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ORIGINAL RESEARCH

Relationship Between Insurance and 30-Day Readmission Rates in Patients 65 Years and Older Discharged From an Acute Care Hospital With Hospice Services

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BACKGROUND: Patients who are dual eligible for both Medicare and Medicaid have previously been shown to have increased healthcare utilization and cost. However, this relationship has not been examined for patients at the end of life. Dual eligible patients enrolled in hospice may receive more comprehensive care in the community, reducing readmissions in the final weeks or months of life.

OBJECTIVE: Determine whether patients who have dual coverage with Medicare and Medicaid and are discharged with referral to hospice services after palliative care consult during their hospitalization differ in their 30-day readmission rate compared with similar patients with other types of insurance.

DESIGN: Retrospective cohort study.

SETTING: Three acute care hospitals affiliated with Montefiore Medical Center in the Bronx, New York.

PATIENTS: In total, 2755 inpatients who received palliative care consultation and were discharged with hospice services.

PREDICTOR: Dual eligible for Medicare and Medicaid compared with other insurance status. **MEASUREMENTS:** Readmission to Montefiore Medical Center for any reason within 30 days of the index admission.

RESULTS: Overall, 9.24% of patients with dual Medicare and Medicaid coverage were readmitted within 30 days compared with 13.12% of others (adjusted odds ratio: 0.77; 95% confidence interval: 0.59-0.98; $P = 0.041$).

CONCLUSIONS: Dual eligibility for Medicare and Medicaid is associated with lower 30-day readmission rates in patients enrolled in a hospice program. Insurance coverage that increases access to custodial care (home attendant hours and residential care) may help decrease burdensome hospital readmissions near the end of life. *Journal of Hospital Medicine* 2016;11:688–693. © 2016 Society of Hospital Medicine

Palliative care and hospice specialists consult on a variety of patients in the acute care setting that span all diagnoses and specialties. These include patients in the intensive care units, oncology units, as well as patients with end-stage pulmonary, cardiac, and renal diseases. Discharge of these patients is often complicated by social issues, intensive personal care needs, and decreased functional status, as well as by the patient's insurance. Options for discharge disposition for patients accepting enrollment in hospice are often limited by financial constraints. Medicare pays for a set package of hospice benefits that do not include payment for room and board for hospice residential care and have a limited number of hours for a personal care attendant.[1] Hospice inpatient units are typically covered only for patients with acute care needs. Patients with secondary commercial insurance similarly find that custodial care benefits are often lacking, as most private and managed care plans mimic the Medicare hospice benefit.[2]

Palliative care inpatient consultation and palliative or hospice home care are associated with decreased 30-day readmission rates.[3–6] None of these studies, however, evaluated the effect of insurance status on readmission rates. Patients with dual coverage of Medicare and Medicaid are eligible for coverage of room and board (covered by Medicaid) in addition to the standard hospice benefit (covered by Medicare), and therefore have more options for discharge planning, including admission to a hospice residence, nursing home care with hospice services, or increased personal care attendant hours at home. Dual eligible patients (those with both Medicare and Medicaid) represent 20% of the Medicare population. They are generally poorer and with worse health status that those with Medicare alone; they have on average 25% more medical conditions than Medicare-only patients.[7] Previous studies of readmissions and healthcare costs in the general population have found that dual eligible patients have higher rates of readmissions and higher overall healthcare costs compared with other groups.[7–9] However, these studies did not specifically look at patients near the end of life receiving

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hospice services. We hypothesize that dual eligible patients may actually have a lower rate of readmission at end of life compared with other groups, and that this effect may be partially mediated by discharge location (facility or home).

Previous studies have identified risk factors for 30-day readmission to hospital, including living alone, insurance status, and poor or fair satisfaction with their primary care provider (PCP).[10] This study aims to evaluate, in the cohort of patients who have received a palliative care consultation during their hospital stay and who were discharged with hospice services, whether type of insurance is associated with risk of early readmission.

METHODS

Data were extracted from a replicate of Montefiore's Clinical Information System using healthcare surveillance software (Clinical Looking Glass; Emerging Health Information Technology, Yonkers, NY). We queried this database to find patients who received palliative care consultation from August 2010 to January 2014 at Montefiore Medical Center, an academic medical center in Bronx, NY, consisting of 3 general hospitals with 1491 beds. The medical center provides care to many underserved and minority patients and serves as the University Hospital of the Albert Einstein College of Medicine.

Inclusion Criteria

Patients who received a palliative care consultation were included if they were ≥65 years of age, nonpregnant, and admitted to the medical intensive care unit, any surgical intensive care unit, cardiac care unit, general medicine, surgery or surgical subspecialty service, family medicine, cardiology or oncology service, and discharged with hospice services.

Exclusion Criteria

Patients ≤65 years old and patients who died during the index admission were excluded, as were admissions to pediatrics, obstetrics, and psychology services, and uninsured patients.

The admission with the first palliative care consultation resulting in hospice referral was considered the index admission for these patients. Sociodemographic variables related to readmission such as age, race, gender, primary language, and socioeconomic status (SES) were examined.[11–16] Clinical variables shown to be related to 30-day readmissions in the literature including lab-based acute physiology score (LAPS), blood urea nitrogen level (BUN), serum sodium level, serum albumin level, documentation of weight loss, and Charlson Comorbidity Index as well as its specific components were also extracted.[11,13,16–19] Other variables related to the index admission such as length of stay for index admission, admission source on index admission (eg, from home, nursing home, other), and whether the primary care physician was listed in the chart were also examined.[11,13,16,17,19,20] All of the variables were examined because they were hypothesized to be related to both insurance status and readmission. Markers of clinical severity, such as LAPS, BUN, hyponatremia, hypoalbuminemia, weight loss, and comorbidity could lead to readmission for symptom management or acute deterioration, and have been found be related to readmission in previous literature.

The predictor variable was insurance status at the time of index admission (dual eligible or all other). The main outcome variable was readmission to Montefiore Medical Center for any reason within 30 days of the index admission. Discharge location (hospice services in a facility vs home hospice) was examined as a potential mediator.

Statistical Analysis

Based on quality metrics available from our department, we expected to find at least 1000 patients ≥65 years of age seen by the palliative care consultation service with a discharge disposition including hospice services. This would give our study 85% power to detect a 10% difference in readmission rates between the 2 groups.

Patients were categorized as dual eligible if they were covered by Medicare and Medicaid only or if they were covered by Medicare, Medicaid, and private insurance. Controls were patients who were covered by Medicare only, Medicaid only, private insurance only, or Medicare and private insurance or Medicaid and private insurance. For the primary analysis, patients with and without dual eligibility were compared with respect to sociodemographic characteristics, healthcare process variables, and measures of comorbidity and illness severity using t tests for continuous variables and χ^2 tests for categorical variables. We used a χ^2 test to assess the univariable association between dual eligibility and 30-day readmission. To address the question as to whether dual eligibility reduces the likelihood of a 30 day readmission, logistic regression was used to model 30-day readmission by selecting from the covariates associated with the 30-day readmissions at the 0.15 significance level. The Hosmer-Lemeshow goodness of fit test was used to evaluate overall model performance.

For the secondary analysis, we assessed whether type and location of hospice services mediate the effect of insurance status on 30-day readmissions using a Sobel-Goodman test for mediation. Statistical analysis was conducted using statistical software (Stata statistical software, release 12; StataCorp, College Station, TX).

This research protocol was reviewed by the Montefiore Medical Center/Albert Einstein College of Medicine Institutional Review Board.

TABLE 1. Comparison of Baseline Characteristics

Characteristic	Dual Eligible, N = 1,688	Not Dual Eligible, N = 1,067	*P* Value	30-Day Readmission		*P* Value
				Yes, N = 296	No, N = 2,459	
Sociodemographic						
Age, y, mean ± SD	81.6 ± 9.0	79.4 ± 8.9	<0.05	77.8 ± 8.8	81.1 ± 9.0	<0.05
Female, n (%)	1,092 (64.7)	622 (58.3)	<0.05	171 (57.8)	1,543 (62.7)	0.095
Has PCP, n (%)	1,451 (86.0)	951 (89.1)	<0.05	263 (88.9)	2,139 (87.0)	NS
Speaks English, n (%)	1,064 (63.0)	728 (68.2)	<0.05	181 (61.1)	1,611 (65.5)	0.137
SES, mean ± SD	−2.76 ± 2.81	−2.51 ± 2.67	<0.05	−3.11 ± 2.72	−2.61 ± 2.77	<0.05
Race/ethnicity			<0.05			<0.05
Hispanic, n (%)	587 (34.8)	267 (31.3)		100 (33.8)	754 (30.7)	
White, n (%)	532 (31.5)	290 (27.2)		58 (19.6)	764 (31.1)	
Black, n (%)	449 (26.6)	420 (39.4)		121 (40.9)	748 (30.4)	
Comorbidities, n (%)						
Congestive heart failure	555 (32.9)	264 (24.7)	<0.05	104 (35.1)	751 (30.5)	0.106
Cardiac valvular disease	179 (10.6)	76 (7.1)	<0.05	19 (6.4)	227 (9.2)	0.109
Myocardial infarction	165 (9.8)	85 (8.0)	0.11	31 (10.5)	219 (8.9)	NS
Pulmonary disease	480 (28.4)	292 (27.4)	NS	98 (33.1)	674 (27.4)	0.039
Liver disease	60 (3.6)	54 (5.1)	0.053	22 (7.4)	92 (3.7)	<0.05
Dementia	135 (8.0)	52 (4.9)	<0.05	11 (3.7)	176 (7.2)	0.026
Diabetes, complicated	125 (7.4)	52 (4.9)	<0.05	15 (5.1)	163 (6.6)	NS
Malignancy	589 (34.9)	499 (46.8)	<0.05	124 (41.9)	921 (37.5)	0.137
Renal disease	394 (23.3)	225 (21.1)	NS	72 (24.3)	547 (22.2)	NS
Depression	174 (10.3)	85 (8.0)	<0.05	25 (8.4)	234 (9.5)	NS
Peripheral vascular disease	166 (9.8)	72 (6.7)	<0.05	16 (5.4)	222 (9.0)	0.036
Cerebrovascular disease	282 (16.7)	125 (11.7)	<0.05	33 (11.1)	374 (15.2)	0.063
Clinical characteristics						
LOS, mean ± SD	10.9 ± 9.93	10.6 ± 9.61	0.19	9.3 ± 8.0	10.9 ± 10.0	<0.05
LAPS, mean ± SD	38.4 ± 27.9	34.6 ± 26.9	<0.05	33.8 ± 25.2	37.3 ± 27.8	0.039
BUN, mean ± SD	34.4 ± 32.3	30.9 ± 28.3	<0.05	29.5 ± 24.4	33.4 ± 31.6	0.036
Charlson score, mean ± SD	4.62 ± 3.37	5.28 ± 3.56	<0.05	5.1 ± 3.5	4.8 ± 3.5	0.152

NOTE: Dual eligible patients are covered by Medicare and Medicaid or covered by Medicare, Medicaid and private insurance. Those not dual eligible are covered by Medicare only, Medicaid only, private insurance only or Medicare and private insurance or Medicaid and private insurance. **Abbreviations:** BUN, blood urea nitrogen; LAPS, lab-based acute physiology score; LOS, hospital length of stay of index hospitalization; NS, not significant; PCP, primary care physician; SD, standard deviation; SES, socioeconomic status.

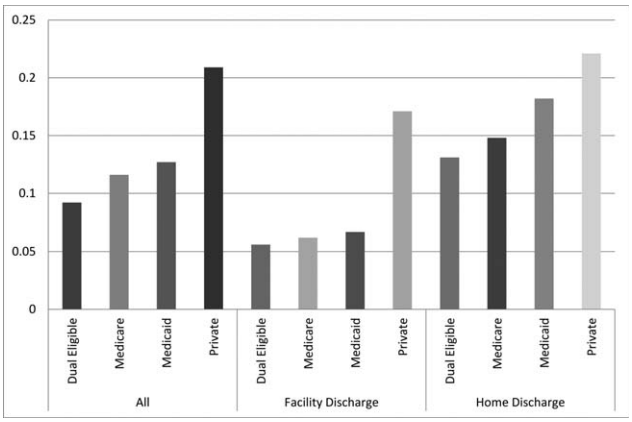

FIG. 1. Proportion of patients in each insurance category (dual eligible, Medicare only, Medicaid only, and private insurance only) with a readmission within 30 days, including all discharge locations and data separated by discharge location.

RESULTS

A total of 2755 inpatients were seen by the palliative care consultation service across the Montefiore Medical Center sites and discharged with hospice services. Of those, 1688 were dual eligible for Medicare and Medicaid, and 1067 were not. Specifically, 695 patients had Medicare only, 148 had private insurance only, 126 had Medicaid only, 78 had Medicare and private insurance, and 19 had Medicaid and private insurance. Univariable relationships between patient characteristics, insurance status, and readmission are shown in Table 1.

In this sample, 9.2% of patients in the dual eligible group were readmitted within 30 days compared with 13.1% of others ($\chi^2 = 10.3$, $P = 0.001$). Of the total cohort, 1500 patients, including 862 dual eligible patients, were discharged to a facility, and 1255 patients, including 826 dual eligible patients, were discharged home. Dual eligible patients had a lower readmission rate compared with others in both settings (Figure 1). In univariable analysis, gender, age, hospital length of stay, race/ethnicity, SES, English as a primary language, LAPS, BUN, Charlson score, and comorbid peripheral vascular disease, cerebrovascular disease, heart disease, dementia, cancer, and liver disease were found to be related both to the predictor and the outcome variables and were included in the logistic regression model. While controlling for these variables, dual eligible patients had a lower odds of readmission within 30 days compared with others (odds ratio [OR]: 0.77; $P = 0.041$; 95% confidence interval [CI]: 0.59-0.98) (Table 2). The Hosmer-

TABLE 2. Logistic Regression Analysis of 30-Day Readmissions

Independent Variable	Odds Ratio	Standard Error	*z* Ratio	*P* Value
Dual eligibility	0.77	0.10	−2.05	0.041
Gender	1.16	0.15	1.17	0.244
Age	0.96	0.01	−4.54	0.000
Hospital length of stay	0.97	0.01	−3.33	0.001
Black	1.93	0.53	2.37	0.018
White	1.02	0.30	0.08	0.939
Hispanic	1.29	0.37	0.90	0.368
Socioeconomic status	0.96	0.02	−1.63	0.103
Primary language English	0.81	0.12	−1.43	0.154
Peripheral vascular disease	0.67	0.18	−1.48	0.139
Cerebrovascular disease	0.86	0.17	−0.73	0.465
Dementia	0.61	0.20	−1.50	0.135
Congestive heart failure	1.75	0.26	3.83	0.000
Cardiac valvular disease	0.73	0.19	−1.23	0.219
Cancer	0.92	0.15	−0.51	0.608
Liver disease	1.80	0.47	2.25	0.024
Lab-based acute physiology score	1.00	0.00	−0.66	0.510
Blood urea nitrogen	1.00	0.00	−1.29	0.197
Charlson comorbidity score	0.99	0.02	−0.57	0.567

Lemeshow test was not significant, indicating that the overall model fit was good.

In the secondary analysis, we found that disposition (hospice services in a nursing home or hospice residence vs home hospice) partially mediates the relationship between insurance status and readmission, explaining 30% of the total effect ($z = -5.06$, $P < 0.001$). When accounting for disposition as a mediator, dual eligible patients still had a lower odds of readmission within 30 days compared with others, although the difference was no longer statistically significant (OR: 0.86; $P = 0.24$; 95% CI: 0.66- 1.11). Patients discharged with hospice services in a nursing home or hospice residence were less likely to be readmitted within 30 days (OR: 0.41; $P < 0.001$; 95% CI: 0.31-0.54) (Table 3).

TABLE 3. Logistic Regression Analysis of 30-Day Readmissions Including Discharge Location (Facility Compared to Home) as a Mediator

Independent Variable	Odds Ratio	Standard Error	*z* Ratio	*P* Value
Dual eligibility	0.86	0.11	−1.17	0.244
Discharge location	0.40	0.59	−6.22	0.000
Gender	1.17	0.16	1.22	0.223
Age	0.96	0.01	−4.69	0.000
Hospital length of stay	0.98	0.01	−2.57	0.010
Black	1.95	0.54	2.39	0.017
White	1.02	0.30	0.10	0.924
Hispanic	1.20	0.35	0.63	0.526
Socioeconomic status	0.96	0.02	−1.51	0.132
Primary language English	0.78	0.11	−1.69	0.090
Peripheral vascular disease	0.70	0.19	−1.31	0.190
Cerebrovascular disease	0.89	0.18	−0.56	0.579
Dementia	0.64	0.21	−1.36	0.174
Congestive heart failure	1.75	0.26	3.80	0.000
Cardiac valvular disease	0.70	0.18	−1.35	0.176
Cancer	0.91	0.15	−0.59	0.552
Liver disease	1.75	0.46	2.12	0.034
Lab-based acute physiology score	1.00	0.00	−0.20	0.843
Blood urea nitrogen	1.00	0.00	−1.10	0.270
Charlson comorbidity score	0.99	0.02	−0.65	0.516

DISCUSSION

This study showed an association between dual coverage and lower odds of 30-day readmission for patients discharged to hospice compared to all other insurance categories, excluding uninsured. This is the first study to date looking specifically at the association between insurance and readmission rates of patients discharged with hospice services. This association was attenuated, and no longer statistically significant, when accounting for discharge location.

These findings suggest that the added services available to patients enrolled in Medicare and Medicaid likely provide an enhanced level of post–acute care. Patients with Medicaid have access to increased hours of personal care attendants as well as residential care, which often provides 24-hour trained staff for rapid assessment of a change in clinical status and adjustment to therapeutic management. Combined with the Medicare hospice benefit, which provides better attention to symptom management, better supervision, and improved compliance with medications, as well as education of family and caregivers,[21–23] additional coverage with Medicaid is associated with a decrease in early readmission to the hospital.

It is often a financial hardship for family members or caregivers to take time off work to care for a dying patient. Without adequate postdischarge resources, the hospital to home transition will be ineffective, which has been shown to increase readmissions.[24] The option of increased attendant hours or residential care can have a positive impact on the financial and psychosocial stressors of caring for a family member at the end of life. Although we did not assess for this in our study, caregiver burnout often plays a role in emergency room visits and admissions of patients at the end of life.[25] The average age of the patients in our cohorts was 81 and 79 years; primary caregivers are often elderly with multiple medical conditions themselves and often struggle to provide the patient's care.[26,27]

The main limitation of this study is that it is a retrospective observational study rather than a prospective randomized controlled trial. Many patients become dual eligible after requiring institutional custodial care, making the relationship between insurance status, discharge location, and readmissions complex and the causal relationship bidirectional. Patients discharged to hospice residence or to a nursing home with hospice services, who are more often dual eligible patients, are likely to receive more timely management of medical crises or changes in medical status, thus preventing readmission, whereas patients who

receive home hospice with family providing the bulk of care may have a lower threshold for emergency room visits, possibly leading to greater incidence of readmission. Therefore, our results may be more a reflection of where the care is provided than what insurance the patient has. However, dual eligible patients discharged home also had a lower readmission rate compared with others, suggesting that insurance status has an independent association with readmission.

Unmeasured variables may explain the relationship between dual eligibility and 30-day readmission rates. Some variables that we were not able to reliably measure in this study include functional status, number of hospitalizations in last year, patient educational level, patient self-reported health status, quality of life, cognitive functioning, hearing or vision impairment, income, employment status, number of people in the home, and caregiver availability.[11–13,19] However, omitting these variables from this study is more likely to bias our results toward the null, because these variables are likely related to dual eligibility and a higher, rather than lower, rate of readmission. We also did not measure whether participating decision makers were involved in the hospice admission or whether patients and families contacted their PCPs after discharge, variables found to be important in a previous pilot study.[5]

The generalizability of the results may be affected by the relative generosity of the New York State Medicaid benefits compared to many other states. New York State ranks third in the nation for eligibility and first for scope of services, including increased access to home- and community-based services.[28] In addition, this study was a single-center study in an urban, socioeconomically disadvantaged environment, explaining the higher rate of readmission compared to hospice patients nationally,[29] which is similar to other urban, academic medical centers.[5] For patients in our practice setting, the financial burden of paying privately for home care or residential custodial services is often prohibitive, which may not be the case in other settings.

Further research to identify whether discharge with hospice services mediates the relationship between insurance status and readmission could help confirm these findings. In addition, the relationship between caregiver burden and quality of life, and increased healthcare costs at the end of life should be explored. Overwhelming evidence suggests that being socioeconomically disadvantaged is a significant risk factor for early readmission, and enrolling these patients in Medicaid may modify this risk.[10,30] Further research should explore whether policies that expand access to Medicaid or otherwise increase access to custodial care services can decrease burdensome hospital readmissions near the end of life.

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