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# Medicare Advantage Enrollees' Use of Nursing Homes: Trends and Nursing Home Characteristics

**Hye-Young Jung, PhD**, **Qijuan Li, PhD**, **Momotazur Rahman, PhD**, and **Vincent Mor, PhD**

Department of Healthcare Policy and Research, Weill Cornell Medical College (H-YJ), New York, NY; Department of Health Services, Policy and Practice, Brown University (QL, MR, VM), Providence, RI.

## Abstract

**OBJECTIVES:** To examine temporal trends in the prevalence of nursing home (NH) patients participating in Medicare Advantage (MA) and to identify the characteristics of both these patients and the NHs that provide care for them.

**STUDY DESIGN:** Retrospective cohort study.

**METHODS:** Data sources included the Medicare enrollment file, Minimum Data Set, and facility-level data from the Certification and Survey Provider Enhanced Reporting system. Longitudinal trends of NH use by MA enrollees were examined over the period 2000 to 2013 and logistic regression models were used to identify facility characteristics associated with having a high proportion of MA patients.

**RESULTS:** The proportion of MA enrollees in NHs more than doubled between 2000 and 2013, increasing 125% during this period. Notable differences in facility characteristics were found between NHs that serve high proportions of MA enrollees and other NHs. High-MA NHs tended to be larger facilities affiliated with chains. These NHs also had better quality indicators, such as higher staffing levels, lower use of antipsychotics, and lower odds of rehospitalization. Additionally, high-MA NHs were more likely to be in counties with higher Medicare managed care penetration and less market concentration.

**CONCLUSIONS:** MA plans may be selectively contracting with NHs, as evidenced by the larger shares of MA patients who have been placed in facilities with better performance on quality measures. This may reflect MA plans concentrating enrollees in specific facilities and building "networks" of postacute and long-term care providers that provide better and more efficient care.

**M**edicare has promoted beneficiaries' enrollment in private risk-bearing plans for more than 25 years. The role of these plans, currently known as Medicare Advantage (MA), was

***Address Correspondence to:*** Hye-Young Jung, PhD, Department of Healthcare Policy and Research, Weill Cornell Medical College, 402 E 67th St, New York, NY 10065. arj2005@med.cornell.edu.

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expanded with the passage of the Medicare Modernization Act (MMA) of 2003.[1] In the decade following implementation of the MMA, the number of beneficiaries in MA plans doubled to 16.8 million, representing 31% of all Medicare beneficiaries in 2015.[2] The goal of increased privatization of Medicare has been to incentivize closer management of beneficiaries' healthcare through capitation, thereby increasing the efficiency of care. MA plans established since the MMA's passage have several advantages over their predecessors by offering coverage for prescription drugs (Part D) and a broader array of preventive services. These plans also typically include higher compensation for providers that serve medically complex beneficiaries; the plans are allowed to establish narrow networks of providers while locking enrollees into plans for a year at a time.[1,3,4]

Another trend over the last decade or more has been the increasing use of nursing homes (NHs) for postacute care following hospitalization. More than one-fifth of Medicare fee-for-service hospitalizations are now discharged to NHs for postacute care.[5] Despite the rapid growth in MA enrollment and the contemporaneous phenomenon of Medicare beneficiaries receiving postacute care in nursing facilities, little is known about MA participants' use of NHs or the characteristics of NHs that provide care for them.

In this study, we explored temporal trends in the prevalence of MA enrollees in NHs, the characteristics of MA patients who receive care in NHs, and the characteristics of NHs that provide care to MA participants. Understanding trends in the use of NH care by beneficiaries in MA plans is increasingly important given the added focus in the Affordable Care Act on the dually eligible and special-needs populations and given the fact that numerous states are initiating efforts to enroll their aged and disabled Medicaid enrollees in managed care plans for the dually eligible.[6,7] These populations are disproportionately represented in NHs, which suggests that further growth in the prevalence of NH patients covered by MA plans will occur.[8] To our knowledge, this is the first nationwide study of trends in NH use among MA enrollees and of the characteristics of NHs in which they receive care.

## METHODS

Using data that include information on nearly every NH in the country, we examined trends in the prevalence of MA enrollees in NHs over the period 2000 through 2013. We included MA enrollees receiving postacute or long-term care in our prevalence estimates. Data from 2013 were used to identify the characteristics of MA participants receiving care in NHs and the characteristics of the facilities that provided care to this population.

### Data

The study used 4 data sources: the Medicare enrollment file; the Minimum Data Set (MDS); the Online Survey, Certification and Reporting system (OSCAR), currently known as the Certification and Survey Provider Enhanced Reporting system; and information on NHs compiled by investigators at Brown University. The Medicare enrollment file contains information on beneficiaries, including demographics, date of death, managed care enrollment, and Medicaid participation. MDS assessments were used to identify individuals who were admitted to an NH. The MDS is federally mandated and conducted upon NH

admission, periodically thereafter, and upon discharge. It includes more than 400 items with measures of both cognitive and physical functioning. OSCAR is an administrative database maintained by CMS, which collects and records the results of the state survey and certification process. NH characteristics, including staffing levels, ownership, and chain membership, were derived from OSCAR. Longitudinal characteristics of NHs available from Long-Term Care: Facts on Care in the US (LTCfocus) supplemented information available in OSCAR. LTCfocus creates facility-level data based on Medicare enrollment files, Medicare claims, and MDS assessments of beneficiaries in NHs. These data have been widely used in previous studies of NHs.[9–11]

## Variables

**Share of MA patients in NHs.—**The primary dependent variable was the prevalence of MA patients in an NH. The numerator for the measure was defined as the number of MA enrollees receiving postacute or long-term care in the facility, and the denominator was defined as all patients in the facility, regardless of insurance coverage. Estimates of the numerator and denominator were calculated based upon NH occupancy on the first Thursday of April in a given year. These estimates were derived from the residential history file, which concatenates MDS assessments to determine where all patients using NHs were on each day, making it possible to estimate each facility's census on a given day.[12,13]

**Characteristics of NHs.—**We examined the relationships between the concentration of MA patients in NHs and multiple NH characteristics, including structural features, quality measures, aggregate patient characteristics, and geographic and market characteristics.[14–22] Structural features of NHs included the number of beds, for-profit status, and chain affiliation, in addition to staffing as measured by direct care hours per patient per day for several types of nursing staff (registered nurses [RNs], licensed practical nurses [LPNs], and certified nursing assistants [CNAs]) and an indicator for the presence of a physician extender or nurse practitioner.[23–25] We used 3 facility quality measures: the proportion of patients receiving antipsychotics, the proportion of patients physically restrained, and the facility's 30-day rehospitalization rate.[26–29] Aggregate patient characteristics included average age, percent female, racial composition, and patient case-mix variables: activities of daily living score at admission on a 28-point scale,[30] an indicator for severe cognitive impairment (a score of 5 or 6 on the Cognitive Performance Scale),[31] the proportion of Medicaid patients in the facility, and the proportion of patients admitted from hospitals. The MA penetration rate, urban location, and market competition measured by the Herfindahl index (with a range of 0 to 1, where higher values indicate a less competitive market) were included as county-level market characteristics. Lastly, we examined geographic variation by including indicators for 4 US regions (ie, Northeast, Midwest, South, and West). The selection of explanatory variables was based on previous studies of NH quality.[14–22]

## Analytic Approach

First, we created longitudinal graphs to examine the aggregated trends over the 14-year study period in the proportion of all Medicare beneficiaries covered by MA, the proportion of NH patients enrolled in MA, the proportion of "high-MA" NHs with 25% or more of their patients enrolled in MA, and the proportion of NHs with any MA patients. National MA

enrollment rates were calculated by using all Medicare beneficiaries as the denominator and MA enrollees as the numerator, based on estimates from January in a given year using Medicare enrollment records. National MA enrollment rates among Medicare beneficiaries were presented to show concurrent trends in MA concentration in NHs. Stratified trends were used to examine MA concentration in NHs by the following facility characteristics: for-profit, part of chain, large size (90th percentile of the distribution for bed count), high percentage of Medicaid patients (90th percentile), urban, US region, and MA penetration rates for counties (by deciles of the distribution).

Next, we used logistic regression models to evaluate the adjusted associations between facility characteristics and having a high proportion of MA patients. We used data from 2013, the most recent year in our study period. Three categories were selected for the outcome measure, based on the distribution of MA concentration in NHs in our sample: high-MA NHs, defined as those with 25% or more of their patients covered by MA, representing those in the highest quintile of the distribution; low-MA NHs, defined as those with 1% to 24% of their patients covered by MA; and no-MA NHs, defined as those with no patients covered by MA.

Our primary model estimated the relationship between facility characteristics and being a high-MA NH, with both low-MA and no-MA NHs included in the reference group (ie, 1, ≥25% MA; 0, 0%−24% MA). As a robustness check, we repeated our primary analysis using only non-MA NHs as the reference group (ie, 1, ≥25% MA; 0, 0% MA). In a secondary analysis, ordered logistic regression was used as an alternative regression model to fit multiple ordered response categories.

All analyses were performed using SAS version 9.2 (SAS Institute; Cary, North Carolina) and Stata MP version 12 (StataCorp; College Station, Texas).

## RESULTS

### Trends in the Share of MA Patients Across NHs

Figure 1 shows the prevalence of MA patients across NHs nationally from 2000 through 2013. A clear upward trend is seen in the average share of MA patients. The percentage of NH patients covered by MA more than doubled from 6.9% in 2000 to 15.5% in 2013. High-MA NHs increased from 9.1% in 2000 to 18.6% in 2013, whereas the share of NHs with any MA patients grew from 48.3% to 90.9% over the same period. MA enrollment among all Medicare beneficiaries over the same period also showed a rapidly increasing trend (Figure 1). NHs that were larger in size had consistently higher proportions of MA patients, whereas nonprofit NHs and those with a low percentage of Medicaid patients experienced more rapid growth in the proportion of MA patients after 2006 (Figure 2). The proportion of MA patients in NHs was higher in counties with greater MA penetration rates, and NHs in urban areas and those located in the Western region of the United States had higher proportions of MA patients over the study period (Figure 3).

### Unadjusted Characteristics of NHs by the Proportion of MA Patients

Differences were seen in the unadjusted characteristics of high-MA NHs compared with low-MA NHs and no-MA NHs (Table 1). Compared with low- and no-MA facilities, high-MA NHs tended to be larger, had a higher likelihood of being part of a multifacility NH system, and were more likely to have a physician extender. High-MA facilities also performed better on 2 of the 3 quality indicators, with fewer patients who received antipsychotics and lower rehospitalization rates, but there was no significant difference in the use of physical restraints. Some differences in patient demographics and case mix were observed among the 3 groups. Patients in high-MA NHs were somewhat older on average, were more likely to be female, had lower percentages of racial and ethnic minorities, and were less likely to be Medicaid beneficiaries. A larger proportion of high-MA NHs were located in the Northeast and West regions of the United States and in urban counties (Table 1). High-MA NHs were more likely to be located in counties with greater Medicare managed care penetration and less market concentration.

### Adjusted Differences Among NHs by the Proportion of MA Patients

Estimates from our primary regression analysis suggested a number of differences among NHs based on the share of MA patients (Table 2). Estimates indicated that high-MA NHs were slightly larger, on average, than other NHs. However, high-MA NHs were much more likely to be part of a chain compared with low- or no-MA NHs (odds ratio [OR], 1.244; 95% CI, 1.120–1.382). Estimates also indicated that high-MA NHs were significantly more likely to have a physician extender than were low- or no-MA NHs (OR, 1.379; 95% CI, 1.249–1.523). High-MA facilities also tended to have much more RN and LPN staffing compared with the other 2 groups, but lower CNA staffing. Estimates reflecting the quality of care indicated that patients in high-MA NHs were somewhat less likely to receive antipsychotics (OR, 0.985; 95% CI, 0.980–0.991) or to be rehospitalized (OR, 0.951; 95% CI, 0.942–0.960). Although differences in patient demographics were statistically significant, the magnitude of the differences was minimal. Case-mix indicators were generally similar for the 2 groups, with the exception of high-MA facilities having more patients admitted from hospitals. High-MA facilities were more likely to be in the West region of the United States and in counties with higher Medicare managed care penetration (OR, 1.114; 95% CI, 1.108–1.120) and less market concentration (OR, 0.491; 95% CI, 0.351–0.688). Lastly, compared with low- or no-MA facilities, high-MA NHs were less likely to be in urban counties (OR, 0.837; 95% CI, 0.717–0.977).

Regression estimates from our secondary analysis using ordered logistic regression were consistent with the results of our primary analysis, except that high-MA facilities were more likely to be run for profit and RN hours per resident day were not statistically different compared with no-MA or low-MA NHs (eAppendix Table [eAppendix available at ajmc.com]). Estimates from our robustness check using only non-MA NHs as the reference group were also similar to those from the primary analysis, but with larger estimated ORs for some covariates. For example, high-MA facilities were significantly more likely to be part of a chain (OR, 1.885; 95% CI, 1.524–2.333), be run for profit (OR, 1.523; 95% CI, 1.188–1.951), and have a physician extender (OR, 1.885; 95% CI, 1.517–2.342) compared with those without any MA patients.

## DISCUSSION

The role of private plans has become increasingly important, considering that nearly 1 in 3 Medicare beneficiaries is now covered by one. In this study, we examined whether this phenomenon is reflected in the NH setting. We explored national trends and geographic concentrations of MA patients in NHs, in addition to the characteristics of facilities based on the share of their patients covered by MA plans. We found that growth in the number of Medicare beneficiaries enrolled in MA plans[32,33] is reflected in the prevalent NH population. The proportion of MA enrollees in NHs increased 125% between 2000 and 2013. The rate of increase of NH patients covered by MA outpaced the growth in MA enrollment for the overall Medicare population (55% vs 41%). A recent Medicare Payment Advisory Commission (MedPAC) report shows that although the number of dually eligible enrollees in special-needs MA plans increased over the last 10 years, enrollment in these plans among the dually eligible residing in institutional settings steadily declined. This may indicate that the increase in MA concentration in NHs is being driven by patients receiving postacute care. In our study, patients from high-MA facilities had higher odds of being admitted from hospitals, which also suggests higher prevalence of postacute care users among these NHs.

Notable differences were also found in facility characteristics between NHs that serve high proportions of MA patients and other NHs. High-MA NHs tended to be larger facilities affiliated with chains. These NHs also had better quality indicators, as demonstrated by higher staffing, lower use of antipsychotics, and lower odds of rehospitalization.

Our results suggest that MA plans may have increasingly placed patients in NHs that provide higher-quality care. MA plans may be selectively contracting with NHs, as evidenced by the larger shares of MA patients who have been placed in facilities with better performance on quality measures. This may reflect MA plans concentrating enrollees in specific NHs and building “networks” of postacute and long-term care providers that provide better and more efficient care. This is suggested by the results of both a recent study and a report by MedPAC, which indicate that MA plans have been building referral networks by selectively contracting with higher-quality NHs for postacute care.[34,35] It is also important to note that high-MA NHs were more likely to be in mature markets with higher managed care penetration, which could be reflective of the long-standing presence of MA plans in these areas. Additionally, it is possible that the larger proportions of MA patients found in higher-quality NHs reflects self-selection. Because beneficiaries self-select into MA and tend to be healthier than beneficiaries in traditional Medicare, MA beneficiaries may also be selectively choosing these NHs.

High-MA NHs are more likely than other facilities to have nurse practitioners, which is a hallmark of the “EverCare” model of managed care in the NH setting.[36–39] This model of care relies on concentrating patients in NHs to increase the ability of the insurer’s medical staff to monitor their beneficiaries in the NH more efficiently, allowing better integration of different types of care providers and enhanced coordination of services. It is possible that MA plans are pursuing similar strategies.

There is evidence of hospitals that discharge patients to narrower networks of NHs having lower rehospitalization rates,[40] suggesting that practiced interorganizational exchanges are effective in improving overall quality.[41] If similar benefits are associated with collaborative arrangements between MA plans and NHs, policy changes that include efforts to package long-term care benefits with MA plans may be warranted.

## Limitations

This study has limitations to consider. First, we conducted a facility-level analysis and did not provide information on the individual experiences of MA enrollees. Second, we did not examine individual MA plans and contracts. We acknowledge that there may be substantial variation in the approaches toward care taken by those that contract with select providers. Lastly, we did not differentiate between incident admissions for postacute care and long-stay NH patients but combined them in an omnibus manner at the time of estimating the prevalent population. Although this is a facility-level analysis and we examined MA growth by the percentage of Medicaid patients in the NH, which could be considered a proxy for the percentage of long-stay patients, future study is warranted to examine the MA status of NH patients as they transition from postacute to long-term care in these facilities.

## CONCLUSIONS

This study represents the first known national examination of the prevalence of MA penetration in NHs and the characteristics of NHs with high concentrations of MA patients. We provide a comprehensive description of the growth of MA enrollment among the NH population over a 14-year period. The findings of this study suggest that MA plans may act on incentives to provide more efficient care by selectively placing enrollees in NHs that provide higher-quality care. Further study is needed to illuminate the experiences of MA plans that contract with NHs and to identify patient outcomes associated with these agreements. Lastly, it is important to identify any unintended consequences of increased MA penetration in NH settings, such as inequitable access to MA plans and associated disparities in patient outcomes, as more growth is anticipated in these plans.

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## eAppendix Table.: Adjusted Odds Ratios for Nursing Home Characteristics Associated With the Share of Medicare Advantage (MA) Patients, Using Ordered Logistic Regressiona

| Variables | Odds Ratio | 95% CI |
|---|---|---|
| ***Facility structural characteristics*** | | |
| Total beds in facility | 1.006*** | 1.005–1.007 |
| Part of a chain | 1.301*** | 1.198–1.413 |
| Run for profit | 1.208*** | 1.095–1.331 |
| ***Staffing levels*** | | |
| Any physician extender FTEs | 1.281*** | 1.184–1.385 |
| Total RN hours/day/patient | 0.975 | 0.860–1.104 |
| Total LPN hours/day/patient | 1.190** | 1.041–1.360 |
| Total CNA hours/day/patient | 0 757*** | 0.698–0.821 |
| ***Facility quality indicators*** | | |
| % physically restrained | 0.993* | 0.985–1.000 |
| % receiving antipsychotics | 0.990*** | 0.986–0.994 |
| Facility 30-day rehospitalization rates | 0.978*** | 0.972–0.984 |
| ***Patient demographics*** | | |
| Average age | 1.046*** | 1.037–1.056 |
| % female | 1.005** | 1.001–1.010 |
| % black | 1.000 | 0.997–1.003 |
| % Hispanic | 0.990*** | 0.986–0.994 |
| *Patient case mix* | | |
| Baseline ADL score (0–28) | 1.004 | 0.984–1.023 |
| % severe cognitive impairment (cognitive performance score of 5 or 6) | 0.997 | 0.992–1.001 |
| % Medicaid | 0.996** | 0.993–0.999 |
| % admitted from hospital | 1.010*** | 1.007–1.014 |
| ***Geographic characteristics*** | | |
| *Reference, Northeast* | | |
| Region, West | 2.200*** | 1.866–2.593 |
| Region, Midwest | 1 492*** | 1.318–1.690 |
| Region, South | 1.009 | 0.889–1.146 |

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| Variables | Odds Ratio | 95% CI |
|---|---|---|
| Medicare managed care penetration | 1.102*** | 1.098–1.107 |
| Herfindahl index | 0.810** | 0.670–0.979 |
| Urban | 0.908* | 0.822–1.004 |
| Observations | 15,353 | |

ADL indicates activities of daily living; CNA, certified nursing assistant; FTE, full-time equivalent; LPN, licensed practical nurse; RN, registered nurse.

* $P < .1$;

** $P < .05$;

*** $P < .01$.

[a]Details of the variables are described in the Methods section. Ordered logistic regression estimates comparing "High" vs ("Low" + "None") and ("Low" + "High") vs "None."

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**TAKEAWAY POINTS**

- The share of Medicare Advantage (MA) beneficiaries in the nursing home (NH) population has been steadily increasing over time, reflecting the overall growth of the MA population.
- MA plans appear to be concentrating enrollees in specific NHs and building "networks" of postacute and long-term care facilities that provide better and more efficient care.
- This is the first national examination of the prevalence of MA penetration in NHs and the characteristics of NHs with high concentrations of MA patients.

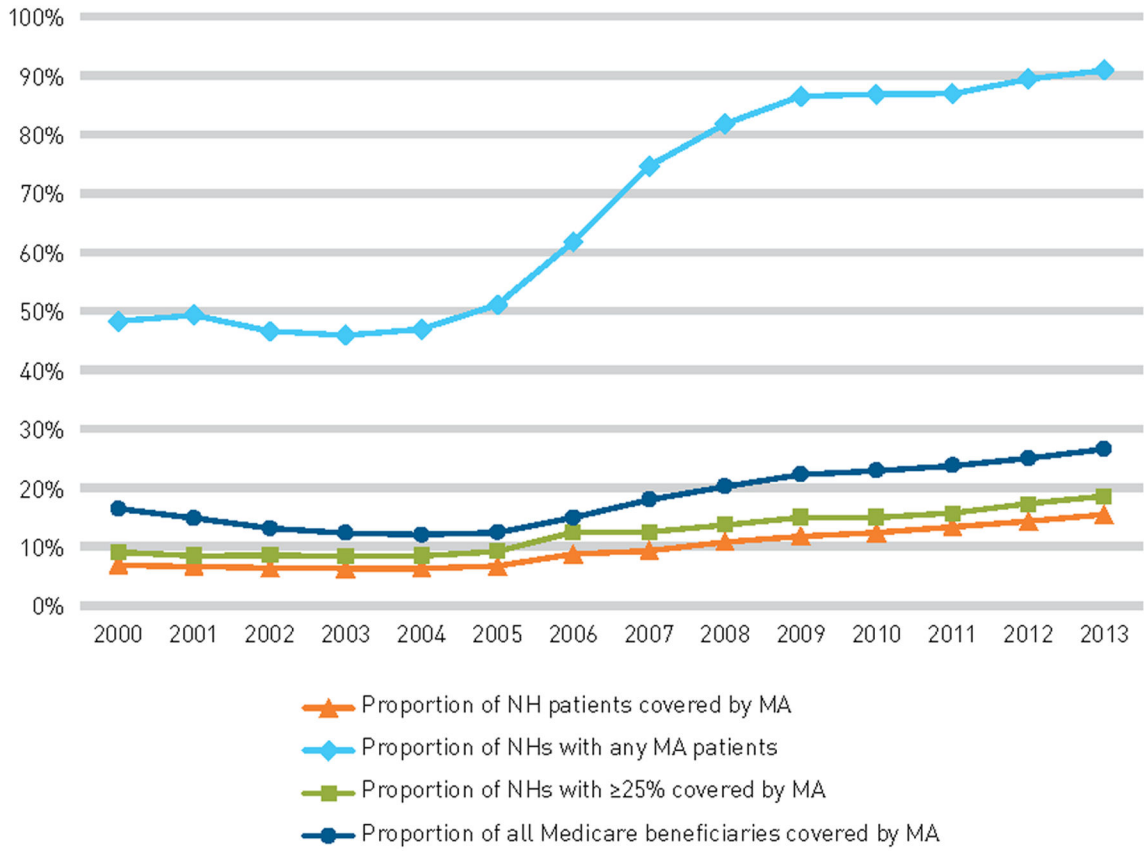


**FIGURE 1. Annual Average Share of MA Patients Across US NHs (2000–2013)**
MA indicates Medicare Advantage; NH, nursing home.

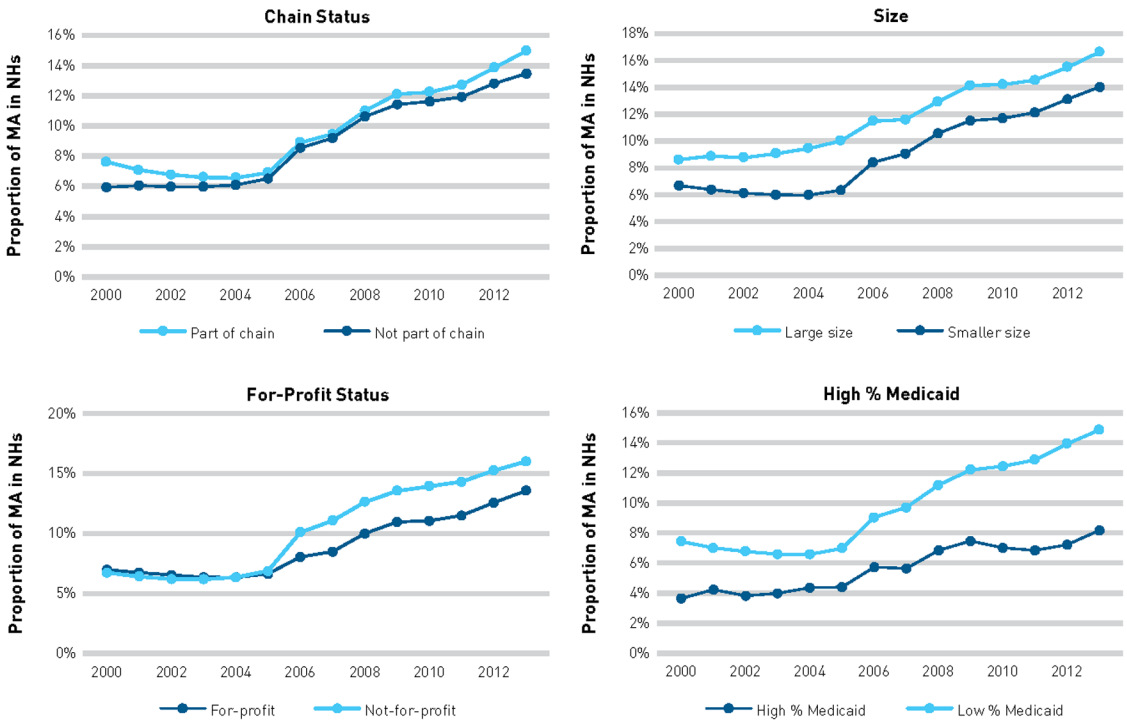


**FIGURE 2. Trends in the Proportion of NH Patients Covered by MA, by NH Characteristics**[a]

MA indicates Medicare Advantage; NH, nursing home. [a]Details of the variables are described in the Methods section. “High % Medicaid” indicates NHs with 90% or more Medicaid patients. “Low % Medicaid” indicates NHs with less than 90% Medicaid patients.

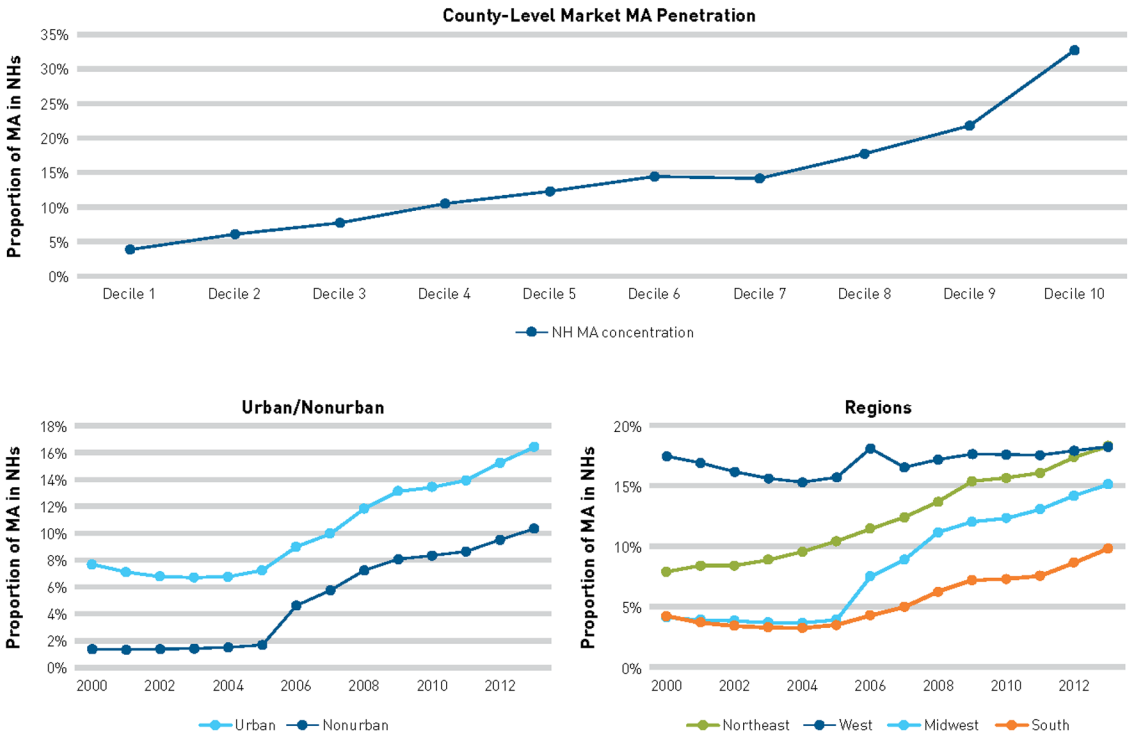


**FIGURE 3. Trends in the Proportion of NH Patients Covered by MA, by Geographic Characteristics**

MA indicates Medicare Advantage; NH, nursing home.

**TABLE 1.**

NH Characteristics by Share of MA Patients[a]

| | Percentage of MA Patients in the NH | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | High-MA (≥25%) (n=2900) | | Low-MA(1%−24%) (n=11,238) | | No-MA (n=1418) | | All NHs (N=15,557) | |
| **NH Characteristics in 2013** | **Mean** | **SD** | **Mean** | **SD** | **Mean** | **SD** | **Mean** | **SD** |
| Facility structural characteristics | | | | | | | | |
| Total beds in facility | 115 | 72 | 109 | 59 | 71 | 47 | 107 | 62 |
| Part of a chain | 58% | | 56% | | 43% | | 55% | |
| Run for profit | 64% | | 72% | | 58% | | 69% | |
| Staffing levels | | | | | | | | |
| Any physician extender FTEs | 53% | | 45% | | 32% | | 45% | |
| Total RN hours/day/patient | 0.6 | 0.7 | 0.5 | 0.5 | 0.8 | 1.5 | 0.5 | 0.7 |
| Total LPN hours/day/patient | 0.8 | 0.5 | 0.8 | 0.4 | 1.0 | 1.2 | 0.9 | 0.6 |
| Total CNA hours/day/patient | 2.4 | 0.8 | 2.4 | 0.7 | 2.6 | 1.5 | 2.4 | 0.9 |
| Facility quality indicators | | | | | | | | |
| % physically restrained | 2 | 4 | 2 | 6 | 3 | 9 | 2 | 6 |
| % receiving antipsychotics | 18 | 11 | 23 | 14 | 27 | 22 | 23 | 15 |
| Facility 30-day rehospitalization rate | 0.15 | 0.1 | 0.18 | 0.1 | 0.16 | 0.1 | 0.17 | 0.1 |
| Patient demographics | | | | | | | | |
| Average age, years | 82 | 6 | 80 | 6 | 76 | 14 | 80 | 7 |
| % female | 62 | 9 | 60 | 11 | 58 | 16 | 60 | 11 |
| % black | 8 | 14 | 11 | 17 | 12 | 19 | 10 | 17 |
| % Hispanic | 4 | 9 | 4 | 11 | 6 | 13 | 4 | 11 |
| Patient case mix | | | | | | | | |
| Baseline ADL score (0–28) | 17 | 2 | 17 | 3 | 16 | 4 | 17 | 3 |
| % severe cognitive impairment (cognitive performance score of 5 or 6) | 13 | 10 | 14 | 10 | 16 | 18 | 14 | 11 |
| % Medicaid | 55 | 23 | 61 | 22 | 63 | 29 | 60 | 23 |
| % admitted from hospital | 86 | 15 | 81 | 17 | 71 | 25 | 81 | 18 |
| Geographic characteristics | | | | | | | | |
| Region, Northeast | 26% | | 15% | | 12% | | 17% | |

| | Percentage of MA Patients in the NH | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | High-MA (≥25%) (n=2900) | | Low-MA(1%−24%) (n=11,238) | | No-MA (n=1418) | | All NHs (N=15,557) | |
| NH Characteristics in 2013 | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| Region, Midwest | 34% | | 32% | | 34% | | 33% | |
| Region, South | 15% | | 39% | | 33% | | 34% | |
| Region, West | 24% | | 13% | | 20% | | 15% | |
| Medicare managed care penetration | 31 | 13 | 19 | 10 | 14 | 9 | 21 | 11 |
| Herfindahl index | 0.16 | 0.2 | 0.24 | 0.2 | 0.29 | 0.2 | 0.23 | 0.2 |
| Urban | 77% | | 63% | | 50% | | 65% | |

ADL indicates activities of daily living; ANOVA, analysis of variance; CNA, certified nursing assistant; FTE, full-time equivalent; LPN, licensed practical nurse; MA, Medicare Advantage; NH, nursing home; RN, registered nurse.

[a]One-way ANOVA tests were used to see if at least 1 group mean was statistically different from the other group means. *P* values for comparisons of all variables for categories of NHs based on the percentage of MA patients are statistically significant ($P < .0001$), except for the indicator for Midwest region ($P = .127$).

**TABLE 2.**

Adjusted ORs for NH Characteristics Associated With the Share of MA Patients[a]

| | Percentage of MA Patients in the NH | | | |
|---|---|---|---|---|
| | "High" vs "Zero" to "Low" | | "High" vs "Zero" (drop "Low") | |
| **Variables** | **OR** | **95%CI** | **OR** | **95%CI** |
| Facility structural characteristics | | | | |
| Total beds in facility | 1.003*** | 1.002–1.004 | 1.020*** | 1.016–1.024 |
| Part of a chain | 1.244*** | 1.120–1.382 | 1.885*** | 1.524–2.333 |
| Run for profit | 1.015 | 0.901–1.144 | 1.523*** | 1.188–1.951 |
| Staffing levels | | | | |
| Any physician extender FTEs | 1.379*** | 1.249–1.523 | 1.885*** | 1.517–2.342 |
| Total RN hours/day/patient | 1.212*** | 1.095–1.343 | 1.203** | 1.010–1.434 |
| Total LPN hours/day/patient | 1.418*** | 1.258–1.598 | 1.184** | 0.975–1.439 |
| Total CNA hours/day/patient | 0.726*** | 0.662–0.796 | 0.642*** | 0.548–0.752 |
| Facility quality indicators | | | | |
| % physically restrained | 0.991* | 0.980–1.001 | 0.977*** | 0.961–0.993 |
| % receiving antipsychotics | 0.985*** | 0.980–0.991 | 0.983*** | 0.973–0.993 |
| Facility 30-day rehospitalization rate | 0.951*** | 0.942–0.960 | 0.015*** | 0.003–0.088 |
| Patient demographics | | | | |
| Average age | 1.043*** | 1.031–1.056 | 1.076*** | 1.054–1.098 |
| % female | 1.013*** | 1.007–1.019 | 1.012** | 1.000–1.023 |
| % black | 1.006*** | 1.002–1.010 | 1.003 | 0.995–1.011 |
| % Hispanic | 0.993*** | 0.987–0.998 | 0.976*** | 0.959–0.993 |
| Patient case mix | | | | |
| Baseline ADL score (0–28) | 0.981 | 0.957–1.006 | 1.045* | 0.999–1.093 |
| % severe cognitive impairment (cognitive performance score of 5 or 6) | 1.001 | 0.996–1.006 | 0.998 | 0.988–1.009 |
| % Medicaid | 0.999 | 0.996–1.002 | 0.991*** | 0.986–0.996 |
| % admitted from hospital | 1.014*** | 1.009–1.018 | 1.014*** | 1.007–1.022 |

| | Percentage of MA Patients in the NH | | | |
|---|---|---|---|---|
| | "High" vs "Zero" to "Low" | | "High" vs "Zero" (drop "Low") | |
| **Variables** | **OR** | **95%CI** | **OR** | **95%CI** |
| Geographic characteristics | | | | |
| Region, West (ref, Northeast) | 2.772*** | 2.341–3.282 | 3.076*** | 2.120–4.463 |
| Region, Midwest (ref, Northeast) | 1.341*** | 1.167–1.541 | 2.305*** | 1.673–3.175 |
| Region, South (ref, Northeast) | 0.593*** | 0.503–0.699 | 1.12 | 0.760–1.652 |
| Medicare managed care penetration | 1.114*** | 1.108–1.120 | 1.183*** | 1.164–1.203 |
| Herfindahl index | 0.491*** | 0.351–0.688 | 0.370*** | 0.191–0.719 |
| Urban | 0.837** | 0.717–0.977 | 0.941 | 0.674–1.315 |
| Observations | 15,353 | | 4219 | |

ADL indicates activities of daily living; CNA, certified nursing assistant; FTE, full-time equivalent; LPN, licensed practical nurse; MA, Medicare Advantage; NH, nursing home; OR, odds ratio; ref, reference; RN, registered nurse.

*$P$<.10;

**$P$<.05;

***$P$<.01.

[a]Details of the variables are described in the Methods section. "High" indicates NHs with 25% or more MA patients. "Low" indicates NHs with between 1% and 24% MA patients. "Zero" indicates NHs with no MA patients.