ISSUE BRIEF
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As It Grows, Medicare Advantage Is Enrolling More Low-Income and Medically Complex Beneficiaries

Recent Trends in Beneficiary Clinical Characteristics, Health Care Utilization, and Spending

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ABSTRACT

ISSUE: Enrollment in Medicare Advantage (MA) has grown significantly over the past two decades, with one of three Medicare beneficiaries now covered by these private plans. Yet we know little about their characteristics or experiences.

GOAL: To analyze MA enrollees' demographic, socioeconomic, and clinical characteristics as well as their health care utilization, spending, and quality of care.

METHODS: Retrospective observational cohort analyses of Medicare encounter data for more than 2 million MA beneficiaries in 2012 and 1.8 million in 2015.

KEY FINDINGS: Between 2012 and 2015, the MA population grew younger and included greater proportions of racial and ethnic minorities. There were also more low-income beneficiaries, more living in poor neighborhoods, and more living in neighborhoods where few residents have college degrees. While chronic conditions had not become more prevalent by 2015, a greater proportion of beneficiaries had complex medical needs. Hospitalization rates were stable, but lengths of hospital stays increased as did use of observation stays and emergency department visits. Spending was 13 percent higher in 2015, largely because of spending on prescription drugs. Performance on several measures of health care quality improved, but medication adherence declined slightly.

CONCLUSIONS: MA plans will need to develop targeted interventions to address beneficiaries' social risks, avoid medical complications, and increase medication adherence. Plans also need to reduce spending on postacute care, for example, by expanding use of services provided in beneficiaries' homes.

TOPLINES

- From 2012 to 2015, there were major changes in the characteristics of Americans in Medicare Advantage plans, including more beneficiaries under 65 with disabilities, racial and ethnic minorities, and people with low incomes.
- The proportion of Medicare Advantage beneficiaries enrolled in a Special Needs Plan more than doubled from 2012 to 2015, and an increasing number of enrollees had social risk factors.

The Commonwealth Fund

INTRODUCTION

Enrollment in Medicare Advantage (MA) plans has grown significantly in the last two decades, from 4.6 million in 2003 to 18.5 million in 2017, representing 33 percent of the Medicare population.[1] Over the same period, government payments to these private plans increased to more than $200 billion per year.[2] Despite the increasing role of MA, there is little known about the composition, health care utilization, and spending patterns of enrollees.[3] For example, although the Centers for Medicare and Medicaid Services (CMS) publishes data on the burden of chronic conditions among beneficiaries enrolled in traditional fee-for-service Medicare, the reports exclude the MA population because "claims data are not available for these beneficiaries."[4]

MA plans consist primarily of health maintenance organizations (HMOs) and preferred provider organizations (PPOs). Given how the plans are paid — monthly capitated payments for each member — they have incentives to avoid unnecessary utilization, coordinate care, and promote better health. They also have flexibility to provide benefits such as hearing, dental, vision, and care management services that are not offered under traditional Medicare. Plans that achieve designated levels of performance and enrollee satisfaction also earn bonus payments, which they may use to provide additional benefits, such as those related to disease prevention. Starting in 2019 and 2020 under the CHRONIC (Creating High-Quality Results and Outcomes Necessary to Improve Chronic) Care Act, Medicare Advantage plans have the option to offer nonmedical benefits like meal delivery, home modifications, help with daily activities, and other services that may promote health and functioning and help avoid medical complications.[5]

Our analysis is based on de-identified, nationally representative data drawn from Medicare Advantage members' medical and pharmacy claims from more than 120 plans. It is the first comprehensive analysis of changes in the MA population between 2012 and 2015, including changes in demographic and socioeconomic characteristics, prevalence of chronic conditions, health care utilization, spending patterns, and performance on selected quality measures.

FINDINGS

Demographic and Plan Characteristics

The study populations included 2.0 million MA beneficiaries in 2012 and 1.8 million beneficiaries in 2015. In 2015, MA beneficiaries on average were younger than in 2012 (Exhibit 1). The proportion of enrollees under age 65 years rose, indicating more people had qualified for Medicare because of disability. There also were more low-income beneficiaries. The proportion of MA beneficiaries enrolled in both Medicare and Medicaid — sometimes referred to as dual eligibles — increased by about 39 percent. The proportion of MA beneficiaries enrolled in a Special Needs Plan (SNP) for dually eligible beneficiaries more than doubled from 2012 to 2015. Such plans offer integrated benefits, but not all dually eligible MA beneficiaries are enrolled in them.

While most MA enrollees identified as white, the percentage identifying as racial or ethnic minorities increased by nearly 22 percent from 2012 to 2015. In both years, most MA enrollees lived in urban or suburban areas. The percentage of members enrolled in an HMO increased nearly 16 percent from 2012 to 2015.

Exhibit 1. Medicare Advantage Beneficiary Demographic and Plan Characteristics, 2012 and 2015

Beneficiary characteristic	2012	2015
Number of beneficiaries (denominator)	2,002,062	1,813,937
Age (mean)	(72.0)	(71.1)
0–54	6.4%	7.9%
55–64	7.8%	9.9%
65–69	23.0%	22.7%
70–74	23.2%	22.6%
75–79	17.2%	15.8%
80–84	12.3%	11.2%
85+	10.3%	10.0%
Gender		
Female	57.3%	57.4%
Male	42.7%	42.6%
Race/Ethnicity (N known)	45.3%	56.6%
White	76.2%	71.0%
Black or African American	15.5%	16.9%
Asian	1.3%	2.3%
Hispanic or Latino	4.9%	5.5%
Other race	2.2%	4.2%
Rural/Urban area type (N known)	93.4%	94.2%
Urban	78.3%	77.0%
Suburban	14.1%	14.7%
Rural town, large	4.5%	5.0%
Rural town, small/isolated	3.1%	3.3%
Dual status (N known)	32.0%	40.7%
Non-dual eligible	81.3%	74.2%
Partial benefit	10.9%	7.9%
Full benefit	7.8%	18.0%
Plan type		
PPO	32.7%	22.7%
HMO	61.9%	71.7%
HMO-POS	5.4%	5.3%
Other	0.0%	0.4%
Special Needs Plan (SNP) (N known)	32.0%	39.5%
Non-SNP	92.2%	81.6%
D-SNP	7.7%	17.3%
C-SNP or I-SNP	0.1%	1.1%
Original reason for entitlement (N known)	42.7%	52.8%
Age	60.3%	58.7%
Disability	39.7%	41.3%
End-stage renal disease and/or disability	0.0%	0.0%

Data: Inovalon's Medical Outcomes Research for Effectiveness and Economics Registry (MORE^2 Registry).

Social Risks

There is increasing evidence that people's life circumstances, including their income and living conditions, affect their health and thus their health care utilization, outcomes, and spending.[6] A growing number of MA beneficiaries have social risks that if unaddressed could lead them to become high-need, high-cost patients. This study used a unique granular source of social risk data aggregated at the nine-digit ZIP code level representing 30 million neighborhoods with an average of five households. From 2012 to 2015, the number of beneficiaries with median incomes below $30,000 increased 35 percent (Exhibit 2). The proportion of those living in a neighborhood where 20 percent or more of households lived below the federal poverty level increased by 29 percent, while the proportion in a neighborhood where less than 20 percent had a bachelor's degree increased by 20 percent.

Exhibit 2. Medicare Advantage Beneficiary Socioeconomic Characteristics, 2012 and 2015

Beneficiary characteristic	2012	2015
Number of beneficiaries	2,002,062	1,813,937
Number with socioeconomic data (denominator)	1,869,884	1,709,146
Median household income		
<$30,000	20.2%	27.2%
$30,000–$49,999	26.6%	26.6%
$50,000–$74,999	29.2%	24.5%
$75,000+	24.0%	21.7%
Percent of households in neighborhoods with 0%–19% or 20%–100% of residents living in poverty		
0%–19%	76.5%	69.7%
20%–100%	23.5%	30.3%
Percent of households in neighborhoods with 0%–19% or 20%–100% of residents with bachelor's degree or higher		
0%–19%	36.8%	44.3%
20%–100%	63.2%	55.7%

Data: Inovalon's Medical Outcomes Research for Effectiveness and Economics Registry (MORE² Registry).

Chronic Conditions

The average number of chronic conditions among MA beneficiaries increased slightly between 2012 and 2015, but there was a 12 percent increase in the number of beneficiaries with eight or more conditions (Exhibit 3). We also used the Charlson Comorbidity Index (CCI) to evaluate the severity of illness in the MA population.[7] The average CCI score was higher in 2015 than in 2012 because of an increase in beneficiaries with a score of four or higher, indicating a larger number of beneficiaries with a high number of comorbidities.

Exhibit 3. Medicare Advantage Beneficiary Clinical Characteristics, 2012 and 2015

Beneficiary characteristic	2012	2015
Number of beneficiaries (denominator)	2,002,062	1,813,937
Number of chronic conditions		
Mean	4.5	4.7
0	9.7%	8.0%
1–3	29.3%	29.7%
4–7	46.1%	45.6%
8+	14.9%	16.7%
Charlson Comorbidity Index		
Mean	1.9	2.1
0	36.5%	33.9%
1–3	44.6%	44.2%
4+	18.9%	21.9%
Top 10 chronic conditions		
Hypertension	68%	70%
Hyperlipidemia	64%	64%
Arthritis and other inflammatory tissue disease	32%	34%
Eye disease	35%	33%
Diabetes	30%	33%
Lung disease	21%	23%
Hematological disease	21%	22%
Acute myocardial infarction/ Ischemic heart disease	23%	21%
Psychiatric disease	15%	19%
Thyroid disease	19%	19%

Data: Inovalon's Medical Outcomes Research for Effectiveness and Economics Registry (MORE² Registry).

The prevalence and rank of chronic conditions was similar in 2012 and 2015. The five most common chronic conditions in both years were hypertension (diagnosed in 70% of beneficiaries in 2015), hyperlipidemia (64%), rheumatoid arthritis (34%), eye disease (33%), and diabetes (33%) (Exhibit 3; see Appendix A for complete list of top chronic conditions).

We applied algorithms developed in a previous analysis of the Medicare fee-for-service population to categorize patients into clinical groupings, or segments, using 29 chronic conditions.[8] The clinical segments are designed to help health care providers and payers better target interventions and control costs, especially among high-need beneficiaries. These segments (defined in "How We Conducted This Study") are:

- disabled under age 65
- frail elderly
- major complex chronic
- minor complex chronic
- simple chronic
- relatively healthy.

Results indicate that the MA population was distributed similarly across the segments in 2012 and 2015, with some notable exceptions (Exhibit 4). While the largest proportion of MA beneficiaries fell into the minor complex chronic segment in both 2012 and 2015, there were declines in the minor complex chronic, simple chronic, and relatively healthy segments and increases in the disabled under age 65 and frail elderly groups. The frail elderly segment indicates the presence of two or more frailty indicators, such as difficulty in walking, falls, and muscle weakness.

Health Care Utilization and Spending

Rates of hospitalizations, outpatient visits, prescription drug fills, and the number of unique medications per

Exhibit 4. Medicare Advantage Beneficiaries by Clinical Segment, 2012 and 2015

Beneficiary characteristic	2012	2015
Number of beneficiaries (denominator)	2,002,062	1,813,937
Clinical segment		
Disabled <65	14.2%	17.8%
Frail elderly	5.8%	6.9%
Major complex chronic illness	17.8%	17.7%
Minor complex chronic illness	34.0%	32.5%
Simple chronic illness	20.1%	18.7%
Relatively healthy	8.2%	6.5%
Frailty indicator		
Abnormality of gait	6.1%	7.1%
Abnormal loss of weight and underweight	1.4%	1.6%
Adult failure to thrive	0.4%	0.5%
Cachexia	0.2%	0.3%
Debility	1.5%	2.5%
Difficulty in walking	3.5%	4.8%
Fall	2.7%	3.8%
Muscular wasting and disuse atrophy	0.6%	0.6%
Muscle weakness	4.9%	6.3%
Pressure ulcer	1.2%	1.4%
Senility without mention of psychosis	0.2%	0.3%
Durable medical equipment	3.5%	3.4%

Data: Inovalon's Medical Outcomes Research for Effectiveness and Economics Registry (MORE^2 Registry).

member were stable from 2012 to 2015, but there was a significant increase in observation visits (43% higher) and emergency department visits (23% higher) (Exhibit 5). (Observation visits last no more than one night and give clinicians time to decide whether patients should be admitted to the hospital.) The average length of hospital stays also increased by 22 percent, indicating those who were admitted to the hospital were sicker on average in 2015 than in 2012.

Average total spending per member per year was 13 percent higher in 2015 than in 2012 ($11,116 vs. $9,799). This was largely because of substantially increased spending on prescription drugs (38% increase). Spending on hospital stays also increased by 25 percent, consistent with the longer lengths of stay, and spending on skilled nursing increased by 20 percent, which is consistent with the increase in the number of frail elderly beneficiaries.

We defined high-cost beneficiaries as those in the top 10 percent of total annual spending per beneficiary. Spending for these high-cost beneficiaries was similar in 2012 and 2015 (Exhibit 6). The largest increases were in prescription drug costs (79% higher) and inpatient costs (21.4% higher); inpatient costs were the highest category of spending in 2015. Spending on physician services and tests declined by 10.3 percent among high-cost beneficiaries, but it remained the second-highest category in 2015.

Performance Ratings

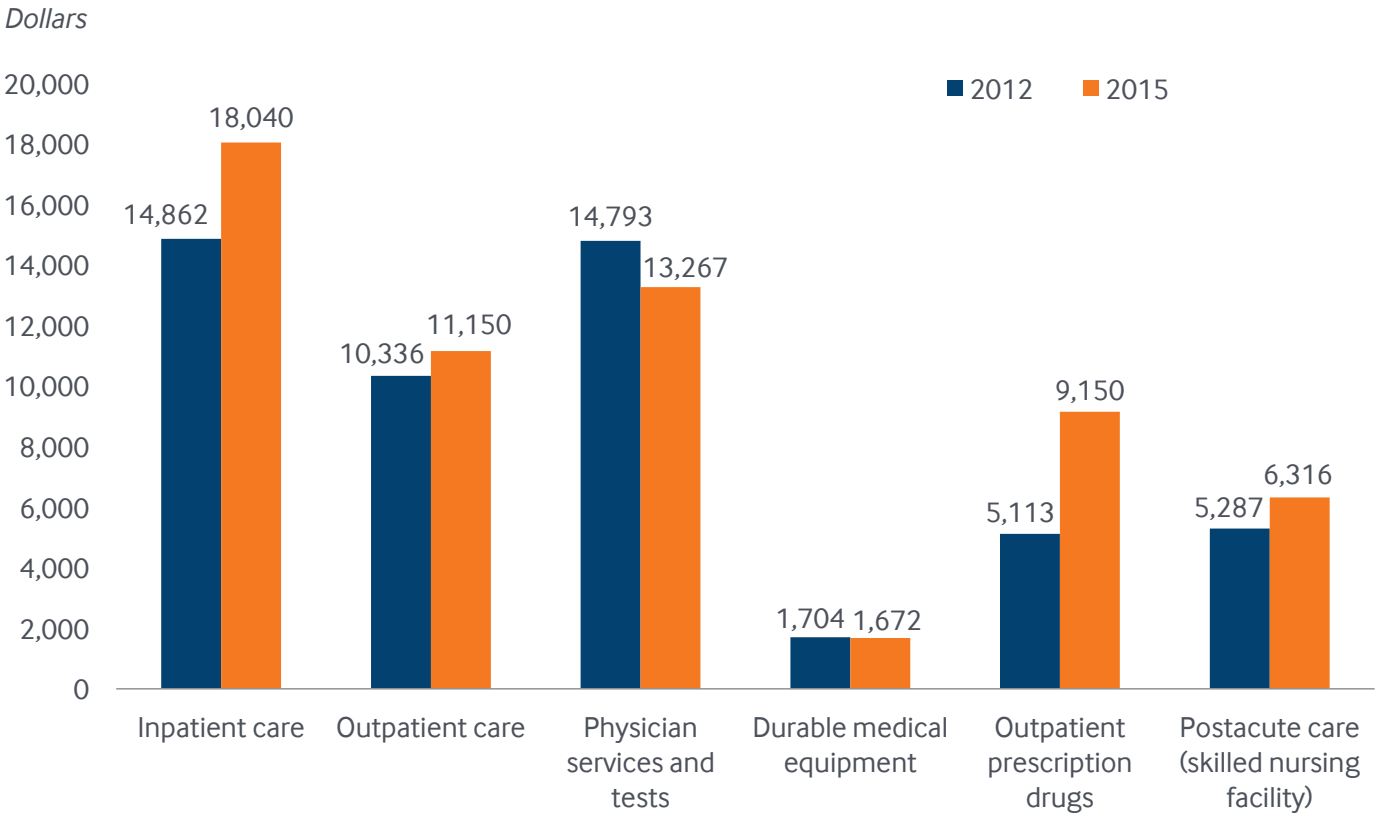
MA plans' performance on measures of health care quality improved from 2012 to 2015 (Exhibit 7). MA beneficiaries had a lower hospital readmission rate in 2015 than in 2012. Potentially avoidable hospitalizations among all beneficiaries were 15 percent lower, mostly because of a 26 percent decline in avoidable acute hospitalizations, but rates of avoidable hospitalizations among patients with chronic conditions also declined by 12 percent. There was a slight increase in rates of breast cancer screenings, while use of high-risk medications for the elderly declined significantly from 11.2 percent to 6.6 percent. Beneficiaries' adherence to medications declined slightly in all three categories (adherence to cholesterol, diabetes, and hypertension treatment).

Exhibit 5. Medicare Advantage Beneficiary Utilization and Spending, 2012 and 2015

Beneficiary characteristic	Rate 2012	Rate 2015	Ratio
Number of beneficiaries (denominator)	2,002,062	1,813,937	
Utilization per 1,000 members			
Hospitalizations	212	217	1.02
Average length of stay	9	11	1.22
Emergency department visits	385	475	1.23
Observation visits	81	116	1.43
Outpatient visits	9,971	10,082	1.01
Number of drug fills	31,553	31,146	.99
Number of unique drugs	7,878	8,085	1.03
Average spending per beneficiary per year			
Total	$9,799	$11,116	1.13
Inpatient	$1,973	$2,470	1.25
Outpatient	$2,104	$2,458	1.17
Physician services and tests	$3,539	$3,358	.95
Durable medical equipment	$308	$309	1.00
Outpatient prescription drugs (Part D)	$1,468	$2,022	1.38
Postacute care (skilled nursing facility)	$408	$498	1.20

Data: Inovalon's Medical Outcomes Research for Effectiveness and Economics Registry (MORE^2 Registry).

Exhibit 6. High-Cost Beneficiary Spending by Category, 2012 and 2015



Data: Inovalon's Medical Outcomes Research for Effectiveness and Economics Registry (MORE² Registry).

Exhibit 7. Medicare Advantage Plan Performance on Selected Quality Measures, 2012 and 2015

Beneficiary characteristic	Rate 2012	Rate 2015	Ratio
Number	2,002,062	1,813,937	
Quality performance measure			
Rheumatoid arthritis management	73.5%	71.3%	.97
Breast cancer screening	63.7%	67.2%	1.05
Potentially avoidable hospitalizations — chronic	15.4	13.6	.88
Potentially avoidable hospitalizations — acute	4.6	3.4	.74
Potentially avoidable hospitalizations — total	20.0	17.0	.85
30-day all-cause readmissions	9.8	9.4	.96
High-risk medications	11.2%	6.6%	.59
Medication adherence — cholesterol	76.5%	74.6%	.98
Medication adherence — diabetes	80.7%	78.5%	.97
Medication adherence — hypertension	79.6%	77.1%	.97

Data: Inovalon's Medical Outcomes Research for Effectiveness and Economics Registry (MORE² Registry).

IMPLICATIONS

About a third of all Medicare beneficiaries are enrolled in MA plans, but we know much less about their experiences than those of traditional Medicare enrollees. To our knowledge, this is the first study to profile and segment the MA population and evaluate recent trends in their demographic, socioeconomic, and clinical characteristics, as well as their health care utilization, spending, and quality.

We found major changes in the MA population from 2012 to 2015. Beneficiaries were younger on average because more people under age 65 qualified for Medicare due to disability. There were also more racial/ethnic minorities and more people with low incomes enrolling in MA. The proportion of MA beneficiaries enrolled in a Special Needs Plan for dually eligible beneficiaries more than doubled from 2012 to 2015. And more beneficiaries had social risks that could eventually make them high-need, high-cost patients. Further investigation is needed to evaluate whether these changes are driven by changes among Medicare beneficiaries generally, changes among those who select an MA plan, or by entry and exit of MA plans available in the market.

While the prevalence of chronic conditions among MA beneficiaries was relatively stable from 2012 to 2015, beneficiaries became more medically complex. More beneficiaries had multiple comorbid conditions, indicators of frailty (i.e., had difficulty walking, muscle loss, senility, or functional problems), or enrolled in Medicare because of disability.

Hospitalization rates, outpatient visits, and medication use were stable from 2012 to 2015, but there was a significant increase in observation stays and emergency department visits. The average length of stay also increased, indicating that on average those who were admitted to the hospital were sicker.

Overall spending was 13 percent higher in 2015, largely because of increased spending on prescription drugs. Spending on hospital stays also increased by 25 percent, consistent with the longer lengths of stay, and spending on skilled nursing increased by 20 percent, which is consistent with the increase in frail elderly beneficiaries. Spending for high-cost beneficiaries showed a similar pattern from 2012 to 2015, with the largest increases in prescription drug costs and inpatient costs. Spending on physician services and tests declined by 10.3 percent among high-cost beneficiaries.

MA beneficiaries had lower rates of potentially avoidable hospitalizations and hospital readmissions in 2015 than in 2012. There also was a significant decline in the use of high-risk medications, which may be linked to lower rates of hospitalizations. There was a slight increase in the breast cancer screening rate, but adherence to medications to treat cholesterol, diabetes, and hypertension declined slightly.

Our findings suggest that MA plans will need to develop targeted interventions to address social and medical risks among beneficiaries who, overall, have become poorer, frailer, and more medically complex in recent years. For example, plans should take steps to reduce complications in high-risk patients and increase adherence to prescribed medications. Several approaches for managing patients with multiple chronic conditions and/or unmet social needs have been shown to improve health outcomes and reduce the costs of care.[9] MA plans also need to consider more efficient options and settings for postacute care for an increasingly frail population by expanding use of services in beneficiaries' homes and engaging in robust management of transitions among care settings. And they may want to exercise new options under the CHRONIC Care Act to offer supplemental services to vulnerable beneficiaries.

Further research analyzing health care utilization, spending, and quality among different groups of MA enrollees would provide additional insight into the characteristics of the most high-need patients and enable plans to create targeted strategies to serve them.

HOW WE CONDUCTED THIS STUDY

Data Sources

We used a large national sample of MA encounter data extracted from Inovalon's Medical Outcomes Research for Effectiveness and Economics Registry (MORE^2 Registry). MORE^2 contains encounter data sourced from more than 150 health plans, with longitudinal information for more than 250 million patients. MORE^2 is de-identified by expert determination in accordance with 45 CFR 164.541 (b)(1)28 and exempt from IRB review.

To our knowledge, MORE^2 contains the largest source of MA beneficiary encounter data available. The study population data are highly representative, including 27 MA health plans with 103 individual contracts and, within those, 512 separate plan benefit packages (Appendix B).

CMS monthly membership reports received from participating health plans were used to identify members' dual eligible status, original reason for entitlement, amount of low-income drug subsidy received, and institutional status. Dual-eligible members with incomes below 150 percent of the federal poverty level qualify for the Part D low-income subsidy.

Data on socioeconomic characteristics were derived from Acxiom's Market Indices ACS data, which is an aggregation of the American Community Survey and Acxiom's InfoBase Geo files.[10] These files include data aggregated from multiple, comprehensive individual and household databases — public records such as government information, self-reported data, buying activity, and financial behavior. This results in roughly 30 million discrete data points based on Zip+4 areas, which include roughly five households on average. Research has demonstrated the close association of a person's characteristics and health behaviors to their near-neighborhood characteristics. By comparison, most previous research has used U.S. Census American Community Survey data aggregated to the block group level representing about 250,000 geographic areas.

Spending per beneficiary was calculated by applying published Medicare payment amounts to each type of service. Standardized pricing was also applied at the National Drug Code level for each pharmacy claim using Average Wholesale Prices. This approach accounts for differences in MA plan pricing across geographic areas and negotiated agreements to allow apples-to-applies comparisons across MA plans and over time. All claims were assigned to one of six expenditure categories: inpatient, outpatient, physician services/tests, Part D drugs, postacute care, and durable medical equipment.

Study Design and Patient Selection

A descriptive cross-sectional design was used to analyze a sample of 2,002,062 beneficiaries who were enrolled in MA plans in 2012 and 1,813,937 beneficiaries enrolled in MA plans in 2015 to develop a detailed profile of the study population. We evaluated changes in clinical characteristics, health care utilization and spending, and quality measure performance from 2012 to 2015. To be eligible for inclusion in the study, beneficiaries were required to be continuously enrolled in the same MA health plan with medical and pharmacy benefit coverage for the 12-month reporting period from January 1, 2012, to December 31, 2012, or January 1, 2015, to December 31, 2015 (with no more than a 30-day gap in enrollment).

To explore the changes in clinical segments between 2012 and 2015, we applied definitions, code sets, and algorithms from previous research supported by the Commonwealth Fund that examined high-cost Medicare fee-for-service beneficiaries using a framework of six distinct clinical segments.[11] The high-cost algorithms categorized patients by 29 prevalent chronic conditions created by harmonizing the CMS Hierarchical Condition Categories with the Medicare Chronic Condition Warehouse.[12] The six clinical segments included:

HOW WE CONDUCTED THIS STUDY (continued)

1. Disabled <65: age <65 with disability and/or end-stage renal disease as reason for entitlement
2. Frail elderly: age 65+ and two or more frailty conditions (Exhibit 4)
3. Major complex chronic: age 65+ and two or more complex conditions (nine of 29 conditions in Exhibit 3) or six or more noncomplex conditions (the other 20)
4. Minor complex chronic: age 65+ and at least one complex and fewer than six noncomplex conditions
5. Simple chronic: age 65+ and one to five noncomplex conditions
6. Relatively healthy: all others.

Study Limitations

While the Medicare Advantage plan data in MORE² represents approximately 25 percent of the national MA market and enrolled individuals have similar demographic and clinical characteristics as the national MA population overall, there is a possibility the study cohort drawn from MORE² may not be entirely representative of the national MA population (e.g., we required 12 months of enrollment with both medical and pharmacy coverage). There is also always a chance of measurement error when using claims data because of miscoding. Finally, while we identified the presence of chronic conditions using ICD-10 diagnosis codes from medical claims, the likelihood of a condition being recorded on claims is higher for patients who seek care more often.

Statistical Analyses

Descriptive statistics were generated separately for 2012 and 2015 to evaluate differences in demographic, socioeconomic, clinical, utilization, spending, and quality measures between the two years. Categorical variables are presented as frequencies and percentages; continuous variables are presented as means. All analyses were performed using SAS software, version 9.4. (SAS Institute Inc., Cary, N.C.).

NOTES

1. Henry J. Kaiser Family Foundation, "Medicare Advantage Enrollees as a Percent of Total Medicare Population," Timeframe: 2018; and Bruce E. Landon et al., "Analysis of Medicare Advantage HMOs Compared with Traditional Medicare Shows Lower Use of Many Services During 2003–09," *Health Affairs* 31, no. 12 (Dec. 2012): 2609–17.

2. Niall Brennan, Charles Ornstein, and Austin B. Frakt, "Time to Release Medicare Advantage Claims Data," *JAMA* 319, no. 10 (2018): 975–76.

3. Medicare Payment Advisory Commission, "Chapter 13: Status Report on the Medicare Advantage Program," in *Report to the Congress* (MedPAC, 2017), 345–79.

4. *Accounting for Social Risk Factors in Medicare Payment: Identifying Social Risk Factors* (National Academies Press, 2016).

5. Martha Hostetter and Sarah Klein, "CHRONIC Care Act Prompts Some Medicare Advantage Plans to Incorporate Social Services," *Transforming Care*, Commonwealth Fund, Jan. 9, 2020.

6. *Accounting for Social,* 2016; Office of the Assistant Secretary for Planning and Evaluation, *Report to Congress: Social Risk Factors and Performance Under Medicare's Value-Based Purchasing Programs* (U.S. Department of Health and Human Services, Dec. 2016); *Accounting for Social,* 2016; Inovalon, *An Investigation of Medicare Advantage Dual-Eligible Member-Level Performance on CMS Five-Star Quality Measures* (Inovalon, Mar. 2015); Center for Medicare, "Examining the Potential Effects of Socioeconomic Factors on Star Ratings," Centers for Medicare and Medicaid Services, Sept. 8, 2015; and National Quality Forum, *Risk Adjustment for Socioeconomic Status or Other Sociodemographic Factors* (NQF, Aug. 15, 2014).

7. Richard A. Deyo, Daniel C. Cherkin, and Marcia A. Ciol, "Adapting a Clinical Comorbidity Index for Use with ICD-9-CM Administrative Databases," *Journal of Clinical Epidemiology* 45, no. 6 (1992): 613–19. The CCI classifies 17 comorbid conditions using ICD-9-CM/ICD-10-CM codes to provide a weighted score of disease severity that accounts for both the number and severity of comorbid conditions as they relate to risk of mortality, with a higher score indicating higher burden of illness. CCI scores range from 0 (the patient had none of the comorbid conditions) to 29 (patient had all 17 chronic conditions at highest level).

8. Jose F. Figueroa et al., "Concentration of Potentially Preventable Spending Among High-Cost Medicare Subpopulations," *Annals of Internal Medicine,* published online Oct. 17, 2017.

9. See the *Better Care Playbook*, https://www.bettercareplaybook.org/.

10. Acxiom Corporation, *ZIP+4 InfoBase® Geo Files: Demographic, Financial and Property,* Sept. 2015 release; Market Indices ACS, Feb. 2016 release.

11. Karen E. Joynt et al., "Segmenting High-Cost Medicare Patients into Potentially Actionable Cohorts," *Healthcare* 5, no. 1–2 (Mar. 2017): 62–67.

12. Centers for Medicare and Medicaid Services, *Chronic Conditions Among Medicare Beneficiaries: A Methodological Overview* (CMS, Mar. 2019).

Appendix A. Medicare Advantage Beneficiary Chronic Conditions, 2012 and 2015

Beneficiary characteristic	2012	2015
Number of beneficiaries (denominator)	2,002,062	1,813,937
Chronic conditions		
Hypertension	68%	70%
Hyperlipidemia	64%	64%
Arthritis and other inflammatory tissue disease	32%	34%
Eye disease	35%	33%
Diabetes	30%	33%
Lung disease	21%	23%
Hematological disease	21%	22%
Acute myocardial infarction/Ischemic heart disease	23%	21%
Psychiatric disease	15%	19%
Thyroid disease	19%	19%
Chronic kidney disease	14%	16%
Dementia	14%	14%
Cancer	13%	14%
Specified heart arrhythmias	12%	13%
Congestive heart failure	11%	12%
Endocrine and metabolic disorders	8%	11%
Benign prostatic hyperplasia	11%	11%
Neuromuscular disease	9%	10%
Osteoporosis	11%	10%
Stroke	6%	6%
Substance use disorder	2%	4%
Skin ulcer	3%	3%

Data: Inovalon's Medical Outcomes Research for Effectiveness and Economics Registry (MORE^2 Registry).

Appendix B. National Representativeness of More²: Medicare Advantage Study Population Compared to National Medicare Advantage (2012 and 2015)

Beneficiary characteristic	MORE² MA 2012	National MA* 2012	MORE² MA 2015	National MA* 2015
Total	100%	100%	100%	100%
Age group				
18–54	5.4%	4.9%	7.5%	4.7%
55–64	7.0%	7.0%	9.7%	7.5%
65–69	21.2%	22.7%	22.6%	23.7%
70–74	23.6%	23.9%	22.6%	24.3%
75–79	17.6%	17.5%	16.0%	17.1%
80–84	12.7%	12.7%	11.3%	11.7%
85+	12.5%	11.3%	10.3%	11.0%
Gender				
Female	56.9%	56.6%	57.4%	56.6%
Male	43.1%	43.4%	42.6%	43.4%
Census region				
Northeast	34.6%	19.2%	35.9%	17.6%
Midwest	25.4%	20.2%	30.0%	20.7%
South	30.2%	30.6%	24.4%	33.8%
West	5.3%	26.3%	4.7%	24.5%
U.S. territory	4.4%	3.7%	4.9%	3.3%
Unknown	0.0%	0.0%	0.0%	0.0%
Medicaid dual status				
Dual eligible	17.3%	15.3%	21.4%	16.6%
Non-dual eligible	82.7%	84.7%	78.6%	83.5%
Plan type				
HMO/HMO-POS	77.3%	69.2%	77.4%	66.8%
PPO	22.7%	30.8%	22.6%	33.2%

* Based on 100% fee-for-service data files for Medicare Parts A, B, and D received by Inovalon under its status as a Centers for Medicare and Medicaid Services Qualified Entity.

Data: Inovalon's Medical Outcomes Research for Effectiveness and Economics Registry (MORE² Registry).

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