



# HHS Public Access

Author manuscript

*Health Aff (Millwood)*. Author manuscript; available in PMC 2018 January 01.

Published in final edited form as:

*Health Aff (Millwood)*. 2017 January 01; 36(1): 57–66. doi:10.1377/hlthaff.2016.0626.

## Accountable Care Organizations Serving High Proportions of Racial and Ethnic Minorities Lag in Quality Performance

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### Abstract

Accountable care organizations (ACOs) are intended, in part, to improve health care quality. However, little is known about how such reforms may affect disparities or how providers serving disadvantaged patients perform under Medicare ACO contracts. We analyzed racial and ethnic disparities in health care outcomes among ACOs—the relationship between the share of an ACO’s patients that are racial and ethnic minorities and the ACO’s performance. Using data from Medicare and from a national survey of ACOs, we found that a higher proportion of minority patients is associated with worse quality performance on 26 of 33 Medicare ACO performance measures. However, ACOs serving a high share of minority patients were similar to other ACOs on most observable characteristics and capabilities, including provider composition, services, and clinical capabilities. Our findings suggest that ACOs with a high share of minority patients may struggle in quality performance under ACO contracts, especially during their early years of participation—reinforcing or potentially exacerbating current inequities. Policymakers must consider how to refine ACO programs to encourage participation of providers serving minority patients and appropriately reward performance.

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Despite decades of research and efforts to improve care for disadvantaged patients, racial disparities in health care remain a serious and persistent problem. Racial minorities in the United States experience worse access to care and health care outcomes across a wide array of diseases, conditions, and procedures.(1) Racial and ethnic disparities exist not only at the individual level, but at the provider level as well. Health care providers serving more racial and ethnic minority patients have worse quality outcomes across many settings, including primary care,(2,3) specialty care,(4,5) and hospital-based care, including surgery.(6–10) These providers also have fewer resources than do providers seeing more white patients.(11–

16) Stakeholders such as the Institute of Medicine have called for efforts to reduce disparities and to strengthen providers and organizations caring for a high proportion of disadvantaged patients or improve health care payment policy to appropriately consider social factors, such as race.(17,18)

Accountable care organizations (ACOs) are groups of providers that are collectively held responsible for the care of a defined population of patients. Delivery system reforms such as ACOs are intended, in part, to improve the quality of care delivered to patients. Overall, ACOs have improved measured quality of care during the first three years of performance. (19,20) However, little is known about how ACOs and similar reforms will affect prevailing racial and ethnic disparities. For example, there is no evidence about how existing disparities may influence providers' performance under new payment models.(21,22) Financial incentives related to quality performance could create disproportionately improved care among currently underperforming providers, including those serving large proportions of minority patients. Under this scenario, ACOs and related delivery system reforms could lead to reduced disparities in quality. On the other hand, providers serving large proportions of minority patients may not have the resources necessary to transform care at the needed rate, and may struggle to meet performance targets set by Medicare or commercial payers. In this case, lagging performance under new payment models by minority-serving providers could exacerbate disparities in quality and call into question the viability of payment and delivery reforms.

No research to date has examined disparities in outcomes between ACOs serving a high and low proportions of racial and ethnic minority patients, although research has examined the unintended consequences of other payment reforms, such as pay-for-performance or hospital readmissions penalties.(23) In this paper, we used data on Medicare ACO performance to examine how ACO quality and cost performance are associated with the share of an ACO's patients that are minority. We also used data on ACO performance and characteristics from a national survey to assess the association between patient racial composition and performance, controlling for patient and provider level characteristics. Finally, we compared characteristics and capabilities of ACOs serving a high share of minority patients with other ACOs, those serving a lower share of minority patients.

## Study Data And Methods

We conducted cross sectional and longitudinal analyses on the quality performance of ACOs participating in the Medicare Shared Savings Program during their first and second years of contracts, with specific attention to the proportion of an ACO's patients that are racial and ethnic minorities ("minority patients"). We used publically available data on performance and patient population characteristics from the Medicare Shared Savings Program, supplemented with data on ACO characteristics from the National Survey of Accountable Care Organizations, conducted by the Dartmouth Institute.

### Medicare Shared Savings Program Public Data

The Centers for Medicare and Medicaid Services (CMS) maintains and publishes publicly available data on all ACOs participating in the Medicare Shared Savings Program.(24,25)

These data include cost and quality performance information, including ACO performance on each of the 33 Medicare ACO quality metrics and two disease composite measures, as well as the overall composite quality performance score used to determine the percent of generated savings an ACO is eligible to receive based on its quality performance. Measures are continuous across [INSERT]. Most measures are presented as a proportion, and three are rates. Our analysis utilizes first and second year performance data; for most measures a higher score indicates better performance, but for five measures the direction of scoring is reversed. Quality measures cover four domains: patient and caregiver experience, preventive care, care coordination and patient safety, and at-risk populations. Notably, quality measures within these domains are not risk adjusted, except for unplanned readmissions, which are adjusted for case mix.

We used first year performance data for ACOs whose contracts began in 2012, 2013, or 2014. We also analyzed second year performance data for ACOs whose contracts began in 2012 and 2013. The results were largely similar, so we present only the first year results in this paper.

CMS data include limited information on each ACO's patient and provider characteristics. Our main exposure of interest was the proportion of an ACO's attributed patient population that are racial and ethnic minorities from the CMS data. We examined racial and ethnic minority groups separately with similar results, so we used a single measure for parsimony, equivalent to the proportion non-white. We conducted sensitivity analyses on all results for varied ways of operationalizing the proportion of minority patients in an ACO, for example, to test if the proportion of black patients had a different association than the proportion of Hispanic patients. Overall results were substantively similar across specifications, so we opted for a simple dichotomy for classifying patients' race and ethnicity as non-Hispanic white or any non-white, racial and ethnic minority.

We considered different ways of treating the proportion of minority patients, including as continuous, categorical (such as quartiles), or dichotomous. Substantive results were similar across specifications. For tables comparing high proportion minority ACOs to other ACOs, we present the top quartile compared to the other three quartiles. In regression models, we used the simple continuous measure of proportion of an ACO's assigned patients that are minority.

We included several other available measures from the CMS data in our analysis, including patient population characteristics (proportion of patients female, over age 85, disabled, and dually eligible for Medicare and Medicaid); patient morbidity (average hierarchical condition category [HCC] scores for aged non-dual beneficiaries, aged dual beneficiaries, and disabled beneficiaries); and provider composition (the total number of providers—physicians, nurse practitioners, physician assistants, and clinical nurse specialists—participating in the ACO, and the proportion of providers that are primary care providers).

### **National Survey of ACOs**

The National Survey of Accountable Care Organizations collects data on factors related to implementation and performance of ACOs. Survey respondents are executive or director-

level decision makers with a broad understanding of ACO activities. Conducted annually in three waves from 2012–15, data from the survey provides a unique overview of organizational characteristics and capabilities and contract arrangements and features. Linked with CMS performance and demographic data, our analysis utilizes all three waves with a pooled response rate of 69% among Medicare ACOs. Previous studies provide additional information on the national survey, including non-response analysis.(26,27) We use measures on ACO composition, services provided, contracts, and clinical capabilities, and restrict the sample to ACOs with complete data on these questions for a consistent sample.

## Analysis

We include in our analysis all Medicare Shared Savings Program ACOs with at least one year of available performance data. We examined the association of the proportion of minority patients with performance on each quality measure. We used linear regression models regressing each performance measure score on the proportion minority as well as patient population and ACO provider characteristics. Multiple regression allowed us to understand the extent to which associations of racial composition were attributable to other patient population characteristics, such as more comorbidities. Finally, we compare high proportion minority ACOs to other ACOs on characteristics and capabilities from the National Survey of Accountable Care Organizations.

The analysis presented here is based on data from the first performance year of Medicare ACO contracts ( $n=331$ ). We conducted analysis on second year performance for those ACOs with data available ( $n=191$ ); substantive results on the associations of interest were the same for the second year, and thus are not shown here. We also examined the association of proportion minority patients with change in quality scores from first to second year to understand if proportion minority patients was associated with greater (or worse) *improvement* in quality during the first two years of ACO contracts.

## Limitations

Our study has several important limitations. First, our data are at the aggregate ACO-level rather than patient level. Thus, we cannot speak to patient-level disparities (such as disparities between white and minority patients); we can only speak to provider-level disparities, meaning disparities between providers seeing more or fewer minority patients. Analysis of individual level data is important and necessary to understand how ACOs may be affecting existing disparities in health care outcomes.

Second, our data are limited in the patient population characteristics. While we focused on racial disparities, a large array of other unmeasured patient characteristics, such as education, income and wealth, social support, neighborhood resources, and health literacy, may explain some or all of the relationships reported here.. It is likely there are other differences in patient populations that we have not fully examined in our models. It may be that most of the association between patient race and quality performance is due to an overall unobservable higher risk patient population (unmeasured in our models).

Third, our data are limited to Medicare ACOs, meaning we are unable to generalize more broadly or know about patients outside of Medicare ACO contracts (for example, the racial composition of non-Medicare patients seen by providers in or outside of our study).

Finally, we are limited in the provider characteristics we can examine. This is due to both limited information from CMS on ACO providers, and a generally small sample of ACOs matched with the national survey ( $n=191$ ). As more performance data become available, the matched cases will allow for more detailed future analysis. Ideally an analysis could take into account the readiness of a provider organization to participate or succeed under shared savings models; at this time no such data are available.

## Study Results

### The distribution and definition of ACO racial composition

The mean percentage of minority patients attributed to ACOs was 17.8% (including 9.8% black, 2.5% Hispanic, 0.2% Native American, 2.2% Asian, and 2.2% other race) (data not shown). Overall these data are right skewed, indicating a small number of ACOs have a very high proportion of minority patients. The top 5% of ACOs in terms of minority patients each served greater than 50% minority patients, and the top quartile of ACOs each served 24% or more minority patients.

### ACO patient populations

We first examined the association of proportion minority with patient population characteristics to understand if ACOs serving more minority patients were serving patients different in other key ways. Compared to other ACOs, patients in high proportion minority ACOs were, on average, more likely to be under age 65, dually eligible for Medicare and Medicaid, disabled, female, or have end stage renal disease (Exhibit 1). In addition, the HCC scores for the aged-non-dual and disabled were higher in high-minority ACOs than in others. Overall, this indicates that ACOs serving a high proportion of minority patients had patients who are higher risk, somewhat sicker or more costly, and perhaps disadvantaged in other ways (for example, on Medicaid) compared to other ACOs. There were no significant differences between high proportion minority ACOs and other ACOs in terms of number of clinicians or proportion primary care clinicians.

### Regression results

We used bivariate and multiple regression to explore the association between proportion minority patients and quality performance. The proportion of minority patients was associated with worse quality performance on 27 out of 36 measures unadjusted and on 25 out of 36 measures adjusted (Exhibit 2). The relative magnitude of these associations varied.

The associations between quality performance and proportion minority in some cases decreased in magnitude and significance after adjustment, such as for patient's rating of their doctor or influenza immunization, but in other cases the associations were strengthened, such as for shared decision making, screening for fall risk, and adult weight screening and follow up. Overall, these results suggest that some, but certainly not all, of the association

between quality and the proportion of patients that are minority can be explained by an overall higher risk or higher acuity patient population.

Notably, the association of worse quality performance among providers serving more minority patients exists across all four domains of quality scores. Differences are greatest in the at-risk population and preventive health measures. In addition, providers serving more minority patients have lower overall quality composite scores; this composite quality measure is used by CMS to determine the share of generated savings an ACO will receive.

In additional regression models of second year performance (results not shown), we found the same broad patterns of association of quality with proportion of minority patients, including similar magnitudes of associations and patterns of significance.

We tested whether ACOs with a high proportion of minority patients improved more rapidly than did other ACOs in closing gaps in performance. We regressed each ACO's absolute change on a given outcome from the first to second year on the proportion of minority patients both unadjusted and adjusted for first year performance (using robust standard errors). In general, gaps in quality performance between high minority ACOs and other ACOs were not reduced or narrowed between the first and second performance years (Exhibit 3). ACOs with a high proportion of minority patients did not improve any more than did other ACOs, in unadjusted or adjusted models.

### **ACO characteristics: data from the National Survey of ACOs**

Finally, we examined differences in characteristics and capabilities between the high minority and other ACOs that responded to the National Survey of Accountable Care Organizations. We examined differences in ACO composition, services offered, ACO contracts, and clinical and health information technology capabilities. There were no significant differences in the provider composition (Exhibit 4). In terms of services offered within the ACO, high proportion minority ACOs were statistically less likely to offer routine specialty care (57% vs. 75%), outpatient rehabilitation (29% vs. 50%), pediatric care (40% vs. 59%), or palliative and hospice care (30% vs. 53%) than other ACOs. They were not significantly different in offering other services. High proportion minority ACOs were less likely than other ACOs to hold a private payer or multiple ACO contracts, but equally likely to have a Medicaid ACO contract.

Finally, there were few differences in capabilities; high minority ACOs were not significantly different on measures of having a single electronic medical record system; working on strategies around improving outpatient care, inappropriate ED use, reducing hospital admissions or reducing re-admissions; or having smooth transitions of care or chronic care management programs.

## **CONCLUSIONS**

Data in this study indicate that providers serving a high proportion of minority patients are performing worse than other ACOs on quality performance measures under Medicare ACO contracts. These associations are only explained in part by patient characteristics, such as

markers of a clinically high-risk patient population. ACOs with more minority patients also have a lower overall quality composite score, meaning they are eligible for a smaller share of the cost savings they generate. Finally, the relationship between the proportion minority and quality performance is consistent across the first and second year of ACO contracts, and high minority ACOs are not improving more rapidly than other ACOs, indicating that high minority ACOs are not “catching up” in quality over time under ACO contracts. Overall, providers serving more minority patients simply achieve worse quality performance compared to other ACOs.

Notably, this performance is across many types of measures, including both clinical and process measures. Clinicians to some degree have more control over process measures than clinical outcome measures. However, results here show that even on process measures, providers serving more minority patients often perform worse. This may be because several process measures still require action on the part of the patient, such as returning for a follow up test or completing an additional appointment, such as for a mammogram. The use of process measures is likely insufficient to remove the influence of patient characteristics from providers’ performance outcomes.

We must note again that numerous other patient-level characteristics, such as income or education, are not measured in this study and might contribute to or explain the association between patient racial composition and ACO performance. In addition, there are any number of potential factors or interventions that might reduce the association of race and performance if implemented, such as improved social supports, transportation, housing supports, supportive employment, and education programs. Efforts made to reduce the influence of social and economic factors on health and healthcare outcomes may diminish the association between provider performance and patients’ characteristics.

The literature suggests several possible explanations for the relationship between quality and providers’ share of minority patients. First, as noted in the introduction, a wide set of studies have documented existing disparities in quality between providers serving more minority patients and those serving fewer minority patients.(2–9) Quality performance under the Medicare Shared Savings Program mirrors these pre-existing disparities, and may be a natural consequence of pre-existing disparities. Second, the literature has documented that providers serving more minority patients tend to have fewer available resources,(11–16) including financial resources, infrastructure and technical resources, and human capital (such as leadership). It may be that ACOs serving more minority patients have fewer resources to devote to ACO initiatives aimed at improving quality. The results in this study on organizational differences between high proportion minority ACOs and other ACOs do not immediately bear out this conclusion, suggesting either organizational characteristics are less important among ACOs or the measures or organizational characteristics in this study do not capture the most important or salient features for quality performance.

These results may have troubling implications. ACO programs are currently voluntary; providers participating in the Medicare Shared Savings Program have made a deliberate decision to do so. Providers may forgo participation in programs such as ACOs if they are concerned about their ability to achieve performance metrics. Our results indicate that an

important swath of providers may either be not capable or not ready to participate successfully. Varied participation could have important consequences for the mix and diversity of providers participating in ACO programs, even as Medicare aims to move an increasing share of health care providers to alternative payment models.[INSERT NOTE]

In contrast, some policymakers or providers may be satisfied with how ACOs are affecting disparities. While ACO programs are not narrowing disparities between providers, the program also is not exacerbating initial disparities between providers—providers serving more minority patients do not catch up, but they also do not fall further behind over time. In essence, providers serving a high share of minority patients are improving at the same rate as other providers under ACO programs, as ACO programs are achieving improved quality across the board.

For those concerned with worse performance among ACOs serving more minority patients, there are at least three possible levers policymakers may consider to address issues raised by these results: risk-adjustment of quality measures, financial reward models, and provider supports and infrastructure.

First, policymakers may consider additional risk adjustment for quality outcomes to take into account socioeconomic characteristics of patients, such as race or income. Some argue this could serve to more fairly compare provider quality by taking into account patient-level factors beyond a provider's control, such as patients' financial resources. Conversely, others hold that this form of risk adjustment for socioeconomic factors can serve to hold providers serving disadvantaged patients to a lower standard, institutionalizing poorer quality care for minority or disadvantaged patients.(18)

Second, it is crucial to consider the ideal model for financially rewarding quality performance. Policymakers should seek to understand to what extent current quality measures encourage high performance among all providers versus penalize providers for their patient population. Medicare's Shared Savings Program currently has a small pay-for-improvement component, as providers can earn a few points toward their overall quality composite score for improvement. However, given multiple years of performance data and these results, it is important that CMS revisit this question and consider if the balance of achievement and improvement is currently ideal or could be refined. In addition, measures in the Medicare ACO program are changing over time, and new measures replaced some existing measures in 2016; research may examine how new measures fare on provider level disparities.

Additionally, other methods of rewarding quality performance may be useful. Research on hospital readmissions penalty programs, for example, has shown that the readmissions penalty has similar issues to those highlighted here, where a portion of variation in readmissions (and associated penalties) can be attributed to unadjusted differences in patient population;(23) and numerous alternative rewards schemes have been proposed that would remedy these potentially unintended and undesirable consequences. Similar in-depth work on ACO quality measures and performance payment may be helpful to ensure that CMS is promoting both quality and equity.



Third, policymakers could carefully consider what additional or improved supports ACOs serving more disadvantaged or at-risk patient populations may need to achieve higher quality performance. A deeper understanding of what particular capabilities or supports are associated with success under value-based payment models could support greater improvement in quality performance (either independent of or alongside refinements in the payment model itself). While a great many researchers, policymakers, and providers have speculated on the necessary capacity or capability for success under ACO programs, there is little empirical evidence to guide providers attempting to navigate the new terrain of value-based payment. For example, our study suggests that the meaningful use criteria included among quality measures do not differ meaningfully by ACOs' racial composition, suggesting that this is not a sufficient support to improve performance on other measures.

This study provides preliminary results for policymakers and providers to consider. Our time period is small, and future research may benefit from a longer follow up as well as more detailed information on ACOs and their patients than available here. Policymakers may use this study and additional data to stimulate discussion and thinking on the role of health care equity in new payment models focused largely on improving efficiency of the health care system.

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**Exhibit 1**  
**Characteristics of ACOs that serve high proportions of racial and ethnic minority patients compared to other ACOs**

Descriptive characteristics of ACOs that are high proportion racial and ethnic minority patients (75<sup>th</sup> percentile or above) compared to lower proportion minority (all other ACOs); data from the Medicare and Medicaid Services Shared Savings Program ACO Public Use File, authors' calculations

	High minority (N=81) Mean	Other ACO (N=250) Mean	Significance
<i>Patient Characteristics</i>			
Proportion minority beneficiaries	0.40	0.11	****
Proportion under age 65	0.23	0.16	****
Proportion age 85 and older	0.12	0.12	
Proportion dual eligible beneficiaries	0.18	0.05	****
Proportion disabled beneficiaries	0.20	0.14	****
Proportion female beneficiaries	0.56	0.54	***
Proportion ESRD beneficiaries	0.02	0.01	****
HCC for aged non-dual	1.15	1.05	****
HCC for aged dual	1.05	1.05	
HCC for disabled	1.20	1.10	****
<i>Physicians</i>			
Total providers (physicians, nurse practitioners, physician assistants, and clinical nurse specialists)	384	462	
Proportion of providers that are primary care physicians	0.45	0.42	

Source: Authors' analysis of Centers for Medicare and Medicaid Services Shared Savings Program ACO Public Use Files, 2013 and 2014 (see Notes 24 and 25 in the text).

Notes: ACOs that serve high proportions of racial and ethnic minorities are in the 75<sup>th</sup> percentile or above. ESRD is end stage renal disease. HCC is hierarchical condition category.

\*  
p < 0.10

\*\*  
p < 0.05

\*\*\*  
p < 0.01

\*\*\*\*  
p < 0.001

## Exhibit 2

**Quality performance measure means and coefficients from linear models regressing each measure on the proportion of an ACO's patients that are racial and ethnic minorities**

Means of quality performance measures and coefficients from linear models regressing each quality measure on the proportion of an ACO's patients that are racial and ethnic minorities (unadjusted; adjusted for patient population and provider characteristics), N=306; data from the Medicare and Medicaid Services Shared Savings Program ACO Public Use File, authors' calculations

Domain	Measure	Mean (SD)	(SD)	Unadjusted Coef.	Adjusted Coef.
<i>Patient/Caregiver experience</i>	Getting timely care	81.0	(3.2)	-8.4 ****	-4.8 ***
	How well your doctors communicate	92.7	(1.6)	-4.3 ****	-2.2 **
	Patient's rating of doctor	91.8	(1.6)	-3.2 ****	-1.3
	Access to specialists	84.9	(2.2)	-3.2 ****	-4.6 ****
	Health promotion and education	57.9	(3.7)	1.3	-1.5
	Shared decision making	74.5	(2.3)	-4.6 ****	-9.4 ****
	Health status/functional status	70.8	(2.2)	-4.7 ****	0.2
<i>Care coordination and patient safety</i>	All-cause, unplanned readmission <sup>a</sup>	15.0	(0.8)	2.0 ****	1.1 ***
	Admissions: COPD or asthma <sup>a</sup>	1.1	(0.4)	0.6 ****	0.5 **
	Admissions: CHF <sup>a</sup>	1.2	(0.2)	0.3 ****	0.5 ****
	PCPs qualifying for EHR incentive pay	69.3	(20.1)	-46.0 ****	-3.6
	Medication reconciliation after discharge	77.3	(25.6)	2.4	-13.7
	Screening for fall risk	38.5	(22.5)	-8.9	-28.1 **
<i>Preventive health</i>	Influenza immunization	55.3	(14.5)	-18.1 ****	-10.7
	Pneumococcal vaccination	53.3	(19.5)	-41.4 ****	-25.2 **

Domain	Measure	Mean (SD)	(SD)	Unadjusted Coef.	Adjusted Coef.
	Adult weight screening and follow-up	61.4	(15.7)	1.4	-18.0*
	Tobacco assessment & cessation intervention	84.5	(13.9)	-12.6**	-5.3
	Depression screening	29.5	(22.4)	1.8	-5.1
	Colorectal cancer screening	57.1	(14.5)	-27.6****	-11.3
	Mammography screening	61.0	(13.5)	-27.7****	-18.0**
	Screening for high blood pressure	68.7	(23.6)	16.9	-0.6
<b>At-risk populations</b>					
	Diabetes composite (hemoglobin A1c control, LDL control, blood pressure control, tobacco non-use, aspirin use, hemoglobin A1c poor control <sup>d</sup> )	22.5	(11.4)	-21.2****	-19.1***
	Hypertension: controlling high blood pressure	67.3	(8.4)	-12.2****	-15.4***
	IVD: complete lipid panel & LDL control	55.0	(12.1)	-22.3****	-20.1***
	IVD: aspirin use	77.8	(15.5)	-31.2****	-31.9****
	Heart failure: beta-blocker therapy for LVSD	83.0	(15.4)	-2.5	7.3
	CAD composite (drug therapy for lowering LDL-cholesterol, ACE inhibitor or ARB therapy)	64.1	(15.7)	-13.8**	-23.5**
<b>ACO Quality Composite<sup>b</sup></b>		62.7	(6.2)	-17.7****	-16.1****

Source Authors' analysis of Centers for Medicare and Medicaid Services Shared Savings Program (MSSP) ACO Public Use Files, 2013 and 2014 (see Notes 24 and 25 in the text).

Notes: N=306. Data are from first year of MSSP contracts (2012–2014, depending on ACO start date). The unadjusted column is the bivariate regression coefficient of the proportion minority for each of the outcomes (in total). The adjusted column is the coefficient for the proportion minority adjusting for patient and ACO characteristics (proportion of assigned patients older than 85, dually eligible for Medicaid, disabled, female; average hierarchical condition category scores for the disabled, aged duals, and aged non-duals; and total number of physicians and percent of physicians that are primary care). Analysis on individual measure components of the diabetes composite and CAD composite was conducted and are similar to the composites, so are not shown here for parsimony.

<sup>a</sup>Indicates a measure where positive results are worse, such as readmissions; this is the reverse of most measures.

<sup>b</sup>The quality composite is a 0–100 score that is multiplied by the total possible sharing rate to calculate the final sharing rate. For example, ACOs in Track 1 of the MSSP are eligible for up to 50% of savings generated. A quality score of 100 would mean the ACO would receive the full 50% of savings generated; a quality score of 50 would mean the ACO would receive 25% of savings generated. PCP is primary care physician. EHR is electronic health record. CHF is congestive heart failure. COPD is chronic obstructive pulmonary disease. LDL is low density lipoprotein. IVD is ischemic vascular disease. LVSD is left ventricular systolic dysfunction. CAD is coronary artery disease.

\* p < 0.10

\*\* p < 0.05

1000 > d  
\*\*\*\*  
1010 > d  
\*\*\*\*

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## Exhibit 3

**Differences in quality performance measures from first to second year and coefficients from linear models regressing the change in each quality measure on the proportion of an ACO's patients that are racial and ethnic minorities**

Mean change scores from of quality performance measures first to second year and coefficients from linear models regressing the change in each quality measure on the proportion of an ACO's patients that are racial and ethnic minorities (unadjusted and adjusted for performance in first year), N=191; data from the Medicare and Medicaid Services Shared Savings Program ACO Public Use File, authors' calculations

	Mean change	(SD)	Unadjusted	Adjusted for PY1
<i>Patient/Caregiver experience</i>				
Getting timely care	-0.8	(3.0)	1.8	-1.0
How well your doctors communicate	-0.4	(1.2)	1.8***	0.8
Patient's rating of doctor	-0.2	(1.3)	0.2	-0.4
Access to specialists	-1.1	(2.4)	-1.3	-3.7***
Health promotion and education	0.6	(2.8)	2.6**	2.4
Shared decision making	0.1	(2.3)	-0.5	-2.4
Health status/functional status	0.5	(1.8)	-1.0	-2.4***
<i>Care coordination and patient safety</i>				
All-cause, unplanned readmission <sup>a</sup>	0.2	(0.7)	-0.2	0.3
Admissions: COPD or asthma <sup>a</sup>	-0.1	(0.2)	0.1	0.2
Admissions: CHF <sup>a</sup>	0.0	(0.2)	0.1	0.2*
PCP's qualifying for EHR incentive pay	11.9	(12.8)	5.5	-11.6*
Medication reconciliation after discharge	8.5	(23.9)	16.5	11.5***
Screening for fall risk	14	(19.2)	-9.1	-13.3
<i>Preventive health</i>				
Influenza immunization	5.2	(11.9)	-2.9	-8.7*
Pneumococcal vaccination	5.5	(11.1)	3.5	-6.7

	Mean change	(SD)	Unadjusted	Adjusted for PY1
Adult weight screening and follow-up	8.9	(14.0)	-8.9	-9.2
Tobacco assessment & cessation intervention	4.7	(14.8)	-2.3	-11.0
Depression screening	15.4	(20.7)	-12.5	-12.3
Colorectal cancer screening	1.6	(11.0)	5.3	-4.4
Mammography screening	2.5	(10.6)	-3.1	-13.6***
Screening for high blood pressure	-10.5	(25.2)	2.0	15.6*
<b>At-risk populations</b>				
Diabetes composite (hemoglobin A1c control, LDL control, blood pressure control, tobacco non-use, aspirin use, hemoglobin A1c poor control <sup>a</sup> )	5.7	(9.5)	4.3	-6.1
Hypertension: controlling high blood pressure	2.6	(6.4)	1.9	-1.7
IVD: complete lipid panel & LDL control	4.9	(10.1)	10.5**	-1.8
IVD: aspirin use	5.7	(11.7)	6.1	-9.6*
Heart failure: beta-blocker therapy for LVSD	2.1	(17.3)	-10.3	-2.6
CAD composite (drug therapy for lowering LDL-cholesterol, ACE inhibitor or ARB therapy)	5.0	(14.2)	1.6	-3.0
<b>ACO Quality Composite<sup>b</sup></b>	3.0	(4.5)	0.0	-5.3**

Source: Authors' analysis of Centers for Medicare and Medicaid Services Shared Savings Program (MSSP) ACO Public Use Files, 2013 and 2014 (see Notes 24 and 25 in the text).

Notes: N=191. Data are from first year and second year of MSSP contracts. PY1 is [INSERT]. Analysis on individual measure components of the diabetes composite and CAD composite was conducted and are similar to the composites, so are not shown here for parsimony.

<sup>a</sup>Indicates a measure where positive results are worse, such as readmissions; this is the reverse of most measures.

<sup>b</sup>The quality composite is a 0–100 score that is multiplied by the total possible sharing rate to calculate the final sharing rate. For example, ACOs in Track 1 of the MSSP are eligible for up to 50% of savings generated. A quality score of 100 would mean the ACO would receive the full 50% of savings generated; a quality score of 50 would mean the ACO would receive 25% of savings generated. PCP is primary care physician. EHR is electronic health record. CHF is congestive heart failure. COPD is chronic obstructive pulmonary disease. LDL is low density lipoprotein. IVD is ischemic vascular disease. LVSD is left ventricular systolic dysfunction. CAD is coronary artery disease.

\* p < 0.10

\*\* p < 0.05

\*\*\* p < 0.01

\*\*\*\* p < 0.001



**Exhibit 4**  
**Organizational characteristics of ACOs that serve high proportions of minority patients compared to all other ACOs**

Organizational characteristics of ACOs that are high proportion minority patients (75<sup>th</sup> percentile or above) compared to all other ACOs; data from the National Survey of ACOs, authors' calculations

	High minority ACOs (N=45)	Other ACOs (N=169)	Significance
<i>Composition</i>			
Hospital in ACO	0.43	0.51	
Community health center in ACO	0.38	0.25	
Nursing facility in ACO	0.26	0.20	
Integrated delivery system	0.39	0.48	
<i>Services offered within the ACO</i>			
Routine specialty care	0.57	0.74	**
Highly specialized care	0.30	0.23	
Emergency Care	0.49	0.57	
Urgent care	0.64	0.66	
Inpatient rehabilitation	0.31	0.43	
Outpatient rehabilitation	0.29	0.50	**
Behavioral health	0.45	0.54	
Skilled nursing	0.30	0.34	
Pediatric health	0.40	0.59	**
Palliative or hospice care	0.30	0.53	***
Home health	0.48	0.51	
<i>Contracts</i>			
Medicaid ACO contract	0.15	0.17	
Private payer ACO contract	0.26	0.51	***
Multipayer ACO	0.20	0.39	***
<i>Capabilities</i>			
All clinicians on single EMR	0.11	0.23	
ACO actively engaged in improving ambulatory care	0.45	0.53	
ACO involved in reducing hospital admissions	0.44	0.37	
Smooth transitions of care across settings	0.22	0.20	
Chronic care management processes and programs in place	0.42	0.32	

Source: Authors' analysis of the National Survey of Accountable Care Organizations and Centers for Medicare and Medicaid Services Shared Savings Program (MSSP) ACO Public Use File (see Notes 24 and 25 in the text).

Notes: ACOs that serve high proportions of racial and ethnic minorities are in the 75<sup>th</sup> percentile or above. ED is emergency department. EMR is electronic medical record.

\*  
p < 0.10

\*\*  
p < 0.05

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p < 0.01

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p < 0.001

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