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Trends in Costs of Care and Utilization for Medicaid Patients with Diabetes in Accountable Care Communities: A Natural Experiment for Translation in Diabetes (NEXT-D) 2 Study

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Abstract

Background/Objectives: Medicaid beneficiaries with diabetes have complex care needs. The Accountable Care Communities (ACC) Program is a practice-level intervention implemented by UnitedHealthcare to improve care for Medicaid beneficiaries. We examined changes in costs and utilization for Medicaid beneficiaries with diabetes assigned to ACC versus usual care practices.

Research Design: Interrupted time series with concurrent control group analysis, at the person-month level. The ACC was implemented in 14 states, and we selected comparison non-ACC practices from those states to control for state-level variation in Medicaid program. We adjusted the models for age, gender, race/ethnicity, comorbidities, seasonality, and state-by-year fixed effects. We examined the difference between ACC and non-ACC practices in changes in the time trends of expenditures and hospital and emergency room utilization, for the four largest categories of Medicaid eligibility (Temporary Assistance to Needy Families, Supplemental Security Income (without Medicare), Expansion, Dual-Eligible).

Subjects/Measures: Eligibility and claims data from Medicaid adults with diabetes from 14 states between 2010–2016, before and after ACC implementation.

Results: Analyses included 1,200,460 person-months from 66,450 Medicaid patients with diabetes. ACC implementation was not associated with significant changes in outcome time trends, relative to comparators, for all Medicaid categories.

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Conclusions: Medicaid patients assigned to ACC practices had no changes in cost or utilization over three years follow-up, compared to patients assigned to non-ACC practices. The ACC program may not reduce costs or utilization for Medicaid patients with diabetes.

Keywords

Natural experiments; Medicaid; Diabetes

Introduction

As the nation's primary health coverage program for the low-income population, Medicaid plays a critical role in the treatment and management of diabetes in the U.S., as well as the financing of diabetes-related medical care. Medicaid enrollees with diabetes have high rates of health care utilization due to their complex health needs.[1] Annual per capita health care expenditures for adult Medicaid enrollees with diabetes are also three times higher than Medicaid enrollees without diabetes.[2] Implementation of the ACA has greatly increased the number of patients with diabetes covered by Medicaid, but the legislation has also opened the door for health plans to experiment with new strategies to provide effective care to enrollees with chronic illnesses.

Medicaid health plans are innovating to meet this challenge, providing historically under-resourced primary care practices with innovative management programs to better address the complex needs of Medicaid beneficiaries.[3] Many of these new programs are modeled after chronic disease management interventions with demonstrated positive outcomes in primary care settings. Interventions based on the Chronic Care Model (CCM), including the Patient-Centered Medical Home (PCMH), in particular have been associated with significant improvements in clinical outcomes and reduction in costs of care for several chronic conditions including diabetes and hypertension. [4–7] However, most prior studies on such interventions have focused on the commercially insured sector. Practices serving high numbers of Medicaid beneficiaries are often under-resourced and may face even greater challenges when trying to drive improvements in quality and comprehensiveness of primary care. In real-world setting, these practices often lack the necessary personnel, information and tools to drive improvements in care. For example, practices may not have the resources to provide care coordination or intensive case management, may not be able to access complete care information, such as critical information from a recent hospitalization, and may lack tools to track quality measures in real-time or conduct data-analytics, all of which have been shown to improve quality of care in the primary care setting.

In 2012, UnitedHealthcare, one of the nation's largest insurers, expanded into the Medicaid market, gaining over 1 million new enrollees. This expansion was accompanied by the launch of a core program targeted to the Medicaid population, known as the Accountable Care Communities (ACC). The ACC is a practice-level intervention that embeds UHC personnel in participating practices to provide hands-on support to drive improvements in care. The ACC program addresses potential barriers to improvements in care through several innovations (described in more detail below) with the goal of improving delivery of evidence-based care across the entire population of patients, while at the same time augmenting care delivery to a cohort of higher-risk patients in a given practice.

The rollout of the ACC by one of the largest for-profit insurance companies in the market presents a unique opportunity for evaluation of a real-world intervention or natural experiment.[8–10] Understanding whether the ACC leads to lower costs and utilization for the Medicaid population with diabetes should be of great interest to both insurers as well as policy makers. Thus, our objective was to determine whether UHC Medicaid enrollees with diabetes assigned to practices participating in the ACC have lower levels of ER use and hospitalizations, and lower costs of care overall as compared to those assigned to practices without the ACC. We hypothesized that UHC Medicaid enrollees with diabetes assigned to ACC practices would have fewer emergency room visits, fewer hospitalizations and lower plan costs of care as compared to UHC Medicaid enrollees with diabetes assigned to usual care practices.

Methods

Study Design (Intervention Group versus Comparator Group)

We used an individual level interrupted time series (ITS) with comparator group study design. This design uses segmented regression analysis to construct a time-series for a given outcome measure for the ACC and for the non-ACC (comparator) practice groups. For each group, the analysis measures the change in the outcome's time trend in the time period after ACC implementation (the "post period," relative to the pre-implementation time trend ["pre period"]), and then compares the pre-post changes between groups. ITS allows for estimation of immediate and sustained (level, or intercept) and longer-term (slope) changes in an outcome's time trend associated with ACC implementation.[11] We used an intent-to-treat analysis, where data from all UHC Medicaid beneficiaries were used to assess outcomes of interest regardless of engagement in care in the assigned practice.

This study was approved by University of California, Los Angeles Institutional Review Board, protocol #16–000276.

Study Population

We analyzed data from 2010 to 2016 from 14 states where ACC was implemented in practices with ≥1,000 UHC adult Medicaid beneficiaries. We included states with greater than one ACC practice implemented in 2012 or later. Comparison non-ACC practices were of similar size (i.e., >1,000 UHC adult Medicaid beneficiaries) and were selected from the same state to control for state-level variation in Medicaid programs. We excluded Hawaii, where many Medicaid beneficiaries insured by UHC are in institutional long-term care.

We included Medicaid beneficiaries who were ≥21 years of age with diabetes. Members with diabetes were identified using the Centers for Medicare and Medicaid Services (CMS) Chronic Conditions Data Warehouse definition for diabetes. [12] Diabetes was defined using any of the following within 24 calendar months of the first record of eligibility: 1 inpatient billing claim, 2 outpatient billing claims, an HbA1C value ≥ 6.5 % and/or ≥1 prescription for insulin or an oral anti-hyperglycemic medication.[13] We excluded the first 6 months of eligibility for each person to ensure that patients assigned to a given practice had adequate time to present for care at their assigned practice. We also excluded people who were enrolled in a separate UHC intervention (a care coordination program administered at the person level and targeted specifically towards high-cost, high-need Medicaid beneficiaries).[14] UHC provided a list of practices and National Provider Identifier (NPI) data; each member had an assigned provider and the practice associated with that provider was the member's assigned clinic (i.e., ACC vs. non-ACC clinic).

ACC Intervention

The ACC program was first launched in Arizona in 2009. By the spring of 2015, the ACC program spanned 15 states (Table 1). The ACC program embedded consultants and/or nurses into practices to work directly with leadership, clinic management and front-line staff to support improvements in care for Medicaid beneficiaries (with or without diabetes). Practices participated in monthly partnership meetings to review monthly data trends for all goals related to process and outcome measures of care and developed specific action plans to address areas in need of improvement. The ACC also provided practices with a host of tools and more complete care information derived from the claims record to support and sustain improvements in care. These included 1) the "UHC Transitions Tool", which provided detailed access to complete care information, including daily updates of admission/transfer/discharge data from geographically co-located hospitals in addition to claims-based data extractions for up to 3 prior years on all UHC patients with Medicaid for "deeper-dive" assessments; 2) "Care Opportunities", which was a list of evidence-based, HEDIS-like measures to facilitate care and visit planning across the population of UHC Medicaid beneficiaries at each practice site; and 3) the "Optum Impact Pro (Ipro) Risk Score", which is a calculated risk score intended to help practices identify and target a smaller cohort of higher-risk patients needing more intensive management.[15]

Study Months

The "interruption" in our ITS study was the date of the ACC's clinical activation for each practice, defined as month zero. We then defined each person's time in the study period relative to this, counting months before and after clinical activation. To align study months between treatment groups, we created a proxy activation date for comparators: within each state, comparator practices were assigned the weighted median ACC activation date among intervention practices. For example, in NM, there were 2 ACC intervention clinics with different start dates. In our data, 3077 person-months were assigned to the clinic that became an ACC February 2015 and 11,121 person-months were assigned to the clinic that became an ACC June 2015. Thus, the median activation date weighted based on the data in NM was June 2015, which was applied to all person-months assigned to control practices in this state.

We stratified results by four main Medicaid categories given differences in baseline demographics between these groups; Temporary Assistance for Needy Families (TANF), Supplemental Security Income without Medicare (SSI), Dual Medicaid-Medicare and Medicaid Expansion. Since eligibility criteria for Medicaid categories and the make-up of persons enrolled vary we decided apriori to separate into the larger Medicaid enrollment groups. We chose these four Medicaid groups since they represent the majority of Medicaid beneficiaries (about 80% of Medicaid person-months were in these four categories) and eligibility criteria are somewhat comparable across states. For example, SSI has been described as the "the nation's safety net for adults and children with major disabilities as well as for poor elderly persons," while TANF "is a federal/state program that provides assistance to needy families with children." [16] While many families receiving TANF report disabilities and some do transition from TANF to SSI, differences between TANF and SSI benefits are substantial, as are the requirements and restrictions for each category. [16] Thus, the evidence for using these separate eligibility categories is based on important differences in eligibility, benefits and demographics of persons enrolled in each category. We excluded 20% of Medicaid beneficiaries; 9% with incomplete data (e.g., were duals with only half the benefit data available), 8% who were in long term care facilities (which seem less pertinent in an analysis of an outpatient practice level intervention), and 3% who fell into numerous other smaller and more variable Medicaid categories.

Our study window included 36 months of data pre-ACC implementation (the pre-period) and 37 months of post-ACC implementation data (the post-period) for all Medicaid categories except the Medicaid Expansion sample, which only had about a year (14 months) of pre-data.

Measures

Outcome measures included monthly enrollee utilization (emergency room [ER] visits and hospitalizations) and monthly plan spending (ACC implementation costs were not included). All outcomes are defined at the person-month level, meaning that each observation corresponds to expenditures (or utilization) for a person in a month. We defined plan expenditures as UHC's payments (adjusted to 2016 dollars using the Consumer Price Index [CPI] for "All medical care services" to control for inflation). Utilization measures included two indicator variables that identified if a person had (1) any ER visit in the month, and (2) any hospitalization in the month.

Covariates of interest included: (1) an indicator variable for study group (1=treatment [ACC assignees] vs. 0=comparator [other large practice assignees]); (2) a continuous variable counting time in months before and after ACC activation (real or proxy, with ACC activation defined as month zero) controlled for the outcome's linear pre period "baseline" time trend; variables to measure changes in an outcome's time trend (changes in level and slope) in the post period, relative to the pre period; (3) an indicator variable (=1 for months in the post period) measured the immediate and sustained impact of ACC activation on an outcome (the discontinuity, or change in level of the outcome during the post period, relative to the level expected based on the pre period trend), and (4) a spline variable (counting months in the post period, from 1 to 37 [=0 in the pre period]) measured any gradual or long-term changes ACC implementation may have had on an outcome over time (the change in the outcome's slope [monthly rate of change] during the post period, relative to the pre period); and the interactions between variables (2)-(4) and Group, generating our estimates of interest: the difference between treatment versus comparator in the change in level from pre to post (change in level) was estimated via the interaction of the treatment group indicator and the post period indicator; the difference between treatment versus comparator in the change in slope from pre to post (change in slope) was measured via the interaction between the treatment group indicator and the post period spline.

Other model covariates included sex, age group, race, language, 17 comorbidity indicators (arthritis, asthma, atrial fibrillation, autism, cancer, chronic obstructive pulmonary disease, congestive heart failure, dementia, depression, HIV, hyperlipidemia, liver disease, myocardial infarction, osteoporosis, schizophrenia, stroke and substance abuse), state-by-year fixed effects, an indicator for whether a state had adopted the Medicaid Expansion in the given month and seasonality.

Statistical Analysis

Separate segmented regression models [17] were estimated for plan costs, any ER visit, and any hospitalization, modeling the difference between treatment and comparator on changes in these outcomes' time trends using the covariates described above. We used linear regression for continuous outcomes (expenditures) and logistic regression for binary outcomes (utilization). We adjusted for clustering at the practice level using Generalized Estimating Equations.[18] We also used these models to compare treatment vs. comparator on the change in an outcome's value at one time point in the post period, 18 months after ACC activation. The change in outcome value at 18 months for each group was estimated by comparing (1) the 18-month outcome amount in the post period (combining the level and slope changes) with (2) what the outcome amount would have been at 18 months after ACC activation if pre-period trends had continued. These predictions provide a summary of ACC's relative effect on an outcome's value at the midpoint of the post period.

Results

We analyzed data from 53 ACC and 155 comparator practices, totaling 1,200,460 person-months of data from 66,450 Medicaid beneficiaries with diabetes (22,435 persons from ACC practices and 47,056 persons from comparator practices). Table 1 provides a comparison of baseline demographics (36-months prior to ACC implementation) between Medicaid beneficiaries assigned to ACC and comparator practices. As compared to comparator practices, ACC practices had slightly higher proportion of female (66% vs 63%), fewer White (31% vs 45%) and more Black Medicaid beneficiaries with diabetes (40% vs 30%).

When examining changes in the time trends (level and slope) of plan costs of care, hospitalization rates, and ER utilization rates after ACC implementation (relative to pre-period trends), we did not find any statistically significant differences between Medicaid beneficiaries with diabetes assigned to ACC versus comparator practices (Table 2). We also did not see any statistically significant effects when estimating ACC's relative impact on our outcomes' values at the midpoint of the post period, 18 months after ACC implementation (Table 3).

Discussion

Our goal was to conduct a rigorous empirical evaluation of the ACC and its impact on healthcare plan costs of care and utilization among Medicaid beneficiaries with diabetes.

Our findings indicate Medicaid beneficiaries with diabetes assigned to ACC practices had no significant changes in plan costs and utilization over 36 months of follow-up after ACC implementation, compared with concurrent beneficiaries assigned to non-ACC practices.

Medicaid beneficiaries face significant challenges in diabetes treatment and severity.[2] Between 2004 and 2015, the proportion of Medicaid-covered inpatient stays increased by 16% [19], so efforts to help contain costs and utilization are important. However, studies of population-based strategies to improve diabetes management and care among Medicaid beneficiaries are lacking. This study is one of the first large-scale evaluations of a population-based strategy implemented nationally for Medicaid beneficiaries. Our use of an ITS analysis with a concurrent comparator group is one of the strongest designs for evaluating naturally occurring policies or interventions using observational data.[20]

Our goal was to test the hypotheses that the ACC program would be associated with decreases in costs of care and healthcare utilization Medicaid beneficiaries with diabetes. We did not find any significant differences in plan costs or utilization in ACC versus comparator practices up to 36 months follow-up after ACC implementation. Various factors may explain the lack of significant changes in costs or utilization per member per month in ACC versus comparator practices. The ACC program aimed to help practices identify and target missed care opportunities as well as cohorts of higher-risk patients needing more intensive management. However, ACC care management strategies may not have been intensive enough to lower costs or utilization in patients with diabetes (particularly if diabetes related complications and co-morbidities were advanced) or patients may have been unable to engage in ACC care strategies due to their competing demands.[21]

The analysis examined changes in utilization and cost measure, but our future work will also try to assess changes in processes of care since it is possible that intended changes were variably implemented across ACC practices and/or applied among patients. Prior studies have shown that use of care management tools and care improvement strategies can vary widely among clinics and physicians caring for patients with diabetes.[22,23] It is also well known that community-based clinics face many barriers to sustaining quality improvement activities, including lack of resources, time, and staff burnout.[21,24] In a national survey of 1,048 physician organizations, over one-third reported removed innovations, such as registry use, nurse care management and quality of care feedback to providers, because they were not effective, too disruptive to clinical operations, or not a good fit for the underlying organization.[25] Thus, practice- or provider-level barriers may have constrained ACC impact.

Alternatively, changes in processes of care may have taken place in ACC practices but patient-level barriers may have prevented our anticipated downstream ACC effects of lowering costs and/or utilization.[26–28] Patient churn in and out of Medicaid eligibility, for example, may disrupt access to and continuity of care.[29–31] However, we used an intent-to-treat analysis, where we assessed outcomes among all patients assigned to ACC practices, irrespective of their degree of care engagement or continuity over time. Our future work may be able to assess whether the degree of care engagement or Medicaid eligibility continuity can impact outcomes of interest.

Our findings should be interpreted in light of several limitations. First, we used a quasi-experimental study design which highlights associations and cannot determine causal relationships. Second, our analysis included states where ACC was implemented in 2012 or later and focused on four main Medicaid categories, so trends in plan costs of care and utilization may not generalize to all locations or the larger population of Medicaid beneficiaries overall. Our study included 3 years of follow-up, which may not be long enough to observe changes in costs of care or healthcare utilization for complex patients, such as Medicaid beneficiaries with diabetes. We did not match our samples for practice-level covariates or individual-level utilization at baseline, and there may have been unmeasured differences between the intervention and comparison populations. However, the ITS with comparator group approach allows the intervention and comparison groups to have different intercepts and slopes in the pre period as long as the *changes* in intercepts and slopes from the pre-period to the post-period would have been the same for both groups in the absence of the intervention.[32] Lastly, implementation of multi-component interventions, such as the ACC program targeting Medicaid beneficiaries, may face logistical challenges in real-world settings and be implemented variably across sites and between patients. Understanding the impact of these variations on outcomes is important but outside the scope of this analysis using claims-based data.

As the proportion of Medicaid covered individuals continues to grow, we need interventions to help improve population-health outcomes in this high-need group. We did not find significant differences in plan costs or healthcare utilization among Medicaid beneficiaries with diabetes over three years for ACC clinics, relative to comparator. Longer term studies of practice-level interventions, such as the ACC, are needed, but interventions targeting individual or community-level factors may also warrant study.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1.

Demographic and Clinical Characteristics of ACC Assignees and Comparators (other large clinic assignees) with Diabetes, averaged over the Pre Period (Months -36 to -1)

	Comparators (other large clinic assignees, N=366,781 person-months)		ACC Assignees (N=171,540 person-months)		P-Value[1]
	n	**%**	**n**	**%**	
Age group					
21–24	9,725	3	4,601	3	**0.91**
25–34	44,732	12	21,702	13	**0.65**
35–44	74,308	20	33,848	20	**0.58**
45–54	100,516	27	49,739	29	**0.08**
55–64	120,702	33	51,616	30	**0.08**
65+	16,798	5	10,034	6	**0.54**
Female	232,727	63	113,401	66	**0.03** *
English as primary language	307,343	84	132,028	77	**0.04** *
Race/ethnicity					
White	166,679	45	53,880	31	**0.02** *
African American	108,941	30	69,393	40	**0.12**
Latino	26,811	7	19,856	12	**0.16**
Asian	13,517	4	3,571	2	**0.15**
Other	50,833	14	24,840	14	**0.81**
State of residence					
Arizona[2]	38,382	10	31,736	19	**0.30**
Delaware[2]	14,312	4	6,628	4	**0.99**
Florida	3,512	1	4,564	3	**0.15**
Maryland[2]	11,958	3	3,732	2	**0.71**
Michigan[2]	67,149	18	5,192	3	**0.08**
Mississippi	2,733	1	8,824	5	**0.04** *
New Jersey[2]	32,204	9	11,311	7	**0.64**
New Mexico[2]	1,796	0	1,517	1	**0.54**
Nevada[2]	10,898	3	2,160	1	**0.45**
New York[2]	55,958	15	2,033	1	**0.00** *
Ohio[2]	30,136	8	1,539	1	**0.04** *
Pennsylvania[2]	21,211	6	7,854	5	**0.77**
Tennessee	67,082	18	74,443	43	**0.01** *
Washington[2]	9,450	3	10,007	6	**0.28**
Mean Comorbidity count[3], IQR	0	0, 1	0	0, 1	**0.96**
Medicaid category					

	Comparators (other large clinic assignees, N=366,781 person-months)		ACC Assignees (N=171,540 person-months)		P-Value[1]
	n	**%**	**n**	**%**	
TANF	148,484	40	53,931	31	**0.00** *
SSI (without Medicare)	168,538	46	89,341	52	**0.16**
Expansion	18,402	5	11,867	7	**0.41**
Medicare/Medicaid dual	31,357	9	16,401	10	**0.75**
Mean Plan Expenditures, IQR	$600	$0, $282	$732	$0, $327	**0.01** *
Any Hospitalization	9,386	3	5,309	3	**0.02** *
Any Emergency department visit	34,271	9	18,884	11	**0.00** *
Total person-months of data in the analyses	805,236		395,224		
Total unique people in the analyses	47,056		22,435		

1. P-values are from regressions controlling for clustering at the practice level. All regressions were logistic regressions except for the comorbidity count (gamma regression) and plan expenditures (two part model regression).

* p<0.05.

2. Adopted Medicaid Expansion

3. Comorbidities included Arthritis, Asthma, Atrial Fibrillation, Autism, Cancer, Chronic Obstructive Pulmonary Disease, Congestive Heart Failure, Dementia, Depression, HIV, Hyperlipidemia, Liver Disease, Myocardial Infarction, Osteoporosis, Schizophrenia, Stroke, Substance Abuse

Table 2.

Interrupted time series with comparator group segmented regression analysis: estimates of the difference between treatment (ACC assignees) vs. comparator (other large practice assignees) on changes in monthly expenditure and utilization time trends associated with ACC implementation

		Post-Period (vs. Pre-Period)			
Enrollment	**Outcome**	**Level**[1]	**P-Value**	**Slope**[2]	**P-Value**
TANF	Plan Expenditures	−$6.70	0.84	$2.50	0.32
(N=410,151 person-months; 25,092 people)	Any Hospitalization	0.01%	0.96	0.01%	0.26
	Any ED Visit	0.70%	0.06	0.01%	0.82
SSI (Without Medicare)	Plan Expenditures	−$47.87	0.34	−$0.16	0.96
(N=457,667 person-months; 23,802 people)	Any Hospitalization	−0.08%	0.76	0.00%	0.96
	Any ED Visit	0.02%	0.96	0.04%	0.19
Expansion	Plan Expenditures	$65.18	0.28	$16.20	0.13
(N=214,339 person-months; 17,526 people)	Any Hospitalization	−0.32%	0.31	−0.01%	0.89
	Any ED Visit	0.99%	0.10	0.08%	0.39
UHC Medicare-Medicaid Dual	Plan Expenditures	$66.11	0.31	−$0.01	1.00
(N=118,301 person-months; 6,332 people)	Any Hospitalization	0.65%	0.07	−0.00%	0.90
	Any ED Visit	0.18%	0.75	−0.04%	0.22

Notes: Linear regression used for expenditures; logistic regression used for utilization outcomes. Sample is person-months eligible from 2010–2016.

[*] denotes significance at $p < .05$. Regression covariates of interest were study Group (treatment [ACC assignees] vs. comparator [other large practice assignees]); a linear monthly time trend counting months before and after ACC activation (real or proxy; ACC activation defined as time zero), indicators and splines for the post period (months 0 and after); and the interactions between these variables and Group. Other covariates included sex, age group, race, language, 17 comorbidity indicators (arthritis, asthma, atrial fibrillation, autism, cancer, chronic obstructive pulmonary disease, congestive heart failure, dementia, depression, HIV, hyperlipidemia, liver disease, myocardial infarction, osteoporosis, schizophrenia, stroke, and substance abuse), state-by-year fixed effects, an indicator for whether a state had adopted the Medicaid Expansion in the given month, and seasonality. Repeated measures adjusted for using generalized estimating equations (GEE), clustering by practice ID.

[1.] Difference between treatment vs. comparator in the discontinuity (change in level) for the post period, measured using marginal effects post-estimation of the interaction between Group & an indicator variable for the post period.

[2.] Difference between treatment vs. comparator in the change in slope for the post period, measured using marginal effects post-estimation of the interaction between Group & a spline variable for the post period.

Table 3.

Change in predicted utilization and expenditures (amount as modeled in the post period vs. amount as expected had the pre period trend continued) for Treatment (ACC assignees) vs. Comparator (other large practice assignees), 18 months after ACC activation

		Treatment Predictions		Comparator Predictions		Difference at 18 months: Treatment vs. Comparator, Post vs. Pre		
		A	B	C	D	Difference = (A-B) - (C-D)		
Enrollment	Predicted Outcome	Under Post Trend	Under Pre Trend	Under Post Trend	Under Pre Trend	Difference	95% Confidence Interval	P-Value
TANF	**Plan Expenditures**	$393.76	$389.69	$386.97	$423.65	$40.74	(−$75.99, $157.48)	0.492
	Any Hospitalization	1.49%	1.25%	1.45%	1.50%	0.29%	(−0.23%, 0.81%)	0.278
	Any ED Visit	8.85%	8.07%	8.29%	8.29%	0.79%	(−0.32%, 1.89%)	0.162
SSI (Without Medicare)	**Plan Expenditures**	$852.01	$972.92	$800.77	$870.81	−$50.87	(−$202.09, $100.36)	0.508
	Any Hospitalization	4.01%	4.13%	3.72%	3.77%	−0.07%	(−0.92%, 0.77%)	0.862
	Any ED Visit	12.47%	11.79%	10.95%	10.99%	0.72%	(−0.46%, 1.90%)	0.233
Expansion	**Plan Expenditures**	$511.62	$243.02	$469.07	$573.49	$373.02	($−100.26, $846.30)	0.121
	Any Hospitalization	1.66%	1.71%	1.37%	1.01%	−0.41%	(−2.64%, 1.83%)	0.723
	Any ED Visit	7.56%	8.21%	6.79%	10.82%	3.37%	(−1.89%, 8.64%)	0.209
UHC Medicare-Medicaid Dual	**Plan Expenditures**	$416.19	$403.27	$446.12	$499.16	$65.96	(−$121.81, $253.73)	0.488
	Any Hospitalization	1.49%	1.26%	1.71%	2.00%	0.52%	(−0.53%, 1.58%)	0.332
	Any ED Visit	4.16%	4.45%	4.17%	3.90%	−0.55%	(−2.38%, 1.27%)	0.551

Notes: Predictions made using interrupted time series segmented regression analysis. Change in outcome at 18 months estimated by comparing (1) the 18-month outcome amount in the post period with (2) what the outcome amount would have been at 18 months after ACC activation (real or proxy) if pre period trends had continued. Linear regression used for expenditures; logistic regression used for utilization outcomes. Sample is person-months from 2010–2016.

* denotes significance at $p < .05$. Regression covariates of interest were study Group (treatment [ACC assignees] vs. comparator [other large practice assignees]); a linear monthly time trend counting months before and after ACC activation (real or proxy; ACC activation defined as time zero), indicators and splines for the post period (months 0 and after); and the interactions between these variables and Group. Other covariates included sex, age group, race, language, 17 comorbidity indicators arthritis, asthma, atrial fibrillation, autism, cancer, chronic obstructive pulmonary disease, congestive heart failure, dementia, depression, HIV, hyperlipidemia, liver disease, myocardial infarction, osteoporosis, schizophrenia, stroke, and substance abuse), state-by-year fixed effects, an indicator for whether a state had adopted the Medicaid Expansion in the given month, and seasonality. Repeated measures adjusted for using generalized estimating equations (GEE), clustering by practice.