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ACO Affiliated Hospitals Increase Implementation of Care Coordination Strategies

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Abstract

Background: Hospitals affiliated with Accountable Care Organizations (ACOs) may have a greater capacity to collaborate with providers across the care continuum to coordinate care, due to formal risk sharing and payment arrangements. However, little is known about the extent to which ACO affiliated hospitals implement care coordination strategies.

Objectives: To compare the implementation of care coordination strategies between ACO affiliated hospitals (n=269) and unaffiliated hospitals (n=502) and examine whether the implementation of care coordination strategies varies by hospital payment model types.

Measures: We constructed a care coordination index (CCI) comprised of 12 indicators that describe evidence-based care coordination strategies. Each indicator was scored on a 5-point Likert Scale from 1= “not used at all” to 5= “used widely” by qualified representatives from each hospital. The CCI aggregates scores from each of the 12 individual indicators to a single summary score for each hospital, with a score of 12 corresponding to the lowest and 60 the highest use of care coordination strategies.

Research Design: We used state-fixed effects multivariable linear regression models to estimate the relationship between ACO affiliation, payment model type, and the use care coordination strategies.

Results: We found ACO affiliated hospitals reported greater use of care coordination strategies compared to unaffiliated hospitals. FFS shared savings and partial or global capitation payment models were associated with a greater use of care coordination strategies among ACO affiliated hospitals.

Conclusion: Our findings suggest ACO affiliation and multiple payment model types are associated with the increased use of care coordination strategies.

Keywords

Accountable Care Organization; Care Coordination; Payment Model

INTRODUCTION

Hospitals throughout the United States have significantly reduced medical errors and improved health care outcomes overtime.^{1, 2} Despite these improvements, many hospitals continue to face high rates of readmissions and emergency department misuse.^{3, 4} Patients still face obstacles navigating the health care system and often delay or forgo seeking care due to high costs.⁵ Many consider Accountable Care Organizations (ACOs), which are comprised of various health care providers that collaborate to deliver high quality care, as an approach to fostering health system integration and improved care coordination.

ACO affiliated hospitals often have more advanced data sharing and better engage with providers across the care continuum to coordinate care.⁶ Care coordination has been associated with better patient experiences, fewer readmissions, increased odds of appropriate health care utilization, and improved health outcomes, particularly for patients with complex health care needs.⁷⁻¹⁰ Recent evidence suggests ACO affiliated hospitals reduce re-hospitalizations from skilled nursing facilities and lower the risk of readmissions.^{11, 12} These improvements may be explained by the increased use of care coordination strategies. However, there is no evidence that describes the extent to which ACO affiliated hospitals implement evidence-based care coordination strategies.

The aim of this study was to: 1) compare the implementation of care coordination strategies between ACO affiliated and unaffiliated hospitals, and 2) examine whether payment model type (e.g. fee-for-service, global, and bundled payment) influences the extent to which ACO affiliated hospitals implement care coordination strategies.

METHODS

Data

We used data from the 2015 American Hospital Association (AHA) Annual Survey and 2015 AHA Survey of Care Systems and PaymentTM to assess the types of care coordination strategies and payment models used by ACO affiliated and unaffiliated hospitals. The surveys were administered to U.S. community hospitals, regardless of AHA membership. A qualified staff member from each hospital reported and confirmed all data on behalf of their institution. We used data from the 2015 American Community Survey (ACS) and the 2015 Area Health Resources Files (AHRF) to assess each hospital's county-level and geographic relevant service area characteristics.

Dependent Variables

We constructed a care coordination index (CCI) comprised of 12 indicators that assess dimensions of care coordination such as prospective management of high-risk patients, chronic care management processes or programs, and the use of post-discharge continuity of care plans. Each indicator measures a single dimension of care coordination and is measured on a 5-point Likert Scale from 1= "not used at all" to 5= "used widely". The CCI aggregates scores from each of the 12 individual indicators to a single summary score for each hospital,

with a score of 12 corresponding to the lowest and 60 the highest use of care coordination strategies. A full description of each CCI indicator is included in Appendix A.

Independent Variables

Hospitals that had established a separate legal entity for an ACO, were a part of an ACO, or were actively working to establish an ACO in the future were given a value of 1 (ACO affiliated) and a value of 0 if they were not (unaffiliated with an ACO). Each hospital reported the percentage of net-patient revenue attributed to FFS diagnostic related groups (DRGs), FFS per diem, and FFS shared savings, as well as bundled and partial or global capitation payment models. We identified hospitals as participating in a payment model if they had any revenue attributed to any of the reported payment model types. We also included an “other” category, which comprises more complex or less common payment models (e.g. Merit-Based Incentive Program and other alternative payment models).

We selected variables that describe hospital characteristics such as ownership, size, and safety-net status. We defined hospital ownership as government, for-profit, or not-for-profit. We categorized hospitals as teaching or non-teaching (e.g. member of the Association of American Medical Colleges), recognizing that hospitals affiliated with academic institutions may have more resources and be more likely to adopt more advanced care coordination strategies. Hospital size was categorized as small (1–49 beds), medium (50–199 beds), and large (>200 beds). We calculated the proportion of Medicaid days to the total inpatient days as a proxy for safety-net status. We created three categories describe as: low (<25th percentile), medium (25 to 75) and high (75th percentile) Medicaid related discharges.

We used hospital addresses to identify geographical coordinates. We used ArcGIS 10.3 to create a circular boundary around each hospital with a radius of 15 miles. We then defined identified the zip code tabulation areas for each hospital that were spatiality within or overlap with each hospital’s boundary area. If a zip code was within the 15-mile range, it was included. We assessed the number of primary care providers (per 1,000), number of federally qualified health centers (FQHC) (per 1,000), the racial/ethnic composition, family income level (i.e. relative status to 100% of the federal poverty level) and percentage of uninsured individuals within each geographic service area. County-level characteristics were weighted as the proportion of the county in the market area.

Analysis

We used t-tests to compare the use of payment model types and care coordination strategies as well as the structural, geographic service area, county-level characteristics among ACO affiliated and unaffiliated hospitals. We used state-fixed effects multivariable linear regression models to estimate the extent to which ACO affiliated and unaffiliated hospitals implement care coordination strategies using the CCI summary scores, controlling for hospital, county-level, and geographic service area characteristics (Model 1). We then assessed whether the use of care coordination strategies vary by ACO affiliation and payment model type controlling for the same factors (Model 2). We conducted sensitivity analyses by using various model specifications and narrowing the geographic service area to a 5-mile radius. Our findings were consistent with the primary results of the study and are

available upon request. We had a sample of 994 hospitals that reported ACO affiliation, however, 24% did not have complete data on care coordination and payment. Our final sample included 771 hospitals, among them 269 affiliated with an ACO. All analyses were conducted in STATA 14.0 and we defined $p < 0.05$ as the level of significance a priori.

RESULTS

Table 1 describes the differences between ACO affiliated and unaffiliated hospitals based on their structural, county-level, geographic service area characteristics. A higher percentage of hospitals affiliated with ACOs were not-for-profit (83%, $p < 0.001$) and a higher percentage of hospitals unaffiliated with ACOs were for-profit (28 %, $p = 0.04$) or government owned (63 %, $p < 0.001$). Hospitals affiliated with an ACO tended to be larger (>200 beds) than hospitals not affiliated with an ACO (57 % vs. 28 %, $p < 0.001$) and a higher percentage were teaching hospitals (12 % vs. 5 %, $p < 0.001$). There was a higher percentage of ACO affiliated hospitals ranked in medium Medicaid related discharges (58% vs. 50%, $p = 0.02$). ACO affiliated hospitals had a greater mean number of primary care providers (959 vs. 448, $p < 0.001$) and FQHCs (21 vs. 9, $p < 0.001$) within a 15-mile radius on average. compared to hospitals unaffiliated with ACO. ACO affiliated hospitals also had a higher percentage of the total population who are non-white (13 percent vs. 10 percent, $p = 0.023$) in their geographic service area compared to hospitals not affiliated with an ACO.

Table 2 describes the differences between ACO affiliated and unaffiliated hospitals based on the implementation of care coordination strategies and payment models. Hospitals affiliated with an ACO had a higher average CCI summary score than hospitals not affiliated with an ACO (43.00 vs. 35.35 $p < 0.001$). There were significant differences between ACO affiliated and unaffiliated hospitals for every indicator of the CCI. We also found significant differences in the types of payment models used by ACO affiliated and unaffiliated hospitals. A higher percentage of ACO affiliated hospitals use FFS DRGs (54.95% vs. 47.47%, $p = 0.002$) and FFS shared savings payment models (0.57% vs. 3.92%, $p < 0.001$).

Table 3 describes the relationship between the use of care coordination strategies between ACO affiliated and unaffiliated hospitals (Model 1). It also describes the use of care coordination strategies by ACO affiliated hospitals based on their payment model types (Model 2). Overall, hospitals affiliated with an ACO reported greater use of care coordination strategies (coef. =4.59, $p = 0.03$) compared to unaffiliated hospitals, are controlling for structural, county-level, and geographic service area characteristics. ACO affiliated hospitals that used fee-for-service shared savings payment models (coef. =0.11, $p = 0.01$) and partial or global capitation payments (coef. =0.26, $p = 0.03$) were more likely to report wider implementation of care coordination strategies.

DISCUSSION

The findings of this study suggest that ACO affiliation and payment model type is associated with the use of evidence-based care coordination strategies. Hospitals that participated in shared savings and partial or global capitation payment models were significantly more likely to prospectively manage high-risk patients, assign case managers for outpatient

follow-up to patients at risk for readmission, and use post-discharge continuity of care plans tailored to a patient's risk profile. These findings contextualize previous studies, which found ACOs that participate in shared savings payment models reduce emergency department use, hospitalizations, and readmissions^{12–14}.

We found ACO affiliated hospitals tend to be larger, not-for-profit, in urban areas, with a higher number of primary care providers and FQHCs in their service areas. The findings are consistent with previous studies that have examined the structural and geographic service area characteristics of ACOs and their hospital affiliates.^{6, 15, 16} These characteristics may increase an organization's capacity for care coordination. However, even after controlling for structural, community-level, and service area factors, we found significant differences in the implementation of care coordination strategies between ACO affiliated and unaffiliated hospitals as well as differences by payment type for ACO affiliated hospitals.

This study only examined one dimension of health care quality (i.e. care coordination) and did not assess other important dimensions like patient/caregiver experience or preventative health, which determine payment in several ACO programs. In addition, although we found no relationship between the use of other payment model types and care coordination, payment models like bundled payment and FFS DRG or FFS per diem may lead to improvements on other dimensions of quality as well as reductions in health care costs.¹⁷

Limitations

Our study had several limitations. We only explored associations given the cross-sectional study design. Still, our findings are important to understand factors that are associated with the implementation of hospital-based care coordination strategies. Further, our measure of whether a hospital was affiliated with an ACO was binary and did not capture the granular differences between ACO sub-types (e.g. Medicare, Medicaid, and commercial), which could potentially have different influences on the implementation of care coordination strategies. However, there may be more difference within than between ACO sub-types given the wide variation in the composition of ACO networks and payment model types.

Moreover, the CCI has not yet been psychometrically evaluated, but it includes evidence-based indicators of care coordination recommended by the Agency for Healthcare Research and Quality and other leading quality organizations. Finally, our sample only included ACO affiliated and unaffiliated hospitals that had complete data describing their care coordination strategies (i.e. answered all questions that make up the CCI) and attributed net-patient revenue. Compared to the full sample of 994 hospitals, the final sample of 771 hospitals were 6 % more likely to be an ACO, 5% less likely to be small and 11% more likely to be in urban areas with higher numbers of primary care physicians and FQHCs, compared to hospitals with missing values.

Conclusion

Our findings suggest ACO affiliation and multiple payment model types are associated with the increased use of care coordination strategies. The findings inform the ongoing national conversation concerning whether ACOs are effective and worth the system level investment. Policy makers in the public and private sector will need to assess the strengths and

weaknesses of different payment model types for achieving their health care improvement goals. Future studies should examine the impact of ACO affiliated hospital care coordination strategies on the cost and quality of care as well as which strategies are most cost-effective.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1:

Characteristics of ACO Affiliated and Unaffiliated Hospitals

	ACO Affiliated Hospitals		Unaffiliated Hospitals		
	N=269		N=502		
Hospital Characteristics	Mean	SE	Mean	SE	p-value
Hospital ownership					
For profit	5% (13)	0.14	9 % (65)	0.13	0.04
Not-for-profit	83% (223)	0.38	63 % (241)	0.48	<0.001
Government owned	12% (32)	0.32	28 % (226)	0.45	<0.001
Bed size					
Small (1–49 beds)	12 % (32)	0.02	36% (10)	0.02	<0.001
Medium (50–199 beds)	32 % (86)	0.47	36 % (241)	0.48	0.256
Large (>200 beds)	57 % (153)	0.50	28 % (226)	0.45	<0.001
Rural or Urban	18 % (48)	0.38	46% (251)	0.50	<0.001
Teaching or Non-Teaching	12 % (32)	0.32	5% (115)	0.23	<0.001
Ratio of Medicaid Inpatient days to total inpatient days					
Lower than 25 th percentile	19%	0.02	25%	0.02	0.054
Middle 25 th –75 th percentile	58%	0.03	50%	0.02	0.023
Higher than 75 th percentile	22%	0.03	25%	0.02	0.458
Geographic Relevant Service Area					
Percent non-white	13 %	0.18	10 %	0.17	0.023
Percent uninsured	11 %	6.11	13%	5.84	<0.001
Percent 100% < Federal Poverty Line	12 %	8.51	13 %	7.52	0.15
County Level Characteristics					
Number of Primary Care Providers (per 1,000)	24.048	0.04	19.555	1.16	0.039
Number of Federally Qualified Health Centers (per 1,000)	0.585	0.08	0.916	0.11	0.040

Data Source: 2015 American Hospital Association (AHA) Survey of Care Systems and PaymentTM, the 2015 AHA annual survey, the 2015 Area Health Resource Files, and the 2015 American Community Survey.

Note 1: Teaching vs. non-Teaching was defined as whether each hospital was a member of the Association of American Medical Colleges. The ratio of Medicaid Inpatient days to total inpatient days was used as a proxy for safety-net status. We created three categories describe as: low (<25th percentile), medium (25 to 75) and high (75th percentile) Medicaid related discharges. We defined geographic relevant service areas as a 15-mile radius from each focal hospital using ArcGIS 10.3. For counties that located on the boundaries of the 15-mile radius, we weighted the county resources by the overlapping area.

Table 2:

The Use of Care Coordination Strategies between ACO Affiliated and Unaffiliated Hospitals

	ACO Affiliated Hospitals		Unaffiliated Hospitals		
	N=269		N=502		
	Mean	SE	Mean	SE	p-value
Care Coordination Index	43.00	9.22	35.35	9.33	<0.001
Chronic Care Management	3.56	1.15	2.75	1.21	<0.001
Predictive Analytics	3.07	1.26	2.25	1.25	<0.001
Prospective Patient Management	3.25	1.13	2.67	1.30	<0.001
Outpatient Follow-up	3.33	1.21	2.53	1.32	<0.001
Medication Reconciliation	4.62	0.67	4.40	0.94	<0.001
Visit Summaries	3.82	1.18	3.23	1.33	<0.001
Discharge Care Plans	3.13	1.27	2.41	1.27	<0.001
Home Visits	2.88	1.38	2.41	1.36	<0.001
Nurse Case Manager	3.13	1.23	2.42	1.31	<0.001
Disease Management Programs	3.52	1.17	2.71	1.28	<0.001
Hospitalists	4.60	0.97	3.85	1.62	<0.001
Outreach after Discharge	4.07	1.02	3.70	1.23	<0.001
Payment Model Type					
Fee-for-service DRG	55%	30.54	47%	34.16	0.0027
Fee-for-service Per Diem	14%	19.69	23%	28.70	<0.001
Fee-for-service Shared Savings	11%	19.23	39%	13.48	<0.001
Bundled Payment	6%	4.30	16%	8.64	0.08
Partial or Global Payments	18%	5.58	16%	7.41	0.617
Other	18%	26.75	23%	31.71	0.038

Data Source: 2015 American Hospital Association (AHA) Survey of Care Systems and PaymentTM

Note 1: Table 2 describes mean differences in the use of care coordination strategies and the percentage of net-patient revenue attributed to each payment model type between ACO affiliated and unaffiliated hospitals using two sample t-tests. Qualified representatives from each hospital were asked to rate the extent to which their hospital uses each care coordination strategy on a scale of 1–5. The Care Coordination Index (CCI) aggregates scores from each of the 12 indicators to a single summary score for each hospital, with a score of 12 corresponding to the lowest and 60 the highest use of care coordination strategies. Appendix A includes definitions for each care coordination indicator that comprises the care coordination index.

Table 3:

State Fixed Effects Regression Model of Use of Care Coordination Strategies between ACO Affiliated and Unaffiliated Hospitals

	Model 1: CCI Between ACO Affiliated and Unaffiliated Hospitals				Model 2: CCI Between ACO Affiliated Hospitals by Payment Model Type			
	Coef.	95%CI		p-value	Coef.	95%CI		p-value
ACO Affiliation	4.30	2.82	5.78	0.00	4.37	0.34	8.39	0.03
ACO* Fee for service - DRG	*	*	*	*	-0.02	-0.07	0.03	0.36
ACO* Fee for service - Per Diem	*	*	*	*	-0.02	-0.08	0.05	0.64
ACO* Fee for service - Plus Shared Savings	*	*	*	*	0.12	0.03	0.20	0.01
ACO* Bundled payment	*	*	*	*	-0.12	-0.41	0.16	0.40
ACO* Partial or global capitation payments	*	*	*	*	0.25	0.02	0.48	0.04
Fee for service - DRG	*	*	*	*	0.01	-0.02	0.03	0.68
Fee for service - - Per Diem	*	*	*	*	-0.01	-0.05	0.02	0.37
Fee for service - plus shared savings	*	*	*	*	-0.03	-0.09	0.03	0.32
Bundled payment	*	*	*	*	-0.02	-0.11	0.07	0.65
Partial and global capitation payments	*	*	*	*	0.06	-0.05	0.17	0.30
Hospital characteristics								
For profit (ref)								
Not for profit	-0.64	-3.15	1.88	0.62	-1.15	-3.64	1.35	0.37
Government	-3.65	-6.46	-0.83	0.01	-3.84	-6.64	-1.05	0.01
Bed size								
Small (1–49 beds) (ref)								
Medium (50–199 beds)	4.26	2.49	6.04	0.00	4.08	2.24	5.92	0.00
Large (>200 beds)	4.55	2.32	6.79	0.00	4.45	2.17	6.73	0.00
Rural	-0.74	-2.46	0.99	0.40	-0.56	-2.29	1.16	0.52
Teaching or Non-Teaching	1.82	-0.94	4.59	0.20	2.12	-0.63	4.86	0.13
Medicaid days (unit 1,000)	0.03	-0.02	0.07	0.20	0.03	-0.02	0.07	0.24
Geographic Relevant Service Area								
Percent Non-White	-1.00	-6.83	4.83	0.74	-1.18	-6.93	4.57	0.69
Percent Uninsured	-0.03	-0.20	0.13	0.70	-0.03	-0.19	0.14	0.73
Percent 100% < Federal Poverty Line	-0.01	-0.14	0.12	0.85	0.00	-0.12	0.13	0.94
County Level Characteristics								
Number of Primary Care Providers (per 1,000)	1.35	-0.15	2.84	0.08	1.73	0.25	3.21	0.02
Number of Federally Qualified Health Centers	-0.04	-0.10	0.03	0.27	-0.06	-0.12	0.01	0.10

Data Source: 2015 American Hospital Association (AHA) Survey of Care Systems and PaymentTM, the 2015 AHA annual survey, the 2015 Area Health Resource Files, and the 2015 American Community Survey.

Note: Model 1 describes the association between ACO affiliation (unaffiliated vs. affiliated) and the use care coordination strategies based on their care coordination index (CCI) summary scores using a state-fixed effect multivariable regression model while holding hospital-, county-level-,

geographic service area characteristics constant. Geographic market area was defined as demographic characteristics within a 15-mile radius of each hospital.

Note: Model 2 describes the association between ACO affiliation (unaffiliated vs. affiliated) and the use of care coordination strategies based on their care coordination index (CCI) summary scores while hospital-, county-level-, geographic service area characteristics constant with payment model type and ACO affiliation as the primary predictor variables using interaction terms.

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