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Changes In Physician Consolidation With The Spread Of Accountable Care Organizations

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ABSTRACT While early evidence suggests that accountable care organizations (ACOs) are associated with higher quality and lower costs, there have been simultaneous concerns that ACOs may incentivize consolidation of physician groups. This is particularly concerning as previous research has shown that consolidation is associated with lower quality and higher prices. Using a difference-in-differences strategy and data from the Medicare Shared Savings Program, which began in 2012, we examined whether physician practices consolidated after ACOs entered health care markets. We observed a 4.0-percentage-point increase in large practices (those with fifty or more physicians) in counties with the greatest ACO penetration, compared to counties with zero ACO penetration, and a 2.7-percentage-point decline in the percentage of small practices (ten or fewer physicians) from 2010 to 2015. The growth of large practices was concentrated in specialty and hospital-owned practices. These findings suggest that ACOs may contribute to the concentration of physician practices.

In recent years, accountable care organizations (ACOs)—hospitals and physician groups that jointly contract to provide care for a specified population of patients—have dramatically increased in popularity. The number of ACOs in the US increased from 167 in 2012 to over 900 in 2017 (a change of over 500 percent), and the number of ACO-covered lives surged from seven million to thirty-two million.[1]

The intent of ACO contracts is to incentivize the coordination of care across providers and settings by holding the contracted providers collectively responsible for the costs and quality of care delivered.[2] Early evaluations of this model suggest that ACOs have indeed been able to generate modest cost savings and improve certain aspects of care quality.[3–10]

Yet the ACO incentives that encourage coordination of care may also have important negative consequences. In particular, they could lead to physician practice consolidation, either because practices believe that merging improves their ability to coordinate patient care or because hospitals, in response to ACO incentives, acquire multiple physician practices and combine them.

Physician practice consolidation is concerning because it has been associated with lower quality and, in some settings, higher prices.[11–13] These effects would be in direct opposition to the intended effects of an ACO. Even before the introduction of Medicare ACOs with the Affordable Care Act, the Federal Trade Commission raised concerns about these potential negative effects[14,15] and sought to specify the conditions under which ACOs could operate without raising antitrust challenges.[16]

An early study that examined consolidation of physician practices in the year after the introduction of Medicare ACOs found little evidence of consolidation overall, but it did find that specialty practices grew in size after becoming ACOs.[17]

Given the serious consequences of consolidation for the cost and quality of care—and the consolidation already taking place in the physician marketplace[18]—these early findings suggest that the potential effects of ACOs on consolidation warrant close monitoring. With each successive year, different types of providers learn more about and adjust to the new regulatory landscape and payment incentives, so consolidation patterns that might not have been apparent one year after launch may emerge later. Additionally, the size of the Medicare ACO program has increased substantially since it was first introduced.

Thus, our objective was to test for changes in physician consolidation associated with the formation of ACOs in the three years after the launch of one of the country's largest ACO programs, the Medicare Shared Savings Program (MSSP). Focusing on the MSSP, which in 2018 included 561 ACOs and covered 10.5 million lives,[19] we examined changes in the size of physician practices during the period when it was introduced and grew, and we characterized the practice changes associated with ACO adoption.

Study Data And Methods

Using data for the period 2010–15, we examined how practice size changed within counties as county-level ACO penetration increased. Counties with no ACO penetration served as a counterfactual over this period, controlling for trends in physician practice size in the absence of ACOs, whereas counties that ACOs entered and where ACO penetration grew over this period allowed us to measure the association between changes in practice size and increases in ACO penetration. This difference-in-differences approach allowed us to examine changes in physician practice size attributable to increases in ACO penetration, rather than changes that might be driven by trends over time.

PHYSICIAN PRACTICES We used IQVIA data to identify office-based physicians practicing in the US in the period 2010–15. Formerly known as SK&A, the IQVIA database of health care providers is comparable to the American Medical Association Physician Masterfile[20,21] and has been shown to provide a nearly complete sampling frame of US office-based physicians.[22] This commercial database is updated annually and contains information on each physician's specialty, practice location or locations, and practice characteristics.

Because of our focus on MSSP ACOs, we restricted our analytic sample to physicians in the database who were most representative of physicians treating Medicare beneficiaries. This sample was created by identifying physicians whose specialties were most frequently represented among Medicare providers listed in the Medicare Data on Provider Practice and Specialty file and excluding specialties—such as pediatrics and pathology—whose practitioners infrequently treat Medicare beneficiaries. The detailed protocol for selecting specialties and the final list of selected specialties are in online appendix A1.[23]

The IQVIA database identifies each physician's office, and when the physician is part of a medical group, it identifies the group. This makes it possible to calculate the size of a physician practice, whether the practice is distributed across multiple offices or in a single location. Thus, we defined *practice size* as the number of physicians in a medical group when the database reported the medical group, and as the number of physicians in an office location when the office was not part of a medical group. In cases where a physician was listed in multiple locations or was part of multiple practices, an equal fraction of the physician was attributed to each practice location. If a medical group spanned multiple counties, we computed the practice size to be the total number of physicians in that group over all counties.

In the graphical analysis, the outcome of interest was the size of the practice. In the regression analyses, the outcomes of interest were whether there were ten or fewer physicians in a practice (to indicate small practice size) and whether there were fifty or more physicians in a practice (to indicate large practice size).

We characterized each practice as either a specialty practice or a primary care practice, and as either a hospital-owned practice or a non-hospital-owned practice, based on variables that indicated physician specialty and hospital ownership of a practice in the IQVIA database. We considered a practice to be a specialty practice if more than 50 percent of the physicians at that practice were specialists. Physicians were identified as primary care providers if they reported their specialty as family practitioner, general practitioner, internal medicine or pediatrics, or internist. Otherwise, they were considered to be specialists. We considered a practice to be hospital owned if at least one physician in that practice reported that his or her practice was owned by a hospital.

Thresholds in defining small versus large practice size, specialty composition, and practice setting variables were determined from our analysis of the distributions of these measures. Sensitivity analyses (results available upon request) showed robustness to changes in threshold levels.

ACCOUNTABLE CARE ORGANIZATION PARTICIPATION AND PENETRATION We used the Medicare

MSSP provider files to identify whether each physician participated in the MSSP in each year of our data. The MSSP began in 2012, and physicians' participation in it increased from 2012 to 2015. All physicians were classified as nonparticipants in 2010 and 2011. For 2012–15 we determined MSSP participation and years of participation.

Using these individual MSSP participation data, we computed the percentage of physicians who participated in the MSSP in each practice. Practices with more than 50 percent of physicians participating in the MSSP were considered ACO-participating practices. We also used physician participation data to calculate annual county-level ACO penetration rates. For each county we calculated the proportion of all physicians in our data who were MSSP participants in each year and classified counties as having zero ACO penetration, greater than 0 percent but less than 30 percent penetration, and 30 percent or greater penetration.

COUNTY CHARACTERISTICS We measured two time-varying county-level characteristics in each year: the number of Medicare beneficiaries and the proportion of Medicare beneficiaries in managed care organizations, defined as the proportion of beneficiaries enrolled in Medicare Advantage for nine or more months. These measures were calculated using annual Medicare Master Beneficiary Summary File data.

STATISTICAL APPROACH We first conducted descriptive practice-level graphical analyses for the period 2010–15 of the relationship between practice size and ACO penetration in the practice's county to obtain a general view of trends in the distribution of practice sizes. Then, using practice-year-level data, we used linear regression to estimate practice size as a function of county-level ACO penetration in that year. Because practices that chose to participate in ACOs are likely to be different in observed and unobserved ways from those that did not, we measured ACO participation at the county level to minimize biases from individual practices' choice to participate in ACOs.

We used two dependent variables. First, to detect changes in the smallest practices, we used a binary variable that indicated whether a practice had ten or fewer physicians in each year. Second, to detect changes in the largest practices, we used a binary variable indicating whether a practice had fifty or more physicians in each year. We included as covariates the county characteristics described above as well as year and county fixed effects. All regressions were weighted by the number of physicians in each practice, to account for different practice sizes. Standard errors were clustered at the county level.

The evidence suggests that the consolidation concerns initially raised regarding ACOs were warranted.

The combination of the time-varying ACO penetration variable and year and county fixed effects gave a difference-in-differences estimate of the association between changes in practice size and changes in ACO penetration. The difference-in-differences regressions described how practice size changed when ACO penetration changed and minimized bias from unobserved confounders in two ways. First, the comparison group of counties with zero ACO penetration during the study period accounted for secular trends in physician consolidation that affected all physician practices over the period. Second, because the timing of increases in ACO penetration varied across counties, it decreased the risk that our estimates were due to changes in practice size caused by some other unobserved event and thus unrelated to the increase in ACO penetration over the period.

Models of changes in the smallest and largest practices were estimated using the full 2010–15 sample of all practices and, to test for heterogeneity in effects, the following subsamples: specialty practices, nonspecialty (primary care) practices, hospital-owned practices, and non-hospital-owned practices. In addition, to test whether the makeup of physicians within practices changed with ACO participation, we reestimated our main models, including the percentage of primary care physicians in each practice, the percentage of physicians in each practice reporting that their practice was hospital owned, and the interaction of each with county-level ACO penetration.

We tested the robustness of our results by estimating models with one of the following five modifications: a continuous measure of county-level ACO penetration in place of a categorical measure; a comparison group consisting of counties with low ACO penetration; continuous measures of county-level ACO penetration and the log of practice size in place of categorical measures of both, using the log of practice size because of the extreme right-skewness of the continuous practice size measure; practice-level

in place of county-level ACO penetration; and a one-year lagged measure of ACO penetration to account for the possibility of reverse causation.

LIMITATIONS There were several limitations to the study. First, ACO participation is voluntary, and therefore counties in which ACOs were most likely to locate and penetrate were not randomly selected. It is possible that markets with high ACO penetration differed in unobserved, time-varying ways from those with low penetration in terms of practice size trends. If, for example, physician practices in high-penetration markets had been more likely to merge during this period because of population migration patterns, this would have resulted in an overestimate of the consolidation effect of ACOs. While we could not fully account for all possible confounders, we did use methods that helped minimize bias from these factors—including county fixed effects, which address time-invariant differences in markets. A related issue is reverse causation, in which consolidating practices choose to enter ACOs because they find it more profitable to do so. However, we still found a significant relationship between ACO penetration and practice size when we lagged the penetration variable, which made reverse causation a less likely explanation for our findings.

Second, we were constrained by the available data. We did not have information on physicians' participation in commercial ACOs. In addition, it is likely that counties that had greater penetration of MSSP ACOs also had greater penetration of commercial ACOs. Thus, our estimates might have overstated the effect of MSSP ACOs but not of ACOs in the aggregate. Furthermore, our data on MSSP ACO participation were available only through 2015, so we were able to formally evaluate associations only for the three-year period after the MSSP launch.

Study Results

In 2010, before the passage of the Affordable Care Act and the launch of the MSSP, 64 percent of the physicians in our sample were in practices of ten or fewer physicians, and 18 percent were in practices of fifty or more physicians (exhibit 1). Almost three-quarters of physicians were in specialty practices, and 15 percent were in hospital-owned practices. Most physicians practiced in areas that in 2012 would have a moderate level of ACO penetration (greater than 0 percent but less than 30 percent), but more than 10 percent of physicians practiced in areas that would have zero penetration in 2012.

Before ACO implementation, trends in the sizes of practices were similar in counties that later did and and did not have physicians participating in MSSP ACOs. This is shown in exhibit 2 for the largest practices and in appendix A2 for the smallest practices.[23] The visual evidence of parallel trends provides suggestive evidence that the group of practices in counties with zero ACO penetration was a reasonable comparison group for detecting the effect of ACO penetration. We report results from a formal test of the parallel trends assumption in appendix A3.[23]

These figures also show that after the MSSP's launch in 2012, practice size increased more in counties with greater ACO penetration, particularly among the largest practices. Among practices in the ninetieth percentile in the nation for size, there was an increase in practice size from 165 physicians to 414 physicians in the counties with the highest ACO penetration rates (penetration of 30 percent or more in 2012) (exhibit 2). At the same time, in counties with zero ACO penetration in 2012, the changes in physician practice size were much smaller. These trends of a relative increase in practice size in counties with high ACO penetration were also observed in smaller practices—those in the seventy-fifth and fiftieth percentiles for practice size.

Among practices in the seventy-fifth percentile of practice size nationally, those in counties with

EXHIBIT 1

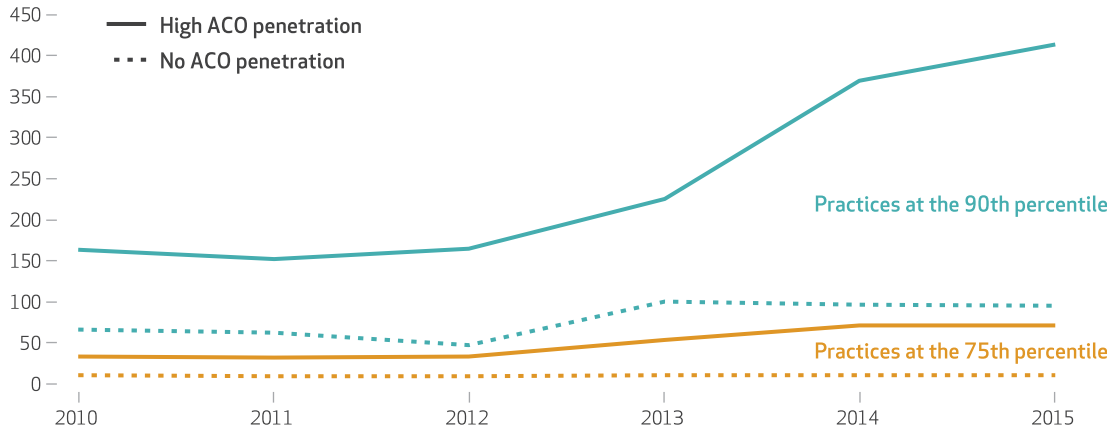
Characteristics of the office-based physician sample at baseline in 2010, by county-level accountable care organization (ACO) penetration in 2012

		ACO penetration		
Characteristic	**All**	**0%**	**>0% to <30%**	**30% or more**
Sample size	471,398	54,357	402,039	14,992
Number of physicians in practice (%)				
≤10	64	75	63	58
11–49	18	14	18	21
≥50	18	11	19	21
Type of practice (%)				
Specialty	71	59	72	71
Hospital owned	15	16	15	16
Daily patient volume				
Median	40	40	40	50
IQR	80	70	80	78
Medicare accepted[a] (%)	87	89	87	89
Medicaid accepted[a] (%)	72	80	70	79
Urban[b] (%)	90	55	95	86
Census region[b] (%)				
Northeast	22	8	23	32
Midwest	22	17	22	46
South	34	47	33	21
West	22	28	22	1

SOURCE Authors' analysis of data from IQVIA and the Centers for Medicare and Medicaid Services. **NOTES** There were 1,868 counties in which 0 percent of physician practices were ACOs, 1,049 counties in which >0 percent to <30 percent were ACOs, and 135 counties in which 30 percent or more were ACOs. IQR is interquartile range (the difference between the 75th and 25th percentiles). [a]20,856 missing observations. [b]314 missing observations.

EXHIBIT 2

Numbers of physicians in practices at the 75th and 90th percentiles of US size distribution in 2010–15, by county-level accountable care organization (ACO) penetration in 2012



SOURCE Authors' analysis of data from IQVIA and the Centers for Medicare and Medicaid Services. **NOTE** High penetration refers to counties in which 30 percent of physician practices or more were ACOs.

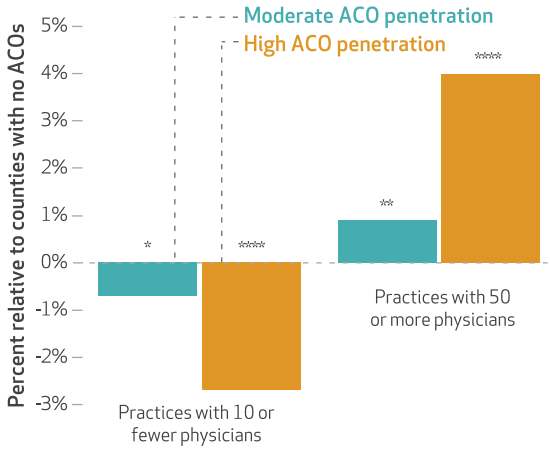
high ACO penetration increased in size from 34 to 72 physicians, while practices in counties with no ACO penetration remained stable at 10–11 physicians. In practices in the fiftieth percentile for practice size (appendix A2),[23] practices grew in size from 7 to 9 physicians in counties with high ACO participation but remained unchanged in counties with zero ACO penetration. The smallest practices (those in the twenty-fifth percentile of practice size nationally) remained unchanged in size across all counties.

These trends of increasing practice size associated with ACO participation were confirmed in multivariable regressions. Compared to counties with zero ACO penetration, counties with high ACO participation experienced a 2.7-percentage-point decrease in the percentage of practices with ten or fewer physicians and a 4.0-percentage-point increase in the percentage of practices with fifty or more physicians (exhibit 3). These changes were from a baseline of 58 percent of practices with ten or fewer physicians and 21 percent of practices with fifty or more physicians (exhibit 1). For counties with a moderate level of ACO penetration, exhibit 3 shows smaller but directionally similar effects.

When we stratified our analysis by practice characteristics, we found that the association between ACO penetration and growth of practice size was stronger in specialty and hospital-owned practices (exhibit 4). In specialty practices in counties with high ACO penetration, the share of practices with ten or fewer physicians decreased by 3.7 percentage points, whereas the share of practices with fifty or more physicians grew by 5.2 percentage points, relative to specialty practices in counties with zero penetration. The magnitude of this effect was larger in counties with high ACO penetration than in those with moderate penetration. In contrast, in primary care practices, there was no significant

EXHIBIT 3

Changes from 2010 to 2015 in percent of physician practices that were accountable care organizations (ACOs), by practice size and county-level ACO penetration in 2012



SOURCE Authors' analysis of data from IQVIA and the Centers for Medicare and Medicaid Services. **NOTES** The exhibit shows the results of multivariable regression analyses in which the reference group is counties with zero ACO penetration. Regression control variables include the number of Medicare beneficiaries, proportion of Medicare HMO beneficiaries, and year and county fixed effects. Standard errors are clustered at the county level. Observations (1,218,562 practice-years, representing 3,066 counties) are at the practice level, and each practice in the regression is weighted by the number of physicians in that practice. Moderate penetration refers to counties in which more than 0 percent but fewer than 30 percent of physician practices are ACOs. High penetration refers to counties in which 30 percent of practices or more are ACOs. *p<0.10 **p<0.05 ****p<0.001

difference in practice size changes between counties with different ACO penetration levels.

Similarly, the relationship between ACO penetration and practice size was localized to hospital-owned practices, with a 4.5-percentage-point decrease in the proportion of small hospital-owned practices and a 6.8-percentage-point increase in the proportion of large hospital-owned practices in counties with high ACO penetration, relative to counties with zero penetration. There was no equivalent difference among non-hospital-owned practices. Furthermore, we found that an increase in the percentage of primary care physicians and hospital-owned physicians in practices that grew in size accompanied an increase in ACO penetration (appendix A4).[23]

Our results were confirmed in robustness tests when we used a continuous measure of ACO penetration (appendix A5), the group of counties with low ACO penetration instead of that with zero penetration as a comparison group (appendix A6), a continuous measure of practice size (appendix A7), a practice-level measure of ACO participation instead of county-level measures (appendix A8), and a lagged measure of ACO participation (appendix A9).[23]

EXHIBIT 4

Changes from 2010 to 2015 in percent of practices with 10 or fewer physicians and those with 50 or more, by practice type and county-level accountable care organization (ACO) penetration in 2012

	Difference in percent of practices with:	
ACO penetration	**10 or fewer physicians**	**50 or more physicians**
SPECIALTY PRACTICES		
>0 percent to <30 percent	−0.9**	1.1*
30 percent or more	−3.7****	5.2****
PRIMARY CARE PRACTICES		
>0 percent to <30 percent	0.2	0.5
30 percent or more	0.6	0.1
HOSPITAL-OWNED PRACTICES		
>0 percent to <30 percent	0.6	−1.0
30 percent or more	−4.5****	6.8****
NON-HOSPITAL-OWNED PRACTICES		
>0 percent to <30 percent	0.0	0.4
30 percent or more	1.2	−0.8

SOURCE Authors' analysis of data from IQVIA and the Centers for Medicare and Medicaid Services. **NOTES** The exhibit shows the results of multivariable regression analyses in which the reference group is counties with zero ACO penetration. Regression coefficients are estimated percentage-point differences in percent of practices with ten or fewer (or fifty or more) physicians. The regression control variables, standard errors, level of observations, and weighting are explained in the notes to exhibit 3. The numbers of observations were as follows: specialty practice models: 814,537 practice-years, representing 2,635 counties; primary care practice models: 404,025 practice-years, representing 3,049 counties; hospital-owned practice models: 184,019 practice-years, representing 2,840 counties; and non-hospital-owned practice models: 1,034,543 practice-years, representing 2,995 counties. *p<0.10 **p<0.05 ****p<0.001

Discussion

We found a clear association between physician consolidation and county-level ACO penetration. In counties with the highest ACO penetration, there were large declines in the number of small practices and increases in the number of large practices. Similar trends were seen in counties with moderate ACO penetration, though the magnitude of the effect was smaller. This dose-response relationship between practice size and ACO penetration supports the hypothesis that growth in practice size is driven, at least in part, by ACOs.

We measured ACO participation at the county level, instead of at the practice level, because the relationship between individual physician practices' decisions to participate in an ACO and their decisions to consolidate might be confounded by unobservable practice characteristics. By measuring ACO participation at the county level and including county fixed effects, we were able to account for unobserved time-invariant differences in practices that chose to locate in counties with high versus low ACO penetration, to minimize this type of confounding.

The growth in practice size in counties without any ACO penetration suggests that there was an underlying secular trend in consolidation, particularly among the largest practices. This is consistent with the results of prior research.[8] However, the trends in consolidation associated with ACOs went above and beyond this secular trend.

We observed the largest growth in physician practices among the largest practices. We also found that this effect was concentrated in specialty practices. This finding about specialty practices confirms results in earlier work that evaluated ACOs after one year.[17] In that study the authors found that specialty practices were growing by adding more specialists. These findings may suggest that amassing market power may be more important to specialty practices that participate in ACOs than to primary care practices. However, we also found that there was an increase in practices' share of primary care physicians among practices that consolidated as ACO penetration increased. While specialty practices may be consolidating under ACOs, practices also seem to see the value of providing primary care within the ACO model. These changes may be driven by specialty practices consolidating with primary care practices.

We also found that growth was concentrated in hospital-owned practices and that ACO penetration increased the share of physicians reporting hospital ownership of practices within consolidating practices. Some of the horizontal integration observed may be the result of vertical integration, as hospitals purchase and combine practices. Overall, this constellation of findings

about specialty and hospital-owned practices points to important heterogeneities in ACO-driven consolidation that should be further investigated.

While the growth in the share of large practices (those with fifty or more physicians) we observed was small in absolute magnitude (1–4 percentage points), it could nonetheless have a big impact, particularly given that in 2010, 21 percent of physicians in counties with high ACO penetration worked in large practices. A 4-percentage-point increase in large practices roughly translates to a 330 percent increase in the number of large practices in these counties (from 87 to 288). The sheer number of physicians in these practices means that a small number of practices could dominate health care markets in certain regions. If spread throughout the country, these practices could have substantial market power nationally, increasing prices and possibly diminishing the quality of care.

Our findings add materially to the existing literature on the relationship between ACO formation and physician practice consolidation. A prior study found early evidence of consolidation among specialty practices one year after the introduction of Medicare ACOs but little evidence of consolidation otherwise.[17] Our finding of increased consolidation three years after the introduction of the MSSP, particularly among specialty and hospital-owned practices, reinforces concerns that ACOs are affecting physician markets in important ways that bear monitoring.

Conclusion

In this study, we examined changes in physician practice sizes associated with ACO penetration three years after the launch of the MSSP. Future research with additional years of data will be able to more clearly discern longer-term consolidation patterns and their implications. Even so, the existing evidence suggests that ACO-driven physician consolidation is accelerating. These patterns suggest that the consolidation concerns initially raised regarding ACOs were warranted and that gains from care coordination facilitated by ACOs will have to be balanced against higher prices and possibly lower-quality care that could result from consolidation. ■

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23 To access the appendix, click on the Details tab of the article online.