

Appendix to Accompany

Are Changes in Medical Group Practice Characteristics Over Time Associated with Medicare Spending and Quality of Care?

1. Attributing Beneficiaries to Practices

Following the Center for Medicare and Medicaid Services (CMS) method for assigning beneficiaries to ACOs [1] we used Part B Outpatient and Carrier file Medicare claims for 2012 to identify beneficiaries who had any primary care service with a physician belonging to an NSPO3 practice (as determined by physician NPI).

Result => 3,789,683 unique beneficiaries

We then applied study eligibility criteria including:

- ≥ 65 as of January 1, 2011
- Not identified as ESRD in 2011 or 2012
- Had continuous coverage in Parts A and B in 2011-2012
- Had no Medicare Advantage coverage in 2011-2012
- Were alive as of December 31, 2012
- Resided in United States or its territories

Result => 2,569,384 unique beneficiaries

We used the resulting finder file to identify all primary care services received for these beneficiaries, from any provider, as listed in the Part B Outpatient and Carrier file Medicare claims for 2012. Beneficiaries were assigned to an NSPO3 practice if the sum of allowed charges for primary care services at that practice was greater than the sum of allowed charges for services received by all other practices combined. Ties were excluded.

Result => 919,414 unique beneficiaries assigned to 1320 practices

We then excluded NSPO3 practices with $<15\%$ primary care physicians in the practice.

Result => 868,213 unique beneficiaries assigned to 1040 practices

References

[1] CMS. Medicare Shared Savings Program Shared Savings and Losses and Assignment Methodology Specifications. Version 4, December 2015

2. Health Information Technology and Care Management Processes indices

The following components are incorporated into the HIT index and the CMP index. See also

Bishop, T.F., et al., *Trends in hospital ownership of physician practices and the effect on processes to improve quality*. American Journal of Managed Care, 2016. **22**(3): p. 172-176.

Health information technology index (range: 0-14 points, Cronbach's alpha=0.54)	
1. Electronic Documentation - Practice makes available an electronic medical record (EMR) that contains the patients medications - Majority of physicians in the practice use the EMR for the patient's problem list - Majority of physicians in the practice use the EMR for progress notes	0-3 points
2. Clinical Decision Support - Majority of physicians in the practice use the EMR for potential drug interactions - Majority of physicians in the practice use the EMR for prompts and reminders - Majority of physicians in the practice use the EMR for alerts on abnormal test results	0-3 points
3. Quality Measurement - Practice uses EMR to collect data for clinical quality measures	1 point
4. Physician order entry - Majority of physicians in the practice transmit prescriptions electronically	1 point
5. Electronic access to data - Majority of physicians have electronic access to clinical information on patient ER visits - Majority of physicians have electronic access to clinical information on patient hospital discharge summaries - Majority of physicians have electronic access to laboratory results - Majority of physicians have electronic access to pharmacy record of prescriptions filled by patients	0-4 points
6. Electronic connectivity for patients - Majority of physicians communicate with patients by email - Patients can view their medical record online	0-2 points
Care management processes index (range: 0-20 points, Cronbach's alpha=0.90)	
For each of four conditions - asthma, coronary heart failure, depression, and diabetes-practice receives one point for the following:	
Practice maintains an electronic registry for majority of patients with each condition	0-4 points
Practice provides nurse care managers for patients with each condition	0-4 points
Practice provides data to physicians on the quality of their care for patients with these conditions	0-4 points
Practice routinely sends reminders to patients with these conditions for preventive care	0-4 points
Practice has non-physician staff to educate patients about managing their condition	0-4 points

3: Questions underlying Quality Improvement process indicators

The following describes the questions that underlie the “Other Quality Improvement Processes” Measure.

For survey 1 (NSSMPP) the question was:

At present or within the past year, has your practice participated in any quality improvement programs offered by other organizations, such as Bridges to Excellence or an IHI (Institute for Healthcare Improvement) Quality Collaborative?

Indicator is Yes if affirmative answer to the question.

For survey 2 (NSPO3) it was:

Does your medical group/practice use any of the following formal and systematic quality improvement systems:

- a) Lean production techniques
- b) Six Sigma
- c) Quality improvement learning collaboratives
- d) Other_____

Indicator is Yes if affirmative answer to any of the four components of the question.

Table A1: Regression Results from Models of log(total spending) and Total Spending without Fixed Effects

	log(total spending)		total spending, without fixed effects	
	All beneficiaries	High-need beneficiaries	All beneficiaries	High-need beneficiaries
<u>Practice Size</u>				
3-9 physicians	1.00 (0.95, 1.06)	0.99 (0.93, 1.06)	62.32 (-270.17, 394.81)	167.19 (-291.92, 626.29)
10-19 physicians	0.98 (0.90, 1.05)	0.98 (0.90, 1.07)	261.45 (-254.24, 777.14)	490.19 (-203.21, 1183.59)
20+ physicians	1.06 (0.96, 1.16)	1.06 (0.96, 1.18)	112.52 (-457.30, 682.34)	273.43 (-502.62, 1049.49)
<u>Ownership</u>				
Physician owned	1.02 (0.95, 1.09)	1.02 (0.94, 1.10)	-110.08 (-551.70, 331.55)	-49.11 (-642.64, 544.41)
FQHC/CHC	0.99 (0.87, 1.13)	1.07 (0.94, 1.22)	-753.62 (-1475.33, -31.91)	-874.77 (-1794.98, 45.45)
<u>CMP Quartile</u>				
Quartile 2	1.01 (0.96, 1.05)	1.00 (0.95, 1.05)	-36.19 (-504.65, 432.27)	-196.35 (-837.28, 444.59)
Quartile 3	0.96 (0.92, 1.01)	0.97 (0.92, 1.02)	-269.10 (-652.65, 114.45)	-446.19 (-971.36, 78.98)
Quartile 4	0.97 (0.93, 1.01)	0.96 (0.91, 1.01)	-150.61 (-544.07, 242.86)	-319.62 (-865.67, 226.43)
<u>HIT Quartile</u>				
Quartile 2	1.01 (0.95, 1.07)	1.02 (0.95, 1.09)	292.64 (-214.69, 799.97)	450.05 (-235.52, 1135.63)
Quartile 3	1.00 (0.95, 1.07)	0.99 (0.93, 1.06)	-119.16 (-575.74, 337.42)	-178.46 (-791.58, 434.65)
Quartile 4	1.01 (0.95, 1.07)	0.99 (0.92, 1.07)	106.21 (-311.98, 524.39)	150.01 (-422.32, 722.34)
Practice uses PDSA	1.02 (0.98, 1.06)	1.01 (0.97, 1.05)	158.82 (-175.35, 492.99)	123.56 (-322.67, 569.79)
Practice uses other QI	1.02 (0.99, 1.06)	1.03 (0.99, 1.08)	56.18 (-267.61, 379.97)	160.68 (-292.23, 613.58)
<u>Beneficiary Characteristics</u>				
Age	1.02 (1.02, 1.02)***	1.01 (1.01, 1.02)***	107.62 (96.50, 118.75)***	112.06 (98.89, 125.24)***
Male	0.99 (0.97, 1.00)	0.97 (0.96, 0.99)***	-94.61 (-188.11, -1.11)*	-243.39 (-375.16, -111.62)***

Dual-Eligible	1.11 (1.08, 1.15)***	1.10 (1.07, 1.13)***	1254.36 (954.87, 1553.85)***	1448.75 (1107.10, 1790.40)***
Disabled	1.30 (1.27, 1.33)***	1.25 (1.22, 1.28)***	1896.94 (1711.59, 2082.29)***	2046.04 (1818.38, 2273.69)***
Num major CC	0.97 (0.93, 1.00)	0.98 (0.94, 1.01)	1889.69 (1813.29, 1966.09)***	2059.51 (1964.54, 2154.47)***
Num minor CC	1.00 (0.95, 1.05)	0.98 (0.92, 1.04)	660.89 (607.54, 714.23)***	906.98 (830.94, 983.02)***
African American	0.86 (0.82, 0.91)***	0.90 (0.84, 0.96)**	-345.94 (-674.20, -17.68)*	-344.93 (-828.15, 138.29)
Hispanic	--	--	21.89 (-514.90, 558.68)	-213.95 (-1030.58, 602.69)
Other Race	1.22 (1.21, 1.23)***	1.19 (1.18, 1.20)***	-1111.38 (-1553.84, -668.92)	-1362.97 (-1979.83, -746.12)
White	1.11 (1.10, 1.12)***	1.12 (1.11, 1.12)***	--	--

Other Practice Characteristics

% physicians PCP	1.00 (1.00, 1.00)	1.00 (1.00, 1.00)	-13.82 (-25.23, -2.41)	-14.19 (-29.28, 0.90)
% Medicaid	1.00 (1.00, 1.00)	1.00 (1.00, 1.00)	29.88 (8.25, 51.52)	38.17 (10.57, 65.77)
Pay for performance	0.99 (0.95, 1.02)	0.98 (0.94, 1.02)	-131.68 (-412.40, 149.04)	-225.98 (-619.21, 167.24)
Public reporting	1.00 (0.97, 1.03)	1.00 (0.96, 1.03)	280.99 (-16.17, 578.15)	340.07 (-59.74, 739.88)
Time 1 observation	1.08 (1.05, 1.10)***	1.07 (1.04, 1.11)***	460.51 (251.42, 669.61)	645.18 (349.52, 940.84)

Practice FE	Yes	Yes	No	No
N	284458	164869	284458	164869

Wald Statistics for Joint tests

Practices size				
Chi-square	5.56	5.03	1.02	1.97
P-value	0.1352	0.1695	0.7973	0.5792
Practice ownership				
Chi-square	0.23	1.10	4.19	3.59
P-value	0.8921	0.5777	0.1231	0.1665
Practice HIT				
Chi-square	0.12	1.50	3.52	4.44
P-value	0.9895	0.6827	0.3183	0.2174

Practice CMP				
Chi-square	6.76	4.53	2.90	3.15
P-value	0.0799	0.2094	0.4077	0.3685

Note: 95% confidence intervals in parentheses. Analysis accounts for clustering within practices. For individual coefficients * indicates $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table A2: Complete Regression Results from Models of Total Spending

	Model 1	Model 2
<u>Practice Size</u>		
	31.58	26.91
3-9 physicians	(-287.28, 350.44)	(-298.83, 352.65)
	22.09	-45.81
10-19 physicians	(-484.28, 528.45)	(-526.99, 435.36)
	466.96	401.68
20+ physicians	(-108.27, 1042.18)	(-171.79, 975.15)
<u>Ownership</u>		
	67.82	145.93
Physician owned	(-424.55, 560.20)	(-314.13, 605.99)
	39.22	-22.19
FQHC/CHC	(-970.89, 1049.32)	(-981.61, 937.22)
<u>CMP Quartile</u>		
		90.92
Quartile 2: 1-3 CMPs	---	(-196.71, 378.54)
		-203.64
Quartile 3: 4-6 CMPs	---	(-476.88, 69.59)
		-223.06
Quartile 4: >=7 CMPs	---	(-498.98, 52.86)
<u>HIT Quartile</u>		
		96.44
Quartile 2: 3 HIT procs	---	(-241.83, 434.70)
		38.47
Quartile 3: 4-7 HIT procs	---	(-316.14, 393.08)
		92.60
Quartile 4: >=8 HIT procs	---	(-280.07, 465.27)
		156.58
Practice uses PDSA	---	(-70.11, 383.26)
		97.26
Practice uses other QI	---	(-118.84, 313.36)
<u>Beneficiary Characteristics</u>		
	99.52	99.51
Age	(88.66, 110.39)***	(88.65, 110.37)***

	-95.94	-96.66
Male	(-182.47, -9.40)*	(-183.19, -10.14)*
	921.48	920.53
Dual-Eligible	(695.48, 1147.48)***	(694.53, 1146.52)***
	1778.17	1778.67
Disabled	(1590.68, 1965.66)***	(1590.95, 1966.39)***
	1806.28	1805.84
Num major CC	(1734.83, 1877.73)***	(1734.40, 1877.28)***
	687.30	687.59
Num minor CC	(642.96, 731.64)***	(643.31, 731.86)***
	-120.93	-119.32
African American	(-335.02, 93.15)	(-333.24, 94.62)
	-93.07	-97.70
Hispanic	(-411.47, 225.34)	(-417.09, 221.69)
	-667.26	-667.58
Other Race	(-928.23, -406.29)***	(-928.50, -406.65)***

Other Practice Characteristics

	-6.64	-5.05
% physicians PCP	(-15.68, 2.41)	(-14.15, 4.05)
	-3.04	0.29
% Medicaid	(-22.35, 16.27)	(-18.49, 19.07)
	-118.93	-123.34
Pay for performance	(-344.35, 106.49)	(-337.24, 90.57)
	-24.24	12.20
Public reporting	(-211.53, 163.06)	(-166.25, 190.65)
	417.04	388.96
Time 1 observation	(278.76, 555.33)***	(235.44, 542.48)***
Practice Fixed Effects	Yes	Yes
N beneficiaries	284,458	284,458

Wald Statistics for Joint Tests

Practice size		
Chi-square	4.38	4.55
P-value	0.22	0.21
Practice ownership		
Chi-square	0.07	0.42
P-value	0.96	0.81
Practice CMP		
Chi-square	---	6.67

P-value	---	0.08
Practice HIT		
Chi-square	---	0.40
P-value	---	0.94

Note: 95% confidence intervals in parentheses. Analysis accounts for clustering within practices. For individual coefficients * indicates $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table A3: Complete Regression Results from Models of Spending Components, part 1

	Hospital Spending		Physician services spending	
	Model 1	Model 2	Model 1	Model 2
<u>Practice Size</u>				
3-9 physicians	-1.88 (-189.16, 185.40)	-5.78 (-194.39, 182.82)	26.38 (-18.88, 71.64)	25.57 (-21.38, 72.52)
10-19 physicians	2.80 (-271.98, 277.59)	-29.22 (-292.57, 234.14)	14.21 (-47.04, 75.47)	5.27 (-54.83, 65.37)
20+ physicians	256.73 (-56.31, 569.76)	204.96 (-104.15, 514.06)	90.65 (16.36, 164.94)*	87.87 (14.31, 161.44)*
<u>Ownership</u>				
Physician owned	-107.93 (-414.36, 198.50)	-50.14 (-332.57, 232.28)	4.69 (-45.00, 54.38)	9.88 (-37.68, 57.44)
FQHC/CHC	-52.96 (-678.61, 572.69)	-84.57 (-676.38, 507.24)	-45.88 (-143.18, 51.42)	-53.68 (-144.48, 37.12)
<u>CMP Quartile</u>				
Quartile 2: 1-3 CMPs		55.06 (-108.44, 218.55)		15.37 (-17.81, 48.55)
Quartile 3: 4-6 CMPs		-93.66 (-251.35, 64.02)		-24.04 (-55.64, 7.55)
Quartile 4: >=7 CMPs		-94.53 (-249.63, 60.56)		-13.14 (-49.80, 23.52)
<u>HIT Quartile</u>				
Quartile 2: 3 HITPs		4.11 (-205.49, 213.71)		-8.53 (-48.29, 31.23)
Quartile 3: 4-7 HITPs		-47.79 (-255.14, 159.55)		-12.31 (-53.77, 29.15)
Quartile 4: >=8 HITPs		9.63 (-220.03, 239.28)		-27.68 (-69.74, 14.37)

Practice uses PDSA	138.17 (12.15, 264.19)*	8.78 (-21.63, 39.19)
--------------------	----------------------------	-------------------------

Practice uses other QI	80.49 (-44.70, 205.68)	18.45 (-8.15, 45.05)
------------------------	---------------------------	-------------------------

Beneficiary Characteristics

Age	23.72 (16.78, 30.66)***	23.72 (16.78, 30.66)***	9.20 (8.25, 10.15)***	9.20 (8.25, 10.16)***
Male	132.85 (76.93, 188.76)***	132.47 (76.57, 188.37)***	-28.50 (-38.28, -18.73)***	-28.57 (-38.35, -18.79)***
Dual-Eligible	422.26 (304.55, 539.97)***	421.84 (304.12, 539.55)***	32.56 (3.86, 61.25)*	32.47 (3.80, 61.14)*
Disabled	963.66 (842.89, 1084.43)***	963.83 (842.89, 1084.77)***	203.86 (181.05, 226.68)***	203.92 (181.08, 226.76)***
Num major CC	933.07 (890.75, 975.38)***	932.88 (890.57, 975.20)***	189.36 (181.22, 197.50)***	189.32 (181.19, 197.45)***
Num minor CC	316.92 (289.80, 344.04)***	317.07 (289.96, 344.18)***	115.03 (107.32, 122.74)***	115.04 (107.33, 122.75)***
African American	-58.77 (-181.86, 64.32)	-58.18 (-181.33, 64.98)	-25.42 (-56.93, 6.10)	-25.21 (-56.80, 6.38)
Hispanic	154.42 (-47.30, 356.15)	150.85 (-51.74, 353.44)	-9.09 (-55.55, 37.37)	-9.45 (-55.97, 37.07)
Other Race	-282.73 (-441.63, -123.82)***	-283.31 (-442.21, -124.40)***	-84.54 (-114.88, -54.20)***	-84.63 (-114.94, -54.31)***

Other Practice Characteristics

% physicians PCP	-4.13 (-9.71, 1.45)	-2.91 (-8.38, 2.55)	-0.99 (-2.38, 0.41)	-0.56 (-1.85, 0.72)
% Medicaid	-0.60 (-10.89, 9.69)	1.38 (-8.39, 11.15)	-2.09 (-4.66, 0.47)	-1.62 (-3.94, 0.70)
Pay for performance	-16.13 (-153.53, 121.26)	-26.47 (-157.96, 105.01)	-2.41 (-32.83, 28.01)	-2.12 (-30.88, 26.64)
Public reporting	40.17 (-66.56, 146.90)	64.99 (-40.61, 170.60)	-13.08 (-36.94, 10.78)	-10.05 (-33.15, 13.05)
Time 1 observation	242.41 (159.62, 325.19)***	224.92 (133.01, 316.82)***	-34.27 (-52.39, -16.14)***	-46.02 (-66.55, -25.50)***
Practice Fixed Effects	Yes	Yes	Yes	Yes
N beneficiaries	284,458	284,458	284,458	284,458

Wald Statistics for Joint Tests

Practice size

Chi-square	4.71	4.23	7.68	8.65
P-value	0.19	0.24	0.05	0.034
Practice ownership				
Chi-square	0.48	0.16	1.05	1.89
P-value	0.79	0.92	0.59	0.39
Practice CMP				
Chi-square		0.74		2.39
P-value		0.86		0.50
Practice HIT				
Chi-square		4.28		7.48
P-value		0.23		0.058

Note: 95% confidence intervals in parentheses. Analysis accounts for clustering within practices. For individual coefficients * indicates $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table A4: Complete Regression Results from Models of Spending Components, part 2

	Post-Acute Spending		Other spending	
	Model 1	Model 2	Model 1	Model 2
<u>Practice Size</u>				
3-9 physicians	-4.06 (-163.18, 155.06)	-5.13 (-164.87, 154.62)	11.14 (-56.79, 79.07)	12.25 (-56.98, 81.48)
10-19 physicians	-29.55 (-255.36, 196.26)	-50.46 (-267.67, 166.76)	34.62 (-62.28, 131.51)	28.59 (-64.87, 122.05)
20+ physicians	24.61 (-240.61, 289.83)	23.76 (-240.77, 288.29)	94.96 (-6.43, 196.36)	85.09 (-12.93, 183.11)
<u>Ownership</u>				
Physician owned	135.46 (-66.30, 337.21)	140.67 (-61.20, 342.54)	35.61 (-30.66, 101.87)	45.53 (-17.27, 108.32)
FQHC/CHC	189.14 (-141.71, 520.01)	182.78 (-152.31, 517.86)	-51.09 (-153.16, 50.99)	-66.72 (-162.62, 29.17)
<u>CMP Quartile</u>				
Quartile 2: 1-3 CMPs		-14.08 (-142.48, 114.31)		34.58 (-8.17, 77.32)
Quartile 3: 4-6 CMPs		-59.84 (-187.13, 67.44)		-26.10 (-72.27, 20.08)
Quartile 4: >=7 CMPs		-121.44 (-249.95, 7.08)		6.05 (-38.60, 50.69)
<u>HIT Quartile</u>				
Quartile 2: 3 HITPs		117.03 (-14.27, 248.32)		-16.16 (-69.88, 37.55)
Quartile 3: 4-7 HITPs		118.04 (-34.20, 270.28)		-19.47 (-78.43, 39.49)
Quartile 4: >=8 HITPs		121.06 (-29.66, 271.78)		-10.41 (-69.29, 48.48)
Practice uses PDSA		-19.21 (-113.59, 75.17)		28.84 (-15.28, 72.96)
Practice uses other QI		-5.66 (-88.09, 76.78)		3.99 (-29.70, 37.67)
<u>Beneficiary Characteristics</u>				

Age	74.73 (69.48, 79.98)***	74.71 (69.47, 79.96)***	-8.13 (-9.78, -6.48)***	-8.13 (-9.78, -6.48)***
Male	-220.87 (-356.34, - 185.40)***	-221.06 (-256.54, - 185.58)***	20.59 (7.46, 33.73)*	20.49 (7.38, 33.61)**
Dual-Eligible	416.77 (308.86, 524.68)***	416.44 (308.64, 524.24)***	49.89 (16.71, 83.08)*	49.78 (16.65, 82.92)**
Disabled	367.58 (291.97, 443.20)***	367.78 (292.16, 443.39)***	243.06 (219.18, 266.94)***	243.15 (219.29, 267.00)***
Num major CC	490.29 (453.72, 526.85)***	490.09 (453.53, 526.65)***	193.57 (185.50, 201.64)***	193.54 (185.47, 201.61)***
Num minor CC	83.05 (67.69, 98.41)***	83.19 (67.86, 98.52)***	172.30 (166.00, 178.59)***	172.29 (165.99, 178.58)***
African American	72.80 (-27.91, 173.51)	73.40 (-27.39, 174.18)	-109.55 (-141.31, - 77.78)***	-109.33 (-141.20, -77.45)***
Hispanic	-164.22 (-308.38, -20.07)*	-164.22 (-307.53, -20.91)*	-74.18 (-128.18, -20.18)**	-74.88 (-129.10, -20.66)**
Other Race	-92.79 (-194.85, 9.28)	-92.25 (-194.22, 9.71)	-207.21 (-243.39, - 171.02)***	-207.39 (-243.58, - 171.20)***
<u>Other Practice Characteristics</u>				
% physicians PCP	-0.41 (-4.24, 3.42)	-0.84 (-4.63, 2.94)	-1.11 (-2.76, 0.54)	-0.73 (-2.27, 0.81)
% Medicaid	-0.11 (-9.29, 9.07)	0.31 (-8.85, 9.47)	-0.24 (-3.19, 2.71)	0.22 (-2.34, 2.78)
Pay for performance	-122.03 (-216.17, -27.90)*	-112.65 (-203.03, -22.28)*	21.65 (-16.47, 59.76)	17.91 (-19.94, 55.76)
Public reporting	-72.68 (-156.35, 11.00)	-68.85 (-147.98, 10.27)	21.36 (-8.73, 51.44)	26.11 (-4.23, 56.46)
Time 1 observation	81.12 (28.33, 133.91)**	85.62 (26.24, 145.00)**	127.78 (102.88, 152.68)***	124.45 (95.23, 153.67)***
Practice Fixed Effects	Yes	Yes	Yes	Yes
N beneficiaries	284,458	284,458	284,458	284,458

Wald Statistics for Joint Tests

Practicesize

Chi-square	0.44	1.12	4.44	3.85
P-value	0.93	0.77	0.22	0.28

Practice ownership

Chi-square	2.26	2.38	3.18	6.11
P-value	0.33	0.30	0.20	0.047

Practice CMP

Chi-square		3.41		0.59
------------	--	------	--	------

P-value	0.33	0.90
Practice HIT		
Chi-square	5.23	6.51
P-value	0.16	0.089

Note: 95% confidence intervals in parentheses. Analysis accounts for clustering within practices. For individual coefficients
* indicates $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table A5: Complete Regression Results from Models of 30-Day Readmissions and ACSAs

	30-day readmissions (per 100)		ACSAs (per 100)	
	Model 1	Model 2	Model 1	Model 2
<u>Practice Size</u>				
3-9 physicians	1.90 (-0.57, 0.85)	0.12 (-0.50, 0.74)	0.10 (-0.66, 0.86)	0.09 (-0.68, 0.87)
10-19 physicians	0.15 (-0.58, 0.87)	0.06 (-0.65, 0.77)	0.50 (-0.50, 1.50)	0.35 (-0.60, 1.30)
20+ physicians	0.73 (-0.06, 1.53)	0.66 (-0.15, 1.48)	0.20 (-1.25, 1.66)	0.11 (-1.33, 1.55)
<u>Ownership</u>				
Physician owned	-0.28 (-0.86, 0.30)	-0.30 (-0.92, 0.31)	-0.64 (-1.53, 0.25)	-0.53 (-1.34, 0.29)
FQHC/CHC	-0.47 (-1.99, 1.05)	-0.53 (-2.00, 0.93)	-0.32 (-2.33, 1.69)	-0.30 (-2.34, 1.74)
<u>CMP Quartile</u>				
Quartile 2: 1-3 CMPs		-0.07 (-0.53, 0.39)		-0.08 (-0.70, 0.53)
Quartile 3: 4-6 CMPs		-0.22 (-0.66, 0.22)		-0.63 (-1.19, -0.07)*
Quartile 4: >=7 CMPs		-0.32 (-0.71, 0.08)		-0.80 (-1.30, -0.30)**
<u>HIT Quartile</u>				
Quartile 2: 3 HITPs		-0.44 (-1.06, 0.18)		0.29 (-0.59, 1.16)
Quartile 3: 4-7 HITPs		-0.05 (-0.66, 0.56)		0.04 (-0.88, 0.97)
Quartile 4: >=8 HITPs		-0.31 (-0.95, 0.33)		0.16 (-0.86, 1.18)
Practice uses PDSA		0.00 (-0.32, 0.32)		0.15 (-0.42, 0.73)
Practice uses other QI		0.02 (-0.31, 0.35)		0.00 (-0.45, 0.44)
<u>Beneficiary Characteristics</u>				
Age	0.03 (0.02, 0.04)***	0.03 (0.02, 0.04)***	0.14 (0.13, 0.16)***	0.14 (0.13, 0.16)***
Male	0.10 (-0.05, 0.24)	0.10 (-0.05, 0.24)	-0.18 (-0.37, 0.00)	-0.19 (-0.37, 0.00)
Dual-Eligible	0.89 (0.52, 1.25)***	0.89 (0.52, 1.25)***	2.12 (1.62, 2.61)***	2.11 (1.62, 2.61)***

Disabled	1.14 (0.73, 1.55)***	1.14 (0.74, 1.55)***	2.20 (1.64, 2.77)***	2.20 (1.64, 2.77)***
Num major CC	1.35 (1.22, 1.48)***	1.35 (1.21, 1.48)***	3.18 (2.95, 3.40)***	3.18 (2.95, 3.40)***
Num minor CC	0.32 (0.26, 0.38)***	0.32 (0.26, 0.38)***	0.26 (0.18, 0.34)***	0.26 (0.18, 0.34)***
African American	0.09 (-0.28, 0.46)	0.09 (-0.27, 0.46)	1.19 (0.57, 1.82)***	1.20 (0.58, 1.82)***
Hispanic	0.26 (-0.35, 0.86)	0.26 (-0.34, 0.86)	1.56 (0.52, 2.60)**	1.55 (0.51, 2.60)**
Other Race	-0.27 (-0.65, 0.11)	-0.27 (-0.65, 0.11)	-0.20 (-0.80, 0.39)	-0.20 (-0.79, 0.39)
<u>Other Practice Characteristics</u>				
% physicians PCP	-0.01 (-0.02, 0.00)	-0.01 (-0.02, 0.00)	-0.01 (-0.03, 0.01)	-0.01 (-0.03, 0.01)
% Medicaid	-0.01 (-0.04, 0.01)	-0.01 (-0.04, 0.01)	0.01 (-0.03, 0.05)	0.01 (-0.02, 0.05)
Pay for performance	0.05 (-0.26, 0.35)	0.05 (-0.25, 0.34)	-0.19 (-0.69, 0.32)	-0.14 (-0.60, 0.32)
Public reporting	-0.19 (-0.45, 0.07)	-0.16 (-0.42, 0.10)	-0.23 (-0.66, 0.19)	-0.18 (-0.60, 0.23)
Time 1 observation	0.91 (0.60, 1.21)***	0.63 (0.41, 0.86)***	0.91 (0.60, 1.21)***	0.82 (0.47, 1.18)***
Practice Fixed Effects	Yes	Yes	Yes	Yes
N beneficiaries	284458	284458	284458	284458
Wald Statistics for Joint Tests				
Practices size				
Chi-square	5	4.47	1.28	0.84
P-value	0.17	0.2153	0.73	0.3597
Practice ownership				
Chi-square	1.18	1.33	1.98	1.62
P-value	0.55	0.5144	0.37	0.4456
Practice CMP				
Chi-square		3.1		11.49
P-value		0.3761		0.0093
Practice HIT				
Chi-square		4.17		0.7
P-value		0.2437		0.8725

Note: 95% confidence intervals in parentheses. Analysis accounts for clustering within practices. For individual coefficients * indicates p<0.05; **p<0.01; ***p<0.001

Table A6: Complete Regression Results from Selected Models, for High-Need Patients

	Total spending	30-Day Readmissions (per 100)	ACSAs (per 100)
<u>Practice Size</u>			
	-60.83	0.07	0.14
3-9 physicians	(-541.71, 420.04)	(-1.00, 1.14)	(-1.07, 1.34)
	-86.14	0.02	0.42
10-19 physicians	(-752.44, 580.17)	(-1.14, 1.18)	(-1.11, 1.94)
	490.58	0.96	0.29
20+ physicians	(-350.39, 1331.56)	(-0.34, 2.26)	(-2.03, 2.61)
<u>Ownership</u>			
	192.99	-0.11	-0.76
Physician owned	(-471.66, 857.65)	(-1.03, 0.80)	(-2.10, 0.58)
	565.64	0.02	0.49
FQHC/CHC	(-541.87, 1673.15)	(-1.79, 1.84)	(-1.79, 2.77)
<u>CMP Quartile</u>			
	7.46	-0.25	-0.28
Quartile 2: 1-3 CMPs	(-414.06, 428.98)	(-0.95, 0.46)	(-1.24, 0.68)
	-278.90	-0.42	-1.10
Quartile 3: 4-6 CMPs	(-691.14, 133.34)	(-1.08, 0.25)	(-1.99, -0.21)*
	-380.42	-0.70	-1.45
Quartile 4: >=7 CMPs	(-818.85, 58.01)	(-1.34, -0.07)*	(-2.24, -0.66)***
<u>HIT Quartile</u>			
	146.72	-0.63	0.22
Quartile 2: 3 HITPs	(-354.54, 647.98)	(-1.63, 0.37)	(-1.22, 1.66)
	-56.56	-0.23	-0.01
Quartile 3: 4-7 HITPs	(-571.36, 458.23)	(-1.19, 0.73)	(-1.52, 1.50)
	-32.08	-0.46	-0.05
Quartile 4: >=8 HITPs	(-598.90, 534.74)	(-1.47, 0.54)	(-1.74, 1.63)
	115.23	0.01	0.27
Practice uses PDSA	(-190.85, 421.30)	(-0.49, 0.50)	(-0.65, 1.19)
	191.21	0.14	0.12
Practice uses other QI	(-143.37, 525.78)	(-0.38, 0.66)	(-0.59, 0.83)
<u>Beneficiary Characteristics</u>			
	99.62	0.02	0.17
Age	(86.70, 112.55)	(0.00, 0.04)*	(0.14, 0.19)***
	-244.51	0.08	-0.38
Male	(-363.68, -125.35)	(-0.15, 0.31)	(-0.70, -0.05)*
	972.34	1.06	2.49
Dual-Eligible	(707.35, 1237.33)***	(0.55, 1.58)***	(1.80, 3.18)***
	1906.82	1.41	2.68
Disabled	(1675.96, 2137.67)***	(0.85, 1.98)***	(1.96, 3.39)***

Num major CC	1956.49 (1870.01, 2042.97)***	1.76 (1.57, 1.94)***	3.91 (3.61, 4.20)***
Num minor CC	944.07 (880.49, 1007.66)***	0.52 (0.42, 0.61)***	0.51 (0.39, 0.63)***
African American	-112.71 (-410.18, 184.76)	0.06 (-0.54, 0.66)	1.68 (0.53, 2.83)**
Hispanic	-261.11 (-773.58, 251.36)	0.43 (-0.53, 1.39)	2.54 (0.90, 4.18)**
Other Race	-705.17 (-1147.75, -262.59)**	-0.56 (-1.26, 0.14)	-0.46 (-1.59, 0.66)
<u>Other Practice Characteristics</u>			
% physicians PCP	-6.02 (-18.21, 6.17)	-0.01 (-0.03, 0.01)	-0.01 (-0.04, 0.02)
% Medicaid	7.36 (-19.84, 34.56)	-0.01 (-0.05, 0.03)	0.02 (-0.04, 0.08)
Pay for performance	-200.93 (-543.05, 141.19)	0.16 (-0.28, 0.60)	-0.13 (-0.86, 0.60)
Public reporting	-10.76 (-290.48, 268.96)	-0.30 (-0.70, 0.10)	-0.24 (-0.90, 0.43)
Time 1 observation	514.33 (276.70, 751.96)***	0.97 (0.61, 1.32)***	1.32 (0.75, 1.89)***
Practice Fixed Effects	Yes	Yes	Yes
N beneficiaries	164,869	164,869	164,869
Wald Statistics for Joint Tests			
Practice size			
Chi-square	3.48	3.72	0.36
P-value	0.3231	0.2930	0.9492
Practice ownership			
Chi-square	1.06	0.06	2.02
P-value	0.5873	0.9687	0.3645
Practice CMP			
Chi-square	1.3	2.23	0.41
P-value	0.7288	0.5254	0.9382
Practice HIT			
Chi-square	4.69	5.56	14.51
P-value	0.1956	0.1352	0.0023

Note: 95% confidence intervals in parentheses. Analysis accounts for clustering within practices. For individual coefficients * indicates p<0.05; **p<0.01; ***p<0.001