

Formative Evaluations of Cost, Quality and Access within a Statewide Multi-Payor Patient-Centered Medical Home Program

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Primary Care in Health Reform

- In the US, population health outcomes not commensurate with health expenditure
 - National health expenditure projected to reach 19% of GDP in 2025¹
 - Life expectancy, infant mortality, and chronic disease prevalence lagging²
 - Contributing factors include poor coordination and poor quality of care³
- Primary care as crucial component of health system reform
 - Transition from episodic health system to value-based system of health
 - Primary care facilitates access, quality, and equity at population level⁴
 - Payment and workforce policies have not prioritized primary care

¹CMS (2017); ²Squires (2015); ³Berwick (2012); ⁴Starfield (2005)



Introduction to the PCMH

- The patient-centered medical home (*PCMH*) is a promising innovation in primary care delivery
 - Inter-professional model focused on coordination and continuity
 - Identifiable provider(s) accountable for all care provided to beneficiary
 - Joint principles:¹
 - **Personal physician**
 - **Physician-directed medical practice**
 - **Whole-person orientation**
 - **Quality and safety**
 - **Enhanced access**
 - **Value-based payment**
 - Accelerated diffusion following public- and private-payer demonstrations

¹American Academy of Family Physicians (2007)



PCMH Attributes

Care Attributes	Examples of Traditional Primary Care	PCMH Enhancements
Access	Easy access to office appointments	Communicate with clinicians electronically
		Remote access to medical records
		Access to office care during evenings & weekends
Continuity	Choice of personal physician with whom one is comfortable	Trusting relationship with primary care team
		Monitor outcomes for attributed patients
Comprehensiveness	Physician meets acute, chronic, and preventive care needs	Practice is accountable for managing care utilization
Care coordination	Primary care physician refers patient for specialized care and ensures smooth transition	Care coordinators to manage chronic illness
		Practice tracks outcomes for patients referred
Patient-centered care	Patient's personal choices are respected and documented	Care models on engagement, decision making

Saultz (2015)



NCQA PCMH Scoring System (2011)

<i>Standard and Element</i>	<i>Points</i>	<i>Factors</i>	<i>Standard and Element</i>	<i>Points</i>	<i>Factors</i>
1 Enhance Access and Continuity	20	34	4 Provide Self-Care and Community Support	9	10
A Access during office hours*	4	4	A Self-care process*	6	6
B Access after hours	4	5	B Referrals to community resources	3	4
C Electronic access	2	6	5 Track and Coordinate Care	18	25
D Continuity	2	3	A Test tracking and follow-up	6	10
E Medical home responsibilities	2	4	B Referral tracking and follow-up*	6	7
F Culturally and linguistically appropriate services	2	4	C Coordinate with facilities/care transitions	6	8
G Practice organization	4	8	6 Measure and Improve Performance	20	22
2 Identify and Manage Patient Populations	17	35	A Measures of performance	4	4
A Patient information	3	12	B Patient/family feedback	4	4
B Clinical data	4	9	C Implements continuous quality improvement*	4	4
C Comprehensive health assessment	4	10	D Demonstrates continuous quality improvement	3	4
D Using data for population management*	5	4	E Performance reporting	3	3
3 Plan and Manage Care	17	23	F Report data externally	2	3
A Implement evidence-based guidelines	4	3			
B Identify high-risk patients	3	2			
C Manage care*	4	7			
D Manage medications	3	5			
E Electronic prescribing	3	6			
			TOTAL:	100 Points	149 Factors

Recognition Levels: Level 1 (35-59 pts.); Level 2 (60-84 pts.); Level 3 (85-100 pts.)



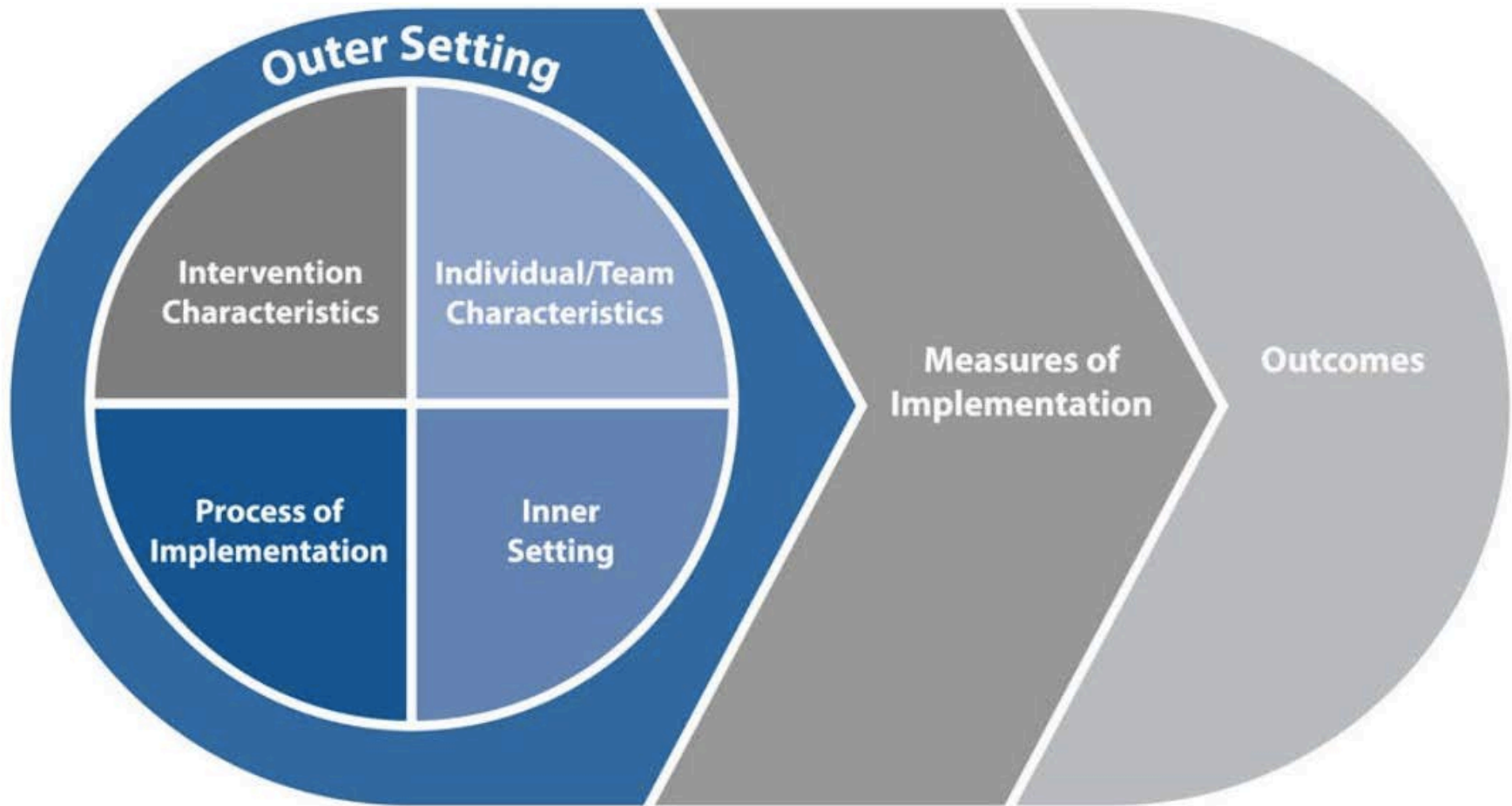
PCMH Effectiveness

- Minimal impact on quality of care, utilization, patient and provider experiences
 - 1.5% decrease in specialty care visits, 1.2% increase in cervical cancer screening, 2.3% reduction in non-pharmacy expenditure
 - Small positive effect on patient experiences (ES: -0.36 – 0.42)
 - Moderate positive effect on provider experiences (ES: 0.14 – 0.22)
- Practical, methodological issues explain underperformance
 - High prevalence of observational designs, limiting causal inference
 - Evaluation period too short for appraising long-term impacts
 - **Variability in definition and constitution of PCMH**
 - **Significant heterogeneity in reported results**

Sinaiko (2017)



Framework for Implementation Research on Patient-Centered Medical Homes



Source: Smith, L. R., Ashok, M., Dy, S. M., Wines, R. C., & Teixeira-Poit, S. (2014). Contextual frameworks for research on the implementation of complex system interventions.



Formative Evaluation of PCMH

AIM 1 (Costs)

Q1: Which patient-level and practice-level characteristics are associated with having recurrently high levels of expenditure under PCMH care?

AIM 2 (Quality)

Q2: Do practices majorly serving low-SES beneficiaries deliver higher quality of care after PCMH transformation?

AIM 3 (Access)

Q3: Which patient-level characteristics are associated with enrollment in or disenrollment from a new medical home?



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AIM 3 (Access)

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Research Questions

Q1.

Are there differences in structural characteristics and case mix between PCMHs majorly serving low-SES populations vs. PCMHs serving more affluent patients?

Q2.

Do PCMHs majorly serving low-SES populations improve in performance on quality measures relative to PCMHs with more affluent patients?



Research Hypotheses

<i>Hypothesis</i>	<i>Rationale</i>
Low-SES PCMHs would have sicker patients than higher-SES PCMHs...	Population faces more challenges from social determinants of health
...and have greater structural capabilities relative to other PCMHs	Medically complex population → more advanced PCMH features
Low-SES PCMHs would perform slightly higher on quality measures than non-PCMH comparators...	Emphasis on quality & care coordination + financial incentives; evidence from FQHCs in Timbie (2018)
...but lag in quality behind PCMHs serving more affluent populations	Lewis (2017): ACOs with a high share of minority patients may struggle with quality performance



Maryland Multi-Payor PCMH Program

3-year pilot launched in Apr. 2011 to test PCMH model in MD

- 52 practices received multi-payor support to function as medical homes
- Medicaid and 5 largest payers in MD mandated to participate

Requirements for MMPP participation:

- NCQA PCMH certification within 1 year of participation
- Care managers for high-need, complex patients
- Reporting to MHCC on pre-specified quality measures

Benefits of MMPP participation:

- Transformation payments: per-patient per-month fee semi-annually
- Shared savings from reduced costs of care, bonuses for improved quality
- Technical support & transformation coaching through Maryland Learning Collaborative



Study Population

Beneficiaries attributed to 52 MMPP PCMHs

- Patient attribution based on provider with plurality of primary care visits

Inclusion criteria:

- Non-elderly adults (18-62 years of age in 2010)
- Continuous enrollment (≥ 11 months per annum) in Medicaid or MMPP-participating commercial insurance plan

Exclusion criteria:

- Attribution to pediatric practice
- Attribution to practice with < 30 adult patients in any study year



Study Data

Administrative Sources

- Claims from providers processed by Medicaid and participating commercial payers
- Institutional and outpatient medical utilization
- Covers baseline year in 2010 (baseline year), 2011-2013 (MMPP implementation years)

Practice-Level Descriptors

- Structural and locational characteristics of practices in baseline year

Patients' Characteristics

- Demographic information
- ACG and ADG classifications for patients (2010-2013)
- Area Health Resource Files on characteristics of patient's county of residence (2010)



Study Measures

Primary independent variable

- Practice-level quartile of proportion of patients who are insured by Medicaid

Patient-level covariates

- Age category, gender, ACG resource utilization band, payer type



Study Measures

Quality outcomes

- Proportion of hospital discharges for ambulatory-care-sensitive conditions:
 - **AHRQ PQI10: Dehydration**
 - **AHRQ PQI11: Bacterial pneumonia**
 - **AHRQ PQI12: Urinary tract infection**

- Screening and prevention measures:
 - **Influenza vaccination (all adults);**
 - **Mammogram (women aged 40-64 y);**
 - **A1C, LDL, nephropathy and retinal screenings (patients with diabetes)**

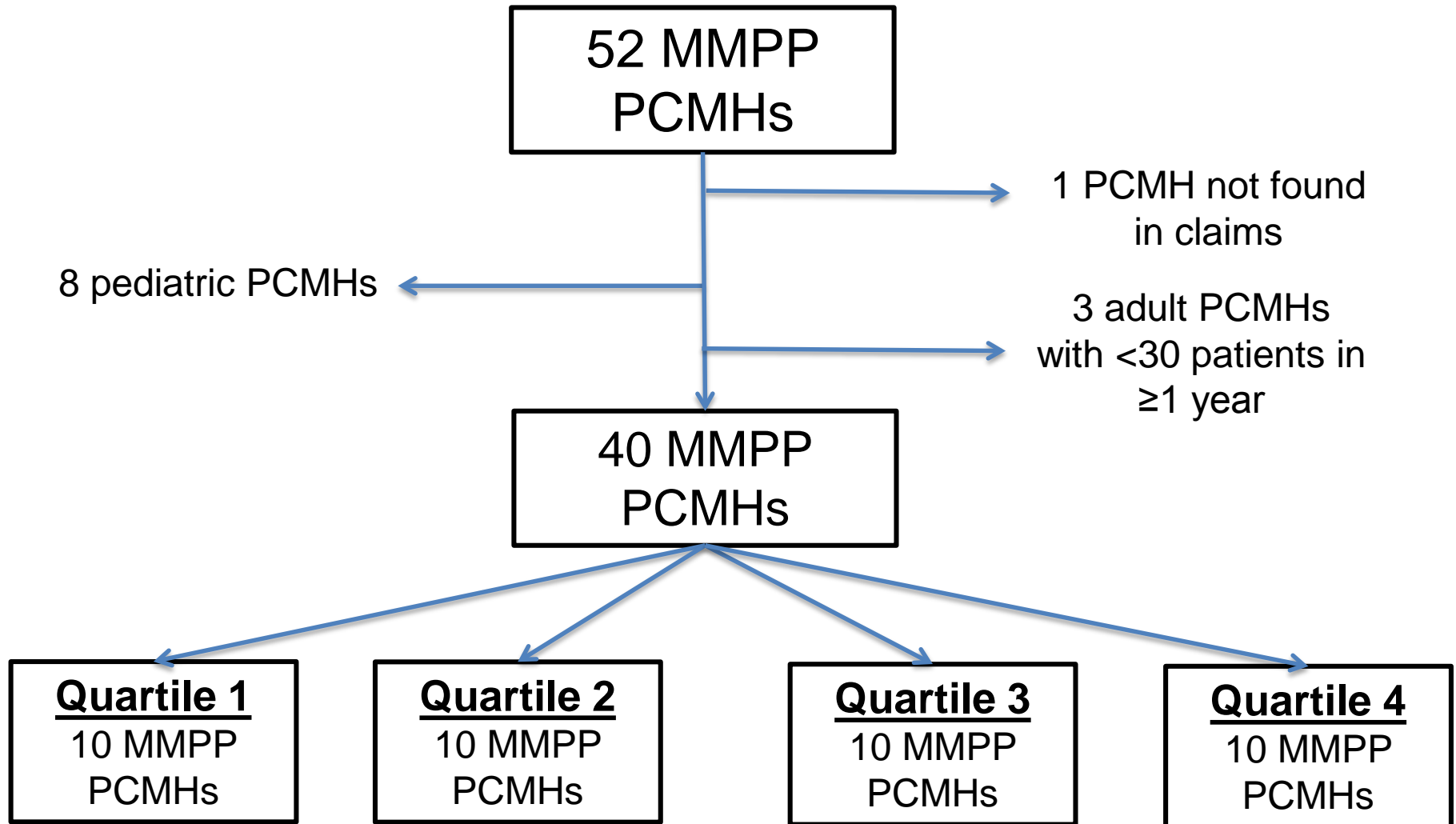


Methods

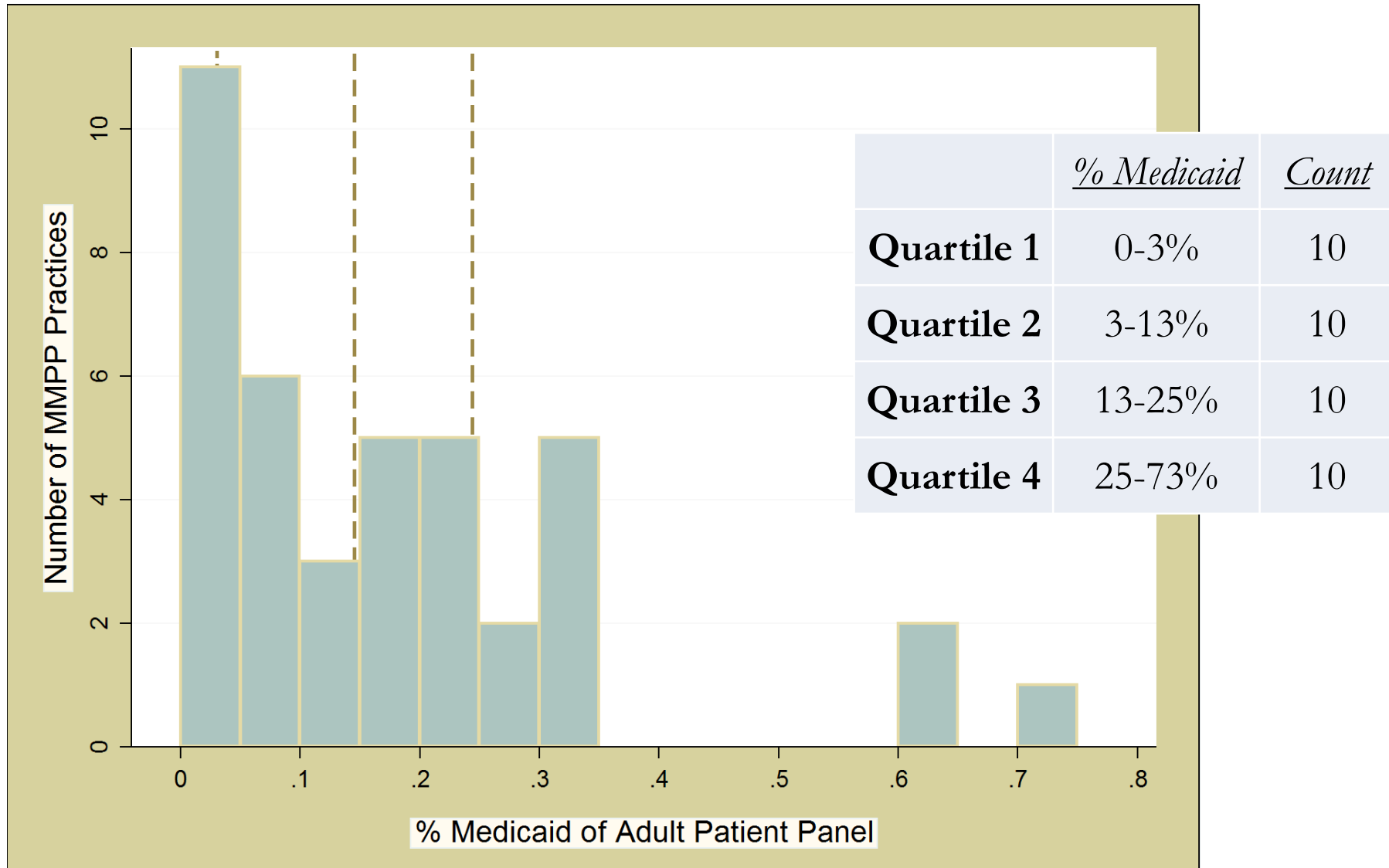
- Bivariate statistics (Kruskal-Wallis tests, χ^2 tests) to contrast characteristics of structure and patient population among PCMH quartiles
- Hierarchical linear models with difference-in-differences estimands to evaluate changes in quality performance from baseline year (2010) to subsequent periods
 - practice-level random intercepts included



Flowchart



Distribution of Medicaid Composition



Characteristics of Patient Population

	Quartile 1	Quartile 2	Quartile 3	Quartile 4	<i>P</i>
Mean patient age (years)	43.4	43.5	41.5	40.3	0.16
% Female	68.7%	61.9%	62.9%	67.0%	0.43
Population density per sq. mile (mean, SD)	1,249	680	1,343	3,064	0.24
% Urban	84.7	69.2	73.1	82.5	0.27
% Non-Hispanic Black	27.1	18.2	22.9	32.6	0.47



Characteristics of Patient Population

	Quartile 1	Quartile 2	Quartile 3	Quartile 4	<i>P</i>
Median Household Income	\$ 75,612	\$ 73,126	\$ 64,382	\$ 62,343	0.27
% Poverty	7.7	8.5	10.6	13.3	0.13
% 18-64 yrs. Uninsured	14.9	13.9	14.8	15.6	0.69
Unemployment rate (%) for 16+	7.4	7.9	8.8	9.2	0.27
Mean FQHCs	2.7	1.4	4.6	10.7	0.35



Characteristics of Patient Population

	Quartile 1	Quartile 2	Quartile 3	Quartile 4	<i>P</i>
Mean Charlson Comorbidity Score	0.38	0.41	0.50	0.67	0.004
Mean Chronic Conditions	2.0	2.0	2.1	2.3	0.32
Frailty Flag	1.6%	2.3%	2.1%	2.7%	0.02
Mean Resource Utilization Band	2.9	2.9	2.9	2.9	0.90
ADG - Chronic Medical Unstable	17.6%	18.5%	20.7%	21.6%	0.17
ADG - Malignancy	3.8%	3.6%	2.8%	3.4%	0.33
ADG - Psychosocial	2.8%	4.9%	6.7%	12.2%	<0.001
ADG - Time-Limited Major	14.2%	14.7%	16.6%	17.9%	0.03



Structural Characteristics

	Quartile 1	Quartile 2	Quartile 3	Quartile 4	<i>P</i>
Mean adult patients at baseline	1,527.7	1,251.6	624.4	1,061.3	0.40
Mean MD count	2.2	5	3	10.9	0.08
Freestanding physician office	10 (100%)	7 (70%)	6 (60%)	4 (40%)	0.37
FQHC	0	1 (10%)	0	1 (10%)	
Other clinic	0	2 (20%)	4 (40%)	5 (50%)	



Structural Characteristics

		Quartile 1	Quartile 2	Quartile 3	Quartile 4	<i>P</i>
Practice type	Solo	4 (40%)	1 (10%)	1 (10%)	1 (10%)	0.12
	Single specialty	6 (100%)	2 (20%)	3 (30%)	2 (20%)	
	Multi-specialty	0	6 (60%)	5 (50%)	6 (60%)	
Primary specialty	Family medicine	6 (60%)	5 (50%)	5 (50%)	5 (50%)	0.66
Baseline NCQA Certification Level	1	4 (40%)	1 (10%)	0	4 (40%)	0.06
	2	6 (60%)	9 (90%)	10 (100%)	6 (60%)	
NCQA Certification Level in 2013	2	4 (40%)	3 (30%)	1 (10%)	4 (40%)	0.41
	3	6 (60%)	7 (70%)	9 (90%)	6 (60%)	



Structural Characteristics

	Quartile 1	Quartile 2	Quartile 3	Quartile 4	<i>P</i>
Fully electronic EMR	7 (70%)	8 (80%)	6 (60%)	4 (40%)	0.36
E-prescribing at baseline	7 (70%)	7 (70%)	9 (90%)	9 (90%)	0.55
Care coordination at baseline	6 (60%)	9 (90%)	9 (90%)	7 (70%)	0.56
Advanced scheduling at baseline	5 (50%)	7 (70%)	5 (50%)	8 (80%)	0.55
Care management at baseline	4 (40%)	9 (90%)	9 (90%)	7 (70%)	0.15
Medication reconciliation at baseline	8 (80%)	6 (60%)	7 (70%)	9 (90%)	0.14
Residency program at baseline	3 (30%)	3 (30%)	3 (30%)	6 (60%)	0.47



Unadjusted Outcomes

		Quartile 1	Quartile 2	Quartile 3	Quartile 4
PQI#10: Admission for Dehydration	Denominator	5,209	5,006	2,947	5,517
	Baseline	0.1%	0.7%	2.9%	5.2%
	<i>Change</i>	+0.2%	+0.3%	+0.4%	-1.4%
PQI#11: Admission for Bacterial Pneumonia	Denominator	5,209	5,006	2,947	5,517
	Baseline	0.0%	0.1%	0.2%	0.4%
	<i>Change</i>	0.0%	0.0%	+0.3%	+0.1%
PQI#12: Admission for Urinary Tract Infection	Denominator	5,209	5,006	2,947	5,517
	Baseline	0.0%	0.4%	1.2%	2.3%
	<i>Change</i>	+0.1%	+0.1%	+0.2%	-0.2%



Unadjusted Outcomes

		Quartile 1	Quartile 2	Quartile 3	Quartile 4
Influenza Vaccination	Denominator	15,226	12,313	6,104	9,573
	Baseline	22.3%	25.0%	24.5%	22.1%
	<i>Change</i>	+5.6%	+4.3%	+8.0%	+7.7%
Mammogram	Denominator	5,913	4,548	2,199	2,970
	Baseline	49.4%	49.9%	46.3%	43.4%
	<i>Change</i>	+0.3%	+0.2%	+6.6%	+2.9%



Unadjusted Outcomes

		Quartile 1	Quartile 2	Quartile 3	Quartile 4
Diabetes - A1C Screening	Denominator	1,248	1,464	785	1,232
	Baseline	77.7%	74.2%	71.3%	75.6%
	<i>Change</i>	+8.4%	+10.4%	+4.3%	+9.0%
Diabetes – LDL Screening	Baseline	74.4%	75.5%	66.6%	70.5%
	<i>Change</i>	+4.8%	+1.6%	+3.1%	+3.1%
Diabetes – Nephropathy Screening	Baseline	48.7%	33.6%	49.0%	41.2%
	<i>Change</i>	-3.3%	+6.5%	-0.5%	+2.1%
Diabetes – Retinal Examination	Baseline	16.7%	18.1%	28.7%	26.5%
	<i>Change</i>	+4.6%	+3.6%	-0.4%	+2.8%



Unadjusted Outcomes

		Quartile 1	Quartile 2	Quartile 3	Quartile 4
PQI#10: Admission for Dehydration	Denominator	5,209	5,006	2,947	5,517
	Baseline	0.1%	0.7%	2.9%	5.2%
	<i>Change</i>	+0.2%	+0.3%	+0.4%	-1.4%
PQI#11: Admission for Bacterial Pneumonia	Denominator	5,209	5,006	2,947	5,517
	Baseline	0.0%	0.1%	0.2%	0.4%
	<i>Change</i>	0.0%	0.0%	+0.3%	+0.1%
PQI#12: Admission for Urinary Tract Infection	Denominator	5,209	5,006	2,947	5,517
	Baseline	0.0%	0.4%	1.2%	2.3%
	<i>Change</i>	+0.1%	+0.1%	+0.2%	-0.2%



Adjusted (Diff-in-Diff) Outcomes

	Quartile 2	Quartile 3	Quartile 4
PQI#10: Admission for Dehydration	-0.2% [-0.9% - 0.6%]	-0.1% [-0.9% - 0.8%]	-0.8% [-1.5% - -0.1%]
PQI#11: Admission for Bacterial Pneumonia	0.0% [-0.3% - 0.2%]	0.2% [-0.1% - 0.5%]	0.2% [-0.1% - 0.5%]
PQI#12: Admission for Urinary Tract Infection	-0.1% [-0.6% - 0.4%]	0.0% [-0.6% - 0.6%]	0.2% [-0.3% - 0.7%]

Estimates represent adjusted change in outcome within quartile from baseline year (2010) to three years into MMPP implementation (2013), adjusted for concurrent change within Quartile 1. 95% CI presented in braces. Cells shaded in green denote $P < 0.05$.



Adjusted (Diff-in-Diff) Outcomes

	Quartile 2	Quartile 3	Quartile 4
Influenza Vaccination	-1.3% [-2.8% - 0.1%]	2.7% [0.9% - 4.4%]	2.0% [0.5% - 3.5%]
Mammogram	1.0% [-1.6% - 3.7%]	7.2% [4.0% - 10.5%]	4.1% [1.2% - 7.1%]

Estimates represent adjusted change in outcome within quartile from baseline year (2010) to three years into MMPP implementation (2013), adjusted for concurrent change within Quartile 1. 95% CI presented in braces. Cells shaded in green denote $P < 0.05$.



Adjusted (Diff-in-Diff) Outcomes

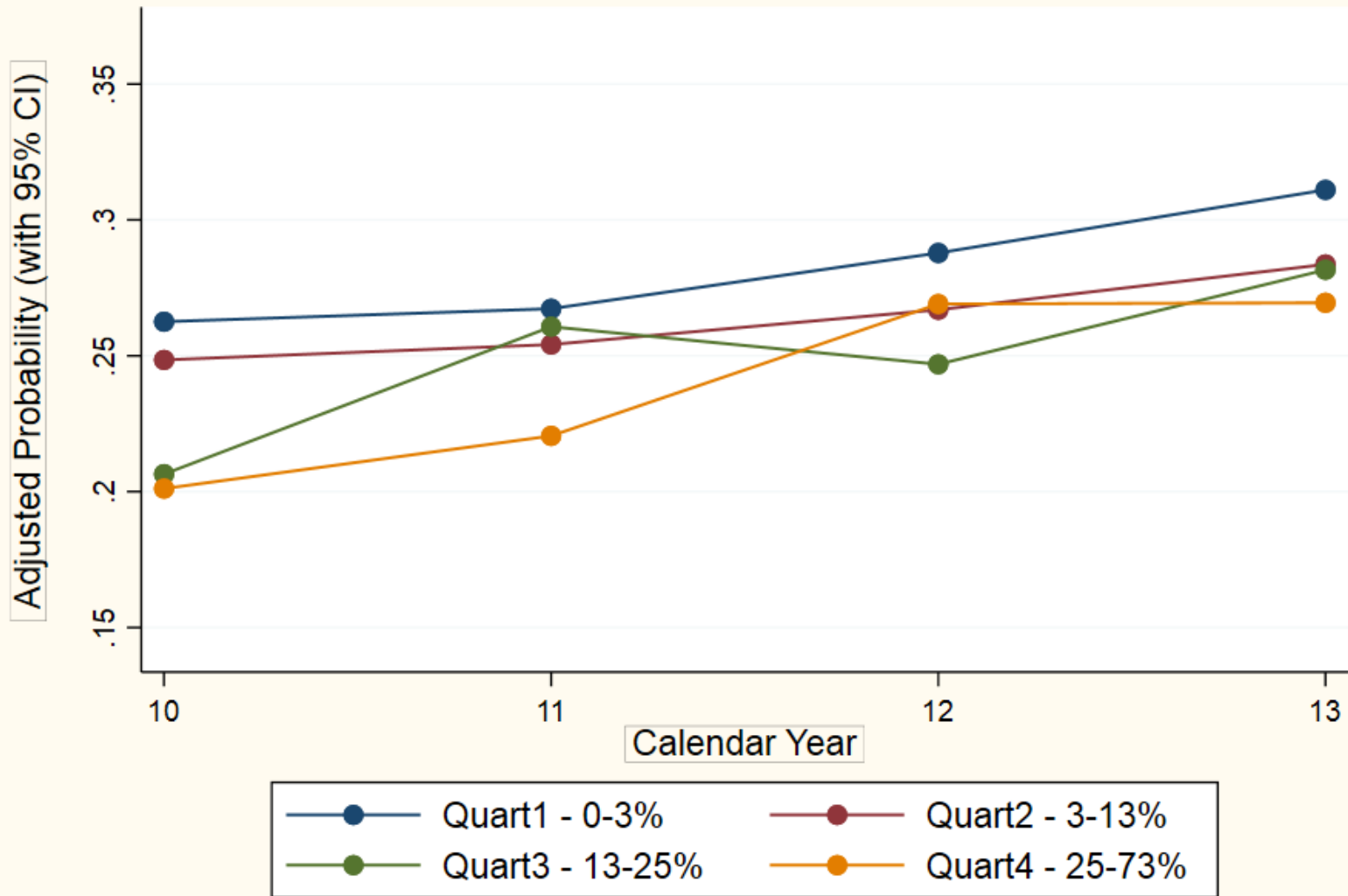
	Quartile 2	Quartile 3	Quartile 4
Diabetes - A1C	-0.7% [-5.0% - 3.6%]	1.2% [-3.1% - 5.4%]	-3.2% [-8.0% - 1.7%]
Diabetes - LDL	-2.6% [-7.1% - 2.0%]	0.2% [-5.0% - 5.4%]	-0.7% [-5.3% - 4.0%]
Diabetes - Nephropathy	8.6% [3.7% - 13.6%]	3.5% [-2.2% - 9.2%]	4.3% [-0.3% - 9.7%]
Diabetes - Retinal	-2.6% [-6.8% - 1.6%]	-5.3% [-10.1% - 0.5%]	-2.0% [-6.3% - 2.3%]

Estimates represent adjusted change in outcome within quartile from baseline year (2010) to three years into MMPP implementation (2013), adjusted for concurrent change within Quartile 1. 95% CI presented in braces. Cells shaded in green denote $P < 0.05$.



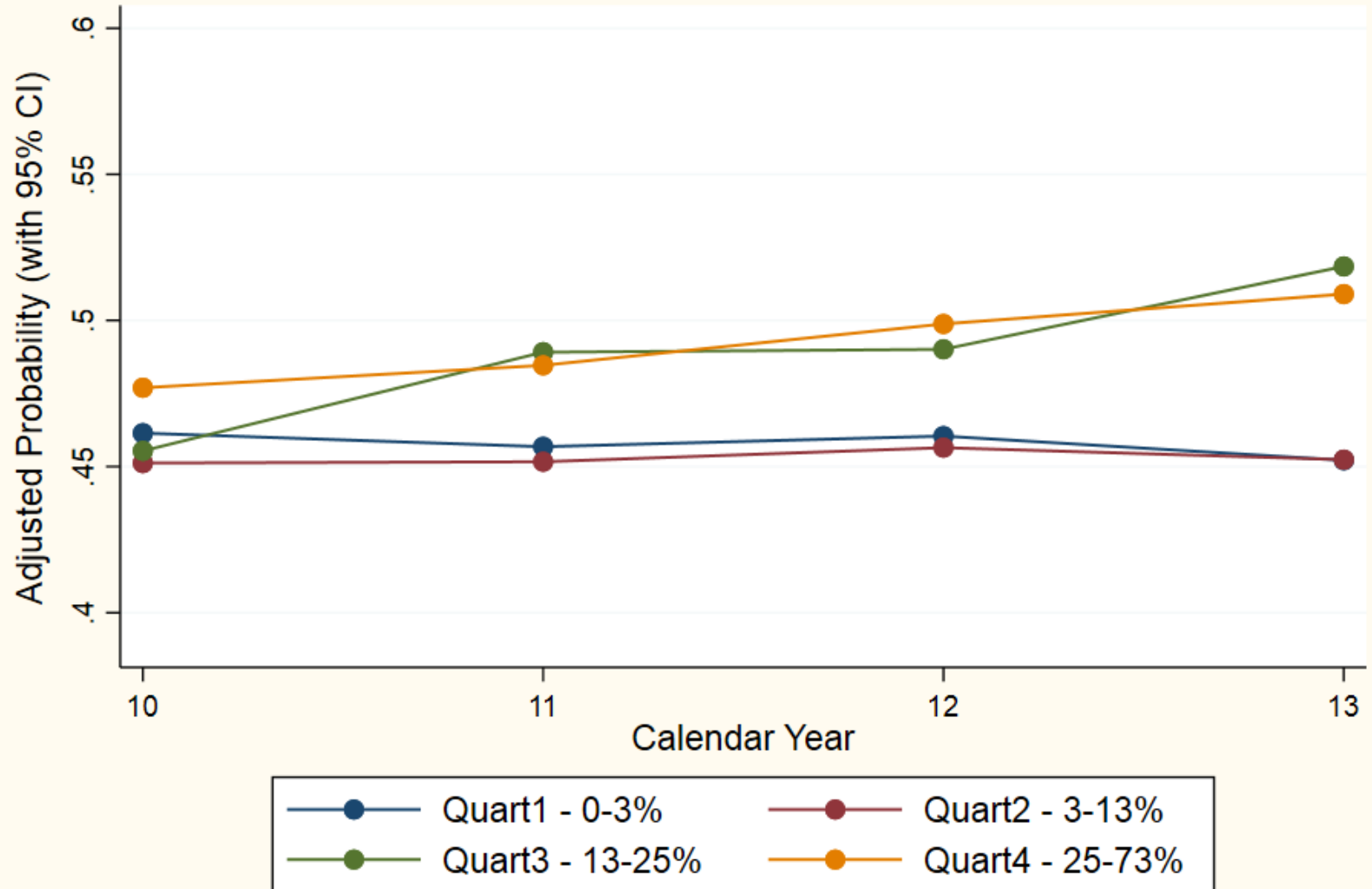
Adjusted (Diff-in-Diff) Outcomes

Adjusted Proportion of Patients Receiving Flu Vaccine



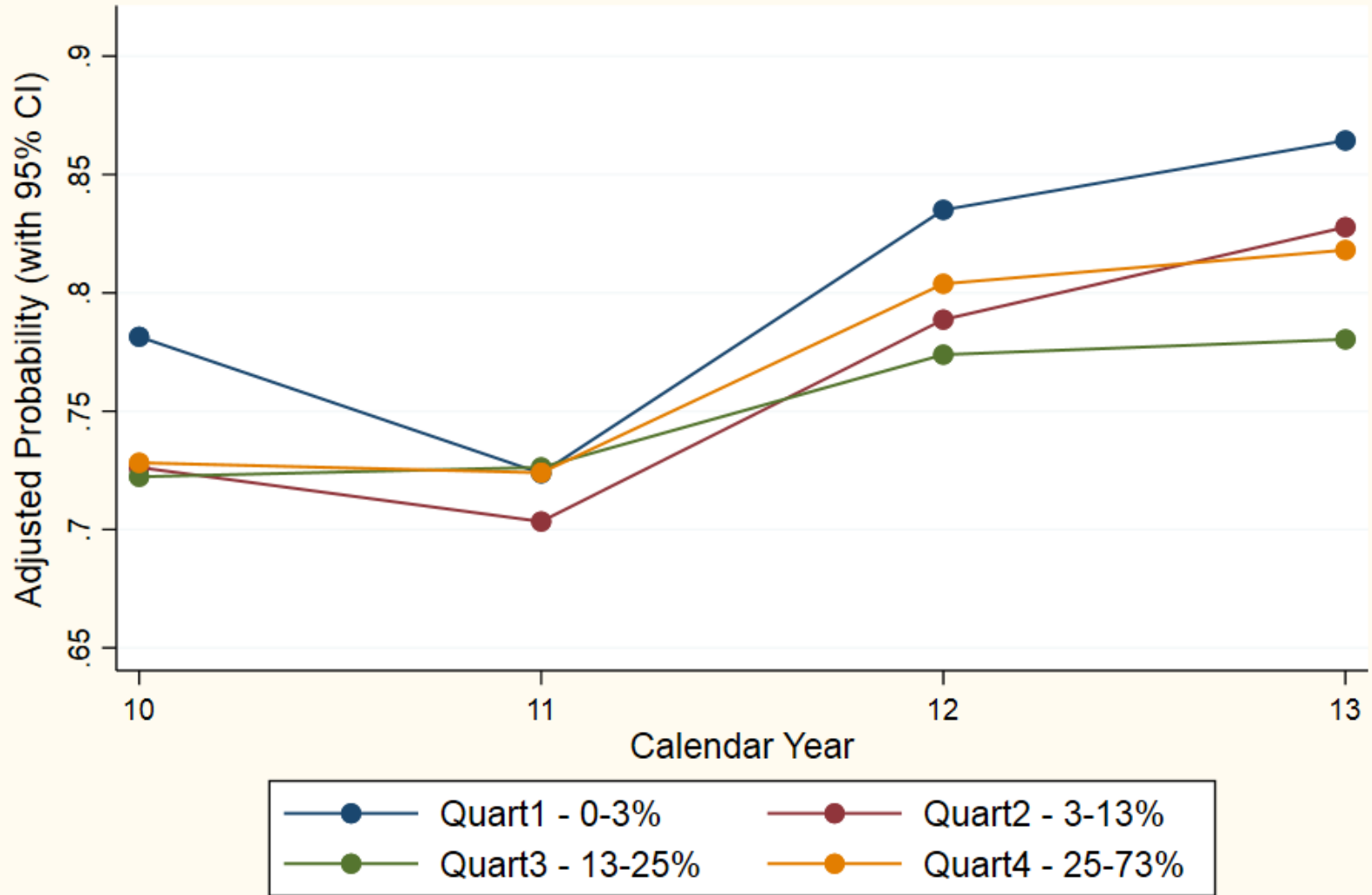
Adjusted (Diff-in-Diff) Outcomes

Adjusted Proportion of Patients Receiving Mammogram

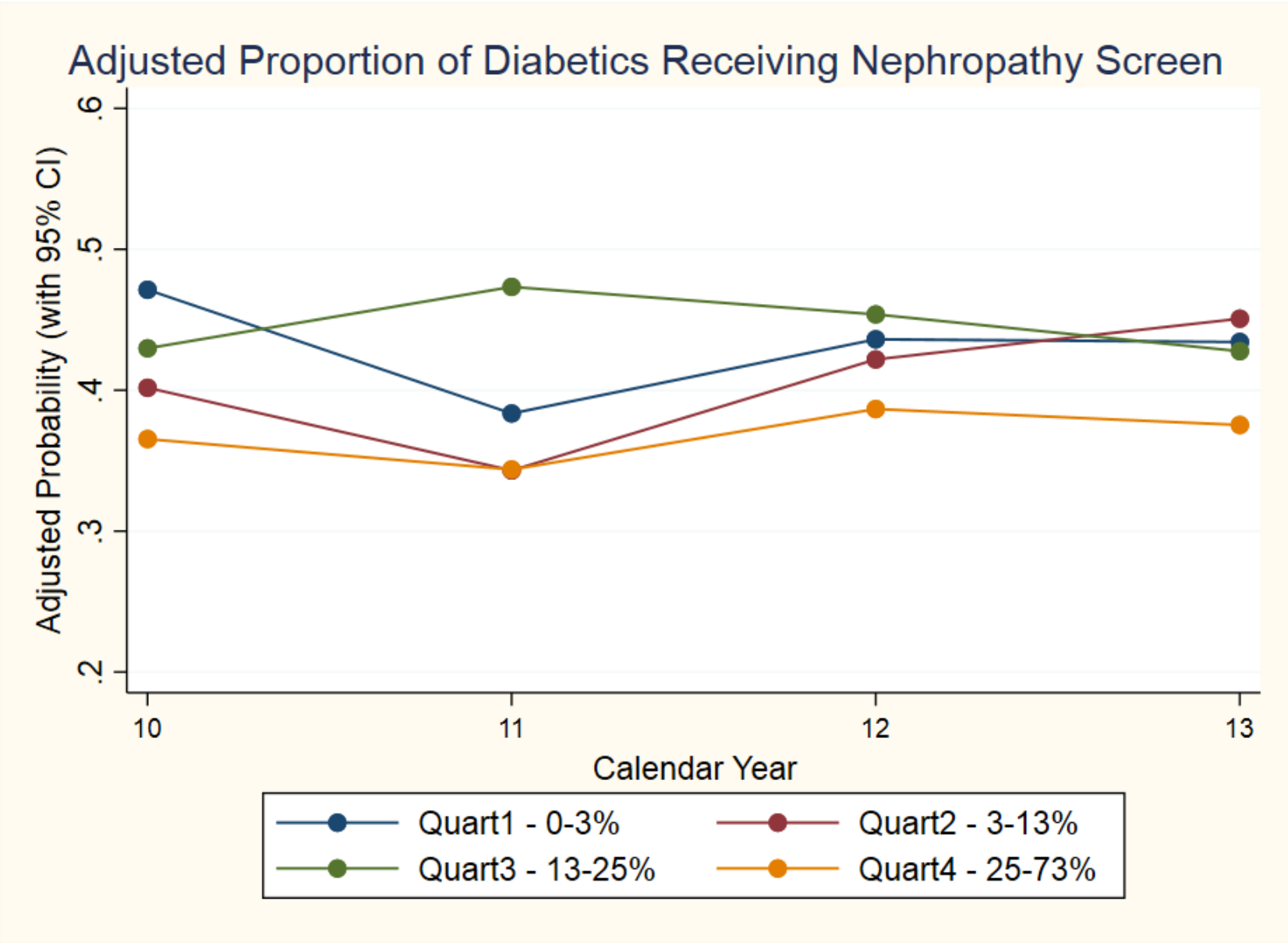


Adjusted (Diff-in-Diff) Outcomes

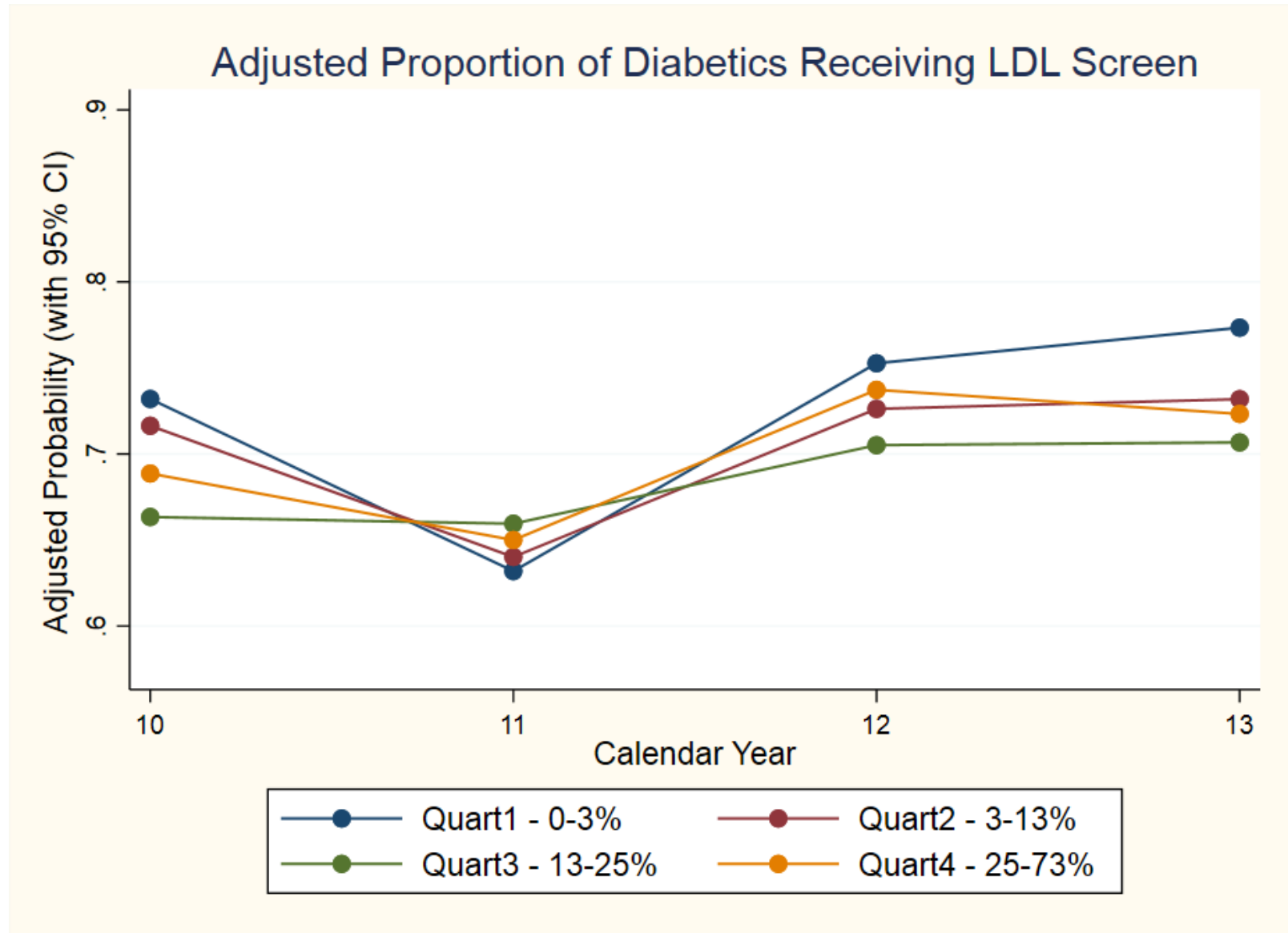
Adjusted Proportion of Diabetics Receiving A1C Screen



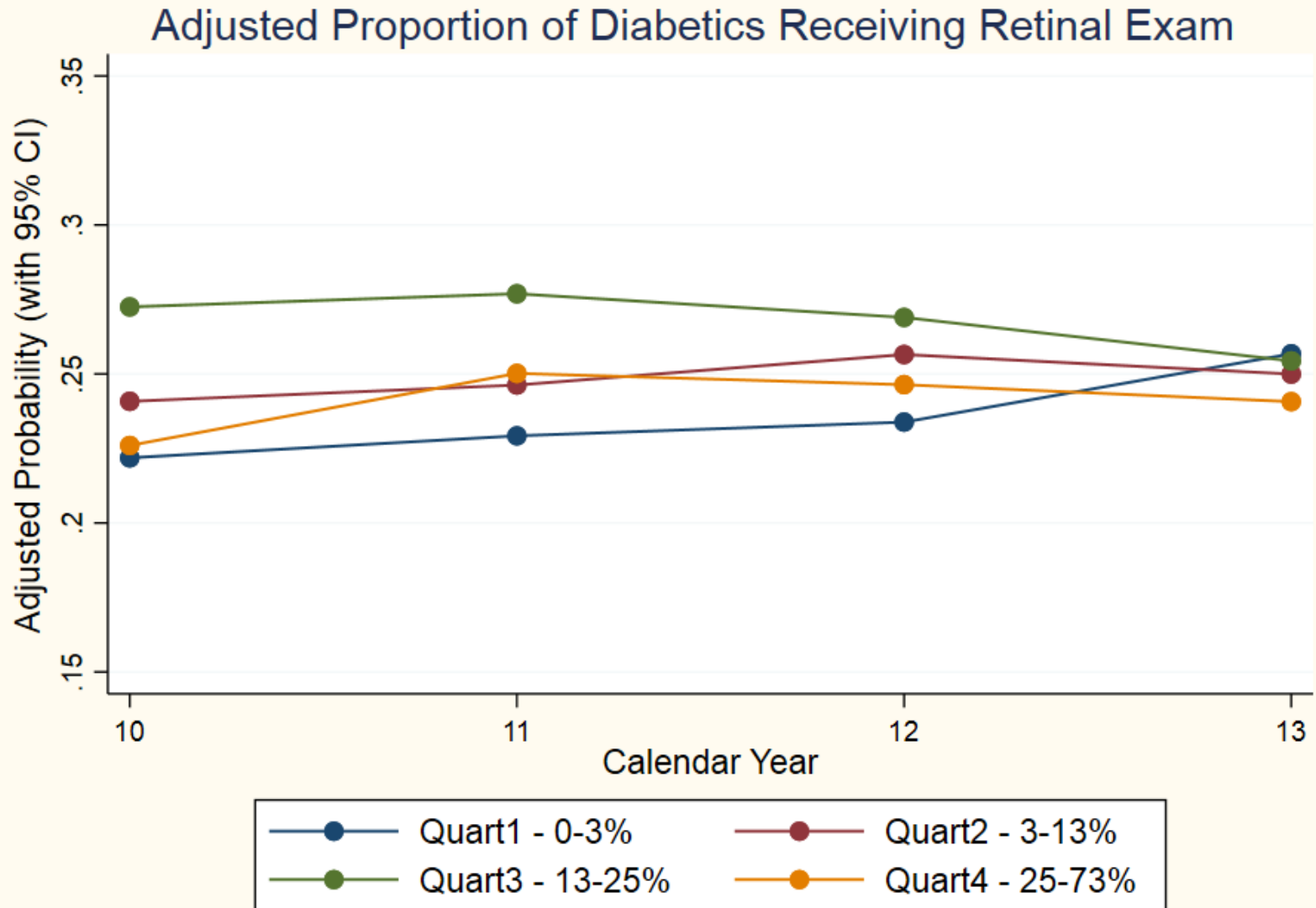
Adjusted (Diff-in-Diff) Outcomes



Adjusted (Diff-in-Diff) Outcomes

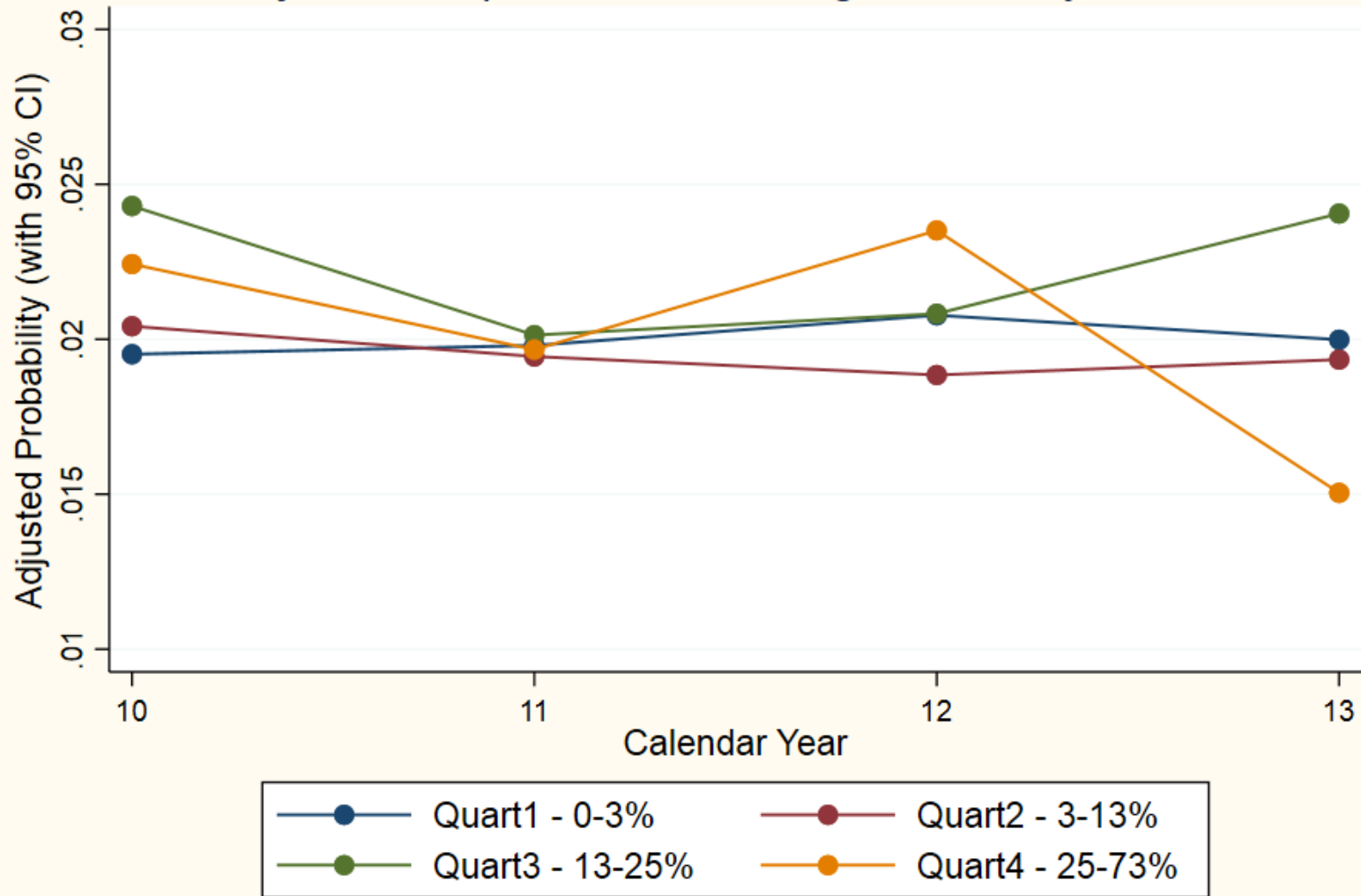


Adjusted (Diff-in-Diff) Outcomes



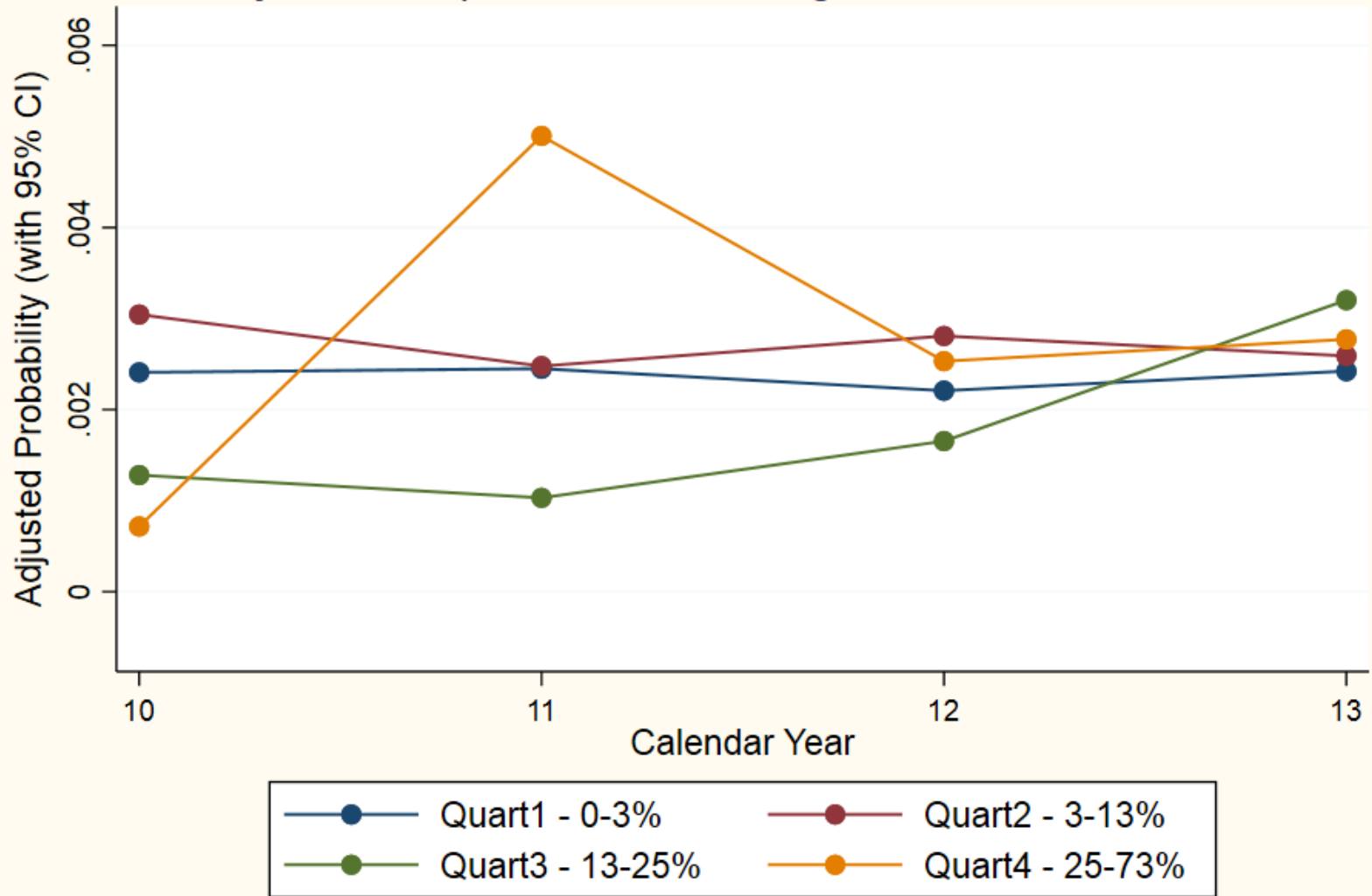
Adjusted (Diff-in-Diff) Outcomes

Adjusted Proportion of Discharges for Dehydration

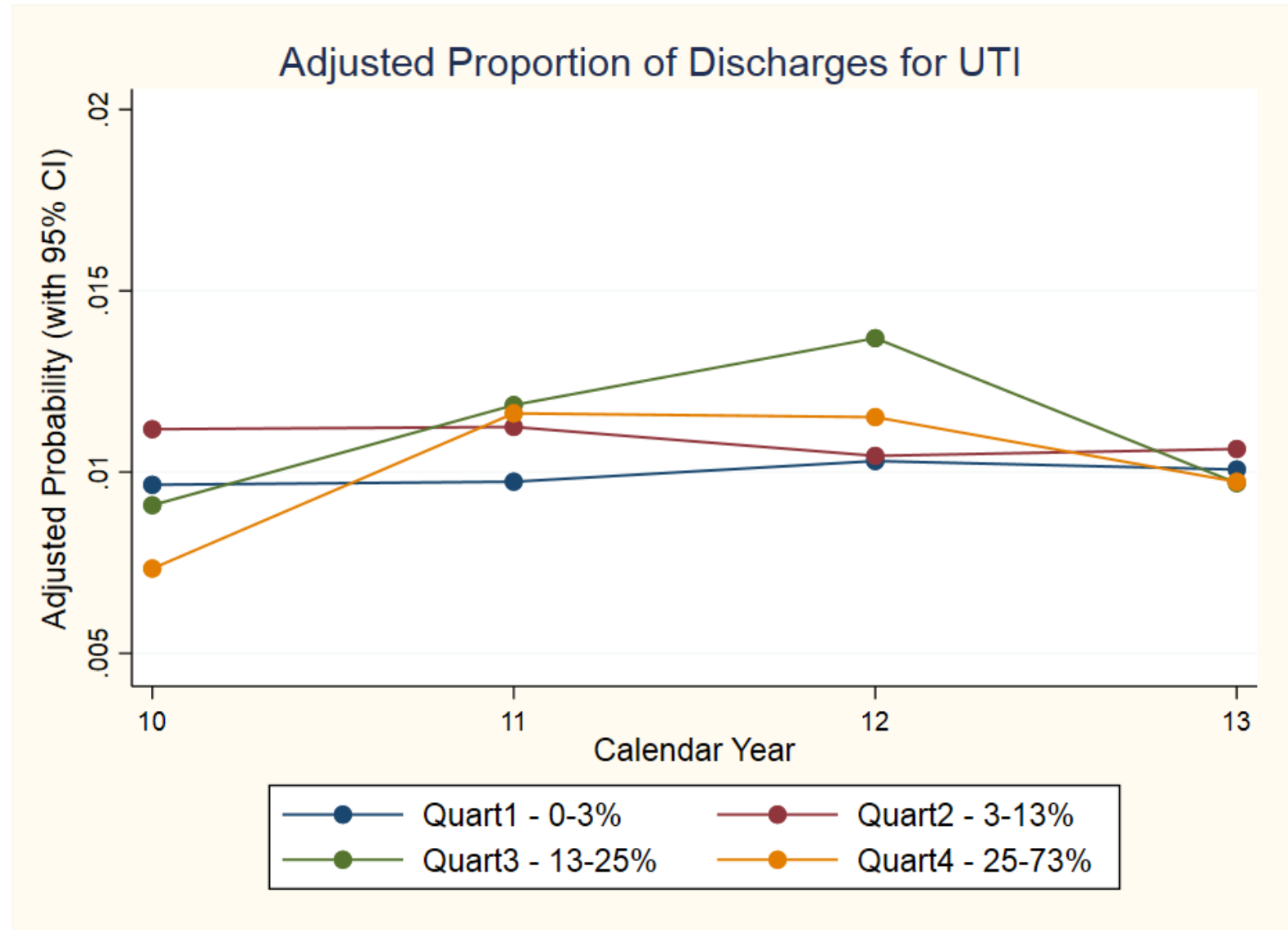


Adjusted (Diff-in-Diff) Outcomes

Adjusted Proportion of Discharges for Bac. Pneumonia



Adjusted (Diff-in-Diff) Outcomes



Conclusions

- High-Medicaid PCMHs had more medically complex patients than low-Medicaid PCMHs
 - Greater prevalence of chronic comorbidity, frailty, psychosocial, and time-limited major conditions
- No significant differences in capabilities for medical home functioning between high-Medicaid and low-Medicaid PCMHs



Conclusions

- Relative to low-Medicaid PCMHs, there was significant improvement in proportion of patients receiving influenza vaccination and mammogram in high-Medicaid PCMHs
 - No significant improvement in admissions for ambulatory-care-sensitive conditions or for diabetes screening measures
- For most measures, performance of high-Medicaid PCMHs remained below that of low-Medicaid PCMHs despite improvement in the former



Limitations

- Study sample limited to PCMHs participating in a state-specific multi-payor program
- Examined mostly process-of-care quality measures, not patient outcomes



Implications

- Multi-payor PCMH models may reduce inter-practice disparities by socioeconomic status
- High-Medicaid PCMH practices would benefit from shared savings or quality bonuses based on improvement rather than attaining benchmarks
- Research on impact of multi-payer PCMH models on disparities in outcomes between high-Medicaid and low-Medicaid practices warranted



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Thank you!

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