

## **Appendix to “The Association Between Primary Care Physician Compensation and Patterns of Care Delivery, 2012-2015”**

Adrian Garcia Mosqueira, M.A.; Meredith Rosenthal, Ph.D. and Michael L. Barnett, M.D., M.S.

### **Table of Contents**

**Appendix Methodology:** Methodology Behind Low-Value and High-Value Composite Measures

**Table A1:** Low-Value and High-Value Care Measure Definitions

**Table A2:** Patient and Physician Characteristics by Ownership

**Table A3:** Factors Affecting Compensation (FACs) for Physician Owners

**Table A4:** Out-of-Visit/Office Care by PCP Ownership

**Table A5:** Overuse and Quality Measures by Ownership

**Table A6:** Out-of-Visit/Office Care by PCP Compensation Type, Alternate Compensation Definition

**Table A7:** Overuse and Quality Measures – Full Adjusted and Unadjusted Models, Alternate Compensation Definition

## **Appendix Methodology: Methodology Behind Low-Value and High-Value Composite Measures**

We developed two composite measures from the 20 quality measures defined in Appendix Table 2. The two composite measures integrated two mutually exclusive groups of quality measures, 8 measures for low-value care and 12 measures for high-value care (Appendix Table 2). A critical component in creating these measures is that a single office visit may be eligible for multiple quality measures. For instance, if a patient with coronary artery disease (CAD) and congestive heart failure (CHF) presents for a visit and is taking aspirin and a beta-blocker but no statin or angiotensin-converting enzyme (ACE) inhibitor, that visit would be eligible for 5 high value measures and receive “credit” for 3 of those measures (1 for aspirin and 2 for beta-blocker), or a composite high-value score of  $3/5 = 0.6$ . Therefore, for the composite measures, each visit has a number of eligible measures (denominator) and the number of times the service measured was delivered (numerator).

We also needed to account for the fact that a visit which is eligible for multiple services should have more weight than a visit with only one service. To accomplish this, for the calculation of survey-weighted estimates of the composite measures, we multiplied the survey weights provided by NAMCS by the number of eligible services for a given visit. Therefore, a visit with 5 eligible services would have 5 times its typical weight than a visit with 1 service. We used these modified survey weights for regressions that included the composite measures.

**Table A1 – Low-Value and High-Value Care Measure Definitions**

	Quality Measure	Denominator Population	Numerator	Exclusions
<b>Low-Value Care Measure</b>	Antibiotics for “never” URI’s	New problem visits with primary diagnosis or reason for visit including: bronchitis, nonstreptococcal pharyngitis or upper respiratory infections	Prescription of any oral antibiotic	"Competing diagnosis" for antibiotics including urinary tract infection, other bacterial infections, vaginitis, human immunodeficiency virus. Also excluded patients with chronic obstructive pulmonary disease or any cancer diagnosis, as well as patients sent to the emergency department or admitted.
	Screening EKG in GME	Any visit with a diagnosis or reason for visit of annual physical exam	Order for EKG	Any diagnosis or reason for visit of chronic sinusitis, immune disorders, nasal polyps, eye/orbit related injuries, or head trauma.
	Screening CBC in GME	Any visit with a diagnosis or reason for visit of annual physical exam	Order for CBC	Any diagnosis or reason for visit of cancer, hematologic disease, fever, fatigue or bacterial infection
	Screening UA in GME	Any visit with a diagnosis or reason for visit of annual physical exam	Order for a UA	Any diagnosis or reason for visit of urologic disease or symptom [dysuria, urgency, retention, hematuria], kidney disease in chronic kidney disease, or pregnancy.
	Opioids for back/neck pain	Any visit with a diagnosis or reason for visit involving back or neck pain	Prescription of any opioid-containing medication	Any diagnosis or reason for visit including “red flags”: fever, weight loss, cachexia, neurologic symptoms, cancer, spinal fracture, myelopathy, post-laminectomy
	CT/MRI for back/neck pain	Any visit with a diagnosis or reason for visit involving back or neck pain	Order of advanced imaging (CT/MRI)	Any diagnosis or reason for visit including “red flags”: fever, weight loss, cachexia, neurologic symptoms, cancer, spinal fracture, myelopathy, post-laminectomy
	Opioids for headache	Any visit with a diagnosis or reason for visit of headache or migraine	Prescription of any opioid-containing medication	Any diagnosis or reason for visit of human immunodeficiency virus, pregnancy, neurologic symptoms [weakness, sensory changes, altered mental status], cancer, head trauma or epilepsy
	CT/MRI for headache	Any visit with a diagnosis or reason for visit of headache or migraine	Order of advanced imaging (CT/MRI)	Any diagnosis or reason for visit of human immunodeficiency virus, pregnancy, neurologic symptoms [weakness, sensory changes, altered mental status], cancer, head trauma or epilepsy
<b>High Value Care Measures</b>	Tobacco cessation counseling	Any visit for a current cigarette smoker or diagnosis/reason for visit for smoking	Tobacco cessation counseling provided	None
	Weight reduction counseling	Any visit for a patient with a body mass index greater than or equal to 30, or a diagnosis/reason for visit of obesity	Counseling provided for weight reduction, exercise, or diet/nutrition	None
	Anticoagulant use in Afib	Any visit with a diagnosis of atrial fibrillation or atrial flutter	Prescription of heparin-family drug, coumadin, novel anticoagulant, aspirin or Aggrenox	Any diagnosis or reason for visit of gastrointestinal bleeding, gastritis, alcoholism or drug abuse, gait disorder, dementia, central nervous system bleeding, seizures, central nervous system malignancy, or thrombocytopenia
	Aspirin use in CAD	Any visit with a diagnosis or reason for visit or chronic illness code for coronary artery disease	Prescription of an antiplatelet agent including aspirin	Any diagnosis or reason for visit of gastrointestinal bleeding, gastritis, central nervous system bleeding
	Beta blocker use in CAD	Any visit with a diagnosis or reason for visit or chronic illness code for coronary artery disease	Prescription of a beta blocker	Any diagnosis of heart block, asthma or chronic obstructive pulmonary disease
	Statin use in CAD	Any visit with a diagnosis or reason for visit or chronic illness code for coronary artery disease	Prescription of a statin	Any diagnosis of liver disease or alcoholism
	Beta blocker use in CHF	Any diagnosis or chronic illness code of congestive heart failure	Prescription of a beta blocker	Any diagnosis of heart block, asthma or chronic obstructive pulmonary disease
	ACE/ARB use in CHF	Any diagnosis or chronic illness code of congestive heart failure	Prescription of an ACE or ARB	Any diagnosis of hyperkalemia or angioedema

	Antiplatelet use in CVD	Any diagnosis or chronic illness code of congestive heart failure	Prescription of an antiplatelet agent including aspirin	Any diagnosis or reason for visit of gastrointestinal bleeding, gastritis, central nervous system bleeding
	Statin use in DM	Any diagnosis or chronic illness code of diabetes mellitus	Prescription of a statin	Any diagnosis of liver disease or alcoholism
	Depression counseling	Any diagnosis of depression or chronic illness code of depression	Prescription of antidepressant (SSRI, SNRI, TCA etc) or mental health counseling	None
	Treatment for osteoporosis	Any diagnosis of osteoporosis or chronic illness code for osteoporosis	Prescription for osteoporosis medication (bisphosphonate, PTH, etc)	None

**Table A2 – Patient and Physician Characteristics by Ownership**

	Own Solo		Own Non-Solo	
<b>(n raw)</b>	27,154		22,081	
<b>(n weighted)</b>	574,548,344		597,514,201	
<b>Age (mean)</b>	<b>39</b>	[36.4 – 41.7]	<b>42.9</b>	[40.8 – 45.0]
<b>Female</b>	<b>61.40%</b>	[0.59 – 0.64]	<b>60.50%</b>	[0.58 – 0.63]
<b>Race/Ethnicity</b>				
Non-Hispanic White	<b>70.70%</b>	[0.68 – 0.74]	<b>58.10%</b>	[0.55 – 0.62]
Non-Hispanic Black	<b>11.10%</b>	[0.09 – 0.13]	<b>13.00%</b>	[0.11 – 0.15]
Hispanic	<b>13.10%</b>	[0.11 – 0.15]	<b>21.70%</b>	[0.18 – 0.25]
Non-Hispanic Other	<b>5.00%</b>	[0.04 – 0.06]	<b>7.20%</b>	[0.05 – 0.09]
<b>Number of Chronic Diseases</b>				
0	<b>50.10%</b>	[0.46 – 0.54]	<b>44.60%</b>	[0.41 – 0.48]
1	<b>19.00%</b>	[0.18 – 0.20]	<b>21.30%</b>	[0.20 – 0.23]
2	<b>12.30%</b>	[0.11 – 0.13]	<b>15.00%</b>	[0.13 – 0.17]
3	<b>9.20%</b>	[0.08 – 0.11]	<b>10.10%</b>	[0.09 – 0.11]
4+	<b>9.40%</b>	[0.07 – 0.12]	<b>9.00%</b>	[0.08 – 0.10]
<b>Region</b>				
Northeast	<b>24.10%</b>	[0.20 – 0.28]	<b>20.50%</b>	[0.16 – 0.25]
Midwest	<b>18.00%</b>	[0.15 – 0.21]	<b>11.80%</b>	[0.09 – 0.15]
South	<b>32.60%</b>	[0.29 – 0.37]	<b>43.70%</b>	[0.39 – 0.49]
West	<b>25.30%</b>	[0.20 – 0.31]	<b>24.00%</b>	[0.19 – 0.29]
<b>Rural Visit Location</b>	<b>8.30%</b>	[0.07 – 0.10]	<b>11.20%</b>	[0.08 – 0.14]
<b>Insurance Type</b>				
Private	<b>63.30%</b>	[0.60 – 0.67]	<b>47.20%</b>	[0.44 – 0.51]
Medicare	<b>20.30%</b>	[0.16 – 0.24]	<b>22.80%</b>	[0.21 – 0.25]
Medicaid/CHIP	<b>13.50%</b>	[0.12 – 0.16]	<b>23.10%</b>	[0.19 – 0.27]
Other	<b>2.90%</b>	[0.02 – 0.03]	<b>6.90%</b>	[0.06 – 0.08]
<b>Practice Characteristics</b>				
<b>Who Owns the Practice?</b>				
Physician Grp.	<b>97.60%</b>	[0.96 – 0.99]	<b>98.70%</b>	[0.97 – 1.00]
Acad/Commty	<b>0.00%</b>	[0.00 – 0.00]	<b>0.00%</b>	[0.00 – 0.01]
Insurer/HMO	<b>2.30%</b>	[0.01 – 0.04]	<b>0.00%</b>	[0.00 – 0.02]
<b>Capitation Revenue</b>				
0-25% Revenue	<b>60.20%</b>	[0.55 – 0.66]	<b>66.80%</b>	[0.61 – 0.73]
26-50% Revenue	<b>5.20%</b>	[0.03 – 0.07]	<b>9.70%</b>	[0.05 – 0.15]
51-75% Revenue	<b>5.50%</b>	[0.00 – 0.11]	<b>2.80%</b>	[0.02 – 0.04]
Over 75% Revenue	<b>1.40%</b>	[0.00 – 0.02]	<b>2.60%</b>	[0.01 – 0.04]
Missing	<b>28.00%</b>	[0.23 – 0.32]	<b>18.00%</b>	[0.14 – 0.22]

Note: Table presents estimates of sample demographic characteristics stratified by ownership type 95% CI in brackets.

**Table A3 – Factors Affecting Compensation (FACs) for Physician Owners**

	<b>Own Solo</b>	<b>Own Non-Solo</b>
Observations (raw)	1,035	1,133
Observations (weighted)	205,769	181,459
<b>Practice Finances</b>	<b>72.88%</b> [0.69-0.77]	<b>71.30%</b> [0.68-0.75]
<b>Personal Productivity</b>	<b>33.70%</b> [0.30-0.38]	<b>57.80%</b> [0.54-0.62]
<b>Patient Satisfaction</b>	<b>4.40%</b> [0.03-0.06]	<b>9.80%</b> [0.07-0.13]
<b>Quality Measures</b>	<b>6.90%</b> [0.05-0.09]	<b>14.80%</b> [0.12-0.18]
<b>Practice Profiling</b>	<b>5.85%</b> [0.04-0.08]	<b>8.52%</b> [0.06-0.11]

Note: Chi squared p-value for differences in FACs across ownership status is 0.00 at the 95% C.I.  
Physicians could check more than one FAC in the survey, thus these totals are not mutually exclusive.

**Table A4 - Out-of-Visit/Office Care by PCP Ownership**

	<b>Percentage [95% C.I.]</b>	<b>Unadjusted O.R. [95% C.I.]</b>	<b>Adjusted O.R. [95% C.I.]</b>
<b>Home Visits</b>			
Own Solo	<b>4.6%</b> [0.30 – 0.60]	<b>1.29</b> [0.51 – 3.26]	0.88 [0.21 – 3.67]
Own Non-Solo	<b>11.5%</b> [0.09 – 0.14]	<b>3.49</b> [1.41 – 8.59] ***	2.04 [0.50 – 8.35]
<b>Nursing H Visits</b>			
Own Solo	<b>15.7%</b> [0.12 – 0.19]	<b>0.90</b> [0.49 – 1.66]	1.23 [0.48 – 3.17]
Own Non-Solo	<b>19.5%</b> [0.16 – 0.23]	<b>1.18</b> [0.67 – 2.08]	1.19 [0.48 – 2.97]
<b>Hospital Visits</b>			
Own Solo	<b>53.7%</b> [0.49 – 0.58]	<b>2.63</b> [1.66 – 4.17] ***	<b>2.28</b> [1.09 – 4.73] **
Own Non-Solo	<b>46.0%</b> [0.42 – 0.50]	<b>1.93</b> [1.22 – 3.07] ***	1.76 [0.84 – 3.69]
<b>Phone Consults</b>			
Own Solo	<b>53.3%</b> [0.49 – 0.58]	<b>1.86</b> [1.16 – 2.98] **	<b>3.07</b> [1.46 – 6.43] ***
Own Non-Solo	<b>62.7%</b> [0.59 – 0.67]	<b>2.74</b> [1.70 – 4.40] ***	<b>4.64</b> [2.18 – 9.84] ***
<b>Email Consults</b>			
Own Solo	<b>16.5%</b> [0.13 – 0.19]	<b>1.15</b> [0.69 – 2.15]	1.42 [0.60 – 3.33]
Own Non-Solo	<b>12.6%</b> [0.09 – 0.16]	<b>0.83</b> [0.43 – 1.59]	1.43 [0.59 – 3.51]

Observations  
(raw/weighed) **7,819/623,039**

Note: \*\*p<0.05 \*\*\*p<0.01

\*Adjusted model uses productivity-based employee physicians as reference category. Adjusters are patient demographics, such as racial/ethnic, urban/rural, age, gender and number of chronic conditions, as well as practice-level characteristics including percentage of revenue from Medicare, Medicaid and private insurance, revenue subject to capitation, and electronic health records availability.

**Table A5 - Overuse and Quality Measures by Ownership**

Quality/Overuse Measure	Owner Solo			Owner Non-Solo		
	N	%	95% CI	N	%	95% CI
Overuse Composite	4798	<b>35.83%</b>	[0.33-0.39]	4391	<b>36.50%</b>	[0.33-0.40]
<b>Antibiotics for "never" URIs</b>	390	<b>56.89%</b>	[0.46-0.68]	414	<b>59.64%</b>	[0.52-0.68]
<b>Screening EKG in GME</b>	2085	<b>6.91%</b>	[0.04-0.10]	1487	<b>6.77%</b>	[0.04-0.09]
<b>Screening CBC in GME</b>	2745	<b>24.93%</b>	[0.21-0.29]	2082	<b>24.05%</b>	[0.20-0.28]
<b>Screening UA in GME</b>	2810	<b>21.75%</b>	[0.18-0.26]	2111	<b>16.67%</b>	[0.13-0.20]
<b>Opioids for back/neck pain</b>	1093	<b>32.21%</b>	[0.27-0.37]	1467	<b>40.50%</b>	[0.34-0.47]
<b>CT/MRI for back/neck pain</b>	1093	<b>5.02%</b>	[0.03-0.07]	1467	<b>4.45%</b>	[0.03-0.06]
<b>Opioids for headache</b>	340	<b>12.93%</b>	[0.08-0.18]	309	<b>14.25%</b>	[0.08-0.21]
<b>CT/MRI for headache</b>	340	<b>1.84%</b>	[0.01-0.03]	309	<b>0.37%</b>	[0.00-0.01]
High Value Composite	9588	<b>34.81%</b>	[0.32-0.37]	8920	<b>34.05%</b>	[0.32-0.36]
<b>Tobacco cessation counseling</b>	2438	<b>9.84%</b>	[0.08-0.12]	2284	<b>11.67%</b>	[0.09-0.14]
<b>Weight reduction counseling</b>	4946	<b>20.23%</b>	[0.17-0.23]	4649	<b>18.87%</b>	[0.16-0.22]
<b>Anticoagulant use in Afib</b>	223	<b>64.92%</b>	[0.55-0.75]	185	<b>64.87%</b>	[0.54-0.76]
<b>Aspirin use in CAD</b>	588	<b>33.78%</b>	[0.25-0.42]	518	<b>37.60%</b>	[0.29-0.46]
<b>Beta blocker use in CAD</b>	479	<b>44.66%</b>	[0.35-0.55]	424	<b>54.63%</b>	[0.46-0.63]
<b>Statin use in CAD</b>	588	<b>38.69%</b>	[0.30-0.48]	524	<b>46.61%</b>	[0.38-0.55]
<b>Beta blocker use in CHF</b>	262	<b>44.14%</b>	[0.35-0.54]	245	<b>42.37%</b>	[0.29-0.56]
<b>ACE/ARB use in CHF</b>	372	<b>17.54%</b>	[0.11-0.24]	329	<b>18.45%</b>	[0.13-0.24]
<b>Antiplatelet use in CVD</b>	396	<b>32.02%</b>	[0.23-0.41]	307	<b>31.00%</b>	[0.24-0.38]
<b>Statin use in DM</b>	2235	<b>36.91%</b>	[0.32-0.41]	2226	<b>37.13%</b>	[0.33-0.41]
<b>Depression counseling</b>	2121	<b>49.38%</b>	[0.45-0.54]	1784	<b>47.61%</b>	[0.43-0.52]
<b>Treatment for osteoporosis</b>	711	<b>19.08%</b>	[0.15-0.23]	601	<b>24.05%</b>	[0.17-0.31]

Note: Abbreviations: confidence interval (CI), upper respiratory tract infection (URI), computed tomography (CT), electrocardiogram (ECG), complete blood count (CBC), urinalysis (UA), general medical examination (GME), magnetic resonance imaging (MRI), atrial fibrillation (AF), coronary artery disease (CAD), congestive heart failure (CHF), angiotensin-converting enzyme inhibitor (ACE), angiotensin receptor blocker (ARB), cerebrovascular disease (CVD), diabetes mellitus (DM).

\*All estimates are survey-weighted proportions accounting for NAMCS sample design.

\*\* Low- and high-value care composites calculated at the visit level as the proportion of low- or high-value services delivered at a visit. To account for visits qualifying for more services than others, survey weights were multiplied by the number of eligible low- or high-value measures.



**Table A6 - Out-of-Visit/Office Care by PCP Compensation Type, Alternate Compensation Definition**

*This definition of compensation defines the exposure as those physicians that select only personal productivity or practice finances FACs.*

	<b>Percentage [95% C.I.]</b>	<b>Unadjusted O.R. [95% C.I.]</b>	<b>Adjusted O.R. [95% C.I.]</b>
<b>Home Visits</b>			
Reference PCPs	<b>3.9%</b> [0.03 - 0.06]	-	-
Productivity FACs	<b>7.6%</b> [0.06 - 0.09]	<b>2.07</b> † [1.26 – 3.45]	<b>1.98*</b> [1.13 – 3.48]
<b>Nursing H Visits</b>			
Reference PCPs	<b>13.1%</b> [0.10 - 0.17]	-	-
Productivity FACs	<b>15.4%</b> [0.13 - 0.18]	<b>1.21</b> [0.87 – 1.69]	<b>0.83</b> [0.49 – 1.42]
<b>Hospital Visits</b>			
Reference PCPs	<b>36.1%</b> [0.32 - 0.40]	-	-
Productivity FACs	<b>46.6%</b> [0.44 - 0.49]	<b>1.54</b> † [1.26 – 1.89]	<b>1.04</b> [0.75 – 1.45]
<b>Phone Consults</b>			
Reference PCPs	<b>56.2%</b> [0.52 - 0.60]	-	-
Productivity FACs	<b>54.4%</b> [0.52 - 0.57]	<b>0.93</b> [0.76 – 1.14]	<b>0.79</b> [0.58 – 1.08]
<b>Email Consults</b>			
Reference PCPs	<b>24.0%</b> [0.21 - 0.28]	-	-
Productivity FACs	<b>14.8%</b> [0.13 - 0.17]	<b>0.55</b> † [0.42 – 0.71]	<b>0.69*</b> [0.49 – 0.97]
Observations (raw/weighed)	<b>7,620/633,815</b>		

Note: \*p<0.05 †p<0.01

\*Adjusted model uses productivity-based employee physicians as reference category. E.H.R uses partial as reference. Adjusters are patient demographics, such as racial/ethnic, urban/rural, age, gender and number of chronic conditions, as well as practice-level characteristics including percentage of revenue from Medicare, Medicaid and private insurance, electronic health records availability, ownership status, and solo/group practice.

**Table A7 - Overuse and Quality Measures – Full Adjusted and Unadjusted Models, Alternate Compensation Definition**

*This definition of compensation defines the exposure as those physicians that select only personal productivity or practice finances FACs.*

	<b>Overuse Composite</b>		<b>High Value Composite</b>	
(n raw)	75,516		3,026	
(n weighted)	1,026,046,733		16,192,336	
	Undj. O.R. [95% CI]	Adj. O.R. [95 % CI]	Undj. O.R. [95% CI]	Adj. O.R. [95 % CI]
<b>Productivity FACs</b> (ref – PCPs with any non-productivity FAC)	1.05	1.04	0.84†	0.93
	[0.89-1.24]	[0.84-1.29]	[0.75-0.95]	[0.80-1.07]

**Note:** \*p<0.05 †p<0.01 Results are odds ratios and 95% confidence intervals in brackets. Compensation reference group is PCPs that have selected clinical factors as FACs.