

Forgotten Patients: ACO Attribution Omits Those With Low Service Use and the Dying

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By holding networks of healthcare providers responsible for the total cost and quality of care for a designated population, the accountable care organization (ACO) model creates incentives to coordinate care across providers, reduce unnecessary spending, and improve the quality of care.¹ The ACO model has grown steadily,² and by January 2017, Medicare held ACO contracts with 525 organizations serving more than 10 million beneficiaries.³ Medicare ACO contract participants that meet quality benchmarks are eligible to share the savings that they generate.^{4,5} An ACO's performance is evaluated based on Medicare methods of measurement and attribution. Researchers have evaluated outcomes of ACOs among attributable beneficiaries,^{6,7} but no study has described unattributable beneficiaries.

In Medicare ACO contracts, beneficiaries are attributed to organizations based on their use of primary care services from eligible providers,^{8,9} so attribution can influence an organization's performance under an ACO contract. Among organizations serving patients with complex clinical and psychosocial needs, for example, quality metrics may be hard to achieve, giving organizations incentives to avoid accepting such patients. Conversely, ACO participants that are effectively managing population health may not achieve shared savings for patients who, appropriately, do not use the primary care services that would make them eligible for attribution. ACOs have little financial incentive to deliver preventive care that might decrease the chance that healthy patients are attributed to an ACO.¹⁰ As advanced payment models mature to include downside risk, and as models like Comprehensive Primary Care expand, it is important to understand which patients are left out so that policy makers can develop regulations that encourage participation and improved care in new payment models.

To date, we have no information on the composition of patients who are not attributable to any provider group under Medicare Shared Savings Program (MSSP) regulations. This paper examines beneficiary characteristics associated with attribution and compares hospitalization, mortality, and spending across attributable and unattributable beneficiaries. Results from our analyses can guide policy on whether additional actions are necessary to adequately

ABSTRACT

OBJECTIVES: Alternative payment models, such as accountable care organizations, hold provider groups accountable for an assigned patient population, but little is known about unassigned patients. We compared clinical and utilization profiles of patients attributable to a provider group with those of patients not attributable to any provider group.

STUDY DESIGN: Cross-sectional study of 2012 Medicare fee-for-service beneficiaries 21 years and older.

METHODS: We applied the Medicare Shared Savings Program attribution approach to assign beneficiaries to 2 mutually exclusive categories: attributable or unattributable. We compared attributable and unattributable beneficiaries according to demographics, dual eligibility for Medicaid, nursing home residency, clinical comorbidities, annual service utilization, annual spending, and 1- and 2-year mortality. We estimated multivariate regression models describing correlates of attribution status.

RESULTS: Most beneficiaries (88%) were attributable to a provider group. The remaining 12% were unattributable. Beneficiaries unattributable to any provider group were more likely to be younger, male, and from a minority group; to have disability as the basis for enrollment; and to live in high-poverty areas. Unattributable beneficiaries included 3 distinct subgroups: nonusers of care, decedents, and those with healthcare service use but no qualifying evaluation and management visits. Many unattributable Medicare beneficiaries had minimal use of healthcare services, with the exception of a small subgroup of beneficiaries who died within the attribution year.

CONCLUSIONS: Attribution approaches that more fully capture unattributable patients with low service use and patients near the end of life should be considered to reward population health efforts and improve end-of-life care.

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TAKEAWAY POINTS

Given the reliance of alternative payment models on assignment of patients to provider groups, we compared clinical and utilization profiles of patients attributable to a provider group with those of patients unattributable to any provider group.

- ▶ We estimated multivariate regression models describing correlates of attribution status.
- ▶ Most beneficiaries (88%) were attributable to a provider group, whereas 12% remained unattributable.
- ▶ Beneficiaries unattributable to any provider group included 3 distinct subgroups: nonusers of care, decedents, and those with healthcare service use but no qualifying evaluation and management visits.
- ▶ Attribution approaches that more fully capture unattributable patients with low service use and patients near the end of life should be considered to reward population health efforts and to improve end-of-life care.

give provider participants incentives to improve population health and to ensure that vulnerable beneficiaries—who may benefit the most from improved care coordination—are not excluded from new payment models.

METHODS

Using Medicare claims and CMS attribution rules for the most widely adopted model, the MSSP,¹¹ we categorized beneficiaries into 2 mutually exclusive groups: patients who were attributable to provider groups and patients who were not attributable to any provider group. We included only beneficiaries with full parts A and B coverage, limiting the sample to those for whom traditional fee-for-service (FFS) Medicare was the primary payer. We combined all beneficiaries attributable to provider organizations (ie, MSSP, Pioneer ACO, and non-ACO medical groups) into a single category because the purpose of our research was to investigate the characteristics of those falling through the cracks of the current attribution methodology. In 2012, Medicare ACO contracts included 32 Pioneer program participants and 114 MSSP participants (over the first performance period from April 2012 or July 2012 through December 2013) that were responsible for more than 2 million beneficiaries.¹² Although Pioneer program participants, which were responsible for nearly 700,000 beneficiaries in 2012,¹³ faced downside risk for spending, virtually all MSSP participants (n = 110) were in Track 1 and eligible for upside savings only.¹² We conducted cross-sectional analyses examining characteristics of beneficiaries according to their attribution status.

Beneficiary Attribution to Provider Organizations

Following MSSP's 2-step attribution process, a beneficiary who has at least 1 face-to-face outpatient evaluation and management (E&M) visit is assigned to the provider group that has the highest allowed charges by primary care clinicians (ie, general practice, family practice, internal medicine, and geriatric medicine practitioners) for those visits.^{11,14-16} Patients not seeing primary care clinicians are attributed based on visits to qualifying non–primary care clinicians (ie, physicians in other specialties, nurse practitioners, physician assistants, and clinical nurse specialists).¹¹ Beneficiaries who received

care only from nonqualifying clinical providers (eg, interventional cardiologists or certified registered nurses) or in nonstandard settings (eg, emergency departments [EDs]) or who had no visits at all were not able to be assigned to any provider group using current MSSP attribution rules; they formed our “unattributable” group.¹¹

Data

For beneficiaries in parts A and B who were 21 years or older, data were drawn from a 40% random sample of 2012 Medicare FFS claims and 2012-2013 beneficiary summary files. Beneficiary summary files provided patient demographics,

enrollment status, and date of death. Attribution status, diagnoses, utilization, and spending were obtained using claims. We chose 2012 because that was the most recent year of claims available without the suppression of claims indicating substance use disorder in research files¹⁷ and within the period of Medicare ACO implementation.

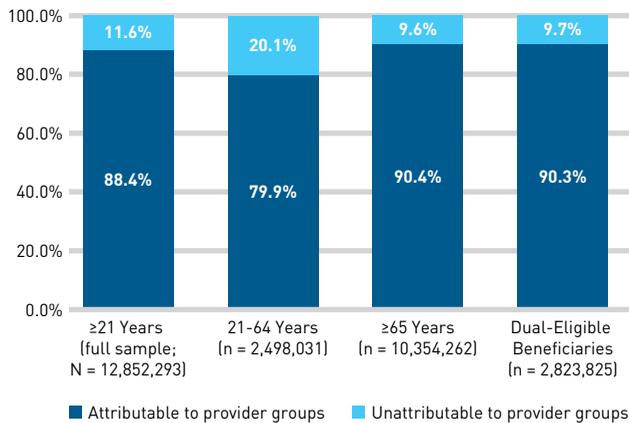
Long-term residence in nursing homes was determined from the 2012 Minimum Data Set (MDS). Patients' zip codes were used to identify hospital referral regions (HRRs) of residence; HRRs represent regional healthcare markets in the United States defined by the Dartmouth Atlas. We further used beneficiaries' zip codes to identify rural and urban areas¹⁸ and whether they lived in high-poverty Census tracts ($\geq 20\%$ of residents below the federal poverty line).¹⁹

Variable Descriptions

The main outcome of interest was whether a beneficiary was attributable to a provider group or not. We estimated correlations between attribution and beneficiary characteristics, including age, sex, race/ethnicity (ie, non-Hispanic white, non-Hispanic black, Hispanic, Asian or Pacific Islander, or other race), residence in a high-poverty Census tract or a rural area, dual eligibility for Medicaid, residence in long-term nursing home (≥ 100 days in a nursing home according to MDS), disability as a basis of original Medicare entitlement, and date of death.

We used *International Classification of Diseases, Ninth Revision* codes on claims to identify beneficiaries' comorbid conditions in 2011 using Hierarchical Condition Categories developed by CMS²⁰ (eAppendix Table 1 [eAppendix available at ajmc.com]). Chronic conditions included dichotomous variables for cancer, cerebrovascular disease and stroke, chronic obstructive pulmonary disease (COPD), congestive heart failure (CHF), connective tissue disease, coronary artery disease, dementia, diabetes, hematologic/thrombotic disease, liver disease, mental health conditions (severe mental illness, substance use disorder, and depression), paralysis (not stroke), Parkinson's/Huntington disease, peripheral vascular disease, and renal disease. We identified these conditions in 2011 to account for beneficiary diagnosis history and for their chronic nature and association with mortality and costs. We categorized patients with 0 observed chronic conditions, with multiple observed

FIGURE 1. Attribution Status of FFS Medicare Beneficiaries (≥21 years) in 2012



FFS indicates fee-for-service.

chronic conditions, and with unknown diagnoses in 2011 due to lack of medical claims. We reported utilization (ambulatory care-sensitive condition admissions, admissions to acute care or critical access hospitals, E&M visits, ED visits not leading to admission) and 2012 spending (Medicare payments to all providers, total and by category: inpatient, physician services, home health, and hospice).

To distinguish those who were unattributable because attribution rules may exclude end-of-life care, we examined mortality in 2012 and 2013 (among those alive January 1, 2013). This approach disentangles the mechanical relationship between attribution and death from clinical complexity.

Data Analysis

We compared characteristics of attributable and unattributable Medicare enrollees—based on a 40% random sample to minimize computing time—using multivariate logistic models. We modeled attribution status as a function of demographics, dual eligibility for Medicaid, nursing home residency, disability, measures of chronic condition history, and HRR fixed effects.

We considered the attribution status of those with dual eligibility for Medicaid, who totaled more than 10 million people as of 2016, due to their low socioeconomic status, complex clinical needs, and elevated medical spending.²¹⁻²⁶

RESULTS

This study included about 13,000,000 FFS Medicare beneficiaries in 2012. Most of these FFS Medicare beneficiaries (88%) were able to be attributed to a provider group, leaving 12% unattributable (Figure 1).

Compared with attributable beneficiaries, unattributable beneficiaries tended to be younger (65 vs 71 years), male (60% vs 43%), from a minority race or ethnic group (28% vs 18%), living in a high-poverty area (25% vs 22%; Table 1), and less likely to be dually eligible for

TABLE 1. Descriptive Statistics: FFS Medicare Beneficiaries (≥21 years), 2012^a

Variable	Attributable to Provider Groups n = 11,359,424 (88.4%)	Unattributable to Provider Groups n = 1,492,850 (11.6%)
Demographic Characteristics		
Age, years, mean (SD)	71.4 (12.4)	65.4 (14.0)
<65, %	17.6	33.6
65-69, %	22.5	31.4
70-74, %	19.1	13.8
75-79, %	15.3	8.3
80-84, %	12.5	5.8
≥85, %	13.1	7.2
Gender, %		
Male	42.7	60.1
Female	57.3	39.9
Race/ethnicity, %		
Non-Hispanic white	81.9	72.1
Black	9.2	13.7
Hispanic	5.2	8.9
Asian/Pacific Islander	2.2	2.8
Other	1.5	2.4
Lives in high-poverty (≥20%) Census tract, %	21.8	25.1
Dual Medicare and Medicaid status, %	22.5	18.3
<65 years, % ^b	57.7	32.1
≥65 years, % ^c	14.9	11.3
Nursing home resident (≥100 days in nursing home), %	3.8	0.6
Clinical Condition History and Disability		
Disabled, %	24.5	35.8
<65 years, % ^b	97.0	88.6
Chronic conditions based on HCCs (2011), % ^d		
Cancer	2.9	0.9
Cerebrovascular disease and stroke	2.3	0.6
Chronic obstructive pulmonary disease	9.5	2.3
Congestive heart failure	8.3	2.2
Connective tissue disease	3.5	0.4
Coronary artery disease	4.1	1.1
Dementia	7.8	2.7
Depression	6.3	1.5
Diabetes	21.7	3.3
Hematologic/thrombotic disease	2.0	0.6
Liver disease	0.6	0.2
Paralysis (not stroke)	0.5	0.2
Parkinson's/Huntington disease	1.2	0.3
Peripheral vascular disease	5.3	1.0

(continued)

TABLE 1. (Continued) Descriptive Statistics: FFS Medicare Beneficiaries (≥21 years), 2012^a

	Attributable to Provider Groups	Unattributable to Provider Groups
Renal disease	8.7	2.5
Severe mental illness	5.4	2.9
Substance use disorder	1.1	0.7
0 observed chronic conditions	23.1	7.3
Non-healthcare service user (2011), % ^a	23.3	63.2
Unknown chronic condition history (2011), % ^f	4.5	17.8
Observed chronic conditions based on HCCs (2011), mean (SD)	0.9 (1.3)	0.2 (0.8)
≥2 observed chronic conditions based on HCCs (2011), %	22.3	5.3
Healthcare Utilization (count per person), Mean (SD)^g		
Hospitalizations for ACSCs	0.06 (0.33)	0.03 (0.23)
Acute care/critical access hospital hospitalizations	0.34 (0.88)	0.20 (0.61)
E&M visits	9.19 (8.17)	0.0001 (0.01)
ED visits	0.72 (1.72)	0.52 (1.48)
Medicare Spending, \$, Mean (SD)^{g,h}		
Total spending per person	10,406 (22,120)	5578 (17,070)
Inpatient	4614 (15,778)	2852 (13,546)
Physician	4517 (8669)	1188 (4672)
Facility	16 (49)	4 (26)
Home health agency	589 (2291)	204 (1292)
Hospice	315 (3055)	1259 (6580)
Durable medical equipment	354 (1498)	71 (604)
Mortality		
Death recorded in 2012, %	4.3	6.6
Death recorded in 2013 conditional on survival in 2012, % ⁱ	4.9	2.8

ACSC indicates ambulatory care-sensitive condition; E&M, evaluation and management; ED, emergency department; FFS, fee-for-service; HCC, Hierarchical Condition Category.

^aN = 12,852,274. Percentages may not sum exactly to 100 due to rounding error.

^bThe sample is restricted to beneficiaries younger than 65 years (n = 2,497,597).

^cThe sample is restricted to beneficiaries 65 years or older (n = 10,354,677).

^dThese conditions include 2011 diagnoses for 419,853 beneficiaries without both parts A and B coverage in 2011.

^eThis identifies existing Medicare FFS beneficiaries with no recorded healthcare use in 2011 and therefore unknown chronic condition history.

^fThis identifies new Medicare enrollees in 2012 and patients who may have missing diagnoses because they were not in both parts A and B or were in managed care plans, which have incomplete reporting, in 2011.

^gThe sample is restricted to those with healthcare service use (n = 11,908,360).

^hInpatient spending includes acute care and critical access hospitalization, skilled nursing facility, inpatient rehabilitation, and long-term acute care facility spending; physician spending includes procedure, E&M, imaging, testing, and other physician spending.

ⁱ2013 mortality rate excludes 587,459 beneficiaries who died in 2012.

Medicaid but no less likely to reside in a rural area (eAppendix Table 2). Unattributable beneficiaries had fewer observed chronic conditions and were less likely to have 2 or more chronic conditions in 2011 (5.3% vs 22.3%; Table 1) compared with attributable beneficiaries; however, people with no service use or very few visits have no or fewer opportunities for diagnoses to be observed. Mortality was higher in the unattributable group in 2012 (6.6% vs 4.3%; Table 1) but lower in 2013 (2.8% vs 4.9%). More beneficiaries younger than 65 years were unattributable than those older than 65 years (20% vs 10%; Figure 1). We do not report *P* values of differences in variables' means and proportions across attribution groups, which were all statistically significant (*P* < .001) due to the large sample size.

In terms of geographic distribution, the proportion of unattributable beneficiaries ranged from 6% to 22% across HRRs (Figure 2); HRRs with the fewest unattributable beneficiaries (less than 10%) were located primarily in parts of the Midwest, South, and Northeast regions.²⁷ Although results are not shown, we examined 2011 physician supply in the market—a proxy for access—and found no evidence for differences across attribution categories.

In the unattributable group, we identified a subpopulation with no healthcare service use or spending in 2012 (63% of the unattributable) and a group that died in 2012 (6%). The remaining beneficiaries (31%) used healthcare services, including primary care services, that did not qualify for attribution (Table 2). Among the unattributable nonusers of care in 2012, few (3.6%) had 1 or more reported diagnoses in 2011. However, spending averaged \$9000 in 2011 in this group, primarily from ED visits and hospitalization (not shown).

Unattributable patients with healthcare service use who died (user-decedents) spent \$19,000, on average (including \$12,000 of inpatient spending and \$5000 of hospice spending; Table 2). More than half (60%) of the unattributable decedents died within the first 3 months of 2012, compared with 20% of decedents attributable to provider organizations (eAppendix Table 3). Of the more than 80,000 unattributable user-decedents, 67% had 1 or more chronic condition diagnoses in claims in 2011; dementia, CHF, renal disease, diabetes, and COPD were common.

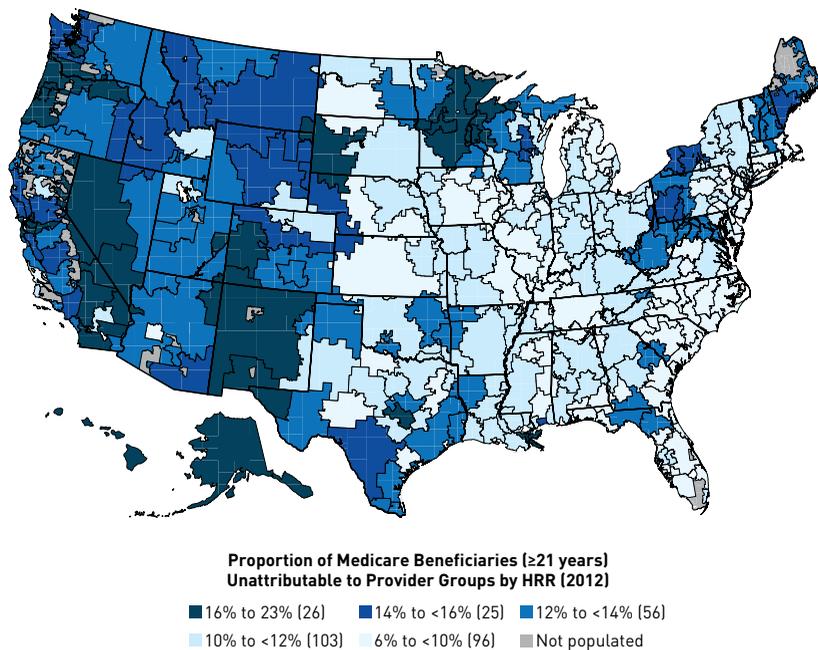
The third group of unattributable beneficiaries (with healthcare use but no qualifying primary care visits) averaged more than \$3000 in annual spending, which was one-third of the spending of attributable patients. Very few of these beneficiaries had nonqualifying E&M visits (n = 57), whereas others had other healthcare use in nonattribution settings. Of the unattributable nondecedent healthcare users, 31% had reported clinical conditions in the prior year, with severe mental illness, diabetes, renal diseases, dementia, and COPD being most common.

In multivariate regression analyses, older and female beneficiaries were less likely to be unattributable (0.1 percentage-point decrease per year of age and 4.5 percentage points less likely among women; *P* < .001) (Table 3). Minorities and those living in high-poverty Census tracts were more likely to be unattributable. Nursing home residents and dual-eligible beneficiaries were less likely than others to be unattributable to provider groups (4.3 and 4.2 percentage

points lower probability, respectively; $P < .001$). Disability as original reason for entitlement was associated with a 4.5 percentage-point increase in the likelihood of being unattributable. Beneficiaries with 0 observed chronic condition diagnoses and those with unknown chronic condition history (nonusers of care and those not in both parts A and B FFS Medicare in 2011) in 2011 were more likely to be unattributable in 2012 relative to those with observed chronic conditions (2.4 and 20.4–22.3 percentage points higher probability, respectively; $P < .001$).

Because Medicaid coverage complements Medicare benefits for certain low-income adults, we explored how attribution status differed in the 22% of our sample who were dually eligible for Medicaid benefits. Although they were less likely than other beneficiaries to be unattributable (Figure 1), results from multivariate analyses of dual-eligible enrollees were consistent with those found in the overall sample (eAppendix Table 4), with 2 exceptions: Asian/Pacific Islander ethnicity and disability status were both associated with a decrease in the likelihood of being unattributable.

FIGURE 2. Proportion of Medicare Beneficiaries Unattributable to Provider Groups in 2012 by HRR



HRR indicates hospital referral region.

DISCUSSION

Because existing evidence on ACOs focuses exclusively on attributable Medicare beneficiaries,^{8,15,28,29} we studied the excluded group of unattributable patients to understand how these omitted groups might influence performance in Medicare ACO programs.³⁰ Using MSSP attribution methods, nearly 12% of beneficiaries were unattributable in 2012. This group was heterogeneous, composed of decedents, beneficiaries using no services, and those using services ineligible for attribution under common methods. The majority of unattributable beneficiaries had no encounter with the healthcare system at all, which may be due to financial and nonfinancial barriers that limit access to care.^{31,32} A small but costly group, 6% of unattributable beneficiaries, died in 2012; among them, inpatient and hospice service use was common. The remaining 31% of unattributable beneficiaries had minimal healthcare use, largely for urgent or hospital-based services.

The distribution of unattributable beneficiaries aligned with regional spending patterns in Medicare.³³ Beneficiaries living in low-cost areas, such as Minnesota, had higher proportions of unattributable beneficiaries. This pattern indicates that alternative payment models in these regions, ironically, may not reward organizations for their activities targeting healthier groups who use few services. For example, ACOs in low-cost regions were evaluated against lower financial benchmarks than were ACOs in high-cost regions. Beginning in 2017, cost benchmark calculations were improved to integrate regional

factors, making an ACO's benchmark less reflective of its historical spending and more dependent on FFS expenditures in its region.³⁴ Two changes to attribution might capture more low-utilization beneficiaries. First, Track 3 of the MSSP, with 16 participating organizations in 2016, and the Next Generation ACO model—another demonstration project in the CMS Innovation Center—are currently piloting attestation, allowing beneficiaries to voluntarily choose an ACO,^{35–38} which would allow for accountability for preventive services in healthier populations with little or no observed utilization. Second, “sticky” attribution, or allowing utilization in a prior year to count in the current year for those with no use in the current year, could capture more healthy patients; it could also capture more individuals who are very sick and use non–primary care settings due to death early in the year. Although attestation has the benefit of permitting patients to choose, sticky attribution may be more feasible in existing programs because it can be done using just claims.

Facilitating the attribution of healthy patients and those with minimal use through any method may improve the consistency and continuity of care for patients. Because ACOs are responsible for both cost and quality of care for assigned patients, attribution of healthy patients with no healthcare use, as well as of those with some healthcare use but nonqualifying visits for current attribution purposes, would reward providers for care delivered to these patients, without rewarding unnecessary care.

Attribution of nonusers may more appropriately contribute to an ACO's shared savings, which are conditional on meeting

TABLE 2. Descriptive Statistics: Unattributable FFS Medicare Beneficiaries (≥21 years), 2012^a

Variable	Nonusers (no claims)	Healthcare Service Users	
	n = 943,914 (63.2%)	Decedents n = 82,057 (5.5%)	Survivors n = 466,879 (31.3%)
Demographic Characteristics			
Age, years, mean (SD)	64.9 (12.8)	78.2 (12.9)	64.3 (15.4)
Gender, %			
Male	62.2	49.8	57.5
Female	37.8	50.2	42.5
Race/ethnicity, %			
Non-Hispanic white	70.3	81.5	74.3
Black	13.7	10.7	14.3
Hispanic	10.3	4.8	6.9
Asian/Pacific Islander	3.2	1.6	2.3
Other	2.6	1.4	2.3
Lives in high-poverty (≥20%) Census tract, %	24.9	24.7	25.4
Dual Medicare and Medicaid status, %			
<65 years, % ^b	22.0	41.9	51.0
≥65 years, % ^c	10.0	20.9	12.0
Nursing home resident (≥100 days in nursing home), %	0.1	6.2	0.5
Clinical Condition History and Disability			
Disabled, %	34.8	23.5	40.1
<65 years, % ^b	85.2	93.1	94.9
Chronic conditions based on HCCs (2011), % ^d			
Cancer	0.2	13.0	0.3
Cerebrovascular disease and stroke	0.2	6.1	0.5
Chronic obstructive pulmonary disease	0.7	21.7	2.3
Congestive heart failure	0.5	24.6	1.7
Connective tissue disease	0.1	2.9	0.4
Coronary artery disease	0.4	9.6	1.0
Dementia	0.6	28.2	2.4
Depression	0.4	11.5	2.0
Diabetes	1.2	22.5	4.2
Hematologic/thrombotic disease	0.1	6.2	0.4
Liver disease	0.1	2.2	0.2
Paralysis (not stroke)	0.05	1.5	0.2
Parkinson's/Huntington disease	0.05	3.0	0.2
Peripheral vascular disease	0.3	10.2	0.9
Renal disease	0.5	23.2	2.8
Severe mental illness	0.5	4.9	7.3
Substance use disorder	0.2	2.4	1.3
0 observed chronic conditions	4.6	8.2	12.7
Non-healthcare service user (2011), % ^e	70.0	20.4	57.1
Unknown chronic condition history (2011), % ^f	21.8	4.3	12.2
Observed chronic conditions based on HCCs (2011), mean, (SD)	0.1 (0.4)	1.9 (2.0)	0.3 (0.7)
≥2 observed chronic conditions based on HCCs (2011), %	1.4	48.4	5.7

(continued)

predetermined quality measure benchmarks, and these benchmarks reflect beneficiaries classified as at-risk populations—for example, in benchmark year(s)—who currently do not use services.^{39,40} Moreover, financial benchmarks are calculated using attributed beneficiaries' historical healthcare use. The current attribution methodology provides incentives for ACOs to bring in healthy patients for primary care visits, but attributing nonusers through alternative methods may be warranted to appropriately reward providers without inducing potentially unnecessary primary care visits.⁴¹ A practical solution that would address those nonusers of care who used healthcare in previous years would be to assign them based on sticky attribution.

Furthermore, healthcare providers and policy makers should give greater attention to the consequential subpopulation of decedents (ie, end-of-life patients) currently falling outside of the responsibility of organizations participating in ACOs. One-fourth of Medicare spending is devoted to care in the last year of life,⁴² so relative savings on end-of-life care contribute outsized savings to the Medicare program. There are also opportunities for improvements in care quality and preference-based care. Organizations that deliver thoughtful end-of-life care, by using providers or settings not recognized by current attribution methods, are not rewarded for this high-quality care. On the flip side, organizations that fail to coordinate end-of-life care or that deliver resource-intensive care not aligned with patient preferences face no penalty. Additionally, higher hospice spending registered in unattributable decedents signals that involvement of hospice and palliative care in new payment initiatives may improve quality of care and potentially reduce costs⁴³⁻⁴⁵ for patients at the end of life.

Alternative attribution methods have different strengths and weaknesses. Retrospective attribution, currently used for most MSSPs and done at the end of the performance year, reflects actual care delivery. It removes patients who no longer receive care from an ACO and captures new patients, such as those aging into Medicare during the year (**eAppendix Table 5**).⁶ However, with retrospective attribution, organizations cannot plan care for patients assigned to them only after care delivery. In contrast, prospective attribution

removes this uncertainty, which might facilitate active engagement with patients and can improve management of patient population health. However, prospective attribution is a forecast based on past healthcare use, and it works best when care-seeking patterns are stable and therefore predictable over time. This attribution, although preferred by ACOs,⁴⁶ may have important cost implications for ACOs if patient care patterns drastically change from one year to another because patients may see any Medicare provider. This type of attribution would also fail to capture patients who initiated care during the year (eAppendix Table 5).

Most of the gaps in attribution rules that we identified may be addressed with a hybrid attribution method. First, for most populations, the current assignment based on E&M visits is appropriate. Second, for those with limited healthcare use and for the healthy, assignment would be based on attestation over a longer time period, therefore “rewarding” providers for early prevention and early detection care patterns. For those with serious illnesses, assignment could be broadened to include hospice and palliative care to encourage better end-of-life care (eAppendix Table 5). Before patients with serious illness reach the end of life, however, a first priority is to engage them in care. Providers could tailor care management and coordination to the needs of patients with chronic conditions who have accessed very little healthcare⁴⁷ in order to improve quality and health outcomes.

Gender disparities were noted between attribution categories, with disproportionately larger proportions of younger and male populations among the unattributable beneficiaries. This may signal gender differences in healthcare-seeking behavior.⁴⁸ The slightly higher proportion of those with dual eligibility for Medicaid attributable to a provider group (90%) may reflect greater coverage for out-of-pocket spending in this group, lowering a barrier to access. New initiatives, such as the CMS Financial Alignment Initiative, which integrates care across primary, acute, behavioral health, and long-term care for dual-eligible beneficiaries, offer another avenue to engage these patients.

Limitations

This cross-sectional exploratory study in the first year of the ACO payment model has limitations. First, methods other than the MSSP, which was used in this study, may result in slightly different distributions of beneficiaries across categories. However, MSSP is the largest Medicare ACO program. Second, a longitudinal study

TABLE 2. (Continued) Descriptive Statistics: Unattributable FFS Medicare Beneficiaries (≥21 years), 2012^a

Variable	Nonusers (no claims)	Healthcare Service Users	
	n = 943,914 (63.2%)	Decedents n = 82,057 (5.5%)	Survivors n = 466,879 (31.3%)
Healthcare Utilization (count per person), Mean (SD)^a			
Hospitalizations for ACSCs	–	0.09 [0.34]	0.02 [0.20]
Acute care/critical access hospital hospitalizations	–	0.57 [0.82]	0.13 [0.54]
E&M visits	–	0 (0)	0.0001 (0.01)
ED visits	–	0.63 [0.98]	0.51 [1.55]
Medicare Spending, \$, Mean (SD)^{a,h}			
Total spending per person	–	18,914 (32,186)	3235 (11,125)
Inpatient	–	11,708 (29,251)	1295 (7010)
Physician	–	1950 [4522]	1054 [4686]
Facility	–	2 (17)	5 (27)
Home health agency	–	399 [1436]	170 [1262]
Hospice	–	4785 [9583]	639 [5675]
Durable medical equipment	–	69 [485]	72 [622]
Mortality			
Death recorded in 2012, %	1.7	100	0
Death recorded in 2013, conditional on survival in 2012, % ⁱ	2.1	–	4.0

ACSC indicates ambulatory care-sensitive condition; E&M, evaluation and management; ED, emergency department; FFS, fee-for-service; HCC, Hierarchical Condition Category.
^aN = 1,492,850. Percentages may not sum exactly to 100 due to rounding error.
^bThe sample is restricted to beneficiaries younger than 65 years (n = 501,243).
^cThe sample is restricted to beneficiaries 65 years or older (n = 991,607).
^dThese conditions include 2011 diagnoses for 19,253 beneficiaries without both parts A and B coverage in 2011.
^eThis identifies existing Medicare FFS beneficiaries with no recorded healthcare use in 2011 and therefore unknown chronic condition history.
^fThis identifies new Medicare enrollees in 2012 and patients who may have missing diagnoses because they were not in both parts A and B or were in managed care plans, which have incomplete reporting, in 2011.
^gThe sample is restricted to those with healthcare service use (n = 548,936).
^hInpatient spending includes acute care and critical access hospitalization, skilled nursing facility, inpatient rehabilitation, and long-term acute care facility spending; physician spending includes procedure, E&M, imaging, testing, and other physician spending.
ⁱThis variable excludes 98,105 beneficiaries who died in 2012.

with additional years of data could examine trends in attribution of Medicare beneficiaries as provider groups gain knowledge and develop better strategies to manage attribution. Third, claims-based measures of patient illness cannot capture the illness burden for those without utilization. Thus, our results may reflect care-seeking behavior, as we cannot attribute or observe clinical comorbidities for those with no or little healthcare utilization and for new enrollees in the preceding year.

CONCLUSIONS

The promise of ACO contracts to lower spending and enhance quality of care, and, ultimately, to improve population health, can be

TABLE 3. Association Between Attribution Status and Beneficiary Characteristics (40% random sample)^a

Variable	Unattributable to Provider Groups ^b	
	Marginal Effect	SE
Age	-0.001*	0.00001
Female	-0.045*	0.0002
Race/ethnicity		
Black	0.047*	0.0003
Hispanic	0.052*	0.0003
Asian/Pacific Islander	0.035*	0.0005
Other ethnicity	0.026*	0.0006
Lives in high-poverty (≥20%) Census tract	0.012*	0.0002
Dually eligible	-0.042*	0.0002
Nursing home resident	-0.043*	0.001
Disabled	0.045*	0.0002
Chronic conditions (2011) ^c		
0 observed chronic conditions	0.024*	0.0003
Non-healthcare service user (unknown chronic conditions) (2011)	0.204*	0.0002
Unknown chronic condition history (new 2012 FFS Medicare enrollees and 2011 managed care enrollees) (2011)	0.223*	0.0003
Observations	12,852,274	
Pseudo R ²	0.220	

ACO indicates accountable care organization; FFS, fee-for-service; HRR, hospital referral region; SE, standard error.

* $P < .001$.

^aA logistic regression was estimated for the attribution measure. The marginal effects reported are the averages of marginal effects across the sample on the predicted probability of being unattributable.

^bThe outcome variable is a dichotomous variable for whether the beneficiary is unattributable to any provider group as opposed to being attributable to a provider group (either associated with a Medicare ACO or any other provider group). The coefficients represent the estimated marginal effects or changes in the predicted probability. HRR fixed effects are included.

^cThe reference category is the group of patients with 1 or more observed chronic conditions.

enhanced by improving the attribution of individuals to providers. By rewarding organizations for keeping patients healthy and out of resource-intensive care settings and by appropriately capturing and rewarding compassionate care, such as hospice services, for patients approaching the end of life, Medicare's continued development of advanced payment models has the potential to move us closer to the goal of improving population health. ■

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eAppendix Table 1. Definition of Chronic Conditions Based on HCCs Developed by CMS^a

HCC/RxHCC/ICD-9 Label and Number	
Coronary artery disease	HCC81, HCC82, HCC83
Cancer	HCC7, HCC8, HCC9
Cerebrovascular disease and stroke	HCC96, HCC100 (remove <i>ICD-9</i> 343.X), HCC95
Congestive heart failure	HCC80
Connective tissue disease	HCC38
Chronic obstructive pulmonary disease	HCC108
Diabetes	HCC15, HCC16, HCC17, HCC18, HCC19 HCC119
Hematologic/thrombotic disease	HCC44, RxHCC100 (remove <i>ICD-9</i> 343.X)
Liver disease	HCC25, HCC26, HCC27
Parkinson's/Huntington disease	HCC73
Paralysis (not stroke)	HCC67, HCC68, HCC69
Renal disease	HCC130, HCC131, HCC132
Severe mental illness ^b	HCC54, HCC55 (remove e codes from HCC55)
Peripheral vascular disease	HCC105
Depression ^c	RxHCC62, <i>ICD-9</i> 296.2X, <i>ICD-9</i> 296.3X
Dementia	RxHCC54, RxHCC55
Substance use disorder ^d	HCC51, HCC52

HCC indicates Hierarchical Condition Categories; *ICD-9*, *International Classification of Diseases, Ninth Revision*.

^aCategories chosen for chronic nature, association with mortality, and costs.

^bSevere mental illness includes schizophrenia, bipolar disease, and depression.

^cDepression includes major depressive disorder, single episode; major depressive disorder, recurrent episode; and depression not otherwise specified and not elsewhere classified.

^dSubstance use disorder includes drug/alcohol dependence and drug/alcohol mental illness.

eAppendix Table 2. Attribution Status by RUCA Codes, 2010^a

	RUCA Codes			Observations, %
	Metropolitan Areas: Core, High Commuting, and Low Commuting	Micropolitan Areas: Core, High Commuting, Low Commuting	Small Towns (core, high commuting, low commuting), Rural Areas, Not Coded Areas	
	1, 1.1, 2, 2.1, 3	4, 4.1, 5, 5.1, 6	7, 7.1, 7.2, 8, 8.1, 8.2, 9, 10, 10.1, 10.2, 10.3, 99	
Attributable to provider groups, %	76.0	12.3	11.6	100
Unattributable to provider groups, %	76.9	11.5	11.7	100

RUCA indicates rural-urban commuting area.

^aN=12,852,274. “Not coded areas” are more likely to be less populated rural areas. Percent may not sum exactly to 100 due to rounding error. Considering each row separately:

Of all attributable beneficiaries

Attributable beneficiaries in metropolitan areas: 76.03%

Attributable beneficiaries in micropolitan areas: 12.33%

Attributable beneficiaries in small towns and rural areas: 11.64%

Of all unattributable beneficiaries

Unattributable beneficiaries in metropolitan areas: 76.86%

Unattributable beneficiaries in micropolitan areas: 11.47%

Unattributable beneficiaries in small towns and rural areas: 11.66%

eAppendix Table 3. Distribution of Decedents by Attribution Status and Month of Death

Month of Death, 2012	Attributable, %	Unattributable, %
1	4.0	34.7
2	7.1	15.1
3	8.6	10.4
4	8.5	7.2
5	8.6	5.9
6	8.3	4.7
7	8.6	4.4
8	8.7	3.9
9	8.7	3.7
10	9.3	3.7
11	9.3	3.0
12	10.3	3.3
Total, N (%)	489,354 (100)	98,105 (100)

eAppendix Table 4. Association Between Attribution Status and Beneficiary Characteristics, Dual-Eligible Beneficiaries (40% random sample)^a

Variable	Unattributable to Provider Groups ^b	
	Marginal Effect	SE
Age	-0.001***	(0.00001)
Female	-0.052***	(0.0003)
Race/ethnicity		
Black	0.023***	(0.0005)
Hispanic	0.007***	(0.0006)
Asian/Pacific Islander	-0.027***	(0.0009)
Other ethnicity	0.002*	(0.0011)
Lives in high-poverty (>20%) Census tract	0.004***	(0.0004)
Nursing home resident	-0.082***	(0.0011)
Disabled	-0.028***	(0.0005)
Chronic conditions (2011) [‡]		
0 observed chronic conditions	0.027***	(0.0006)
Non-healthcare service user (unknown chronic conditions) (2011)	0.155***	(0.0004)
Unknown chronic condition history (new 2012 FFS Medicare enrollees and 2011 managed care enrollees) (2011)	0.155***	(0.0006)
Observations	2,824,031	
Pseudo R ²	0.191	

ACO indicates accountable care organization; FFS, fee-for-service; HRR, hospital referral region; SE, standard error.

*** $P < .001$, ** $P < 0.01$, * $P < 0.05$.

^aA logistic regression was estimated for the attribution measure. The marginal effects reported are the averages of marginal effects across the sample on the predicted probability of being unattributable.

^bThe outcome variable is a dichotomous variable for whether the beneficiary is unattributable to any provider group as opposed to being attributable to a provider group (either associated with a Medicare ACO or any other provider group). The coefficients represent the estimated marginal effects or changes in the predicted probability. HRR fixed effects are included.

^cThe reference category is the group of patients with 1 or more observed chronic conditions.

eAppendix Table 5. Comparison of Attribution Methodologies: FFS Medicare Beneficiaries (2011-2012)^a

Attribution Categories in 2011	Attribution Categories in 2012					Observations, n (%)
	Attributable to (ACO and non-ACO) Provider Groups	Unattributable		Not in 2012 Data		
		Nonusers	Healthcare Service Users			
			Decedents	Survivors		
Attributable to (ACO and non-ACO) provider groups, n, (%)	10,021,587 (88.8)	127,514 (1.1)	60,445 (0.5)	183,282 (1.6)	890,675 (7.9)	11,283,503 (100)
Unattributable, n (%)	419,910 (28.7)	603,427 (41.2)	15,521 (1.1)	216,197 (14.8)	208,887 (14.3)	1,463,942 (100)
Not in 2011 data, n (%)	917,927 (76.2)	212,973 (17.7)	6091 (0.5)	674,000 (5.6)	–	1,204,391 (100)
Observations, n	11,359,424	943,914	82,057	466,879	1,099,562	13,951,836

ACO indicates accountable care organization; FFS, fee-for-service.

^aPercent may not sum exactly to 100 due to rounding error. Under prospective attribution (based on 2011 utilization), some of the 890,000 healthcare users in 2011 would be prospectively attributable to provider groups (ACOs and non-ACOs) in 2012 even though they were no longer enrolled in 2012—those who have lost eligibility for enrollment in 2012. Beneficiaries who may have died in 2011, following the end of the attribution window (October-September) and production of the attribution list would be removed. Over 370,000 (127,514 + 60,445 + 183,282) unattributable beneficiaries in 2012 would be prospectively attributable beneficiaries to provider groups based on their utilization in 2011. About 920,000 new (parts A & B) FFS Medicare beneficiaries in 2012 attributable to provider groups in 2012 would be excluded from responsibility of provider groups.

Under the proposed hybrid attribution and focusing on 2011 and 2012 data above, over 10,000,000 beneficiaries would be attributable in 2012 based on retrospective attribution method. To that number would be added over 127,000 2012 unattributable healthcare nonusers, 60,000 2012 unattributable decedents, and 183,000 2012 unattributable survivors who were attributable in 2011 under the long-term or “sticky” attribution recommendations. Attestation would permit attribution for additional 2012 unattributable patients, those who were new enrollees in 2012, and patients with some healthcare use in 2012 but who were unattributable in 2011. Finally, some of the remaining 2012 unattributable decedents would further be included by broadening assignment to hospice and palliative care.