The Costs And Potential Savings Associated With Nursing Home Hospitalizations

Data from New York State suggest that reducing unnecessary hospitalizations could generate major savings for Medicare.

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ABSTRACT: Reducing nursing home hospitalizations has been identified as a possible area for cost savings, but little is known about the magnitude of spending associated with these hospitalizations. Using merged hospital and nursing home administrative files from New York State, we found that inflation-adjusted spending on nursing home hospitalizations increased 29 percent from 1999 through 2004. By 2004, aggregate spending totaled roughly $972 million, of which 23 percent was attributable to ambulatory care–sensitive conditions. These data highlight the potential for cost savings associated with programs designed to reduce these potentially avoidable hospitalizations from the nursing home setting. [*Health Affairs* 26, no. 6 (2007): 1753–1761; 10.1377/hlthaff.26.6.1753]

HOSPITALIZATION OF NURSING HOME RESIDENTS is prevalent: More than 15 percent of long-stay nursing home residents are hospitalized within any given six-month period.[1] Approximately 40 percent of nursing home–hospital transfers have been deemed inappropriate, meaning that the resident could have been cared for safely at a lower level of care.[2] Moreover, hospitalizations put nursing home residents at risk for iatrogenic disease and delirium.[3] As a result, potentially avoidable hospitalizations have been targeted as an indicator of poor nursing home quality and an area for quality improvement.[4]

Given the high cost of hospitalizations, there is also the possibility for sizable cost savings associated with a reduction in potentially avoidable hospitalizations.[5] However, payment incentives create tension between Medicaid, the dominant payer of chronic nursing home services for the elderly, and Medicare, the dominant payer of hospital services, regarding the subsidy of acute, maintenance, and preventive care provided in the nursing home setting.[6] A state Medicaid program that pays nursing homes to invest in the staff and clinical resources (for example, intravenous therapy or diagnostic services) necessary to reduce the likeli-

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hood of hospitalization mostly generates savings for Medicare.

Most recently, reducing avoidable hospitalizations has been proposed as a performance measure in the planned Medicare Nursing Home Value-Based Purchasing Demonstration.[7] In conjunction with other quality dimensions, nursing homes with lower avoidable hospitalization rates will be rewarded with higher incentive-based payments. These bonus payments will not alter Medicare payments to nursing homes for postacute services. By law, the demonstration must be budget-neutral: For example, Medicare Demonstration Bonus Pool payments to nursing homes with lower hospitalization rates would be balanced against the savings to Medicare from reduced hospitalizations.

Using a merged individual-level hospital–nursing home file for New York State, we estimated the costs associated with total and potentially avoidable nursing home hospitalizations over the period 1999–2004.

Study Design And Methods

■ **Data sources.** We obtained data on the costs associated with nursing home hospitalizations in New York State by linking two administrative databases for the period 1998–2004. Individual nursing home data were obtained from the Minimum Data Set (MDS) assessment instrument, collected at the time of admission and then at least quarterly thereafter for all residents in Medicaid/Medicare-certified nursing homes. We had MDS data from 690 distinct nursing homes in New York State during the period.[8] Given the factors associated with hospitalizations among short-stay (postacute care) and long-stay (custodial care) nursing home residents, we limited our analysis to long-stay (more than 120 days) residents.[9] The MDS assessments for these residents were linked with the Statewide Planning and Research Cooperative System (SPARCS) hospital inpatient data set. All acute care hospitals in New York State must collect demographic, diagnostic, procedural, payer, and other financial information for each admission. Over the period, we had SPARCS data from 253 distinct hospitals. Because SPARCS does not have a consistent record of outpatient and emergency department (ED) hospital visits for our period of study, we focus on inpatient hospitalizations.

■ **Adjustments and analysis.** Adjustments were made to the merged MDS-SPARCS data. First, because the SPARCS data report charges rather than costs, we adjusted the data using a cost-to-charge ratio specific to each hospital and year. Each hospital's ratio was obtained from the annual Institutional Cost Report (ICR) by dividing costs (ICR Exhibit 11) by charges (ICR Exhibit 46). Second, where we present inflation-adjusted dollar values, we used the medical Consumer Price Index to make this adjustment. Third, we identified hospitalizations with an ambulatory care–sensitive (ACS) primary diagnosis, which could have been prevented or treated in the nursing home, as potentially avoidable.[10] The list of ACS diagnoses can vary, but in this context it includes angina; asthma; cellulitis; chronic obstructive pulmonary disease; congestive heart failure; dehydration; diabetes mellitus; gastro-

enteritis; epilepsy; hypertension; hypoglycemia; urinary tract infections; pneumonia; and severe ear, nose, and throat infections. Although the ACS conditions were developed for the community-dwelling elderly, they have also been applied to the nursing home population.[11] Finally, because we limited our analysis to long-stay residents, the data from the initial months of 1998 and final months of 2004 cannot be used. We addressed this by reporting only results from 1999 onward and by using the utilization and spending data from the first half of 2004 to estimate aggregate hospitalizations and costs for the entire calendar year. Because the 2004 data reflect the most recent data available on the costs of nursing home hospitalizations, we report results for that year, even though the data were not available for the full year.

Study Results

■ **Total hospitalizations.** In nominal terms, annual total spending on nursing home hospitalizations increased from roughly $608 million in 1999 to $971 million in 2004 (Exhibit 1). Adjusted for inflation, aggregate spending increased 29.2 percent over this period. The overall number of nursing home days decreased 5.4 percent in New York State over this time period, and the total number of hospitalizations increased 30.1 percent (Exhibit 1). Thus, the rate of hospitalized long-stay nursing home residents increased from 24.2 percent in 1999 to 28.8 percent in 2003. The average hospital length-of-stay declined 9.6 percent, from 10.51 days in 1999 to 9.50 days in 2004. Total inflation-adjusted costs per hospital stay remained rela-

EXHIBIT 1
Costs Of Nursing Home Hospitalizations, New York State, 1999–2004

	1999	2000	2001	2002	2003	2004
Nursing home residents	167,452	165,228	162,946	161,967	161,726	–[a]
Nursing home days	43,197,371	42,762,249	41,945,591	41,467,849	40,882,053	–[a]
Total no. of hospitalizations	63,198	67,836	71,401	75,021	78,702	82,230
Total no. of residents hospitalized	40,475	41,981	43,782	45,083	46,642	55,878
Total hospital days	664,347	699,409	726,961	738,818	760,911	781,208
Average length-of-stay	10.51	10.31	10.18	9.85	9.67	9.50
Hospitalization rate	24.17%	25.41%	26.87%	27.83%	28.84%	–[a]
Total costs ($ millions)	$607.7	$658.5	$737.5	$806.9	$900.1	$971.7
Total cost (millions, $2004)	$752.0	$783.0	$838.4	$876.2	$939.5	$971.7
Total cost per hospitalization	$9,911	$10,026	$10,583	$11,018	$11,643	$12,160
Total cost per hospitalization ($2004)	$12,264	$11,922	$12,029	$11,964	$12,152	$12,160
Total cost per hospital day	$969	$999	$1,060	$1,144	$1,227	$1,304
Total cost per hospital day ($2004)	$1,199	$1,188	$1,205	$1,242	$1,281	$1,304

SOURCES: Minimum Data Set (MDS); and Statewide Planning and Research Cooperative System (SPARCS).

NOTES: The 2004 estimates are generated from the period January through June to account for truncation in the long-stay nursing home population. As such, we do not report the number of nursing home residents, nursing home days, or the hospitalization rate for this year. The measures involving total number of residents, total home days, and hospitalization rate are not computed for 2004 because there is no obvious way of converting the values for the first half of the year to full-year values. Across all years, approximately 2.5 percent of hospitalizations were missing cost information. These observations were excluded in calculating costs per hospitalization and per hospital day.

[a] Not available; see Notes.

tively constant over the period of study, decreasing 0.8 percent, while inflation-adjusted costs per hospital day increased 8.8 percent.

■ **Potentially avoidable hospitalizations.** When we limited the analysis to only ACS hospitalizations, annual total spending increased from $169 million in 1999 to $223.8 million in 2004 (Exhibit 2). Adjusted for inflation, this increase represented a 7.1 percent increase in spending on ACS hospitalizations. The proportion of ACS hospitalizations (out of total hospitalizations) was 29 percent in 2004. Adjusted for inflation, spending per ACS stay decreased by 4.7 percent, and spending per ACS day increased by 8.5 percent, over the period of study.

The SPARCS system provides information on the primary and secondary payers for a given hospitalization. We present data on ACS hospitalization spending by primary payer (Exhibit 3). In 2004, Medicare was the primary payer for spending totaling $188.5 million (84 percent), Medicaid for spending totaling $26.5 million (12 percent), and other payers for spending totaling $8.9 million (4 percent). Inflation-adjusted hospital spending for which Medicare was the primary payer increased 9 percent; Medicaid, increased 17.2 percent; and other payers, declined 34.5 percent.

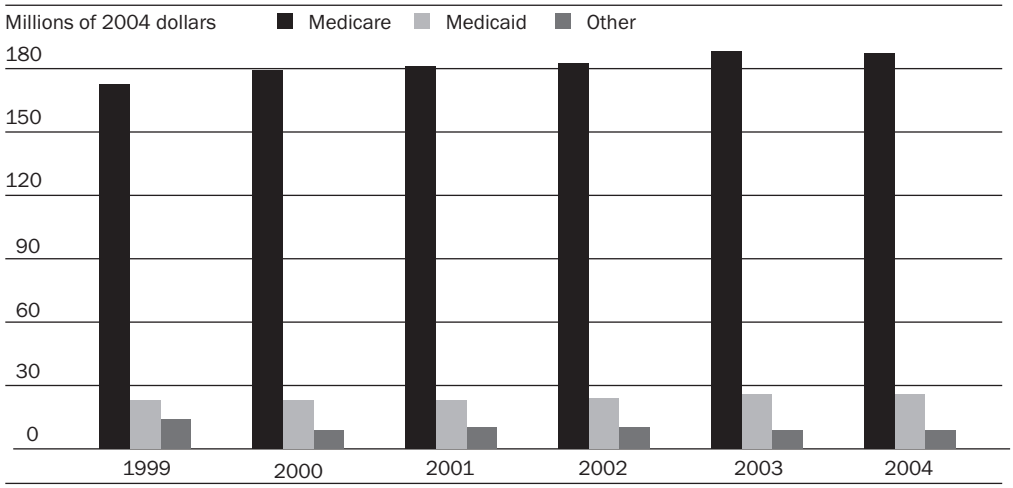
■ **Diagnoses.** We also present data on the fourteen ACS conditions used to identify potentially avoidable nursing home hospitalizations (Exhibit 4). Over the period January 1999 through June 2004, 122,027 hospitalizations (31.3 percent) were categorized as potentially avoidable, accounting for $1.24 billion in spending (in 2004 dollars). Specifically, pneumonia, the most common diagnosis, accounted for 33 percent of ACS hospitalizations and 37 percent of ACS spending. Other frequent diagnoses included kidney/urinary tract infections, congestive heart failure, dehydration, and chronic obstructive pulmonary disease. The high concentration of spending in relatively few conditions suggests that targeted prevention and treat-

EXHIBIT 2
Costs Of Ambulatory Care–Sensitive Nursing Home Hospitalizations, New York State, 1999–2004

	1999	2000	2001	2002	2003	2004
Total no. of hospitalizations	21,256	22,609	22,765	23,152	23,530	23,622
Total no. of residents hospitalized	16,795	17,398	17,784	17,958	18,380	20,068
Total hospital days	196,673	202,714	198,645	192,954	193,786	190,954
Average length-of-stay (days)	9.25	8.97	8.73	8.33	8.24	8.02
Total costs ($ millions)	$169.0	$178.4	$189.3	$199.7	$214.4	$223.8
Total cost (millions, $2004)	$209.1	$212.1	$215.2	$216.8	$223.8	$223.8
Total cost per hospitalization	$8,198	$8,154	$8,510	$8,840	$9,273	$9,664
Total cost per hospitalization ($2004)	$10,144	$9,695	$9,673	$9,598	$9,679	$9,664
Total cost per hospital day	$913	$939	$992	$1,093	$1,148	$1,226
Total cost per hospital day ($2004)	$1,130	$1,117	$1,127	$1,187	$1,199	$1,226

SOURCES: Minimum Data Set (MDS); and Statewide Planning and Research Cooperative System (SPARCS).
NOTES: Across all years, approximately 2.5 percent of hospitalizations were missing cost information. These observations were excluded in calculating costs per hospitalization and per hospital day.

EXHIBIT 3
Costs Of Ambulatory Care–Sensitive Nursing Home Hospitalizations By Primary Hospital Payer, New York State, 1999–2004



SOURCES: Minimum Data Set (MDS); and Statewide Planning and Research Cooperative System (SPARCS).
NOTE: The 2004 estimates are generated from the period January through June to account for truncation in the long-stay nursing home population.

ment interventions in nursing homes could be particularly fruitful. The average spending per ACS hospitalization was $10,140, with asthma, pneumonia, and diabetes being the most costly conditions.

EXHIBIT 4
Ambulatory Care–Sensitive Nursing Home Hospitalizations, New York State, 1999–2004

Rank	Condition	Number	Percent of total	Total spending (millions, $2004)	Percent of total spending	Mean spending
1	Pneumonia	40,580	33.25	456.6	36.90	11,252
2	Kidney/urinary tract infection	21,476	17.60	200.9	16.24	9,354
3	Congestive heart failure	20,116	16.48	210.8	17.04	10,481
4	Dehydration	10,650	8.73	89.1	7.20	8,366
5	Chronic obstructive pulmonary disease	9,494	7.78	98.3	7.95	10,357
6	Grand mal status and epileptic convulsions	5,719	4.69	49.4	3.99	8,637
7	Cellulitis	5,234	4.29	47.5	3.84	9,067
8	Diabetes	4,778	3.92	52.6	4.25	11,015
9	Asthma	1,336	1.09	15.1	1.22	11,332
10	Gastroenteritis	832	0.68	5.1	0.41	6,125
11	Angina	777	0.64	4.1	0.33	5,281
12	Hypertension	588	0.48	4.8	0.38	8,086
13	Severe ear, nose, throat infections	266	0.22	1.6	0.13	6,190
14	Hypoglycemia	181	0.15	1.3	0.11	7,369
	All	122,027	100.00	1,237.3	100.00	10,140

SOURCES: Minimum Data Set (MDS); and Statewide Planning and Research Cooperative System (SPARCS).
NOTE: This exhibit contains only those hospitalizations for which we have full cost information for the period January 1999 through June 2004.

Discussion

These data suggest that major costs are associated with hospitalizations from the nursing home setting. Specifically, we estimate that approximately $971.7 million was spent on such hospitalizations in New York State in 2004. Spending on ACS hospitalizations constitutes $223.8 million (23 percent) of this total, of which Medicare was the primary payer for spending totaling $188.5 million (84 percent) and Medicaid for spending totaling $26.5 million (12 percent). These results underscore the idea that policies to decrease potentially avoidable nursing home hospitalizations could generate major savings for public programs.

After adjusting for inflation, the results also indicate a 29 percent increase in total hospital spending and a 7 percent increase in ACS hospital spending over the period. These trends are largely attributable to higher rates of hospitalization over time, rather than increased spending per hospitalization. The exact reason for this increase is unclear, but there are several potential explanations. First, nursing homes are caring for an increasingly sicker and more disabled population.[12] Second, given the important relationship between nursing home staff and hospitalizations, the increase in hospitalizations may relate to the growing nurse shortage.[13] Third, the recent increase in lawsuits against nursing homes may have led facilities to hospitalize patients who previously would have been treated in the nursing home, to avoid potential litigation.[14] Finally, although Medicaid nursing home payment rates have generally increased over the period in question, nursing home cost growth might have outpaced growth in payment rates, leaving nursing homes without the resources to care for an increasingly sicker population. This could be especially relevant in the context of recent cuts to Medicare postacute nursing home payment rates, which have been found to cross-subsidize the care of long-stay nursing home residents.[15] Interestingly, a recent report commissioned by the Medicare Payment Advisory Commission found a sizable increase in potentially avoidable hospitalizations among short-stay nursing home residents during 2000–2004.[16]

There is a large literature establishing the importance of nursing home–level factors toward reducing potentially avoidable hospitalizations. These factors encompass both prevention-oriented measures, such as enhanced primary care, and treatment-oriented measures, such as the increased presence of IV and respiratory therapy.[17] Policymakers might consider several pathways in efforts to change facilities' behavior with respect to potentially avoidable hospitalizations.

First, existing research has established that states with higher Medicaid payment rates have lower hospitalization rates among long-stay nursing home residents.[18] However, because Medicare typically covers the hospitalization costs of nursing home residents, there may be less financial incentive for state Medicaid programs to provide nursing homes with the clinical resources necessary to prevent nursing home hospitalizations.[19] Policymakers have addressed this problem for the community-dwelling elderly by financially integrating Medicare and

Medicaid via capitation.[20] Another intriguing payment mechanism, which has received much attention from policymakers in recent years, is pay-for-performance (P4P). The planned federal Nursing Home Value-Based Purchasing Demonstration will use the Medicare savings from decreased avoidable hospitalizations to reward facilities with good performance. It is an open issue as to whether the size of the payments will be sufficient to change nursing home behavior.[21]

As an alternative to payment policy, the Centers for Medicare and Medicaid Services (CMS), which has primary oversight over the Medicare-Medicaid nursing home survey and certification process, could institute more stringent regulatory requirements for nursing homes to provide, for example, increased nursing and medical staff. However, given recent state budget shortfalls, it is unlikely that state Medicaid programs, the dominant payer of nursing home services, would be able to cover the increased costs. This leaves open the issue of potential cost shifting to private-pay and Medicare residents. Moreover, it is also unclear whether more stringent regulation translates into better outcomes.[22]

Finally, given the importance of nursing home hospitalizations as a potential measure of facility quality, the CMS could disseminate a risk-adjusted measure of potentially avoidable hospitalizations on Medicare's Nursing Home Compare Web site. Indeed, the development of such a measure is one of the research objectives of the Value-Based Purchasing Demonstration. Although this approach is low-cost relative to the payment and regulatory approaches outlined above, consumers and providers might not be responsive to such data.[23]

■ **Study limitations.** There are several potential limitations and caveats in interpreting these estimates. First, our findings might not generalize to other states. Although previous work has established variation across states in nursing home hospitalizations, a recent national study found that New York's hospitalization rate for long-stay residents over a five-month period (16.5 percent) is quite similar to the national average (15.7 percent, standard deviation = 4.5 percent).[24] Second, our estimates do not include spending associated with hospitalizations such as physician or medical transportation costs. The SPARCS database does not contain information on these items. As a related point, we did not include hospital costs associated with ED visits and other outpatient care. Unfortunately, SPARCS does not contain complete measures of these costs prior to 2004. However, the 2004 SPARCS data suggest that their inclusion would add roughly 6 percent to total spending on nursing home hospitalizations. Third, SPARCS reports hospital spending, not the amount the hospital was paid by Medicare, Medicaid, and other payers. Spending is a good approximation for payment rates in the aggregate.[25] However, payment information would provide the actual savings for Medicare or Medicaid associated with the nonhospitalization of nursing home residents. Fourth, any definition of *potentially avoidable hospitalizations* is subjective, and we acknowledge a lack of consensus among clinicians on this issue. Specifically, the ACS conditions were developed for the community-dwelling population, not the chronically ill nursing home population. How-

ever, other studies—using alternative definitions—also suggest that a large proportion of nursing home hospitalizations may be potentially avoidable.[26] Fifth, we used a 120-day cut-off to identify the custodial nursing home population. A potential limitation here is the exclusion of any custodial residents discharged before 120 days. Finally, the cost analysis we have conducted would be one input into a broader cost-effectiveness analysis. Because we did not analyze the costs associated with treating nonhospitalized residents in nursing homes (or effectiveness across either setting), it would be incorrect to directly interpret our cost estimates as cost savings if the hospitalization was avoided. Rather, our estimates suggest potential cost savings, assuming that the person could be appropriately treated in the nursing home at a lower cost.

■ **Conclusions.** Although there has been recent policy interest in lowering potentially avoidable nursing home hospitalizations, there has been little research documenting the associated financial costs. This paper has documented sizable and increasing costs associated with such hospitalizations in New York State over 1999–2004. Importantly, these costs are predominantly borne by Medicare, which suggests that policies directed at decreasing nursing home hospitalizations may generate major cost savings for the Medicare program.

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NOTES

1. Long-stay residents were identified by the authors as those in a nursing home for at least 160 days. O. Intrator, J. Zinn, and V. Mor, "Nursing Home Characteristics and Potentially Preventable Hospitalizations of Long-Stay Residents," *Journal of the American Geriatrics Society* 52, no. 10 (2004): 1730–1736.
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