Per Capita Medicare Inflation in the Last Decade: Unit Cost Increases Offset by Reduced Utilization

William B. Weeks, MD, PhD, MBA¹ and James N. Weinstein, DO, MS^{1,2,3,4}



J Gen Intern Med 35(6):1894–6 DOI: 10.1007/s11606-019-05553-y © Society of General Internal Medicine 2019

D artmouth College has determined that analyses of publicly available data are not considered to be human subjects research (CPHS00028121).

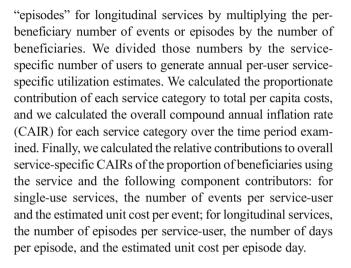
Among the commercially insured, per capita medical expenditure growth has been fueled by unit price inflation. Though attenuated by reduced per capita utilization (2011–2017),¹ unit price inflation has driven overall inflation, being substantially higher for hospital than for physician services (2007–2014).² While per capita health care spending growth has been higher for the commercially insured than for those insured by Medicare,³ evaluation of the relative contributions of utilization and unit price inflation to overall per capita Medicare fee-for-service expenditure inflation has not been conducted. We sought to complete such an analysis.

METHODS

From the Centers for Medicare and Medicaid Services (CMS), we obtained 2007–2017 public use files for Medicare fee-forservice beneficiaries aged less than 65 years old (< 65) and 65 years old and older (65+). Those data included the number of fully enrolled Medicare Parts A & B beneficiaries and standardized care expenditures (that eliminate expenditures for graduate medical education and disproportionate share, locality pay differences, and alternative payment model differentials) disaggregated into 18 service categories.⁴

For each service category, we obtained the number of beneficiaries who used each service and per-beneficiary service-specific utilization rates (for longitudinal services (e.g., inpatient care categories, home health care, and hospice), including the number of days of service use). We estimated the total number of service-specific "events" (e.g., procedures or dialysis visits) for single-use services and service-specific

Received August 3, 2019 Accepted October 31, 2019 Published online November 11, 2019



RESULTS

For both age groups, per capita costs of care shifted from inpatient, long-term care, home health, procedures, imaging, and durable medical equipment (DME) to inpatient rehabilitation, outpatient hospital, federally qualified health center or rural health center (FQHC/RHC), and ambulatory surgical center care (Table 1). Proportions of both populations using FQHC/RHCs and procedures grew; proportions of the 65+ population using most longitudinal services fell. The annual per-user event number decreased for most longitudinal care services, imaging, DME, and testing but increased for outpatient hospital care, outpatient dialysis, and procedures. Among longitudinal care episodes, the number of days per episode fell while the estimated standardized unit cost per episode day increased.

Increases in every CAIR-contributing component caused overall outpatient hospital, FQHC/RHC, and ambulatory surgical center care CAIRs to be the highest (Fig. 1). Longitudinal services' CAIRs were fueled by higher estimated costs per day but offset by fewer days per episode and a smaller proportion of 65+ beneficiaries using those services. Dialysis, imaging, and DME CAIRs were offset by lower costs per event; per-beneficiary DME CAIRs were further deflated by decreases in the per-user event number and the proportion of the population obtaining services.



	Service category	Standardized per capita cost (total and %)	apita		Proportion using the service	n using e	Annual service events per user	rvice user	Standardized cost per event	zed vent	Days per episode	10	Estimated standardized cost per episode day	d ized episode
	Younger than 65 years old		2017 (N = 5,341,828 Amount		2007	2017	2007	2017	2007	2017	2007	2017	2007	2017
	Total													
	Inpatient			32.3%	19.8%	17.9%	1.92	1.90	\$7606	\$10,408	6.3	6.1	\$1210	\$1524
	Long-term care home Invariant rehabilitation facility		\$195 \$167	1.8%	0.43%	0.44%	1.15	1.14	\$34,064 \$14 959	\$38,952	28.6 12.6	26.8 12 5	\$1191	\$1300
	Skilled nursing facility		\$458	4.2%	2.3%	2.7%	1.50	1.48	\$8340	\$11.453	26.1	25.3	\$319 \$319	\$398
Fright S10 10% 510% 10% 510% 10% 510%	Home health		\$375	3.4%	5.9%	6.7%	2.07	2.09	\$2752	\$2680	20.2	15.3	\$136	\$166
	Hospice			1.0%	0.76%	0.94%	1.05	1.07	\$9815	\$10,647	65.6	59.6	\$150	\$172
	Cutpatient hospital			1/.0%0	05.4% 11 80%	08.1%	5.00	1.02	\$75 \$75	0000				
	Outnatient dialvsis center facility			%6.0 1.6%	2.8%	3.4%	110.05	138.94	\$205	\$120 \$182				
	Ambulatory surgical center			0.7%	5.2%	6.3%	1.73	1.81	\$435	\$687				
	Evaluation and management			9.8%	83.0%	85.6%	16.34	17.66	\$61	\$71				
	Procedures		\$586	5.3%	48.5%	53.9%	7.22	8.08	\$137	\$135				
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Imaging		1/18	1.6%	59.9%	62.5%	6.08	5.99	\$65 \$140	742				
	Durable medical equipment Tests		\$207 \$308	0.0% 2.8%	20.0% 65.5%	20.12% 70.7%	8.11 11 56	0./1 10.89	\$29	2015 840				
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	Ambulance		\$189	1.7%	12.1%	13.8%	4.10	3.92	\$304	\$350				
S11 1.4% 5109 1.0% S11 1.4% 5109 1.0% S02573 32.2% 5109 1.0% S02573 32.2% 52597 27.2% 50.33 S02573 32.2% 5102 1.1% 0.25% 1.61 1.54 57705 59951 5.5 5.0 51409 S121 1.5% 5102 1.1% 0.25% 1.1% 1.0% 1.1% 20.33% 52.7% 51.2% 51.33 51.33 S121 1.5% 5102 1.1% 0.33% 0.25% 1.1% 1.0% 51.32 53.0351 5.5 5.0 51409 S748 9.3% 5329 2.1% 1.1% 1.0% 1.38 590351 5.5 5.2 5.13 S495 6.2% 5339 5.7% 0.3% 5.2% 1.40 1.38 590351 5.5 5.2% 51343 S495 6.2% 5339 5.7% 1.3% 1.0% 1.38 59037 231364 2.14 23133 S718 1.5% 5339 5.7% 5.2% 1.40 1.38 59011 $511,007$ 26.6 $2.5.0$ 5139 S714 1.5% 5144 1.5% 5.7% 5.7% 5.26 5207 5197 5207 5107 26.6 $2.5.0$ 5139 S714 1.0% 577 8.8% 4.70 4.3% 1.2% 5107 5.6 52.0 5139 S714	Part B drugs		\$426	3.9%	34.5%	37.6%								
	Other services		\$109											
5001500150015001555.05140facility $$121$ 1.5% $$229$ 27.2% 20.3% 0.25% 1.61 1.54 57705 59951 5.5 5.0 $$1409$ $$172$ 2.1% $$229$ 2.4% 1.1% 1.0% 1.13 $$10966$ 12.7 12.3 $$1135$ $$517$ 5276 52% 52% 1.26 1.1% 1.0% 1.13 $$5007$ $$5107$ $$123$ $$5133$ $$574$ 9.3% 52% 52% 52% 52% 1.1% 1.0% $$11.9$ $$50,228$ $$513,256$ $$123,345$ $$248$ $$21,396$ $$1277$ $$123$ $$11.90$ $$513,907$ $$5143$ $$213,356$ $$52\%$ $$5149$ $$511,907$ $$516$ $$51,907$ $$5149$ $$513,356$ $$52\%$ $$5149$ $$511,907$ $$516$ $$5176$ $$52\%$ $$5149$ $$511,907$ $$514$ $$511,907$ $$516$ $$513,366$ $$52\%$ $$5149$ $$5276$ $$516$ $$5107$ $$511,907$ $$516$ $$5107$ $$511,907$ $$5126$ $$5107$ $$511,907$ $$516$ $$5176$ $$5207$ $$5216$ $$5107$ $$5126$ $$5126$ $$5127$ $$5276$ $$5266$ $$5776$ $$586$ $$6607$ $$660\%$ $$660\%$ $$660\%$ $$660\%$ $$660\%$ $$660\%$ $$610\%$ $$511,649$ $$68,4451$ $$5124$ $$5124$ $$5124$ $$5124$ $$5124$ $$5124$ $$5124$ $$5124$ $$5124$ $$$	65 years old and older	(N = 27, 363, 352)	(N = 28,3)	<u>ന</u> ്										
facility\$121 1.5% 5102 1.1% 0.33% 0.25% 1.21 1.19 $530,328$ $533,345$ 24.8 2133 facility $$172$ 2.1% $$229$ 2.4% 1.1% 1.0% 1.13 1.16 $$11,307$ $$19086$ 12.7 12.3 $$1133$ $$748$ 9.3% $$539$ $$59\%$ 5.9% 5.9% 5.9% 5.9% 5.9% 5.9% 5.9% 5.9% 5.9% 5.333 9006 12.7 12.3 $$1133$ $$5766$ 9.6% $$5396$ 5.9% 5	10tal Innatient			JOC LC	20.8%	16 90%	1 61	154	\$7705	\$9951	5 5	5 0	\$1400	\$1073
facility $$172$ 2.1% $$229$ 2.4% 1.1% 1.0% 1.13 1.16 $$14,357$ $$19066$ 12.7 12.3 $$1133$ $$748$ 9.3% $$887$ 9.0% 5.9% 5.2% 1.40 1.38 $$59010$ $$11,907$ 26.6 25.0 $$339$ $$876$ 9.6% $$59\%$ 5.2% 1.40 1.38 $$59010$ $$11,907$ 26.6 25.0 $$339$ $$876$ 9.6% $$194$ 15.7% 3.2% 1.04 1007 $$11,907$ 26.6 25.0 $$339$ $$876$ 9.6% $$184$ $$527$ $$2978$ $$1907$ $$11,907$ 26.6 25.0 $$339$ $$876$ $$9.6\%$ $$144$ $$12\%$ $$104$ 15.7% $$25\%$ $$5149$ 16.9 $$143$ $$876$ $$565$ $$510$ $$5136$ $$6.81$ $$11,67$ $$814$ $$174$ $$114$ $$877$ 1.0% $$116\%$ $$1.74$ 1.2% $$10.2\%$ $$11.0\%$ $$174$ $$127$ $$877$ 1.0% $$816$ $$1.0\%$ $$10.2\%$ $$11.0\%$ $$1.74$ 1.67 $$827$ $$2918$ $$6.4$ $$144$ $$877$ 1.0% $$876$ $$16\%$ $$1.6\%$ $$1.74$ $$12.6$ $$25.0$ $$214$ $$144$ $$877$ $$218$ $$11.0\%$ $$1.74$ $$1.2\%$ $$10.2\%$ $$143$ $$144$ $$877$ $$218$ $$210$ $$210$ $$21.0\%$ $$216$ $$25.0\%$ $$214$ <td>Long-term care home</td> <td></td> <td></td> <td>1.1%</td> <td>0.33%</td> <td>0.25%</td> <td>121</td> <td>1.19</td> <td>\$30.328</td> <td>\$33.845</td> <td>24.8</td> <td>23.0</td> <td>\$1225</td> <td>\$1472</td>	Long-term care home			1.1%	0.33%	0.25%	121	1.19	\$30.328	\$33.845	24.8	23.0	\$1225	\$1472
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	Inpatient rehabilitation facility		\$229	2.4%	1.1%	1.0%	1.13	1.16	\$14.357	\$19.086	12.7	12.3	\$1133	\$1558
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	Skilled nursing facility		\$857	9.0%	5.9%	5.2%	1.40	1.38	\$9010	\$11,907	26.6	25.0	\$339	\$477
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	Home health		\$539	5.7%	9.4%	9.8%	1.85	1.84	\$2827	\$2978	19.7	16.9	\$143	\$177
\$766 9.6% $$1494$ 15.7% 63.3% 65.7% 5.86 6.65 $$207$ szd 0.3% $$1494$ 15.7% 63.3% 65.7% 5.86 6.65 $$207$ szd 0.3% $$1494$ 15.7% $6.3.3\%$ 65.7% 5.86 6.65 $$207$ al center $$77$ 1.0% $$149$ 1.6% 0.69% 0.68% 96.81 125.60 $$204$ al center $$77$ 1.0% $$917$ 10.2% 11.0% 1.74 1.67 $$435$ $$574$ 7.2% $$509$ 91.0% 91.7% 11.44 1.576 $$504$ $$574$ 7.2% $$509$ 7.0% 64.0% 67.6% 7.02 $$802$ $$574$ 7.2% $$511$ 1.6% 28.9% $$710\%$ $$5.77$ $$518$ $$574$ 7.2% $$516$ 2.4% 72.0% 710% $$5.77$ $$518$ $$573$ $$2266$ 2.4% 72.0% 71.0% $$5.77$ $$518$ $$713\%$ $$5108$ $$136$ $$1.3\%$ $$113\%$ $$11.3\%$ $$11.8$ $$314$ $$302$ $$5269$ 3.4% $$5459$ 4.8% 54.8% 57.3% $$512$ $$12.8\%$ $$11.6\%$ $$5209$ $$261$ $$56$ $$2.8\%$ $$51.3\%$ $$512$ $$512$ $$512$ $$512$ $$529$ $$251$ $$11.3\%$ $$11.3\%$ $$11.3\%$ $$11.4\%$ $$532$ $$529$ $$256$ $$2.4\%$ $$51.3\%$ <t< td=""><td>Hospice</td><td></td><td>\$384</td><td>4.0%</td><td>2.7%</td><td>3.2%</td><td>1.04</td><td>1.04</td><td>\$9911</td><td>\$11,649</td><td>68.8</td><td>68.4</td><td>\$144</td><td>\$170</td></t<>	Hospice		\$384	4.0%	2.7%	3.2%	1.04	1.04	\$9911	\$11,649	68.8	68.4	\$144	\$170
524 $0.3%$ 548 $0.5%$ $6.7%$ $8.8%$ 4.70 4.35 575 ysis center facility 571 $1.5%$ 5149 $1.6%$ $0.60%$ $0.68%$ 96.81 $1.25.60$ 5204 rgical center 577 $1.0%$ 5114 $1.2%$ $112%$ $10.2%$ 1.74 1.67 5435 rmanagement 5790 $9.9%$ 5979 $10.3%$ $91.0%$ $91.7%$ 1.74 1.67 5435 5744 $7.2%$ 5669 $7.0%$ $64.0%$ $67.6%$ 7.02 8.22 8128 5310 $3.9%$ 8226 $2.4%$ $72.0%$ $71.0%$ 5.87 5.54 573 5233 $2.9%$ 8151 $1.6%$ $28.9%$ $27.0%$ $71.0%$ 5.77 8118 5208 $1.3%$ $11.3%$ $11.3%$ $11.3%$ 31.4 5302 5108 $1.3%$ $11.3%$ $51.3%$ $11.3%$ $57.3%$ 5.54 573 5108 $1.3%$ 81.9 $26.1%$ 6.56 5.77 5.74 573 5108 $1.3%$ $11.3%$ $51.8%$ $57.3%$ 51.4 532 5122 $1.5%$ $54.8%$ $57.3%$ $57.3%$ 51.4 532 5122 $1.5%$ $51.8%$ $57.3%$ 51.4 5302 5122 $1.5%$ $54.8%$ $57.3%$ $57.3%$ 51.4 5302 5122 $1.5%$ $54.8%$ $57.3%$ $51.4%$ 5302 5122 <td>Outpatient hospital</td> <td></td> <td>\$1494</td> <td>15.7%</td> <td>63.3%</td> <td>65.7%</td> <td>5.86</td> <td>6.65</td> <td>\$207</td> <td>\$342</td> <td></td> <td></td> <td></td> <td></td>	Outpatient hospital		\$1494	15.7%	63.3%	65.7%	5.86	6.65	\$207	\$342				
Jysis center factury 5/18 1.5% 5/14 1.6% 0.60% 96.81 1.25.60 5/204 argical center 577 1.0% 5/14 1.2% 10.2% 11.0% 1.74 1.67 5/435 f management 5790 9.9% 5979 10.3% 91.0% 0.1.0% 1.74 1.67 5/435 anagement 5574 7.2% 5669 7.0% 64.0% 67.6% 7.02 8.22 5.31 5.34 573 state state 5.31 3.9% 5.26 2.4% 72.0% 71.0% 5.87 5.54 573 state state 5.21 1.6% 72.0% 71.0% 5.87 5.54 573 state state 72.0% 11.3% 11.3% 3.14 5302 state 5108 1.3% 11.3% 57.3% 5.14 5302 state 512 1.5% 54.8% 57.3% 5.33 5323 state 51.3% 51.3% 51.3% 53.23 53.23 53.23 <td>FOHC or RHC</td> <td></td> <td>\$48</td> <td>0.5%</td> <td>6.7%</td> <td>8.8%</td> <td>4.70</td> <td>4.35</td> <td>\$75</td> <td>\$124</td> <td></td> <td></td> <td></td> <td></td>	FOHC or RHC		\$48	0.5%	6.7%	8.8%	4.70	4.35	\$75	\$124				
Ingleat center $57/1$ 1.0% 5114 1.2% 10.2% 11.0% 5453 I management 5790 9.9% 5979 10.3% 91.0% 90.7% 14.48 15.02 560 5574 7.2% 5669 7.0% 64.0% 67.6% 7.02 8.22 8128 5310 3.9% 8256 2.4% 72.0% 71.0% 5.87 554 573 5310 3.9% 8256 2.4% 72.0% 71.6% 5.87 554 573 5233 2.9% 8151 1.6% 28.9% 261.1% 6.56 5.77 8118 5233 2.9% 8126 1.3% 11.3% 3.14 5302 5120 1.3% 54.8% 57.3% 3.14 5302 8122 1.5% 51.3% 51.3% 57.3% 3.14 5302 5122 1.5% 54.8% 57.3% 57.3% 57.3% 5302 5122 <	Outpatient dialysis center facility		\$149	1.6%	0.60%	0.68%	96.81	125.60	\$204 \$425	51/4				
all equipment \$574 7.2% \$669 7.0% 51.0% 7.0% 51.0% 51.0% 52.2 \$128 \$574 7.2% \$669 7.0% 64.0% 67.6% 7.0% 8.22 \$128 \$511 1.6% \$2.4% 70.0% 71.0% 5.87 5.54 \$73 \$523 2.9% \$151 1.6% 28.9% 26.1% 6.56 5.77 \$118 \$233 2.9% \$216 1.3% 11.3% 3.18 3.14 \$302 \$108 1.3% \$11.3% \$11.3% 3.18 3.14 \$302 \$269 3.4% \$459 4.8% \$54.8% \$7.3% \$314 \$302 \$122 1.5% \$146 1.5% 57.3% \$3.14 \$302	Amoulatory surgical center Evaluation and management		\$010 \$070	1.2%	01 00%	0/11.0% 00 70%	1.74	15.07	0400 660	1704				
\$310 3.9% \$226 2.4% 72.0% 71.0% 5.87 5.54 \$73 cal equipment \$224 2.8% \$151 1.6% 28.9% 26.1% 6.56 5.77 \$118 \$233 2.9% \$266 2.8% 79.7% 80.9% 12.87 11.62 \$23 \$108 1.3% \$11.3% 11.3% 3.18 3.14 \$302 \$269 3.4% \$459 4.8% 54.8% 57.3% 3.14 \$302 \$212 1.5% \$146 1.5% 57.3% 57.3% 57.3% 57.3% 57.3%	Procedures		\$669	7.0%	64.0%	67.6%	7.02	8.22	\$128	\$120				
al equipment \$224 2.8% \$151 1.6% 28.9% 26.1% 6.56 5.77 \$118 \$233 2.9% \$266 2.8% 79.7% 80.9% 12.87 11.62 \$23 \$108 1.3% \$126 1.3% 11.3% 11.3% 3.18 3.14 \$302 \$269 3.4% \$459 4.8% 54.8% 57.3% \$122 1.5% \$146 1.5%	Imaging		\$226	2.4%	72.0%	71.0%	5.87	5.54	\$73	\$57				
52.3 2.276 5.200 2.076 1.277 0.0.776 1.2.07 11.1.2 0.2.7 \$108 1.3% \$11.3% 11.3% 11.3% 3.18 3.14 \$302 \$269 3.4% \$459 4.8% 54.8% 57.3% 3.14 \$302 \$122 1.5% \$146 1.5% 54.8% 57.3% 3.14 \$302	Durable medical equipment		\$151 \$766	1.6%	28.9% 70.7%	26.1%	6.56 17 87	5.77	\$118	\$100				
\$269 3.4% \$459 4.8% 54.8% 57.3% J.19 J.17 402	Lests A mbulance		\$126	1.30_{6}	11 300	00.9% 11 30%	12.0/ 3 18	2071 214	620 8307	970 6356				
\$122 1.5% \$146 1.5%	Part B drugs		\$459	4.8%	54.8%	57.3%	01.0		7000					
	Other services		\$146	1.5%										

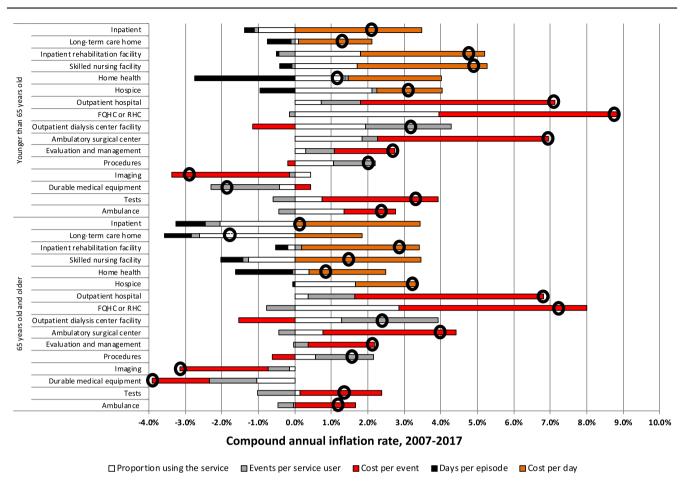


Figure 1 For Medicare fee-for-service enrollees younger than age 65 (top) and 65 years old and older (bottom), compound annual inflation rates for the period 2007–2017 overall for each service (in the black circle) and for each inflation rate component (the proportion of the service population that used the service, the number of events per service, the estimated cost per event (for single-use services), and the number of days per episode and the estimated cost of each episode day (for longitudinal services).

DISCUSSION

We examined per capita utilization, per-service expenditures, and average per-unit cost estimates for a variety of health care services between 2007 and 2017 and found that per capita Medicare fee-for-service expenditures shifted from inpatient to outpatient settings and that perbeneficiary longitudinal care cost inflation was driven by substantial increases in the estimated standardized cost of care per day but mitigated by shorter lengths of service provision and lower per-user service utilization. Dialysis, procedures, and imaging experienced unit cost deflation.

While accountability may have driven care to lower cost settings and reduced waste, we found relatively high unit cost growth in most care services. Although limited by its reliance on administrative data, and an inability to adjust for changing patient needs, these initial findings invite further research examining the effectiveness of efforts to reduce components of per capita Medicare inflation by reducing low-value care provision (reducing service use),⁵ reducing estimated unit costs for longitudinal services (reducing episode costs), or enhancing provider productivity (improving care efficiency).⁶

Corresponding Author: William B. Weeks, MD, PhD, MBA; Microsoft Healthcare NExT, Redmond, WA, USA (e-mail: William. weeks@microsoft.com).

REFERENCES

- 2017 and 2013 Health Care Cost and Utilization Reports. http://www. healthcostinstitute.org/research/annual-reports/entry/2017-health-carecost-and-utilization-report and http://www.healthcostinstitute.org/images/ pdfs/2013-HCCUR-12-17-14.pdf. Health Care Cost Institute; 2019 & 2014.
- Cooper Z, Craig S, Gaynor M, Harish NJ, Krumholz HM, Van Reenen J. Hospital Prices Grew Substantially Faster Than Physician Prices For Hospital-Based Care In 2007-14. Health Affairs (Project Hope) 2019;38:184-9.
- Frost A, Barrette E, Kennedy K, Brennan N. Health Care Spending Under Employer-Sponsored Insurance: A 10-Year Retrospective. Health Affairs (Project Hope) 2018;37:1623-31.
- Centers for Medicare & Medicaid Services Public Use file. http://www.cms. gov/research-statistics-data-and-systems/statistics-trends-and-reports/ medicare-geographic-variation/gv_puf.html. Centers for Medicare & Medicaid Services; 2019.
- Schwartz AL, Jena AB, Zaslavsky AM, McWilliams JM. Analysis of Physician Variation in Provision of Low-Value Services. JAMA Intern Med 2019;179:16-25.
- Skinner J, Chandra A. Health Care Employment Growth and the Future of US Cost Containment. Jama 2018;319:1861-2.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.