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Hospitalizations in nursing homes: does payer source matter? Evidence from New York State

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Abstract

The objective of this study was to examine the reasons for different hospitalization rates between Medicaid and private-pay nursing home residents – to disentangle within-facility differences from across-facility variations in hospitalizations between these two types of residents. Multiple data sources (2003) for New York State were linked. Hospitalization was the dependent variable. Individual payer status was the main independent variable. Facilities were stratified into four groups by ownership status and bed-hold payment eligibility. We found both within-facility (Medicaid residents were more likely to be hospitalized than private-pay residents within a facility) and across-facility differences (facilities with a higher concentration of Medicaid residents were more likely to hospitalize their residents), controlling for individual and facility characteristics. The magnitude of within-facility differences varied with facility ownership and bed-hold eligibility. To reduce hospitalizations of Medicaid residents and to improve both quality of care and costs, policy-makers may need to align Medicaid's and Medicare's incentives.

INTRODUCTION

Hospitalizations of nursing home (NH) residents in the United States are frequent (Fried & Mor, 1997; Grabowski, Stewart, Broderick, & Coots, 2008; Intrator et al., 2007) , and many are considered unnecessary (Saliba et al., 2000; Teresi, Holmes, Bloom, Monaco, & Rosen, 1991). They cause significant disruption in care and, due to the frailty and vulnerability of NH residents, often result in poor outcomes leading to further physical and psychological deterioration (Boockvar et al., 2005; Creditor, 1993; Kayser-Jones, Wiener, & Barbaccia, 1989; Kruse et al., 2004; Loeb et al., 2006; Ouslander, Weinberg, & Phillips, 2000) . Such hospitalizations are also costly (Grabowski, O'Malley, & Barhydt, 2007; Mor, Intrator, Feng, & Grabowski, 2010). For example, in 2004 Medicare paid $188.5 million for potentially avoidable hospitalizations among long-stay NH residents in New York State alone (Grabowski, et al., 2007). Re-hospitalizations (within 30-days) of NHs residents cost Medicare $4.34 billion in 2006 (Mor, et al., 2010). The Medicare program is currently facing serious financial problems (American Academy of Actuaries, 2008), and the health

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insurance expansion enacted under the Obama health care reform act is, in large part, expected to be funded through cuts in Medicare expenditures. Hence, understanding the reasons for hospitalizations in NHs may provide lessons and opportunities for reducing unnecessary hospitalizations, leading to decreases in Medicare expenditures.

Studies have identified both clinical and non-clinical risk factors for hospitalizations among NH residents (Grabowski, Stewart, et al., 2008). In particular, individual payer status has been found to be associated with hospitalizations – Medicaid residents are more likely to be hospitalized than private-pay residents, controlling for health status (Konetzka, Spector, & Shaffer, 2004). However, the reasons for this difference are not clear. It is not known if the observed differences in hospitalizations result from within-facility variations with NHs making different hospitalization decisions vis. a vis. Medicaid and private-pay residents, or whether it is due to across-facility variations with facilities with a higher proportion of Medicaid residents having greater propensity towards hospitalizations. Some studies suggest that NH quality is a common good and NHs provide equal care to Medicaid and private-pay residents (Grabowski, Gruber, & Angelelli, 2008; Troyer, 2004). If this is the case, NHs would be making similar hospitalization decisions for their Medicaid and private-pay residents with similar health conditions, and the observed difference in hospitalizations between Medicaid and private-pay residents would be due to across-facility variations. That is, individuals in NHs with a higher proportion of Medicaid residents will be more likely to be hospitalized than their counterparts residing in NHs with a lower proportion of Medicaid residents. No studies to date, however, have attempted to determine the source of the differences in hospitalization rates by payer and disentangle the within and across NH variations. Therefore, the objective of the research we present is to test the assumption of common good with respect to hospitalizations in NHs, using a comprehensive dataset in New York State (NYS). Understanding the mechanisms leading to the observed payer-based hospitalization differentials between Medicaid and private-pay residents may offer insights and guidance in developing policies to address and mitigate inequities.

NEW CONTRIBUTION

To our knowledge, this study is the first to differentiate the within-facility differences from across-facility variations in hospitalization rates between Medicaid and private-pay NH residents. Other studies have done so for outcome measures other than hospitalization in NHs (Grabowski, Gruber, et al., 2008; Troyer, 2004). Prior research with regard to NH hospitalizations focused mainly on differences in rates across-facilities (Intrator, et al., 2007; Intrator & Mor, 2004; Intrator, Schleinitz, Grabowski, Zinn, & Mor, 2009; Intrator, Zinn, & Mor, 2004) and on the overall inequity, i.e. the sum of within and across NH differences, in hospitalizations between Medicaid and private-pay residents (Konetzka, et al., 2004). In addition, this study is the first to link Medicare and Medicaid claims with the MDS data to more accurately identify individuals' payer source (i.e. Medicare, Medicaid, and private-pay) instead of relying on a single dataset, such as the MDS or Medicaid claims, to identify payer source (Cai, Mukamel, Veazie, & Temkin-Greener, 2010; Grabowski, Gruber, et al., 2008; Troyer, 2004). Linking these data sources also allows for a more precise identification of hospitalization events and of individual health conditions compared with prior studies (Konetzka, et al., 2004). Finally, we employed a statistical methodology to account for the potential bias in estimation caused by unobserved facility factors, for which prior studies did not control (Intrator, et al., 2007; Intrator & Mor, 2004; Intrator, et al., 2009; Konetzka, et al., 2004).

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CONCEPTUAL FRAMEWORK & HYPOTHESES

This study focuses on the decision to hospitalize NH residents once they have developed an acute condition, recognizing that NHs, in many instances, have discretion in whether to keep the patient in the facility and expend additional care resources, or transfer the resident to the hospital. This study, however, does not focus on the prevention of the occurrence of acute events that may lead to potential avoidable hospitalizations.

Within-facility differences

Legal, behavioral and economics arguments support the commonality theory (Arrow, 1963; Frank, 2004; Gertler & Waldman, 1992), and several empirical studies offer evidence suggesting that NHs indeed provide similar quality of care to all residents, irrespective of payer source (Grabowski, Gruber, et al., 2008; Troyer, 2004). However, hospitalization decisions may be different from the decisions involved in provision of daily care, which were the focus of these prior studies. First, hospitalization decisions are not a daily occurrence. Therefore, an obviously and transparently discriminatory practice pattern is not likely to emerge, and NHs are less likely to be concerned with potential legal ramifications. Second, hospitalization decisions typically do not involve frontline staff. Rather the decision is typically made by the RN, LPN and the patient's personal physician. In many NHs, different patients have different physicians, thus making it easier for the staff to make leading suggestions without a discriminatory pattern emerging. Finally, the financial incentives involved in hospitalization decisions are likely to be much larger, thus making it more likely that NHs will choose to engage in differential practices vis a vis hospitalization but not vis a vis other quality related aspects of care.

Furthermore, the financial incentives arising from the existing Medicaid policies may provide NHs with motivation to treat Medicaid residents differently than private-pay residents with regard to hospitalization decisions, leading to within-facility differences. Payment to NHs (i.e. Medicaid rate and private-pay price) is typically set prospectively, with Medicaid rates being lower than private-pay price (AARP Public Policy Institute, 2002, 2004, 2006). When a resident develops an acute condition, the NH is likely to incur additional costs for providing intensive medical care on-site. This is particularly true for Medicaid residents whose payment rates tend to be lower and are less likely to cover the costs of care needed during an acute episode, compared with private-pay residents. In addition, NHs generally compete for private-pay residents who are harder to recruit than Medicaid residents. Hence, NHs may have a stronger incentive to hospitalize a Medicaid resident than a private-pay resident with the same acute-care needs, resulting in payer-based within-facility differences in hospitalizations. Thus, the commonality assumption competes with the financial incentive assumption in explaining NHs' behavior regarding hospitalization decisions. We therefore test the following hypotheses based on the financial incentive assumption. The rejection of these hypotheses may suggest the commonality assumption:

> H1: NHs are more likely to hospitalize Medicaid residents than private-pay patients residing in the same facility, given the same acute-care needs.

While NHs may not differ much in their incentives to hospitalize private-pay residents who are generally profitable and hard to recruit, their incentives to hospitalize Medicaid residents may vary across facilities. For example, while the for-profit (FP) facilities try to maximize their profits, not-for-profit (NFP) facilities may incorporate objectives (e.g. quality of care) in their goals (Cohen & Spector, 1996; Scanlon, 1980; Spector, Selden, & Cohen, 1998). Hence, ownership status may affect NHs' payer-related hospitalization decisions, and modify the payer-based within-facility differences. Consequently, we hypothesize that:

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H2: The within-facility difference in hospitalizations between Medicaid and private-pay residents is greater in for-profit facilities than in not-for-profit facilities.

Bed-hold eligibility may also modify NHs' incentives to hospitalize Medicaid residents. NYS requires a NH to be at least 95% occupied to be eligible for bed-hold payment. In NYS, NHs that are subject to bed-hold payment are required to hold the bed for a pre-specified period when a Medicaid resident is hospitalized, and they are reimbursed at a full Medicaid rate for this period (New York State Department of Health, 1996). Therefore, for bed-hold eligible facilities, hospitalizing a sick Medicaid resident is more profitable than providing onsite intensive care. On the other hand, bed-hold ineligible facilities are not required and are not reimbursed for bed-holding when a Medicaid resident is hospitalized. Therefore, we hypothesize that:

H3: The within-facility difference in hospitalization propensity is greater in bed-hold eligible facilities than in bed-hold ineligible facilities.

Across-facility variations

The payer-mix level (defined as Medicaid reimbursed days as a proportion of all inpatient days in the facility in a year) is an important determinant of the facility's budget constraints (Mor, Zinn, Angelelli, Teno, & Miller, 2004). Studies have shown that facilities with a higher percentage of Medicaid residents are less able to afford resources than those with a lower percentage of Medicaid residents (Mor, et al., 2004). Therefore we hypothesize that:

H-4: Facilities with a higher proportion of Medicaid residents are more likely to hospitalize their residents, regardless of individual payer source.

This hypothesis deals with payer-related across-facility variations – the higher hospitalization risk in a facility with a higher proportion of Medicaid residents contributes to the overall higher hospitalization rates for Medicaid residents. Although the payer-mix in the facility could be endogenous with the overall hospitalization rates, the main objective of this analysis is to disentangle the within-facility versus across-facility variations in hospitalizations between Medicaid and private-pay residents. Hence, in this study, we focus more on the existence of the association between facility hospitalization rates and payer-mix level, which indicates across-facility variations in hospitalization rates between Medicaid and private-pay residents, rather than the causal relationship between facility characteristics and overall hospitalization rates in a facility.

METHODOLOGY

Data

Both individual and facility level data for NYS for calendar year 2003 were employed in this study. Individual level data sources included the Minimum Data Set (MDS), the Medicaid Analytic Extract (MAX) Personal Summary file and Long-Term Care file, the Medicare Provider and Analysis Review file (MedPAR) and Medicare denominator file. The MDS is a federal government mandated resident assessment tool for nursing facilities. The MDS includes detailed information about residents' health conditions, socio-demographic status, and treatment preferences. The reliability and validity of the MDS data in recording residents' clinical health conditions is generally considered to be high (Gambassi et al., 1998; Hawes et al., 1997; Mor et al., 2003; Morris et al., 2003; Shin & Scherer, 2009). The Medicare Denominator File contains enrollment information for Medicare beneficiaries, and the MedPAR file contains information about Medicare reimbursement and the type of services delivered. The MAX Personal Summary file and Long-Term Care file contain each individual's Medicaid enrollment information, Medicaid reimbursement information and the type of services provided in NHs under Medicaid payment. The Medicaid claims data are

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considered to be of high quality regarding individual's health insurance status (Research Data Assisstance Center, the Centers for Medicare and Medicaid Services, the Department of Health and Human Services Office of the Assistant Secretary for Planning and Evaluation, & the U.S. Census Bureau, 2009).

Facility and county level factors were obtained from the State Medicaid Costs Reports, Online Survey, Certification and Reporting (OSCAR) File and Area Resource File (ARF).

Population

The sample population consisted of NH residents who were age 65 or older and were enrolled in Medicare Part A from the beginning of the year. For each resident who was private pay or Medicaid, an observational period started from the date of the first available assessment during their NH episode in 2003. Those admitted as Medicare residents were included only if they became Medicaid or private-pay patients later on; their observational period started at the end of the Medicare reimbursement period. Several exclusions were made. Medicare/Medicaid Managed Care enrollees were excluded. Individuals who were initially private-pay and then spend-down to Medicaid were also excluded to avoid intra-individual correlation. Because this study focused on Medicaid versus private-pay status, residents whose NH stays were exclusively reimbursed by Medicare were excluded.

Facilities with an extremely high/low proportion of Medicaid residents or without eligible Medicaid or private-pay residents were excluded because this study focused on NH hospitalization decision for Medicaid versus private-pay residents. The criterion of “extreme” - above the upper 2.5 percentile or below the lower 2.5 percentile - was based on the distribution of the facility payer-mix level, defined as the percentage of Medicaid reimbursed days among total inpatient days, in NYS. In total, the analytical sample included 67,256 NH residents in 545 facilities in NYS (accounting for 83% of NYS nursing homes).

Variables

Outcome variable: The outcome variable was defined as the presence of any hospitalizations from the start of an individual's observational period till the end of the year. MedPAR and MDS data were used to identify NH-originating hospitalizations.

Main independent variables: An individual's payer status (Medicaid vs. private-pay) was the variable used to test the within-facility differences. Since payer status information in the MDS could be incomplete or inaccurate (Cai, et al., 2010 ; Grabowski, Gruber, et al., 2008), the MDS, MAX, and MedPAR files were linked to identify each individual's payer source. If a period of a NH stay was neither reimbursed by Medicare nor Medicaid, it was considered to be private-pay.

Control variables: We controlled for the following individual health conditions at the beginning of each observational period (Grabowski, Stewart, et al., 2008): case-mix acuity (RUG-III); activities of daily living (ADL) scale; changes in Health, End-Stage Disease and Symptoms and Signs (CHESS) score; unstable disease conditions; falls in the past 30/180 days; body mass index (BMI); infections, and chronic disease conditions (e.g. diabetes). Each individual's treatment preference (e.g. do-not-hospitalize order) and their socio-demographic characteristics (e.g. age, gender, race) were also controlled for. These variables were obtained from the MDS data.

Prior hospitalizations (whether a resident has been hospitalized within past 30 days of the observational start date or not) were controlled for to account for the acuity and frailty of individual's health conditions. The interval between the observational start date and the end

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of year was also accounted for. These 2 variables were constructed by linking the MDS and MedPAR data.

Facility level control variables: Payer-mix was defined as the percent of Medicaid-reimbursed days to total bed-days during the entire one year period. This variable was interacted with individual payer source to allow for the variation in within-facility difference across NHs with different levels of payer-mix. Other facility level variables included ownership status, facility size, chain membership, staffing, resources, occupancy rate, registered nurse hourly wages, and Medicaid payment rate. County level control variables included availability of hospital beds in the county (from the ARF file), defined as the number of hospital beds per person for the population aged 75+ years, and market competition, represented by the Herfindahl index. Although these variables were not used in the model to test the within-facility differences, they were included in the model to describe the across-facility variations and to calculate the average partial effects (APE, as described in the statistical methods section). These variables were obtained from OSCAR, state Medicaid costs reports and Area Resource File.

Statistical methods—All the analyses were performed at the individual level. We first estimated a pooled model including all facilities. The facilities were then stratified into 4 groups by ownership status and bed-hold eligibility, based on the annual occupancy rate (>=95% versus <95%, which is the threshold for bed-hold payment in NYS). We performed the stratified analysis because the difference across these strata could be more substantial than a mere intercept change might capture. Several types of models, as described below, were estimated separately for each subgroup. Hypotheses were tested for each subgroup, and comparisons were made across the subgroups using the Wald statistics. Because our hypotheses were directional our tests were based on one-tailed tests. In addition to hypotheses testing, we also estimated the APE of Medicaid payer status on hospitalization probabilities.

We first estimated a logit model, controlling for individual level characteristics. The effect of payer status on hospitalization represented the overall difference between Medicaid and private-pay residents, which may originate from both within- and across-facility difference in hospitalizations between Medicaid and private residents. A conditional fixed-effects logit model was then estimated to test the effect of payer source on within-facility differences in hospitalizations. This model accounted for facility effects that could be potentially correlated with other covariates, and provided consistent estimators regardless of the distribution of facility characteristics and the number of observations in each facility (Chamberlain, 1980). The conditional fixed-effect logit estimator provided us with the effect of payer source on the log-odds ratio (log-OR) of being hospitalized within a facility (Wooldridge, 2001). The interaction term was centered at the mean to represent the effect of the average within-facility effect of Medicaid payer status on log-odds of being hospitalized across facilities with difference payer-mix. Wald statistics was calculated to test the difference between the estimates across separate subgroups.

Although the conditional fixed-effects model provided the estimation of the relative risk of hospitalizations between Medicaid and private-pay residents (in the form of log-odds ratio), this model did not allow for the estimation of the effects of facility characteristics on hospitalization nor the estimation of the APE . Therefore a random-effects logit model was estimated to examine the across-facility variations – the effect of facility payer-mix on hospitalizations – after accounting for the effect of individual payer status. A random-effects probit model was used to obtain the APE of payer status on hospitalizations. The reason to choose a random-effects probit model over a logit model was that the estimates from the probit model directly took care of the distribution of facility random effects (Wooldridge,

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2001), while integrating out the facility random effects for random-effects logit models could be computationally expensive. After fitting a random-effects probit model, we estimated APE of Medicaid payer status on the probability of hospitalizations. The standard errors were obtained by bootstrapping.

Random-effects models, however, required the assumption of independence of unobserved facility effects with other covariates (Greene, 2002). The violation of this assumption may result in inconsistent estimates. In order to examine the existence and direction of bias, we compared the estimations from the random-effects logit model with the conditional fixed-effects logit model.

RESULTS

Overall, 81.8% of the sample population is Medicaid and 27.7% has at least one hospitalization throughout the observational period. The overall hospitalization rates vary across the 4 groups, with the lowest rate in bed-hold eligible NFP facilities (24.7%) and highest rate in FP facilities that are ineligible for bed-hold policy (32.0%). The hospitalization rates and individual characteristics, stratified by subgroups and payer source, are presented in Table 1. As presented in Table-2, the pooled model (including all 4 strata) indicates that on average, Medicaid residents have 27% higher odds ($e^{0.239}$) of being hospitalized than their private-pay counterparts. After accounting for facility fixed-effects, this difference is only 18 % ($e^{0.162}$) - i.e the within facility differential is substantially lower. The following hypothesis testing is based on the stratified analysis.

Hypothesis testing

Effect of payer status on hospitalizations (H-1)—This hypothesis tests the average within-facility difference in hospitalizations between Medicaid and private-pay residents. As presented in Table 2, the average effect of payer source on within-facility differences in hospitalizations (conditional fixed-effects model) is expressed as log-OR with the interaction term centered at the state mean. In bed-hold eligible FP, NFP, and bed-hold ineligible NFP facilities, Medicaid residents are significantly more likely to be hospitalized than their private-pay counterparts within the same facility, confirming hypothesis H-1. However, the effect of payer source is not significant in bed-hold ineligible FP facilities, consequently we cannot distinguish between H-1 and its alternative in this subgroup of NHs.

The impact of ownership on within-facility differences (H-2)—As shown in the last column of the first row of Table 3, among bed-hold eligible NHs, the within-facility difference, as represented by log-OR, is significantly higher in FP facilities than in NFP facilities, confirming H-2. However, the same pattern is not detected among bed-hold ineligible NHs. As indicated in the last column of the second row of Table-3, the payer-related within-facility difference in FP is significantly smaller than that in NFP facilities. Hence H-2 is disconfirmed among bed-hold ineligible NHs in NYS.

The effect of bed-hold policy (H-3)—As shown in the first column of the last row of Table 3, the result confirms H-3 among FP facilities: the payer-related within-facility difference is significantly higher in bed-hold eligible facilities than in bed-hold ineligible facilities. However, as shown in the second column of the last row of Table-4, the within-facility differences between bed-hold eligible and ineligible NFP facilities are not significant. Consequently we cannot distinguish between H-3 and its alternative among NFP NHs.

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Across-facility variations (H-4)—As presented in Table-2, the overall difference (from logit model) between Medicaid and private-pay residents is significantly higher than within-facility difference (from conditional fixed-effects model) in hospitalizations among all but FP bed-hold eligible facilities. This is consistent with the findings from the random-effects model – a higher proportion of Medicaid residents is associated with higher hospitalizations in that type of facility, even after controlling for individual payer source and other observed facility characteristics. For example, for each 10% increase in payer-mix from the state mean, residents in NFP bed-hold eligible facilities have 21% ($e^{0.188}$) higher odds of hospitalization, compared with residents in similar facilities with payer-mix level at the state mean, regardless of their payer source.

The magnitude of the payer-related within-facility difference in hospitalizations and average partial effect of Medicaid payer status

For brevity of exposition we only discuss the magnitude of payer-related within-facility differences at the state mean level for the interaction term (Table 2). Among bed-hold eligible FP facilities, Medicaid residents have 34% ($e^{0.296}$) higher odds of being hospitalized compared with their private-pay counterparts in the same facility. Among bed-hold eligible NFP facilities, Medicaid residents have 17% ($e^{0.160}$) higher odds of being hospitalized compared to their private-pay counterparts. There is no significant payer effect among bed-hold ineligible FP facilities, but in bed-hold ineligible NFP facilities Medicaid residents have 25% ($e^{0.223}$) higher odds of being hospitalized than their private-pay counterparts.

Table 2 also illustrates the APE of payer status by using the standard population in the state. Consistent with the estimation from the conditional fixed-effects model, the APE of Medicaid payer status is the highest in bed-hold eligible FP facilities (APE=0.054, P<0.01) – where on average Medicaid payer status increases the probability of hospitalization by 5%; and lowest in bed-hold ineligible FP facilities (APE=0.001, P=0.962).

Sensitivity analysis

We performed a sensitivity analysis among those who entered as private-pay and then spent-down to Medicaid. We estimated a conditional fixed-effects logit for this population, accounting for individual fixed effects and time interval before and after spend-down. We found that the odds of hospitalizations significantly increased by 22% after an individual switched to Medicaid ($e^{0.196}$, P=0.026)). This further confirms our findings that the likelihood of hospitalizations may be affected by individual payer status.

DISCUSSION

This study explores the reasons for the observed differences in hospitalizations between Medicaid and private-pay residents in NHs. Our findings demonstrate that both within-facility and across-facility variations account for the difference in hospitalizations between Medicaid and private-pay residents in NYS facilities. All NHs, except those that are FP and bed-hold ineligible, seem to make differential hospitalization decisions for their Medicaid and private-pay residents. The magnitude of this within-facility difference varies with facility ownership status and bed-hold eligibility. For example, the within-facility disparity is greater in FP than NFP facilities eligible for Medicaid bed-hold, but not among those where a bed-hold policy does not apply. Among the NFP facilities bed-hold policy does not seem to have the expected impact. These findings suggest that FP facilities may behave differently than NFP, perhaps because they might be more sensitive to financial incentives. NFP facilities may be more heterogeneous and incorporate different goals into their objective functions (Cohen & Spector, 1996; Ettner, 1993; O'Neill, Harrington, Kitchener, & Saliba, 2003; Scanlon, 1980; Spector, et al., 1998). Moreover, we find that residents in most

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NHs with a higher concentration of Medicaid residents are more likely to be hospitalized, regardless of their payer status.

These findings suggest that NHs' hospitalization decisions may be affected by financial factors. The incremental hospitalization events induced by such financial incentives are likely to be "unnecessary" since these hospitalization decisions are not based on residents' health conditions or their treatment preferences. This appears to be particularly true when we compare hospitalizations rates by payer within the same facility. In principle, all residents in the same facility should have the same level of resources available to them and hence, unless we have been unable to sufficiently control for differences in the clinical risk or treatment preferences between Medicaid and private pay patients (see further discussion below), there is no reason to expect a differential hospitalization pattern.

Our findings are not consistent with previous studies that found no within facility differences in quality of care between Medicaid and private- pay residents, which have suggested that quality of care is a common good in NHs (Grabowski, Gruber, et al., 2008; McKay, 1989; Troyer, 2004). However, these studies focused on different outcomes. For example, Grabowski and colleagues have examined quality indicators such as the prevalence of physical restraints, pain and pressure ulcers, measures that are directly affected by care provided by the frontline staff. It seems reasonable that frontline staff will provide similar quality of daily care (e.g. turning the residents to prevent pressure ulcers) to residents regardless of their payer status. However, hospitalization decisions are not directly made by the frontline staff. In addition, in contrast to the care delivered to residents every day, hospitalization decisions are more sporadic and more directly affected by financial resources and incentives (especially under a generous bed-hold policy). Furthermore, there is no standard definition as to what should be considered an "appropriate hospitalization". While quality measures used in the above cited study are well defined, widely used, and published in the Centers for Medicare and Medicaid Services (CMS) quality report cards, there are no such indicators for hospitalizations. Because of this, while reports of poor quality of care may potentially hurt NHs' profits (i.e. attractiveness to private-pay residents), hospitalization rates may not have such an effect.

Consistent with previous studies (Intrator, et al., 2007; Intrator, et al., 2009), we find that Medicaid bed-hold policy might provide an incentive for NHs to hospitalize residents, specifically Medicaid residents in FP facilities. However, it may not be practical to simply repeal the Medicaid bed-hold policy to reduce the burden of unnecessary hospitalizations associated with this policy. For Medicaid residents bed-hold policy has been associated with continuity of care (Intrator, et al., 2009). Without a bed-hold policy, Medicaid residents may not be able to return to their original NHs following discharged from the hospital. Such disruption of care could lead to unfavorable health outcomes for these residents (Intrator, et al., 2009; Nohigren, 2004) and maybe undesirable as a policy option for Medicaid. Moreover, the potential savings from hospitalizations associated with repealing bed-hold policies would largely benefit Medicare. Given the separation of Medicaid and Medicare funding mechanisms, state Medicaid programs do not have the financial incentive to repeal their bed-hold policies.

Since the main objective of a bed-hold policy is to ensure continuity of care, it should ideally only be applied to facilities with very high occupancy rates. In NHs with low occupancy rates it may not be necessary to hold a bed since there is no shortage of empty beds to which a Medicaid resident may be re-admitted following a hospital stay. In fact, NYS raised the occupancy rate requirement for its Medicaid bed-hold policy from 95% to 97% in 2009. This literally excludes most facilities from eligibility for Medicaid bed-hold payments in NYS. It will be interesting to re-investigate hospitalization rates in New York

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State after this change. This would offer guidance to other states who may be contemplating changes to their bed-hold policies.

Recently, the Centers for Medicare and Medicaid Services (CMS) embarked on a pay-for-performance (P4P) demonstration, which provides incentive payments to NHs based on their quality performance, including a measure based on hospitalizations rates (Barondess, 2008). CMS expects savings due to the anticipated reductions in hospitalization rates. However, concerns about the impact of the P4P program have also been raised, including the potential for deepening the existing Medicare and Medicaid payment silos. For example, NHs that improve their care management strategies to avoid unnecessary hospitalizations may save Medicare dollars, while increasing the cost of care to Medicaid by making daily routine care more costly (Briesacher, Field, Baril, & Gurwitz, 2008).

The Evercare model has been associated with fewer hospitalization events among certain groups of the elderly (Kane, Keckhafer, Flood, Bershadsky, & Siadaty, 2003). Through dual capitation, this model somewhat eases the financial tensions between Medicaid and Medicare. Extending such a model to the majority of NH residents may further help to reduce hospitalization rates for Medicaid residents. Indeed, Evercare may be a plausible way to reduce avoidable hospitalization events since the costs incurred by saving Medicare costs are born by Medicare. However, there are also potential issues with this approach. In absence of a clear definition of intensive care that qualifies for Medicare reimbursement, NHs may have an incentive to provide unnecessarily intensive care in order to receive a higher Medicare rate (Grabowski, 2007).

As to payer-related across-facility variations in hospitalizations, facilities with a higher proportion of Medicaid residents are likely to have fewer resources (Mor, et al., 2004), and, therefore, may not be able to provide intensive onsite care in the first place. For these facilities, policy interventions such as P4P may not be effective since these facilities may need additional funding to bring them up to par in order to compete with other facilities. However, it may be less feasible to simply increase the Medicaid payment rates, considering states' current fiscal deficits and the financial conflicts between Medicare and Medicaid. Moreover, the assumption that a higher Medicaid reimbursement rate may reduce hospitalization rates is based on the supposition that NHs are willing to invest in the clinical services necessary for the provision of intensive care onsite if they are better funded. If the profits of hospitalizing a resident are higher than providing onsite care (especially under a generous bed-hold policy), NHs may still be inclined to hospitalize their residents, even under a higher Medicaid reimbursement rate.

Several limitations of the study must be acknowledged. First, we may not be able to capture the occurrence of all acute events as their availability is only as good as the data set we have. However, we assume that the incidence of acute conditions is similar for Medicaid and private-pay residents, conditional on their health status at the beginning of the observation period. If this assumption is violated, the differences in hospitalizations between Medicaid and private-pay residents could also be attributed to unequal quality of care delivered to Medicaid and private-pay residents. However, this is not very likely as other studies have not found any systematic differences in quality of daily care by payer within a facility (Grabowski, Gruber, et al., 2008; Troyer, 2004). Second, although we have controlled for individuals' treatment preferences and a very long and exhaustive list of their health conditions, we may still not have captured all residents' heath conditions or their treatment preferences, and thus have biased estimations of the effect of payer source. If Medicaid residents are systematically different from private-pay residents in an unobserved way that make them more susceptible to hospitalization (e.g. unobserved heterogeneity of health conditions or their preferences), the difference in hospitalizations between Medicaid and

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private-pay residents could be caused by these unobserved factors rather than their payer status. Future studies that examine the within-facility differences across states with different bed-hold policies may provide more evidence because the differences in unobserved heterogeneities between Medicaid and private-pay residents may be less likely to correlate with different state Medicaid bed-hold policies. Third, we do not consider multiple hospitalizations and deaths in NHs in our main analysis. However, we do not think this limitation seriously undermines the findings of this study. For any individual, multiple hospitalization events are likely to be highly correlated. We have conducted a sub-analysis among those who have multiple hospitalization events, and find Medicaid residents are more likely to be hospitalized multiple times than their private-pay counterparts. Further, under the null hypothesis (NHs treat Medicaid and private-pay residents the same), there should be no systematic difference in the distribution of the number of hospitalizations or deaths for Medicaid and private-pay residents, controlling for health conditions. The likelihood of death in NHs will be directly affected by the hospitalization decisions. In other words, the differences in the distribution of deaths or the number of hospitalizations are directly linked with the rejection of the hypotheses. Fourth, this study focuses on the overall hospitalizations rather than non-discretionary or discretionary hospitalization admissions because there is no clear definition of what should be considered as discretionary/non-discretionary hospitalization admissions, and our data do not provide us with a sufficient sample if we only focus on a small subset of hospitalization admissions with relatively high agreement for the distinction of discretionary / non-discretionary hospitalizations(e.g. acute myocardial infarction). Finally, our study only focuses on New York State, which is unique as it has the highest Medicaid reimbursement rate in the country and a very generous bed-hold policy.

In conclusion, we find unequal hospitalization risks between Medicaid and private-pay residents in New York State NHs. Furthermore, we find evidence suggesting that financial incentives may motivate consideration of payer source in hospitalization decisions. Future research should examine whether such variations hold across states with different levels of Medicaid payment and bed-hold policies. Findings from such research would offer additional insights on these complex relationships and may help guide Medicaid and Medicare policies that influence these decisions.

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Table-1

Distribution of individual level variables : stratified by facility ownership status, eligibility for bed-hold payment and individual payer source

Mean(SD) / %	Group-1:FP (bed-hold payment eligible: Occupancy>=95%) N= 126		Group-2:FP (bed-hold payment ineligible: Occupancy<95%) N=130		Group-3:NFP (bed-hold payment eligible: Occupancy>=95%) N=218		Group-4:NFP (bed-hold payment ineligible Occupancy<5%) N=71	
	Private-pay (N=2830)	Medicaid (N=12503)	Private-pay (N=2156)	Medicaid (N=11165)	Private-pay (N=5767)	Medicaid (N=24416)	Private-pay (N=1468)	Medicaid (N=6951)
Ever hospitalized (%)	23.67	32.59	26.90	32.99	19.11	25.96	19.62	27.09
Male (%)	29.40	23.90	34.04	28.87	30.03	24.15	32.08	25.15
White (%)	97.00	83.47	93.09	79.95	96.34	83.85	95.50	84.82
Age	84.58 (7.33)	84.47 (7.95)	83.91 (7.51)	83.49 (8.28)	85.07 (7.38)	84.57(8.01)	84.50 (7.43)	84.09 (8.11)
Do-not-hospitalization/hospice enrollment(%)	2.37	0.96	2.27	0.82	4.30	1.45	4.29	1.15
Hospitalization in past 30 days (%)	17.74	7.99	25.65	9.63	21.87	7.99	24.59	8.85
Case Mix Index (CMI)	1.02 (0.27)	0.88 (0.25)	1.05(0.27)	0.88 (0.27)	0.97 (0.27)	0.86 (0.25)	1.01 (0.28)	0.85 (0.25)
Activities of daily living (ADL, long form)	16.31(6.99)	16.14(8.07)	15.97(7.37)	15.49(8.46)	15.48(7.43)	16.26(8.46)	14.90(7.32)	15.31(8.49)
Unstable condition (%)	36.11	23.62	38.82	21.65	35.01	21.81	38.08	25.82
Antipsychotic medications (%)	23.36	28.03	25.74	32.59	23.24	26.26	25.68	27.28
Physical restraints (%)	3.57	4.66	3.57	5.29	3.61	4.68	3.61	4.22
Cognitive Performance Scale (moderate) (%)	26.82	28.64	26.07	29.06	27.41	27.11	27.38	28.33
Cognitive Performance Scale (severe) (%)	21.02	29.51	19.48	29.83	19.80	30.87	17.30	26.72
Pressure sores (%)	18.69	9.95	21.57	11.05	16.14	9.74	17.92	10.42
Body mass index >=30 (%)	10.32	17.17	10.20	16.23	11.17	17.30	12.33	18.07
Body mass index <=19 (%)	16.64	10.23	17.12	10.87	14.77	10.09	15.46	10.01
Fell within last 30d (%)	21.80	11.23	20.36	11.38	23.70	12.25	25.00	13.11
Fell within past 31-180d(%)	71.98	76.99	74.77	77.90	71.93	75.44	74.32	76.26
Changes in Health, End-Stage Disease and Symptoms and Signs(CHESS) scale>0 (%)	49.54	35.10	47.45	32.67	51.34	35.73	54.02	37.88
Diabetes (%)	23.32	28.82	26.07	29.56	22.56	28.52	22.75	28.51
Congestive heart failure (%)	26.54	28.43	27.27	27.30	24.73	24.18	30.04	25.98
Hypertension (%)	61.70	60.23	61.83	57.83	60.38	56.68	60.76	57.46
Other heart diseases (%)	49.08	47.88	47.82	43.92	46.68	44.61	48.50	45.17
Cancer(%)	12.72	9.18	12.94	8.62	13.42	8.08	12.47	8.47

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Mean(SD) / %	Group-1:FP (bed-hold payment eligible: Occupancy>=95%) N= 126		Group-2:FP (bed-hold payment ineligible: Occupancy<95%) N=130		Group-3:NFP (bed-hold payment eligible: Occupancy>=95%) N=218		Group-4:NFP (bed-hold payment ineligible Occupancy<5%) N=71	
	Private-pay (N=2830)	Medicaid (N=12503)	Private-pay (N=2156)	Medicaid (N=11165)	Private-pay (N=5767)	Medicaid (N=24416)	Private-pay (N=1468)	Medicaid (N=6951)
Chronic obstructive pulmonary disease/asthma (%)	20.25	21.15	21.52	21.30	17.86	18.29	20.98	20.39
Alzheimer /dementia (%)	49.05	59.52	45.22	56.84	48.27	56.69	49.18	55.43
Renal failure (%)	5.72	5.13	6.96	5.08	6.02	5.03	7.70	5.73
The interval between the start of observational period till the end of year	210.30 (111.25)	286.41 (74.79)	195.34 (115.46)	283.16 (77.46)	217.11 (110.87)	287.70 (73.14)	201.06 (112.96)	282.71 (77.19)

Categorical variables are presented as percentage; continuous variables are presented as Mean (SD)

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Table-2

Estimation of logit, conditional-fixed effects logit (FE), random-effects logit (RE) and average partial effects (APE), stratified by facility ownership & eligibility for bed-hold payment

		Medicaid	Medicaid × Payer- mix[+]	Payer-mix[+]
Pooled model (include all facilities)	Logit model [1]	0.239*** (0.027)	0.109*** (0.012)	
	FE model[1]	0.162*** (0.030)	0.004 (0.029)	
	RE model[2]	0.167*** (0.030)	0.016 (0.028)	0.186*** (0.036)
	APE[3]	0.028*** (0.005)		
FP & Bed-hold eligible	Logit model [1]	0.320*** (0.055)	0.056*** (0.220)	
	FE model[1]	0.296*** (0.065)	0.113** (0.054)	
	RE model[2]	0.302*** (0.065)	0.118*** (0.053)	0.077(0.066)
	APE[3]	0.054*** (0.012)		
FP & Bed-hold ineligible	Logit model	0.065 (0.061)	0.112*** (0.026)	
	FE model	0.009 (0.064)	-0.028 (0.068)	
	RE model	0.012 (0.064)	-0.029 (0.066)	0.252*** (0.082)
	APE	0.001(0.012)		
NFP & Bed-hold eligible	Logit model	0.252*** (0.041)	0.151*** (0.020)	
	FE model	0. 160*** (0.045)	-0.023 (0.046)	
	RE model	0.166*** (0.045)	-0.005 (0.046)	0.188*** (0.062)
	APE	0.026*** (0.007)		
NFP & Bed-hold ineligible	Logit model	0.291*** (0.080)	0.105*** (0.035)	
	FE model	0.223*** (0.086)	-0.059(0.085)	
	RE model	0.224*** (0.086)	-0.049(0.083)	0.205*** (0.097)
	APE	0.037*** (0.013)		

The numbers in the cell indicates the coefficients; SE value in the parenthesis.

*P<0.1. All tests are based on 1 -tail test. Shaded cells indicate that the estimates from logit model are statistically different from the estimates from FE model (p<0.01 for the pooled model ; P =0.06, <0.01and =0.09 FP bed-hold ineligible, NFP bed-hold eligible and NFP bed-hold ineligible NHs respectively).

*** P<0.01,

** P<0.05,

[+] The original payer-mix variable, which ranges from 0-100%, is divided by 10. Thus one unit increase represents 10% increase in payer-mix level. This variable is centered at the state mean value.

[1] The following individual level variables were controlled: age, male, white, do-not-hospitalization/hospice enrollment, hospitalization within past 30 days, unstable condition, case-mix index, antipsychotic medications, physical restraints, ADL(long form), cognitive performance scale, pressure sore, diabetes, congestive heart failure, hypertension, other heart diseases, cancer, chronic obstructive pulmonary disease/asthma, Alzheimer /

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dementia, renal failure fell within last 30d, fell within past 31-180d; obese (>=30); low BMI (<=19) , CHESS (CHESS scale>0), linear, squared and cubed terms of the interval between observational start date till the end of the year ,and infection.

[2]The following variables were controlled for RE models, additional to the above individual level variables: facility payer-mix, facility size, onsite physician extender, onsite registered nurse, resources (onsite x-ray, onsite-lab, onsite pharmacy), registered nurse hourly wage, Medicaid payment rate, facility average case-mix level, average occupancy rate, % Medicare in the facility, rural location, downstate location, the number of hospital beds per person for the population aged 75+ years (county level), and the Herfindahl index (county level).

[3]Estimated by random-effects probit model; SE was obtained by bootstrapping.

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Table-3

Testing H-2 & H-3: the effect of ownership and bed-hold policy on within-facility hospitalization differences between Medicaid and private-pay residents [+]

	(1) FP	(2) NFP	(3) The difference between FP and NFP
(1) Bed-hold eligible facilities	0.296 (SE=0.065)	0.160 (SE=0.045)	0.296-0.160=0.136 (SE=0.079; P=0.044)
(2) Bed-hold ineligible facilities	0.009 (SE=0.064)	0.223 (SE=0.086)	(0.009)-0.223=-0.214 (SE=0.107; P=0.023)
(3) The difference between Bed-hold eligible and bed-hold ineligible	0.296-0.009=0.287 (SE=0.092;P<0.01)	0.160-0.223=-0.06 (SE=0.097; P=0.259)	

[+]The number in the cell indicates the log-odds ratio of hospitalizations for Medicaid residents relative to private-pay residents. All tests are based on 1-tail test