

OBSERVATION: BRIEF RESEARCH REPORT

Primary Care Physicians and Spending on Low-Value Care

Background: Low-value services account for \$75 billion to \$100 billion of U.S. health care spending (1). Primary care physicians (PCPs) have been conceptualized as potential gatekeepers for efforts to reduce low-value spending, but the share of low-value spending directly related to their services and referral decisions remains unclear (2, 3).

Objective: To estimate the share of low-value spending on Medicare beneficiaries that is directly related to their attributed PCP's services or referrals.

Methods and Findings: We analyzed Medicare Part B claims from a 20% random sample of beneficiaries enrolled between 2007 and 2014. The study population included beneficiaries who were continuously enrolled in fee-for-service Medicare Parts A and B in a given year and the preceding year. Each beneficiary was attributed to the PCP (general practice, family practice, internal medicine, or geriatric medicine physician) who accounted for the plurality of the patient's office visits in each calendar year (2). Those unattributed to a PCP in a given year were attributed to their PCP from the preceding year. We excluded beneficiaries in a given year who could not be attributed to a PCP.

We calculated the percentages of all low-value spending resulting from services performed or ordered by a beneficiary's PCP, referred for by their PCP, performed by a physician to whom their PCP previously referred them, and performed by a physician to whom their PCP never referred them. Spending was based on a claim's Medicare allowed amount. We defined low-value services using an established set of 31 services judged to be low-value by physician societies, Medicare criteria, and clinical guidelines (Table 1), of which 17 are commonly provided in primary care (2, 4, 5).

Analyses were done in Stata, version 15 (StataCorp). The institutional review board at Stanford University approved this study and waived patient informed consent.

We attributed 8 402 085 beneficiaries (73.3% of 11 467 232 beneficiaries) (57.0% women; 83.7% White; mean age, 73.0 years [SD, 11.9]) to 210 277 PCPs. The percentages of beneficiaries who received 0, 1, 2, and 3 or more low-value services per year were 60.9%, 21.3%, 9.4%, and 8.4%, respectively. Annual spending on low-value Part B services (\$171.33) amounted to 4.2% of total Part B spending (\$4063.49) and 1.4% of total Medicare spending (\$11 991.99) per beneficiary.

The share of low-value spending on services for which a beneficiary's attributed PCP was the performing or ordering physician was 14.5%, 19.8% of such spending was referred for by the PCP, and 5.6% was performed by a physician to whom the PCP previously referred the beneficiary. The remaining 60.2% of low-value spending was for services performed or ordered by a physician to whom the PCP never referred the beneficiary (Table 1). For health care use, 23.2% of low-value services were performed or ordered by the PCP, 11.9% were referred for by the PCP, 3.3% were performed by a previously PCP-referred physician, and 61.6% were not PCP-related. Low-value services PCPs performed or ordered, those they referred out, those performed by a previously PCP-referred physician,

and those that were not PCP-related accounted for 0.6%, 0.8%, 0.2%, and 2.5%, respectively, of total Medicare Part B spending.

Among PCPs with at least 20 attributed beneficiaries in the 20% Medicare sample, services PCPs performed or ordered accounted for a median of 8.3% (interquartile range, 3.9% to 15.1%; 95th percentile, 35.6%) of their attributed patients' overall spending on low-value services. Services PCPs referred out accounted for a median of 15.4% (interquartile range, 6.3% to 26.4%; 95th percentile, 44.6%) of such spending. These service types constituted 0.3% and 0.5%, respectively, of the median total Medicare Part B spending of PCPs' patient panels.

Specialties accounting for the largest share of low-value spending were cardiology (27.3%), primary care (services performed or ordered by the beneficiary's attributed PCP) (14.5%), ambulatory surgical centers (8.9%), internal medicine (7.0%), orthopedic surgery (4.9%), and gastroenterology (4.8%) (Table 2).

Discussion: In this retrospective study of low-value spending on Medicare beneficiaries, most PCPs performed or ordered less than 9% and referred out less than 16% of their attributed patients' spending on low-value services. Study limitations include that findings are dependent on the low-value services analyzed, some services may have been misclassified as low-value, and the analysis excluded hospital outpatient services because those claims do not identify the referring physician. In addition, some beneficiaries may have been misattributed to a PCP, and results may not be generalizable to unattributed beneficiaries.

Future research should investigate practice patterns of outlier PCPs responsible for a major share of their patients' low-value spending, referral tools and payment strategies that facilitate PCP management of low-value care beyond services PCPs perform, and methods to minimize low-value measurement burden in primary care.

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Note: Dr. Baum had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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Table 1. Sources of Low-Value Medicare Part B Spending Between 2007 and 2014, by Category of Low-Value Care

Service*	Spending on Low-Value Services Among PCPs' Attributed Patients, \$ (thousands) (%)†				
	PCP Performed or Ordered	PCP Referred	PCP Previously Referred	Non-PCP	Total‡
Stress testing for stable coronary disease§	86 626 (5)	520 270 (32)	157 468 (10)	860 363 (53)	1 624 727 (24)
Spinal injection for low back pain§	25 933 (3)	155 032 (17)	38 707 (4)	695 482 (76)	915 154 (14)
Colorectal cancer screening for adults aged >85 y§	115 321 (13)	258 592 (29)	36 703 (4)	475 441 (54)	886 057 (13)
Back imaging for nonspecific low back pain§	173 453 (23)	43 905 (6)	15 583 (2)	518 069 (69)	751 010 (11)
Screening for carotid artery disease in asymptomatic adults§	124 314 (26)	94 429 (20)	26 302 (6)	227 883 (48)	472 929 (7)
Prostate-specific antigen testing for men aged >75 y§	108 267 (42)	22 596 (9)	10 251 (4)	115 367 (45)	256 480 (4)
Renal artery angioplasty or stenting	4140 (2)	28 089 (15)	14 940 (8)	146 808 (76)	193 976 (3)
Head imaging for uncomplicated headache	46 964 (29)	3386 (2)	1194 (1)	108 743 (68)	160 286 (2)
Routine preoperative stress tests§	5933 (4)	47 312 (32)	12 276 (8)	82 318 (56)	147 839 (2)
PCI with balloon angioplasty or stent for stable coronary disease	1943 (1)	37 332 (26)	19 811 (14)	85 678 (59)	144 765 (2)
Cervical cancer screening for women aged >65 y§	31 875 (23)	7029 (5)	1463 (1)	97 083 (71)	137 450 (2)
Total or free T ₃ level testing for patients with hypothyroidism§	61 357 (54)	3864 (3)	1416 (1)	47 189 (42)	113 825 (2)
Homocysteine testing in cardiovascular disease	62 125 (60)	1111 (1)	571 (1)	40 490 (39)	104 297 (2)
Vertebroplasty/kyphoplasty for osteoporotic vertebral fractures	8271 (8)	16 320 (16)	5924 (6)	69 232 (69)	99 747 (1)
Arthroscopic surgery for knee osteoarthritis§	113 (<1)	14 413 (15)	6396 (7)	77 491 (79)	98 413 (1)
PTH measurement for patients with stage 1-3 CKD	17 330 (19)	1949 (2)	3180 (3)	70 539 (76)	92 998 (1)
Preoperative echocardiography§	4171 (7)	16 653 (27)	4530 (7)	36 967 (59)	62 322 (1)
Preoperative chest radiography§	17 895 (30)	1066 (2)	419 (1)	40 629 (68)	60 009 (1)
Screening for carotid artery disease for syncope	13 765 (31)	6796 (15)	1544 (3)	22 956 (51)	45 061 (1)
Carotid endarterectomy for asymptomatic patients	99 (<1)	13 001 (30)	5232 (12)	24 899 (58)	43 231 (1)
IVC filters for the prevention of pulmonary embolism	2770 (7)	4219 (10)	1013 (2)	34 545 (81)	42 548 (1)
Head imaging in the evaluation of syncope	9364 (23)	774 (2)	296 (1)	30 579 (75)	41 013 (1)
CT of the sinuses for uncomplicated acute rhinosinusitis§	6860 (17)	3187 (8)	1396 (4)	28 133 (71)	39 576 (1)
Imaging for diagnosis of plantar fasciitis§	635 (2)	7345 (21)	1076 (3)	25 630 (74)	34 686 (1)
Vitamin D test without hypercalcemia or decreased kidney function	16 912 (61)	476 (2)	83 (<1)	10 294 (37)	27 765 (<1)
Bone mineral density testing at frequent intervals§	11 222 (41)	2993 (11)	772 (3)	12 750 (46)	27 736 (<1)
Cancer screening for patients with CKD receiving dialysis	3040 (26)	942 (8)	238 (2)	7708 (65)	11 929 (<1)
Electroencephalography for headaches	103 (1)	2134 (29)	449 (6)	4709 (64)	7395 (<1)
Preoperative pulmonary function testing§	2299 (35)	938 (14)	248 (4)	3123 (47)	6608 (<1)
Hypercoagulability testing for patients with DVT§	1814 (28)	77 (1)	56 (1)	4449 (70)	6396 (<1)
Pulmonary artery catheterization in the ICU	2 (<1)	56 (9)	14 (2)	575 (89)	647 (<1)
Total spending on low-value services, \$ (thousands) (%)	964 918 (15)	1 316 288 (20)	369 551 (6)	4 006 118 (60)	6 656 875 (100)
Low-value services, n (thousands) (%)	8189 (23)	4195 (12)	1180 (3)	21 779 (62)	35 341 (100)
Beneficiaries receiving ≥1 low-value service, n (thousands)	2946 (35)	1851 (22)	619 (7)	4624 (55)	5482 (65)

CKD = chronic kidney disease; CT = computed tomography; DVT = deep venous thrombosis; ICU = intensive care unit; IVC = inferior vena cava; PCI = percutaneous coronary intervention; PCP = primary care physician; PTH = parathyroid hormone; T₃ = triiodothyronine.

* We defined low-value services using an established set of 31 clinical services judged to be of low value by the American Board of Internal Medicine Foundation's Choosing Wisely campaign, the U.S. Preventive Services Task Force, Medicare's Healthcare Effectiveness Data and Information Set criteria, and other clinical guidelines.

† Values reflect totals for a 20% random sample of fee-for-service Medicare beneficiaries using Part B claims from 2007 to 2014. Spending was calculated on the basis of each claim's Medicare allowed amount, which is adjusted for local area cost of living and other factors and includes the Medicare payment amount, the primary payer amount (if the primary payer is different from Medicare), and the deductible and coinsurance amounts. The Medicare allowable amount reflects the total dollar amount that Medicare allows the provider to collect from all sources for that claim. *PCP Performed* indicates claims for which a beneficiary's PCP was the performing physician on the Medicare claim (using the Carrier file). *PCP Referred* was determined on the basis of the referring physician National Provider Identifier (NPI) on the Medicare claim. *PCP Ordered* indicates claims where the performing physician specialty code was clinical laboratory (billing independently), diagnostic radiology, independent diagnostic testing facility, mammography screening center, portable radiography supplier, radiation therapy center, or slide preparation facility, for which the beneficiary's PCP was the referring physician NPI on the Medicare claim. *PCP Previously Referred* indicates claims performed by a physician to whom a beneficiary's PCP previously referred the patient. *Non-PCP* indicates a claim that was not classified as any of the above (*PCP Performed*, *Ordered*, *Referred*, or *Previously Referred*).

‡ The percentages in parentheses reflect the column percentage—i.e., the proportion of low-value spending each service accounts for.

§ A low-value service that is commonly provided in the primary care setting or referred for provision elsewhere (2).

|| Overall, 5.5 million beneficiaries (65% of the study population) received ≥1 low-value service during the study period. The percentages in parentheses sum across the columns to >65% because many beneficiaries received low-value services in multiple categories (e.g., they received a low-value service performed by their PCP and also a low-value service that was not PCP-related).

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Table 2. Low-Value Spending and Use in Medicare Part B, by Specialty

25 Highest-Spending Specialties	Spending on Low-Value Services, \$ (thousands) (%)*	Low-Value Services, n (thousands) (%)	Beneficiaries Receiving ≥1 Low-Value Service, n (thousands) (%)†
Cardiology	1 817 460 (27)	4142 (12)	1635 (19)
PCP of beneficiary‡	964 918 (15)	8189 (23)	2946 (35)
Ambulatory surgical center	592 569 (9)	1465 (4)	786 (9)
Internal medicine§	463 747 (7)	2414 (7)	1329 (16)
Orthopedic surgery	325 889 (5)	1822 (5)	819 (10)
Gastroenterology	319 179 (5)	1279 (4)	980 (12)
Anesthesiology	213 344 (3)	1026 (3)	321 (4)
Interventional pain management	167 300 (3)	618 (2)	185 (2)
Physical medicine and rehabilitation	161 428 (2)	740 (2)	262 (3)
Obstetrics/gynecology	128 098 (2)	1973 (6)	639 (8)
Neurology	118 658 (2)	514 (1)	328 (4)
Vascular surgery	117 032 (2)	455 (1)	249 (3)
General surgery	114 470 (2)	743 (2)	512 (6)
Nephrology	93 698 (1)	546 (2)	182 (2)
Urology	92 330 (1)	1187 (3)	376 (4)
Family practice§	85 862 (1)	884 (3)	581 (7)
Emergency medicine	78 277 (1)	1339 (4)	919 (11)
Neurosurgery	76 375 (1)	514 (1)	222 (3)
Pain management	76 263 (1)	305 (1)	104 (1)
Multispecialty clinic or group practice	53 545 (1)	302 (1)	211 (3)
Nurse practitioner	44 114 (1)	480 (1)	303 (4)
Physician assistant	36 402 (1)	413 (1)	289 (3)
Hematology/oncology	35 008 (1)	244 (1)	103 (1)
Interventional radiology	34 280 (1)	167 (<1)	134 (2)
Podiatry	30 937 (<1)	1026 (3)	321 (4)
Total	6 656 875 (100)	35 341 (100)	5482 (65)

PCP = primary care physician.

* Reflects totals for a 20% random sample of fee-for-service Medicare beneficiaries using Part B claims from 2007 to 2014. We excluded beneficiaries in a given year who could not be attributed to a PCP.

† Overall, 5.5 million beneficiaries (65% of the study population) received ≥1 low-value service during the study period. The percentages in parentheses sum to >65% because many beneficiaries received low-value services performed or ordered by physicians of different specialties (e.g., they received a low-value service performed by a cardiologist and also a low-value service performed by an orthopedic surgeon during the study period).

‡ The performing or ordering physician on the claim was the beneficiary's attributed PCP.

§ Including physicians of that specialty who were not the beneficiary's attributed PCP.

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