

## Supplementary Appendix

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

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**SECTION A. Methods of Identifying Physician Specialty; Evaluation and Management (E&M) and Non-E&M Services; and Beneficiaries with Individual Chronic Conditions.**

Physician specialty was determined from HCFA provider specialty codes, which agreed with physicians’ self-reported specialty on the CTS survey in 91% of cases: primary care physicians (codes 01, 08, 11, 12, 37, 38, 60, 84); medical specialists (03, 06, 07, 10, 13, 25, 26, 27, 29, 39, 44, 46, 66, 75, 79, 81, 82, 83, 86, 90); surgeons (02, 04, 09, 14, 15, 16, 17, 18, 19, 20, 23, 24, 28, 33, 34, 40, 49, 76, 77, 78, 85, 91, 98); and emergency medicine physicians (93). Physicians with claims under both code 70 (“Multiclinic/multigroup practice”) and a physician specialty code were assigned to that specialty.

Individual line items within claims were identified as representing evaluation and management (E&M) services if they were associated with a physician-related “performing provider” Unique Physician Identification Number (UPIN), a Berenson-Eggers type of service code of M1A (office visits, new patient), M1B (office visits, established patient), or M6 (consultations), and did not include Healthcare Common Procedure Coding System codes 99381, 99411, 95115, 99391, 95117, 99236, 99262, 99251, 99255, 99261, 99254, G0175, 99253, or 99252.[8,9,13] All other physician-related line items were considered to represent non-E&M services, and included in our calculations of “total physician visits,” with the exception of services associated with specialty codes for physicians considered to have limited responsibility for ongoing patient care (e.g., radiologists, anesthesiologists, pathologists). Services rendered by these physicians were excluded from all analyses.

Beneficiaries with individual chronic conditions were identified using ICD-9-CM codes 250.00–250.91 for diabetes; 410.xx–414.xx for coronary artery disease; and 162.2–162.5, 162.8, 162.9, 197.0, and 231.2 for lung cancer.[6]

**SECTION B.** Number of Providers that Medicare Beneficiaries Saw in Year 2000 with, and without, Inpatient Visits.

	Number of beneficiaries (%)	Including inpatient visits Median (IQR)				Excluding inpatient visits Median (IQR)			
		Total physicians	PCPs	All specialists	Practices	Total physicians	PCPs	All specialists	Practices
<b>Total physician visits</b>									
All beneficiaries	1,787,484 (100)	7 (4-11)	2 (1-4)	5 (2-8)	4 (3-7)	6 (4-9)	2 (1-3)	4 (2-6)	4 (2-6)
Beneficiaries with individual conditions <sup>a</sup>									
Diabetes	430,461 (24.6)	8 (5-14)	3 (1-4)	6 (3-10)	5 (3-8)	7 (4-10)	2 (1-3)	4 (2-7)	4 (3-6)
Coronary artery disease	633,750 (38.2)	10 (6-15)	3 (1-5)	7 (4-11)	6 (4-8)	7 (5-10)	2 (1-3)	5 (3-7)	5 (3-6)
Lung cancer	40,086 (2.5)	11 (7-16)	3 (2-5)	8 (5-12)	6 (4-9)	8 (5-11)	2 (1-4)	5 (3-8)	5 (3-7)
Beneficiaries' number of chronic conditions <sup>b</sup>									
0-2	257,471 (12.8)	3 (2-5)	1 (1-2)	2 (1-3)	2 (1-3)	3 (2-4)	1 (1-2)	2 (1-3)	2 (1-3)
3-4	451,774 (24.1)	5 (3-7)	2 (1-3)	3 (2-5)	3 (2-5)	4 (3-6)	2 (1-2)	3 (1-4)	3 (2-4)
5-6	448,855 (25.3)	7 (5-10)	2 (1-3)	4 (3-7)	4 (3-6)	6 (4-8)	2 (1-3)	4 (2-5)	4 (3-5)
7+	629,354 (37.8)	11 (8-16)	3 (2-5)	8 (5-12)	7 (5-9)	8 (6-11)	2 (1-4)	6 (4-8)	5 (4-7)
<b>E&amp;M visits</b>									
All beneficiaries	1,787,484 (100)	3 (2-5)	1 (1-2)	2 (1-3)	3 (2-4)	3 (2-5)	1 (1-2)	2 (1-3)	3 (2-4)

Unweighted counts and weighted percentages of beneficiaries.

\* Inter-quartile range. Medians are based on number of providers billing for any type of physician-related visit, or for physician-related evaluation and management visits, from complete Medicare professional services claims for 1.79 million beneficiaries who were treated at least once by a CTS physician in the year 2000. We excluded beneficiaries under 65 years of age, with end stage renal disease or disability, or who did not have claims in 2000.

<sup>a</sup> Populations of beneficiaries with individual chronic conditions overlap as some beneficiaries have more than one condition.

<sup>b</sup> The number of distinct chronic conditions was determined using Hwang et al.'s identification of ICD-9 codes for chronic conditions[16] assigned to mutually exclusive clinical categories based on the Agency for Healthcare Research and Quality's Clinical Classification System.[17]

**SECTION C. Percentage of Medicare Beneficiaries with Changed Assignments, 2000-2001, by Number of Evaluation and Management Visits in 2000, Using *Plurality*, *Majority*, and *Multiple Provider* Algorithms.**

<b>Assignment method and number of beneficiaries’ E&amp;M visits in 2000</b>	<b>Beneficiaries, N (%)</b>	<b>Percentage changing assignments,<sup>a</sup> 2000-2001, Weighted %</b>
<i>Plurality</i>		
All assigned beneficiaries	381,796 (100)	31
1-2 visits	62,208 (15.7)	37
3-4 visits	78,735 (20.2)	31
5-6 visits	69,565 (18.3)	29
7+ visits	171,288 (45.8)	31
<i>Majority</i>		
All assigned beneficiaries	315,185 (100)	37
1-2 visits	68,077 (21.0)	45
3-4 visits	74,959 (23.7)	37
5-6 visits	59,341 (19.1)	35
7+ visits	112,808 (36.2)	34
<i>Multiple</i>		
All assigned beneficiaries	434,475 (100)	27
1-2 visits	66,863 (14.8)	32
3-4 visits	97,855 (22.2)	31
5-6 visits	76,392 (17.7)	23
7+ visits	193,365 (45.4)	24

Unweighted counts and weighted percentages of beneficiaries. Percentages were weighted with CTS physician survey weights. Estimates are based on an overall population of 434,475 Medicare beneficiaries who had at least one evaluation and management visit in 2000 and could be assigned to a CTS primary care physician or medical specialist in that year using any of the three assignment methods. We excluded “snowbirds,” beneficiaries under 65 years of age, with end stage renal disease or disability, or who did not have claims in 2000, died during the study period, or entered managed care, hospice, or nursing homes for any length of time.

<sup>a</sup> Switched assignments were designated as instances in which:

- *Plurality* algorithm: Beneficiaries were assigned to a different *Plurality* physician UPIN in 2000 vs. 2001.
- *Majority* algorithm: Beneficiaries were assigned to a different *Majority* physician UPIN in 2000 vs. 2001, or if they were assigned to a *Majority* physician in 2000 but could not be assigned in 2001.
- *Multiple* algorithm: Beneficiaries retained assignment in 2001 to only a subset, or none, of their assigned physicians in 2000.

**SECTION D.** Percentage of Medicare Beneficiaries’ Care Billed for by their Assigned Physicians,

Using the *Majority Provider* Algorithm.

<b>Beneficiary populations</b>	<b>Number (%) of all beneficiaries with at least one E&amp;M visit</b>	<b>Percentage of total physician visits that were with assigned physicians, Median (IQR)</b>	<b>Percentage of E&amp;M visits that were with assigned physicians, Median (IQR)</b>
<b>All beneficiaries with E&amp;M visits in 2000</b>	1,787,454 (100)	27 (0-50)	53 (0-75)
<b>Assigned beneficiaries</b>	1,166,750 (65.3)	45 (30-62)	67 (56-90)
Beneficiaries with individual conditions <sup>a</sup>			
Diabetes	280,217 (24.6)	43 (27-60)	67 (56-88)
Coronary artery disease	371,658 (24.7)	38 (24-53)	67 (55-83)
Lung cancer	23,684 (2.3)	40 (25-57)	67 (56-83)
Beneficiaries’ number of chronic conditions <sup>b</sup>			
0-2	215,941 (16.7)	53 (40-75)	80 (57-100)
3-4	329,781 (27.1)	50 (33-67)	67 (56-100)
5-6	286,909 (25.0)	45 (31-60)	67 (56-83)
7+	334,119 (31.2)	37 (22-50)	67 (55-80)

Median percentages of visits were based on complete Medicare professional services claims billed by 8,604 CTS physician survey respondents for 1.79 million beneficiaries they treated at least once in the year 2000, and who had at least one evaluation and management visit. Estimates are weighted with CTS survey weights. We excluded beneficiaries under 65 years of age, with end stage renal disease or disability, or who did not have claims in 2000.

<sup>a</sup> Populations of beneficiaries with individual chronic conditions overlap as some beneficiaries have more than one condition.

<sup>b</sup> The number of chronic conditions was determined using Hwang et al.’s identification of ICD-9-CM codes for chronic conditions[16] assigned to mutually exclusive clinical categories based on the Clinical Classification System.[17]

**SECTION E.** Percentage of Medicare Beneficiaries’ Care Billed for by their Assigned Physicians,

Using the *Multiple Provider* Algorithm.

<b>Beneficiary populations</b>	<b>Number of assigned physicians, Mean</b>	<b>Number (%) of all beneficiaries with at least one E&amp;M visit</b>	<b>Percentage of total physician visits that were with assigned physicians, Median (IQR)</b>	<b>Percentage of E&amp;M visits that were with assigned physicians, Median (IQR)</b>
<b>All beneficiaries with E&amp;M visits in 2000</b>	NA	1,787,454 (100)	50 (29-68)	80 (57-100)
<b>Assigned beneficiaries</b>	1.5	1,726,216 (96.6)	50 (31-69)	80 (60-100)
Beneficiaries with individual conditions <sup>a</sup>				
Diabetes	1.5	415,196 (24.6)	45 (28-65)	78 (58-100)
Coronary artery disease	1.5	605,287 (37.8)	41 (26-59)	75 (55-100)
Lung cancer	1.5	38,452 (2.5)	42 (26-60)	73 (55-92)
Beneficiaries’ number of chronic conditions <sup>b</sup>				
0-2	1.6	255,120 (13.2)	70 (50-100)	100 (83-100)
3-4	1.6	443,191 (24.5)	60 (40-78)	88 (67-100)
5-6	1.5	435,246 (25.5)	50 (33-67)	79 (60-100)
7+	1.4	592,659 (36.9)	38 (24-56)	69 (50-88)

Median percentages of visits were based on complete Medicare professional services claims billed by 8,604 CTS physician survey respondents for 1.79 million beneficiaries they treated at least once in the year 2000, and who had at least one evaluation and management visit. Estimates are weighted with CTS survey weights. We excluded beneficiaries under 65 years of age, with end stage renal disease or disability, or who did not have claims in 2000.

<sup>a</sup>Populations of beneficiaries with individual chronic conditions overlap as some beneficiaries have more than one condition.

<sup>b</sup>The number of chronic conditions was determined using Hwang et al.’s identification of ICD-9-CM codes for chronic conditions[16] assigned to mutually exclusive clinical categories based on the Clinical Classification System.[17]

**SECTION F.** Percentage of Medicare-Reimbursed Care Delivered by Physicians that was Directed at their Assigned Patients, Using the *Majority Provider* Algorithm.

<b>Assigned provider</b>	<b>Number (%)</b>	<b>Percentage of Medicare patients who were assigned patients, Median (IQR)</b>	<b>Percentage of total visits that were with assigned patients, Median (IQR)</b>	<b>Percentage of E&amp;M visits that were with assigned patients,<sup>a</sup> Median (IQR)</b>
<b>All physicians</b>	8,604 (100)	7 (1-27)	13 (2-45)	25 (10-60)
<b>Specialty<sup>b</sup></b>				
Primary care physicians	5,527 (44.8)	28 (8-46)	45 (13-63)	59 (36-73)
Medical specialists	1,406 (25.4)	3 (0-9)	6 (0-17)	16 (8-31)
Surgeons	1,261 (23.4)	6 (3-10)	9 (4-15)	11 (6-18)
Emergency medicine physicians	390 (6.2)	0 (0-0)	0 (0-0)	3 (0-13)

Unweighted counts and weighted percentages of physicians. Assignments of patients to individual physicians were made using the *Plurality provider* algorithm. Medians were based on Medicare claims billed by 8,604 CTS physician survey respondents for 1.79 million beneficiaries they treated in the year 2000, and weighted with CTS survey weights. We excluded beneficiaries under 65 years of age, with end stage renal disease or disability, or who did not have claims in 2000.

<sup>a</sup> Estimates of percentage of physicians’ evaluation and management visits that were with assigned patients were based on the subset of 7,630 CTS physicians who billed for at least one E&M visit in the year 2000 (4,955 primary care physicians; 1,309 medical specialists; 1,245 surgeons; and 121 emergency medicine physicians).

<sup>b</sup> Physician specialty subgroups comprise 8,584 physicians because specialty data were missing for 20 physicians.

**SECTION G.** Percentage of Medicare-Reimbursed Care Delivered by Physicians that was Directed at their Assigned Patients, Using the *Multiple Provider* Algorithm.

<b>Physician and practice characteristics</b>	<b>Number (%)</b>	<b>Percentage of Medicare patients who were assigned patients, Median (IQR)</b>	<b>Percentage of total visits that were with assigned patients, Median (IQR)</b>	<b>Percentage of E&amp;M visits that were with assigned patients,<sup>a</sup> Median (IQR)</b>
<b>All physicians</b>	8,604 (100)	25 (7-49)	38 (11-70)	61 (39-87)
<b>Specialty<sup>b</sup></b>				
Primary care physicians	5,527 (44.8)	48 (22-67)	70 (33-84)	86 (69-93)
Medical specialists	1,406 (25.4)	14 (2-26)	24 (3-45)	52 (35-69)
Surgeons	1,261 (23.4)	25 (15-34)	33 (21-46)	41 (29-53)
Emergency medicine physicians	390 (6.2)	0 (0-0)	0 (0-0)	22 (0-50)

Unweighted counts and weighted percentages of physicians. Medians were based on Medicare claims billed by 8,604 CTS physician survey respondents for 1.79 million beneficiaries they treated in the year 2000, and weighted with CTS survey weights. We excluded beneficiaries under 65 years of age, with end stage renal disease or disability, or who did not have claims in 2000.

<sup>a</sup> Estimates of percentage of physicians’ evaluation and management visits that were with assigned patients were based on the subset of 7,630 CTS physicians who billed for at least one E&M visit in the year 2000 (4,955 primary care physicians; 1,309 medical specialists; 1,245 surgeons; and 121 emergency medicine physicians).

<sup>b</sup> Physician specialty subgroups comprise 8,584 physicians because specialty data were missing for 20 physicians.