Published in final edited form as:

Med Care Res Rev. 2014 August ; 71(4): 384–401. doi:10.1177/1077558714533824.

Dual Eligibility, Selection of Skilled Nursing Facility, and Length of Medicare Paid Postacute Stay

Momotazur Rahman¹, Pedro Gozalo¹, Denise Tyler¹, David C. Grabowski², Amal Trivedi¹, and Vincent Mor¹

¹Brown University, Providence, RI, USA

²Harvard University, Boston, MA, USA

Abstract

Medicare and Medicaid dual-eligible beneficiaries use more medical care and experience worse health outcomes than Medicare-only beneficiaries. This article points to a possible inefficiency in the skilled nursing facility (SNF) admission process, specifically that patients and SNFs are partially matched based on dual-eligibility status, and investigates its influence on patients' SNF length of stay. Using a set of fee-for-service beneficiaries newly admitted for Medicare-paid SNF care, we document two findings: (1) compared with Medicare-only patients, dual-eligibles are more likely to be discharged to SNFs with low nurse-to-patient ratios and (2) dual-eligibles are more likely to become long-stay nursing home residents than Medicare-only beneficiaries if treated in SNFs with low nurse-to-patient ratios. We conclude that changes in the current SNF care referral process have the potential to reduce excess SNF utilization by dual-eligible beneficiaries and could help reduce spending by both Medicare and Medicaid.

Keywords

dual eligibility; skilled nursing facility care; care utilization

Reprints and permissions: sagepub.com/journalsPermissions.nav

Corresponding Author: Momotazur Rahman, Department of Health Services Policy and Practice, Brown University, 121 South Main Street S-6, Providence, RI 02912, USA. momotazur_rahman@brown.edu.

Declaration of Conflicting Interests

The author(s) declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: Professor Mor's Brown research is in a related area to that of several different paid activities. Dr. Mor also periodically serves as a paid speaker at national conferences where he discusses trends and research findings in long term and post acute care. Each of these is enumerated below. Dr. Mor holds stock of unknown value in PointRight, Inc. an information services company providing advice and consultation to various components of the long term care and post acute care industry, including suppliers and insurers. PointRight sells information on the measurement of nursing home quality to nursing homes and liability insurers. Dr. Mor was a founder of the company but has subsequently divested much of his equity in the company and he relinquished his seat on board. In addition, Professor Mor Chairs the Independent Quality Committee for HRC Manor Care, Inc., a nursing home chain, for which he receives compensation in the \$20,000–\$40,000 range. Dr. Mor also serves as chair of a Scientific Advisory Committee for NaviHealth, a post-acute care service organization, for which he also receives compensation in the \$20,000–440,000 per year range and holds a one time stock option of .01% of equity. In 2013 and 2014 Dr. Mor was a compensated speaker at the following non-academic meetings and organizations: Florida Health Care Association; National Investment Center; National Long Term Care Quality Meeting. Dr. Mor serves as a Technical Expert Panel member on several Center for Medicare/Medicaid quality measurement panels. Dr. Mor also serves on the Advisory Board of several research organizations and is a member of the board of directors of: Tufts Health Plan Foundation; Hospice Care of Rhode Island; The Jewish Alliance of Rhode Island.

Introduction

Medicare paid skilled nursing facility (SNF) care recently has become a concern of policy makers. The nursing home sector has undergone a remarkable transformation in terms of payer source over the past two decades. In 1980, Medicare accounted for only 1.7% of total nursing home expenditures (National Center for Health Statistics, 2005) and this share reached 18.3% by 2010. Such changes are mostly driven by increased use of postacute care. Per-capita Medicare fee-for-service spending on SNF care almost doubled over the past decade (Medpac, 2012). Additionally, among the health care services paid by Medicare, utilization of SNF care varies most widely across geographic areas and providers with about 15% of the variation in all Medicare expenditures explained by variation in SNF care services (Newhouse & Garber, 2013). However, there is limited understanding of the sources of such variation. This article investigates the role of Medicaid-eligible Medicare beneficiaries, usually referred to as dual-eligibles, in generating variation in SNF care utilization.

Dual-eligible beneficiaries are considered to be one of the most vulnerable groups in our public insurance system and have the highest health care expenditures among Medicare beneficiaries (Moon & Shin, 2006a, 2006b). In 2008, dual-eligibles comprised approximately 17% of all fee-for-service Medicare beneficiaries and accounted for 29% of all Medicare expenditures (Medpac, 2012). SNF care is highly used by dual-eligible beneficiaries. Average spending on SNF care per beneficiary was 2.6 times higher for dual-eligibles (\$1,120 vs. \$424), whereas total spending was 1.8 times higher (\$16,699 vs. \$9,140; Medpac, 2012). In addition to differences in health and socioeconomic status, the inefficiency of the payment and delivery system for dual-eligibles has been shown to contribute to cost differentials (Brown, Peikes, Peterson, Schore, & Razafindrakoto, 2012; Gold, Jacobson, & Garfield, 2012; Grabowski, 2009). This article examines one possible inefficiency in the hospital-discharge/SNF-admission process and examines the implications this may have in terms of SNF care utilization.

Focusing on newly admitted SNF patients, this study examines how variations in quality among SNFs affect differential utilization of postacute care between dual-eligible and Medicare-only patients. Using nurse hours per patient per day as a proxy for nursing home quality, we tested two hypotheses:

- Hypothesis 1** Dual-eligibles are more likely to be discharged from the hospital to an SNF with lower nurse staffing irrespective of their health status and residential neighborhood. We term this *differential discharge*.
- Hypothesis 2** Compared with Medicare-only beneficiaries, dual-eligibles are more likely to become long-stay residents when discharged to an SNF with low nurse staffing relative to facilities with high nurse staffing. Thus, differential length of stay between dual-eligibles and Medicare-only patients within the same SNF decreases with the availability of nursing staff in the SNF.

New Contribution

This study has several new contributions. First, to the best of our knowledge, this is the first study to examine the extent and cause of excess utilization of SNF care. Second, we document important disparities in SNF admissions by dual-eligibility status. Third, we provide evidence that nursing homes treat patients differently based on their insurance status by keeping dual-eligible patients in the nursing home for longer periods of time and converting them to long-stay custodial patients at higher rates. Fourth, this study shows that patients could be allocated across nursing homes more efficiently and equitably and such allocation could reduce costs incurred by both Medicare and Medicaid.

Conceptual Framework

Our hypotheses are driven by two key differences between dual-eligible and Medicare-only beneficiaries in terms of their payment rate and incentive to stay in a nursing home. The payment rate for SNF care is effectively lower for dual-eligibles than for Medicare-only patients. This is because Medicare pays for up to 100 days of SNF care, including full payment for the first 20 days and with a copayment (\$142 per day in 2012) for the remaining 80 days. These copayments for dual-eligible beneficiaries are supposed to be paid by Medicaid. However, they often remain unpaid and become “bad debt.” In fact, dual-eligible beneficiaries account for more than 90% of the bad debt incurred by SNFs (Agency for Health Care Administration [AHCA], 2013). This bad debt is ultimately paid by Medicare, but SNFs must still face the lost interest in waiting for these payments. For stays beyond 100 days, care is covered by out-of-pocket payments, private insurance, or Medicaid, the latter at a much lower payment rate.

We posit that dual-eligible beneficiaries have a greater incentive to stay in a nursing home for two reasons. First, dual-eligible patients do not face cost-sharing as Medicare-only patients do and, therefore, have less financial incentive to return home as soon as possible to minimize out-of-pocket expenditures. Second, dual eligibility is highly correlated with the factors that are documented to prolong nursing home length of stay. Such factors include living alone (Cai, Salmon, & Rodgers, 2009; Howell, Silberberg, Quinn, & Lucas, 2007; Kelly et al., 2010; Martikainen et al., 2009), low socioeconomic status (Martikainen et al., 2009), lower household's net worth (Kelly et al., 2010), dissatisfaction with living conditions at home (Howell et al., 2007), and lower rates of home ownership (Cai et al., 2009). Thus, quality of living at nursing home relative to that in community is higher for dual-eligibles than for Medicare-only patients.

In addition to heterogeneity across patients, we also assume that there is heterogeneity across SNFs, especially in resources and quality of care. Our analyses use a single proxy for SNF care quality that serves two purposes: to identify possible disparities in SNF admissions and to predict patient outcomes. This article uses nursing hours per patient per day as a measure of SNF quality. Higher availability of nursing staff has been rigorously documented as a marker for better quality in the nursing home literature (Castle, 2008; Castle & Anderson, 2011; Harrington, Zimmerman, Karon, Robinson, & Beutel, 2000; Hyer et al., 2011; Schnelle et al., 2004). Availability of nursing staff is an important component of the

nursing home comparison tools provided by Center for Medicare and Medicaid Services and is likely to be the most relevant quality measure for postacute care patients.

The working hypothesis of this article is that both patients and nursing homes rank each other using available information and are matched based on this relative ranking. Because of their potential contribution to bad debt and lower payment rates as long-stay residents, dual-eligibles are likely to be less preferred by SNFs than Medicare-only beneficiaries. Additionally, because of their higher likelihood of becoming a long-stay nursing home resident, they may also be less preferred by SNFs with higher staffing that are typically high cost/quality facilities. On the other hand, SNFs with higher nurse staffing are likely to be preferred by patients or the originating hospitals. The *differential discharge hypothesis* is driven by the assortative matching argument that Medicare-only patients who are financially more attractive to providers will be treated in high nurse staffing SNFs that are more attractive to patients.

SNFs with high nurse staffing also have a relatively lower incentive to prolong the length of stay of patients because they have a higher cost structure and payment rates for long-stay patients are typically lower. As dual-eligible patients may have a greater incentive to stay in the nursing home, they will have longer lengths of stay than Medicare-only patients regardless of the treating SNF. However, dual-eligible patients will have relatively longer lengths of stay than Medicare-only patients in low nurse staffing facilities which are willing to keep patients for a longer time at a lower payment rate. Thus, our *second hypothesis* is that differential length of stay between dual-eligible and Medicare-only patients will be greater in SNFs with a low nurse staffing than in other SNFs.

This article tests these two hypotheses using a sample of fee-for-service Medicare beneficiaries who (1) were admitted to skilled nursing facilities for Medicare-paid postacute care between July 2008 and June 2009 and (2) had not had any nursing home stay in the 6 months prior to admission. We estimated these relationships after adjusting for demographic, clinical, and neighborhood characteristics. We also tested the relationship specified in the second hypothesis using rehospitalization rate and mortality as outcomes.

Method

Data Sources

We used the following sources of data to obtain nursing home and individual characteristics:

1. Minimum data set (MDS): MDS assessment forms are completed for all residents in certified nursing homes on admission and then at least quarterly thereafter. The MDS instrument has numerous data elements and includes summary measures of cognitive and physical functioning, continence, pain, mood state, diagnoses, health conditions, mortality risk, special treatments, and medication use. Numerous reliability and validity studies reveal that most MDS items achieve an intraclass correlation of .6 (Hawes et al., 1995; Kidder et al., 2002; Mor, 2004; Mor, Intrator, Unruh, & Cai, 2011; Morris et al., 1990; Phillips et al., 1997).

2. Medicare Standard Analytic File (Claims): This file includes all claims related to inpatient, SNF care, home health and hospice services for Medicare enroll-ees. All Part A claims include dates of service and up to 10 diagnoses.
3. Medicare enrollment file: This file identifies individuals enrolled in Medicare within a given year and includes demographic data, survival status, residential location, and program eligibility information for parts A, B, and D, Managed Care and Medicaid.
4. Online Survey Certification and Reporting System (OSCAR): OSCAR is a compilation of data elements collected by surveyors during inspection surveys conducted at nursing facilities. Surveys are conducted at least once during every 15-month period for certifying participation in the Medicare and Medicaid programs. The database includes each nursing home's organizational characteristics and aggregate patient characteristics.
5. Census (2000) aggregates at zip code level: Census 2000 data allow calculation of the composition of the population in all the zip codes with respect to various demographic characteristics, disability status, poverty status and per-capita income for the elderly population (age 65+ years). The zip code tabulation area Gazetteer file provides the area and centroid of each zip code.

We used Medicare enrollment records and claims data to identify fee-for-service Medicare beneficiaries who were discharged to an SNF following an acute hospital stay. We merged these data with individuals' MDS assessment records using the health insurance claim number. Next, using the residential history file (RHF; Intrator, Hiris, Berg, Miller, & Mor, 2011) methodology, we linked subjects' MDS assessments and Medicare SNF claims to track daily medical services for 6 months after the qualifying hospital discharge. We excluded individuals with any nursing home stay in the prior 6 months for two reasons. First, prior nursing home use may affect an individual's likelihood of becoming dually eligible via spend-down of assets (Liu, Doty, & Manton, 1990). Second, long-term nursing home residents who are dual-eligible, are likely to return to the same nursing home as an SNF patient following a hospitalization event before transitioning back to being a long-stay resident. We also linked OSCAR data using the SNF provider number documented on Medicare SNF claims. Finally, we used zip codes of residence, included on the Medicare enrollment files, to link to zip code-level census data.

In our study, 1,099,019 Medicare beneficiaries were discharged from hospital to SNF between July 1, 2008, and June 30, 2009, and had no nursing home stay in the 6 months prior to hospital discharge. We excluded 11.4% of these individuals who did not reside in the contiguous 48 states and for whom SNF and residential zip code identification did not match with OSCAR and census data, respectively. We excluded the noncontiguous states because zip code-level information and distances to particular type of SNFs are either missing or less precisely measured. We further excluded 6% of individuals for whom we could not identify MDS records, which may have been due to very short stays in SNF facilities or problematic individual identifiers. This did not vary with dual-eligibility status. The final cohort included 907,311 patients, of which 19.2% were dual-eligible. These

Medicare beneficiaries resided in 27,525 zip codes and were discharged to 14,697 different SNFs.

Variables

Our primary outcome is whether an SNF patient becomes a long-stay nursing home resident, defined as remaining in a nursing home for more than 100 days in the 180 days following SNF admission. Typically, a patient is considered a long-term resident when the length of stay exceeds 90 days (Lau, Kasper, Potter, Lyles, & Bennett, 2005) or if a patient has a quarterly MDS assessment (Intrator, Zinn, & Mor, 2004). We used a 100-day threshold because Medicare is the primary payer for up to 100 days. Our secondary outcome variables are 30-day rehospitalization (i.e., whether the patient was rehospitalized within 30 days of hospital discharge) and 6-month mortality (i.e., death within 180 days of hospital discharge).

Nurse hours per patient per day were calculated using two variables, registered nurse (RN) hours per patient per day and licensed practical nurse (LPN) hours per patient per day, obtained from the OSCAR. Given that RNs and LPNs are not strictly comparable, we calculated an RN care equivalent of nursing care hours that is RN hours plus LPN hours multiplied by the wage ratio of LPN to RN (0.624). Thus, it is in effect the RN hours per patient per day that could be purchased if the entire nursing budget were spent on RNs. We used the salaries in 2011 reported by the Bureau of Labor Statistics (average annual salary was \$67,930 for RNs and \$42,400 for LPNs). We calculated nurse staffing in this way to take into account both the “quality” and “quantity” aspects of other commonly used measures of nurse staffing. RN to total nurse ratios are a measure of the quality of nurse staffing; several studies have shown the importance of RN staffing for care quality (Backhaus, Verbeek, van Rossum, Capezuti, & Hamers, 2014; Bostick, Rantz, Flesner, & Riggs, 2006). Higher RN staffing ratios have been shown to be related to survey deficiencies as well as standard quality indicators (e.g., urinary tract infections), the latter being related especially to the care of postacute patients (Harrington, Kovner, et al., 2000). On the other hand, the quantity of nurse staffing which is usually measured in terms of RN hours per patient per day or total nurse (RN and LPN) hours per patient per day has also been shown to be important for quality care (Harrington, Kovner, et al., 2000). Our measure captured both these aspects of nurse staffing by capturing total nurse hours per patient per day while also taking into account the greater importance of RN staffing. We used nurse staffing as a dependent variable when examining the differential discharge and as an explanatory variable when examining differential length of stay. We used both continuous and quintile versions of nurse staffing alternatively in our analysis.

The main independent variable is dual eligibility (obtained from Medicare enrollment records that include monthly Medicaid eligibility status). A patient is classified as dually eligible if he or she was Medicaid eligible for at least one of the six months preceding the SNF admission. Those who spent-down following the SNF admission were not considered dually eligible.

We used three types of control variables: demographic, clinical, and residential neighborhood characteristics. We obtained gender, race, date of birth, date of death and residential zip code from the Medicare enrollment file. From hospitalization claims, we

derived patient clinical characteristics, including Elixhauser (Elixhauser, Steiner, Harris, & Coffey, 1998) and Deyo (Deyo, Cherkin, & Ciol, 1992) comorbidity indexes, hospital length of stay, and the number of intensive care unit days during the hospitalization. We used home health claims to construct an indicator of home health utilization before the qualifying hospital stay. Other clinical characteristics were obtained from the MDS and include indicators for common diagnoses (e.g., diabetes, serious mental illness, etc.), the number of medications taken in the past 7 days, the Morris late loss Activities of Daily Living Scale (Morris, Fries, & Morris, 1999), the cognitive performance scale (Morris et al., 1994), and the resource utilization group (5.12; Fries & Cooney, 1985; Fries et al., 1994). Residential neighborhood (i.e., zip-code characteristics) included per-capita income, poverty rate among the age 65+ population, share of the population living in a rural area, and the proportion of Blacks among those aged 65+ years. As the distance from one's residential neighborhood plays an important role in nursing home choice (Grabowski, Feng, Hirth, Rahman, & Mor, 2012; Rahman, Foster, Grabowski, Zinn, & Mor, 2013; Shugarman & Brown, 2006; e.g., Zwanziger, Mukamel, & Indridason, 2002), we calculated distances from the centroid of the residential zip code to the nearest nursing facility belonging to different quintiles based on nurse staffing.

Statistical Analysis

To examine differential discharge, we conducted descriptive analysis to examine whether patients from the same residential neighborhood are discharged to different types of nursing homes based on their dual-eligibility status. We also estimated the effect of dual eligibility on admission to a SNF with different nurse staffing using a multivariate model. We categorized SNFs into quintiles based on their nursing hours per patient per day and used an ordered probit model to estimate the association of dual eligibility with the likelihood of being admitted to nursing homes belonging to each category. Other covariates include patients' demographic and clinical characteristics, residential zip code characteristics, and distances to the nearest SNFs in each quintile of nurse staffing. The estimated ordered probit model was used to calculate the marginal effect of dual-eligibility status.

To test the hypothesized patterns related to differential lengths of stay, we plotted the bivariate relationship between the likelihood of becoming a long-stay nursing home resident among the postacute patients and the nurse staffing in the treating nursing facility separately by dual-eligibility status. We also calculated differential lengths of stay (i.e., the difference in the fraction of patients who became long-stay) between dual-eligible and Medicare-only patients at each nursing facility and plotted this against the nurse staffing in the corresponding facility. Finally, we generalized the analysis to our clinical outcome variables by estimating the effect of dual eligibility separately for the five types of SNFs defined by quintiles of nurse staffing. We used a linear probability model to estimate differences in outcomes by dual eligibility, controlling for patient demographic, clinical, and neighborhood characteristics and nursing home fixed effects. The health outcomes reflect the role of unobserved differences in acuity by dual eligibility that could potentially underlie our results. Our analysis examines how differential lengths of stay within a facility varies with quality of care in that facility, but does not estimate the effect of being treated in a particular type facility. Thus, the implicit assumption is that unobservable differences exist between

patients treated in different facilities but the unobservable attributes of patients within a facility do not vary with dual eligibility.

Results

Table 1 presents patient characteristics by dual-eligibility status. About 30% of all dual-eligible patients became long-stay (>100 days) nursing home residents following their hospital discharge compared with 15% of Medicare-only beneficiaries. Dual-eligible patients were more likely to be rehospitalized and to die within 6 months of hospital discharge.

Table 1 also reveals that dual-eligible patients differ from Medicare-only patients in a number of ways. Dual-eligible patients were 2 years younger on average, more likely to be female and a minority, and resided in relatively rural or low-income neighborhoods. Medicare-only patients were two times more likely to be married than dual-eligible patients. Dual-eligible patients were more often admitted to nursing homes with complex health conditions. On average, dual-eligible patients stayed 1 day longer in the hospital and had relatively higher intensive care use and comorbidity as measured by both the Elixhauser and Charlson-Deyo indexes. Using health indicators from the MDS, we observe that dual-eligible patients were 1.4 times more likely to have diabetes, 2 times more likely to have bipolar disease, and 6 times more likely to have schizophrenia.

Figure 1 shows how dual-eligible and Medicare-only beneficiaries are being segregated into different nursing homes although they are from the same residential neighborhoods. These plots separate out the role of neighborhood and dual eligibility in the differential hospital-discharge. Figure 1, Panel A, plots the average nurse staffing in treating SNFs for dual-eligible and Medicare-only patients against the poverty rate in the originating neighborhood zip code. Regardless of the originating neighborhood, dual-eligibles were more likely to be admitted to an SNF with lower nurse staffing. Additionally, nurse staffing in the treating SNF decreases (though not strictly) with the poverty rate in the residential neighborhood for both types of patients. Here parallelism of the plotted lines implies that patients with different Medicaid eligibility are sorted into different nursing homes. Downwardness of the plotted lines implies that patients in high-poverty neighborhoods are discharged to low staffing SNFs. In fact, it can be shown from our data that SNFs located near high-poverty neighborhoods have a lower nurse patient ratio (results are available online at <http://mcr.sage-pub.com/supplemental>).

We plotted the median distance of the treating SNF from the residential neighborhood against the poverty rate of the residential neighborhood for patients with different dual eligibility in Figure 1, Panel B. Given that lower nurse staffing SNFs are located in high-poverty neighborhoods, differential discharge also implies that compared with Medicare-only patients, dual-eligible patients have to travel greater distances from low-poverty neighborhoods and shorter distances from high-poverty neighborhoods. We indeed see the crossing of plotted lines as expected in the presence of differential discharge.

Table 2 presents hospital discharges to SNFs based on nurse staffing in the facility (by quintiles). More than 36% of all Medicare-only residents were discharged to the 20% (2,955) of nursing homes with the highest nurse staffing whereas only 27% of dual-eligibles were discharged to such facilities. In contrast, only 9% of Medicare-only residents were discharged to facilities with the lowest nurse staffing, while 13% of dual-eligible patients were discharged to these facilities. Thus, an average dual-eligible was approximately 9 percentage points *less* likely to be discharged to an SNF with the highest nurse staffing and 4 percentage points more likely to be discharged to an SNF belonging to the lowest quintile in terms of nurse staffing. After adjusting for patients' demographic, clinical, and neighborhood characteristics, the average dual beneficiary continued to be 4.5 percentage points less likely to be discharged to a highest quintile SNF and more likely to be admitted to facilities with relatively low nurse staffing. We observed very similar patterns using groups of clinically homogenous patients (i.e., with the same primary diagnosis and similar comorbidity) and these results are available online at <http://mcr.sagepub.com/supplemental>.

Figure 2 shows the patterns of differential discharge on various outcomes. Figure 2, Panel A, shows that for both dual-eligible and Medicare-only patients, the likelihood of becoming a long-stay resident decreases with the nurse staffing in SNFs. However, regardless of SNF quality, dual-eligibles are more likely to become long-stay residents. Moreover, as nurse staffing increases, the gap in the outcome between dual-eligible and Medicare-only beneficiaries decreases. As shown in Figure 2, Panel B, in SNFs with nurse staffing greater than 1.5 hours per patient per day (roughly 7% of all facilities), dual-eligible patients were about 6 percentage points more likely to become long-stay residents than Medicare-only patients; this difference increases to about 14 percentage points for SNFs with nurse staffing less than 1.0 hours per patient per day (about 79% of all facilities).

In Table 3, we compare dual-eligible and Medicare-only patients in SNFs with different nurse staffing and observe very similar patterns. After controlling for individual and neighborhood characteristics and applying SNF fixed effects, dual-eligibles were 8% more likely to become long-stay nursing home residents in 20% SNFs with high nurse staffing (quintile 5) and 13 percentage points higher in rest of the facilities. Dual-eligible beneficiaries have higher unadjusted 30-day rehospitalization rates and lower adjusted 30-day rehospitalization gaps that are not statistically different from zero except for quintile 1. Also, dual-eligible patients are less likely to die within 180 days of discharge even after adjustment. Excess hospitalization and mortality by Medicare-only patients declines as nurse staffing increases. We found similar results using subsets of patients with the same diagnosis and comorbidities (results are available online at <http://mcr.sagepub.com/supplemental>).

Discussion

This article examines outcomes for patients who were discharged to Medicare paid SNF care following an acute hospital stay and demonstrates how Medicaid eligibility interacted with the chosen nursing facility and contributed to the likelihood of becoming a long-stay nursing home resident. Dual-eligible beneficiaries were more likely to be discharged to lower nurse staffing SNFs that treat patients for a longer time. They were also more likely to become long-stay residents in any SNF. In addition, the gap in likelihood of becoming a long-stay

nursing home resident between dual-eligible patients and Medicare-only beneficiaries is much smaller in the top 20% SNFs in terms of nurse staffing than that in rest of the SNFs. Dual-eligibles have the same or lower adjusted hospitalization rates than Medicare-only patients. This indicates that excess length of stay by dual-eligible patients is largely due to nonclinical reasons. Lower mortality of dual-eligible patients in low nurse staffing facilities implies better unobserved health condition or returns to longer nursing home stay.

This article identifies important disparities in the hospital-discharge/SNF-admission process and provides caregivers/coordinators insight on outcomes for patients in different types of SNFs. SNFs with the highest nurse staffing may specialize in the treatment of postacute patients and may not be willing to treat dual-eligible patients for longer periods of time. These facilities may avoid patients who are likely to become long-stay residents and may use dual eligibility as a marker of potential long-stay residency. In contrast, SNFs that have low nurse staffing may not get many new admissions, have a lower cost structure, and may be willing to treat patients at the Medicaid payment rate for a longer time to keep their beds filled.

The main limitation of this article is the assumption that patients within SNFs are comparable after adjusting for observable characteristics. Dual-eligible beneficiaries may lack family support at home, which is not included in our analysis and thus we may overestimate the effect of dual eligibility on SNF length of stay. However, controlling for patient characteristics including marital status and residential neighborhood characteristics that are correlated with support at home does not affect the estimated difference much (comparing the last two columns in Table 3). This signals that the bias from omitted variables like support at home might be small. If we ignore such omitted variable bias, our results can be interpreted in terms of reduction in the length of stay gap under alternative hypothetical scenarios. Dual-eligible patients are on average 15 percentage points more likely to become long-stay residents. If SNF admission decisions were not affected by dual eligibility and were determined by clinical characteristics and residential neighborhood characteristics alone, the gap would be reduced to 13 percentage points. On the other hand, if length of stay within a given SNF was not affected by dual eligibility, differential length of stay would decline to 3 percentage points. Similarly, we can calculate how Medicaid eligibility interacted with the chosen nursing facility contributes to the variation in SNF care utilization. The variance in predicted likelihood of becoming long-stay resident of all the patients in our model would decline by 2% if there were no differential discharge and by 20% if length of stay within a given SNF was not affected by dual eligibility. However, all these calculations may be overly optimistic since our analysis does not account for the fact that dual residents could also remain in higher quality SNFs due to lack of informal support back at home.

Another key limitation of this study is that residents discharged to low nurse staffing SNFs might be fundamentally different from those who are discharged to high nurse staffing SNFs in ways not accounted for by our control variables. In such a case, the effect of availability of staffing and the likelihood of becoming a long-stay resident would not be identified. The validity of differential distances between types of SNFs from residential zip codes as instrumental variables for discharged SNF can be argued. Residential neighborhood

characteristics can affect quality of life at home and have a direct effect on the likelihood of becoming a long-stay nursing home resident, which would violate the exclusionary restriction needed for the validity of distance as an instrument. For this reason, we used distance as a control variable only. However, the relationships are very robust even within small groups of clinically similar patients; therefore, the estimated statistical association may not be very different from the causal effect estimate. A third limitation is that we focus our analysis only on patients who are discharged to SNFs and ignore the role of other forms of postacute care such as inpatient rehabilitation facilities, long-term care hospitals, and home health care. Availability of postacute care setting may vary with dual eligibility in the area and that may have an important effect on the disparities in use of services.

One of the main factors underlying the patterns documented in this article could be differences in payment rate by dual eligibility. On February 22, 2012, the *Middle Class Tax Relief and Job Creation Act* was passed with the aim of reducing Medicare payment for bad-debt for different health care providers. Skilled nursing facilities are currently reimbursed 100% of the bad debt for dual-eligible beneficiaries, but by 2015, such coverage will be reduced to 65% (AHCA, 2013). Since dual-eligible patients account for more than 90% of the bad debt incurred by SNFs, such reduction in coverage for bad debt will reduce the attractiveness of dual-eligible beneficiaries as SNF patients. Additionally, Medicaid policies regarding long-term care vary substantially across states and may have an influence on differential discharge and differential nursing home length of stay. Higher Medicaid reimbursement rates may encourage nursing facilities, especially the resource poor ones, to keep dual-eligible patients for longer periods of time. Additional research is needed to understand the influence of payment rate policies.

Acknowledgments

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was supported by the National Institute of Ageing Grant P01 AG027296 Mor (Principal Investigator).

References

- Agency for Health Care Administration. Uncompensated care: Medicare bad debt coverage to skilled nursing facility: A critical lifeline. 2013. (Issue Brief). Retrieved from http://www.ahcancal.org/research_data/funding/Documents/bad%20debt%20issue%20brief.pdf
- Backhaus R, Verbeek H, van Rossum E, Capezuti E, Hamers JP. Nurse staffing impact on quality of care in nursing homes: A systematic review of longitudinal studies [Review]. *Journal of the American Medical Directors Association*. 2014 Advance online publication. 10.1016/j.jamda.2013.12.080
- Bostick JE, Rantz MJ, Flesner MK, Riggs CJ. Systematic review of studies of staffing and quality in nursing homes. *Journal of the American Medical Directors Association*. 2006; 7:366–376.10.1016/j.jamda.2006.01.024 [PubMed: 16843237]
- Brown RS, Peikes D, Peterson G, Schore J, Razafindrakoto CM. Six features of medicare coordinated care demonstration programs that cut hospital admissions of high-risk patients. *Health Affairs (Millwood)*. 2012; 31:1156–1166.10.1377/hlthaff.2012.0393
- Cai Q, Salmon JW, Rodgers ME. Factors associated with long-stay nursing home admissions among the U.S. elderly population: Comparison of logistic regression and the Cox proportional hazards

- model with policy implications for social work. *Social Work in Health Care*. 2009; 48:154–168.10.1080/00981380802580588 [PubMed: 19197772]
- Castle NG. Nursing home caregiver staffing levels and quality of care. *Journal of Applied Gerontology*. 2008; 27:375–405.
- Castle NG, Anderson RA. Caregiver staffing in nursing homes and their influence on quality of care: Using dynamic panel estimation methods. *Medical Care*. 2011; 49:545–552.10.1097/MLR.0b013e31820fbc9 [PubMed: 21577182]
- Deyo RA, Cherkin DC, Ciol MA. Adapting a clinical comorbidity index for use with ICD-9-CM administrative databases. *Journal of Clinical Epidemiology*. 1992; 45:613–619. [PubMed: 1607900]
- Elixhauser A, Steiner C, Harris DR, Coffey RM. Comorbidity measures for use with administrative data. *Medical Care*. 1998; 36:8–27. [PubMed: 9431328]
- Fries BE, Cooney LM Jr. Resource utilization groups. A patient classification system for long-term care. *Medical Care*. 1985; 23:110–122. [PubMed: 3919222]
- Fries BE, Schneider DP, Foley WJ, Gavazzi M, Burke R, Cornelius E. Refining a case-mix measure for nursing homes: Resource Utilization Groups (RUG-III). *Medical Care*. 1994; 32:668–685. [PubMed: 8028403]
- Gold MR, Jacobson GA, Garfield RL. There is little experience and limited data to support policy making on integrated care for dual eligibles. *Health Affairs (Millwood)*. 2012; 31:1176–1185.10.1377/hlthaff.2012.0162
- Grabowski DC. Special Needs Plans and the coordination of benefits and services for dual eligibles. *Health Affairs (Millwood)*. 2009; 28:136–146.10.1377/hlthaff.28.1.136
- Grabowski DC, Feng Z, Hirth R, Rahman M, Mor V. Effect of nursing home ownership on the quality of post-acute care: An instrumental variables approach. *Journal of Health Economics*. 2012; 32:12–21.10.1016/j.jhealeco.2012.08.007 [PubMed: 23202253]
- Harrington C, Kovner C, Mezey M, Kayser-Jones J, Burger S, Mohler M, Zimmerman D. Experts recommend minimum nurse staffing standards for nursing facilities in the United States. *The Gerontologist*. 2000; 40:5–16. [PubMed: 10750309]
- Harrington C, Zimmerman D, Karon SL, Robinson J, Beutel P. Nursing home staffing and its relationship to deficiencies. *Journals of Gerontology B Psychological Sciences & Social Sciences*. 2000; 55:S278–S287.
- Hawes C, Morris JN, Phillips CD, Mor V, Fries BE, Nonemaker S. Reliability estimates for the Minimum Data Set for nursing home resident assessment and care screening (MDS). *The Gerontologist*. 1995; 35:172–178. [PubMed: 7750773]
- Howell S, Silberberg M, Quinn WV, Lucas JA. Determinants of remaining in the community after discharge: Results from New Jersey's Nursing Home Transition Program. *The Gerontologist*. 2007; 47:535–547. [PubMed: 17766674]
- Hyer K, Thomas KS, Branch L, Harman J, Johnson CE, Weech-Maldonado R. The influence of nurse staffing levels on quality of care in nursing homes. *The Gerontologist*. 2011; 51:610–616.10.1093/geront/gnr050 [PubMed: 21602292]
- Intrator O, Hiris J, Berg K, Miller SC, Mor V. The residential history file: Studying nursing home residents' long-term care histories. *Health Services Research*. 2011; 46(1 Pt 1):120–137.10.1111/j.1475-6773.2010.01194.x [PubMed: 21029090]
- Intrator O, Zinn J, Mor V. Nursing home characteristics and potentially preventable hospitalizations of long-stay residents. *Journal of the American Geriatrics Society*. 2004; 52:1730–1736.10.1111/j.1532-5415.2004.52469.x [PubMed: 15450053]
- Kelly A, Conell-Price J, Covinsky K, Cenzer IS, Chang A, Boscardin WJ, Smith AK. Length of stay for older adults residing in nursing homes at the end of life. *Journal of the American Geriatrics Society*. 2010; 58:1701–1706.10.1111/j.1532-5415.2010.03005.x [PubMed: 20738438]
- Kidder, D.; Rennison, M.; Goldberg, H.; Warner, D.; Bell, B.; Hadden, L.; Mor, V. MegaQI covariate analysis and recommendations: Identification and evaluation of existing quality indicators that are appropriate for use in long-term care settings. Cambridge, MA: Abt Associates; 2002. Centers for Medicare and Medicaid Services Contract No. 500-95-0062 TO #4

- Lau DT, Kasper JD, Potter DE, Lyles A, Bennett RG. Hospitalization and death associated with potentially inappropriate medication prescriptions among elderly nursing home residents. *Archives of Internal Medicine*. 2005; 165:68–74.10.1001/archinte.165.1.68 [PubMed: 15642877]
- Liu K, Doty P, Manton K. Medicaid spenddown in nursing homes. *The Gerontologist*. 1990; 30:7–15. [PubMed: 2107131]
- Martikainen P, Moustgaard H, Murphy M, Einio EK, Koskinen S, Martelin T, Noro A. Gender, living arrangements, and social circumstances as determinants of entry into and exit from long-term institutional care at older ages: A 6-year follow-up study of older Finns. *The Gerontologist*. 2009; 49:34–45.10.1093/geront/gnp013 [PubMed: 19363002]
- Medpac. A data book: Health care spending and the Medicare program. 2012 Jun. Retrieved from <http://www.medpac.gov/documents/Jun12DataBookEntireReport.pdf>
- Moon S, Shin J. Health care utilization among Medicare-Medicaid dual eligibles: A count data analysis. *BMC Public Health*. 2006a; 6:88.10.1186/1471-2458-6-88 [PubMed: 16595021]
- Moon S, Shin J. Racial differences in health care use among medicare only and dual eligibles. *Journal of Health and Human Services Administration*. 2006b; 28:326–345.
- Mor V. A comprehensive clinical assessment tool to inform policy and practice: Applications of the minimum data set. *Medical Care*. 2004; 42(4 Suppl):III50–III59. [PubMed: 15026672]
- Mor V, Intrator O, Unruh MA, Cai S. Temporal and geographic variation in the validity and internal consistency of the Nursing Home Resident Assessment Minimum Data Set 2.0. *BMC Health Services Research*. 2011; 11:78.10.1186/1472-6963-11-78 [PubMed: 21496257]
- Morris JN, Fries BE, Mehr DR, Hawes C, Phillips C, Mor V, Lipsitz LA. MDS Cognitive Performance Scale. *Journal of Gerontology*. 1994; 49:M174–M182. [PubMed: 8014392]
- Morris JN, Fries BE, Morris SA. Scaling ADLs within the MDS. *Journals of Gerontology A Biological Sciences & Medical Sciences*. 1999; 54:M546–M553.
- Morris JN, Hawes C, Fries BE, Phillips CD, Mor V, Katz S, Friedlob AS. Designing the national resident assessment instrument for nursing homes. *The Gerontologist*. 1990; 30:293–307. [PubMed: 2354790]
- National Center for Health Statistics. *Health, United States, 2005*. Hyattsville, MD: Author; 2005.
- Newhouse JP, Garber AM. Geographic variation in health care spending in the United States: Insights from an Institute of Medicine report. *JAMA*. 2013; 310:1227–1228.10.1001/jama.2013.278139 [PubMed: 24008265]
- Phillips CD, Morris JN, Hawes C, Fries BE, Mor V, Nennstiel M, Iannacchione V. Association of the Resident Assessment Instrument (RAI) with changes in function, cognition, and psychosocial status. *Journal of American Geriatrics Society*. 1997; 45:986–993.
- Rahman M, Foster AD, Grabowski DC, Zinn JS, Mor V. Effect of Hospital-SNF Referral Linkages on Rehospitalization. *Health Services Research*. 2013; 48(6 Pt 1):1898–1919.10.1111/1475-6773.12112 [PubMed: 24134773]
- Schnelle JF, Simmons SF, Harrington C, Cadogan M, Garcia E, Bates-Jensen BM. Relationship of nursing home staffing to quality of care. *Health Services Research*. 2004; 39:225–250.10.1111/j.1475-6773.2004.00225.x [PubMed: 15032952]
- Shugarman, LR.; Brown, JA. *Nursing home selection: How do consumers choose? Volume I: Findings from focus groups of consumers and information intermediaries*. Washington, DC: Office of Disability, Aging and Long-Term Care Policy, Office of the Assistant Secretary for Planning and Evaluation, U.S. Department of Health and Human Services; 2006 Dec. Contract No. HHS-100-03-0023
- Zwanziger J, Mukamel DB, Indridason I. Use of resident-origin data to define nursing home market boundaries. *Inquiry*. 2002; 39:56–66. [PubMed: 12067076]

Figure 1.

Relationship between skilled nursing facility characteristics and poverty rate in residential neighborhood by dual eligibility. (A) Adjusted nurse hours per patient per day. (B) Median distance of treating skilled nursing facility (SNF).

Note. These are local polynomial smooth plots drawn using residential zip code–level data weighted by number of observed patients in corresponding zip code. Poverty rate is defined as percentage of 65+ age population with income under poverty line and have been obtained from census. These figures are based on 858,543 individuals from 18,993 zip codes. We excluded zip codes with poverty rates lower than 1 and higher than 30 (5.4% of the individuals) that did not have sufficient numbers of patients of both types to do meaningful comparisons.

Figure 2. Relationship between likelihood of becoming a long-stay resident and nurse staffing. (A) Fraction of patients who became long-stay residents. (B) Difference in the fraction of patients becoming long-stay residents between dual-eligible and Medicare-only patients. *Note.* These are local polynomial smooth plots drawn using nursing facility-level data weighted by the number of observed patients in the corresponding nursing facility.

Table 1

Patient Characteristics.

Source	Variable	Medicare-only (N = 732,976)		Dual-eligible (N = 174,335)	
		M	SD	M	SD
Residential history file	Outcome variables				
	Became long-stay resident	0.145	0.352	0.301	0.459
	Rehospitalized in 30 days	0.175	0.380	0.196	0.397
	Death by 180 days	0.218	0.413	0.222	0.416
Medicare enrollment	Control variables				
	Age	81.72	7.65	79.77	8.35
	Female	0.641	0.480	0.724	0.447
	Black	0.051	0.220	0.164	0.370
Medicare claims of qualifying hospitalization	Race other than black or white	0.016	0.126	0.102	0.303
	Deyo greater than 1	0.409	0.492	0.487	0.500
	ElixHauser greater than 2	0.497	0.500	0.533	0.499
	Days in intensive care unit	1.69	3.66	1.88	4.20
MDS	Days stayed in hospital before discharge	8.87	7.06	9.75	7.51
	Used home health before discharge	0.144	0.351	0.212	0.409
	Married	0.384	0.486	0.183	0.386
	Diabetes mellitus	0.278	0.448	0.383	0.486
	Congestive heart failure	0.198	0.399	0.233	0.423
	Hip fracture	0.093	0.290	0.078	0.268
	Alzheimer's disease	0.037	0.188	0.044	0.205
	Stroke	0.115	0.319	0.151	0.358
	Dementia other than Alzheimer's	0.115	0.319	0.136	0.343
	Bipolar disease	0.008	0.087	0.015	0.123
	Schizophrenia	0.003	0.054	0.018	0.132
	Emphysema	0.185	0.388	0.245	0.430
	Cancer	0.075	0.263	0.065	0.247
	Number of meds in past 7 days	12.04	4.77	12.10	4.93
	Morris additive ADL scale	16.31	5.38	17.01	5.78

Source	Variable	Medicare-only (N = 732,976)		Dual-eligible (N = 174,335)	
		M	SD	M	SD
Residential zip code	CPS scale, Fries/Morris 92	1.26	1.51	1.60	1.63
	Resource Utilization Group (III) Score	6.07	1.83	5.96	1.88
	Percentage of Black	6.10	13.57	11.09	20.04
	Per-capita income	23481	9576	19527	7665
	Poverty rate among 65+ age population	8.50	5.52	12.28	7.83
	Percentage of rural population	21.95	31.85	25.95	34.97
	Distance to the nearest SNF in quintile 1 ^a	20.87	24.25	21.22	25.94
	Distance to the nearest SNF in quintile 5 ^a	14.42	19.00	17.00	21.82

Note. SNF = skilled nursing facility; MDS = minimum data set; ADL = activities of daily living.

^a Quintiles are in terms of nurse staffing in the SNF. Differences in all the variables between dual-eligible and Medicare only patients are statistically significant.

Table 2

Distribution of the Admissions of Dual-Eligible and Medicare-Only Patients Into Skilled Nursing Facilities (SNFs) of Different Quintiles of Nurse Staffing.

Quintiles of SNFs' nurse hours per patient per day	Percentage of patients distributed in different SNFs				
	All	Medicare-only	Dual-eligible	Difference	Risk-adjusted difference
1	0.093	0.085	0.126	0.041	0.0185***
2	0.143	0.136	0.174	0.038	0.0195***
3	0.188	0.185	0.201	0.016	0.0114***
4	0.232	0.234	0.227	-0.006	-0.0049***
5	0.344	0.361	0.272	-0.0897	-0.0445***

Note. A total of 14,775 SNFs have been divided into five (quintile) groups based on adjusted nurse hours per patient per day. To obtain the adjusted values we estimated an ordered probit model with different quintiles of nursing home discharged as the outcome variable and calculated the marginal effects of dual eligibility (using mfx2 command in stata), that is, change in likelihood of being discharged to a certain type of nursing home due to being dual-eligible. The control variables include patient characteristics and residential zip code characteristics listed in Table 1. Detailed results of this regression can be obtained from the corresponding author on request.

* $p < .1$.

**

$p < .05$.

$p < .01$.

Table 3

Differences in Outcomes Between Dual-Eligible and Medicare-Only Patients From Stratified Analyses Using Quintiles of Nurse Staffing as Strata.

Outcome	Nurse hours per patient per day (quintiles)	Medicare-only	Dual-eligibles	Difference	Risk-adjusted difference
Become long-stay	1	0.218	0.379	0.161	0.126***
	2	0.191	0.351	0.160	0.130***
	3	0.168	0.335	0.168	0.131***
	4	0.150	0.305	0.156	0.124***
	5	0.098	0.205	0.107	0.0822***
30-Day rehospitalization	1	0.188	0.198	0.010	-0.00693***
	2	0.185	0.200	0.015	-0.00334
	3	0.178	0.195	0.016	-0.00241
	4	0.175	0.192	0.017	-0.00022
	5	0.168	0.195	0.027	0.00369
Death within 180 days	1	0.253	0.241	-0.012	-0.0245***
	2	0.247	0.241	-0.006	-0.0195***
	3	0.236	0.227	-0.008	-0.0250***
	4	0.223	0.222	-0.001	-0.0200***
	5	0.189	0.198	0.009	-0.0185***

Note. To calculate the risk-adjusted difference, we estimated ordinary least squares models of these outcome variables separately for each quintile of adjusted nurse hours per patient per day. Coefficients of the dual-eligibility variable have been presented. The control variables include individual and residential zip code characteristics in Table 1 and nursing facility fixed effects.

* $p < .1$.

** $p < .05$.

*** $p < .01$.

These are based on robust standard errors clustered by state.