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Geographic Variation in Medicare Drug Spending:

Does Not Offset Variation in Other Medical Spending

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The widespread geographic variation in Medicare spending has garnered a great deal of attention in the health reform debate, both as a marker of inefficient resource use and as a window into potential strategies for improving the quality and value of health care delivery. Analysis to date, however, has focused solely on inpatient and outpatient spending and lacked information on pharmaceutical spending. With drug spending accounting for a rising share of total health care spending, this data limitation hinders interpretation of the variation: do Medicare patients who spend more on pharmaceuticals to control their chronic condition have fewer physician visits, reducing total variation – or do more physician visits lead to more prescriptions, amplifying variation? Without information on total spending, it is impossible to know whether variation in spending on medical services is masking substitution across different types of care or complementary use.

We bring new data on the Medicare drug benefit (Part D) to bear on these questions, allowing a more complete picture of the patterns of utilization and spending across areas. We obtained a 5 percent random sample of Medicare beneficiaries enrolled in stand-alone Part D plans in 2007. We restricted our study sample to beneficiaries between 65 and 99 years of age in 2007, alive on December 31 2007, and with full year enrollment in Parts A, B, and a stand-alone Part D plan. Thus, these data, like those in the Dartmouth Atlas,¹ exclude individuals enrolled in Medicare Advantage (Part C) plans because medical spending data for these beneficiaries are not available. We assigned the resulting sample of 533,170 individuals to one of the 306 Dartmouth Hospital Referral Regions (HRRs) based on the beneficiary's zip code of residence.

We adjusted spending for local price level differences using factor prices given us by the Medicare Payment Advisory Commission,² individual-level demographics (age, gender, race, eligibility for Medicaid and federal low-income subsidy), health characteristics as measured by the Centers for Medicare and Medicaid Services Hierarchical Condition Category scores,³ and Part D insurance plan characteristics such as whether generic drugs were covered in a coverage gap. These adjustments are described in more detail in the note to the Table. After making these adjustments we calculated the average medical and pharmacy spending in each HRR, holding constant the variables just described and thus isolating variation between HRRs that is not driven by differences in prices or population characteristics or health.

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The Table shows the variation across HRRs in medical spending, drug spending, and total spending. It yields four major findings.

- Pharmaceutical spending represents a significant share of total spending – more than 20 percent of total spending on average - and it also exhibits substantial variation across HRRs, with the highest HRR spending 60 percent more per beneficiary on pharmaceuticals than the lowest. This variation is driven by variation in both the number of monthly prescriptions filled and the mix of drugs used, with higher-spending areas using more drugs and drugs with a higher cost per prescription.
- Medical spending, however, exhibits even more variation than drug spending. The ratio of the highest- to the lowest-spending HRR for medical care exclusive of drug spending is 2.16 with a coefficient of variation of 0.12, while the ratio for pharmaceutical spending is only 1.60 with a coefficient of variation of 0.08.
- Pharmaceutical spending and medical (non-drug) spending are only weakly correlated across HRRs ($r=0.10$, $p=0.07$). In other words, the areas where medical spending is the highest have neither systematically higher- nor lower-than-average drug spending. This weak correlation is consistent with drugs being a substitute for medical care for some patients and a complement for others.
- The variation in total spending is only slightly lower once pharmaceutical spending is taken into account; the ratio of the highest to the lowest total Medicare spending is 1.95 with a coefficient of variation of 0.10.

Thus, the substantial variation in pharmaceutical spending across HRRs does not seem to be associated with notable offsetting reductions in medical spending and conversely. Spending on pharmaceuticals itself is variable, and thus warrants scrutiny similar to that given medical spending to glean lessons about optimal prescribing, insurance characteristics, and resource allocation.⁴ This reinforces the importance of understanding the drivers of geographic variation, as increases in either medical spending or pharmaceutical spending are not associated with offsetting savings in other realms. Using this more complete measure of spending reveals that area-level variation in spending is little affected by patient characteristics nor merely a marker of a different practice style with substitution between types of care, but rather offers an opportunity to gain insight into the drivers of the intensity of use of health care resources and the potential for public policy actions to improve the value of health care delivery.

The “Lowest” row shows the HRR that is lowest within each top-line category. Thus, the HRR with the lowest drug spending spent \$1854 per beneficiary (adjusted as below), and the HRR with the lowest non-drug medical spending spent \$7208 per beneficiary, but these are not the same HRR.

We adjusted Medicare medical spending for price differences with a Medicare factor price county-level index used by the Medicare Payment Advisory Commission (MedPAC).² Following MedPAC’s recommendation, we did not similarly adjust drug spending because the price variation was trivial; price indices for 34 prescription drug plan (PDP) regions (except for Alaska) were consistently within two percent of the national price index at the median.⁵

We further controlled for variation across HRRs in individual demographics, health status, and insurance plan features by estimating a linear regression of spending on age (5 year age groups to 65–69, 70–74, 75–79, 80–84, 85–89, 90–94, 95–99), gender, race; characteristics of Part D insurance, including whether the individual received a low-income-subsidy (LIS) and the type of coverage, if any, in the coverage gap; a risk score based on CMS’s

Hierarchical Condition Categories (CMS-HCCs) for medical spending or Prescription Drug Hierarchical Condition Category (CMS-RxHCC) for pharmaceutical spending; and HRR indicator variables.³ The values shown above represent that estimating equation evaluated at national averages for the covariates, thus capturing variation at the HRR level that is purged of variation in population characteristics across HRRs.

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Table

Variations in *Annual*/Total Medicare Spending, Non-drug Medical Spending, Pharmacy Spending and Counts of Monthly Prescriptions Filled Per Person Across Hospital Referral Regions^{*}

	Drug Spending					Adjusted Annual Medical Spending	Adjusted Annual Total Spending
	Adjusted Annual Drug Spending	Adjusted Counts of Monthly Brand-name Drugs	Monthly Average Cost Per Brand-name Drug [†]	Adjusted Counts of Monthly Generic Drugs	Monthly Average Cost Per Generic Drug [†]		
Lowest	1854	14	93	17	15	7208	9300
25 th percentile	2289	16	104	25	19	8793	11174
Median	2407	17	107	27	19	9542	11976
75 th percentile	2540	18	110	29	20	10202	12650
Highest	2973	22	120	34	27	15533	17730
Mean	2411	17	107	27	20	9585	11996
S.D.	194	1	5	3	1	1161	1201
Highest/lowest	1.60	1.65	1.29	1.95	1.76	2.16	1.91
Coeff of Var	0.08	0.08	0.04	0.12	0.07	0.12	0.10

^{*} S.D. denotes standard deviation; and Coeff of Var denotes Coefficient of Variation.

[†] Monthly average cost per brand-name drug is the ratio of the adjusted annual spending for brand-name drugs and the adjusted counts of monthly brand-name drugs, with a similar calculation for generic drugs.