What Happens When Hospital-Based Skilled Nursing Facilities Close? A Propensity Score Analysis

Chapin White and Susanne Seagrave

Objective. To assess the effects of hospital-based skilled nursing facility (HBSNF) closures on health care utilization, spending, and outcomes among Medicare fee-for-service beneficiaries.

Data Sources. One hundred percent Medicare fee-for-service claims files for 1997–2002 were merged with Medicare Provider of Services files and beneficiary-level enrollment records.

Study Design. Medicare spending, the use of postacute care, and health outcomes, were compared among hospitals that did and did not close their HBSNFs between 1997 and 2001. Hospitals were stratified according to propensity scores (i.e., predicted probability of closure from a logistic regression) and analyses were conducted within these strata.

Principal Findings. HBSNF closures were associated with increased utilization of alternative postacute care settings, and longer acute care hospital stays. Because of increased use of alternative settings, HBSNF closures were associated with a slight increase in total Medicare spending. There are no statistically robust associations between HBSNF closures and changes in either mortality or rehospitalization.

Conclusions. HBSNF closures altered utilization patterns, but there is no indication that closures adversely affect beneficiaries' health outcomes.

Key Words. skilled nursing facility, Medicare, propensity score, postacute care

In recent decades, postacute care services, which include skilled nursing facility (SNF) care, inpatient rehabilitation, and home health care, have emerged as an important component of the Medicare program and the U.S. health care system as a whole. In 2002, Medicare's spending on SNFs, home health agencies, and other postacute facilities totaled nearly \$36 billion, around one-fifth of total Medicare spending (Thaker 2004).

Medicare limits coverage of SNF services to short-term stays following a hospitalization. The most common diagnoses among Medicare-covered SNF

users are hip fracture, stroke, pneumonia, and heart failure (White 2003). During the early and mid-1990s, a large number of acute care hospitals opened their own hospital-based SNFs (HBSNFs) (Dalton and Howard 2002). In 1997, after this period of rapid growth, 7.0 percent of all acute care hospital stays were followed by an HBSNF stay (authors' calculations).

The rapid growth in postacute utilization and spending during the 1990s attracted the attention of policymakers and prompted sweeping payment reforms in the Balanced Budget Act of 1997 (BBA). These payment reforms affected SNFs as well as home health agencies and other postacute providers. At that time, HBSNFs were viewed by some policymakers as exploiting Medicare's payment systems through "unbundling" (i.e., receiving both hospital and HBSNF payments for essentially the same stay).

The BBA resulted in sharp declines in payments for most HBSNFs, as intended by Congress. Researchers have shown that many HBSNFs, following these payment changes, exited the market (Dalton and Howard 2002) (free-standing SNFs generally fared better under the new payment system, and their Medicare participation increased over the same time period). Researchers have identified several facility characteristics associated with higher probability of HBSNF closure (urban, for-profit, recently opened, high-cost case mix) (Liu and Black 2003; Medicare Payment Advisory Commission 2004).

An important question for Medicare policy is how these closures affected Medicare beneficiaries and, in particular, whether beneficiaries received appropriate care in substitute settings. Congress, in setting Medicare's payment rates, attempts to balance federal budgetary concerns (which argue for lower payments) against concerns for beneficiary access to care (which argue for higher payments). A sharp decline in provider participation following payment cuts, as occurred among HBSNFs, might have led to declines in beneficiary access to care if substitute settings that provided a comparable level of care were not available. But, the impact of provider exits on beneficiaries depends both on the availability of substitute settings of care, and on whether these settings can provide comparable levels of care. In the context of Medicare payment cuts, substitutability of sites of care is a double-edged sword—it mitigates access concerns, but it can also undermine attempts to reduce Medicare spending.

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Earlier research has shown that, among patients using various types of postacute care, a good deal of overlap exists in their clinical and demographic characteristics (Gage 1999). This suggests that the site of care has the potential to be influenced by payment incentives. MedPAC has recently documented the substitution of freestanding SNF beds for HBSNF beds, and the substitution of long-term care hospital utilization for other postacute settings (Medicare Payment Advisory Commission 2003, 2004). Beyond that, little is currently known about the extent to which acute care hospitals, freestanding SNFs, home health agencies, and other settings can substitute for HBSNFs. This research sheds light on substitutability by examining how HBSNF closures resulted in increased utilization of alternative sites of care.

Our specific research questions are the following: What happens to Medicare beneficiaries who would have been treated in the HBSNFs that closed, and what does this mean for the quality of their health care? How are hospitals, especially those that close their SNF units, affected by these closures? Finally, what happens to the utilization of health care resources and Medicare spending when HBSNFs close?

This study compares hospitals that did and did not close their HBSNFs, with the outcomes of interest being the length of hospital stays, the use of alternative postacute care settings, the level of Medicare spending, and health outcomes. The data for this study come entirely from Medicare's fee-for-service administrative data files, including the MEDPAR files, claims data, and provider of service files. This study builds on previous studies that have focused on the reasons for HBSNF closures by examining the effects of the closures.

METHODS

We perform a hospital-level difference-in-differences analysis, with the goal of estimating the effects of HBSNF closures on patterns of utilization and outcomes. We begin with claims-level data on individuals' utilization of health care services and outcomes over the period from 1997 to 2002. These claims-level data are grouped into episodes, where each episode begins with an acute care hospital admission and includes the beneficiary's subsequent postacute care and hospital readmissions. Episodes include the initial hospital admission and any subsequent utilization initiated within 90 days (including hospital stays). Episodes are assigned to the acute care hospital where the initiating stay occurred. Each episode includes information on the use of services, spending, and outcomes. We aggregate the episode-level data to the hospital level by

calculating means. We calculate hospital-level means for episodes beginning in 1997 and, separately, 2001. We chose this time frame because of the large number of HBSNF closures that took place beginning in 1998. The key results compare changes (1997–2001) among hospitals that closed their SNF with changes among hospitals that kept their SNF open. An HBSNF was defined as being closed by 2001 if no Medicare claims were submitted in 2001.

We include the universe of acute care hospitals in the U.S. that provided services to Medicare beneficiaries throughout the period from 1997 to 2001 and that hosted an HBSNF in 1997. The analysis excludes hospitals that never hosted an HBSNF and also excludes hospitals that opened an HBSNF after 1997. (As Dalton and Howard [2002] have shown, HBSNF openings after 1997 were quite rare; excluding newly opened HBSNFs does not greatly limit the analysis.) Using a propensity score approach, we group hospitals into five strata according to the predicted probability of closing their HBSNF by 2001. Within each propensity score group, we calculate a difference-in-differences estimate of the effect of HBSNF closure. The difference-in-differences estimate equals the change from 1997 to 2001 among those hospitals that closed their SNF minus the change among hospitals that kept their SNF open. All hospital-level analyses are weighted by the number of fee-for-service Medicare hospital admissions in 1997.

Propensity-score methods have been proposed for use in nonexperimental research designs focused on measuring the causal effects of a binary “treatment” (Rosenbaum and Rubin 1984). Examples of such treatments include coronary artery bypass surgery, substance abuse counseling, or, in our case, closure of an HBSNF (Mojtabai and Graff Zivin 2003). Observations are assigned a propensity score, which reflects the likelihood of receiving the treatment as predicted using observed characteristics. Observations are then grouped based on these propensity scores, typically into five groups, and treatment effects are measured within groups.

Propensity-score methods are similar to standard OLS, in that both are potentially subject to bias because of unobserved factors. Propensity-score methods have several advantages over standard OLS, though. First, grouping observations based on the predicted likelihood of treatment forces the researcher to confirm that there is some degree of “overlap” between treatment and nontreatment observations, that is, that there are at least some treatment and nontreatment observations with similar observed characteristics. Second, measuring treatment effects within propensity groups allows treatment effects to vary across groups in a flexible way. Third, identifying characteristics associated with receiving the treatment can be of interest in itself.

We conduct a hospital-level difference-in-differences analysis, with hospitals grouped by propensity score. Within groups, we compare hospitals that closed their HBSNFs (the treatment group) with those that did not. We chose this approach for the following reasons. First, a difference-in-differences approach allows for underlying changes over time in patterns of care and outcomes that may be unrelated to HBSNF closures. For example, home health care utilization and spending dropped substantially over the period we examine. The difference-in-differences approach allows us to identify whether HBSNF closures were associated with any *differential* change in home health utilization. Second, HBSNFs draw their patients almost exclusively from their host hospital's discharges. Whether a patient uses an HBSNF is, therefore, determined largely by whether the admitting hospital hosts an SNF. A hospital-level comparison of closers versus nonclosers, therefore, offers a sharp contrast in practice patterns. Third, we chose not to conduct a simple individual-level analysis comparing HBSNF users to nonusers because HBSNF use is likely to be strongly related to an individual's clinical characteristics, both observed and unobserved. We hypothesize that patient-level selection concerns are mitigated in the hospital-level analysis. Fourth, by measuring changes over time at the hospital level, we control for stable hospital-level characteristics, which include local practice patterns, hospital quality, and patient populations. Fifth, the propensity score approach allows us to group similar hospitals and, within these groups, compare closers to nonclosers. Compared with a simple pooled difference-in-differences model, the propensity score approach is more robust to variation among hospitals in observed characteristics. The propensity score approach also allows identification of differential effects of HBSNF closure across different types of hospitals.

To build the episode-level measures of utilization and outcomes, we use the universe of Medicare claims for inpatient facilities (acute care hospitals, SNFs, inpatient rehabilitation facilities, and long-term care hospitals) and home health agencies. Utilization and payments are measured separately for HBSNFs, freestanding SNFs, home health care, and "other" postacute settings, which include swing-bed SNFs, inpatient rehabilitation facilities, and long-term care hospitals. We do not include office-based physician services or other miscellaneous categories of Medicare spending such as durable medical equipment. Utilization information includes whether a setting was used during an episode and Medicare payments (including outlier payments and beneficiary cost sharing, if any). Payments are inflated to January 2004 using the Gross Domestic Product Implicit Price Deflator (Federal Reserve Bank of St. Louis 2004).

The results we present here are based on episodes, which we define as starting with an acute care hospitalization and including any utilization initiated within 90 days of the initial admission date. For example, suppose an individual has a hospital admission on day 0, another hospital admission on day 80, and an SNF admission on day 89. Both of the hospital admissions and the entire SNF stay are included in the day 0 episode. The day 80 admission generates a separate episode, which also includes the SNF stay (and, possibly, other utilization). To test the sensitivity of our results to our definition of an episode, we experimented with an alternative episode definition. (In the alternative definition, episodes started with an acute care hospitalization and ended with either death or 60 consecutive days with no institutional care.) Reassuringly, the alternative episode definition yielded results (not shown) that were remarkably similar to our original results.

Each episode includes a measure of 90-day rehospitalization and 30-, 120-, and 360-day mortality from linked Social Security records. We created a separate measure of potentially preventable rehospitalizations. These are hospitalizations for which the diagnoses meet the criteria for one or more of the following conditions: pneumonia, dehydration, urinary tract infection, congestive heart failure, hypertension, chronic obstructive pulmonary disease, and short-term complications of diabetes (Agency for Healthcare Research and Quality 2001). The Agency for Healthcare Research and Quality identified hospitalizations for these conditions as possible markers of low-quality care. The treatment of these conditions has also been cited as an area of concern specifically in the nursing facility setting (Burger, Kayser-Jones, and Bell 2000; Lewis 2002; Levenson 2003; Pandya 2003). Therefore, we use potentially preventable hospitalizations as a general indicator of the quality of medical care received during the episode.

Episodes were defined as “early transfers” if the initiating hospital stay was short enough to meet CMS’s criteria for short-stay *per diem* payments (Gilman et al. 2000). We use early transfers as a measure of the prevalence of very short hospital stays. This measure is used, in conjunction with length of stay, to assess the effects of HBSNF closure on the timing of discharge from the acute care hospital.

To account for possible changes in patient mix at the hospital level, all episode-level utilization and outcome measures are adjusted for demographics and clinical factors. We calculated mean utilization and outcomes for each combination of age group (under 65, 65–69, 70–74, etc., 90 and above), sex, and DRG using pooled (1997 and 2001) episode-level data. The adjusted values equal the difference between the actual value and the predicted value

(plus the overall mean). These adjustments were made using all episodes, including those beginning with admission to a hospital that did not host an HBSNF in 1997. Unadjusted results (not shown) are quite similar to the adjusted results, suggesting that changes in hospital-level patient mix were not highly correlated with HBSNF closure.

We assigned hospitals to propensity groups using a logistic regression model predicting whether a hospital would close its SNF by 2001. We found that only a small set of variables were strong predictors of closure. As shown in Table 2, these included the predicted change (1997–2001) in Medicare payments per SNF resident per day (“per diem”), for-profit ownership status, metropolitan location, the number of certified SNF beds, and whether the SNF was opened recently (on or after July 1, 1995). Note that we use the *predicted* change in SNF per diem rather than actual changes because the actual change is undefined among SNFs that closed. HBSNFs’ per diems post-PPS are determined by a national payment rate, a local wage index, and the HBSNF’s case mix. To predict the change in SNF per diem, we regressed change in per diem (1997–2001) on per diem in 1997 and the local wage index used by CMS to adjust payments under the PPS (U.S. Department of Health and Human Services 2001). This model predicted the change in per diem well, with an R^2 of 0.6956. Case mix was not included in either the per diem model or the closure model because additional analyses (not shown) did not identify case mix as an important predictor of HBSNF closure. The logistic closure model included dummies for geographic division as defined by the U.S. Census. An examination of the characteristics of closers and nonclosers within each propensity group revealed that the groups were well balanced.

We also generated “pooled” results in which a single difference-in-differences estimate was calculated including hospitals in all five propensity groups. For the pooled model we included dummy variables corresponding to the propensity groups along with a dummy variable indicating whether the hospital had closed its HBSNF by 2001.

RESULTS

Table 1 presents a descriptive analysis of the changes from 1997 to 2001 in unadjusted measures of postacute utilization and spending. Note that this descriptive analysis, for the sake of consistency, only includes episodes beginning with an admission to a hospital that hosted an HBSNF in 1997 (i.e., the same hospitals included in other analyses). During this period, there were

Table 1: Episode-Level Measures of Utilization, Spending, and Outcomes

<i>Variable</i>	<i>Mean in 1997</i>	<i>Mean in 2001</i>	<i>Change from 1997 to 2001</i>
Hospital length of stay (days)	5.87	5.60	− 0.26
Hospital payments per episode	\$8,057.09	\$8,086.65	\$29.55
Hospital outlier payments per episode	\$352.44	\$415.50	\$63.06
Early transfer (%)	3.2	3.0	− 0.1
Postacute use (%)			
Hospital-based SNF	12.8	8.7	− 4.1
Freestanding SNF	11.2	13.4	2.1
Home health	26.8	21.8	− 4.9
Other	5.3	7.1	1.7
No postacute use	58.0	61.3	3.3
Postacute payments per episode			
Hospital-based SNF	\$883.27	\$476.18	− \$407.08
Freestanding SNF	\$1,289.68	\$1,555.05	\$265.37
Home health	\$1,016.21	\$683.51	− \$332.69
Other	\$766.92	\$908.51	\$141.58
Total episode payments per episode	\$15,711.17	\$15,631.62	− \$79.55
30-day mortality (%)	8.2	7.9	− 0.3
120-day mortality (%)	16.0	15.8	− 0.2
360-day mortality (%)	25.8	25.6	− 0.2
Rehospitalized (%)	30.0	31.1	1.1
Rehospitalized with a potentially preventable condition (%)	6.6	6.1	− 0.4
Number of episodes	5,592,212	5,620,563	

Notes: Only includes episodes beginning with an admission to a hospital that hosted an HBSNF in 1997. We exclude standard errors because these statistics are generated from the universe of these episodes and, therefore, represent the true population means and changes.

Due to rounding, changes may appear not to equal differences in means.

SNF, skilled nursing facility.

relatively large shifts in the patterns of postacute care use. The use of HBSNFs and home health care dropped substantially, reflecting the payment reforms in the BBA. On the other hand, the use of freestanding SNFs and other postacute care (which includes inpatient rehabilitation facilities, long-term care hospitals, and swing-bed SNFs) increased. Total episode payments dropped slightly, as did all three measures of mortality (30, 120, and 360 days).

Table 2 presents the results of the logistic regression model used to assign hospitals to propensity groups, and describes the hospitals assigned to each group. As would be expected, the predicted change in Medicare per diem is inversely associated with closure—this result indicates that HBSNFs that faced decreased profitability post-PPS were more likely to close. In addition, urban HBSNFs and newer HBSNFs were more likely to close, as were HBSNFs with fewer beds and HBSNFs with lower occupancy. For-profit status was not

Table 2: Propensity Score Groups Based on Predicted Probability of Hospital-Based Skilled Nursing Facility Closure

	Mean				
	Propensity Group				
	1 [lowest]	2	3	4	5 [highest]
Odds Ratio from Logistic Regression (95% Confidence Interval)					
Predicted change in Medicare SNF per diem	\$91.06	\$16.27	-\$72.02	-\$125.16	-\$203.50
For-profit					
Located in a metropolitan area	1.2%	5.3%	11.4%	20.3%	38.6%
Number of certified SNF beds	35.3%	46.0%	72.0%	77.0%	85.4%
SNF occupancy in 1997	112.8	40.4	26.1	23.0	18.1
SNF opened recently (on or after July 1, 1995)	92.6%	83.8%	75.6%	68.2%	50.9%
	1.0%	2.7%	6.1%	24.6%	60.5%
Mountain					
West North Central	3.3%	11.4%	6.1%	10.4%	9.9%
West South Central	22.3%	11.4%	18.0%	7.8%	3.5%
East North Central	0.7%	1.2%	6.3%	25.9%	40.2%
East South Central	13.4%	26.9%	18.0%	8.9%	4.5%
South Atlantic	10.6%	11.9%	9.4%	6.8%	4.0%
Mid-Atlantic	20.6%	12.9%	13.2%	10.9%	9.4%
New England	17.5%	8.9%	8.1%	6.1%	10.9%
No. of SNFs closed	1.7%	2.5%	2.7%	4.3%	4.3%
No. of SNFs stayed open	13	38	90	93	196
Fraction of SNFs closed (%)	380	355	303	300	197
	3.3	9.7	22.9	23.7	49.9

Notes:
* p -value < 0.10 ;
** p -value < 0.05 ;
*** p -value < 0.01 . The logistic regression is unweighted. "Pacific" is the excluded geographic category.
SNF, skilled nursing facility.

independently associated with probability of closure, although for-profits tended to have other characteristics associated with closure (note that the percent for-profit is highest in propensity group 5). There were also important geographic factors, with HBSNFs in the west south central division (which comprises Texas, Oklahoma, Arkansas, and Louisiana) substantially more likely to close.

Table 3 presents the main difference-in-differences estimates. Each row represents a different outcome of interest, and each column represents a group of hospitals. Each cell represents a separate estimating equation, and presents a single parameter estimate. This parameter, the difference-in-differences estimate, equals the change from 1997 to 2001 among hospitals that closed their HBSNF minus the change from 1997 to 2001 among hospitals that did not close their HBSNF. This difference-in-differences estimate is meant to capture the effect of HBSNF closure on utilization and outcomes. The pooled results in the rightmost column include hospitals from all propensity groups.

These results indicate, briefly, that the primary effect of HBSNF closures was to shift the site of service to other alternative postacute care settings. HBSNF closures were also associated with a slight increase in hospital length of stay and payments to hospitals. The key results are quite consistent across the propensity groups. Therefore, the discussion of results that follows refers primarily to the pooled results.

Care Setting

Not surprisingly, HBSNF closure is associated with a sharp 9.2 percentage point reduction in the probability of HBSNF use (Table 3). Closures also led to significant increases in the probability that patients were referred to other settings, such as freestanding SNFs, long-term care hospitals, and inpatient rehabilitation facilities. For example, HBSNF closures increased the probability of freestanding SNF use by 2.4 percentage points.

The use of home health services and payments to home health agencies fell sharply over the period we analyzed because of substantial changes in Medicare's home health payment system. The magnitude of the change in the use of home health services does not appear to be related in any statistically robust way to HBSNF closure. This result suggests that home health care and HBSNF care are not close substitutes.

HBSNF closures were associated with small but statistically significant increases in the acute care hospital length of stay. HBSNF closure is associated with an increase in the average hospital length of stay of 0.12 days, and a

Table 3: Difference-in-Differences Estimates of the Effects of Hospital-Based SNF Closure on Utilization, Spending, and Outcomes

Variable	Propensity Group					Pooled (all hospitals)
	1 [lowest]	2	3	4	5 [highest]	
Hospital length of stay	0.28	0.05	0.08	0.12	0.18**	0.12***
Hospital payments per episode	-\$213.56	-\$91.60	\$475.74***	\$364.88**	\$124.15	\$254.57***
Hospital outlier payments per episode	-\$103.32	\$108.01*	\$57.84	\$71.83	\$93.80	\$75.96*
Early transfer (%)	-0.3	-0.1	-0.1	-0.2	-0.4**	-0.2***
Postacute use						
Hospital-based SNF (%)	-15.9***	-9.1***	-8.1***	-8.6***	-10.3***	-9.2***
Freestanding SNF (%)	4.5***	3.3***	2.6***	2.0***	2.2***	2.4***
Home health (%)	-0.5	-0.5	1.5***	0.0	0.0	0.3
Other (%)	1.4	2.5***	3.0***	1.6***	2.5***	2.3***
No postacute use (%)	5.8**	1.2	-0.8	1.4**	1.6**	0.9***
Postacute payments per episode						
Hospital-based SNF	-\$1,391.96***	-\$609.05***	-\$292.34***	-\$322.09***	-\$472.77***	-\$415.30***
Freestanding SNF	\$764.00***	\$331.48***	\$197.96***	\$199.13***	\$41.59	\$174.36***
Home health	\$111.74	-\$28.62	-\$3.48	-\$26.15	-\$30.25	-\$18.99
Other	\$179.21*	\$351.31***	\$399.11***	\$80.10	\$303.30***	\$272.46***
Total episode payments per episode	-\$807.37	-\$165.91	\$897.21***	\$366.03	\$100.80	\$342.86**
30-day mortality (%)	-0.7	0.2	-0.1	0.0	-0.3**	-0.1*
120-day mortality (%)	-1.8**	0.2	0.0	0.0	-0.3	-0.1
360-day mortality (%)	-2.8	0.0	0.1	0.0	0.1	0.0
Rehospitalized (%)	-0.1	-0.2	0.4*	-0.1	0.7***	0.2*
Rehospitalized with a potentially preventable condition (%)	0.6	-0.4	-0.1	-0.1	0.1	0.0
Number of hospitals	351	364	368	368	351	1,965

Notes:
* p -value < 0.10;
** p -value < 0.05;
*** p -value < 0.01. Weighted by number of admissions in 1997.
SNF, skilled nursing facility.

decrease of 0.2 percentage points in the probability of the stay meeting the early transfer criteria.

Medicare Spending

The effects of HBSNF closures on Medicare spending parallel the effects on utilization. HBSNF closures are associated with sharp decreases in Medicare spending for HBSNF services, and substantial increases in hospital spending, freestanding SNF spending, and spending on other postacute settings. HBSNF closure is associated with \$254.57 in additional payments to acute care hospitals for each initiating hospital stay (i.e., not including rehospitalizations). The higher hospital payments appear to result from a decrease in early transfers (note that early transfers result in reduced hospital payments) rather than an increase in outlier payments. In terms of total episode spending, the sharp decrease in HBSNF spending was offset by increased spending on alternative postacute settings. Because of offsetting postacute use and increased hospital payments, HBSNF closure was associated with a statistically significant increase in total episode payments of \$342.86 per episode.

Outcomes

The results of the propensity score analysis do not indicate a statistically robust association between HBSNF closures and health outcomes. HBSNF closure was associated with an increased probability of rehospitalization in propensity groups 3 and 5, but this finding was not consistent across propensity groups and was only marginally statistically significant in the pooled results. In propensity group 5, HBSNF closure is associated with a slight decrease in 30-day mortality, although the pooled 30-day mortality result is only marginally statistically significant. Of the other health outcomes examined—120- and 360-day mortality, and rehospitalization with a potentially preventable condition—none showed any statistically robust associations with HBSNF closures.

DISCUSSION

HBSNF closures from 1997 to 2001 were associated with substantial shifts in the site of service for postacute care services and in the distribution of Medicare payments for these services. These results indicate that HBSNF closures are associated with a slight increase in total Medicare spending, which is surprising given the magnitude of the associated reduction in HBSNF spending. This suggests that some patients who would have received care in the

HBSNF setting receive care instead in other costly settings, such as long-term care hospitals and inpatient rehabilitation facilities.

HBSNF closures had a statistically significant but relatively small effect on the length of stay in the acute care hospital setting. Anecdotal evidence suggested that the primary motivation for acute care hospitals to open SNF units was to lower the length of stay and receive additional payments for patients who would otherwise remain in the hospital. If HBSNFs did, in fact, contribute to lowering the hospital length of stay, the closure of the HBSNFs did not substantially reverse this effect.

The results have two main implications for policymakers. The first is that provider exits in response to payment cuts, as occurred among HBSNFs, do not necessarily lead to access problems. The availability of substitute sites of care can mitigate the impact of payment cuts. The second implication is that Medicare's payment policies for different types of providers should be viewed as an interconnected whole. Payment policy for one type of provider, such as HBSNFs, clearly affects utilization and spending among other providers.

Our analysis was limited to the early period of HBSNF closures before 2001. It is possible that some of the effects of the closures did not begin to occur until after this period, in which case we would be unable to document them. It is also possible that the closures that occurred in the 2 years or so after the implementation of the SNF prospective payment system were substantively different than closures that have occurred in more recent years. Thus, caution should be used in extrapolating these results to the more recent time period.

This analysis was limited by the types of data available in Medicare administrative records. Claims data provide detailed and accurate information on the utilization of services and provide some information on diagnoses, but do not provide any information on functional status (e.g., mobility, ability to dress oneself). For many HBSNF residents, the goal of treatment is to regain functional capacity after an acute episode such as a stroke, hip fracture, or coronary event. Improvement in functional capacity would, therefore, be the most direct measure of the success or failure of an HBSNF stay. Because we do not have direct measures of functional status, we instead use cruder outcome measures such as rehospitalization and mortality. Some measures of functional status are recorded in Medicare administrative data, such as the SNF Minimum Data Set-2.0 assessments and the Outcome and Assessment Information Set (OASIS) used by home health agencies. These functional status measures are currently being gathered but were not generally available in 1997 (our "pre" period). Furthermore, the functional status measures that exist in Medicare administrative data differ across sites of care, and are only gathered among

individuals using a particular type of postacute care. These data features preclude the use of direct measures of functional status in the type of analysis presented here (i.e., one which focuses on substitution across sites of care).

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