

## Supplementary Online Content

Colla CH, Wennberg DE, Meara E, et al. Spending differences associated with the Medicare Physician Group Practice Demonstration. *JAMA*. 2012;308(10):1015-1023.

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This supplementary material has been provided by the authors to give readers additional information about their work.

## eAppendix. Methodologic details

*Data:* We use Medicare fee-for-service administrative claims data from 2001 to 2009 to complete our analyses (denominator file, inpatient file, MedPar, outpatient file, home health standard analytic file, skilled nursing standard analytic file, hospice, durable medical equipment, and the carrier file). For years 2001-2005, we use 20% of the Medicare population, and from 2006-2009, we use 100% of Medicare claims.

*Cohort:* We assign beneficiaries to ten PGPD participants using methodology defined by Medicare for bonus payment.<sup>1,2</sup> We obtain tax identification numbers (and in some cases individual provider identification numbers) from PGPD participants and assign beneficiaries annually to the system (for PGPD participants) or tax identification number (for non-PGPD participants) with the greatest allowed charges for a set of ten evaluation and management visits.<sup>2</sup> The market from which beneficiaries are drawn for the control group is any county that contributes at least one percent of a participant's assigned beneficiaries in a given year.

We replicate the Medicare exclusions for assigned beneficiaries annually,<sup>2</sup> excluding beneficiaries with: a) no visits in any of the ten necessary evaluation and management categories; b) any Medicare Advantage; c) less than full part A and B entitlement the entire year (or from the month turning 65 to month of death); d) residence outside the 50 United States or Washington, DC; e) unidentifiable county; and f) presence of a primary payer other than Medicare. Beneficiaries are excluded from analysis the month after they enroll in hospice. In addition, we exclude beneficiaries from the control group for a given year if they were assigned to a PGPD participant in the prior year. For the control groups, all analyses are weighted to reflect the population from each of the contributing counties in the participant group. Beneficiaries who die or age into Medicare during the year are weighted according to the person months they contribute. Finally, we up-weight 2005 observations by 5 to allow 2005 to contribute equally to the treatment effect (because 2005 is a 20% sample and later years use the 100% population).

*Covariates:* We use patient demographic, clinical, and area characteristics to adjust for differences between PGPD participants and local controls. All models adjust for age, gender and race (black/other), and interactions between these variables. We adjust for race-specific income at the ZIP code level (proportion under the federal poverty line and proportion in a high income group, defined by race at the 85<sup>th</sup> percentile) and disability.<sup>3</sup> We consider a beneficiary to be disabled based on their original reason for entitlement. Therefore, if the beneficiary is over 65, there is a possibility that they are no longer disabled.

*Risk adjustment<sup>1</sup>:* The PGPD used hierarchical clinical categories (HCC) scores to risk-adjust benchmark payments.<sup>2,5</sup> To replicate CMS methodology, we calculate annual HCC scores for each beneficiary, using year-specific CMS-provided programming code and provide the results of these analyses in Appendix 4.<sup>5,6</sup> We use all hospital diagnoses as well as diagnoses from evaluation and management

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<sup>1</sup> Concurrent HCCs are no longer the primary basis for risk adjustment: ACO target expenditures will primarily be driven by historical spending of assigned beneficiaries and national changes in health spending. (Department of Health and Human Services, Centers for Medicare & Medicaid Services. Medicare Program; Medicare Shared Savings Program: Accountable Care Organizations, Final Rule. In; November 2, 2011.) This change will limit the ability of diagnostic coding practice to affect estimates of savings or losses, however, prior costs also reflect practice intensity in part.

and procedure claims from physicians to determine HCC score. We derive the HCC score based on diagnoses, age, gender, disability status, Medicaid eligibility and place of residence (nursing home or community dwelling). We determine nursing home residence based on carrier file visit codes indicating a physician visit in a residential nursing facility. To calculate HCC score, we use ten major comorbidities from the same set of claims and diagnoses.<sup>7</sup> It is important to note that, while HCC is associated with illness, it is not a true comorbidity index but a linear predictor of spending in the following calendar year.<sup>5</sup>

We found that regression-adjusted HCC scores increased approximately three percent more in the participant group during the Demonstration than in control groups. In the Duals, we find adjusted HCC scores increased 1.3% more during the PGPD than in the control group. Research has shown that HCC is subject to discretionary coding practices that vary by region, and may not accurately reflect the underlying illness of the population.<sup>9,10</sup> In order to explore the role that risk adjustment played in estimated savings, we create an alternative risk adjustment method using “low variation” conditions. These conditions, acute myocardial infarction, stroke, hip fracture and colorectal cancer, were chosen because they require an acute care hospitalization and are less subject to diagnostic intensity or coding practices, therefore more closely representing true disease burden.<sup>13,14</sup> In Appendix 4, we compare results adjusting for HCC scores and low-variation condition rates.

We define the rate of each low-variation condition using Medicare acute hospital claims.<sup>15</sup> Colorectal cancer is defined as having a primary diagnosis of colorectal cancer (153.0-154.1,154.8) and evidence of a surgical resection (procedure codes 17.32-6, 17.39, 45.71-6, 45.79, 45.80-3, 48.41, 48.49, 48.50-3, 48.61-5, 48.69,). Hip fracture is defined by a primary diagnosis of hip fracture (820.xx). AMI was defined by a primary diagnosis of 410.x0 or 410.x1. Stroke is also defined solely by primary diagnosis: 431.xx, 433.xx,434.x1 or 436.x1.<sup>16</sup> The rates for each condition are calculated by participant/control for each of the ten local areas and used as covariates.

*Outcome variables:* Our primary outcome measure is total annual Medicare payments per beneficiary, summed across all services. We cap annual payments at \$100,000 per beneficiary<sup>2</sup> and use the GDP deflator to adjust payments in 2001-2008 to 2009 dollars.<sup>17,18</sup> We divide payments into subcategories and describe the distribution of payments for each group before and after PGPD implementation.

To measure the impact of the PGPD on quality, we create indicators for readmission to the hospital within 30 days for any cause and visits to the emergency department. Our measure of readmission is all source readmission within 30 days of an index event. We allow only a single readmission during the 30 day window. Once the date range exceeds the window a new index date is created when another admission occurs. Transfers are not counted as readmissions and the date window is not reset for a transfer (defined as admissions that begin on the same day as the discharge or the next day if the discharge destination for the index event and the admission source for the subsequent admission indicate a transfer). Index admissions are defined as medical or surgical based on DRGs and results are stratified. For each person with an index admission during a given year, the value is number of readmissions divided by number of admissions. So for example, if a person had three index events in a given year, but only one readmission the value is 0.33.

Visits to the emergency department are identified regardless of subsequent admission using carrier claims (CPT codes 99281-99285), outpatient claims (revenue center codes 0450-0459 and 0981), as well

as acute hospital claims in the Medpar file (with positive emergency department charges, an emergent admission type, or the source of admission is the emergency department). We allow only one visit per day.

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eTable 1: Validation of Assignment Algorithm with CMS

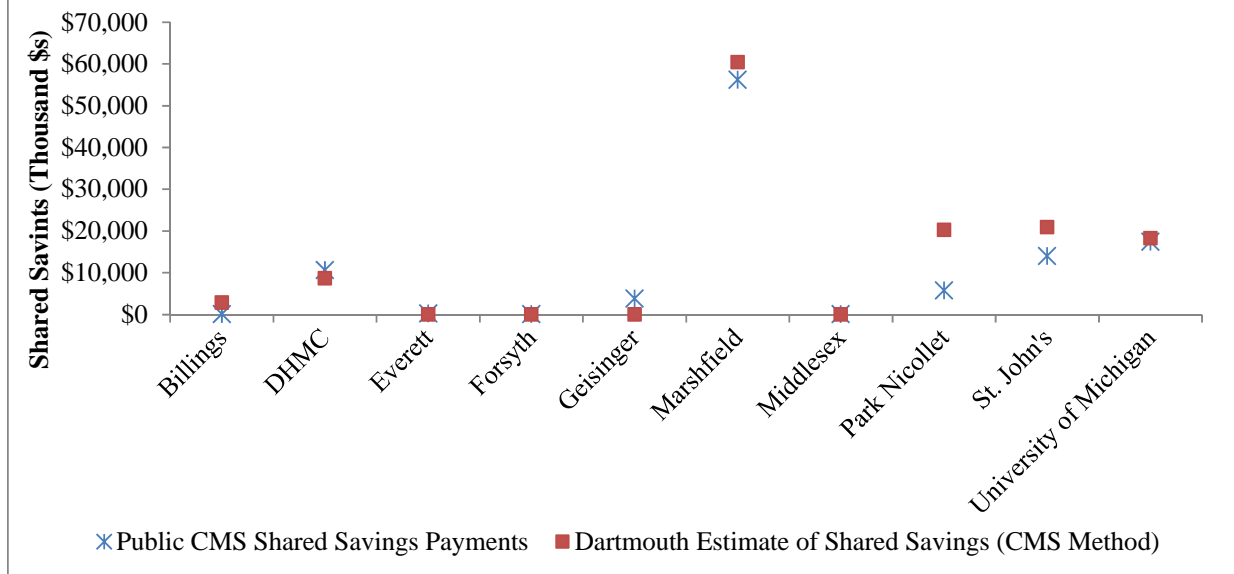
Site	2006 Study Cohort N <sup>a</sup>	CMS PY2 N <sup>b</sup>	% Complete
Billings Clinic	11,378	13,400	85%
Dartmouth-Hitchcock Clinic	27,875	30,600	91%
Everett Clinic	9,326	9,700	96%
Forsyth Medical Group	13,159	14,000	94%
Geisinger Clinic	24,530	25,400	97%
Marshfield Clinic	34,497	38,700	89%
Middlesex Health System	17,317	17,700	98%
Park Nicollet Clinic	17,440	19,000	92%
St. John's Clinic	29,127	31,700	92%
University of Michigan Faculty Group Practice	17,531	19,200	91%
<b>Total</b>	<b>202,180</b>	<b>219,400</b>	<b>92%</b>

**a** The 2006 cohort is the PGPD-attributed cohort defined by authors for use in this study.

**b** Performance Year 2 (PY2) was from April 2006 - March 2007.

Source for CMS figures: Sebelius K. Physician Group Practice Demonstration Evaluation Report: The Centers for Medicare & Medicaid Services' Office of Research, Development, and Information; 2009.

## Estimated Shared Savings Payments for PGPD Sites (2005-2009)



Notes: CMS uses performance years April 2005-March 2010, while the Dartmouth method uses calendar years 2005-2009. Source for CMS figures: Center for Medicare and Medicaid Services. Medicare Physician Group Practice Demonstration Fact Sheet. [https://www.cms.gov/DemoProjectsEvalRpts/downloads/PGP\\_Fact\\_Sheet.pdf](https://www.cms.gov/DemoProjectsEvalRpts/downloads/PGP_Fact_Sheet.pdf); July 2011.

eTable 2: Beneficiaries in the Physician Group Practice Demonstration  
Descriptive Characteristics for Participating Sites and Local Controls

	All Beneficiaries							
	Participants				Controls			
	Pre (2001-2004)		Post (2005-2009)		Pre (2001-2004)		Post (2005-2009)	
N	153,844		836,072		1,233,369		6,275,877	
<b>Demographics</b>								
Mean Age	72.0	(71.9, 72.0)	71.3	(71.2, 71.3)	72.0	(72.0, 72.0)	71.5	(71.5, 71.5)
% Female	57.7%	(57.5%, 58.0%)	57.7%	(57.6%, 57.8%)	58.5%	(58.4%, 58.6%)	57.6%	(57.5%, 57.6%)
% Medicaid	12.4%	(12.3%, 12.6%)	15.1%	(15.0%, 15.1%)	13.2%	(13.1%, 13.3%)	14.9%	(14.8%, 14.9%)
% Black	1.8%	(1.8%, 1.9%)	2.3%	(2.3%, 2.3%)	2.7%	(2.7%, 2.8%)	3.3%	(3.3%, 3.3%)
% < Age 65	12.7%	(12.7%, 12.6%)	16.2%	(16.2%, 16.1%)	12.8%	(12.8%, 12.8%)	15.8%	(15.8%, 15.7%)
% Disabled & ≥ Age 65 <sup>a</sup>	6.5%	(6.4%, 6.7%)	7.3%	(7.3%, 7.4%)	6.9%	(6.9%, 7.0%)	7.5%	(7.4%, 7.5%)
% Blacks Below FPL in Zipcode	18.7%	(18.4%, 19.1%)	18.7%	(18.6%, 18.9%)	21.5%	(21.4%, 21.5%)	21.0%	(21.0%, 21.0%)
% Non-Black Below FPL in Zipcode	8.2%	(8.2%, 8.2%)	8.0%	(8.0%, 8.0%)	8.5%	(8.4%, 8.5%)	8.3%	(8.3%, 8.3%)
% Black High-Income in Zipcode <sup>b</sup>	11.6%	(10.4%, 12.8%)	12.7%	(12.2%, 13.1%)	8.0%	(7.9%, 8.2%)	9.0%	(9.0%, 9.1%)
% Non-Black High-Income in Zipcode <sup>b</sup>	11.0%	(10.9%, 11.2%)	11.9%	(11.8%, 11.9%)	7.3%	(7.2%, 7.3%)	8.6%	(8.6%, 8.6%)
<b>Risk Adjustment</b>								
Mean HCC	1.05	(1.05, 1.06)	1.18	(1.18, 1.18)	1.03	(1.03, 1.03)	1.12	(1.12, 1.12)
% Died (Overall) <sup>c</sup>	3.7%	(3.6%, 3.8%)	3.5%	(3.5%, 3.5%)	3.6%	(3.5%, 3.6%)	3.4%	(3.4%, 3.4%)
% Nursing Home Resident <sup>d</sup>	2.2%	(2.2%, 2.3%)	2.2%	(2.1%, 2.2%)	2.7%	(2.7%, 2.7%)	2.5%	(2.5%, 2.6%)
Mean Comorbidity Count (of 10 below)	0.71	(0.70, 0.71)	0.76	(0.76, 0.76)	0.69	(0.69, 0.70)	0.73	(0.72, 0.73)
% Malignant Cancer/Leukemia	2.9%	(2.8%, 3.0%)	3.0%	(2.9%, 3.0%)	2.2%	(2.1%, 2.2%)	2.3%	(2.2%, 2.3%)
% Chronic Pulmonary Disease	11.1%	(11.0%, 11.3%)	11.5%	(11.4%, 11.6%)	11.4%	(11.4%, 11.5%)	11.5%	(11.4%, 11.5%)
% Coronary Artery Disease	16.2%	(16.0%, 16.4%)	15.5%	(15.4%, 15.6%)	15.7%	(15.7%, 15.8%)	15.2%	(15.1%, 15.2%)
% Congestive Heart Failure	8.1%	(7.9%, 8.2%)	7.4%	(7.3%, 7.4%)	8.0%	(7.9%, 8.0%)	7.0%	(7.0%, 7.1%)
% Peripheral Vascular Disease	6.2%	(6.1%, 6.3%)	6.8%	(6.7%, 6.8%)	6.0%	(6.0%, 6.1%)	6.6%	(6.6%, 6.6%)
% Severe Chronic Liver Disease	0.3%	(0.3%, 0.3%)	0.4%	(0.4%, 0.4%)	0.3%	(0.3%, 0.3%)	0.3%	(0.3%, 0.3%)
% Diabetes with End Organ Damage	2.0%	(2.0%, 2.1%)	2.4%	(2.3%, 2.4%)	1.8%	(1.8%, 1.9%)	1.9%	(1.9%, 1.9%)
% Chronic Renal Failure	2.2%	(2.2%, 2.3%)	4.3%	(4.2%, 4.3%)	2.2%	(2.2%, 2.2%)	3.8%	(3.8%, 3.8%)
% Dementia	4.1%	(4.0%, 4.2%)	4.3%	(4.3%, 4.4%)	4.2%	(4.2%, 4.2%)	4.5%	(4.5%, 4.5%)

% Diabetes (Without End Organ Damage)	17.6%	(17.4%, 17.8%)	20.3%	(20.2%, 20.4%)	17.5%	(17.4%, 17.6%)	19.4%	(19.4%, 19.5%)
<b>Low-Variation Indicators (per 1000)</b>								
Hip Fracture	6.28	(5.88, 6.67)	6.06	(5.89, 6.22)	6.75	(6.61, 6.90)	6.25	(6.19, 6.31)
Stroke	7.57	(7.13, 8.00)	6.93	(6.75, 7.11)	7.71	(7.55, 7.86)	6.84	(6.77, 6.90)
Colon Cancer	2.30	(2.06, 2.53)	1.91	(1.82, 2.01)	2.20	(2.12, 2.28)	1.70	(1.67, 1.73)
Acute Myocardial Infarction	10.41	(9.90, 10.92)	8.69	(8.49, 8.89)	10.01	(9.83, 10.18)	7.92	(7.85, 7.99)
Any of Four Above	26.04	(25.24, 26.83)	23.20	(22.88, 23.53)	26.14	(25.86, 26.42)	22.31	(22.20, 22.43)
<b>Annual Spending (\$)°</b>								
Mean Per Capita Payments	\$7,914	(\$7,830, \$7,999)	\$9,120	(\$9,081, \$9,160)	\$7,458	(\$7,431, \$7,487)	\$8,688	(\$8,674, \$8,702)
Mean Payments - Acute Care	\$3,251	(\$3,199, \$3,303)	\$3,337	(\$3,315, \$3,360)	\$2,931	(\$2,915, \$2,948)	\$3,081	(\$3,074, \$3,089)
Mean Payments - Acute Care Users	\$27,617	(\$27,331, \$27,903)	\$30,725	(\$30,593, \$30,857)	\$26,088	(\$25,993, \$26,182)	\$29,782	(\$29,735, \$29,829)
Proportion who use Acute Care (%)	21.51%	(21.30%, 21.71%)	21.55%	(21.46%, 21.64%)	21.32%	(21.25%, 21.39%)	20.94%	(20.91%, 20.98%)
Mean Payments - Procedures	\$1,113	(\$1,102, \$1,125)	\$1,299	(\$1,293, \$1,304)	\$1,102	(\$1,098, \$1,107)	\$1,289	(\$1,287, \$1,291)
Mean Payments - E&M	\$844	(\$838, \$849)	\$982	(\$979, \$984)	\$797	(\$795, \$799)	\$913	(\$912, \$914)
Mean Payments - SNF	\$497	(\$481, \$512)	\$648	(\$640, \$656)	\$523	(\$517, \$528)	\$670	(\$667, \$673)
Mean Payments - DME	\$459	(\$447, \$470)	\$695	(\$688, \$701)	\$377	(\$374, \$380)	\$573	(\$571, \$575)
Mean Payments - Imaging	\$381	(\$377, \$384)	\$494	(\$492, \$496)	\$361	(\$360, \$362)	\$475	(\$474, \$475)
Mean Payments - HHA	\$322	(\$315, \$330)	\$371	(\$367, \$374)	\$302	(\$299, \$304)	\$363	(\$361, \$364)
Mean Payments - LTC	\$323	(\$309, \$337)	\$372	(\$365, \$379)	\$353	(\$348, \$358)	\$392	(\$390, \$395)
Mean Payments - Tests	\$296	(\$294, \$298)	\$407	(\$406, \$409)	\$288	(\$287, \$289)	\$399	(\$398, \$399)
<b>Outcomes</b>								
Number of Emergency Department Visits per 100 Beneficiaries	60.54	(59.80, 61.28)	72.38	(71.99, 72.76)	60.82	(60.56, 61.11)	72.58	(72.43, 72.72)
Percent with an Emergency Department Visit	30.94%	(30.71%, 31.17%)	33.82%	(33.72%, 33.93%)	31.15%	(31.07%, 31.23%)	33.78%	(33.74%, 33.82%)
30-Day Surgical Readmission Rate	9.30%	(8.89%, 9.79%)	9.10%	(8.91%, 9.29%)	9.40%	(9.23%, 9.55%)	9.10%	(9.06%, 9.20%)
30-Day Medical Readmission Rate	15.80%	(15.41%, 16.26%)	15.70%	(15.50%, 15.86%)	14.60%	(14.48%, 14.76%)	15.00%	(14.96%, 15.09%)

**Dually Eligible Medicaid Beneficiaries**

Participants		Controls	
Pre (2001-2004)	Post (2005-2009)	Pre (2001-2004)	Post (2005-2009)



N	19,228	128,587	160,471	968,630
<b>Demographics</b>				
Mean Age	61.5 (61.3, 61.8)	59.2 (59.1, 59.3)	62.3 (62.2, 62.3)	60.0 (60.0, 60.0)
% Female	64.9% (64.2%, 65.5%)	64.1% (63.9%, 64.4%)	64.9% (64.6%, 65.1%)	63.2% (63.1%, 63.3%)
% Medicaid	100.0%	100.0%	100.0%	100.0%
% Black	5.1% (4.8%, 5.4%)	5.7% (5.6%, 5.9%)	7.7% (7.5%, 7.8%)	8.9% (8.9%, 9.0%)
% < Age 65	48.3% (47.6%, 49.0%)	55.7% (55.5%, 56.0%)	47.2% (47.0%, 47.5%)	54.8% (54.7%, 54.9%)
% Disabled & ≥ Age 65 <sup>a</sup>	20.1% (19.3%, 20.9%)	23.1% (22.8%, 23.5%)	20.2% (19.9%, 20.5%)	22.4% (22.2%, 22.5%)
% Blacks Below FPL in Zipcode	19.5% (19.0%, 20.1%)	19.7% (19.5%, 19.9%)	22.6% (22.5%, 22.8%)	22.4% (22.3%, 22.4%)
% Non-Black Below FPL in Zipcode	9.4% (9.3%, 9.4%)	9.3% (9.2%, 9.3%)	9.8% (9.8%, 9.8%)	9.7% (9.7%, 9.7%)
% Black High-Income in Zipcode <sup>b</sup>	7.4% (5.7%, 9.0%)	10.2% (9.5%, 10.8%)	5.7% (5.5%, 6.0%)	7.0% (6.9%, 7.1%)
% Non-Black High-Income in Zipcode <sup>b</sup>	5.7% (5.4%, 6.0%)	5.5% (5.3%, 5.6%)	3.8% (3.7%, 3.9%)	4.2% (4.1%, 4.2%)
<b>Risk Adjustment</b>				
Mean HCC	1.35 (1.34, 1.37)	1.45 (1.45, 1.46)	1.33 (1.32, 1.33)	1.42 (1.42, 1.42)
% Died (Overall) <sup>c</sup>	4.6% (4.3%, 4.9%)	3.8% (3.7%, 3.9%)	4.4% (4.3%, 4.5%)	3.8% (3.7%, 3.8%)
% Nursing Home Resident <sup>d</sup>	6.2% (5.9%, 6.6%)	4.7% (4.6%, 4.8%)	7.5% (7.3%, 7.6%)	5.7% (5.6%, 5.7%)
Mean Comorbidity Count (of 10 below)	0.86 (0.84, 0.88)	0.88 (0.87, 0.89)	0.89 (0.88, 0.89)	0.88 (0.87, 0.88)
% Malignant Cancer/Leukemia	2.3% (2.1%, 2.5%)	2.5% (2.4%, 2.6%)	2.0% (1.9%, 2.1%)	1.9% (1.8%, 1.9%)
% Chronic Pulmonary Disease	16.6% (16.1%, 17.2%)	17.3% (17.1%, 17.5%)	17.5% (17.3%, 17.7%)	18.1% (18.0%, 18.2%)
% Coronary Artery Disease	14.8% (14.3%, 15.3%)	13.1% (12.9%, 13.3%)	15.1% (14.9%, 15.2%)	13.4% (13.3%, 13.4%)
% Congestive Heart Failure	10.4% (10.0%, 10.9%)	8.4% (8.3%, 8.6%)	11.0% (10.8%, 11.1%)	8.7% (8.6%, 8.8%)
% Peripheral Vascular Disease	7.2% (6.8%, 7.6%)	7.2% (7.0%, 7.3%)	7.6% (7.5%, 7.7%)	7.4% (7.3%, 7.4%)
% Severe Chronic Liver Disease	0.5% (0.4%, 0.6%)	0.8% (0.8%, 0.9%)	0.5% (0.5%, 0.5%)	0.7% (0.7%, 0.7%)
% Diabetes with End Organ Damage	3.0% (2.7%, 3.2%)	3.4% (3.3%, 3.5%)	2.6% (2.5%, 2.7%)	2.7% (2.7%, 2.7%)
% Chronic Renal Failure	3.4% (3.1%, 3.6%)	5.2% (5.1%, 5.3%)	3.3% (3.2%, 3.3%)	5.0% (5.0%, 5.1%)
% Dementia	5.5% (5.2%, 5.8%)	5.1% (5.0%, 5.2%)	6.3% (6.1%, 6.4%)	5.6% (5.6%, 5.7%)
% Diabetes (Without End Organ Damage)	22.3% (21.7%, 22.9%)	25.0% (24.8%, 25.3%)	23.0% (22.8%, 23.2%)	24.3% (24.2%, 24.4%)
<b>Low-Variation Indicators (per 1000)</b>				
Hip Fracture	7.13 (5.94, 8.32)	5.89 (5.47, 6.31)	7.63 (7.20, 8.05)	6.79 (6.63, 6.95)
Stroke	8.32 (7.04, 9.61)	7.09 (6.63, 7.55)	8.77 (8.31, 9.23)	6.56 (6.40, 6.72)
Colon Cancer	1.95 (1.32, 2.57)	1.36 (1.16, 1.56)	1.98 (1.76, 2.20)	1.23 (1.16, 1.30)
Acute Myocardial Infarction	11.94 (10.41, 13.48)	9.41 (8.88, 9.93)	10.59 (10.09, 11.09)	8.61 (8.43, 8.80)

Any of Four Above Annual Spending (\$) <sup>e</sup>	28.52	(26.16, 30.87)	23.27	(22.45, 24.10)	28.22	(27.41, 29.03)	22.78	(22.48, 23.08)
Mean Per Capita Payments	\$10,495	(\$10,211, \$10,780)	\$11,510	(\$11,394, \$11,625)	\$9,799	(\$9,711, \$9,894)	\$11,299	(\$11,257, \$11,341)
Mean Payments - Acute Care	\$4,292	(\$4,118, \$4,465)	\$4,205	(\$4,140, \$4,269)	\$3,838	(\$3,785, \$3,893)	\$4,064	(\$4,041, \$4,088)
Mean Payments - Acute Care Users	\$30,308	(\$29,532, \$31,085)	\$32,788	(\$32,466, \$33,110)	\$27,927	(\$27,677, \$28,176)	\$32,307	(\$32,190, \$32,424)
Proportion who use Acute Care (%)	27.02%	(26.40%, 27.65%)	26.34%	(26.11%, 26.59%)	27.19%	(26.96%, 27.40%)	26.12%	(26.04%, 26.22%)
Mean Payments - Procedures	\$1,206	(\$1,165, \$1,247)	\$1,353	(\$1,336, \$1,370)	\$1,168	(\$1,155, \$1,183)	\$1,357	(\$1,350, \$1,363)
Mean Payments - E&M	\$1,147	(\$1,127, \$1,168)	\$1,312	(\$1,302, \$1,321)	\$1,087	(\$1,081, \$1,094)	\$1,274	(\$1,271, \$1,278)
Mean Payments - SNF	\$772	(\$717, \$828)	\$846	(\$823, \$870)	\$799	(\$780, \$818)	\$889	(\$880, \$898)
Mean Payments - DME	\$748	(\$705, \$791)	\$1,031	(\$1,012, \$1,049)	\$637	(\$626, \$649)	\$934	(\$928, \$940)
Mean Payments - Imaging	\$397	(\$388, \$407)	\$535	(\$530, \$539)	\$373	(\$370, \$377)	\$513	(\$511, \$515)
Mean Payments - HHA	\$473	(\$445, \$501)	\$504	(\$492, \$515)	\$448	(\$439, \$458)	\$514	(\$509, \$518)
Mean Payments - LTC	\$650	(\$592, \$709)	\$685	(\$661, \$708)	\$678	(\$658, \$698)	\$719	(\$710, \$728)
Mean Payments - Tests	\$359	(\$351, \$366)	\$478	(\$474, \$482)	\$354	(\$351, \$357)	\$481	(\$479, \$482)
<b>Outcomes</b>								
Number of Emergency Department Visits per 100 Beneficiaries	124.36	(120.60, 128.11)	144.38	(142.67, 146.09)	125.75	(124.48, 127.07)	149.95	(149.32, 150.58)
Percent with an Emergency Department Visit	45.97%	(45.27%, 46.68%)	49.09%	(48.81%, 49.36%)	46.80%	(46.56%, 47.05%)	49.95%	(49.85%, 50.05%)
30-Day Surgical Readmission Rate	13.00%	(11.56%, 14.44%)	11.80%	(11.27%, 12.36%)	11.50%	(11.06%, 12.01%)	12.30%	(12.08%, 12.49%)
30-Day Medical Readmission Rate	17.30%	(16.24%, 18.29%)	16.60%	(16.22%, 17.02%)	15.70%	(15.33%, 15.99%)	15.90%	(15.75%, 16.03%)

#### Non-Medicaid Beneficiaries

	Participants				Controls			
	Pre (2001-2004)		Post (2005-2009)		Pre (2001-2004)		Post (2005-2009)	
	N		N		N		N	
	134,616		707,485		1,072,898		5,307,247	
<b>Demographics</b>								
Mean Age	73.5	(73.4, 73.5)	73.4	(73.4, 73.4)	73.5	(73.5, 73.5)	73.5	(73.5, 73.5)
% Female	56.7%	(56.4%, 57.0%)	56.6%	(56.5%, 56.7%)	57.5%	(57.5%, 57.6%)	56.6%	(56.6%, 56.6%)
% Medicaid	0.0%		0.0%		0.0%		0.0%	
% Black	1.4%	(1.3%, 1.4%)	1.7%	(1.7%, 1.7%)	2.0%	(2.0%, 2.0%)	2.3%	(2.3%, 2.3%)
% < Age 65	7.7%	(7.6%, 7.8%)	9.2%	(9.1%, 9.3%)	7.6%	(7.5%, 7.6%)	8.9%	(8.9%, 9.0%)

% Disabled & ≥ Age 65 <sup>a</sup>	5.5%	(4.9%, 5.2%)	6.0%	(5.3%, 5.5%)	5.8%	(5.4%, 5.4%)	6.2%	(5.6%, 5.6%)
% Blacks Below FPL in Zipcode	18.3%	(17.9%, 18.7%)	18.1%	(18.0%, 18.3%)	20.8%	(20.7%, 20.9%)	20.1%	(20.1%, 20.1%)
% Non-Black Below FPL in Zipcode	8.0%	(8.0%, 8.0%)	7.8%	(7.8%, 7.8%)	8.3%	(8.3%, 8.3%)	8.0%	(8.0%, 8.0%)
% Black High-Income in Zipcode <sup>b</sup>	13.8%	(12.2%, 15.3%)	14.2%	(13.5%, 14.8%)	9.4%	(9.2%, 9.6%)	10.4%	(10.3%, 10.5%)
% Non-Black High-Income in Zipcode <sup>b</sup>	11.8%	(11.6%, 11.9%)	12.9%	(12.9%, 13.0%)	7.8%	(7.7%, 7.8%)	9.3%	(9.3%, 9.3%)
<b>Risk Adjustment</b>								
Mean HCC	1.01	(1.01, 1.02)	1.13	(1.13, 1.14)	0.98	(0.98, 0.98)	1.07	(1.07, 1.07)
% Died (Overall) <sup>c</sup>	3.6%	(3.5%, 3.7%)	3.5%	(3.4%, 3.5%)	3.4%	(3.4%, 3.5%)	3.3%	(3.3%, 3.4%)
% Nursing Home Resident <sup>d</sup>	1.6%	(1.6%, 1.7%)	1.7%	(1.7%, 1.7%)	1.9%	(1.9%, 2.0%)	2.0%	(2.0%, 2.0%)
Mean Comorbidity Count (of 10 below)	0.69	(0.68, 0.69)	0.74	(0.73, 0.74)	0.66	(0.66, 0.67)	0.70	(0.70, 0.70)
% Malignant Cancer/Leukemia	3.0%	(2.9%, 3.0%)	3.1%	(3.0%, 3.1%)	2.2%	(2.2%, 2.2%)	2.3%	(2.3%, 2.3%)
% Chronic Pulmonary Disease	10.3%	(10.2%, 10.5%)	10.5%	(10.4%, 10.5%)	10.5%	(10.4%, 10.6%)	10.3%	(10.3%, 10.3%)
% Coronary Artery Disease	16.4%	(16.2%, 16.6%)	15.9%	(15.8%, 16.0%)	15.8%	(15.8%, 15.9%)	15.5%	(15.5%, 15.5%)
% Congestive Heart Failure	7.7%	(7.6%, 7.9%)	7.2%	(7.1%, 7.2%)	7.5%	(7.5%, 7.6%)	6.8%	(6.7%, 6.8%)
% Peripheral Vascular Disease	6.1%	(5.9%, 6.2%)	6.7%	(6.6%, 6.7%)	5.8%	(5.7%, 5.8%)	6.5%	(6.5%, 6.5%)
% Severe Chronic Liver Disease	0.3%	(0.3%, 0.3%)	0.3%	(0.3%, 0.4%)	0.3%	(0.3%, 0.3%)	0.3%	(0.3%, 0.3%)
% Diabetes with End Organ Damage	1.9%	(1.8%, 2.0%)	2.2%	(2.1%, 2.2%)	1.7%	(1.7%, 1.8%)	1.7%	(1.7%, 1.7%)
% Chronic Renal Failure	2.1%	(2.0%, 2.1%)	4.1%	(4.0%, 4.1%)	2.0%	(2.0%, 2.0%)	3.6%	(3.6%, 3.6%)
% Dementia	3.9%	(3.8%, 4.0%)	4.2%	(4.2%, 4.3%)	3.9%	(3.9%, 3.9%)	4.3%	(4.3%, 4.3%)
% Diabetes (Without End Organ Damage)	16.9%	(16.7%, 17.1%)	19.5%	(19.4%, 19.6%)	16.7%	(16.6%, 16.7%)	18.6%	(18.5%, 18.6%)
<b>Low-Variation Indicators (per 1000)</b>								
Hip Fracture	6.16	(5.74, 6.58)	6.09	(5.90, 6.27)	6.6	(6.47, 6.77)	6.15	(6.09, 6.22)
Stroke	7.46	(7.00, 7.92)	6.90	(6.71, 7.09)	7.6	(7.38, 7.71)	6.89	(6.81, 6.96)
Colon Cancer	2.34	(2.09, 2.60)	2.01	(1.91, 2.12)	2.2	(2.14, 2.32)	1.78	(1.74, 1.81)
Acute Myocardial Infarction	10.19	(9.66, 10.73)	8.56	(8.35, 8.78)	9.9	(9.73, 10.11)	7.79	(7.72, 7.87)
Any of Four Above	25.69	(24.84, 26.53)	23.19	(22.84, 23.54)	25.8	(25.53, 26.13)	22.23	(22.11, 22.36)
<b>Annual Spending (\$) <sup>e</sup></b>								
Mean Per Capita Payments	\$7,549	(\$7,461, \$7,636)	\$8,696	(\$8,655, \$8,738)	\$7,102	(\$7,074, \$7,132)	\$8,233	(\$8,218, \$8,247)
Mean Payments - Acute Care	\$3,104	(\$3,050, \$3,158)	\$3,183	(\$3,160, \$3,207)	\$2,793	(\$2,776, \$2,811)	\$2,910	(\$2,902, \$2,918)
Mean Payments - Acute Care Users	\$27,119	(\$26,813, \$27,425)	\$30,259	(\$30,115, \$30,404)	\$25,715	(\$25,613, \$25,817)	\$29,208	(\$29,157, \$29,259)
Proportion who use Acute Care (%)	20.73%	(20.51%, 20.94%)	20.70%	(20.61%, 20.80%)	20.43%	(20.35%, 20.50%)	20.04%	(20.00%, 20.07%)
Mean Payments - Procedures	\$1,100	(\$1,088, \$1,112)	\$1,289	(\$1,283, \$1,295)	\$1,092	(\$1,088, \$1,097)	\$1,278	(\$1,275, \$1,280)

Mean Payments - E&M	\$801	(\$795, \$806)	\$923	(\$920, \$926)	\$753	(\$751, \$755)	\$850	(\$849, \$851)
Mean Payments - SNF	\$458	(\$442, \$473)	\$613	(\$605, \$622)	\$480	(\$475, \$486)	\$632	(\$629, \$635)
Mean Payments - DME	\$418	(\$406, \$429)	\$635	(\$629, \$642)	\$338	(\$335, \$341)	\$510	(\$508, \$512)
Mean Payments - Imaging	\$378	(\$375, \$382)	\$487	(\$485, \$489)	\$359	(\$358, \$360)	\$468	(\$467, \$469)
Mean Payments - HHA	\$301	(\$293, \$309)	\$347	(\$343, \$351)	\$279	(\$277, \$282)	\$336	(\$335, \$338)
Mean Payments - LTC	\$276	(\$263, \$290)	\$316	(\$309, \$323)	\$304	(\$299, \$309)	\$336	(\$333, \$338)
Mean Payments - Tests	\$287	(\$285, \$290)	\$395	(\$393, \$396)	\$278	(\$277, \$279)	\$384	(\$384, \$385)
<b>Outcomes</b>								
Number of Emergency Department Visits per 100 Beneficiaries	51.49	(50.85, 52.13)	59.61	(59.29, 59.93)	50.95	(50.72, 51.20)	59.08	(58.95, 59.20)
Percent with an Emergency Department Visit	28.81%	(28.57%, 29.05%)	31.12%	(31.01%, 31.23%)	28.77%	(28.68%, 28.86%)	30.96%	(30.92%, 31.00%)
30-Day Surgical Readmission Rate	8.80%	(8.33%, 9.27%)	8.60%	(8.42%, 8.82%)	9.10%	(8.89%, 9.23%)	8.60%	(8.51%, 8.65%)
30-Day Medical Readmission Rate	15.50%	(15.07%, 16.00%)	15.40%	(15.23%, 15.63%)	14.40%	(14.22%, 14.53%)	14.80%	(14.72%, 14.86%)

a Disability is defined using original reason for entitlement.

b Proportion in a high income group is defined by race at the 85<sup>th</sup> percentile.

c Mortality is weighted using only county weights.

d Nursing home residency is defined by carrier file visit codes indicating a physician visit in a residential nursing facility.

e Payments inflated to 2009 dollars using the GDP deflator.

Notes: Cases and controls are weighted by person-years. Controls are weighted such that the sum of the weights equals the number of cases by county.

Source: Medicare claims files, 2001-2005 (20% sample), 2006-2009 (100% sample).

eTable 3: Low Variation Cohort Definitions

Acute Myocardial Infarction (AMI)	Primary diagnosis of AMI (410.x0 or 410.x1)
Colorectal Cancer	Primary diagnosis of colorectal cancer (153.0-154.1,154.8) and evidence of a surgical resection (procedure codes 17.32-17.36, 17.39, 45.71-45.76, 45.79, 45.80-45.83, 48.41, 48.49, 48.50-48.53, 48.61-48.65, 48.69)
Hip Fracture	Primary diagnosis of hip fracture (820.xx)
Stroke	Primary diagnosis of stroke (431.xx, 433.xx, 434.x1, 436.x1)

Table 4: Changes in Utilization-Based Quality Measures Associated with the Physician Group Practice Demonstration by Site

Site	Beneficiary Type	Emergency Department Visit Rate			30-Day Medical Readmission Rate			30-Day Surgical Readmission Rate		
		2001-2004 Participant Mean Annual Rate	Estimated Annual Change in Rate Associated with PGPD <sup>a</sup>		2001-2004 Participant Mean Annual Rate	Estimated Annual Change in Rate Associated with PGPD <sup>a</sup>		2001-2004 Participant Mean Annual Rate	Estimated Annual Change in Rate Associated with PGPD <sup>a</sup>	
		Rate	Estimate	(95% CI)	Rate	Estimate	(95% CI)	Rate	Estimate	(95% CI)
All PGPD Participants	All	31%	0.06%	(-0.11, 0.24)	16%	-0.67%	(-1.11, -0.23)	9%	-0.17%	(-0.59, 0.25)
	Dually Eligible	46%	-0.10%	(-0.52, 0.32)	17%	-1.07%	(-1.73, -0.41)	13%	-2.21%	(-3.07, -1.34)
	Non-Dually Eligible	29%	0.14%	(-0.04, 0.32)	16%	-0.58%	(-1.08, -0.07)	9%	0.14%	(-0.29, 0.57)
Billings Clinic	All	29%	-0.95%	(-1.09, -0.81)	16%	-1.68%	(-1.82, -1.54)	10%	-0.34%	(-0.58, -0.10)
	Dually Eligible	43%	2.89%	(2.30, 3.48)	18%	-3.45%	(-4.54, -2.35)	13%	-1.51%	(-2.37, -0.64)
	Non-Dually Eligible	28%	-2.65%	(-3.29, -2.02)	15%	-1.22%	(-1.33, -1.11)	10%	-0.21%	(-0.45, 0.02)
Dartmouth-Hitchcock Clinic	All	33%	1.46%	(1.26, 1.65)	16%	-1.24%	(-1.59, -0.88)	10%	-0.58%	(-0.90, -0.26)
	Dually Eligible	50%	1.40%	(0.58, 2.23)	18%	-2.59%	(-3.44, -1.74)	13%	-4.29%	(-5.74, -2.84)
	Non-Dually Eligible	32%	3.56%	(2.74, 4.38)	16%	-0.67%	(-1.03, -0.32)	9%	-0.17%	(-0.48, 0.15)
Everett Clinic	All	26%	2.50%	(2.31, 2.68)	15%	-2.49%	(-3.05, -1.94)	8%	-0.47%	(-0.84, -0.09)
	Dually Eligible	46%	1.36%	(1.03, 1.70)	15%	0.48%	(0.24, 0.72)	14%	-2.68%	(-3.06, -2.30)
	Non-Dually Eligible	22%	1.35%	(-0.03, 2.73)	15%	-3.29%	(-3.82, -2.76)	7%	0.25%	(-0.19, 0.69)
Forsyth Medical Group	All	32%	1.78%	(1.55, 2.00)	15%	0.26%	(-0.64, 1.16)	10%	-0.04%	(-0.73, 0.65)
	Dually Eligible	49%	0.26%	(-0.10, 0.63)	17%	-1.36%	(-2.10, -0.62)	16%	-5.38%	(-6.21, -4.54)
	Non-Dually Eligible	28%	6.07%	(4.93, 7.21)	14%	0.69%	(-0.26, 1.63)	9%	1.07%	(0.43, 1.71)
Geisinger Clinic	All	32%	0.73%	(0.62, 0.84)	16%	0.11%	(-0.34, 0.57)	9%	0.60%	(0.24, 0.96)
	Dually Eligible	44%	3.19%	(2.96, 3.42)	17%	-1.29%	(-1.84, -0.74)	12%	-0.67%	(-1.70, 0.36)
	Non-Dually Eligible	30%	1.53%	(1.08, 1.98)	16%	0.49%	(-0.03, 1.01)	8%	0.77%	(0.42, 1.12)
Marshfield Clinic	All	28%	-1.98%	(-2.13, -1.83)	16%	-1.01%	(-1.36, -0.67)	8%	0.23%	(-0.25, 0.70)
	Dually Eligible	41%	-3.51%	(-3.79, -3.24)	16%	-2.05%	(-2.79, -1.32)	12%	-2.44%	(-3.06, -1.83)
	Non-Dually Eligible	27%	-4.10%	(-5.25, -2.95)	16%	-0.77%	(-1.23, -0.32)	8%	0.58%	(0.11, 1.06)

Middlesex Health System	All	34%	0.63%	(0.50, 0.75)	13%	0.20%	(-0.10, 0.50)	8%	0.62%	(0.38, 0.87)
	Dually Eligible	50%	-0.82%	(-1.39, -0.26)	14%	3.95%	(2.93, 4.96)	9%	-2.98%	(-4.24, -1.72)
	Non-Dually Eligible	33%	1.47%	(0.99, 1.94)	14%	-0.60%	(-0.93, -0.26)	8%	1.19%	(0.94, 1.44)
Park Nicollet Clinic	All	26%	-0.14%	(-0.25, -0.02)	15%	0.90%	(0.61, 1.19)	11%	-2.48%	(-2.78, -2.18)
	Dually Eligible	42%	-3.65%	(-3.91, -3.39)	16%	0.61%	(0.40, 0.82)	22%	-10.55%	(-10.95, -10.15)
	Non-Dually Eligible	24%	-0.88%	(-1.70, -0.05)	14%	0.93%	(0.55, 1.30)	9%	-1.64%	(-1.99, -1.29)
St. John's Clinic	All	32%	-0.18%	(-0.42, 0.06)	16%	-1.28%	(-1.81, -0.76)	8%	0.61%	(0.03, 1.18)
	Dually Eligible	49%	-0.01%	(-0.20, 0.18)	18%	-1.78%	(-2.08, -1.49)	9%	1.18%	(0.89, 1.46)
	Non-Dually Eligible	29%	-0.05%	(-1.22, 1.12)	15%	-1.31%	(-2.01, -0.61)	8%	0.54%	(-0.10, 1.17)
University of Michigan Faculty Group Practice	All	36%	-1.18%	(-1.33, -1.03)	19%	-0.66%	(-0.88, -0.44)	13%	-0.88%	(-1.11, -0.64)
	Dually Eligible	49%	-1.81%	(-2.12, -1.50)	21%	0.73%	(0.26, 1.20)	18%	2.24%	(1.75, 2.74)
	Non-Dually Eligible	34%	-3.96%	(-4.52, -3.41)	19%	-1.00%	(-1.21, -0.79)	13%	-1.43%	(-1.66, -1.21)

a Estimates derived from a linear model adjusting for area-year indicators, age, black race, female, Medicaid eligibility, and disability. The model adjusts for ZIP-code-level rates of poverty and high income. The model adjusts for the rate of low-variation conditions (LVCs) for each of the ten local areas for each year separately for treatment and control groups. LVC rate is the number of individuals experiencing the conditions hip fracture, stroke, colon cancer, and AMI per thousand Medicare beneficiaries.  
Source: Author analyses of Medicare claims files, 2001-2005 (20% sample), 2006-2009 (100% sample).