

Reimbursement of sole community hospitals under Medicare's prospective payment system

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Under the prospective payment system (PPS), designated sole community hospitals (SCH's), usually smaller than other rural hospitals but offering comparable services, have had higher average cost levels, in part because of underutilization of plant and equipment. This has resulted in negative operating margins on patient revenues, although local financial

support and other revenue sources bring margins on total revenues into the positive range. The PPS legislation has also provided SCH's temporary protection from volume declines. SCH's are more likely than other rural hospitals to experience large volume swings, but only for declines greater than the threshold specified under PPS.

Introduction

Under Medicare's prospective payment system (PPS), certain types of short-term general hospitals are reimbursed differently than the majority of institutions. One such group includes the sole community hospital (SCH) that:

"by reason of factors such as isolated location, weather conditions, travel conditions, or absence of other hospitals, is the sole source of inpatient hospital services reasonably available in a geographic area to Medicare beneficiaries" (Section 405.476, Title 42 of the 1983 *Code of Federal Regulations*).

Sole community hospitals, unlike rural referral hospitals, which form another special group, predate PPS. When the Health Care Financing Administration (HCFA) established the routine cost-per-diem limitation under Section 223 of the 1972 Social Security Amendments, a class of SCH's—both urban and rural—was exempted. This was done to protect beneficiaries from additional charges that the hospital could legally bill them for to cover the Medicare routine cost penalties (Social Security Administration, Title XVIII, 1866 [a]). It was thought that beneficiaries using SCH's had no realistic alternatives for inpatient care and thus could not avoid any additional charges the hospital might choose to impose as compensation for the routine penalties. In reality, no hospital, SCH or otherwise, ever made any such impositions.

In 1983, all of the original 259 SCH's were grandfathered into the new SCH category under PPS, including some urban ones. Additional SCH's were made eligible according to the following criteria (Section 405.476[3], Title 42 of the 1983 *Code of Federal Regulations*; Public Law 98-21 with

subsequent amendments):

- “1) The hospital is located more than 50 miles from other hospitals; or
- 2) The hospital is located between 25 and 50 miles from other hospitals and either:
 - no more than 25 percent of the residents in the hospital's service area are admitted to other hospitals for care, or
 - because of local topography, weather, etc., the other hospitals are generally not accessible for more than 1 month during a 12-month period; or
- 3) The hospital is located between 15 and 25 miles from other hospitals and because of local topography, weather, etc., the other hospitals are generally not accessible for more than 1 month during a 12-month period.”

Sole community hospital reimbursement

During the transition phase of PPS, all covered hospitals are being paid a combination of their own hospital-specific rate (constrained by the Tax Equity and Fiscal Responsibility Act of 1982 [TEFRA]) and the Federal-regional diagnosis-related group (DRG) rate. The latter is determined by applying a DRG relative-value factor to a regional standardized amount consisting of 20 cells: national plus 9 census divisions, urban/rural. The hospital-specific portion is also case-mix-adjusted. In the transition's first year, the hospital-specific, Federal-regional weights were 75 percent and 25 percent, respectively; then 50 percent each in year 2; 50 percent each for the first 7 months, and 45 percent and 55 percent for the last 5 months of year 3; 25 percent and 75 percent in year 4; and 100 percent DRG rates by year 5 (1988). Moreover, the 9 census division strata are also eliminated by transition's end, leaving only a national rural/urban distinction.

While not exempt from PPS, SCH's are treated quite differently in three respects (Paragraph 405.476, 1983, Title 42, *Code of Federal Regulations* and the changes produced by the Consolidated Omnibus

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Budget Reconciliation Act of 1985 [Public Law 99-272]):

- SCH's are to be reimbursed indefinitely using the 75-percent and 25-percent hospital-specific, Federal-regional weighting method.
- For hospital cost-reporting periods between October 1983 and September 1989, the base payment amount can be adjusted upward to reflect a significant increase in operating costs attributable to the addition of new inpatient facilities or services.
- Also for hospital cost-reporting periods between October 1983 and September 1989, SCH's can receive additional reimbursement for decreases in discharges beyond their control exceeding 5 percent of total discharges in the preceding reporting period.

To qualify for a volume adjustment, the hospital must submit documentation to the intermediary demonstrating the cost implications of the volume decline; and must identify the extraordinary circumstances (e.g., floods, fires, inability to recruit essential physician staff, prolonged severe weather conditions) beyond the hospital's control.

Designation and reimbursement issues

A number of issues are suggested by the designation and special treatment of sole community hospitals. Do the SCH designation criteria represent an appropriate market area for granting exemptions? If patient travel for inpatient care patterns indicate greater travel distances on average than specified in the regulations, then fewer SCH's may be appropriate. On the other hand, if travel distances tend to be far shorter, then more SCH's should be considered for exemption.

Another designation issue concerns the grandfathered SCH's. Are their market areas sufficiently different from those of newly designated SCH's such that many would not qualify under the new regulations?

Under PPS, a 75-percent sheltering against the Federal rate is potentially very advantageous to a number of high-cost SCH's. Because the dollars involved are potentially large—at least to those institutions so designated—a careful analysis of the relative performance of SCH's versus other rural hospitals is in order.

The adjustment for decreases in discharges also deserves further consideration. What is the rationale and appropriate method for singling out SCH's for shelter against unexpected, uncontrollable volume declines? How arbitrary is the 5-percent threshold?

Data sources and methods

The wide range of issues involved in analyzing SCH's necessitated the compilation of hospital-level data, not just on Medicare beneficiaries and payments, but also on local area characteristics, scope of services, and non-Medicare financial and utilization variables. The vast majority of the data presented in

this report were not derived from a sample of hospitals, but rather from a census of hospitals covered by PPS. Consequently, descriptive means are presented under "Characteristics of sole community hospitals" without statistical tests that are premised on sampling theory. However, the data for a few of the financial variables were based on a sample of hospitals. Most of the analysis and data are for the year 1981, although for certain sections data for the earlier years 1977-80 are also used.

File construction

Three primary sources were merged to construct the analytical file: Medicare Cost Reports (MCR), the area resource file (ARF), and the American Hospital Association (AHA) Annual Survey of Hospitals. Medicare Cost Reports are filed by hospitals and contain a variety of information, including the financial data that were used to determine Medicare cost-based payments prior to PPS. The ARF contains county-level socioeconomic, demographic, and health-related data compiled from a number of sources. For all three sources, data were available for the years 1977-81. To provide more detailed analysis of the financial status of hospitals, data were also utilized from the sample of hospitals constructed for the National Hospital Rate-Setting Study.

Hospitals that are excluded from the coverage of PPS were also excluded from the analytical file. The primary excluded hospital types are: psychiatric, rehabilitation, alcohol and/or drug treatment, children's, and long-term care. A few other hospitals, amounting to less than one-half of 1 percent of the original number on the file, were eliminated because they had missing or incorrect data for several important variables, such as case-mix index, total or Medicare expenses, or total or Medicare admissions.

The designations of sole community hospitals come from two sources. Approximately 260 SCH designations were taken from the MCR data. These are the ones that were designated under the Section 223 cost limits and were grandfathered into PPS. An additional 104 designations were provided by the Bureau of Program Operations, Department of Health and Human Services, to make the list of SCH's current through July 1984. This last group represents designations made under PPS.

Variable definitions and cleaning

Hospital location, ownership, teaching status

A hospital was designated an "urban" hospital if there was a standard metropolitan statistical area (SMSA) number in the AHA data. Otherwise, the hospital was "rural." Additional checks uncovered approximately 100 hospitals that were miscoded and these were corrected. A hospital's ownership and the ratio of interns and residents to beds were obtained from the MCR. Other measures of teaching involvement and a hospitals' JCAH (Joint

Commission on the Accreditation of Hospitals) accreditation were taken from AHA data.

Market characteristics

Most of the characteristics of the county in which a hospital was located were obtained from the ARF. The exceptions were the number of acute care hospitals in the county and the number of hospital beds. Both of these were constructed from the MCR data by summing the number of acute care hospitals and beds within each county.

Size and utilization statistics

Measures of a hospital's bed size were obtained from the 1981 Medicare Cost Reports. The number of inpatient days for all patients and for Medicare patients, as well as the number of Medicare admissions were also taken from the MCR. Of the two choices in measuring total admissions (AHA or MCR data), the AHA number (excluding newborns) was preferred because of less missing data, especially for earlier years.

Cost statistics

The total cost for all patients was obtained from the AHA annual survey, where it is called total expenses. The AHA expense figure is for the total facility and includes the costs of emergency rooms, outpatient departments, and nursing home units for some 670 institutions. Because these costs are not paid for under Medicare Part A, but cannot be subtracted from the 1981 cost figures, the hospitals with nursing homes were excluded from the descriptive means for measures that utilize these expense data. It is not clear whether any bias was introduced by this limitation in the data.

The Medicare cost figures were from the MCR's. The figure used includes depreciation and interest costs allocated to the treatment of Medicare patients, but excludes all uncovered Medicare services (e.g., maternity) and outpatient care.

Financial statistics

As part of the HCFA National Hospital Rate-Setting Study, Abt Associates collected MCR income and balance sheet data on four key financial ratios:

- Current ratio. Ratio of assets expected to be realized as cash within 1 year to obligations due as cash within 1 year, i.e., short-term assets over short-term liabilities.
- Long-term debt to net total assets. Debt obligations not due in less than 1 year divided by net (of depreciation) total assets.
- Operating margin. Ratio of operating revenue minus operating expenses to total operating revenue.
- Total margin. Ratio of total revenue from all sources minus total expenses to total revenue.

The two margins reflect the hospital's "profitability" or financial performance. The primary difference between the two is that the operating margin reflects only patient-care revenues and expenses while the total margin includes nonpatient revenues from donations, government transfers, investments, parking lots, as well as any additional expenses.

These statistics are available, however, for only a sample of U.S. hospitals used in the rate-setting evaluation. A one-quarter random sample of all U.S. short-term hospitals was drawn for this study, then supplemented by all remaining short-term hospitals in 15 rate-setting States. After extensive cleaning and other editing procedures were completed, financial data were available for over 1,400 hospitals in 1981, including 68 rural SCH's.

Scope of services

The AHA in its annual survey asks hospitals to report whether they offer one or more of nearly 50 specialized services. We selected about 20 of the more complex or access-oriented services for analysis. The major drawback of these 0, 1 codes is that they give no indication of how large a service it is or how underutilized it might be. As a crude attempt to obtain some measure of the magnitude of ancillaries, we used MCR cost statistics for total ancillary costs, and five special services: operating rooms (including operating room, recovery room, and anesthesia delivery rooms), all radiology (including diagnostic, therapeutic, and radioisotope), all laboratory, and physical therapy. Costs are defined as expenses to a particular department.

Characteristics of sole community hospitals

The sole community hospital designation contains two geographical groups—urban and rural hospitals. The groups are distinct from a regulatory standpoint because, while rural hospitals may apply for new SCH designations, only the small number of urban hospitals that were already designated as SCH's are eligible for such status under PPS. From a functional viewpoint, the two types may be similar, because "urban" SCH's may be in rural areas of large counties that are attached to a metropolitan area. Rural SCH's can be further divided into those hospitals that obtained their designations under the old Section 223 cost limits (and were therefore grandfathered into PPS) and those hospitals that applied for and received new designations under PPS.

In the following analysis, we present data for each of these three groups that, for the sake of brevity, are called urban SCH's, pre-PPS rural SCH's, and post-PPS rural SCH's. The text focuses largely on the two types of rural SCH's, given the very small number of urban SCH's. For comparison, the data for other hospitals are broken out by urban and rural location. A total of 354 sole community hospitals is analyzed

here. This figure represents 89 more SCH's than were studied by Farley (1985). Where the same variables are being measured, the results presented here are similar to his work, although Farley uses different groups for comparison.

Location and organizational characteristics

Because population density and topography are not uniform across the United States, there is substantial variation in the location of SCH's. As shown in Table 1, more than 60 percent of urban SCH's and pre-PPS rural SCH's are located in the Mountain and Pacific regions of the United States, even though less than 20 percent of all hospitals are located in these two regions. However, there is a substantial difference between rural hospitals with pre- and post-PPS SCH designations. A far greater proportion of new SCH's are located in the West North Central region, the region that contains the largest percentage of rural hospitals in the country.

A number of factors may have led to this regional difference between those hospitals with old and new SCH designations. Under the 223 limits, the criteria for SCH designation were largely formulated at the regional level. As a result, hospitals in some regions may have found it easier to obtain such designations.

Alternatively, some regions may have had better information dissemination programs, on the part of either the HCFA regional office or hospital associations, that encouraged and/or assisted SCH applications. The data presented on the following pages can show whether there are important differences between the two groups that relate to the appropriateness of the SCH designation.

Rural hospitals in general have a substantially higher level of government ownership than do urban hospitals, but there is no difference between old and new rural SCH's and other rural hospitals. In this aspect of ownership, urban SCH's are similar to rural SCH's and distinctly different from other urban hospitals. Private nonprofit ownership is more likely in sole community hospitals than in other rural hospitals, but less likely than in urban hospitals. Finally, all three types of SCH's have much lower rates of for-profit ownership than do other hospitals.

These differences in ownership are most likely a reflection of the financial and market factors that underlie the SCH designation. The market for a sole community hospital may not be large enough to utilize all of the hospital's facilities at an efficient level. This makes such hospitals unattractive to investors and requires the financial support of a charitable or philanthropic institution, or direct ownership by a government entity.

Table 1
Number and percent of sole community, other rural, and other urban hospitals, by regional distribution and organizational characteristics: United States, 1981

Regional distribution and organization characteristic	Sole community hospitals				Other rural hospitals	Other urban hospitals
	Urban	Pre-PPS rural	Post-PPS rural	All rural		
Number of hospitals	31	233	90	323	2,188	2,786
	Percent					
Region						
Northeast	6.5	6.1	6.7	6.5	2.1	6.1
Mid-Atlantic	6.5	0	0	0	4.6	16.7
South-Atlantic	3.2	4.4	7.8	5.3	14.1	14.9
East North Central	3.2	1.8	4.4	2.5	14.5	18.8
East South Central	0	2.6	5.6	3.4	12.7	5.2
West North Central	9.7	11.4	26.7	15.5	24.3	6.5
West South Central	3.2	10.5	6.7	9.3	17.4	12.1
Mountain	12.9	41.5	27.8	37.1	5.8	3.2
Pacific	54.8	21.8	14.4	20.4	4.5	16.5
Ownership						
Government	42	48	44	47	47	16
Private nonprofit	55	49	51	50	45	68
Private for-profit	3	3	4	3	8	16
JCAH ¹ accreditation	93	53	57	54	59	90
Teaching involvement						
Affiliated with medical school	7.1	0	1.0	0.3	0.4	24.6
Member COTH ²	3.6	0	0	0	0.1	10.7
Residents per 100 beds	1.6	0.0	0.0	0.0	0.2	5.2
Affiliated with nursing school	0	0	0	0	0.9	9.7

¹ Joint Commission on the Accreditation of Hospitals.

² Council of Teaching Hospitals.

NOTE: PPS is for prospective payment system.

SOURCES: American Hospital Association: Data from the Annual Hospital Surveys, 1977-81; Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Medicare Cost Reports; Public Health Service, Health Resources and Services Administration, Bureau of Health Professions: Data from the area resource file.

Only about one-half of the rural SCH's have JCAH accreditation, a figure slightly lower than that for other rural hospitals and much lower than for urban hospitals. Rural SCH's have almost no involvement with teaching activities, but in this respect they are almost identical to other rural hospitals.

Market area characteristics

The differences in regional location and in ownership would lead us to expect substantial differences in the market areas for the different types of hospitals. Data are not available on specific market areas for each hospital, but data available at the county level can shed some light on these local market conditions and are presented in Table 2.

Whether one looks at the total population in the county or its density, one finds that rural SCH's face a much smaller market for health care services than do other rural hospitals. Furthermore, the pre-PPS SCH's are in even less densely populated areas than are the post-PPS SCH's, although the average population per county is about the same. There are no substantial differences among the types of rural hospitals in the characteristics of the local population, such as the proportion enrolled in Medicare Part A, per capita income, and the unemployment rate, that might affect the demand for services. Urban SCH's fall in between other urban hospitals and rural ones.

Similarities are also found between rural SCH's and other rural hospitals when health care resources available in the county are compared. The number of physicians per person are somewhat higher in SCH counties while the number of hospitals and the number of hospital beds per person are nearly identical. Hospital beds per capita are actually the same in other urban and SCH counties. However,

other urban counties contain more than twice as many physicians per person.

County level data therefore appear to indicate that there is no gross disparity in access to basic health care resources for the counties containing rural SCH's as compared to counties containing other rural hospitals. However, some counties cover many square miles, and it may be the case that many residents of the county are far from a sole community hospital. Furthermore, an SCH may provide services to residents of adjacent counties that have no hospitals at all.

Capacity and financial characteristics

The preceding sections have shown a general similarity between rural SCH's and other rural hospitals in their ownership and local market characteristics, with the exceptions of population size and density. As indicated in Table 3, post-PPS SCH's are also similar to other rural hospitals in terms of size and expenses. Hospitals with pre-PPS SCH designations are substantially smaller than other rural hospitals, with correspondingly lower admissions. The disparity between total days for the two groups is even greater than the difference for total beds, and is reflected in the lower average occupancy rate for pre-PPS than for post-PPS rural SCH's (47 percent versus 56 percent). Total expenses average \$4 million for the pre-PPS rural SCH's, only about 10 percent lower than the total expenses for other rural hospitals, in spite of the difference in their sizes.

The differences between SCH's and other rural hospitals are only partially reflected in the average values of their financial characteristics. The degree of long-term indebtedness is slightly greater for rural SCH's. These hospitals, and those with pre-PPS

Table 2

Location of sole community, other rural, and other urban hospitals, by population characteristics and health care resources: United States, 1981

Characteristic	Sole community hospitals					
	Urban	Pre-PPS rural	Post-PPS rural	All rural	Other rural hospitals	Other urban hospitals
Population characteristics						
Total population in thousands	603	24	23	24	32	1,037
Population density per square mile	183	17	24	20	49	2,217
Per capita income in dollars	\$8,369	\$7,173	\$7,030	\$7,136	\$6,856	\$9,162
Percent of unemployment rate	7.7	7.6	7.5	7.6	7.8	7.6
Percent of population in Medicare Part A	11.7	13.3	15.5	13.9	15.5	12.0
Health care resources						
Number of hospitals per county	11.2	1.7	1.4	1.6	1.8	15.7
Number of hospital beds per thousand population	3.3	4.1	4.7	4.3	4.5	4.3
Number of patient care physicians per 100,000 population	145	80	80	80	70	183
Number of specialist physicians per 100,000 population	120	58	51	56	45	163

NOTE: Calculations exclude Alaska and Hawaii. PPS is for prospective payment system.

SOURCES: American Hospital Association: Data from the Annual Hospital Surveys, 1977-81; Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Medicare Cost Reports; Public Health Service, Health Resources and Services Administration, Bureau of Health Professions: Data from the area resource file.

Table 3
Characteristics of sole community, other rural, and other urban hospitals: United States, 1981

Characteristic	Sole community hospitals					
	Urban	Pre-PPS rural	Post-PPS rural	All rural	Other rural hospitals	Other urban hospitals
Total beds	110	51	72	57	70	255
Total admissions	4,414	2,019	2,866	2,233	2,636	9,588
Medicare admissions	1,272	599	987	701	926	2,723
Total days	26,148	10,212	16,224	11,801	15,775	71,462
Percent of occupancy rate	55	47	53	49	56	72
Total expenses in thousands of dollars	\$8,616	\$4,033	\$4,987	4,290	4,475	28,261
Financial data¹						
Long term debt as a percent of total assets	(²)	27	30	28	26	32
Current ratio, general fund	(²)	361	261	332	321	218
Margin on patient revenue	(²)	-5.7	-4.5	-5.5	-3.4	-1.7
Margin on total revenue	(²)	2.5	2.8	2.5	1.7	2.3

¹ Financial data are available only for a sample of hospitals. For pre-PPS rural SCH's, post-PPS rural SCH's, other rural hospitals, and other urban hospitals, the samples are 48, 20, 555, and 799 hospitals, respectively.

² Fewer than 10 observations.

NOTE: PPS is for prospective payment system.

SOURCES: American Hospital Association: Data from the Annual Hospital Surveys, 1977-81; Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Medicare Cost Reports; Public Health Service, Health Resources and Services Administration, Bureau of Health Professions: Data from the area resource file.

designations in particular, have more negative "profit" margins on patient revenues, but higher margins on total revenues. The difference between patient revenues and total revenues is comprised of, among other items, donations, income from investments, cafeteria meals, drugs, etc., for nonpatients, revenues from such services as parking lots and gift shops, and transfers from State and/or local governments. The results for these financial variables are different from those presented by Farley (1985), which are based on a smaller number of observations for earlier years.

The differences between the margins on patient revenues and total revenues are 8.0 percentage points for rural SCH's, 5.1 points for other rural hospitals, and 4.0 points for urban hospitals. The larger differences for rural than for urban hospitals probably reflect the substantially greater government ownership of these hospitals and the fact that some of them receive significant amounts of revenues in the form of transfers. The even greater gap for rural SCH's than for other rural hospitals probably reflects the higher cost structures of the SCH's, which require greater government or charitable support.

A clearer picture of some of these effects can be gained by looking at the distributional aspects of these financial characteristics. Twenty-five percent of rural SCH's had a negative margin on patient revenues in excess of 9.2 percent. In contrast, the figures for the 25th percentile for other rural and urban hospitals are -6.9 and -4.4 percent, respectively. However, substantial assistance must have been provided to rural SCH's in the form of other types of payments, such as transfers from governments, because the 25th percentile figure for the margin on their total revenues increases dramatically to -0.7 percent, basically in line with the other two groups.

Twenty-five percent of urban hospitals have debt ratios of 13.0 or less, but for rural SCH's, the figure

for the 25th percentile is 4.5 percent, while for other rural hospitals it is 5.7 percent. This disparity may result from situations in which some government-owned SCH's obtain indirect financing through a government agency rather than borrowing directly to fulfill their needs for capital.

Utilization and average cost

The total expenses of rural sole community hospitals appear to be high for hospitals for their average size and level of admissions. As shown in Table 4, the average cost per admission for a rural SCH is \$1,733, almost \$250 higher than the figure for other rural hospitals. Because the length of stay for rural SCH's is shorter (5.0 versus 5.8 days), this means that rural SCH's are even more expensive per day. Indeed, the cost per day for these hospitals is almost 40 percent higher than for other rural hospitals (\$351 versus \$256). This high cost per day for rural SCH's can be further highlighted by comparing it to other urban hospitals, which exhibit an identical cost in spite of higher case-mix-index (CMI) levels. Rural SCH's with pre-PPS designations have even higher costs per admission and per day and lower lengths of stay than do rural SCH's in general.

One important reason for these high costs appears to be low occupancy rates for rural SCH's. However, occupancy rate differences appear to be only part of the story. Rural SCH's may have other resources, such as ancillary services, that are grossly underutilized.

Cost per day is highest for urban SCH's. These hospitals combine the higher CMI of an urban hospital with the low length of stay and occupancy rate of a rural hospital, producing a cost per day of \$488.

Another way to examine these cost differences is to compare the cost of a bed (per year) with the cost of

Table 4

Average utilization and cost data of sole community, other rural, and other urban hospitals, by type of hospital: United States, 1981

Characteristic	Sole community hospitals				Other rural hospitals	Other urban hospitals
	Urban	Pre-PPS rural	Post-PPS rural	All rural		
All patients						
Cost per admission in dollars	\$2,317	\$1,763	\$1,627	\$1,733	\$1,490	\$2,536
Cost per day in dollars	\$488	\$366	\$305	\$351	\$256	\$351
Length of stay in days	5.2	4.8	5.3	5.0	5.8	7.2
Percent of occupancy rate	55	47	53	49	56	72
Case-mix index	1.01	0.96	0.96	0.96	0.95	1.04
Cost per bed in dollars	\$87,324	\$65,132	\$61,044	\$63,630	\$53,262	\$93,575
Cost per occupied bed in dollars	\$178,173	\$133,716	\$111,290	\$128,080	\$93,620	\$127,966
Medicare patients						
Admissions as percent of all patients	31	31	36	33	39	31
Cost per admission in dollars	\$2,337	\$1,892	\$1,677	\$1,842	\$1,547	\$2,823
Cost per day in dollars	\$326	\$269	\$220	\$257	\$191	\$279
Length of stay in days	7.4	7.2	7.6	7.3	8.1	10.2

NOTE: PPS is for prospective payment system.

SOURCES: American Hospital Association: Data from the Annual Hospital Surveys, 1977-81; Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Medicare Cost Reports; Public Health Service, Health Resources and Services Administration, Bureau of Health Professions: Data from the area resource file.

an occupied bed. This comparison indicates the average annual cost of maintaining each bed and the concomitant services provided by the facility versus the average cost of maintaining each occupied bed (holding constant the capacity to provide other services). Cost per bed ranges from \$53,262 to \$93,575 in other rural and other urban hospitals, with SCH's falling between these two extremes. The picture is dramatically different for cost per occupied bed. Here urban SCH's are the most expensive at \$178,000, and all rural SCH's are next at \$128,000, slightly more than other urban hospitals.

Similar cost and utilization data for Medicare patients, who comprise about one-third of all admissions, are also shown in Table 4. The length of stay is much longer for Medicare patients than for other patients, and the increase is proportionally the same for all hospital categories. However, the cost per day is much lower. As a result of these offsetting forces, the average cost per Medicare admission is only slightly higher than the average for all admissions in each category.

The data presented earlier are based on comparisons of averages for SCH's and their non-SCH counterparts. However, as one might expect, there is much variation about these mean cost levels. As indicated in Table 5, although SCH's are more expensive on average than non-SCH hospitals, some SCH's are less costly than the average non-SCH. For example, the average cost of a Medicare admission for a rural SCH is \$1,842, which is 19 percent more than for other rural hospitals. But Table 5 shows that over 25 percent of rural SCH's have an average cost below the mean cost for other rural hospitals. As a result, some SCH's may find it to their advantage to be paid on the basis of the "grouped" Federal rate under PPS, rather than be paid largely on the basis of their

Table 5

Variation in average costs of sole community, other rural, and other urban hospitals, by mean and percentile: United States, 1981

Mean and percentile	Sole community hospitals		Other rural hospitals	Other urban hospitals
	Urban	Rural		
Cost per admission				
Mean	2,317	1,733	1,490	2,536
90 percentile	3,393	2,441	2,060	3,779
75 percentile	2,715	1,990	1,727	2,935
25 percentile	1,800	1,356	1,201	1,889
10 percentile	1,524	1,086	1,008	1,543
Cost per Medicare admission				
Mean	2,337	1,842	1,547	2,823
90 percentile	3,582	2,658	2,171	4,157
75 percentile	2,953	2,148	1,822	3,343
25 percentile	1,747	1,398	1,201	2,107
10 percentile	1,540	1,142	997	1,659
Occupancy rates				
Mean	55	49	56	72
90 percentile	81	72	78	88
75 percentile	71	62	69	83
25 percentile	40	35	45	64
10 percentile	28	26	35	50
Case-mix index				
Mean	1.01	.96	.95	1.04
90 percentile	1.09	1.06	1.03	1.16
75 percentile	1.06	1.01	.99	1.10
25 percentile	.96	.91	.91	.99
10 percentile	.92	.87	.87	.93

SOURCES: American Hospital Association: Data from the Annual Hospital Surveys, 1977-81; Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Medicare Cost Reports; Public Health Service, Health Resources and Services Administration, Bureau of Health Professions: Data from the area resource file.

own historical costs, as would be the case with an SCH designation.

Scope of services provided

It is apparent from the analysis in the preceding section that one cause of the high costs of SCH's might be the existence in these hospitals of ancillary services that are not as highly utilized as in other hospitals. Data were not available to measure the intensity of utilization of services among hospitals in our population. However, we can present data on whether or not particular services are available and, to some degree, on the costs of providing some of these services. These data are presented in Table 6.

Presented in the first part of Table 6 are data on the percent of total hospital expenditures allocated to a number of specific ancillary services, as well as to ancillary services as a whole. These percentages are remarkably stable across all hospital categories. Ancillaries account for about one-third of all expenditures, with the operating room and the lab being the two largest identified components, at about 7 percent each. It should be borne in mind that these

figures do not indicate the percent of costs in each category that are fixed and unrelated to utilization.

Also shown in Table 6 is the proportion of hospitals in each category that provide some more specific services. The vast majority of rural SCH's provide an emergency department, physical therapy, a postoperative recovery room, and respiratory therapy. Approximately one-half of them have a blood bank, electroencephalography services, a mixed intensive care unit (ICU), and a social work department. The other services are provided by only a minority of rural SCH's. Generally speaking, rural SCH's are similar to other rural hospitals, but tend to provide most services with slightly lower frequency. Urban SCH's fall between rural hospitals and other urban hospitals. Rural SCH's that received their designations prior to PPS are less likely to provide many of the listed services than are SCH's designated under PPS.

These results indicate that the average rural SCH provides a fairly diverse range of services, one that is similar to the range provided by other rural hospitals that are larger on average. This conclusion is supported by evidence presented by Farley (1985) that SCH's are more likely to possess more specialized

Table 6
Scope of services of sole community, other rural, and other urban hospitals, by percent of expenditures and hospital services; United States, 1981

Service	Sole community hospitals					
	Urban	Pre-PPS rural	Post-PPS rural	All rural	Other rural hospitals	Other urban hospitals
Percent of total expenditures allocated:						
Operating room ¹	7	7	7	7	6	8
Delivery room	1	1	1	1	1	1
Radiology ²	3	3	4	3	4	4
Lab	7	7	8	7	8	7
Physical therapy	1	1	1	1	1	1
All ancillary services	32	31	34	32	33	35
Percent of hospitals with the following services:						
Bloodbank	54	57	67	60	65	80
Diagnostic radioisotope facility	43	35	43	37	43	82
Electroencephalography	50	36	51	40	43	83
Emergency department	96	89	95	91	91	91
Family planning	4	3	2	3	3	14
Hemodialysis-inpatient	21	2	6	3	3	40
Histopathology lab	61	33	35	33	37	83
Mixed intensive care	68	52	62	55	55	80
Open heart surgery	4	0	1	0	0	19
Outpatient department	39	28	23	27	26	53
Physical therapy	89	76	73	75	78	94
Post-op recovery room	96	79	77	79	86	97
Premature nursery	32	14	14	14	19	41
Psychiatric emergency medical services	26	21	21	21	13	39
Radium therapy	11	2	1	2	4	28
Rehab outpatient	14	14	13	14	15	44
Respiratory therapy	93	74	83	76	85	96
Social work department	75	50	55	51	61	92
Therapeutic radioisotope facility	14	5	6	5	7	40
X-ray therapy	11	4	8	5	8	31

¹ Includes costs allocated to operating room, recovery room, and anesthesiology.

² Includes costs allocated to diagnostic radiology, therapeutic radiology, and radioisotope facilities.

NOTE: PPS is for prospective payment system.

SOURCES: American Hospital Association: Data from the Annual Hospital Surveys, 1977-81; Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Medicare Cost Reports; Public Health Service, Health Resources and Services Administration, Bureau of Health Professions: Data from the area resource file.

hospital units, such as acute pediatric units, obstetrics units, and intensive care units, than are hospitals of similar size and location. The high costs of SCH's most likely result in part from underutilization of these services.

Protection from unexpected volume declines

Legislative authority

As previously described, sole community hospitals may receive additional payments for a cost-reporting period during which the hospital experiences more than a 5-percent decrease in total discharges from its immediately preceding reporting period. To receive these payments, the SCH must document the size of the decrease the impact of the decrease on costs and must demonstrate the extraordinary nature of the circumstances that caused the volume decline. For qualifying hospitals, HCFA will determine a per-discharge adjustment amount including at least an amount reflecting the reasonable cost of maintaining the hospital's necessary core staff and services, based on:

- The individual hospital's needs and circumstances, including minimum staffing requirements imposed by State agencies.
- The hospital's fixed (and semifixed) costs, other than those costs reimbursed on a reasonable-cost basis.
- The length of time the hospital has experienced a decrease in utilization. (Paragraph 405.476, 1983, Title 42, *Code of Federal Regulations*).

The criteria and cost-finding methods follow directly from the 1974 Social Security regulations pertaining to the 223 routine cost penalties, except for the 5-percent rule. In other words, HCFA has made case-by-case adjustments for untoward volume declines for 10 years, making determinations of "extraordinary circumstances," "essential staff," "fixed and semifixed costs," and "the reasonable cost of maintaining the hospital's necessary staff and services." While the new legislation appears silent on how much of the uncovered fixed costs Medicare is responsible for, previous allowances have only included Medicare's share. The 5-percent threshold, on the other hand, is triggered by total discharges, not just Medicare declines.

General arguments for volume protection

Practically all hospitals experience variation in their average daily census across the week, the month, and the year. Sources of volume variation include a number of underlying epidemiological characteristics of the population, locational factors, and sociomedical styles of hospital use. The shorter the time period, the greater the role played by random episodes of illness in the population, e.g., influenza, natural disasters. Longer term volume changes are

more likely influenced by the spread of health insurance, new technologies that make hospitalization a more effective mode of care, and secular trends in population growth and demographic mix.

Each hospital must judge how much stand-by capacity (or reservation quality to use Joskow's [1980] term) it needs to assure that no patient will be turned away or that the likelihood is below some threshold (e.g., 2 percent). Queuing theory has been applied to the problem, showing that the optimal occupancy rate varies directly with hospital size (Shonick, 1972; Joskow, 1980; Phillip, Mullner, and Andes, 1984). Phillip, Mullner, and Andes (1984) for example, estimate that a 50-bed hospital could only run a 78-percent occupancy rate to be 95 percent confident that it could admit a patient instantly as opposed to a 93-percent occupancy rate for a 500-bed hospital. This is before considering the imperfect substitutability of medical-surgical, ICU, psychiatric, and other kinds of beds that further reduces optimal occupancy rates. Needed stand-by capacity also varies directly with the underlying variability of demand and inversely with the hospital's population base. This makes the hospitals in more sparsely populated rural areas especially vulnerable.

Urban/rural, regional, and bed-size differences in average occupancy rates reflect in part the extent to which hospitals have already protected themselves against large, random, short-run changes in utilization. The lower occupancy rates and higher average costs of rural hospitals as a group reflect this kind of communitywide protection. Annual utilization variation is a different matter because it is far less important generally in influencing needed stand-by capacity, and because its sources are usually more systematic, less random in nature, and consequently more predictable.

Although it is recognized that nearly all U.S. hospitals experience both daily, monthly, and annual variation in utilization, only SCH's have been singled out for volume protection during the transitional phase of PPS. Why this is so hinges on the new risk associated with fixed payment rates. With these fixed rates, overall payments to a hospital are not automatically adjusted to compensate for declines in utilization of plant and equipment. Large-volume declines therefore put the Medicare beneficiary at risk by undermining the financial solvency of the SCH. In the case of a hospital closure, there is a lack of viable medical alternatives for SCH patients. A similar beneficiary risk is presumed not to exist in other, competitive, rural or urban hospital market areas. In these other areas, closures and mergers of individual hospitals may cause hardships, but need not seriously jeopardize reasonable access to acute care, because alternative facilities are available nearby.

Trends in affected market areas

In the top half of Table 7 are the annual trends for a few of the more relevant market area characteristics of SCH's over the 1977-81 period. The average SCH

Table 7
Annual percent change in sole community hospital market characteristics and performance: United States, 1977-81

Market characteristic or performance	Sole community hospitals (rural)	Other rural hospitals	Urban hospitals
County population	1.6	-1.9	-1.6
Per capita income	9.9	9.3	9.7
Medicare enrollees per capita	3.7	3.6	3.8
Nursing home beds per 1,000 population	0.0	0.5	0.0
Physicians per capita	3.3	1.9	0.0
Admissions	0.9	0.2	1.9
Medicare admissions	5.8	3.4	5.2
Inpatient days	1.1	-0.8	1.7
Length of stay	-0.8	-1.0	-0.1
Beds	0.9	-0.7	1.0
Occupancy rate	0.2	-0.4	0.8
Cost per day	13.8	13.7	12.8
Cost per admission	13.5	13.1	12.8

SOURCES: American Hospital Association: Data from Annual Hospital Surveys, 1977-81; Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Medicare Cost Reports.

county population grew slightly between 1977-81, while it declined for other rural hospitals. Per capita income growth kept pace with other areas, while physician supply grew more rapidly than elsewhere, which is consistent with recent locational patterns favoring rural areas.

Volume growth in SCH's as a group has also been positive. Total admissions and days per SCH grew at an average 0.9 percent and 1.1 percent annually from 1977 to 1981, and Medicare admissions grew at an average 5.8 percent annually. This growth exceeds that of other rural hospitals. Average rural SCH bed size grew slightly as well, which is a little surprising, given their very low occupancy rate of 49 percent. In comparison, there was a slight decline for other rural hospitals.

Over the 1977-81 period, the increase in cost per day was quite similar among SCH's and other rural hospitals, while both were roughly a percentage point higher than urban hospitals. SCH costs per admission also rose seven-tenths of a point faster than in urban areas and about one-half of a point faster than in other rural hospitals.

Variations in occupancy

Although capacity utilization rates among SCH's did not deteriorate in the 5 years 1977-81, the 49-percent average rate is certainly indicative of serious underutilization. If the average occupancy rate is this low, some hospitals must be even lower.

The 1981 frequency distribution of occupancy rates for rural SCH's versus other rural and urban hospitals are shown in Figure 1. A very small number of hospitals had occupancy rates of over 100 percent. The occupancy rate was calculated as the number of

patient days divided by [365 x the number of beds at the end of the period]. If there had been a decrease in the number of beds during the year, then it would be possible to obtain an occupancy rate greater than 100 percent.) It shows that one of every five SCH's has an occupancy rate between 40 and 50 percent while more than one-third have rates of less than 40 percent. This is much greater underutilization than that found in rural hospitals generally, where fewer than one in five hospitals have occupancy rates below 40 percent. At the other extreme, only 12 percent of SCH's reported occupancy rates above 70 percent versus 23 percent for other rural hospitals. Urban hospitals show a highly skewed distribution, with very few hospitals operating below 60 percent of capacity.

The frequency distribution of admissions changes in categories ranging from annual declines in excess of 20 percent to increases of 20 percent or more are shown in Figure 2. Each group's distribution includes all annual changes over the 1977-81 period, or four observations per hospital times the average number of hospitals in each group. According to our data, about 4 in 10 admissions changes in rural SCH's were within plus or minus 5 percent. Approximately another one-quarter reported admissions declines in excess of plus 5 percent with 8 percent showing declines in excess of 15 percent.

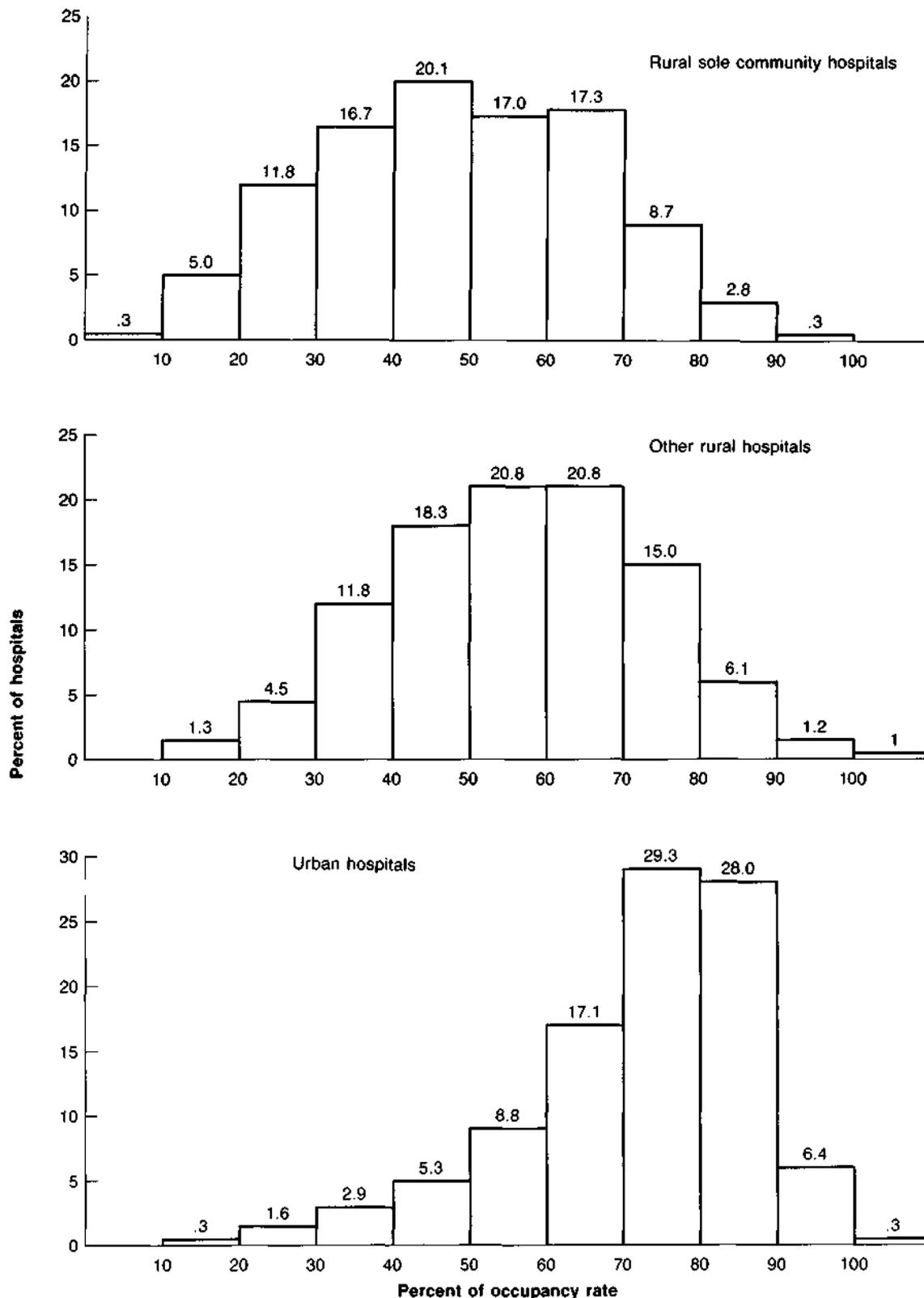
It is also important to note that over one-third of the volume changes in rural SCH's were in excess of plus 5 percent; this is important because these changes may be offsetting many of the large 1-year declines. Furthermore, other rural hospitals showed volume declines in excess of 5 percent about as often as SCH's, indicating that rural hospitals in general frequently suffer large drops in utilization.

Urban hospitals are far less likely to have large annual swings in volume in either direction. Many urban hospitals already enjoy very high occupancy rates, which constrains the potential number of large volume increases. They also serve a much denser population base, which statistically reduces the importance of random fluctuations in admissions.

Are SCH's "uniquely vulnerable" to wide volume swings, as Congress assumed in giving them the 5-percent volume decline protection? The answer is yes, but only for large declines, beyond 10 percent. Based on *t*-tests of the frequency of declines, SCH's were no more likely to have a volume fall than other rural hospitals, and while they were statistically more likely to have a fall of at least 5 percent, the difference was trivial, i.e., a couple of points around 25 percent. Only when a 10-percent threshold is applied do we find SCH's more likely to have a "unique," statistically significant, volume decline, i.e., 15 percent of SCH's versus 10 percent of rural hospitals generally.

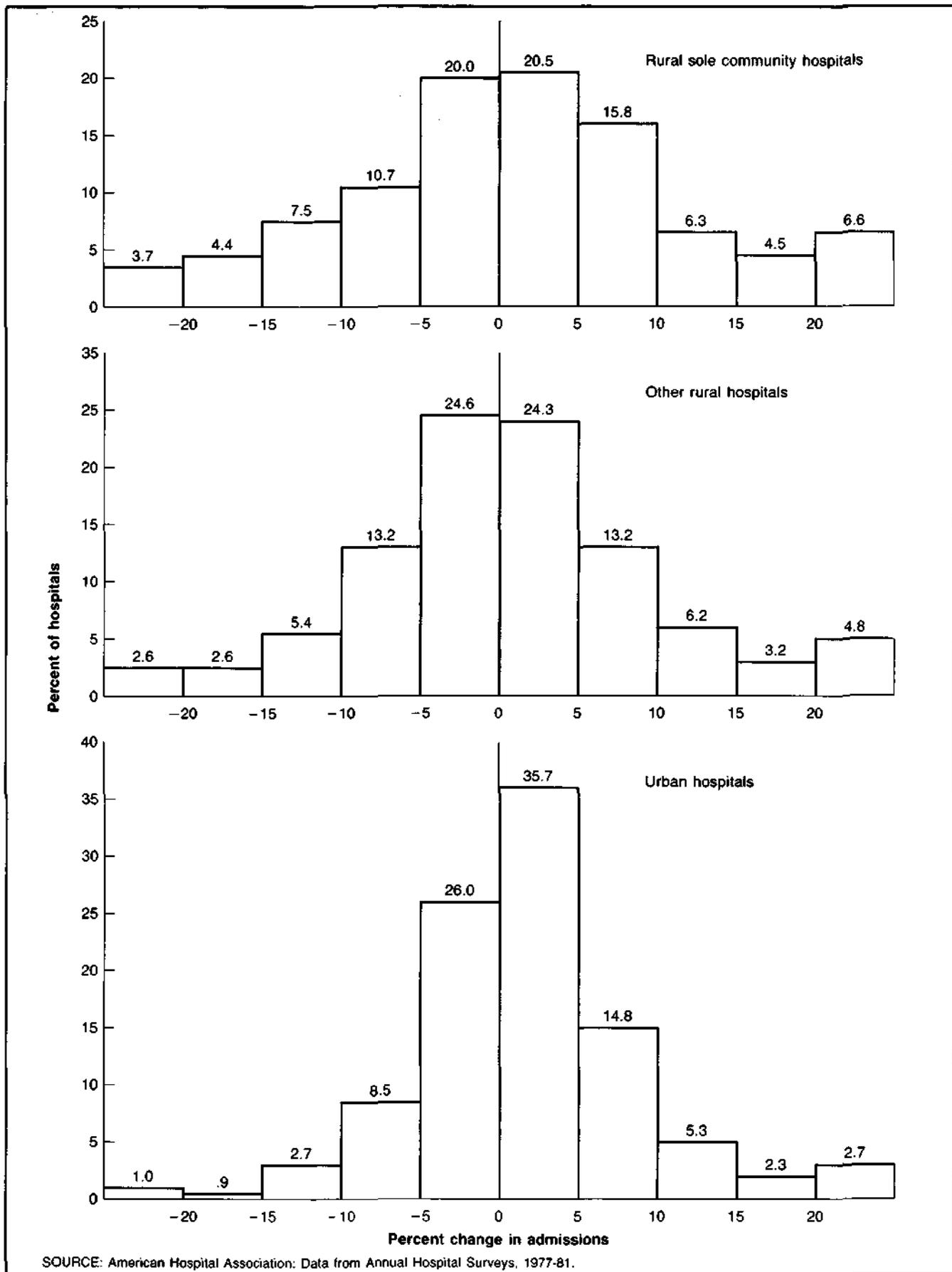
Because SCH's are on average about 20 beds smaller than other rural hospitals, we expected their volume fluctuations to be larger, in terms of percentages, but adjusting for bed size did not materially affect the results. SCH's were significantly more likely to have at least a 10-percent volume

Figure 1
Frequency distribution of occupancy rates for sole community hospitals and other rural and urban hospitals: United States, 1981



SOURCE: American Hospital Association: Data from Annual Hospital Surveys, 1981.

Figure 2
Frequency distribution of admissions changes for sole community hospitals and other rural and urban hospitals: United States, 1977-81



swing, plus or minus, even holding bed size constant.

An inverse relation was found between volume swings and increases in average cost per case. As volume declines become larger, the percent increase in costs rises. Any rural hospital, SCH or otherwise, experiencing a 20-percent volume decline had average costs per case rise about 35 percent in 1980-81, compared with only a 14-18 percent increase within the plus-or-minus 5-percent admissions corridor. Conversely, SCH's and other rural hospitals with over a 20-percent volume increase had average costs rise only 2 percent. Given that SCH's are more prone to volume declines in excess of 10 percent, they will also be more likely to suffer from larger cost increases per discharge. The converse is true, on the other hand, for SCH's enjoying large, offsetting volume increases. Thus, the fact that SCH's are more susceptible to large declines is only part of the picture, and the temporal pattern of offsetting positive swings is important in making a complete and equitable policy decision.

Offsetting annual volume variations

The time path of volume changes can affect the hospital's net revenue flows under certain sheltering methods. Consider two SCH's with identical base period admissions rates of 2,000 per year. Both hospitals experience a 10-percent admissions decline to 1,800 in 1984. Hospital A then maintains this rate for 1985 and 1986 while hospital B enjoys a temporary 20-percent jump in admissions in 1985 followed by a 17-percent decline in 1986, producing the same number of admissions in 1986 as hospital A.

Under PPS, both hospitals may be eligible for a volume adjustment in 1984, but only hospital B could be eligible again in 1986. Assuming HCFA found marginal costs equal to 60 percent of average admissions costs of \$2,000, a 10-percent volume decline could entitle both hospitals to an \$80 increase in their 1985 rate (or an equivalent total settlement) to cover their 40-percent fixed costs ($\$80 = \$2,000 (10.6)(.10)$). Marginal costs are further discussed in this article. If fixed costs were in fact 40 percent of each hospital's cost base, then this simple adjustment would just cover all fixed costs and neither hospital would lose money.

In 1985, neither hospital would receive any volume adjustment, but hospital B would enjoy \$720,000 extra revenue (assuming a constant \$2,000 rate) because of a 20-percent rise in admissions. If marginal costs associated with positive volume growth were also 60 percent of average costs, hospital B would enjoy a "profit" due to the proportional increase in total revenues. Then in 1986, any losses from its precipitous volume decline of 17 percent would be sheltered, or avoided, through a \$136 increase in its \$2,000 fixed rate.

The net effect of these adjustments could be to

Table 8
Frequency distribution of sole community hospital admissions changes in excess of plus or minus 5 percent: United States

Number of positive changes greater than or equal to 5 percent	Total	Number of negative changes less than or equal to 5 percent				
		0	1	2	3	4
Percent						
Total	100.0	45	34	17	3	2
0	34	17	7	7	1	2
1	31	9	14	8	1	—
2	26	13	10	3	—	—
3	8	5	3	—	—	—
4	1	1	—	—	—	—

NOTE: Columns may not add to totals because of rounding.

SOURCE: American Hospital Association: Data from the Annual Hospital Surveys, 1977-81.

permit profits in hospitals with offsetting changes in volume. This arises not directly from sheltering but indirectly from not applying sheltering rules symmetrically.

A cross-tabulation of the frequency of SCH's showing volume swings of plus or minus 5 percent or more over the 1977-81 period is shown in Table 8. Each hospital can have up to four annual swings beyond 5 percent. According to the table, 45 percent of SCH's had no volume decline of more than 5 percent over the 5-year period (see column 1, bottom row) while another 34 percent had only one decline of this magnitude. The frequency in the upper-left-hand corner of the table indicates that 17 percent of SCH's (or 62 hospitals) never had a wide swing in utilization in either direction. Reading across the top row of the table, 7 percent of SCH's had one large fall and no large increase while another 7 percent had two falls and no offsetting large increase.

A pattern of offsetting volume increases and declines can be seen in Table 8. Consider SCH's with one large decline (third column from left). Fully 80 percent of these hospitals also had at least one large increase and nearly 40 percent had two large offsetting increases. Even the majority of SCH's with two large declines (fourth column from left) had at least one large increase as well, i.e., 11 percent of 17 percent.

Summarizing, over the 1977-81 period, 55 percent of SCH's would have been potentially eligible for volume protection at some point. Of these, the vast majority would also have enjoyed an offsetting, large increase in volume at some other time during the period. Indeed, roughly 3 in 10 SCH's potentially eligible for volume protection would have enjoyed at least 2 years of large volume increases. In these instances, they are likely to profit from a fixed reimbursement rate based on average costs—costs that exceed marginal costs when occupancy rates are low.

Marginal cost/average cost ratios

Several authors (Lipscomb, Raskin, and Eichenholz, 1978; Friedman and Pauly, 1983) have noted the possible asymmetric response of hospital administrators to volume declines versus increases. Under cost-based reimbursement, administrators may be quicker to raise costs when admissions increase than they are in reducing costs on the downside.

To examine this "ratchet" hypothesis, we ran the following pooled regression:

$$\% \Delta \text{COST}_{it} = a(\% \Delta \text{ADM})_{it} + \sum_t b_t T_t + e_{it}$$

where $\% \Delta \text{COST}_{it}$ = the annual percent change in total expenses for the i -th hospital in year t ; $\% \Delta \text{ADM}_{it}$ = the percent change in admissions; T_t = time dummies for $t = 1978-81$; and e_{it} = error term. Coefficient a represents the elasticity of costs with respect to admissions, or the marginal cost/average cost (MC/AC) ratio. To determine whether this elasticity varies with the sign and size of the volume change, the equation was estimated separately for four hospital groups: (1) $\% \Delta \text{ADM} > 5\%$; (2) $0\% < \% \Delta \text{ADM} < = 5\%$; (3) $-5\% < \% \Delta \text{ADM} < 0\%$; (4) $\% \Delta \text{ADM} < -5\%$. All hospitals are categorized by one of these groups, with no SCH distinction.

The resulting elasticities (not shown here) are quite consistent with the rest of the literature, implying that a greater percentage of costs are variable for a larger volume change. Furthermore, MC/AC ratios are greater for volume increases than for decreases. For small admissions declines of 0 to 5 percent, costs fall only .17 percent for every 1.0 percent fall in volume; for large volume declines of more than 5 percent, costs fall about .4 percent for every 1.0 percent fall in volume. Thus, for small volume declines, it would appear that practically all costs are considered fixed over a year's time, while for declines in excess of 5 percent only about 60 percent are fixed. Whether such rigidity reflects true production and cost relationships or is simply a matter of the "ratchet incentive" of cost-based reimbursement is unknown.

Sole community hospital market areas

Defining sole community hospitals

As previously described, newly designated sole community hospitals must meet criteria regarding the distance to another hospital. In meeting these criteria, only short-term acute care hospitals are to be considered, and distances are measured along improved roads. A hospital is not allowed to obtain SCH status solely on the basis of a specific set of services provided, but in calculating a hospital's coverage of its service area, hospitals with fewer than 50 beds are allowed to exclude trips made by residents to other hospitals to obtain more specialized services. A hospital's service area is defined as the area from which it draws at least 75 percent of its admissions.

Either the total patient population or the Medicare population can be used in the calculations.

A hospital that is more than 50 miles away from the nearest hospital would appear to have a fairly clear justification to be designated a sole community hospital. Consequently, the analysis in this section focuses on the appropriateness of the remaining criteria. This is analogous to asking the question, "What is the definition of a local market area for hospital services?" Unfortunately, there is no clear answer to such a question. More generally, the difficulties that surround the definition of a market pervade all areas of economic activity.

Hospital use and distance

There are a number of studies, particularly of urban areas, that document the effects of distance from a hospital (as measured in either miles or time) on the probability of patients seeking care at that hospital. For example, Drossness and Lubin (1966) analyzed admissions data for 10 hospitals in Santa Clara County in California. They found that for almost all of the hospitals, over 75 percent of their admissions came from within 15 minutes travel time.

However, this and other studies have made it equally clear that distance from the hospital is not the sole determinant of which hospital is chosen by the patient (Studnicki, (1975). A number of other factors can affect the choice of a hospital, such as distance from place of work, occupancy rates, the provision of particular services, and perceptions of quality.

The physician also plays a substantial role. In many situations the patient first chooses a physician who may have admitting privileges at one or more hospitals, the location of which may be in part determined by distance from his or her office or place of residence. The choice of hospital then becomes a joint decision between patient and physician. Such interactions are incorporated in the analysis performed by McGuirk and Porell (1984).

Many of the early hospital planning studies designated independent geographical service areas (Studnicki, 1975), out of which there is little travel to obtain hospital services. These efforts are similar to constructing a "chain of substitutes"—that is, a series of hospitals where the first is an alternative to the second, the second an alternative to the third, etc. This approach was recently used by Luft and Maerki (1984). Such efforts are of use in considering the potential effects of competition, broadly speaking, and for regional planning of the location of health care facilities, but the areas designated are not at all the same as market areas for individual hospitals.

Any attempt to delimit a market, or service area, for an individual hospital must necessarily involve some arbitrary decisions. For example, the analyses cited above provide information about the effect of distance on the utilization of hospitals, but they provide little guidance for the definition of a specific hospital's market area.

Even if attempts to obtain an objective definition of

a sole community hospital are destined to fail, one can compare the PPS criteria with others that have been used to determine whether there is some continuity or whether the current criteria represent a radical departure.

The National Guidelines for Health Planning that were issued by the Public Health Service in 1978 also contained provisions addressing the special conditions of rural areas. Specifically, a standard was issued for non-Federal short-stay hospital beds, stating that there should be fewer than 4 such beds per 1,000 persons. However, the standard was relaxed for rural areas where a majority of residents would otherwise be more than 30 minutes travel time from a hospital.

This standard is not directly comparable to the SCH distance criteria. However, in both instances it may be the case that policymakers had in mind some subjective sense of the maximum distance that most persons should be required to travel in order to receive care, some of it for conditions that may require immediate treatment. From such a perspective, one might decide that persons who live in more isolated rural areas should not be required to travel substantially further than do residents of urban areas in order to receive their care, and that persons who live much further away deserve protection of their facilities. It appears that most persons in urban areas travel less than 30 minutes to their hospital. (That the travel time is not even less than it is due to congestion and the fact that some patients do not choose the nearest hospital.) A 30-minute travel interval in an urban area might translate into approximately a 25-mile interval in a rural area.

Criteria based on interrupted access

The service area criteria for SCH designation contain two components that are based on the temporary inaccessibility of adjacent hospitals. Were it not for interrupted access, the presence of these other hospitals would preclude the potential SCH from obtaining such designation.

The current regulations require the period of inaccessibility to be at least 1-month long. Information has been developed since the regulations were promulgated that indicates that this criterion is quite severe—in only a few locations in the country are the climate and topography such that accessibility to an adjacent hospital might be interrupted for an entire month.

In general, the use of an interrupted service criterion involves a societal decision based on factors that are difficult to quantify. Even under the current regulations, an adjacent hospital is accessible most of the time and therefore provides an alternative to the hospital applying for SCH designation for most of the year. Furthermore, for some conditions a longer travel distance, or even the postponement of hospitalization for a period due to inaccessibility, may not produce substantially increased risk. A clinical panel could analyze the mix of cases treated in a hospital and estimate the percentage of cases that

would suffer from the lack of access to a reasonably close hospital for a given period. However, it would still remain for society to decide whether it is worthwhile subsidizing an SCH hospital for the small period of time when the alternative to the SCH is inaccessible.

Summary and concluding remarks

Hospitals that are designated as sole community hospitals are being reimbursed at 75 percent of their hospital-specific rates and 25 percent of the Federal rate indefinitely. SCH's will therefore continue to be reimbursed largely on the basis of their historical costs per admission. As a result, SCH's that have high costs due to underutilization of services, low occupancy rates, or other factors, are protected from the leveling effects of the Federal rate. To the extent that these high costs result from the particular mission of SCH's in serving communities that are relatively isolated from other health care providers, then this protection is in keeping with the objective of the SCH designation.

However, this protection is significantly different from simple cost-based reimbursement. Sole community hospitals will still be paid 25 percent on the basis of the Federal rate. Moreover, the 75 percent hospital-specific portion is TEFRA constrained. Holding all other factors constant, a high-cost hospital will therefore face an incentive to increase the efficiency of delivery of its services. SCH's with extremely high costs may end up in dire financial straits if strong economizing steps are not taken.

One factor that contributes to the higher costs of SCH's is low occupancy. Although the 75-percent hospital-specific payment will incorporate the occupancy rates of the recent past, it will not protect against future declines in occupancy. The reimbursement adjustment for the decline in volume can be applied to any given decline for only 1 year. After that, an SCH must economize in the face of whatever increases in costs may result from a permanent decline in occupancy.

SCH's are more likely than other rural hospitals to experience large volume swings, but only for declines in excess of 10 percent, not the 5 percent used in the SCH regulations. However, the majority of SCH's expected to use the volume shelter would also be expected to experience at least one large volume increase during the transition phase, resulting in extra hospital revenues that could offset earlier incurred shortfalls. If volume sheltering of sole community hospitals is extended beyond transition, consideration might be given to applying variable cost ratios to offsetting volume increases in SCH's, so as to avoid overpaying in "good" years. There is precedent for a symmetrical application of volume adjustments, both in State rate-setting programs and under Federal wage-price controls.

There is wide variation in costs among sole community hospitals. Consequently, some might find the Federal rate to be greater than their hospital-

specific rate. In these situations, the hospitals may find it more to their advantage to opt out of SCH status. However, the PPS regulations make it very difficult, and in many cases impossible, for a hospital to return to sole community status after electing to opt out. As a result, hospitals will carefully weigh their long-run expectations about future alternative reimbursement levels before making such a decision.

Medicare is a national entitlement program, with all benefits transportable across States. The U.S. hospital industry must therefore be considered more a national than a local phenomenon as far as Medicare is concerned. However, the disproportionate public control of SCH's also reflects local preferences to assure basic acute inpatient care to residents. As a result, changes in payment rates brought about by the new PPS regulations may produce countervailing changes in these levels of local support.

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