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The impact of Medicaid payer status on hospitalizations in nursing homes

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Abstract

Objectives—To examine the association between payer status (Medicaid versus private-pay) and the risk of hospitalizations among long-term stay nursing home (NH) residents who reside in the same facility.

Data and study population—The 2007–2010 national Medicare Claims and the Minimum Data Set were linked. We identified newly admitted NH residents who became long-stayers and then followed them for 180 days.

Analyses—Three dichotomous outcomes – all-cause, discretionary and nondiscretionary hospitalizations during the follow-up period – were defined. Linear probability model with facility fixed-effects and robust standard errors were used to examine the within-facility difference in hospitalizations between Medicaid and private-pay residents. A set of sensitivity analyses were performed to examine the robustness of the findings.

Results—The prevalence of all-cause hospitalization during a 180-day follow-up period was 23.3% among Medicaid residents compared to 21.6% among private-pay residents. After accounting for individual characteristics and facility effects, the probability of any all-cause hospitalization was 1.8 percentage point (P<0.01) higher for Medicaid residents than for private-pay residents within the same facility. We also found Medicaid residents were more likely to be hospitalized for discretionary conditions (5% increase in the likelihood of discretionary

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hospitalizations), but not for non-discretionary conditions. The findings from the sensitivity analyses were consistent with the main analyses.

Conclusion—Observed higher hospitalization rates for Medicaid NH residents are at least in part driven by the financial incentive NHs have to hospitalize Medicaid residents.

INTRODUCTION

The frequency of hospitalizations of nursing home (NHs) residents is a significant financial and health concern. NH residents are generally old, frail and in poor health. Thus the interruption in care and transition between NHs and hospitals can cause significant physical and psychological deterioration.[1–7] Furthermore, many of these hospitalizations are potentially unnecessary or avoidable, [1,8–12] which leads to a significant financial burden on the Medicare program. Reducing unnecessary hospitalizations in the NH population is a focus of the Center for Medicare and Medicaid Services (CMS). Understanding the mechanisms underlying these hospitalizations, including identifying populations most vulnerable to these hospitalizations, is crucial to achieve the goal of reducing hospitalizations in NHs.

Medicaid residents account for the largest long-term care population in NHs.[13] The NH Medicaid policies, however, may provide incentives for NHs to hospitalize Medicaid residents. For instance, Medicaid reimbursement rates, which are usually set prospectively, are generally lower than private payment rates[13,14] and less likely to cover costs if a resident requires intensive medical care due to an exacerbation of their conditions or an acute episode. Medicaid bed-hold policies, which reimburse NHs for holding the bed for a Medicaid resident when hospitalized (there is no such policy for private-pay residents), [15] could provide additional incentives for NHs to hospitalize Medicaid residents.[15–17]

Under these Medicaid NH policies, Medicaid residents may experience higher risks of hospitalization through two mechanisms: One possibility is that NHs with many Medicaid residents do not have the resources to provide onsite intensive care, and therefore may have no choice but to transfer their residents to hospitals (refer as across-facility variations). Alternatively, Medicaid residents may be more likely to be hospitalized because it is less costly (and thus more profitable) for facilities to transfer them to a hospital for treatment than to provide intensive care onsite, even when resources are available. This second scenario suggests that Medicaid patients will be more likely to be hospitalized than private-pay residents in the same facility (referred as within-facility differences). While some studies have suggested across-facility variations in hospitalizations between Medicaid and private-pay residents, [15,16,18,19] relatively few studies are focused on whether NHs make different hospitalization decisions for Medicaid and private-pay residents within the same facility. [20] It is important to differentiate between these two possible mechanisms because the policy implications of each may be different. For example, while across-facility variation may suggest increased investment in poor-resource nursing homes (i.e. NHs with a high proportion of Medicaid residents), simply investment in resources may not be effective if within-facility differences exist. If the higher hospitalization rates experienced by Medicaid residents are related to NHs' inherent financial incentives (transferring a Medicaid patient to

hospital is more profitable than providing onsite care), it will be necessary to use an appropriate approach to incentivize NHs to promote equal care among NH residents with different payer status. Otherwise, some NHs may always have incentives to hospitalize their Medicaid residents regardless of their capability to provide such care.

The objective of this study is to examine the difference in hospitalization risks between Medicaid and private-pay residents within the same facility. By using national data (i.e. from 01/01/2007 to 09/30/2010), this study also examines whether the within-facility differences in hospitalizations between Medicaid and private-pay residents vary between discretionary and non-discretionary hospitalizations. Financial incentives are less likely to affect hospitalization decisions for conditions that are considered non-discretionary – when hospitalization is the standard of care for the condition (e.g. acute myocardial infarction) – compared with discretionary conditions – when there is no agreement about the necessity of hospitalization (e.g. congestive heart failure).[11,21–26] Hence, the different relationship between Medicaid payer status and discretionary versus non-discretionary hospitalizations will provide more robust evidence on the impact of financial incentives on NHs' hospitalization decisions.

METHODS

Data

The national Medicare beneficiary summary file, Medicare claims (including inpatient claims, skilled nursing facility claims, home health claims, hospice claims, and outpatient claims) and the Minimum Data Set (MDS) 2.0 between Jan 1, 2007 to Sep 30, 2010 were linked and compiled into a "residential history file" to track each individual through health care locations, including the transition between home, skilled nursing facility, nursing facilities and hospitals.[27] The MDS is a federally mandated assessment tool for all residents in Medicare and/or Medicaid certified NHs. The MDS contains detailed information on individual socio-demographic characteristics as well as health conditions.

Cohort

The study included NH residents 65 years old or older, who were enrolled in Medicare fee-for-service and were newly admitted to NHs between July 1 2007 and Jan 1 2010. A resident was considered newly admitted to a NH if he or she did not have any NH stay in the prior 6 months before the NH admission. If a resident had multiple qualified "new admissions", we randomly selected one of them. Among those who were newly admitted, we only focused on those who became NH long-stayers (i.e. who stayed in the NH for at least 100 day after the initial NH admission) so that residents were more homogeneous in terms of their needs of care. We considered the date representing 100 days after the initial admission to be the "baseline" date. We then followed these residents for another 180 days after the baseline date (in other words, a resident was followed for 280 days after the initial NH admission). We used a 180-day window so that our findings could be compared to prior studies.[16,18,19,28] In total, we identified 841,388 newly admitted long-stayers residents. Among these long-stayers, 49.8% (N=419,134) had Medicaid as the payment source at the baseline date, 17.5 % (N=147,287) spent down to Medicaid during the course of their NH

stay,[a] and the rest of the residents were considered as private-pay (Medicare does not pay for long-term care in NHs). We did not differentiate residents who were paid by other payer, such as Veterans, since they only accounted a very small proportion of the residents in Medicare and/or Medicaid certified NHs. We excluded residents who spent-down to Medicaid because these residents had their NH stay covered both by Medicaid (after spend-down) and other private source (before spend-down). We further restricted our analysis to facilities with at least 20 qualified individuals. Therefore, the final analytical sample included 651,507 residents (396,090 Medicaid residents and 255,417 private-pay residents) in 13,109 facilities.

Outcome variables

Three dichotomous outcomes of NH originating hospitalizations were defined. The first outcome variable was defined as any acute hospitalization (all-cause hospitalizations) from a NH within 180 days versus none after the baseline date. The second outcome variable was defined as any non-discretionary hospitalization from a NH within a 180-day follow-up window after the baseline date. A hospitalization was defined as non-discretionary if hospitalization is the standard of care for the condition. Based on the literature, we considered a hospitalization as non-discretionary if the admission diagnoses fell within the following set of diagnoses: acute myocardial infarction, hip fracture, respiratory failure, subdural hemorrhage, concussion, severe infection (i.e. sepsis, meningitis, endocarditis), gastrointestinal bleeding, and stroke appendectomy.[26,29] The third outcome variable was defined as any discretionary hospitalization from a NH within a 180-day window after the baseline date. We considered a hospitalization as discretionary when there is no clear agreement in the necessity of hospitalization for the medical condition (i.e. pneumonia, congestive heart failure, hypertension, chronic obstructive pulmonary disease, and urinary tract infection)[11,21–26]. As a sensitivity analysis, we also used two additional approaches to define the discretionary hospitalizations (see the sensitivity analysis section).

Independent variable of interest

Individual payer status was jointly determined by the MDS, Medicare denominator file and Medicare SNF claims.[30] We used Medicare SNF claims to determine whether the NH stay was covered by Medicare. If a resident's NH stay was not covered by Medicare and the resident was not eligible for Medicaid, we considered the payer source for her/his NH stay as private-pay.

Covariates

Individual social-demographic characteristics (e.g. age, gender, race, and education) were obtained from Medicare beneficiary summary file and the MDS data. Individual treatment preferences (e.g. do-not-hospitalization order and do-not-resuscitate order) and health status (e.g. activities of daily living [ADL], cognitive impairment score [CPS], comorbidities) were obtained from the most recent MDS assessment prior to the baseline date. We also

[a]The proportion of private-pay residents seems to be higher than the prevalence of private-pay residents estimated by other sources. This may be due to the identification of this cohort, which only included those who were newly admitted to nursing homes and stayed for at least 100 days. The longer a resident stays in a nursing home, the more likely he/she spends –down to Medicaid.

controlled for the history of health care utilization (e.g. number of hospitalization) 180 days prior to the initial NH admission and during the first 100 NH days after the initial admission (i.e. before they became long-stayers). Lastly, we accounted for secular trends (i.e. 2007–2010) by including indicators for the years of the baseline date.

Statistical analysis

We estimated a linear probability model with facility fixed-effects and robust standard error to test the differences in hospitalizations between Medicaid and private-pay residents within a facility. We chose to use linear probability model because of its computational efficiency (i.e. our large data sample size and more than 10,000 fixed-effects) and more importantly, because of its easy interpretation (i.e. the direct marginal effect of payer status on probability of being hospitalized). The linear probability model approximates the response probability and provides a good estimate of the marginal effect on the response probability near the center of the distribution of independent variables.[31] The linear probability model with facility fixed-effects accounts for facility (and state) factors that are invariant to residents who resided in the same facility of the distribution of facility effects and the relationship between facility effects and other independent variables.

Three separate models were used to examine the relationship between Medicaid payer status and all-cause hospitalizations, discretionary and non-discretionary hospitalizations, respectively, controlling for individual covariates and secular trends. We expected Medicaid payment status to be related to a higher probability of all-cause hospitalizations and discretionary hospitalization, but not for non-discretionary hospitalizations. We also tested the difference in the effect of Medicaid payer status on discretionary hospitalization versus non-discretionary hospitalization. Lastly, to examine whether survival time will bias the relationship between Medicaid payer status and the probability of hospitalizations, we stratified NH residents by those who died within the 180-day observational window and those who survived the observational window, and repeated the analysis of the relationship between Medicaid payer status and all-cause hospitalizations.

Sensitivity analysis

We performed a set of sensitivity analyses. First, we used two alternative approaches to define discretionary hospitalizations: 1) any hospitalizations that did not qualify as nondiscretionary hospitalizations, and 2) any hospitalizations for conditions that were considered to be discretionary in CMS's Nursing Home Value Based Purchasing demo (i.e. heart failure, respiratory infection, electrolyte imbalance, sepsis, urinary tract infection, or anemia). Second, we defined the study cohort as any NH long stayers in 2009 (we used one year of data due to the large population), randomly selected one quarterly/annual assessment as the baseline, and followed them for 180 days. Lastly, we repeated the main analyses by conditional fixed-effects logit models to check the potential discrepancy between a linear probability model (with fixed-effects) and fixed-effects logit model.

RESULTS

Descriptive analyses

The overall prevalence of all-cause hospitalization during a 180-day follow-up period was 23.3% among Medicaid residents compared to 21.6% among private pay residents. The overall prevalence of nondiscretionary hospitalizations was 2.46% among Medicaid residents versus 2.50% among private residents. The prevalence of discretionary hospitalizations was 4.22% among Medicaid residents versus 4.21% among private-pay residents (Table 1).

As presented in Table 1, on average, Medicaid residents were two years younger than private residents. The prevalence of chronic obstructive pulmonary disease (COPD)/asthma, stoke, diabetes, mental conditions was higher among Medicaid residents than among private-pay residents. However, the prevalence of congestive heart failure (CHF) was similar among the Medicaid residents and private-pay residents, and Medicaid residents had lower prevalence of other heart conditions (e.g. arteriosclerotic heart disease, cardiac dysrhythmias, peripheral vascular disease) than private-pay residents. While Medicaid residents were more likely to have severe cognitive impairment as compared with private-pay residents, their physical functional status appeared to be similar as that of private-pay residents (ADL score was 16.22 for Medicaid residents and 16.52 for private-pay residents).

Multivariate analysis

As shown in Table 2, after accounting for individual characteristics and facility effects, the probability of being hospitalized among Medicaid residents was 1.8 percentage point ($P<0.01$) higher than that among private-pay residents within the same facility. In other words, Medicaid payer status was associated with 8% increase in the probability of hospitalization rates as compared to private-pay residents (calculated as 1.8% divided by 21.6%, which was the average hospitalization rates for private-pay residents).

The regression on nondiscretionary hospitalizations revealed no significant difference in these hospitalizations between Medicaid and private-pay residents, as expected. On the other hand, Medicaid payer status was associated with 0.22 percentage point higher ($P<0.01$) in the probability of hospitalizations compared with the private pay patients for the discretionary hospitalizations. This was approximately 5% increase in the rates of these hospitalizations relative to the rates experienced by private-pay residents in the same facility (calculated as 0.22 % divided by 4.21%, which was overall rates for discretionary hospitalizations among private-pay residents). The coefficient of Medicaid payer status estimated from discretionary hospitalizations was significantly different from that estimated from non-discretionary hospitalizations ($P<0.05$).

Table 3 displays the results from the analysis in which we compared the probability of all cause hospitalization for “survivor” and “decedents”. Consistent with our expectations, Medicaid residents were more likely to be hospitalized from a NH than private-pay residents in the same facility - the probability of being hospitalized for Medicaid residents was 2.2% and 2.8% point higher than that for private-pay residents among “survivors” and “decedents”, respectively. The difference in these two probabilities was marginally

significant (P=0.1). In other words, as compared with private-pay residents, the increase in the likelihood of NH originating hospitalizations was higher among Medicaid "decedents" than "survivors".

Sensitivity analyses

The findings from the sensitivity analyses were consistent with the main analyses. The effect size of payer status on hospitalizations based on a cohort of any NH long stayers was similar to the main analysis, and findings from conditional logit models were similar to the main analyses. The findings from the alternative definitions of discretionary hospitalizations were consistent with the main findings.

DISCUSSIONS

To our knowledge this study is the first national study to explore the differences in hospitalizations between Medicaid and private-pay residents within a facility. We found that Medicaid residents had a higher probability of all-cause hospitalizations as well as discretionary hospitalizations than did similar private-pay residents residing in the same facility. We did not find Medicaid residents to have a higher probability of non-discretionary hospitalization, supporting the hypothesis that financial incentives play a role in the higher hospitalization rates observed for Medicaid residents rather than unmeasured severity. We considered hospitalizations among private-pay residents as the baseline rate in a facility assuming that NHs had no or less incentive to hospitalize private-pay residents since they were generally more profitable than Medicaid residents and to our knowledge, were not subject to the bed-hold policy. Therefore, the hospitalization rates among private-pay residents were more likely to reflect the facility's ability to provide onsite intensive care, and the difference in the probability of hospitalizations between Medicaid and private-pay residents could be attributable to payer status related financial incentives.

The extra hospitalizations experienced by Medicaid residents are likely to be unnecessary as they are not directly related to individual clinical needs. NH residents are generally in poor health, having complex medical conditions, and are usually on complex medication and treatment regimens. [32] Transitions between NHs and hospitals can lead to significant disruption of care resulting in medication errors and/or other quality deficiencies. Moreover, hospitalization exposes frail elderly to nosocomial infections, which may not only lead to further deterioration in individual health status, but also to longer stay in hospitals. These unnecessary hospitalizations also incur considerable financial burden on the Medicare program. A recent report by the Office of Inspector General revealed that 24.8% NH residents were hospitalized in FY 2011, at a cost of $14.3 billion to Medicare.[33] The 1.8 percentage point increase in hospitalization rates detected in this study translates into approximately $1 billion increase in expenditure on Medicare for the hospitalization costs. It is noteworthy that we are likely to underestimate the extent of potentially unnecessary hospitalizations experienced by Medicaid residents as the NH where a Medicaid resident receives her/his care can also lead to unwanted hospitalizations – studies indicate that NHs with a higher proportion of Medicaid residents have fewer resources for providing intensive care and therefore are more likely to hospitalize all their residents. [16,18]

Reducing unnecessary hospitalizations among Medicaid residents is important for the Medicare program to achieve the purpose of reducing overall hospitalizations in NHs. Addressing these financial incentives to hospitalize Medicaid residents is becoming more important especially considering the expansion of the Medicaid population in the coming years under the Affordable Care Act. However, there is a long-standing conflict between Medicaid and Medicare – while Medicaid is the payer for long term NH stays, Medicare pays for the inpatient care.[34] Therefore state Medicaid programs and NHs do not have incentives to make investment in reducing hospitalizations to save Medicare dollars. While several models, such as PACE and Evercare program, demonstrate the success of integrating Medicare and Medicaid funding to reduce hospitalizations among the elderly, these programs are not widely adopted in NHs.[35,36]

Furthermore, even the new care and financing models developed post ACA do not address the issue. The Accountable Care Organizations (ACOs) are designed to coordinate care among providers (e.g. physicians and hospitals), who are responsible for caring for Medicare beneficiaries with multiple chronic disease conditions who need care across settings. Providers are incentivized to offer high quality and efficient care because "When an ACO succeeds both in both delivering high-quality care and spending health care dollars more wisely, it will share in the savings it achieves for the Medicare program".[37] While this approach may be feasible and effective to improve care between hospital and skilled nursing facilities when caring for post-acute care residents because both are reimbursed by Medicare, it does not extend to the NH long-stayers. These patients are "siloed" into Medicaid and the incentives in ACOs, which cross providers, do not cross payers. Thus the incentives to over hospitalize Medicaid patients remain even within ACOs.

Medicaid hospitalization of nursing home patients also does not benefit from the recent pay-for-performance movement. CMS has launched a Nursing Home Value-Based Purchasing Demonstration aiming to reduce hospitalizations in NHs. However, the program is targeted at Medicare beneficiaries who receive skilled nursing facility care (who are short stayers) under Medicare Part A benefits. This does not apply to the NH long-stayers. While some state Medicaid programs have adopted pay-for-performance approaches to improve quality of care in NHs, they have not incorporated incentives to lower hospitalization rates because of the financial conflicts between Medicare and Medicaid.[38] Thus the reduction of extra hospitalizations experienced by Medicaid residents within a facility, which we found is independent of the availability of resources in a facility, will require policy considerations to reconciliatie Medicare and Medicaid financing.

LIMITATIONS

Several limitations need to be noted. First, although we had claims data and clinically enriched MDS data, it is possible that the findings might be confounded by unobserved factors. For example, if Medicaid residents were systematically sicker than private-pay residents, the difference in hospitalization rates between Medicaid and private-pay residents could be due to unobserved difference in health conditions, rather than Medicaid payer-status. However, based on the observed characteristics, there is no clear evidence that Medicaid residents were systematically sicker than private-pay residents – Medicaid

residents were actually less likely to have prior inpatient events compared with private-pay residents (they both covered by Medicare for inpatient event). Further, the relationship between Medicaid payer status and nondiscretionary hospitalizations was close to 0, and was statistically smaller than the relationship with discretionary hospitalizations. If the increased probability of hospitalizations for Medicaid residents was led by unmeasured severity, we would expect a similar relationship between Medicaid payer status and nondiscretionary versus discretionary hospitalizations.[26] Secondly, we assumed that the occurrence of acute medical conditions was similar between Medicaid and private-pay residents within a facility conditional on their observed health conditions. This is likely to be true as a prior study indicated that there was no systematic difference in the quality of daily care (i.e. prevention of pressure ulcers) delivered to Medicaid versus private-pay residents. [39]

In conclusion, our findings support the hypothesis that the observed higher hospitalization rates for Medicaid NH residents are at least in part driven by the financial incentive NHs have to hospitalize (rather than care in house) Medicaid residents. These findings are especially relevant to today's Medicare program given the large number of Medicare and Medicaid dual eligible residents in NHs and the continuous increase in Medicare spending. Future investment will be needed to understand how to re-design the Medicaid policies so that the financial incentives NHs have to hospitalize Medicaid residents can be altered.

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Table 1

Comparison of individual characteristics between Medicaid and private-pay residents

	Medicaid residents (N=396,090)	Private-pay residents (N=255,417)
Outcome variables		
Any hospitalizations	23.3%	21.6%
Non-discretionary hospitalizations	2.46%	2.50%
Discretionary hospitalizations	4.22%	4.21%
Socio-demographic characteristics		
Male	26.5%	34.0%
Age	82.79 (8.47)	84.99 (7.25)
Black	14.9%	3.6%
Other race or ethnicity (e.g. Hispanics)	9.1%	1.6%
Education level		
Below high school	29.6%	17.0%
Above college	8.1%	27.3%
Missing education	34.8%	10.1%
Married	16.5%	28.9%
Do not resuscitate or Do not hospitalization order	51.8%	57.5%
Health status		
Activities of daily living (ADL) score (on 0–28 scale)	16.22 (7.94)	16.52 (6.89)
Cognitive impairment (cognitive performance scale [CPS])		
Moderate impairment (CPS=2,3)	51.14%	53.21%
Severe impairment (CPS=4,5,6)	26.98%	21.05%
Pressure Ulcers	12.9%	17.8%
Obesity (BMI>=30)	22.0%	13.8%
Fell in past 30 days	15.0%	22.2%
Infection in the past 14 days*	9.5%	13.3%
Renal failure	8.2%	8.4%
End stage disease	3.1%	3.2%
Urinary tract infection	11.0%	14.8%
Chronic obstructive pulmonary disease	26.9%	22.4%
Stoke	26.8%	22.7%
Diabetes	37.6%	28.6%
Multiple sclerosis	0.6%	0.4%
Severe mental illness	9.3%	2.8%
Dementia	63.8%	57.3%
Anxiety	25.2%	22.4%
Congestive heart failure	30.0%	29.2%
Other heart conditions **	54.9%	56.3%
Cancer	9.7%	12.8%
Depression	60.3%	55.9%

	Medicaid residents (N=396,090)	Private-pay residents (N=255,417)
Any use of antipsychotics	26.2%	20.4%
Use at least 10 medications	59.1%	60.9%
Prior utilization		
Any hospitalization in 100 days prior to baseline	22.1%	33.1%
Any ER visits in prior 180 days prior to NH admission	19%	28%
One inpatient event in the 180 days prior to NH admission	40.1%	50.1%
At least two inpatient events in the 180 prior to NH admission	13.1%	21.5%

Numbers indicate percentage for categorical variables and mean (SD) for continuous variables. All differences between Medicaid and private-pay residents are statistically significant (P<0.01)

* Include the following conditions in the past 14 days: Conjuctivitis, Clostridium difficile, Pneumonia, Respiratory Infection, Resistant infection, Septicemia, Wound Infection

** Including arteriosclerotic heart disease, cardiac dysrhythmias, peripheral vascular disease

Table 2

Regression analysis of all-cause, discretionary and non-discretionary hospitalizations.

	All cause hospitalizations (N=649,811)		Non-discretionary hospitalizations (N=649,811)*		Discretionary (N=649,811)	
	Coefficients	P>t	Coefficients	P>t	Coefficients.	P>t
Medicaid	**0.018**	**0**	**0.000**	**0.991**	**0.002**	**0.001**
Female	−0.022	0	0.002	0.001	−0.008	0
Age	0.001	0	0.000	0	0.001	0
Black	0.007	0.001	−0.001	0.316	−0.006	0
Other race or ethnicity	−0.001	0.686	−0.003	0.001	−0.003	0.039
Do not resuscitate or Do not hospitalization order	−0.041	0	−0.005	0	−0.006	0
Education level						
Below high school	0.001	0.354	0.000	0.735	0.001	0.072
Above college	−0.001	0.427	−0.001	0.024	0.000	0.741
Missing education	−0.013	0	−0.002	0.001	−0.002	0.009
Married	0.004	0.002	−0.001	0.208	0.003	0
Activities of daily living (ADL)	0.001	0	0.000	0	0.001	0
Moderate impairment (CPS=2,3)	−0.012	0	0.002	0.006	−0.001	0.042
Severe impairment (CPS=4,5,6)	−0.019	0	0.001	0.133	−0.003	0.003
Fell in past 30 days	0.017	0	0.005	0	0.001	0.251
Infection in the past 14 days	0.009	0	−0.001	0.034	0.003	0.003
Renal failure	0.031	0	0.001	0.269	0.001	0.234
End stage disease	−0.155	0	−0.017	0	−0.031	0
Urinary tract infection	0.017	0	0.000	0.686	0.007	0
Pressure Ulcers	0.024	0	−0.002	0	0.002	0.003
Obesity (BMI>=30)	−0.007	0	−0.004	0	0.000	0.767
Chronic obstructive pulmonary disease	0.050	0	0.005	0	0.018	0
Stoke	0.026	0	0.010	0	0.001	0.06
Diabetes	0.028	0	0.001	0.005	0.005	0
Multiple sclerosis	0.037	0	−0.002	0.24	0.017	0
Severe mental illness	−0.007	0.002	−0.003	0	0.000	0.671
Dementia	0.006	0	0.002	0	0.000	0.633

	All cause hospitalizations (N=649,811)		Non-discretionary hospitalizations (N=649,811)*		Discretionary (N=649,811)	
	Coefficients	**P>t**	**Coefficients**	**P>t**	**Coefficients.**	**P>t**
Anxiety	0.003	0.04	0.001	0.014	0.000	0.829
Congestive heart failure	0.063	0	0.005	0	0.027	0
Other heart conditions	0.026	0	0.003	0	0.002	0
Cancer	0.013	0	0.000	0.704	−0.001	0.342
Depression	0.009	0	0.000	0.887	0.000	0.385
Any use of antipsychotics	−0.003	0.009	0.000	0.717	0.002	0.003
Use at least 10 medications	0.028	0	0.001	0.118	0.007	0
Any ER visits in prior 180 days prior to NH admission	0.015	0	0.002	0	0.002	0.001
One inpatient event in the 180 days prior to NH admission	0.060	0	0.005	0	0.012	0
At least two inpatient events in the 180 prior to NH admission	0.088	0	0.006	0	0.019	0
Any hospitalization in 100 days prior to baseline	0.041	0	0.002	0	0.006	0
Year 2008	−0.026	0	−0.003	0	−0.009	0
Year 2009	−0.039	0	−0.004	0	−0.013	0
Year 2010	−0.041	0	−0.005	0	−0.013	0
Constant	0.052	0	0.004	0.152	−0.043	0

Results are based on linear probability model with facility fixed-effects and robust standard error.

* The number in the final regression is smaller than the number in Table 1 because some variables have missing values.

Table 3

Regression analysis of all-cause hospitalizations for survivors and decedents (those who died within 180 observational window or not)

	Survivors (N=520,187)		Decedents (N= 129,624)	
	Coefficients	**P>t**	**Coefficients**	**P>t**
Medicaid	**0.022**	**0**	**0.028**	**0**
Female	−0.013	0	−0.013	0
Age	0.000	0.197	−0.001	0
Other race or ethnicity (e.g. Hispanics)	0.001	0.776	0.022	0.004
Black	0.012	0	0.032	0
Do not resuscitate or Do not hospitalization order	−0.030	0	−0.141	0
Education level				
Below high school	0.002	0.324	0.005	0.136
Above college	−0.002	0.168	0.010	0.013
Missing education	−0.012	0	−0.011	0.009
Married	0.002	0.154	0.008	0.014
Activities of daily living (ADL)	0.001	0	−0.010	0
Moderate impairment (CPS=2,3)	−0.014	0	−0.034	0
Severe impairment (CPS=4,5,6)	−0.018	0	−0.069	0
Fell in past 30 days	0.016	0	−0.016	0
Infection in the past 14 days	0.015	0	−0.022	0
Renal failure	0.025	0	0.004	0.322
End stage disease	−0.113	0	−0.252	0
Urinary tract infection	0.021	0	−0.004	0.237
Pressure Ulcers	0.032	0	−0.030	0
Obesity (BMI>=30)	−0.004	0.007	0.049	0
Chronic obstructive pulmonary disease	0.051	0	0.017	0
Stoke	0.028	0	0.050	0
Diabetes	0.028	0	0.029	0
Multiple sclerosis	0.045	0	0.085	0
Severe mental illness	0.001	0.789	0.021	0.004
Dementia	0.016	0	0.023	0
Anxiety	0.008	0	0.000	0.896
Congestive heart failure	0.059	0	0.034	0
Other heart conditions	0.027	0	0.030	0
Cancer	0.020	0	−0.072	0
Depression	0.018	0	0.016	0
Any use of antipsychotics	−0.007	0	−0.014	0
Use at least 10 medications	0.021	0	0.024	0
Any ER visits in prior 180 days prior to NH admission	0.014	0	0.006	0.071
One inpatient event in the 180 days prior to NH admission	0.050	0	0.089	0
At least two inpatient events in the 180 prior to NH admission	0.076	0	0.094	0

	Survivors (N=520,187)		Decedents (N= 129,624)	
	Coefficients	**P>t**	**Coefficients**	**P>t**
Any hospitalization in 100 days prior to baseline	0.049	0	−0.044	0
Year 2008	−0.022	0	−0.018	0
Year 2009	−0.034	0	−0.029	0
Year 2010	−0.033	0	−0.032	0
Constant	0.058	0	0.698	0

Results are based on linear probability model with facility fixed-effects and robust standard error.