,110	78,575	7.7	6.5	12.2
Rate per 1,000 persons ⁴									
Fiscal year:									
1967.....	139	125	275	1,104	847	3,475			
1968.....	140	124	285	1,131	841	3,779			
1969.....	141	124	300	1,148	837	3,972			
1970.....	146	128	308	1,156	849	3,937			
1971.....	149	131	311	1,154	853	3,872			
Calendar year									
1963.....	139	(*)	(*)	1,051	(*)	(*)			
1964.....	140	(*)	(*)	1,064	(*)	(*)			
1965.....	139	(*)	(*)	1,062	(*)	(*)			
1966.....	139	(*)	(*)	1,079	(*)	(*)			
1967.....	139	124	278	1,114	838	3,619			
1968.....	141	124	293	1,145	839	3,912			
1969.....	142	124	306	1,148	834	3,984			
1970.....	150	132	309	1,167	864	3,898			
1971.....	148	130	307	1,139	839	3,755			

¹ Unpublished data
² Estimated
³ Not available

⁴ Based on estimated civilian resident population.
 Source *Hospitals*, Journal of the American Hospital Association, mid-month issues

reports monthly utilization and financial statistics of its registered hospitals in a section titled "Hospital Indicators." These data are derived from a stratified probability sample of over 800 non-Federal, short-term, general, and other special (community) hospitals drawn from the total of more than 5,000 such hospitals registered by the Association. Since 1963 the survey has included the number of admissions and average length of stay. Beginning with July 1966, "Hospital Indicators" has also been reporting admissions and average length of stay for patients aged 65 and over.

The Guide Issue Survey.—The American Hospital Association has been reporting hospital utilization and financial statistics in the Guide Issue edition of its journal, *Hospitals*, on August 1 each year beginning with 1947. The number of admissions and average length of stay for patients of all ages by type, size, and regional location of the hospital are included among the published data.

The AHA Guide Issue survey data are derived from a mail survey of all hospitals registered by the Association as of February of each year. Since it is a survey of the aggregate records of hospitals, the data contain no demographic detail with respect to patients.

TABLE D.—Guide Issue Survey (American Hospital Association): Hospital utilization experience and rate per 1,000 persons, by age, in community hospitals, 1963-70

Fiscal year (ending September 30)	Admissions		Days of care		Average length of stay (days)
	Number (in thousands)	Rate per 1,000 persons ¹	Number (in thousands)	Rate per 1,000 persons ¹	
1963.....	25,267	135	193,600	1,037	7.7
1964.....	25,987	137	201,300	1,063	7.7
1965.....	26,463	138	205,600	1,071	7.8
1966.....	26,897	139	214,600	1,108	8.0
1967.....	26,988	138	223,300	1,141	8.3
1968.....	27,276	138	230,700	1,168	8.5
1969.....	28,200	142	237,600	1,190	8.4
1970.....	29,252	145	241,500	1,194	8.3

¹ Based on civilian resident population of the United States
² Estimated.

Source *Hospitals*, Journal of the American Hospital Association, Guide Issue, August 1, various years

TABLE E—Medicare Control Records (Social Security Administration): Hospital utilization experience and rates per 1,000 HI enrollees, in all hospitals, 1967-71

Fiscal year	Admissions		Covered days of care		Average length of covered stay (days) ²
	Number (in thousands)	Rate per 1,000 enrollees ¹	Number (in thousands)	Rate per 1,000 enrollees ¹	
1967.....	5,079	266	61,682	3,232	12 2
1968.....	5,771	297	75,400	3,874	13 1
1969.....	6,065	307	81,000	4,101	13 4
1970 ³	6,135	306	79,000	3,944	12 9
1971 ³	6,300	309	78,000	3,829	12 4

¹ Based on total HI enrollment as of January 1 each year

² Based on bills, not discharges, and may be slightly understated

³ Adjusted for lags in claims processing

Source: Howard West, "Five Years of Medicare—A Statistical Review," *Social Security Bulletin*, December 1971, table 7

The Medicare Control Records Data.—The hospital insurance program's payment operations generate a variety of data on the utilization experience of enrolled aged persons. Records of each hospital bill for which coverage is claimed and admission notices are maintained on a centralized basis by the Social Security Administration. Data on hospital admissions, discharges, days of care, and average length of stay covered under the program can be derived from these control records for each year since the beginning of the program.

These data represent the hospital utilization of the enrolled population for which benefits were paid. Thus total hospital use by aged persons is slightly understated because some aged persons are not eligible for hospital insurance benefits and some of those who are eligible have exhausted their benefits for hospital care for the year, but are nonetheless hospitalized. In addition, data for recent years are incomplete because of lags in filing and reporting of claims. Data for 1970 and 1971 have been estimated based on an adjustment for these lags.

The Current Medicare Survey.—The hospital insurance sample of the CMS conducted by the Office of Research and Statistics of the Social Security Administration has produced annual data on hospital utilization covered under Medicare's hospital insurance program for the period 1966-69. The number of admissions and discharges, their covered days of care and average length of covered stay by age, race, sex, and residence are included among the data. Utilization data for all hospitals and short-stay hospitals are available on either a fiscal-year or calendar-year basis.

TABLE F.—Current Medicare Survey (Social Security Administration). Hospital utilization experience and rates per 1,000 HI enrollees, in all hospitals, 1967-69

Year	Discharges		Covered days of care		Average length of covered stay (days)
	Number (in thousands)	Rate per 1,000 enrollees	Number (in thousands)	Rate per 1,000 enrollees	
All hospitals					
Fiscal year					
1967.....	5,151	270	69,373	3,638	13 5
1968.....	5,555	286	76,363	3,932	13 7
1969.....	5,955	302	79,939	4,051	13 4
Short-stay hospitals					
Calendar year					
1967.....	5,204	270	70,318	3,644	13 5
1968.....	5,744	293	76,096	3,878	13 2
1969.....	6,013	303	78,576	3,955	13 0

CMS data are derived from a 0.5-percent systematic sample of admission notices received by the Social Security Administration each month. To obtain data on discharges, covered days of care, and average length of covered stay, these admissions are linked at a later date with corresponding claims. If the corresponding claim has not been filed, information is obtained directly from the hospital. A supplementary sample of long-term stays—a 0.5 percent systematic sample of all admission notices with 31 days elapsed between the date of admission and the date of selection or recorded discharge—is also drawn to reduce the sampling variability in estimates of covered days of care and average length of covered stay. As a result the CMS sample includes about 42,000 admissions each year.

As mentioned before, data on covered days of care and average covered stay for 1968 and 1969 are slightly understated because the definition of the survey excludes the effect of the 60-day lifetime reserve that became operative in January 1968. Before this change enrollees had 90 days of hospital care covered under the program in a benefit period. Any days used beyond 90 were not covered and therefore were not counted in the sample. After January 1968, however, an enrollee who used more than 90 days could receive as many as an additional 60 days of covered care before exhausting his benefits for that period. In the CMS sample no covered days of care beyond 90 were counted. Potentially, the CMS data could underestimate total covered days of care by as much as one million days and average covered stay by as much as 0.2 days.

TABLE G.—Population estimates used in calculation of utilization rates per 1,000 persons for each survey in this report, including fiscal and calendar years, by age, 1963-71

[in thousands]

Year	National Center for Health Statistics						American Hospital Association				Social Security Administration	
	Health Interview Survey ¹			Hospital Discharge Survey ²			Hospital Indicators Survey ³			Guide Issue Survey ⁴	Medicare Control Records ⁵ (aged 65 and over)	Current Medicare Survey ⁶ (aged 65 and over)
	All ages	Under age 65	Aged 65 and over	All ages	Under age 65	Aged 65 and over	All ages	Under age 65	Aged 65 and over	All ages		
	Fiscal year											
1963.....	183,146	166,280	16,866	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)
1964.....	185,797	168,775	17,022	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)
1965.....	188,430	171,138	17,292	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)
1966.....	190,710	173,132	17,578	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)
1967.....	192,359	174,494	17,865	(?)	(?)	(?)	194,275	175,367	18,967	(?)	18,940	19,071
1968.....	(?)	(?)	(?)	(?)	(?)	(?)	196,272	176,960	19,340	(?)	19,310	19,423
1969.....	(?)	(?)	(?)	(?)	(?)	(?)	198,204	178,704	19,651	(?)	19,587	19,733
1970.....	(?)	(?)	(?)	(?)	(?)	(?)	200,391	180,275	19,958	(?)	19,839	(?)
1971.....	(?)	(?)	(?)	(?)	(?)	(?)	203,046	182,305	20,386	(?)	20,588	(?)
	Calendar year											
1963.....	(?)	(?)	(?)	(?)	(?)	(?)	186,448	(?)	(?)	186,448		
1964.....	(?)	(?)	(?)	(?)	(?)	(?)	189,085	(?)	(?)	189,085		
1965.....	(?)	(?)	(?)	189,787	172,353	17,434	191,539	(?)	(?)	191,539		
1966.....	(?)	(?)	(?)	191,634	173,919	17,724	193,345	(?)	(?)	193,345		
1967.....	193,403	175,374	18,029	* 193,475	* 175,432	* 18,043	195,181	176,377	19,216	195,181		19,295
1968.....	195,392	177,051	18,341	* 195,324	* 176,971	* 18,353	197,026	177,892	19,507	197,026		19,621
1969.....	197,422	178,764	18,658	* 197,416	* 178,745	* 18,671	199,067	179,597	19,772	199,067		19,871
1970.....	199,843	180,846	18,997	* 199,574	* 180,356	* 19,218	201,647	181,491	20,144	201,647		(?)
1971.....	(?)	(?)	(?)	(?)	(?)	(?)	204,211	183,757	20,925	(?)		(?)

¹ Civilian noninstitutional population of the United States at midyear from NCHS *Vital and Health Statistics*, Series 10, various issues

² Civilian noninstitutional population of the United States at July 1 from NCHS *Vital and Health Statistics*, Series 13, various issues. Population data for the period 1965-69 were projected from the 1960 Census, data for 1970 based on the 1970 Census. Age distribution on fiscal-year basis not available

³ Estimates for subgroups do not add to total. Population aged 65 and over is taken from data for enrollees under HI and/or SMI portions of Medicare, as of January 1 and July 1. Population under age 65 is calculated from population of all ages, less unpublished estimates of population aged 65 and over as of January 1 and July 1. Medicare enrollment was used for population aged 65 and over because Census estimates are believed to understate the

number of persons in this age group, enrollment was not used to calculate population under 65 because it was believed that understatement of this group would result

⁴ Civilian resident population at January 1 and July 1 from Bureau of the Census, Series P-25, No. 478

⁵ Persons enrolled under the HI portion of Medicare as of January 1 from Social Security Administration records

⁶ Average number of persons enrolled under the HI portion of the Medicare program during each 12-month period from Social Security Administration records

⁷ Not available

⁸ Unpublished estimates of civilian noninstitutional population as of July 1.