

Accountable Care Organizations and Patient-Centered Medical Homes: Health Expenditures and Health Services Utilization

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ABSTRACT

Objectives: To compare the total health expenditures and health services utilization of patients receiving care in stand-alone accountable care organization (ACO only), stand-alone patient-centered medical home (PCMH only), hybrid (ACO + PCMH), and standard (neither ACO nor PCMH) facilities.

Study Design: A retrospective cross-sectional study was conducted.

Methods: Medical Expenditure Panel Survey 2016 data were used to identify patients 18 years and older who received care at a facility designated as ACO, PCMH, hybrid, or standard. The association of health expenditures with site of care was analyzed using a generalized linear model (gamma distribution with log-link function). Unadjusted expenditures were compared after bootstrapping.

Results: We identified 3431 patients who received care in facilities designated as ACO (n=1096), PCMH (n=355), hybrid (n=1219), or standard (n=761). Unadjusted yearly total health expenditure was significantly higher in the standard care group vs hybrid (\$9850 vs \$8432; $P < .0001$), standard vs ACO (\$9850 vs \$8399; $P < .0001$), and standard vs PCMH (\$9850 vs \$7580; $P < .0001$). Additionally, unadjusted total health expenditure was significantly lower in the PCMH group compared with the ACO, hybrid, and standard care groups. After adjusting, total health expenditure was significantly lower in the ACO ($\beta = -0.12$; $P = .0189$) and PCMH ($\beta = -0.25$; $P = .0005$) groups compared with hybrid but significantly higher in standard care ($\beta = 0.16$; $P = .0049$) compared with hybrid.

Conclusions: Care received in ACO and PCMH facilities is associated with lower total health care costs compared with standard care. However, hybrid models are associated with slightly higher total health care costs compared with stand-alone models. Integrating innovations in health care delivery and health care reimbursement warrants further evaluation.

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The United States spent \$3.65 trillion toward health care in 2018 and is expected to spend nearly \$6 trillion per year by 2027.¹ Although the United States spends excessive amounts on health care, it also grapples with issues pertaining to the quality of care, efficiency, disparities, and the patient experience in the current health care system. In short, the United States ranks first in health care spending yet lags in health outcomes among the developed nations.²

The disconnect between health spending and health outcomes is a cause of concern. Researchers have cited the fee-for-service model, fragmented care delivery models, defensive medicine, administrative costs, inflated prices, and underinvestment in addressing social determinants of health as some of the reasons that explain the disconnect.³⁻⁹ Innovation in health care delivery and reimbursement have come to the fore to address the issues mentioned above. These innovative models strive to achieve the Triple Aim of improving population health, reducing costs, and enhancing the patient experience.¹⁰ Two innovative models that have been widely adopted are patient-centered medical homes (PCMHs) and accountable care organizations (ACOs).

ACOs and PCMHs have proliferated in the health care arena. The number of ACOs and patients served by ACOs have experienced tremendous growth. The number of covered lives under ACOs has increased from 2.6 million in 2011 to 23.5 million in 2015.¹¹ This number is expected to rise to 150 million lives by 2025.¹¹ ACO contracts have been sponsored by CMS as well as private payers. Preliminary evidence indicates positive outcomes concerning health outcomes and health care costs compared with standard care, especially among the clinically vulnerable population.¹²⁻¹⁴ Currently,

13,000 practices housing about 67,000 clinicians deliver care to approximately 21 million patients in PCMH-certified facilities.^{15,16} Preliminary evidence indicates that, like patients at ACOs, those receiving care at PCMH-certified facilities have improved health outcomes and reduced health care costs compared with standard care.¹⁷⁻¹⁹

The goals of the ACO and PCMH models are similar; however, the means to achieve the goals differ. According to CMS, the ACO is primarily a value-based reimbursement model that incorporates “voluntary” collaboration among providers, whereas the PCMH is primarily a care delivery model involving significant collaboration as part of the certification process.^{16,20,21} In other words, the ACO could also be described as an incentive-based payment model that addresses the fallacies of the fee-for-service model and holds providers accountable for the outcomes while giving them a share of the earned savings. The PCMH is a systems-based approach in which structures and processes are established to ensure that holistic and coordinated care is delivered to the patient.

Additionally, ACOs are contractual agreements between groups of providers and payers, but becoming a PCMH is a certification process that facilities choose to undergo. Many facilities and providers are not only obtaining PCMH certification but also entering into ACO contracts with payers, given that these models have similar goals and a high degree of compatibility. Most of the evidence compares these models with standard care. There is limited evidence on the comparative effectiveness of these models, especially hybrid vs stand-alone (ACO only or PCMH only) models, all of which are becoming more prevalent. Exploring the effectiveness of these models can provide evidence on the interventions that add value to the health care system. Also, it may help ascertain the value of incentives, structures, and processes in our inefficient health care system. Moreover, it may provide valuable insights to assist during the decision-making process of pursuing an ACO contract and/or PCMH certification from the perspectives of payers, policy makers, health systems, and provider practices.

The primary objective of this study was to compare the total health expenditures of adult patients receiving care in stand-alone ACO (ACO only), stand-alone PCMH (PCMH only), hybrid (ACO + PCMH), and standard (neither ACO nor PCMH) facilities. The secondary objective was to compare expenditures (inpatient and outpatient) and health services utilization (emergency department [ED] and outpatient visits).

METHODS

A retrospective database analysis using the 2016 Medical Expenditure Panel Survey (MEPS) data was conducted. MEPS is a nationally representative database of survey

responses of noninstitutionalized Americans.²²⁻²⁴ Information on demographic characteristics, health conditions, health status, charges, payments, health services utilization, access to care, satisfaction with care, insurance status, income, and employment status is collected from individuals, families, medical providers, and employers.²⁴ An overlapping panel design was used to collect data. Three data files were used for this study: full-year consolidated (FYC), medical conditions (MC), and medical organizations (MO). The FYC file was used to obtain demographic, expenditure, and health services utilization information. The MC file was used to impute the Charlson Comorbidity Index (CCI) score. The MO file was used to identify site-of-care designation. The MO file was generated using the responses from the practice site (physician or administrative staff). Additionally, respondents in the MO file were those that were identified as the usual source of office-based care.²⁴ Each of these files included a unique patient identifier that was utilized for matching.

Adult patients (≥ 18 years) were placed in the 4 cohorts (ACO, PCMH, hybrid, standard) using the responses to the following questions: “Is the practice certified as a patient-centered medical home?” and “Does the practice participate in an ACO arrangement with either Medicare or private insurers?” Patients were included only if the responses to the above questions were any combination of yes and/or no.

Information was also collected on age (18-40, 41-64, ≥ 65 years), gender, insurance type (public, private, uninsured), education (high school or less, some college, bachelor’s degree or higher), income (high, middle, low), race (white, African American, other minorities), ethnicity (Hispanic, non-Hispanic), and employment status (employed, unemployed). Total health care expenditure in MEPS included the sum of all payments for health care irrespective of the source of payment.²⁴ Total outpatient expenditure was imputed as the sum of all payments during a visit to an outpatient (office-based or hospital) setting.²⁴ Total inpatient expenditure was imputed as the sum of all payments during a hospitalization event.²⁴ Outpatient utilization was imputed as the sum of all office-based and outpatient (hospital) visits.²⁴

Statistical Analysis

Descriptive analysis was conducted using χ^2 for categorical variables and analysis of variance (ANOVA) for continuous variables. Unadjusted means were calculated using bootstrapping over 1000 iterations to account for the nonparametric distribution.²⁵ These means were compared using ANOVA followed by a Bonferroni post hoc test. Association between site of care and health expenditures was analyzed using a generalized linear model with a log-link function and gamma

distribution using the following covariates: age, gender, race, ethnicity, education, employment status, income, insurance type, and imputed CCI score. The complex, multistage survey design of MEPS was incorporated using survey weights in all analyses. National estimates were calculated using person weights. All statistical analyses were conducted using SAS 9.4 (SAS Institute Inc).

RESULTS

A total of 3431 patients were identified who received care in facilities designated as ACO (n=1096), PCMH (n=355), hybrid (n=1219), or standard (n=761). This translates to 11.89 million, 3.92 million, 12.74 million, and 7.98 million US residents receiving care at facilities designated as ACO, PCMH, hybrid, and standard, respectively (Table 1).

Table 1. Demographic Characteristics

	Hybrid	ACO	PCMH	Standard	P
n (unweighted)	1219	1096	355	761	
n (weighted)	12,735,406	11,885,348	3,919,842	7,980,582	
Age in years, n (%)					
18-40	3,268,706 (25.67)	2,738,461 (23.04)	951,181 (24.27)	1,880,758 (23.57)	.9543
41-64	5,196,825 (40.80)	5,031,326 (42.33)	1,622,813 (41.40)	3,261,447 (40.87)	
≥65	4,269,876 (33.53)	4,115,561 (34.63)	1,345,847 (34.33)	2,838,377 (35.56)	
Gender, n (%)					
Female	7,792,679 (61.19)	6,616,614 (55.67)	2,355,352 (60.09)	4,434,629 (55.57)	.0313
Insurance, n (%)					
Private	8,677,960 (68.14)	8,330,408 (70.09)	2,901,998 (74.03)	5,421,170 (67.93)	.1003
Public	3,641,569 (28.59)	3,288,794 (27.67)	804,845 (20.53)	2,235,648 (28.01)	
Uninsured	415,877 (3.27)	266,146 (2.24)	212,998 (5.43)	323,764 (4.06)	
Education, n (%)					
High school or less	5,498,385 (43.17)	5,441,857 (45.79)	1,757,733 (44.84)	3,446,731 (43.19)	.9682
Some college	2,997,137 (23.53)	2,614,869 (22.00)	889,049 (22.68)	1,807,631 (22.65)	
Bachelor's degree or higher	4,239,885 (33.29)	3,828,622 (32.21)	1,273,060 (32.48)	2,726,221 (34.16)	
Income, n (%)					
Low	3,440,036 (27.01)	2,950,738 (24.83)	1,067,749 (27.24)	2,366,848 (29.66)	.3880
Middle	3,841,896 (30.17)	3,231,533 (27.19)	1,190,034 (30.36)	2,046,295 (25.64)	
High	5,453,474 (42.82)	5,703,078 (47.98)	1,662,059 (42.40)	3,567,439 (44.70)	
Race, n (%)					
White	10,629,796 (83.47)	9,659,000 (81.27)	3,318,356 (84.66)	6,738,628 (84.44)	.5760
African American	1,212,437 (9.52)	1,149,415 (9.67)	334,625 (8.54)	734,791 (9.21)	
Other minorities	893,173 (7.01)	1,076,933 (9.06)	266,861 (6.81)	507,163 (6.34)	
Ethnicity, n (%)					
Hispanic	1,293,024 (10.15)	1,576,331 (13.26)	463,996 (11.84)	1,093,307 (13.67)	.1163
Employment, n (%)					
Employed	7,470,850 (58.66)	6,687,399 (56.27)	2,099,190 (53.55)	4,590,555 (57.52)	.6562
CCI score, mean	0.99	1.11	1.02	1.18	.0704

ACO, accountable care organization; CCI, Charlson Comorbidity Index; PCMH, patient-centered medical home.

Comparison of baseline characteristics indicated no significant differences across all sociodemographic variables besides gender. There was a statistically significant difference in gender distribution among the groups in that women accounted for approximately 60% of the patients in the hybrid and PCMH cohorts compared with approximately 55% for the ACO and standard care cohorts.

Table 2 provides a comparison of unadjusted health expenditure estimates of the 4 cohorts. Unadjusted yearly total health expenditure was significantly higher in the standard care group vs hybrid (\$9850 vs \$8432; $P < .0001$), standard vs ACO (\$9850 vs \$8399; $P < .0001$), and standard vs PCMH (\$9850 vs \$7580; $P < .0001$). Additionally, unadjusted total health expenditure was significantly lower in PCMH compared with the ACO, hybrid, and standard care groups. Total yearly outpatient expenditure was significantly different across all groups ($P < .0001$). The total yearly outpatient expenditure was highest in the ACO cohort (\$2688), followed by hybrid (\$2629) and standard (\$2597), and lowest in the PCMH cohort (\$2295). Total yearly inpatient expenditure was significantly different across all groups ($P < .0001$). Total yearly inpatient expenditure was highest in the standard care cohort (\$2828), followed by hybrid (\$2112) and ACO (\$1637), and lowest in the PCMH cohort (\$1412).

Table 2. Unadjusted Health Expenditure Comparison

Expenditures	Mean	95% CI	P
Total			
Hybrid	\$8432	\$8402-\$8463	<.0001 Significant: standard vs all groups; PCMH vs hybrid, ACO
ACO	\$8399	\$8370-\$8427	
PCMH	\$7580	\$7529-\$7632	
Standard	\$9850	\$9804-\$9897	
Outpatient			
Hybrid	\$2629	\$2620-\$2639	<.0001 All comparisons significant
ACO	\$2688	\$2676-\$2700	
PCMH	\$2295	\$2277-\$2314	
Standard	\$2597	\$2584-\$2609	
Inpatient			
Hybrid	\$2112	\$2093-\$2130	<.0001 All comparisons significant
ACO	\$1637	\$1622-\$1652	
PCMH	\$1412	\$1388-\$1436	
Standard	\$2828	\$2799-\$2857	

ACO, accountable care organization; PCMH, patient-centered medical home.

Table 3. Health Services Utilization Comparison

	Mean	95% CI	P
ED visits			
Hybrid	0.27	0.27-0.27	<.0001 All comparisons significant
ACO	0.25	0.25-0.25	
PCMH	0.23	0.22-0.23	
Standard	0.31	0.31-0.31	
Outpatient visits			
Hybrid	10.82	10.80-10.85	<.0001 All comparisons significant
ACO	10.08	10.05-10.10	
PCMH	9.38	9.33-9.43	
Standard	10.64	10.61-10.67	

ACO, accountable care organization; ED, emergency department; PCMH, patient-centered medical home.

Table 3 provides a comparison of yearly health services utilization among the 4 cohorts. Average ED visits were significantly different across all groups ($P < .0001$). Average ED visits were highest in the standard care cohort (0.31), followed by hybrid (0.27) and ACO (0.25), and lowest in the PCMH cohort (0.23). Average yearly outpatient visits were significantly different across all groups ($P < .0001$). Average yearly outpatient visits were highest in the hybrid cohort (10.82), followed by standard (10.64) and ACO (10.08), and lowest in the PCMH cohort (9.38).

Table 4 provides the association of total health expenditures with site-of-care designation after adjusting for socioeconomic factors. Total health expenditures were about 12% and 25% lower in the ACO ($\beta = -0.1199$; $P = .0189$) and PCMH ($\beta = -0.2516$; $P = .0005$) cohorts, respectively, compared with hybrid. However, total health expenditure was about 16% higher in the standard care cohort ($\beta = 0.1597$; $P = .0049$) compared with hybrid. Inpatient expenditure was about 48% higher in the standard care cohort ($\beta = 0.4831$; $P = .0002$) compared with hybrid. There was no difference between the other cohorts in average per capita inpatient expenditures. Outpatient expenditures were about 16% and 30% lower in the ACO ($\beta = -0.1631$; $P = .0019$) and PCMH ($\beta = -0.2960$; $P < .0001$) cohorts, respectively, compared with hybrid. There was no difference in average per capita outpatient expenditures between the hybrid and standard care cohorts.

Total health expenditures were significantly higher in individuals older than 40 years (compared with 40 years and younger), women (compared with men), unemployed individuals (compared with employed), and those with a higher CCI score. On the contrary, total health expenditures were significantly

Table 4. Demographic Characteristics: Pre- and Post Matching

	Total health expenditure		Inpatient expenditure		Outpatient expenditure	
	Coefficient	P	Coefficient	P	Coefficient	P
Intercept	8.3245	<.0001	9.3971	<.0001	7.8718	<.0001
Cohort						
Hybrid	Reference	–	Reference	–	Reference	–
ACO	–0.1199	.0189	–0.0925	.4553	–0.1631	.0019
PCMH	–0.2516	.0005	0.1242	.5518	–0.2960	<.0001
Standard	0.1597	.0049	0.4831	.0002	–0.0904	.1252
Age in years						
18-40	Reference	–	Reference	–	Reference	–
41-64	0.4446	<.0001	0.8159	<.0001	0.1812	.0015
≥65	0.3818	<.0001	0.4822	.0050	0.1922	.0042
Gender						
Male	Reference	–	Reference	–	Reference	–
Female	0.2178	<.0001	0.0418	.7087	0.2361	<.0001
Insurance						
Private	Reference	–	Reference	–	Reference	–
Public	0.0881	.1201	–0.2372	.0380	–0.1197	.0415
Uninsured	–0.5711	<.0001	–0.1633	.6180	–0.6225	<.0001
Education						
Bachelor's degree or higher	Reference	–	Reference	–	Reference	–
Some college	0.0718	.2142	0.0666	.6626	–0.0091	.8785
High school or less	–0.1043	.0439	–0.0570	.6812	–0.2454	<.0001
Income						
High	Reference	–	Reference	–	Reference	–
Middle	–0.1756	.0008	–0.0819	.5452	–0.0970	.0002
Low	–0.0993	.1148	–0.3278	.0190	–0.2997	<.0001
Race						
White	Reference	–	Reference	–	Reference	–
African American	–0.2877	.0001	0.2804	.1027	–0.4658	<.0001
Other minorities	–0.4448	<.0001	–0.1037	.7331	–0.5029	<.0001
Ethnicity						
Non-Hispanic	Reference	–	Reference	–	Reference	–
Hispanic	–0.1798	.0055	0.0536	.7343	–0.2114	.0018
Employment status						
Employed	Reference	–	Reference	–	Reference	–
Unemployed	0.3705	<.0001	0.2497	.0653	0.2064	.0003
CCI score	0.2224	<.0001	–0.0260	.2848	0.1858	<.0001

ACO, accountable care organization; CCI, Charlson Comorbidity Index; PCMH, patient-centered medical home.

lower in uninsured individuals (compared with those with private insurance), those who completed high school or less (compared with a bachelor's degree or higher), those with middle income (compared with high income), African Americans and other minorities (compared with whites), and Hispanic individuals (compared with non-Hispanic individuals).

DISCUSSION

Based on our review of the literature, this is the first study that compares health care costs associated with innovative models (hybrid and stand-alone). This study finds that ACO and PCMH models are associated with reduction in total health care costs compared with standard care. These findings are consistent with previous literature, which indicates that ACO and PCMH models are associated with reduction in health care costs compared with standard care.^{13,14,17-19} However, this study also adds that stand-alone models are associated with greater reduction in health care costs compared with hybrid models. This is contrary to the expected notion that hybrid models may generate savings that are partly cumulative of those achieved by the stand-alone models. This may be attributed to multiple reasons. Firstly, hybrid models may experience additive effects of operational and implementation challenges of the stand-alone models. ACO and PCMH are associated with significant challenges including organizational structure, culture change, employee and leadership buy-in, operational changes, and administrative resource mobilization, to name a few.²⁶⁻²⁹ These challenges may be standing in the way of hybrid models achieving their intended outcomes and performing to their full potential. Also, previous research has indicated that reduction in health expenditure is time dependent^{30,31}—that is, reduction in health expenditure can be seen after a longer duration of evaluation. In this study, information was not collected by the survey administrators (MEPS) to determine the duration of ACO contract or PCMH certification. Next, the distribution of hybrid models may not be consistent throughout the nation, leading to diverse risk profiles. An evaluation conducted by Graf et al found significant variation in participants served under the Medicaid ACO-PCMH hybrid arrangement among different states.³² They found that approximately 80% of Vermont's Medicaid ACO population received care at a hybrid facility compared with 72% in Minnesota and 38% in Maine.³² Future research should explore the outcomes of hybrid models compared with stand-alone models and identify opportunities to reduce operational and implementation burden. With significant overlap in the goals, similar consolidation of certification requirements (PCMH) and contractual obligations (ACO) may alleviate administrative and implementation burden on participating practices.

This study found that outpatient expenditure was lowest in the PCMH cohort. Moreover, outpatient and ED utilization was lowest in the PCMH cohort compared with the other cohorts. Evidence in the literature suggests that robust primary care can improve health outcomes and reduce health care costs.^{33,34} PCMH certification is contingent on the structures and processes that ensure a robust primary care center, which could explain the positive findings associated with PCMH. Additionally, some evidence indicates that PCMH certification is associated with the likelihood of ACO participation.³⁵ Moreover, ACOs with a strong primary care base tend to perform better than ACOs with a weak primary care base.³⁶ In the evaluation conducted by Graf et al, the authors explored the utilization of existing PCMH programs in Medicaid ACO developments.³² This results in these models working as complements to each other rather than in silos. Next, it utilizes existing frameworks of quality measurement to minimize disruption as it navigates toward a hybrid model. Similarly, stepwise rollout of PCMHs followed by ACOs may help participating health systems increase efficiency, reduce administrative burden, improve health outcomes, and reduce health care costs. Also, ACOs receive assistance in terms of capital with programs like the ACO Investment Model and Advance Payment ACO Model; similar start-up capital opportunities are not available for “medical homes” to achieve PCMH certification. In light of the evidence presented, policy makers and payers may want to explore funding for PCMH certification. Further evaluation of the value of PCMH and ACO is necessary to help payers and policy makers determine interventions that provide a better return on investment.

Limitations

There are several limitations inherent to the data set. First, this study does not address any contextual factors that play an important role in the performance of ACO and hybrid models because of the nature of the data available from MEPS. Some contextual factors that could affect the results are ACO size, rural vs urban ACO, hospital-led ACO vs provider-led ACO, and underlying risks of the population served, among others.³⁷⁻³⁹ Next, the cross-sectional study design utilized may not be able to capture time-dependent performance trends of these models.^{30,31} Information on duration of ACO/PCMH participation is not obtained from the respondents. Also, social desirability and response bias are inherent to the MEPS data set. Additionally, the data set does not incorporate the complexities of the ACO/PCMH models.

CONCLUSIONS

Care received in ACO and PCMH models is associated with lower health care costs compared with standard care. However,

hybrid models are associated with slightly higher health care costs compared with stand-alone models. Integrating innovations in health care delivery and health care reimbursement warrants further evaluation.

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