

Supplemental materials for:

Balasubramanian BA, Marino M, Cohen DJ, et al. Use of quality improvement strategies among small to medium-size US primary care practices. *Ann Fam Med*. 2018;16(Suppl 1):35-43.

Supplemental Table 1. Practice Survey Measures

Survey Item	Response categories
Practice Characteristics	
Practice size	Solo; 2-5; 6-10; 11-15 clinicians
Practice ownership	Clinician owned; Hospital/health system; FQHC, RHC, IHS, Federal; Other/none
Location	Urban core; Large town; Rural area; Suburban
EvidenceNOW cooperative	1-7
Medically underserved area classification	Yes/no
External Factors	
Received external incentives in prior 12 months	<p><i>During the past year, did your medical group/practice have the opportunity to receive additional income from health plans or other external entities for scoring well on measures of clinical quality, such as HEDIS and/or on measures of patient satisfaction and/or experience?</i></p> <p>Yes/no</p>
Participation in other demonstration projects	<p><i>At present or within the past 12 months, has your practice participated in any of the following payment or quality demonstration programs?: SIM, CPCI, TCPI, CHW, PCMH, Million Hearts, or other</i></p> <p>Yes (any)/no</p>
Patient Centered Medical Home recognition	Yes/no
Part of an Accountable Care Organization	<p><u><i>Groups of doctors, hospitals, or other healthcare providers who coordinate high quality care for Medicare patients with the goal of avoiding duplication of services, preventing medical errors, and ensuring appropriate care</i></u>⁶²</p> <p>Yes/no</p>
Internal Factors	
Major disruption(s) in prior 12 months	<p><i>Have there been any of the following major changes in your practice in the last 12 months? (New EHR, moved to new location, lost one or more clinicians, lost one or more office managers or head nurses, been purchased by or affiliated with a larger organization, new billing system, other)</i></p> <p>No major disruption; one major disruption; more than one major disruption</p>
Health Information Technology Characteristics	
Completely electronic EHR	Yes/no
Time on EHR	# years
ONC certified EHR	Yes/no
Participation in Meaningful Use	Not participating; stage 1; stage 1 and 2

Physical location of data	Server in practice; server in practice and copy in the cloud; in cloud with vendor; health system data warehouse; don't know
Shares patient health information electronically	<i>Do you share any patient health information (e.g., lab results, imaging reports, problem lists, medication lists) electronically (not fax) with any other providers, including hospitals, ambulatory providers, or labs?</i> Yes/no
Clinical labs incorporated as structured data	<i>Is your practice able to incorporate clinical lab-test results into EHR/EMR as structured data (i.e., data recorded in discrete fields and not in text fields)?</i> Yes/no
<u>Use of Clinical Quality Data for Reporting and Quality Improvement</u>	
Produced quality report(s) in prior 6 months	<i>Please indicate if your practice has produced quality reports on any of the following clinical quality measures in the last 6 months: IVD, hypertension, tobacco use.</i> Yes (at least 1)/no
Report CQMs at Practice level	Yes/no
Report CQMs at Clinician level	Yes/no
EHR vendor helps produce CQM reports	Yes; with restrictions; Yes; with no restrictions; No; Don't know
Outside organization helps EHR data capture	<i>Does your practice work with the following organizations/networks to support capture of EHR/Electronic Medical Record (EMR) data used to report clinical quality measures?: Clinical data warehouse, Regional extension center, Health system practice network, Health information exchange, Hospital network, External consulting group, Practice-based research network</i> Yes (any organization)/No
Ability to create CQM reports	<i>Does your practice have someone who can configure or write quality reports from the EHR/EMR?</i> No ability; In-house clinician or other staff; Outside service/consultant
Routinely discuss clinical quality data	<i>During meetings in your practice, how often – if ever – are these data or reports about clinical quality from health plans or other external entities discussed?</i> Never; Infrequently; Often; NA
<u>Use of Evidence in Practice</u>	
Use of at least one registry	<i>Please indicate the categories of patients for which your practice uses a registry or receives reports that identify services due, gaps in care, or track progress: IVD, hypertension, high cholesterol, diabetes, prevention services, and high risk patients.</i>

	Yes (any)/no
Guidelines for CVD prevention	<p><i>Please identify how your practice uses clinical guidelines for cardiovascular disease prevention (for example, use of aspirin or antithrombotics for those with ischemic vascular disease or smoking cessation counseling)</i></p> <p>No guidelines used or guidelines posted/clinicians agree to use guidelines Use of EHR prompts or standing orders</p>
Guidelines for CVD management	<p><i>Please identify how your practice uses clinical guidelines for management of patients at risk for cardiovascular disease (e.g., statin use among those at risk):</i></p> <p>No guidelines used or guidelines posted/clinicians agree to use guidelines Use of EHR prompts or standing orders</p>

Supplemental Table 2. Unadjusted and adjusted mean difference in Change Process Capability Questionnaire strategies scores by practice characteristics among 1,181 small-to-medium sized primary care practices.

	Univariable		Multivariable Final Model $R^2=22.4\%$
Characteristic	Unadjusted Mean (-28 to +28)	Unadjusted Mean Difference	Adjusted Mean Difference
Practice Characteristics			
Practice size	$R^2=1.2\%$		
<i>Solo practice</i>	8.51	Ref	
<i>2 to 5 clinicians</i>	8.94	+0.42	
<i>6 to 10 clinicians</i>	8.20	-0.32	
<i>11 or more clinicians</i>	10.06	+1.54	
<i>Missing</i>	14.20	+5.69**	
Practice ownership	$R^2=1.7\%$		
<i>Clinician owned</i>	9.93	Ref	Ref
<i>Hospital/health system</i>	8.08	-1.84*	-3.32**
<i>FQHC, RHC, IHS, Federal¹</i>	8.78	-1.14	-1.49
<i>Other/none²</i>	7.44	-2.48*	+0.62
<i>Missing</i>	15.18	5.25*	+0.96
Location ³	$R^2=1.5\%$		
<i>Urban Core</i>	10.28	Ref	Ref
<i>Large Town</i>	7.66	-2.62*	+1.29
<i>Rural area</i>	7.70	-2.58*	+0.65
<i>Suburban</i>	5.95	-4.33*	-2.13
EvidenceNOW Cooperative	$R^2=4.4\%$		
<i>1</i>	8.11	Ref	
<i>2</i>	10.90	+2.79*	
<i>3</i>	5.75	-2.37	
<i>4</i>	14.46	+6.34**	
<i>5</i>	7.89	-0.22	
<i>6</i>	7.17	-0.94	
<i>7</i>	11.12	+3.01*	
Medically Underserved Area classification	$R^2=1.2\%$		
<i>No</i>	9.06	Ref	Ref
<i>Yes</i>	8.17	-0.89	-1.52
<i>Missing</i>	12.62	+3.56*	+1.46
External Factors			
Received external incentives in prior 12 months	$R^2=0.9\%$		
<i>No</i>	7.45	Ref	Ref
<i>Yes</i>	10.14	+2.69*	+0.96
<i>Missing</i>	8.94	+1.49	-1.43
Participation in other demonstration projects ⁴	$R^2=2.9\%$		
<i>No</i>	7.72	Ref	Ref
<i>Yes</i>	10.44	+2.72**	+1.24
<i>Missing</i>	14.45	+6.73**	+3.10
Patient Centered Medical Home recognition	$R^2=0.9\%$		
<i>No</i>	8.03	Ref	

<i>Yes</i>	10.46	+2.44**	
<i>Missing</i>	9.06	+1.03	
Part of an Accountable Care Organization	$R^2=4.2\%$		
<i>No</i>	6.99	Ref	Ref
<i>Yes</i>	11.42	+4.43**	+2.74**
<i>Missing</i>	13.98	+6.98**	+2.23
Internal Factors			
Major disruption(s) in prior 12 months ⁵	$R^2=1.6\%$		
<i>No major disruption</i>	9.25	Ref	Ref
<i>One major disruption</i>	9.44	+0.19	-0.22
<i>More than one major disruption</i>	7.04	-2.21*	-2.68*
<i>Missing</i>	13.37	+4.12*	+0.33
<u>Health Information Technology Characteristics</u>			
Completely Electronic EHR ⁶	$R^2=1.2\%$		
<i>No, part paper</i>	10.45	Ref	Ref
<i>Yes</i>	8.71	-1.74	-3.59*
<i>Missing</i>	13.49	+3.04	-1.54
Time on EHR	$R^2=2.1\%$		
≤ 3 years	6.76	Ref	
4-6 years	8.92	+2.16*	
>6 years	10.41	+3.65**	
<i>Missing</i>	11.94	+5.18**	
ONC ⁷ certified EHR	$R^2=0.4\%$		
<i>No</i>	4.58	Ref	
<i>Yes</i>	9.06	+4.47	
<i>Uncertain</i>	7.86	+3.28	
<i>Missing</i>	10.49	+5.91	
Participation in Meaningful Use	$R^2=2.4\%$		
<i>Not participating</i>	6.24	Ref	
<i>Stage 1 only</i>	6.96	+0.71	
<i>Stage 1 and Stage 2</i>	9.73	+3.49**	
<i>Missing</i>	12.63	+6.38**	
Physical location of data	$R^2=0.7\%$		
<i>Server in practice</i>	8.95	Ref	
<i>In cloud with vendor</i>	9.76	+0.81	
<i>Health system data warehouse</i>	7.77	-1.18	
<i>Don't know where data resides</i>	8.59	-0.35	
<i>Missing</i>	11.27	+2.32*	
Shares patient health information electronically	$R^2=1.8\%$		
<i>No</i>	6.38	Ref	
<i>Yes</i>	9.67	+3.29**	
<i>Missing</i>	11.5	+5.12**	
Clinical labs incorporated as structured data	$R^2=0.8\%$		
<i>No</i>	6.46	Ref	
<i>Yes</i>	8.97	+2.51	
<i>Missing</i>	11.48	+5.02*	
<u>Use of Clinical Quality Data for Reporting and Quality Improvement</u>			
Produced quality report(s) in prior 6 months	$R^2=4.3\%$		
<i>No</i>	4.16	Ref	Ref
<i>Yes</i>	10.81	+6.65**	+5.09**

<i>Missing</i>	8.43	+4.27**	+2.96
Report CQM ⁸ s at Practice level	$R^2=1.8\%$		
<i>No</i>	2.74	Ref	Ref
<i>Yes</i>	9.92	+7.18**	+2.21
<i>Missing</i>	8.08	+5.34*	+5.09*
Report CQMs at Clinician level	$R^2=1.1\%$		
<i>No</i>	4.10	Ref	
<i>Yes</i>	9.78	+5.67**	
<i>Missing</i>	8.02	+3.92*	
EHR vendor helps produce CQM reports	$R^2=1.1\%$		
<i>Yes, with restrictions</i>	9.89	Ref	
<i>Yes, with no restrictions</i>	10.9	+1.01	
<i>No</i>	8.77	-1.12	
<i>Don't know</i>	7.23	-2.66*	
<i>Missing</i>	8.53	-1.36	
Outside organization helps EHR data capture	$R^2=3.6\%$		
<i>No</i>	5.95	Ref	
<i>Yes</i>	10.03	+4.08**	
<i>Missing</i>	13.59	+7.64**	
Ability to create CQM reports from EHR	$R^2=1.3\%$		
<i>No ability</i>	6.68	Ref	Ref
<i>In-house clinician or other staff</i>	10.83	+4.14*	+2.26*
<i>Outside service/consultant</i>	8.82	+2.14*	0.76
<i>Missing</i>	9.84	+3.16*	0.18
Routinely discuss clinical quality data	$R^2=7.0\%$		
<i>Never</i>	2.00	Ref	Ref
<i>Infrequently</i>	6.84	+4.84**	+1.87
<i>Often</i>	12.35	+10.35**	+5.56**
<i>NA/Solo Practice</i>	9.39	+7.39**	+4.40*
<i>Don't know</i>	8.36	+6.36**	+3.81*
<i>Missing</i>	10.47	+8.47**	+4.21*
Use of Evidence in Practice			
Use of at least one registry	$R^2=8.8\%$		
<i>No</i>	3.45	Ref	Ref
<i>Yes</i>	11.02	+7.57**	+3.74**
<i>Missing</i>	14.22	+10.77**	2.22
Guidelines for CVD ⁹ prevention or management	$R^2=8.0\%$		
<i>Not used or clinician agreement to use</i>	4.21	Ref	Ref
<i>Included in EHR prompts or standing orders</i>	11.21	+7.00**	+4.45**
<i>Missing</i>	13.88	9.67**	+0.41

*** denotes p-value<0.05; ** denotes p-value <0.001**

Note: Final multivariable model was selected using backward model selection by the Akaike information criterion (AIC). The model with the lowest AIC was preferred regardless of statistical significance for individual covariates.

¹ FQHC, RHC, HIS, federal includes Federally Qualified Health Centers, Rural Health Clinics, Indian Health Services Clinics, and VA, military, Department of Defense or other federally owned practices

² “Other/none” category includes practices with non-federal, private/non-clinicians, academic, or tribal ownership, those indicating “other” without specifying an ownership type, and practices responding “no” to every ownership type

³ Location categories determined using rural-urban commuting area (RUCA) codes

⁴ Other demonstrations programs include State Innovation Models initiative, Comprehensive Primary Care Initiative, Transforming Clinical Practice Initiative, Community Health Worker training program, BC/BS PCMH program, and Million Hearts

⁵ Major disruptions include new EHR, new billing system, moved locations, staff turnover, and purchased/affiliated with larger organization

⁶ Electronic Health Record

⁷ The Office of the National Coordinator for Health Information Technology

⁸ Clinical Quality Measure

⁹ Cardiovascular disease; Guidelines for CVD prevention and management were combined to avoid multicollinearity. A practice was categorized as 'Included in EHR prompts or standing orders' if they denoted that in either CVD prevention or CVD management or both.

Supplemental Table 3. Description of 1,489 EvidenceNOW Practices stratified by those with complete data on (CPCQ) Strategies Scores (N=1,181) and those with missing CPCQ strategies scores (N=308).

Practice Characteristics, n (%)	Complete CPCQ Data (N=1,181)	Missing CPCQ Data (N=308)	Total CPCQ Data (N=1,489)
Practice size			
<i>Solo practice</i>	241 (20.4)	113 (36.7)	354 (23.8)
<i>2 to 5 clinicians</i>	558 (47.2)	137 (44.5)	695 (46.7)
<i>6 to 10 clinicians</i>	174 (14.7)	31 (10.1)	205 (13.8)
<i>11 or more clinicians</i>	143 (12.1)	17 (5.5)	160 (10.7)
<i>Missing</i>	65 (5.5)	10 (3.2)	75 (5.0)
Practice ownership			
<i>Clinician owned</i>	436 (36.9)	165 (53.6)	601 (40.4)
<i>Hospital/health system</i>	275 (23.3)	67 (21.8)	342 (23.0)
<i>FQHC, RHC, IHS, Federal¹</i>	286 (24.2)	35 (11.4)	321 (21.6)
<i>Other/none²</i>	133 (11.3)	33 (10.7)	166 (11.1)
<i>Missing</i>	51 (4.3)	8 (2.6)	59 (4.0)
Location ³			
<i>Urban core</i>	733 (62.1)	213 (69.2)	946 (63.5)
<i>Large town</i>	171 (14.5)	29 (9.4)	200 (13.4)
<i>Rural area</i>	191 (16.2)	44 (14.3)	235 (15.8)
<i>Suburban</i>	86 (7.3)	21 (6.8)	107 (7.2)
<i>Missing</i>	0 (0.0)	1 (0.3)	1 (0.3)
Medically Underserved Area classification			
<i>No</i>	633 (53.6)	175 (56.8)	808 (54.3)
<i>Yes</i>	410 (34.7)	83 (26.9)	493 (33.1)
<i>Missing</i>	138 (11.7)	50 (16.2)	188 (12.6)
External Factors			
Received external incentives in prior 12 months			
<i>No</i>	303 (25.7)	79 (25.6)	382 (25.7)
<i>Yes</i>	602 (51.0)	141 (45.8)	743 (49.9)
<i>Missing</i>	276 (23.4)	88 (28.6)	364 (24.4)
Participation in other demonstration projects ⁴			
<i>No</i>	707 (59.9)	204 (66.2)	911 (61.2)
<i>Yes</i>	369 (31.2)	71 (23.1)	440 (29.6)
<i>Missing</i>	105 (8.9)	33 (10.7)	138 (9.3)
Patient Centered Medical Home recognition			
<i>No</i>	530 (44.9)	159 (51.6)	689 (46.3)
<i>Yes</i>	481 (40.7)	94 (30.5)	575 (38.6)
<i>Missing</i>	170 (14.4)	55 (17.9)	225 (15.1)
Part of an Accountable Care Organization			

<i>No</i>	648 (54.9)	174 (56.5)	822 (55.2)
<i>Yes</i>	452 (38.3)	109 (35.4)	561 (37.7)
<i>Missing</i>	81 (6.9)	25 (8.1)	106 (7.1)
Internal Factors			
Major disruption(s) in prior 12 months ⁵			
<i>No major disruption</i>	433 (36.7)	151 (49.0)	584 (39.2)
<i>One major disruption</i>	412 (34.9)	94 (30.5)	506 (34.0)
<i>More than one major disruption</i>	246 (20.8)	47 (15.3)	293 (19.7)
<i>Missing</i>	90 (7.6)	16 (5.2)	106 (7.1)
<u>Health Information Technology Characteristics</u>			
Completely Electronic EHR ⁶			
<i>No</i>	60 (5.1)	18 (5.8)	78 (5.2)
<i>Yes</i>	1030 (87.2)	268 (87.0)	1298 (87.2)
<i>Missing</i>	91 (7.7)	22 (7.1)	113 (7.6)
Time on EHR			
<i>≤ 3 years</i>	324 (27.4)	72 (23.4)	396 (26.6)
<i>4-6 years</i>	344 (29.1)	111 (36.0)	455 (30.6)
<i>>6 years</i>	365 (30.9)	60 (19.5)	425 (28.5)
<i>Missing</i>	148 (12.5)	65 (21.1)	213 (14.3)
ONC ⁷ Certified EHR			
<i>No</i>	12 (1.0)	3 (1.0)	15 (1.0)
<i>Yes</i>	972 (82.3)	241 (78.2)	1213 (81.5)
<i>Uncertain</i>	37 (3.1)	8 (2.6)	45 (3.0)
<i>Missing</i>	160 (13.5)	56 (18.2)	216 (14.5)
Participation in Meaningful Use			
<i>Not participating</i>	189 (16.0)	41 (13.3)	230 (15.4)
<i>Stage 1 only</i>	139 (11.8)	36 (11.7)	175 (11.8)
<i>Stage 1 and Stage 2</i>	722 (61.1)	164 (53.2)	886 (59.5)
<i>Missing</i>	131 (11.1)	67 (21.8)	198 (13.3)
Physical location of data			
<i>Server in practice</i>	436 (36.9)	92 (29.9)	528 (35.5)
<i>In cloud with vendor</i>	246 (20.8)	85 (27.6)	331 (22.2)
<i>Health system data warehouse</i>	229 (19.4)	42 (13.6)	271 (18.2)
<i>Don't know where data resides</i>	111 (9.4)	25 (8.1)	136 (9.1)
<i>Missing</i>	159 (13.5)	64 (20.8)	223 (15.0)
Shares patient health information electronically			
<i>No</i>	266 (22.5)	72 (23.4)	338 (22.7)
<i>Yes</i>	762 (64.5)	169 (54.9)	931 (62.5)
<i>Missing</i>	153 (13.0)	67 (21.8)	220 (14.8)
Clinical labs incorporated as structured data			
<i>No</i>	61 (5.2)	16 (5.2)	77 (5.2)
<i>Yes</i>	965 (81.7)	223 (72.4)	1188 (79.8)
<i>Missing</i>	155 (13.1)	69 (22.4)	224 (15.0)
<u>Use of Clinical Quality Data for Reporting and Quality Improvement</u>			
Produced CQM report(s) in prior 6 months			
<i>No</i>	209 (17.7)	51 (16.6)	260 (17.5)

<i>Yes</i>	741 (62.7)	157 (51.0)	898 (60.3)
<i>Missing</i>	231 (19.6)	100 (32.5)	331 (22.2)
Report CQM ⁸ s at Practice level			
<i>No</i>	58 (4.9)	12 (3.9)	70 (4.7)
<i>Yes</i>	867 (73.4)	183 (59.4)	1050 (70.5)
<i>Missing</i>	256 (21.7)	113 (36.7)	369 (24.8)
Report CQMs at Clinician level			
<i>No</i>	49 (4.1)	13 (4.2)	62 (4.2)
<i>Yes</i>	881 (74.6)	183 (59.4)	1064 (71.5)
<i>Missing</i>	251 (21.3)	112 (36.4)	363 (24.4)
EHR vendor helps produce CQM reports			
<i>Yes, with restrictions</i>	226 (19.1)	64 (20.8)	290 (19.5)
<i>Yes, with no restrictions</i>	287 (24.3)	55 (17.9)	342 (23.0)
<i>No</i>	163 (13.8)	30 (9.7)	193 (13.0)
<i>Don't know</i>	211 (17.9)	53 (17.2)	264 (17.7)
<i>Missing</i>	294 (24.9)	106 (34.4)	400 (26.9)
Outside organization helps EHR data capture			
<i>No</i>	343 (29.0)	139 (45.1)	482 (32.4)
<i>Yes</i>	731 (61.9)	145 (47.1)	876 (58.8)
<i>Missing</i>	107 (9.1)	24 (7.8)	131 (8.8)
Ability to create CQM reports			
<i>No ability</i>	206 (17.4)	82 (26.6)	288 (19.3)
<i>In-house clinician or other staff</i>	305 (25.8)	75 (24.4)	380 (25.5)
<i>Outside service/consultant writes reports</i>	438 (37.1)	76 (24.7)	514 (34.5)
<i>Missing</i>	232 (19.6)	75 (24.4)	307 (20.6)
Routinely discuss clinical quality data			
<i>Never</i>	115 (9.7)	26 (8.4)	141 (9.5)
<i>Infrequently</i>	294 (24.9)	51 (16.6)	345 (23.2)
<i>Often</i>	425 (36.0)	78 (25.3)	503 (33.8)
<i>NA/Solo practice</i>	83 (7.0)	46 (14.9)	129 (8.7)
<i>Don't Know</i>	98 (8.3)	41 (13.3)	139 (9.3)
<i>Missing</i>	166 (14.1)	66 (21.4)	232 (15.6)
<u>Use of Evidence in Practice</u>			
Use of at least one registry			
<i>No</i>	322 (27.3)	136 (44.2)	458 (30.8)
<i>Yes</i>	781 (66.1)	151 (49.0)	932 (62.6)
<i>Missing</i>	78 (6.6)	21 (6.8)	99 (6.6)
Guidelines for CVD ⁹ prevention			
<i>Not used or clinician agreement to use</i>	390 (33.0)	122 (39.6)	512 (34.4)
<i>Included in EHR prompts or standing orders</i>	719 (60.9)	167 (54.2)	886 (59.5)
<i>Missing</i>	72 (6.1)	19 (6.2)	91 (6.1)
Guidelines for CVD management			
<i>Not used or clinician agreement to use</i>	436 (36.9)	136 (44.2)	572 (38.4)
<i>Included in EHR prompts or standing orders</i>	673 (57.0)	153 (49.7)	826 (55.5)
<i>Missing</i>	72 (6.1)	19 (6.2)	91 (6.1)

¹ FQHC, RHC, HIS, federal includes Federally Qualified Health Centers, Rural Health Clinics, Indian Health Services Clinics, and VA, military, Department of Defense or other federally owned practices

² “Other/none” category includes practices with non-federal, private/non-clinicians, academic, or tribal ownership, those indicating “other” without specifying an ownership type, and practices responding “no” to every ownership type

³ Location categories determined using rural-urban commuting area (RUCA) codes

⁴ Other demonstrations programs include State Innovation Models initiative, Comprehensive Primary Care Initiative, Transforming Clinical Practice Initiative, Community Health Worker training program, BC/BS PCMH program, and Million Hearts

⁵ Major disruptions include new EHR, new billing system, moved locations, staff turnover, and purchased/affiliated with larger organization

⁶ Electronic Health Record

⁷ The Office of the National Coordinator for Health Information Technology

⁸ Clinical Quality Measure

⁹ Cardiovascular disease

Supplemental Table 4. Association between practice characteristics and Change Process Capability Questionnaire (CPCQ) strategies scores among 1,489 of small-to-medium sized primary care practices after multiple imputation.

	Univariable		Multivariable Model $R^2=18.6\%$
Characteristic	Unadjusted Mean (-28 to +28)	Unadjusted Mean Difference	Adjusted Mean Difference
Practice Characteristics			
Practice size	$R^2=0.2\%$		
<i>Solo practice</i>	8.51	Ref	
<i>2 to 5 clinicians</i>	8.67	+0.16	
<i>6 to 10 clinicians</i>	8.14	-0.37	
<i>11 or more clinicians</i>	10.27	+1.76	
Practice ownership	$R^2=0.6\%$		
<i>Clinician owned</i>	9.54	Ref	Ref
<i>Hospital/health system</i>	7.81	-1.72*	-2.78*
<i>FQHC, RHC, IHS, Federal¹</i>	9.05	-0.48	-1.50
<i>Other/none²</i>	6.99	-2.54*	-0.04
Location ³	$R^2=0.8\%$		
<i>Urban core</i>	9.57	Ref	Ref
<i>Large town</i>	7.67	-1.90	+1.57
<i>Rural area</i>	7.13	-2.44*	+0.39
<i>Suburban</i>	6.87	-2.70*	-1.04
EvidenceNOW Cooperative	$R^2=3.9\%$		
<i>1</i>	7.73	Ref	
<i>2</i>	10.90	+3.18*	
<i>3</i>	5.22	-2.50*	
<i>4</i>	12.16	+4.43**	
<i>5</i>	7.41	-0.32	
<i>6</i>	6.92	-0.81	
<i>7</i>	11.70	+3.97*	
Medically Underserved Area classification	$R^2=0.1\%$		
<i>No</i>	9.01	Ref	Ref
<i>Yes</i>	8.27	-0.74	-1.15
External Factors			
Received external incentives in prior 12 months	$R^2=1.4\%$		
<i>No</i>	6.76	Ref	Ref
<i>Yes</i>	9.79	+3.03**	+1.02
Participation in other demonstration projects ⁴	$R^2=1.4\%$		
<i>No</i>	7.72	Ref	Ref
<i>Yes</i>	10.80	+3.08**	+1.14
Patient Centered Medical Home recognition	$R^2=1.3\%$		
<i>No</i>	7.46	Ref	
<i>Yes</i>	10.29	+2.83**	
Part of an Accountable Care Organization	$R^2=2.0\%$		
<i>No</i>	7.24	Ref	Ref
<i>Yes</i>	10.82	+3.58**	+2.29*
Internal Factors			

Major disruption(s) in prior 12 months ⁵	$R^2=0.3\%$		
<i>No major disruption</i>	8.84	Ref	Ref
<i>One major disruption</i>	9.32	+0.48	+0.08
<i>More than one major disruption</i>	7.53	-1.31	-1.63
<u>Health Information Technology Characteristics</u>			
Completely Electronic EHR ⁶	$R^2=0.2\%$		
<i>No, part paper</i>	10.62	Ref	Ref
<i>Yes</i>	8.60	-2.02	-3.13*
Time on EHR	$R^2=1.1\%$		
<i>≤ 3 years</i>	7.13	Ref	
<i>4-6 years</i>	8.53	+1.40	
<i>> 6 years</i>	10.38	+3.25**	
ONC ⁷ Certified EHR	$R^2=0.1\%$		
<i>No</i>	7.45	Ref	
<i>Yes</i>	8.73	+1.27	
<i>Uncertain</i>	9.36	+1.91	
Participation in Meaningful Use	$R^2=0.6\%$		
<i>Not participating</i>	7.57	Ref	
<i>Stage 1 only</i>	7.26	-0.31	
<i>Stage 1 and Stage 2</i>	9.41	+1.85	
Physical location of data	$R^2=0.3\%$		
<i>Server in practice</i>	8.74	Ref	
<i>In cloud with vendor</i>	9.51	+0.78	
<i>Health system data warehouse</i>	7.65	-1.09	
<i>Don't know where data resides</i>	8.85	+0.11	
Shares patient health information electronically	$R^2=1.8\%$		
<i>No</i>	6.05	Ref	
<i>Yes</i>	9.78	+3.73**	
Clinical labs incorporated as structured data	$R^2=0.6\%$		
<i>No</i>	5.41	Ref	
<i>Yes</i>	9.03	+3.61*	
<u>Use of Clinical Quality Data for Reporting and Quality Improvement</u>			
Produced quality report(s) in prior 6 months	$R^2=4.4\%$		
<i>No</i>	4.41	Ref	Ref
<i>Yes</i>	10.30	+5.89**	+3.67*
Report CQM ⁸ s at Practice level	$R^2=1.9\%$		
<i>No</i>	5.66	Ref	Ref
<i>Yes</i>	9.70	+4.05**	-1.96
Report CQMs at Clinician level	$R^2=1.7\%$		
<i>No</i>	5.76	Ref	
<i>Yes</i>	9.63	+3.87**	
EHR vendor helps produce CQM reports	$R^2=2.1\%$		
<i>Yes, with restrictions</i>	9.91	Ref	
<i>Yes, with no restrictions</i>	10.68	+0.77	
<i>No</i>	8.15	-1.76	
<i>Don't know</i>	6.29	-3.62**	
Outside organization helps EHR data capture	$R^2=2.5\%$		
<i>No</i>	6.14	Ref	
<i>Yes</i>	10.23	+4.09**	
Ability to create CQM reports	$R^2=1.3\%$		
<i>No ability</i>	6.80	Ref	Ref

<i>In-house clinician or other staff</i>	10.50	+3.70**	+2.33*
<i>Outside service/consultant</i>	8.66	+1.85*	+0.66
Routinely discuss clinical quality data	$R^2=7.6\%$		
<i>Never</i>	2.01	Ref	Ref
<i>Infrequently</i>	6.71	+4.70**	+2.41*
<i>Often</i>	12.51	+10.50**	+6.34**
<i>NA/Solo Practice</i>	8.79	+6.78**	+4.50*
<i>Don't know</i>	8.00	+5.99**	+4.25*
<u>Use of Evidence in Practice</u>	$R^2=7.6\%$		
Use of at least one registry	$R^2=7.6\%$		
<i>No</i>	3.81	Ref	Ref
<i>Yes</i>	11.12	+7.31**	+3.49**
Guidelines for CVD ⁹ prevention or management	$R^2=7.0\%$		
<i>Not used or clinician agreement to use</i>	4.22	Ref	Ref
<i>Included in EHR prompts or standing orders</i>	11.11	+6.88**	+4.20**

* denotes p-value<0.05; ** denotes p-value <0.01

Note: The Final multivariable model was selected using backward model selection by the Akaike Information Criterion (AIC) using the completely observed data. We used multiple imputation by chained equations to account for missing data in outcome and independent variables. Specifically, we employed a fully conditional specification using the *mice* package in R to produce 30 imputed data sets. Each imputation model used all the variables in the analysis. Because all variables were categorical, logistic and polytomous regression were specified as the conditional distribution for the missing columns given the rest of the variables. Additionally, individual items for the CPCQ Strategies Scale were imputed and for each imputed data set, CPCQ strategies scores were estimated by summing across the 14 CPCQ items. The univariable and multivariable models were performed on each imputed data set and estimates across the 30 imputed data sets were combined using Rubin's rules through the *pool()* function in *mice*. Lastly, to combine estimates of R^2 across imputed models, we utilized the *pool.r.squared()* function in *mice*. The model with the lowest AIC was preferred regardless of statistical significance for individual covariates.

¹ FQHC, RHC, HIS, federal includes Federally Qualified Health Centers, Rural Health Clinics, Indian Health Services Clinics, and VA, military, Department of Defense or other federally owned practices

² "Other/none" category includes practices with non-federal, private/non-clinicians, academic, or tribal ownership, those indicating "other" without specifying an ownership type, and practices responding "no" to every ownership type

³ Location categories determined using rural-urban commuting area (RUCA) codes

⁴ Other demonstrations programs include State Innovation Models initiative, Comprehensive Primary Care Initiative, Transforming Clinical Practice Initiative, Community Health Worker training program, BC/BS PCMH program, and Million Hearts

⁵ Major disruptions include new EHR, new billing system, moved locations, staff turnover, and purchased/affiliated with larger organization

⁶ Electronic Health Record

⁷ The Office of the National Coordinator for Health Information Technology

⁸ Clinical Quality Measure

⁹ Cardiovascular disease; Guidelines for CVD prevention and management were combined to avoid multicollinearity. A practice was categorized as 'Included in EHR prompts or standing orders' if they denoted that in either CVD prevention or CVD management or both.