

Medicare Advantage and Postdischarge Quality: Evidence From Hospital Readmissions

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The Medicare Advantage (MA) program was designed to provide a range of insurance choices that can meet the specific health care needs of Medicare beneficiaries and help coordinate the delivery of care. As a result of both policy changes and the incentive to reduce costs in a capitated environment, MA plans have been increasingly focused on coordinating care. A variety of strategies to do so have been implemented over the past decade, including patient-centered care models, disease management programs, Special Needs Plans, and incentivizing primary care teams to better coordinate care delivery.^{1,2} Because of its size and focus on the elderly and disabled, the MA program has been lauded as a possible avenue for providing enrollees with better value and quality of care and potentially spurring larger reforms to the health care system.³

Readmission rates are one method for assessing the role that managed care can play in improving quality and value. Although readmissions are an imperfect proxy for quality, they can serve as a signal of the success that managed care can have at coordinating care through disease management, as well as postdischarge care and communication. Recognizing the role of readmissions in improving the value and quality of health care systems, since 2013 CMS has penalized acute care hospitals with relatively high readmission rates under the Hospital Readmissions Reduction Program (HRRP). Moreover, accountable care organizations are now being evaluated using all-cause readmissions.⁴ Although it may be impossible to target a specific readmission rate that could be considered appropriate or acceptable, MA plans have the potential to provide postacute care that is more coordinated than for those covered through traditional Medicare (TM). Thus, it is plausible that MA plans can improve so-called “care transitions,” which have been shown to reduce readmission rates.⁵

To evaluate the success of MA in improving readmission rates, we compared MA patients with their TM counterparts, assessing changes in the relative rate of readmissions over the 2009-2014 period. Although MA plans coordinate care in heterogeneous ways, we broaden the focus on aggregate outcomes to understand and compare how managed care may have influenced postdischarge coordination over a period of great interest for changes

ABSTRACT

OBJECTIVES: To compare relative readmission rates for beneficiaries enrolled in Medicare Advantage (MA) and traditional Medicare (TM) as suggestive evidence of changes in postdischarge care coordination and the quality of care delivered to Medicare beneficiaries.

STUDY DESIGN: We used the Agency for Healthcare Research and Quality’s 2009 and 2014 Healthcare Cost and Utilization Project State Inpatient Databases for 4 states with reliable sources of payment identifiers, linking these data to local area characteristics. Our outcome was the probability of a hospital readmission within 30 days of an index admission. We computed readmission rates overall and by subgroups, including for patients with multiple chronic conditions, by patients’ state of residence, and by type of index admission.

METHODS: We estimated linear probability models with hospital fixed effects including a wide array of patient-level characteristics relating to health status and sociodemographic characteristics. Standard errors were adjusted for clustering at the area level.

RESULTS: Significantly lower all-cause readmission rates were found among MA enrollees relative to those in TM in both 2009 and 2014, suggesting an association between MA enrollment and higher quality of care. However, over the 2009-2014 period, MA enrollment was not associated with an increased reduction in readmission rates relative to TM.

CONCLUSIONS: Although our focus was on a single measure of performance, the claims that managed care plans are spearheading changes in the delivery system are not supported by our finding that relative readmission rates were stable over the 2009-2014 period.

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in the landscape for elderly beneficiaries. After controlling for differences in treatment patterns among hospitals and for differential health selection into MA and TM, we found that relative rates of readmission between MA and TM were not statistically different in 2009 and 2014. In 1 state—California—the change over time was modestly significant, indicating potential improvements in care delivery in a region with a history of higher managed care penetration. Earlier studies have compared readmission rates in MA and TM, but none to our knowledge has been able to directly address both concerns of selection bias and the possibility that treatment patterns may systematically differ among hospitals, which may have biased earlier efforts to identify the effect of MA on readmissions.

BACKGROUND

A core goal of managed care organizations is to provide value for enrollees because of their ability to provide more closely coordinated care than individuals would otherwise receive in an unmanaged health care plan. However, given the complexity of the inpatient setting and the variety of causes that can lead to readmissions, it is not clear to what extent managed care can improve readmission risks. In the Medicare setting, limited but conflicting evidence exists regarding how MA may contribute to a patient's readmission risks after an initial hospitalization compared with beneficiaries in a TM setting. Most studies have found that unadjusted readmission rates were lower for MA than TM patients. However, contradictory evidence exists after adjusting for risk, which is necessary because enrollees are enrolled by default into TM and most have a choice of several MA plans. Most earlier studies found that readmission rates for MA patients were lower than those for TM patients.^{5,7} On the other hand, other studies using different methods and data sources have found that MA patients were significantly more likely than TM patients to be readmitted.^{8,9}

Previous research efforts have generally focused on readmission outcomes for a single year, including work on racial and ethnic disparities in readmission rates,¹⁰ readmission comparisons for single diseases,^{7,11,12} and an early assessment of readmission rates shortly after the introduction of the HRRP.¹³ Other studies focusing on readmission outcomes over time in the wake of the HRRP did not compare outcomes for MA and TM beneficiaries.^{14,15}

Our study differs from earlier work by comparing MA and TM readmission rates over time while using robust methods to adjust for selection bias between MA and TM and simultaneously controlling for hospital-specific patterns of selection and treatment. Heterogeneous effects at the hospital level could occur either through selection or via treatment quality and decision-making. Specifically, MA plans might steer enrollees to particular hospitals (selection), and hospitals can vary widely in their discharge protocols, as well

TAKEAWAY POINTS

Medicare Advantage (MA) plans have been increasingly focused on improving the delivery of care and coordinating postdischarge transitions through policy changes.

- ▶ We compared relative readmission risks for beneficiaries enrolled in MA and traditional Medicare as evidence of changes in care coordination and practice outcomes.
- ▶ Although delivery system reforms have been much lauded for years, changes in improved quality for postacute care do not appear to be differentially accruing to MA beneficiaries.
- ▶ Additional research on specific managed care interventions to reduce readmissions is needed to strengthen the evidence base.

as incentives and arrangements for utilizing postacute care (treatment), both of which could have contaminated previous results but, to our knowledge, have not yet been addressed.

METHODS

Our main sources of data are the Agency for Healthcare Research and Quality 2009 and 2014 Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases. HCUP data are discharge-level records, and the unit of analysis is each inpatient hospital admission (index admission), which could have been for any cause between January and November in each calendar year. Our outcome was the patient's risk of readmission, defined as the probability of a hospital readmission within 30 days of discharge from an index admission. (A single patient can be counted multiple times during the course of the January through November observation period, so a hospital stay may be both a readmission for a prior stay and the index admission for a subsequent readmission.) We included index admissions for beneficiaries 65 years and older. Planned readmissions and trauma-related readmissions are excluded, based on methods used in previous research.¹⁶

We looked at the performance of MA plans in 4 states (New York, California, Florida, and Tennessee), which had a range of MA penetration rates (from 32% to 38%). Together these 4 states accounted for 32% of all Medicare managed care enrollees in 2014.¹⁷ We limited the sample to these states because they have robust and validated data on patient identifiers to calculate readmissions and indicators for MA and TM for both 2009 and 2014.

To identify MA vs TM enrollment, we used patient-level indicators for the expected source of payment as recorded in the intramural versions of the discharge-level HCUP data. MA plans included all managed care plan types (eg, health maintenance organizations [HMOs], preferred provider organizations, private fee-for-service [FFS]); we were not able to distinguish among them.

We computed readmission rates overall and by subgroups, including for patients with multiple chronic conditions (MCC), by patients' state of residence, and by type of index admission. Relative probabilities of readmission in MA and TM were compared over time. We explored effects on patients with MCCs because of the attention this population has long garnered and the possibility

that stronger effects could be found for a population with the most to gain from better postacute coordination.¹⁸ Because of the high number of chronic conditions among the elderly, we defined MCC as 6 or more conditions identified in an index admission, which narrowed the sample for these analyses to about 64% of the size of our elderly study population. We computed readmission rates by index admission types, including emergency, urgent, and elective admissions. Our hypothesis was that if managed care organizations can effectively reduce readmission rates, we would expect larger improvements for elective admissions, for which plans can anticipate and plan postacute care more effectively than for complex, unforeseen cases.

We computed multivariate linear probability models (LPMs) with hospital fixed effects, which control for the effect of hospital-specific treatment patterns and potential steering by MA plans to specific hospitals. All models controlled for individual and regional characteristics that may be associated with the probability of choosing MA vs TM and overall treatment patterns. Estimates shown are predicted probabilities of readmission while adjusting for model covariates. Standard errors were adjusted for clustering at the primary care service area (PCSA) level, and reported differences were significant using a *P* value of .05.

Covariates

To control for self-selection into managed care plans, we included the following individual patient characteristics: number of chronic conditions, age group, severity of illness, admission type, risks of mortality, race/ethnicity, gender, and patient comorbidities. We used the All Patient Refined Diagnosis Related Groups (APR-DRGs) severity score in the HCUP database to control for patient severity and risk of mortality; these were summarized into 4 categories. Severity of illness and risk of mortality were assigned by applying a base APR-DRG and then adjusting for the severity of secondary diagnoses and interactions with age, principal diagnosis, and procedures.¹⁹ To control for variations in readmission risks across APR-DRGs, our model includes APR-DRG weights, calculated as standardized values of overall readmission rates in 4 states by APR-DRG categories.

We defined regional controls using data from the Health Resources and Services Administration that define markets as PCSAs (rather than larger, more heterogeneous, counties). PCSAs approximate geographic markets for primary care services based on Medicare FFS patient flows to primary care physicians' offices.²⁰ PCSA-level variables included primary care physician density, population density, and rural-urban location.

eAppendix Table 1 (eAppendix available at ajmc.com) provides summary statistics for all covariates by MA and TM status in each year.

Sensitivity Analyses

We tested the robustness of our findings to different models, including LPMs without hospital fixed effects, propensity score matching (PSM) with inverse probability weights, and PSM with augmented

inverse probability weights. PSM models were used to understand the sensitivity of our estimates to a more conservative approach for matching comorbidities to adjust for selection bias in MA or TM. **eAppendix Table 2** shows that the results for these alternative models did not differ meaningfully from the results in the text. For all PSM models, we confirmed the models were correctly specified for each covariate by checking the balance in both the differences in the means and the ratio of variances between the treated and control groups (**eAppendix Tables 3 and 4**).

We also tested the sensitivity of our findings to (1) including number of procedures and total charges for each admission, (2) including mortality rates at the hospital level, (3) including length of stay for the index admission, and (4) excluding patients who died in the hospital. No meaningful changes in our findings were observed.

RESULTS

Figure 1 shows readmission rates in 2009 and 2014 after adjusting for differences in beneficiary health status and differences arising from hospital treatment patterns and compositional effects. In 2009, readmission rates for MA enrollees were lower (14.4%) compared with those for beneficiaries with TM (15.1%). Likewise, in 2014, readmission rates for MA enrollees (13.4%) were lower than for those in TM (14.1%). The difference in MA and TM readmission rates in 2009 (−0.6%) was not statistically different from the difference in 2014 (−0.8%) (*P* = .30). (**eAppendix Table 2** shows that the relative unadjusted readmission rate changed over time, but this comparison was statistically insignificant after controlling for health status and other covariates. **eAppendix Tables 5 and 6** provide the full regression results for the LPMs for each year.)

Figure 2 shows that, among those with 6 or more chronic conditions in 2009, MA enrollees had lower rates of readmission (16.9%) than enrollees in TM (17.5%). Similarly, in 2014, enrollees with MCC in MA had lower readmission rates (15.2%) than those in TM (16.1%). However, the differences in the MA and TM readmission rates (−0.7% in 2009 and −0.9% in 2014) did not statistically differ over time (*P* = .27).

Figure 3 shows differences in the MA and TM readmission rates in each year and by state. The difference between the MA and TM readmission rates did not change over the 2009-2014 period in Florida, New York, or Tennessee. Differences between these years in each state were not statistically or meaningfully different. However, the difference in MA and TM readmission rates in 2014 (−1.6%) was significantly different from the difference in 2009 (−1.1%) in California (*P* = .04).

Figure 4 displays differences in MA and TM readmission rates by category of index discharge in each year of our study. None of the differences in discharge types over time suggested changes in the relative rate of MA and TM readmissions. Although all 3 of the relative rates of readmission were not statistically different in 2014 than in 2009, the 2014 relative rates were modestly lower than the 2009 rates across all 3 categories.

FIGURE 1. Adjusted Readmission Probability, by Enrollment in TM or MA, 2009 and 2014^a

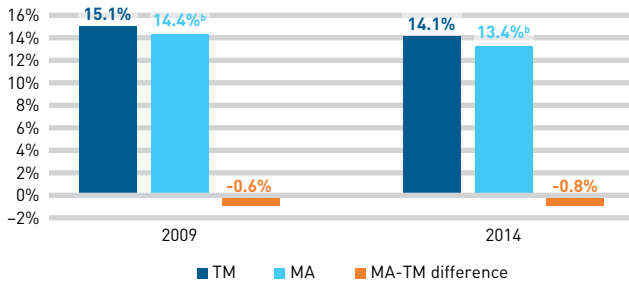
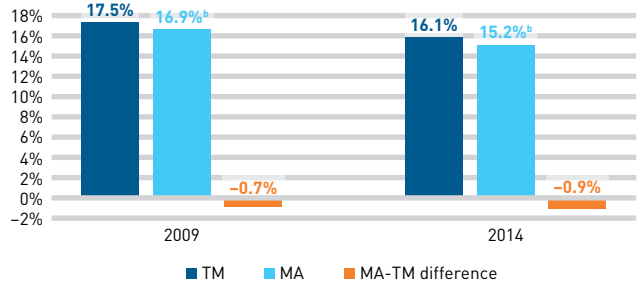


FIGURE 2. Adjusted Readmission Probability for Beneficiaries With 6 or More Chronic Conditions, by Enrollment in TM or MA, 2009 and 2014^a



MA, Medicare Advantage; PCSA, primary care service area; TM, traditional Medicare.

^aAuthors' calculations of data from the 2009 and 2014 Healthcare Cost and Utilization Project State Inpatient Databases. Percentages are predicted probabilities of readmission within 30 days after an index admission adjusted for patients' comorbidities, number of chronic conditions, severity of diagnosis-related groups, age, race, etc. Models include hospital fixed effects. Average household income is controlled for at the patient's zip code level, and physician density is controlled for at the PCSA level. Standard errors are adjusted for clustering at the PCSA level.

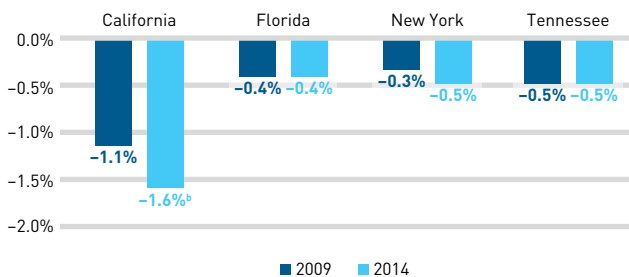
^bReadmission rate in MA in that year is statistically different from readmission rate in TM at 5% level.

MA, Medicare Advantage; PCSA, primary care service area; TM, traditional Medicare.

^aAuthors' calculations of data from the 2009 and 2014 Healthcare Cost and Utilization Project State Inpatient Databases. Percentages are predicted probabilities of readmission within 30 days after an index admission adjusted for patients' comorbidities, number of chronic conditions, severity of diagnosis-related groups, age, race, etc. Models include hospital fixed effects. Average household income is controlled for at the patient's zip code level, and physician density is controlled for at the PCSA level. Standard errors are adjusted for clustering at the PCSA level.

^bReadmission rate in MA in that year is significantly different from readmission rate in TM at 5% level.

FIGURE 3. Difference Between MA and TM Adjusted Readmission Probability, by State, 2009 and 2014^a

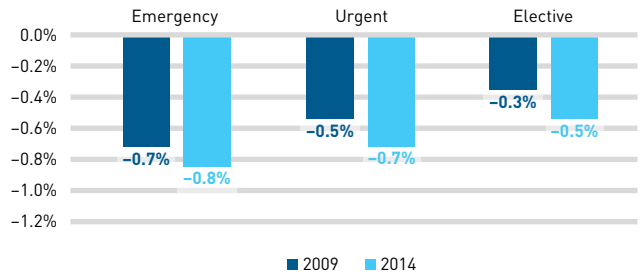


MA, Medicare Advantage; PCSA, primary care service area; TM, traditional Medicare.

^aAuthors' calculations of data from the 2009 and 2014 Healthcare Cost and Utilization Project State Inpatient Databases. Percentages are predicted probabilities of readmission within 30 days after an index admission adjusted for patients' comorbidities, number of chronic conditions, severity of diagnosis-related groups, age, race, etc. Models include hospital fixed effects. Average household income is controlled for at the patient's zip code level, and physician density is controlled for at the PCSA level. Standard errors are adjusted for clustering at the PCSA level.

^bDifference in MA and TM readmission rates in 2014 is significantly different from difference in 2009 at 5% level.

FIGURE 4. Difference Between MA and TM Adjusted Readmission Probability, by Type of Admission, 2009 and 2014^a



MA, Medicare Advantage; PCSA, primary care service area; TM, traditional Medicare.

^aAuthors' calculations of data from the 2009 and 2014 Healthcare Cost and Utilization Project State Inpatient Databases. Percentages are predicted probabilities of readmission within 30 days after an index admission adjusted for patients' comorbidities, number of chronic conditions, severity of diagnosis-related groups, age, race, etc. Models include hospital fixed effects. Average household income is controlled for at the patient's zip code level, and physician density is controlled for at the PCSA level. Standard errors are adjusted for clustering at the PCSA level.

DISCUSSION

Our results are consistent with those of the majority of earlier studies in finding lower rates of readmission for MA enrollees than TM enrollees after controlling for health risk. We confirmed that lower rates of readmission in MA were present in both 2009 and 2014 and were generally consistent over time for the subgroups we analyzed,

including beneficiaries with MCC, in 3 of the 4 states in our sample, and for different admission types. Our estimates extend the prior literature by using a methodology that accounts for both differential health selection into MA and for treatment and selection patterns that can differ across hospital settings. After controlling for a wide array of measures of health risk, including chronic conditions and comorbidities, and removing hospital-specific variability, our results

provide further support for the association between MA enrollment and lower risk of hospital readmission, which is one measure by which quality of care and value to enrollees can be assessed.

But, importantly, we also found that the lower relative rate of readmission in MA was not statistically different in 2014 compared with 2009. Since 2009, increasing attention has been paid to how to improve the quality of care for the Medicare population and, specifically, how MA plans might better coordinate care using disease management programs, postdischarge planning, and Special Needs Plans, which may benefit those with MCC.¹⁸ With greater capacity to focus on designing integrated delivery systems to meet the needs of high-risk, high-need individuals, it would be reasonable to expect differential improvement in readmission rates among MA enrollees compared with those in TM. An alternative explanation of our findings is that managed care organizations have been less involved in delivery system changes than hospital administrators and thus reductions in readmissions are accruing across Medicare beneficiaries without respect to payer status.

In 3 of the 4 states in our study, we were unable to confirm that any such significant changes had taken place over the 2009 to 2014 time period. We found that the relative readmission rate in MA vs TM for California was lower in 2014 compared with 2009. Of note, California has consistently had higher local HMO penetration in its MA market compared with other states (97% enrolled in HMOs in California in 2014 compared with 70%-73% in the 3 other states in our sample). It is possible that the higher percentage of enrollees in HMO plans in California may have enabled improved quality of inpatient or postacute delivery through greater coordination and management of care. However, our methodological design did not allow us to determine the specific causes of the difference in California.

We found no evidence that readmission rates are differentially improving in MA for some types of index admissions but not others. The null finding for any improvement in MA relative to TM over time seems intuitive for the complex and heterogeneous treatment patterns associated with emergency and urgent care admissions. One area where managed care plans could theoretically have more ability to coordinate and control readmissions would be elective surgeries. However, we found similar relative rates of readmission in MA and TM within any particular year and no change over time for any of the subcategories of readmissions.

Limitations

By focusing on readmissions in the HCUP data, we did not specifically measure how MA plans may be coordinating postdischarge care. Although we have controlled for a broad array of comorbidities and health status measures, unobserved health selection between MA and TM may still influence our results. For instance, one characteristic we do not observe consistently in the HCUP data is dual eligibility for Medicare and Medicaid. Because dual-eligible patients are sicker and poorer and more likely to be in TM, this could have resulted in higher observed rates of readmission among TM patients than

among MA patients. Ultimately, we find that controls for severity of illness, including an extensive list of patient comorbidities, did not substantially affect our estimated probabilities. Thus, further refinements in this vein would likely not have changed our results and, moreover, would have only narrowed the statistically insignificant differences we found over time between MA and TM readmission rates.

Compositional changes in the MA and TM populations over the 2009–2014 period may also be influencing our results. Beneficiaries may change their status over time by switching from one sector to the other, perhaps in response to a health event. These effects are likely mitigated by the introduction of lock-in periods for MA enrollees that began in 2006.²¹ Finally, because we studied only 4 states, our conclusions may not be generalizable to the nation as a whole.

CONCLUSIONS

We consistently found lower readmission rates for MA beneficiaries than for those in TM, which suggests that managed care might be successful at providing higher quality in the postacute care setting. However, over the period we observed, we did not find that the differential between MA and TM enrollees was increasing, although a broad range of attempts were made to systematically change how MA plans deliver care to beneficiaries. Future work in this area should investigate more recent data on how readmissions and other quality metrics differ in MA and TM and more systematically assess specific managed care interventions to improve the delivery system. Although delivery system reforms have been much lauded for years, changes in improved readmission rates do not appear to be differentially accruing to MA beneficiaries. ■

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eAppendix Table 1: Sample sizes and means by payment source (MA/TM), 2009 and 2014^a

		2009		2014	
		MA	TM	MA	TM
Sample size		778,395	2,061,383	933,261	1,837,396
Means	30-day all-cause readmission rate	14.2%	15.2%	13.2%	14.2%
	Chronic conditions, 2-3	16.8%	15.6%	11.9%	11.4%
	Chronic conditions, 4+	79.4%	81.0%	85.4%	86.1%
	Female	55.6%	57.6%	55.0%	56.1%
	Ages 75-84	41.0%	39.1%	37.2%	35.8%
	Ages 85+	21.6%	26.7%	21.9%	27.8%
	African-American	12.2%	8.2%	11.9%	7.9%
	Hispanic	12.9%	9.6%	16.5%	10.2%
	Other	7.1%	6.6%	7.3%	7.6%
	Zipcode income, \$40,000-49,999	23.7%	25.0%	26.3%	27.5%
	Zipcode income, \$50,000-65,999	26.8%	24.6%	21.8%	21.7%
	Zipcode income, \$66,000+	27.4%	26.2%	23.2%	24.0%
	PCPs per 100,000 residents in PCSA, 5-14	2.3%	4.7%	0.8%	0.8%
	PCPs per 100,000 residents in PCSA, 15-57	12.0%	18.4%	32.1%	31.1%
	PCPs per 100,000 residents in PCSA, 58+	85.2%	76.0%	66.8%	67.8%
	Population density: 1000s per sq. mile in PCSA	7468	6032	7845	6137
	Urban/rural, suburban (2009)/sm. metro (2014) ^b	4.2%	4.3%	20.5%	29.6%
	Urban/rural, large town (2009)/micropolitan (2014) ^b	3.2%	8.0%	2.2%	4.9%
	Urban/rural, other (both years) ^b	1.8%	4.9%	1.2%	3.1%
	APR-DRG risk of mortality, moderate	39.6%	39.6%	36.3%	36.5%
	APR-DRG risk of mortality, major	23.2%	25.3%	28.5%	30.5%
	APR-DRG risk of mortality, extreme	9.4%	10.8%	9.9%	10.8%
	APR-DRG disease severity, moderate	39.5%	38.5%	39.5%	39.0%
	APR-DRG disease severity, major	32.8%	34.9%	33.6%	35.4%
	APR-DRG disease severity, extreme	10.1%	11.7%	10.0%	11.2%
	Admission type, emergency	76.5%	72.1%	78.0%	75.9%
	Admission type, urgent	6.1%	8.7%	5.2%	6.7%
	Admission type, other	0.1%	0.1%	0.2%	0.2%
	State, California	41.5%	32.8%	35.6%	34.2%
	State, Florida	27.4%	31.0%	33.0%	33.7%
	State, New York	25.2%	26.7%	25.0%	24.0%
	State, Tennessee	5.9%	9.5%	6.4%	8.1%
	Teaching hospital	45.7%	35.7%	63.5%	54.6%
	Hospital bed size, medium	26.9%	22.7%	29.9%	28.6%
	Hospital bed size, large	66.3%	68.9%	58.9%	59.8%
	APRDRG weight	-0.03	0.01	-0.03	0.01
	Co-morbidity, HIV/AIDS	0.0%	0.0%	0.1%	0.0%
	Co-morbidity, alcohol abuse	2.1%	1.8%	2.7%	2.4%
	Co-morbidity, anemia/iron deficiency	22.3%	24.3%	23.1%	25.4%
	Co-morbidity, rheumatoid arthritis	2.9%	3.1%	3.4%	3.8%
	Co-morbidity, chronic blood loss	1.5%	1.6%	1.2%	1.2%
	Co-morbidity, congestive heart failure	12.9%	14.5%	13.8%	15.6%
	Co-morbidity, chronic pulmonary disease	21.6%	23.5%	23.5%	24.5%
	Co-morbidity, coagulopathy	4.5%	4.8%	6.6%	6.5%
	Co-morbidity, depression	8.2%	9.9%	9.4%	11.8%

eAppendix Table 1: Sample sizes and means by payment source (MA/TM), 2009 and 2014^a

	2009		2014	
	MA	TM	MA	TM
Co-morbidity, diabetes, uncomplicated	23.1%	25.3%	25.0%	26.1%
Co-morbidity, diabetes, with complications	8.6%	5.2%	10.3%	6.1%
Co-morbidity, drug abuse	0.4%	0.4%	1.1%	1.1%
Co-morbidity, hypertension	72.0%	68.7%	74.6%	72.1%
Co-morbidity, hypothyroidism	15.2%	16.5%	17.2%	19.3%
Co-morbidity, liver disease	1.8%	1.8%	2.7%	2.6%
Co-morbidity, lymphoma	1.1%	1.1%	1.2%	1.3%
Co-morbidity, fluid and electrolyte disorder	24.7%	28.4%	29.3%	33.1%
Co-morbidity, metastatic cancer	2.8%	2.8%	2.9%	3.0%
Co-morbidity, other neurological disorder	8.5%	11.1%	9.3%	11.8%
Co-morbidity, obesity	8.3%	6.8%	12.7%	10.3%
Co-morbidity, paralysis	2.9%	3.3%	3.1%	3.7%
Co-morbidity, peripheral vascular disorder	10.8%	9.5%	17.5%	10.0%
Co-morbidity, psychoses	3.3%	3.4%	5.0%	4.1%
Co-morbidity, pulmonary circulation disorder	2.4%	2.6%	3.5%	3.5%
Co-morbidity, renal failure	19.0%	17.5%	22.8%	21.4%
Co-morbidity, solid tumor without metastasis	3.2%	3.0%	3.2%	3.2%
Co-morbidity, peptic ulcer secluding bleeding	0.1%	0.1%	0.0%	0.0%
Co-morbidity, valvular disease	5.5%	6.6%	6.5%	7.5%
Co-morbidity, weight loss	5.5%	5.5%	7.9%	7.3%

Notes: MA indicates Medicare Advantage; TM indicates Traditional Medicare; PCP indicates primary care physician; PCSA indicates primary care service area; APR-DRG indicates All Patients Refined Diagnosis Related Groups.

^a Authors' calculations of data from the Agency for Healthcare Research and Quality's (AHRQ) 2009 and 2014 Healthcare Cost and Utilization Project-State Inpatient Databases (HCUP) for New York, California, Florida, and Tennessee. Data are discharge-level records between January and November in each calendar year. Data include admissions for beneficiaries ages 65 and older.

^b Rural-urban commuting area categories changed between 2009 and 2014. The excluded groups were urban (2009 data) and large metropolitan (2014 data).

eAppendix Table 2: Readmission probability within 30 days, by model, enrollment in TM or MA, and year 2009 and 2014^a

	2009				2014			
	Unadjusted percentage	Adjusted percentage from propensity score model	Adjusted percentage from linear probability model (no fixed effects)	Adjusted percentage from linear probability model with hospital fixed effects	Unadjusted percentage	Adjusted percentage from propensity score model	Adjusted percentage from linear probability model (no fixed effects)	Adjusted percentage from linear probability model with hospital fixed effects
Traditional Medicare	15.12%	15.20%	15.14%	15.08%	14.23%	14.30%	14.26%	14.15%
Medicare Advantage	14.23%	14.40%	14.26%	14.43%	13.16%	13.30%	13.14%	13.37%
Difference	-0.89%	-0.80%	-0.88%	-0.64%	-1.06%	-1.00%	-1.12%	-0.78%
Change over time in MA/TM percentage differences					-0.18%	-0.20%	-0.24%	-0.14%
Robust standard errors					0.06%	0.18%	0.28%	0.13%
P-value					0.00	0.35	0.28	0.30

Notes: MA indicates Medicare Advantage; TM indicates Traditional Medicare.

^a Authors' calculations of data from the Agency for Healthcare Research and Quality's (AHRQ) 2009 and 2014 Healthcare Cost and Utilization Project-State Inpatient Databases (HCUP) for New York, California, Florida, and Tennessee. Percentages are predicted probabilities of readmission within 30 days after an index admission. Data are discharge-level records between January and November in each calendar year. Data include admissions for beneficiaries ages 65 and older.

eAppendix Table 3: Treatment equation and covariate balance results from inverse-probability weighted propensity score model, 2009^a

	Raw	Weighted					
Observations:	2752599	2752599					
Treatment (MA):	754364	1382840					
Control (TM):	1998235	1369759					
Variable	Treatment Equation			Covariate Balance			
	Coeff.	St. Error	P-value	Raw diff.	Wgthed diff.	Raw variance	Wgthed variance
Chronic conditions, 2-3	-0.028	0.008	0.001	0.034	0.000	1.064	1.000
Chronic conditions, 4-5	-0.072	0.008	0.000	-0.040	0.001	1.063	0.999
Female	-0.078	0.003	0.000	-0.043	0.000	1.012	1.000
Ages 75-84	0.009	0.003	0.008	0.041	-0.006	1.017	0.997
Ages 85+	-0.228	0.004	0.000	-0.118	-0.011	0.867	0.987
African-American	0.330	0.005	0.000	0.131	-0.003	1.425	0.991
Hispanic	0.175	0.005	0.000	0.101	-0.001	1.284	0.997
Other	-0.084	0.006	0.000	0.014	0.003	1.050	1.011
Zipcode income, \$40,000-49,999	0.042	0.004	0.000	-0.032	0.012	0.962	1.014
Zipcode income, \$50,000-65,999	0.046	0.004	0.000	0.054	-0.005	1.061	0.994
Zipcode income, \$66,000+	-0.053	0.004	0.000	0.028	-0.018	1.029	0.981
PCPs per 100K residents in PCSA, 5-14	0.092	0.022	0.000	-0.129	0.014	0.504	1.069
PCPs per 100K residents in PCSA, 15-57	0.084	0.021	0.000	-0.177	0.015	0.705	1.028
PCPs per 100K residents in PCSA, 58+	0.270	0.021	0.000	0.232	-0.023	0.692	1.032
Pop. density: 1000s/sq. mile in PCSA	0.000	0.000	0.000	0.094	-0.007	1.159	0.956
Suburban	0.152	0.008	0.000	-0.004	0.000	0.983	1.001
Large town	-0.657	0.008	0.000	-0.208	0.030	0.420	1.107
Small town	-0.708	0.013	0.000	-0.145	0.009	0.364	1.050
Rural/isolated	-0.779	0.020	0.000	-0.101	0.007	0.330	1.065
APR-DRG risk of mortality, moderate	-0.040	0.004	0.000	-0.001	-0.006	1.000	0.997
APR-DRG risk of mortality, major	-0.122	0.006	0.000	-0.050	0.002	0.942	1.003
APR-DRG risk of mortality, extreme	-0.124	0.009	0.000	-0.046	0.006	0.886	1.017
APR-DRG disease severity, moderate	-0.094	0.005	0.000	0.019	-0.002	1.009	0.999
APR-DRG disease severity, major	-0.145	0.006	0.000	-0.043	0.000	0.971	1.000
APR-DRG disease severity, extreme	-0.219	0.009	0.000	-0.050	0.006	0.881	1.015
Admission type, emergency	0.275	0.004	0.000	0.103	-0.012	0.892	1.013
Admission type, urgent	0.083	0.007	0.000	-0.101	0.015	0.716	1.047
Admission type, other	0.246	0.043	0.000	-0.003	0.000	0.913	0.992
State, California	0.610	0.007	0.000	0.187	-0.014	1.100	0.991
State, Florida	0.268	0.007	0.000	-0.076	-0.007	0.935	0.994
State, New York	0.187	0.007	0.000	-0.037	0.004	0.959	1.004
Teaching hospital	0.398	0.003	0.000	0.203	-0.009	1.084	0.995
Hospital bed size, medium	0.318	0.006	0.000	0.094	-0.010	1.119	0.988
Hospital bed size, large	0.085	0.006	0.000	-0.052	0.007	1.041	0.994
APRDRG weight	-0.035	0.002	0.000	-0.042	0.002	0.992	1.040
Co-morbidity, HIV/AIDS	-0.405	0.083	0.000	-0.003	0.000	0.860	1.005
Co-morbidity, alcohol abuse	0.055	0.010	0.000	0.018	0.000	1.135	0.999
Co-morbidity, anemia/iron deficiency	-0.100	0.004	0.000	-0.047	0.003	0.942	1.003
Co-morbidity, rheumatoid arthritis	-0.018	0.008	0.030	-0.011	-0.002	0.940	0.989
Co-morbidity, chronic bloos loss	-0.043	0.011	0.000	-0.007	0.001	0.944	1.009
Co-morbidity, congestive heart failure	-0.044	0.004	0.000	-0.049	0.000	0.901	1.001

Variable	Treatment Equation			Covariate Balance			
	Coeff.	St. Error	P-value	Raw diff.	Wghted diff.	Raw variance	Wghted variance
Co-morbidity, chronic pulmonary	-0.035	0.003	0.000	-0.047	0.004	0.940	1.005
Co-morbidity, coagulopathy	0.018	0.007	0.010	-0.014	0.003	0.943	1.015
Co-morbidity, depression	-0.129	0.005	0.000	-0.058	0.004	0.847	1.011
Co-morbidity, diabetes, uncomplicated	-0.120	0.003	0.000	-0.054	0.012	0.937	1.014
Co-morbidity, diabetes, w/complications	0.405	0.006	0.000	0.137	-0.006	1.609	0.978
Co-morbidity, drug abuse	-0.185	0.022	0.000	-0.003	0.003	0.957	1.044
Co-morbidity, hypertension	0.124	0.003	0.000	0.072	-0.003	0.938	1.002
Co-morbidity, hypothyroidism	-0.022	0.004	0.000	-0.036	-0.001	0.934	0.998
Co-morbidity, liver disease	-0.044	0.011	0.000	0.003	0.000	1.024	1.000
Co-morbidity, lymphoma	-0.020	0.013	0.138	-0.007	-0.001	0.941	0.988
Co-morbidity, fluid/electrolyte dis.	-0.102	0.003	0.000	-0.085	0.007	0.914	1.007
Co-morbidity, metastatic cancer	0.045	0.009	0.000	-0.002	0.000	0.991	1.001
Co-morbidity, other neurological dis.	-0.222	0.005	0.000	-0.087	0.001	0.790	1.002
Co-morbidity, obesity	0.160	0.005	0.000	0.058	0.000	1.203	0.999
Co-morbidity, paralysis	-0.150	0.008	0.000	-0.021	-0.001	0.893	0.997
Co-morbidity, peripheral vascular dis.	0.137	0.005	0.000	0.047	-0.007	1.131	0.981
Co-morbidity, psychoses	-0.062	0.008	0.000	-0.003	-0.006	0.984	0.968
Co-morbidity, pulmonary circulation dis.	0.073	0.009	0.000	-0.011	0.001	0.936	1.009
Co-morbidity, renal failure	0.087	0.004	0.000	0.040	-0.004	1.068	0.994
Co-morbidity, solid tumor w/o metastatis	0.093	0.008	0.000	0.012	-0.001	1.069	0.993
Co-morbidity, peptic ulcer	-0.077	0.060	0.196	-0.001	0.000	0.939	1.002
Co-morbidity, valvular disease	-0.091	0.006	0.000	-0.043	-0.002	0.853	0.994
Co-morbidity, weight loss	0.105	0.006	0.000	-0.001	-0.007	0.998	0.972
Constant	-1.782	0.024	0.000				

eAppendix Table 4: Treatment equation and covariate balance results from inverse-probability weighted propensity score model, 2014^a

	Raw	Weighted					
Observations:	2705716	2705716					
Treatment (MA):	912537	1356270					
Control (TM):	1793179	1349446					
Variable	Treatment Equation			Covariate Balance			
	Coeff.	St. Error	P-value	Raw diff.	Wghted diff.	Raw variance	Wghted variance
Chronic conditions, 2-3	-0.009	0.009	0.329	0.016	-0.003	1.040	0.992
Chronic conditions, 4-5	-0.026	0.009	0.004	0.003	-0.002	1.004	0.998
Chronic conditions, 6+	-0.061	0.009	0.000	-0.017	0.004	1.010	0.998
Female	-0.011	0.003	0.000	-0.023	0.000	1.005	1.000
Ages 75-84	-0.054	0.003	0.000	0.030	-0.001	1.017	0.999
Ages 85+	-0.292	0.004	0.000	-0.136	-0.005	0.854	0.994
African-American	0.314	0.005	0.000	0.133	-0.002	1.438	0.994
Hispanic	0.404	0.004	0.000	0.180	-0.005	1.489	0.988
Other	-0.064	0.005	0.000	-0.015	-0.006	0.954	0.980
Zipcode income, \$40,000-49,999	-0.103	0.004	0.000	-0.027	0.003	0.973	1.003
Zipcode income, \$50,000-65,999	-0.131	0.004	0.000	0.002	-0.002	1.002	0.997
Zipcode income, \$66,000+	-0.251	0.004	0.000	-0.019	-0.003	0.976	0.997
PCPs per 100K residents in PCSA, 5-14	-0.407	0.031	0.000	0.004	0.000	1.039	1.001
PCPs per 100K residents in PCSA, 15-57	-0.364	0.028	0.000	0.023	0.003	1.018	1.002
PCPs per 100K residents in PCSA, 58+	-0.481	0.028	0.000	-0.024	-0.003	1.018	1.003
Pop. density: 1000s/sq. mile in PCSA	0.000	0.000	0.000	0.103	-0.007	1.317	1.044
Small metro	-0.533	0.003	0.000	-0.208	0.007	0.785	1.008
Micropolitan	-0.952	0.009	0.000	-0.146	0.007	0.458	1.032
Other rural/urban	-1.187	0.011	0.000	-0.129	0.008	0.401	1.049
APR-DRG risk of mortality, moderate	-0.049	0.004	0.000	-0.005	-0.001	0.997	1.000
APR-DRG risk of mortality, major	-0.048	0.006	0.000	-0.043	0.002	0.962	1.002
APR-DRG risk of mortality, extreme	0.012	0.008	0.163	-0.030	0.003	0.924	1.007
APR-DRG disease severity, moderate	-0.110	0.004	0.000	0.010	-0.002	1.004	0.999
APR-DRG disease severity, major	-0.177	0.006	0.000	-0.036	0.003	0.977	1.002
APR-DRG disease severity, extreme	-0.310	0.009	0.000	-0.039	0.003	0.905	1.007
Admission type, emergency	0.168	0.004	0.000	0.049	-0.006	0.939	1.007
Admission type, urgent	-0.006	0.007	0.418	-0.061	0.013	0.795	1.046
Admission type, other	0.167	0.029	0.000	0.000	0.000	1.004	1.001
State, California	-0.098	0.006	0.000	0.032	-0.025	1.021	0.983
State, Florida	-0.074	0.006	0.000	-0.013	0.002	0.991	1.001
State, New York	-0.019	0.007	0.003	0.017	0.017	1.021	1.020
Teaching hospital	0.214	0.003	0.000	0.178	-0.004	0.937	1.001
Hospital bed size, medium	0.099	0.005	0.000	0.027	-0.003	1.025	0.997
Hospital bed size, large	0.011	0.004	0.008	-0.019	0.005	1.007	0.998
APRDRG weight	-0.049	0.002	0.000	-0.044	0.006	0.986	1.070
Co-morbidity, HIV/AIDS	-0.291	0.064	0.000	-0.001	0.000	0.964	1.021
Co-morbidity, alcohol abuse	0.065	0.009	0.000	0.016	-0.001	1.105	0.993
Co-morbidity, anemia/iron deficiency	-0.149	0.003	0.000	-0.054	0.003	0.937	1.003
Co-morbidity, rheumatoid arthritis	-0.047	0.007	0.000	-0.017	0.000	0.919	1.000
Co-morbidity, chronic bloos loss	-0.057	0.012	0.000	-0.008	0.000	0.933	1.002
Co-morbidity, congestive heart failure	-0.094	0.004	0.000	-0.050	0.003	0.904	1.007

Variable	Treatment Equation			Covariate Balance			
	Coeff.	St. Error	P-value	Raw diff.	Wghted diff.	Raw variance	Wghted variance
Co-morbidity, chronic pulmonary	-0.017	0.003	0.000	-0.023	0.003	0.973	1.004
Co-morbidity, coagulopathy	0.084	0.006	0.000	0.003	0.000	1.011	1.001
Co-morbidity, depression	-0.183	0.005	0.000	-0.080	0.006	0.814	1.016
Co-morbidity, diabetes, uncomplicated	-0.068	0.003	0.000	-0.027	0.006	0.970	1.006
Co-morbidity, diabetes, w/complications	0.363	0.005	0.000	0.153	-0.002	1.607	0.995
Co-morbidity, drug abuse	-0.107	0.013	0.000	-0.004	-0.001	0.962	0.995
Co-morbidity, hypertension	0.076	0.003	0.000	0.057	0.000	0.942	1.001
Co-morbidity, hypothyroidism	-0.043	0.004	0.000	-0.052	0.001	0.918	1.002
Co-morbidity, liver disease	-0.016	0.008	0.051	0.011	0.000	1.066	0.997
Co-morbidity, lymphoma	-0.041	0.012	0.001	-0.011	-0.001	0.912	0.992
Co-morbidity, fluid/electrolyte dis.	-0.099	0.003	0.000	-0.083	0.006	0.935	1.005
Co-morbidity, metastatic cancer	-0.009	0.008	0.269	-0.007	-0.001	0.961	0.993
Co-morbidity, other neurological dis.	-0.198	0.005	0.000	-0.082	0.002	0.809	1.006
Co-morbidity, obesity	0.168	0.004	0.000	0.075	-0.001	1.199	0.997
Co-morbidity, paralysis	-0.188	0.008	0.000	-0.031	0.000	0.853	1.001
Co-morbidity, peripheral vascular dis.	0.651	0.004	0.000	0.222	-0.003	1.610	0.992
Co-morbidity, psychoses	0.121	0.006	0.000	0.041	-0.003	1.198	0.988
Co-morbidity, pulmonary circulation dis.	0.115	0.008	0.000	0.001	0.000	1.007	0.999
Co-morbidity, renal failure	0.043	0.004	0.000	0.033	0.000	1.045	1.001
Co-morbidity, solid tumor w/o metastatis	0.041	0.008	0.000	0.002	0.000	1.009	1.001
Co-morbidity, peptic ulcer	0.071	0.063	0.259	0.001	0.000	1.064	0.997
Co-morbidity, valvular disease	-0.067	0.005	0.000	-0.039	0.000	0.878	1.001
Co-morbidity, weight loss	0.188	0.005	0.000	0.023	-0.005	1.076	0.983
Constant	0.021	0.030	0.490				

eAppendix Table 5: Estimates of probability of 30-day readmission from linear probability model with hospital fixed effects, 2009^a

Variable	Coeff.	St. Error	T-value	P-value
Medicare Advantage	-0.006	0.001	-9.010	0.000
Chronic conditions, 2-3	0.002	0.001	1.360	0.174
Chronic conditions, 4-5	0.010	0.001	8.710	0.000
Female	-0.005	0.001	-9.370	0.000
Ages 75-84	0.000	0.001	0.680	0.494
Ages 85+	-0.005	0.001	-6.000	0.000
African-American	0.008	0.001	7.500	0.000
Hispanic	0.002	0.001	1.810	0.071
Other	-0.009	0.001	-7.880	0.000
Zipcode income, \$40,000-49,999	-0.002	0.001	-2.410	0.016
Zipcode income, \$50,000-65,999	-0.004	0.001	-3.810	0.000
Zipcode income, \$66,000+	-0.006	0.001	-5.770	0.000
PCPs per 100K residents in PCSA, 5-14	0.003	0.002	1.360	0.175
PCPs per 100K residents in PCSA, 15-57	0.003	0.003	1.340	0.182
PCPs per 100K residents in PCSA, 58+	0.005	0.003	2.040	0.042
Pop. density: 1000s/sq. mile in PCSA	0.000	0.000	-2.830	0.005
Suburban	0.000	0.001	0.180	0.854
Large town	0.000	0.002	-0.280	0.778
Small town	-0.005	0.002	-2.270	0.024
Rural/isolated	-0.004	0.002	-1.810	0.070
APR-DRG risk of mortality, moderate	0.017	0.001	24.910	0.000
APR-DRG risk of mortality, major	0.026	0.001	24.480	0.000
APR-DRG risk of mortality, extreme	-0.014	0.001	-9.440	0.000
APR-DRG disease severity, moderate	0.010	0.001	15.210	0.000
APR-DRG disease severity, major	0.030	0.001	33.530	0.000
APR-DRG disease severity, extreme	0.030	0.002	19.480	0.000
Admission type, emergency	0.001	0.001	2.180	0.029
Admission type, urgent	0.001	0.001	0.870	0.384
Admission type, other	-0.017	0.007	-2.370	0.018
APRDRG weight	0.034	0.000	98.680	0.000
Co-morbidity, HIV/AIDS	0.012	0.013	0.910	0.365
Co-morbidity, alcohol abuse	-0.004	0.002	-2.610	0.009
Co-morbidity, anemia/iron deficiency	0.021	0.001	33.750	0.000
Co-morbidity, rheumatoid arthritis	0.010	0.001	7.480	0.000
Co-morbidity, chronic bloos loss	0.020	0.002	10.930	0.000
Co-morbidity, congestive heart failure	0.018	0.001	22.550	0.000
Co-morbidity, chronic pulmonary	0.016	0.001	26.930	0.000
Co-morbidity, coagulopathy	-0.006	0.001	-5.140	0.000
Co-morbidity, depression	0.007	0.001	10.110	0.000
Co-morbidity, diabetes, uncomplicated	0.010	0.001	15.410	0.000
Co-morbidity, diabetes, w/complications	0.019	0.001	15.140	0.000
Co-morbidity, drug abuse	0.025	0.004	6.620	0.000
Co-morbidity, hypertension	-0.003	0.001	-5.790	0.000
Co-morbidity, hypothyroidism	0.001	0.001	1.050	0.294

eAppendix Table 5: Estimates of probability of 30-day readmission from linear probability model with hospital fixed effects, 2009^a

Variable	Coeff.	St. Error	T-value	P-value
Co-morbidity, liver disease	0.013	0.002	6.890	0.000
Co-morbidity, lymphoma	0.037	0.002	15.220	0.000
Co-morbidity, fluid/electrolyte dis.	0.003	0.001	5.400	0.000
Co-morbidity, metastatic cancer	0.025	0.002	15.920	0.000
Co-morbidity, other neurological dis.	0.001	0.001	1.010	0.314
Co-morbidity, obesity	-0.004	0.001	-4.530	0.000
Co-morbidity, paralysis	0.004	0.001	2.920	0.004
Co-morbidity, peripheral vascular dis.	0.011	0.001	12.690	0.000
Co-morbidity, psychoses	0.016	0.001	11.690	0.000
Co-morbidity, pulmonary circulation dis.	0.001	0.001	1.000	0.318
Co-morbidity, renal failure	0.028	0.001	38.070	0.000
Co-morbidity, solid tumor w/o metastatis	0.024	0.001	17.490	0.000
Co-morbidity, peptic ulcer	0.004	0.009	0.440	0.663
Co-morbidity, valvular disease	0.003	0.001	2.620	0.009
Co-morbidity, weight loss	0.012	0.001	10.690	0.000
Constant	0.091	0.003	29.290	0.000

Notes: MA indicates Medicare Advantage; TM indicates Traditional Medicare; PCP indicates primary care physician; PCSA indicates primary care service area; APR-DRG indicates All Patients Refined Diagnosis Related Groups.

^a Authors' calculations of data from the Agency for Healthcare Research and Quality's (AHRQ) 2009 Healthcare Cost and Utilization Project-State Inpatient Databases (HCUP) for New York, California, Florida, and Tennessee. Data are discharge-level records between January and November. Data include admissions for beneficiaries ages 65 and older.

eAppendix Table 6: Estimates of probability of 30-day readmission from linear probability model with hospital fixed effects, 2014^a

Variable	Coeff.	St. Error	T-value	P-value
Medicare Advantage	-0.008	0.002	-5.130	0.000
Chronic conditions, 2-3	0.002	0.001	1.560	0.120
Chronic conditions, 4-5	0.006	0.001	4.640	0.000
Chronic conditions, 6+	0.016	0.002	10.930	0.000
Female	-0.005	0.001	-5.380	0.000
Ages 75-84	-0.004	0.001	-5.380	0.000
Ages 85+	-0.013	0.001	-11.950	0.000
African-American	0.005	0.001	4.040	0.000
Hispanic	-0.001	0.001	-0.710	0.480
Other	-0.007	0.001	-8.140	0.000
Zipcode income, \$40,000-49,999	-0.002	0.001	-2.630	0.009
Zipcode income, \$50,000-65,999	-0.005	0.001	-5.510	0.000
Zipcode income, \$66,000+	-0.006	0.001	-5.950	0.000
PCPs per 100K residents in PCSA, 5-14	0.002	0.004	0.500	0.615
PCPs per 100K residents in PCSA, 15-57	0.005	0.003	1.470	0.141
PCPs per 100K residents in PCSA, 58+	0.005	0.003	1.560	0.119
Pop. density: 1000s/sq. mile in PCSA	0.000	0.000	0.250	0.799
Small metro	-0.005	0.002	-2.760	0.006
Micropolitan	-0.008	0.002	-3.600	0.000
Other rural/urban	-0.011	0.002	-4.360	0.000
APR-DRG risk of mortality, moderate	0.013	0.001	18.360	0.000
APR-DRG risk of mortality, major	0.021	0.001	19.750	0.000
APR-DRG risk of mortality, extreme	-0.022	0.001	-18.690	0.000
APR-DRG disease severity, moderate	0.008	0.001	11.960	0.000
APR-DRG disease severity, major	0.026	0.001	25.670	0.000
APR-DRG disease severity, extreme	0.024	0.002	13.460	0.000
Admission type, emergency	0.001	0.001	0.770	0.444
Admission type, urgent	-0.001	0.001	-0.710	0.479
Admission type, other	-0.015	0.005	-2.980	0.003
APRDRG weight	0.033	0.000	70.160	0.000
Co-morbidity, HIV/AIDS	0.024	0.015	1.630	0.105
Co-morbidity, alcohol abuse	-0.002	0.001	-1.340	0.181
Co-morbidity, anemia/iron deficiency	0.022	0.001	37.530	0.000
Co-morbidity, rheumatoid arthritis	0.007	0.001	5.890	0.000
Co-morbidity, chronic bloos loss	0.022	0.002	9.070	0.000
Co-morbidity, congestive heart failure	0.020	0.001	27.130	0.000
Co-morbidity, chronic pulmonary	0.015	0.001	20.750	0.000
Co-morbidity, coagulopathy	-0.001	0.001	-1.370	0.173
Co-morbidity, depression	0.005	0.001	6.450	0.000
Co-morbidity, diabetes, uncomplicated	0.008	0.000	19.000	0.000
Co-morbidity, diabetes, w/complications	0.015	0.001	11.600	0.000
Co-morbidity, drug abuse	0.024	0.002	10.120	0.000
Co-morbidity, hypertension	-0.003	0.001	-5.020	0.000
Co-morbidity, hypothyroidism	0.001	0.001	1.000	0.318

eAppendix Table 6: Estimates of probability of 30-day readmission from linear probability model with hospital fixed effects, 2014^a

Variable	Coeff.	St. Error	T-value	P-value
Co-morbidity, liver disease	0.015	0.001	10.930	0.000
Co-morbidity, lymphoma	0.030	0.002	12.660	0.000
Co-morbidity, fluid/electrolyte dis.	0.004	0.000	8.870	0.000
Co-morbidity, metastatic cancer	0.029	0.002	15.230	0.000
Co-morbidity, other neurological dis.	-0.001	0.001	-1.760	0.080
Co-morbidity, obesity	-0.007	0.001	-8.920	0.000
Co-morbidity, paralysis	0.002	0.002	1.180	0.240
Co-morbidity, peripheral vascular dis.	0.011	0.001	12.850	0.000
Co-morbidity, psychoses	0.010	0.002	5.510	0.000
Co-morbidity, pulmonary circulation dis.	0.006	0.001	4.050	0.000
Co-morbidity, renal failure	0.023	0.001	25.960	0.000
Co-morbidity, solid tumor w/o metastatis	0.023	0.001	16.660	0.000
Co-morbidity, peptic ulcer	0.025	0.008	3.170	0.002
Co-morbidity, valvular disease	0.003	0.001	3.690	0.000
Co-morbidity, weight loss	0.012	0.001	8.630	0.000
Constant	0.086	0.004	21.790	0.000

Notes: MA indicates Medicare Advantage; TM indicates Traditional Medicare; PCP indicates primary care physician; PCSA indicates primary care service area; APR-DRG indicates All Patients Refined Diagnosis Related Groups.

^a Authors' calculations of data from the Agency for Healthcare Research and Quality's (AHRQ) 2014 Healthcare Cost and Utilization Project-State Inpatient Databases (HCUP) for New York, California, Florida, and Tennessee. Data are discharge-level records between January and November. Data include admissions for beneficiaries ages 65 and older.