

Cost and case-mix differences between hospital-based and freestanding nursing homes

by Margaret B. Sulvetta and John Holahan

Cost differences between freestanding and hospital-based skilled nursing facilities (SNF's) are identified and examined in this article. Although hospital-based and freestanding SNF's have significant differences in terms of location, admissions per bed, percent of Medicare days, occupancy rates, staffing, provisions of rehabilitative services, and patient characteristics, these are insufficient to fully explain cost differences.

Less than one-half of the existing cost differences can be explained after controlling for case mix, staffing, and other cost-contributing factors. A reimbursement system that differentiates solely by provider type without relating rates to patient characteristics may overcompensate some providers and undercompensate others.

Introduction

The Medicare program covers short-term, post-hospital, and rehabilitative nursing home care. Most Medicare-certified skilled nursing facilities (SNF's) are freestanding, and they contain nearly 90 percent of all certified beds. These SNF's provide a less than proportionate share of Medicare patient days, representing 80 percent of all Medicare days, and a somewhat greater than proportionate share of total patient days.

Hospital-based facilities, on the other hand, comprise 14 percent of the total number of Medicare certified SNF's and contain 10 percent of all certified beds. However, these facilities provide nearly 20 percent of all Medicare days and roughly 10 percent of total patient days.

Although freestanding facilities provide the major share of Medicare days, Medicare accounts for only a small share of those facilities' total patient days (7 percent). Medicare is more important for hospital-based facilities where it accounts for 16 percent of total patient days.

Medicare reimbursement for SNF care is based on "reasonable cost," with routine operating costs subject to a ceiling. Other costs, such as capital and ancillary costs, are not subject to the ceiling and are simply "passed through", i.e., reimbursed at full cost. The setting of the routine operating cost ceiling has been the subject of considerable debate. In the past, much of the debate has centered on establishment of single versus dual limits for hospital-based and freestanding facilities. Dual limits set separate ceilings for freestanding and provider-based facilities and were designed to recognize the higher cost experience of hospital-based SNF's. Hospitals generally attribute their higher costs to both the methodology required by Medicare for the allocation of overhead costs and a more intensive case mix within the SNF setting. Under dual limits, 37 percent

of hospital-based facilities had costs in excess of the ceiling, but under single limits based on average costs of freestanding facilities, 73 percent of all hospital-based SNF's exceeded reimbursement limits.

The current reimbursement system sets routine operating cost ceilings based on the cost experience of freestanding homes. The ceiling for freestanding homes is currently set at 112 percent of mean costs for freestanding facilities. The ceiling for provider-based SNF's is also set at 112 percent of mean costs for freestanding facilities, plus 50 percent of the difference between the mean costs of freestanding and hospital-based homes. Under the current system, about 62 percent of all hospital-based facilities incur nonreimbursable costs. The Health Care Financing Administration (HCFA) has acknowledged that the required method of allocating overhead costs to the SNF cost center may result in higher costs for hospital-based SNF's. In recognition of this, hospital-based homes are allowed an "add-on" to their ceiling. However, HCFA's Bureau of Eligibility, Reimbursement, and Coverage estimates that the average cost attributable to the overhead allocation procedures is minimal, amounting to \$4.67 per patient per day for urban SNF's and \$1.95 for rural SNF's, during the time period studied here.

This article addresses the issue of cost differences between hospital-based and freestanding Medicare certified skilled nursing facilities, and the question of how much of the cost difference should be recognized by the Medicare reimbursement system. It utilizes data on 3,492 of the 4,900 Medicare certified SNF's filing costs reports in 1980. These 1980 costs were projected to 1983 trending forward by the HCFA market basket. The projections adjust the cost reports to a common fiscal year, thus eliminating the problem of different cost-reporting periods. The sample facilities account for about seven-eighths of all Medicare patient days. Newly participating facilities, and those with small Medicare revenues, change of ownership, or decertification have been excluded.

Cost and facility characteristics

Medicare accounting procedures require skilled nursing facilities to report expenses on a cost-center

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Reprint requests: Margaret B. Sulvetta, Health Policy Center, The Urban Institute, 2100 M Street, NW., Washington, D.C. 20037.

basis. Separate cost centers exist for routine inpatient services, ancillary service departments, overhead (e.g., administration, maintenance, laundry, dietary, housekeeping), and capital costs. It is therefore possible, using Medicare cost report data, to examine cost differences between freestanding and hospital-based facilities on a cost-center basis.

Average costs by facility type and major cost category are shown in Table 1. Unweighted total average costs of hospital-based facilities are 72 percent higher than those reported by freestanding SNF's. Average costs weighted by Medicare patient days are higher than unweighted cost, reflecting the fact that the facilities providing Medicare services are generally among the higher cost SNF's. As previously noted, 16 percent of all patient days provided by hospital-based facilities are Medicare days, compared with only 7 percent among freestanding homes.

Because Medicare reimbursement limits are based on Medicare patient days, the mean costs utilizing that weight are most relevant. Total average costs among hospital-based facilities (weighted by Medicare days) are twice those of freestanding homes. Hospital-based facilities reported higher costs across all cost categories. Among the nonpatient-related categories, routine overhead costs were about 104 percent higher and capital costs were 52 percent higher. Among the patient-related categories of routine nursing and ancillary costs, costs of provider-based facilities ranged from 25 percent higher for drugs and supplies to 186 percent higher for therapy costs. The significantly higher costs for therapy services may partially reflect the fact that hospitals are more likely to have therapists on staff than are freestanding facilities. Freestanding facilities frequently contract out for rehabilitation therapies and such services are billed and reimbursed under Medicare Part B (supplementary medical insurance). Thus, therapy costs may have a greater probability of being included in the cost reports from hospital-based SNF's than in the cost reports from freestanding facilities.

Given the existence and magnitude of the cost differences across facility types, the issue then becomes one of identifying potentially contributing factors. It is possible that hospital-based and

freestanding facilities are intrinsically different in their characteristics and that such differences explain the divergent cost patterns. Possible explanatory factors include underlying differences in the geographic distribution of facilities, compensation levels, ownership type, staffing or service provision (proxy measures of quality of care), case mix, or inefficiency.

A wide divergence does exist in the location of hospital-based and freestanding facilities in terms of community size. Nearly 79 percent of all freestanding homes are located in urban areas, whereas hospital-based SNF's are fairly evenly split between urban and rural locations. Given the greater expenses frequently associated with urban locations (e.g., higher wage rates, capital costs, etc.), the predominantly urban makeup of freestanding facilities makes their previously noted lower costs even more striking.

Significant differences also exist across facility type with regard to type of ownership. Three-quarters of all freestanding facilities have proprietary ownerships, yet less than one-tenth of all hospital-based facilities are proprietary. Hospital-based facilities are primarily nonprofit (58 percent) and government owned (34 percent). Approximately 20 percent of all freestanding SNF's are nonprofit. In terms of patient days, nonprofit facilities account for about 63 percent of all hospital-based SNF Medicare patient days; proprietary facilities provide 77 percent of all freestanding SNF Medicare patient days.

Weighted average SNF costs for 1983 by facility type, community size, and ownership type are presented in Table 2. The costs of hospital-based facilities exceed the costs of freestanding homes regardless of location. Within urban areas, total average costs for freestanding facilities are estimated to have been \$68.86 in fiscal year 1983, compared with \$141.61 for hospital-based facilities, a difference of 106 percent. Within rural areas, average costs for freestanding facilities totaled \$57.04, compared with \$96.39 for hospital-based facilities, a difference of 69 percent. A similar pattern is evident within the routine operating cost category. Although basic differences do exist across facility types with regard to urban versus rural setting, these differences do not explain the cost differential.

Table 1
Average facility costs by type of facility and cost category: 1983

Cost category	Unweighted mean		Weighted by Medicare days		Weighted by total days	
	Freestanding facility	Hospital-based facility	Freestanding facility	Hospital-based facility	Freestanding facility	Hospital-based facility
	Amount in dollars					
Total Costs	\$61.12	\$105.31	\$66.95	\$131.51	\$61.80	\$97.76
Routine operating	45.76	77.88	48.37	94.98	47.51	74.49
Routine nursing	18.77	29.86	19.86	36.85	19.03	27.74
Routine overhead	26.99	48.01	28.50	58.14	28.48	46.75
Medicare ancillary	11.39	22.32	14.12	29.75	11.33	19.19
Drugs and supplies	5.26	8.37	6.58	8.18	4.62	6.53
Therapy	6.13	13.95	7.54	21.57	5.71	12.64
Capital costs	3.98	5.11	4.46	6.78	3.96	4.10

SOURCE: The Urban Institute: Skilled Nursing Facility Study, 1980 Cost Report data projected to 1983.

It is also evident from Table 2 that differences in ownership type do not explain cost differences. Once again, costs of hospital-based homes exceed those of their freestanding counterparts across all ownership categories. The greatest disparity is found among proprietary homes with hospital-based SNF total costs exceeding those of freestanding facilities by 125 percent. Nonprofit and government operated hospital-based SNF's have estimated costs that exceed those of freestanding facilities by 83 percent and 43 percent, respectively.

Regression analysis of cost differences

In addition to cost and facility characteristics, other factors such as State policy, case mix, occupancy rates, admissions per bed, and percent of Medicare days may influence the level of average facility costs.

State policy is important in explaining average facility cost because Medicaid is the largest public payer for nursing home care. Estimated Medicaid expenditures for elderly individuals in 1984 amounted to \$4.45 billion. By contrast, Medicare expenditures for the same period amounted to \$348 million (Waldo and Lazenby, 1984). Because Medicaid SNF coverage and reimbursement practices vary by State, nursing home costs are influenced heavily by State policy variables. If hospital-based facilities tend to be located in States with weak reimbursement controls, and therefore have higher average costs, some of the difference in costs between the two types of facilities may be explained by location.

The geographic distribution of hospital-based and freestanding facilities is different. About 63 percent of all freestanding facilities are located in the relatively generous Medicaid States (with regard to expenditures per capita) such as California, New York, Pennsylvania, Ohio, and Michigan, compared with 42 percent of all hospital-based facilities.

One of the major causes of cost differences across facility types cited by hospital administrators is that hospital-based facilities treat a different, more intensive case mix. Case mix generally refers to the distribution of patients within a facility according to the characteristics that reflect the type and quantity of

care required (Cameron and Knauf, 1982). Facilities with a high percent of Medicare days are generally oriented toward the short-term rehabilitation patient. In this sense, percent of Medicare days can be considered a crude measure of case mix. Higher cost facilities tend to have greater percents of Medicare days than lower cost facilities. Hospital-based facilities have an average 16 percent of total days attributable to Medicare, compared with only 7 percent among freestanding facilities.

Another proxy case-mix measure is admissions per bed. In general, the greater the number of admissions per bed, the greater the tendency toward the more expensive short-term rehabilitation patient. About 21 percent of all hospital-based homes have a high number of admissions per bed (six or more admissions per bed per year), compared with 13 percent of all freestanding homes. Facility occupancy rate is an additional factor contributing to total cost. Lower occupancy rates are associated with higher costs because the facility is incurring costs for unused beds. The average occupancy rate for freestanding facilities is 93 percent, compared with an average rate of 86 percent for hospital-based facilities.

In this section, we present the results of a regression equation that controls for these and other factors and provides estimates of the remaining cost differences between hospital-based and freestanding facilities. The model explains a substantial portion of both total costs and routine operating costs. A listing of regression variables is presented in Table 3, and the results of the regression analysis of total costs and routine operating costs are presented in Table 4.

The most interesting finding is that compared with freestanding facilities, hospital-based SNF's are positively and significantly related to total and routine operating costs. After controlling for all other variables, hospital-based facilities have total average costs that exceed those in freestanding facilities by \$27.62 per day. Routine operating costs in hospital-based facilities exceed those in freestanding SNF's by \$17.46 per day after controlling for all other variables. Thus, even after the influence of the facility characteristics described earlier have been taken into account, hospital-based facilities have remaining

Table 2
Average skilled nursing facility costs weighted by Medicare days, by type of community and ownership: 1983

Type of community and ownership	Total costs		Routine operating costs	
	Freestanding	Hospital-based	Freestanding	Hospital-based
Amount in dollars				
Community				
Urban	\$68.86	\$141.61	\$49.44	\$102.11
Rural	57.04	96.39	42.79	70.23
Ownership				
Proprietary	64.66	145.47	45.50	99.99
Nonprofit	74.75	136.94	56.61	98.15
Government	75.11	107.12	64.43	82.84

SOURCE: The Urban Institute: Skilled Nursing Facility Study, 1980 Medicare Cost Report data projected to 1983.

Table 3
Regression analysis variables

Variable	Definition	Mean	Standard deviation
RURAL	Binary variable indicating rural area.	0.25	0.43
PROP	Binary variable indicating proprietary facility.	0.67	0.47
NP	Binary variable indicating nonprofit facility.	0.24	0.43
WAGE	Hospital wage index.	1.08	0.17
BEDS	Number of certified beds.	79.45	70.22
PMEDCERT	Percent of Medicare days.	0.13	0.19
APB	Admissions per bed.	2.90	4.09
OCC80	Occupancy rate in certified beds.	0.92	0.11
DP	Binary variable indicating freestanding distinct part facility.	0.48	0.50
HB	Binary variable indicating hospital-based facility.	0.14	0.34
CH	Binary variable indicating chain facility (10 or more facilities under the same ownership).	0.17	0.34

Table 4
Regression analysis coefficients

Independent variables	Dependent variable	
	Total costs	Routine operating costs
R ²	.64	.67
RURAL	* -2.26 (-2.41)	-.45 (-.70)
PROP	* -13.10 (-10.23)	* -15.80 (17.97)
NP	* -3.72 (-2.97)	* -5.95 (-6.91)
WAGE	*35.30 (10.94)	*31.30 (14.31)
BEDS	.01 (1.70)	*.01 (2.97)
PMEDCERT	*55.47 (23.82)	*36.13 (22.61)
APB	*.34 (3.51)	*.25 (3.78)
OCC80	-60.69 (-17.60)	* -44.46 (-18.78)
DP	1.05 (1.30)	1.07 (1.93)
HB	*27.62 (21.62)	*17.46 (19.91)
CH	-1.51 (-1.71)	* -2.09 (-3.44)

*Significant at the .01 level.

NOTES: See Table 3 for definitions of variables. T-statistics are given in parentheses.

unexplained higher costs than their freestanding counterparts.

With regard to the other independent variables, we find that rural location is a negative and significant factor with regard to total costs, but not with regard to routine operating costs (ROC). Relative to

government homes, proprietary facilities are found to have total costs that are \$13.10 less per day and routine operating costs that are \$15.80 less per day. Nonprofit homes are significantly lower than government homes in total costs (by \$3.72) and routine operating costs (by \$5.95).

The wage index, which is a measure of wage costs in an area, is a significant, positive variable for both total costs and routine operating costs. The number of certified beds is a slightly positive but significant variable for both total and routine operating costs. Percent of Medicare days and admissions per bed—the two proxy case-mix variables—are each positive and significant for total and routine operating costs. The percent of Medicare days variable, in particular, is a strong predictor of both total and operating costs. That is, both measures of costs increase as the percent of Medicare days increases.

In a separate regression, not shown, the percent of Medicare days variable was restructured as a set of four binary variables. The results showed that total costs per day increased from an average of \$2.91 for facilities with 5.0 to 9.9 percent of Medicare days, to \$5.44 for facilities with 10.0 to 19.9 percent of Medicare days, \$6.75 for facilities with 20 to 39.9 percent of Medicare days, and \$26.08 for facilities with more than 40 percent of Medicare days.

Occupancy rate is a negative and highly significant variable. Distinct part certification¹ is a positive and significant variable for both total cost and ROC, whereas the chain facility variable is negative and significant.

Many of the State coefficients were significant. Compared with California, eight States (Hawaii, Maine, Mississippi, Minnesota, Nebraska, New York, Utah, and Vermont) have relatively high costs. Again compared with California, 14 States (Alabama, Colorado, Florida, Georgia, Idaho, Illinois, Kansas, Kentucky, Michigan, Montana, North Dakota, Ohio, Oregon, and Texas) have relatively low costs, other things equal. To the extent that hospital-based facilities are disproportionately located in relatively high-costs States and freestanding SNF's are located in relatively low-cost States, part of the differences in total and routine operating costs may be explained by location.²

Case-mix variation

The measures of case-mix differences used in the analysis up to this point must be considered crude proxies and are not intended to provide a definitive answer with regard to the issue of case-mix variation across facility types. In this section, we examine a more direct measure of case mix in a sample of 1,584 hospital-based and freestanding nursing homes from 30 States.

¹A "distinct part" is a separate unit within a larger institution that is certified as a skilled nursing facility.

²Complete results on the State variables may be obtained from the authors.

Patient characteristics and resource use

The relevance of case mix to facility cost lies in the relationship of patient characteristics to level of resource use. If a facility has a high percent of patients whose characteristics are associated with intensive resource use, that facility may legitimately incur higher costs than a similar facility with relatively lower resource use patients. The most relevant measure of patient case mix then, is one which relates specified patient characteristics to resource usage, such as nursing time. Several studies have addressed this relationship and offered patient classification schemes (Stassen and Bishop, 1983; Shaughnessy et al., 1982; Fries and Cooney, 1984). One problem confronting many of these researchers is the lack of available relevant data. For this reason, many studies have been confined to analysis of facilities within single States and have therefore been based on small sample sizes. This section makes use of data collected by the Medicare and Medicaid Automated Certification System (MMACS) in 30 States. The variables provide a measure of the number and percent of total patients within an individual facility by specific patient characteristics. The MMAC survey questions pertained to all SNF patients, not just Medicare patients. Although the variables included here are not ideal measures of case mix, they can be considered more direct indicators than the proxy variables of percent of Medicare days and admissions per bed, and they do include 1,373 freestanding and 211 hospital-based facilities.

The major shortcoming of these data is that, as currently structured, they do not directly relate patient characteristics to resource use. Thus, for example it is not possible to state whether facilities with a higher percent of patients with characteristic A and a lower percent with characteristic B have a less/more intense case-mix than facilities with the reverse pattern. In addition, the facilities percent of patients with specified characteristics does not provide a complete picture of the severity of the overall case-mix largely because it does not identify the percent of patients with multiple dependencies of characteristics. It is useful, however, to identify the differences by facility type in the relative percents of patients by each individual patient characteristic. If, for example, hospital-based SNF's were found to have higher percents of patients in every category indicating greater levels of resource use, it would be clear that those homes had a more intense case-mix. However, differences in some, but not all, characteristics will contribute to more tenuous conclusions.

Data on the percent of total patients by patient characteristics and facility type are presented in Table 5. Although data on the characteristics of Medicare patients are not available, using information on all patients is consistent with the data available on costs, staffing, etc. That is, Medicare pays on the basis of average costs for the facility, staffing ratios are relative to total beds, etc. One exception is

Table 5
Percent of total patients, by type of facility and patient characteristics

Patient characteristic	Unweighted means	
	Freestanding	Hospital-based
Completely bedfast patients	.043	** .087
Patients requiring no assistance with ambulation	** .162	.138
Patients requiring assistance with ambulation	.514	.543
Patients requiring full assistance in eating	.231	.258
Patients requiring some assistance in eating	.257	** .309
Patients with indwelling catheters	.148	** .209
Incontinent patients	* .463	.431
Patients with decubiti	.082	.094
Patients with bowel and bladder retraining	.081	** .145
Patients receiving special skin care	.331	** .396
Confused or disoriented patients	** .556	.495
Patients receiving intravenous or blood transfusions	.003	** .014
Bed-to-chair patients	.374	.356

* Statistically significant at the .05 level.
** Statistically significant at the .01 level.

ancillary costs where data used in this article relate specifically to Medicare patients.

What emerges is a somewhat mixed picture. Hospital-based facilities are found to report a higher percent of persons requiring assistance in eating and ambulation but a lower percent of confused, disoriented or incontinent patients. With the exception of the confused and incontinent patients, hospital-based facilities tend to have a higher percent of patients than freestanding homes in every category indicating resource use.

We can also group the patient characteristics variables in an effort to more closely relate a given set of characteristics to a given level of required resources. Three groups can be developed to measure the level of dependency in the patient population: the percent of patients with functional dependency, the percent of patients requiring special nursing procedures, and the percent requiring extra staff time.³ An approximate measure of level of dependency would include the percent of patients who: are completely bedfast, require assistance in ambulation, or require full assistance in eating. The percent of patients requiring special nursing procedures could be measured by the percent of patients with indwelling catheters, requiring special skin care, or patients with

³The Health Care Financing Administration is currently studying these patient characteristic groupings, which were specified according to the findings of the New York Department of Health's study of resource utilization groups.

Table 6

Number of facilities and percent of total patients, by percent of Medicare days, type of facility, and patient characteristics

Patient characteristic	Percent of Medicare days							
	Less Than 10		10 to 34.99		35 to 64.99		65 or more	
	Free-standing	Hospital-based	Free-standing	Hospital-based	Free-standing	Hospital-based	Free-standing	Hospital-based
	Unweighted percents							
Number of facilities	937	120	311	45	88	16	32	30
Completely bedfast patients	.036	** .070	.060	** .118	.053	* .124	.054	.085
Patients requiring no assistance with ambulation	.169	.174	** .146	.105	** .157	.088	.149	.078
Patients requiring assistance with ambulation	.507	* .561	.512	.458	.575	.531	.549	.609
Patients requiring full assistance in eating	.225	.237	.254	** .330	.226	.296	.213	.213
Patients requiring some assistance in eating	.255	** .317	.258	.276	.248	.291	.302	.332
Patients with indwelling catheters	.122	.149	.202	** .293	.209	* .309	.215	.266
Incontinent patients	.466	.443	.464	.477	.447	.421	* .425	.322
Patients with decubiti	.069	.061	** .112	** .157	.112	.139	.111	.113
Patients with bowel/bladder retraining	.078	** .168	.089	.091	.093	.111	.066	* .153
Patients receiving special skin care	.321	.356	.347	.420	.372	.493	.336	.472
Confused or disoriented patients	** .553	.493	.568	.541	.558	.506	.513	.431
Patients receiving IV or blood transfusions	.003	.003	.005	.023	.004	* .046	.003	** .029
Bed-to-chair patients	** .376	.298	.379	** .493	.325	.361	.390	.378

* Statistically significant at the .05 level.

** Statistically significant at the .01 level.

intravenous tubes or receiving blood transfusions. The percent of patients requiring extra staff time would be measured by the percent of patients who are incontinent, with decubiti, or confused or disoriented.

Utilizing these groupings, we find that hospital-based homes have a higher percent of patients with functional dependency and requiring special nursing procedures, but a lower percent of patients requiring extra staff time.

If the percent of patients receiving blood transfusions or with intravenous tubes provides a crude indicator of the level of medical problems, and the percent of confused or disoriented patients a measure of the intensity of psychosocial problems, then hospital-based SNF's have a more severely medically impaired patient population, and freestanding homes have a more severely mentally impaired population. The difference in the means of both variables is statistically significant.⁴

We examine the relationship between provision of Medicare services and a facility's patients characteristics in Table 6. Facilities are classified by the percent of Medicare days to examine the impact

on patient characteristics. There are two findings of interest. First, the difference between freestanding and hospital-based facilities is greatest for homes with less than 35 percent of their patients covered by Medicare. There are few significant differences in the facilities with a high percent of Medicare patients. Second, the relationship between the percent of Medicare days and the various patient characteristics measures seems weak. In most instances, the percent of patients with different impairments does not increase with the percent of Medicare days in the facility. This could reflect the possibility that the percent of patients with specific impairments may be measured with some error. The percent of Medicare days may also better capture the number of patients with multiple impairments.

Because these data provided additional information on case mix, we merged them with cost report data and estimated additional regressions including each patient characteristic variable. Several variables are significant. The percent of patients who are completely bedfast, the percent requiring some assistance in eating, the percent with indwelling catheters, and the percent requiring special skin care add significantly to total costs. The percent needing no assistance with ambulation and the percent who are incontinent were negatively related to total costs. However, after controlling for these patient

⁴Shaughnessy et al. (1985) found that hospital-based Medicare patients were less likely than Medicare patients in freestanding facilities to require the traditional maintenance services provided by nurses and more likely to require skilled nursing and therapist services.

characteristic measures, differences between hospital-based and freestanding facilities still remain large—\$26.11 for total costs and \$18.51 for routine operating costs.⁵

Staffing differences

Staffing pattern differences between facilities may reflect inefficiencies in the use of resources, different case mixes, or differences in the “quality” of care provided. All of these latter factors may involve a greater or lesser use of resources per fixed unit of output (McKnight, 1970).

One such measure of resources per fixed unit of output is the number of nursing hours per inpatient day. Hospital-based facilities average 3.9 hours of nursing care, compared with 3.27 hours provided in freestanding homes.

The difference in nursing hours in hospital-based versus freestanding facilities is much more pronounced in urban than in rural areas. Hospital-based facilities in urban areas provide 4.15 nursing hours per inpatient day whereas urban freestanding facilities provide 3.43 hours. In contrast, rural hospital-based SNF's provide only slightly more hours per inpatient day than rural freestanding SNF's with 3.65 and 3.22 hours, respectively.

Differences in staffing patterns may also be measured by the number of rehabilitation therapies offered (physical, occupational, and speech therapy) and by the number of nurses per bed. The distribution of facilities characterized by combining these measures of staffing patterns is presented in Table 7. Nurse-to-bed ratios have been defined in the following manner:

- High—one nurse to nine or less beds.
- Moderate—one nurse to 10-13 beds.
- Low—one nurse to 14 or more beds.

Facilities are cross-classified as providing none, one, or two or more rehabilitation services.

Hospital-based facilities are greater providers of rehabilitation services than freestanding facilities. Nearly 35 percent of all hospital-based homes provide two or more rehabilitation services, compared with only 15.1 percent of freestanding homes. In addition, approximately 92 percent of all hospital-based facilities have high nurse-to-bed ratios, but only 59 percent of all freestanding SNF's fall into that category.

The difference across urban and rural locations is striking. For urban hospital-based facilities, about 30 percent provide no rehabilitation services and about 51 percent provide two or more. For rural hospital-based homes, nearly 55 percent provide no rehabilitation services and only 19 percent provide two or more. A similar, though less dramatic, pattern can

⁵These estimates were made using a subset of facilities which had data on patient characteristics. The numbers should not be directly compared with the differences in hospital-based and freestanding facility costs cited earlier.

be observed among freestanding homes. For urban facilities, 60 percent provide no rehabilitation services and 17.2 percent provide two or more. For rural freestanding homes, about 68 percent provide no rehabilitation services and 7.6 percent provide two or more.

Staffing differences between hospital-based and freestanding facilities may be attributable to differences in all of the factors discussed earlier: location, State policies, percent of Medicare days, admissions per bed, and patient characteristics. To control for these variables we estimated a regression with registered nurses (RN's) and licensed practical nurses (LPN's) per bed as the dependent variable and the same set of explanatory variables as in the previous cost regressions. The dummy variable for hospital-based SNF's was again highly significant with the results suggesting that hospital-based facilities employ seven nurses more per hundred beds than freestanding facilities, after patient mix, State, percent of Medicare days, and other variables are held constant.

As shown in Table 8, even when staffing pattern differences are taken into account, hospital-based facilities costs exceed those of freestanding homes. When we control for nursing ratios and rehabilitation services provision, hospital-based costs still exceed freestanding costs. The excess exists at every staffing level and ranges from 12 percent for urban facilities with one rehabilitation service and low nurse-to-bed ratios (\$47.02 for freestanding, \$52.51 for hospital-based) to 183 percent for rural facilities with two or more rehabilitation services and moderate nurse-to-bed ratios (\$41.42 for freestanding, \$117.19 for hospital-based).⁶

These higher costs cannot be explained by the composition of the nursing staff within facility types. In fact, freestanding facilities have a higher percent of registered nurses to total nursing staff than hospital-based facilities. Among the freestanding SNF's, an average 51 percent of all nurses are RN's, compared with 46 percent in hospital-based homes.

These cost differences could be attributable to other differences between hospital-based and freestanding homes. To test whether cost differences remained after staffing patterns are controlled, we added the RN's- and LPN's-per-bed variable to the cost regressions. The results showed that although staffing is clearly related to costs, substantial differences between hospital-based and freestanding homes remain. The estimated difference is \$16.31 for routine operating costs and \$23.03 for total costs. This implies that cost differences cannot be fully explained by the case-mix and staffing variables we have employed.

⁶Rehabilitation services are an ancillary cost rather than a routine operating cost. They are, thus, included here as a proxy measure for quality of care rather than as a cost-contributing factor.

Table 7

Percent distribution of skilled nursing facilities, by location, type of facility, number of rehabilitation therapies, and nurse-to-bed ratios

Number of rehabilitation therapies and nurse-to-bed ratios	All locations				Urban				Rural			
	Freestanding		Hospital-based		Freestanding		Hospital-based		Freestanding		Hospital-based	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All facilities	2,932	100.0	464	100.0	2,314	100.0	231	100.0	618	100.0	233	100.0
High nurse-to-bed ratio	1,726	58.9	426	91.8	1,338	57.8	211	91.3	388	62.8	215	92.3
Moderate nurse-to-bed ratio	651	22.2	27	5.8	519	22.4	13	5.6	132	21.3	14	6.0
Low nurse-to-bed ratio	555	18.9	11	2.4	457	19.7	7	3.0	98	15.9	4	1.7
No rehabilitation	1,794	61.2	196	42.2	1,372	59.3	69	29.9	422	68.3	127	54.5
High nurse-to-bed ratio	998	55.6	180	91.8	748	54.5	62	89.8	250	59.2	118	92.9
Moderate nurse-to-bed ratio	445	24.8	10	5.1	344	25.1	4	5.8	101	23.9	6	4.7
Low nurse-to-bed ratio	351	19.6	6	3.1	280	20.4	3	4.3	71	16.8	3	2.4
One rehabilitation therapy	694	23.7	107	23.1	545	23.6	45	19.5	149	24.1	62	26.6
High nurse-to-bed ratio	417	60.1	98	91.6	315	57.8	42	93.3	102	68.4	56	90.3
Moderate nurse-to-bed ratio	132	19.0	8	7.5	107	19.6	2	4.4	25	16.8	6	9.7
Low nurse-to-bed ratio	145	20.9	1	0.9	123	22.6	1	2.2	22	14.8	—	0.0
Two or more rehabilitation therapies	444	15.1	161	34.7	397	17.2	117	50.6	47	7.6	44	18.9
High nurse-to-bed ratio	311	70.0	148	91.9	275	69.3	107	91.4	36	76.6	41	93.2
Moderate nurse-to-bed ratio	74	16.7	9	5.6	68	17.1	7	6.6	6	12.8	2	4.5
Low nurse-to-bed ratio	59	13.3	4	2.5	54	13.6	3	2.8	5	10.6	1	2.3

SOURCE: The Urban Institute: Merged data from projected cost report file 1980, projected to 1983, and the Medicare and Medicaid Automated Certification System file, 1980.

Table 8
Routine operating costs of skilled nursing facilities, by location, type of facility, number of rehabilitation therapies, and nurse-to-bed ratios

Number of rehabilitation therapies and nurse-to-bed ratios	All locations		Urban		Rural	
	Freestanding	Hospital-based	Freestanding	Hospital-based	Freestanding	Hospital-based
	Amount in dollars					
All facilities	\$45.76	\$77.88	\$46.73	\$91.62	\$42.14	\$64.02
No rehabilitation						
High nurse-to-bed ratio	43.43	70.44	44.17	90.68	41.21	59.81
Moderate nurse-to-bed ratio	39.51	57.77	39.66	54.29	39.02	60.10
Low nurse-to-bed ratio	42.62	66.19	43.19	85.65	40.39	46.72
One rehabilitation therapy						
High nurse-to-bed ratio	50.02	70.08	51.30	76.43	46.06	65.32
Moderate nurse-to-bed ratio	45.77	55.91	46.99	80.93	40.51	47.57
Low nurse-to-bed ratio	46.38	52.51	47.02	52.51	42.80	—
Two or more rehabilitation therapies						
High nurse-to-bed ratio	58.16	92.58	59.26	99.53	49.78	74.44
Moderate nurse-to-bed ratio	50.01	101.19	50.77	96.62	41.42	117.19
Low nurse-to-bed ratio	49.19	74.01	49.38	80.15	47.20	55.58

SOURCE: The Urban Institute: Merged data from projected cost report file 1980, projected to 1983, and the Medicare and Medicaid Automated Certification System file, 1980.

Table 9
Cost differences between hospital-based and freestanding facilities

Difference between hospital-based and freestanding facilities (1)	Pure difference (2)	Controlling for admissions—admissions per bed, percent of Medicare days, State and other facility characteristics (3)	Controlling for all variables in (3) plus patient characteristics (4)	Controlling for all variables in (4) plus staffing (5)
Total cost	\$35.65	\$27.42	\$26.11	\$23.03
Operating costs	28.35	19.31	18.51	16.31

NOTES: Differences reported in columns (2) and (3) will be different than those reported in the text of this article. Statistics reported in this table reflect only the sample of homes with data on patient characteristics and staffing.

Conclusions

In general, we have found that although significant differences do exist in the facility characteristics of hospital-based and freestanding SNF's, as currently measured, these different characteristics cannot fully explain existing cost differences. The contention that cost differences are primarily attributable to a more intensive case mix could not be confirmed by either proxy measurement (percent of Medicare days and admissions per bed) or more direct analysis of patient characteristic data. Substantial cost differences remain after controlling for both case-mix and staffing patterns.

Differences between hospital-based and freestanding homes after controlling for different explanatory variables are presented in Table 9. The results are based on those homes reporting data on costs, patient characteristics, and staffing. For these facilities, the pure observed difference per patient per day is \$28.35 for operating costs and \$35.65 for total costs. When all variables have been controlled for, differences are \$16.31 for operating costs and \$23.03 for total costs. These residual cost differences include the effect of Medicare overhead cost allocation procedures. As

noted earlier, HCFA estimates this cost allocation effect to be between \$2 and \$5 per patient day for the period studied here. The magnitude of our unexplained cost differentials suggest at least the possibility that these estimates are low.

The implication for public reimbursement policy is that less than one-half of the observed difference in costs between hospital-based and freestanding facilities can be attributed to case-mix and staffing differences. It is probable that a more refined measure of case mix would yield a different estimate of the contribution of case mix to cost. However, it is not possible to state *a priori* whether such improved measures would account for a higher or lower proportion of the cost differences. Shaughnessy and Schlenker (1984), in their work on Colorado nursing homes, have estimated that approximately 50 percent of the difference in freestanding and hospital-based costs can be explained by case-mix differences. Given existing imprecision in the measurement of case mix, the recognition of one-half the cost difference as implemented under the current cost reimbursement system would appear to be an appropriate short-term policy. However, the risk in recognizing these differences and establishing higher ceilings for

provider-based facilities is that those hospital-based homes that do not have severely impaired patients or high staffing ratios would benefit and those freestanding homes who do would be penalized. This problem could be ameliorated in the short run by incorporating percent of Medicare days into the calculation of cost ceilings. The preferred long-term policy would adjust rates directly for patient characteristics and quality and ignore the hospital-based and freestanding distinction. However, until more refined data systems are developed to permit case-mix adjustment, percent of Medicare days could be used as a proxy measure.

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