

Variation in Spending Associated With Primary Care Practices

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Although the country is making preliminary steps toward recovery, the COVID-19 pandemic has sent the United States into its most significant economic downturn since the Great Depression, which will significantly exacerbate pressure for employers to control health care spending. One strategy available to employers is to encourage the individuals and families they cover to use more efficient health care providers.

A large body of literature documents the significant variation in prices within markets, from which it can be inferred that considerable cost-saving opportunities are associated with price shopping.¹ Importantly, physician practice prices have not been found to be associated with quality or efficiency metrics.² The literature on practice style variation suggests that there may also be savings opportunities from identifying physicians with less intensive practice styles.³ For example, physician beliefs about treatment regimens contribute to significant regional differences in physician practice spending.⁴ Similarly, physician experience is associated with spending, as less experienced primary care physicians (PCPs) and specialists have higher overall costs.⁵

Much of the practice variation literature focuses on market-level analysis, which masks widespread variation within geography.^{6,7} For this reason, the National Academy of Medicine has called for greater understanding of variation attributable to physician practice styles.⁸

We extend the nascent research on this topic using unique data on commercial prices and spending. We focus on variation in total medical and prescription drug spending attributable to PCP groups, as well as variation in inpatient prices. Specifically, PCPs influence primary care and have some sway over the frequency with which their patients visit specialists, as well as which specialists and facilities their patients visit. There is considerable price variation by specialty practice and site of service.³

It is important to note, however, that the extent to which PCPs can influence specialty care and overall utilization varies and can be limited. Although PCPs can influence how care is utilized by serving as gatekeepers to other services, their impact is limited by a variety of factors. For example, patient preferences regarding specialist visits are associated with higher specialist utilization, suggesting

ABSTRACT

OBJECTIVES: To measure variation in spending and inpatient prices associated with the primary care physician (PCP) practice to which patients are attributed.

STUDY DESIGN: Cross-sectional analysis of claims data.

METHODS: We used random effect models to estimate case mix-adjusted spending across large PCP practices within 3-digit zip codes. We compare inpatient prices for patients in high-spending practices with those in low-spending practices.

RESULTS: The physician practice to which a patient was attributed is associated with significant differences in spending after controlling for patient comorbidities and geography. Patients attributed to practices in the top quartile of total medical expenses have about 30% higher spending than patients attributed to practices in the bottom quartile of adjusted spending in their 3-digit zip code. If patients attributed to practices in the top 2 quartiles had spending equivalent to those in the median practice, total spending would drop by 8%. Price variation accounts for a meaningful amount of the variation, with inpatient prices 17% higher in top-quartile vs bottom-quartile practices. We cannot disaggregate the large variation in utilization into practice patterns and unmeasured case mix (including unmeasured differences in patients' socioeconomic status) vs random health shocks, but correlation in spending patterns across years suggests that some persistent differences in spending patterns exist.

CONCLUSIONS: There are meaningful opportunities to reduce spending by changing patient PCP selection, encouraging patients to use lower-priced specialists and hospitals, and eliminating wasteful care. Attention must be paid to the best ways to reap these savings.

Am J Manag Care. 2021;27(7):297-300. doi:10.37765/ajmc.2021.88557

TAKEAWAY POINTS

- Physician practices account for a significant amount of variation in spending.
- ▶ There is widespread variation in spending associated with physician practices.
- ▶ This likely reflects variation in utilization and in the prices of care delivered by the practice and the sites they refer to.
- ▶ Significant savings can be obtained if patients shift from practices associated with high spending to those with low spending.

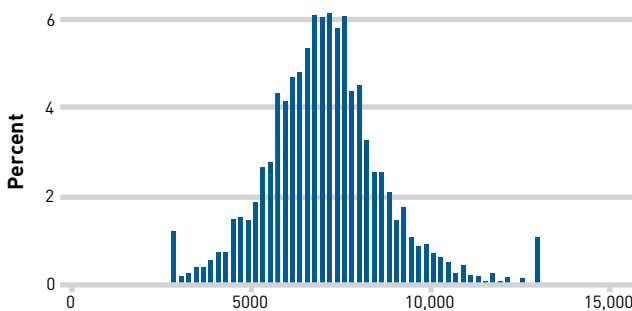
both years. This yielded a sample of 2 million commercial enrollees with both medical and pharmacy coverage. We calculated total annual medical and pharmacy spending for each enrollee, including both the insurer-paid amounts and the enrollee cost-sharing amounts.

To measure variation in case mix-adjusted spending, we used random effect models to estimate the spending associated with each primary care practice, controlling for their

patients' characteristics, age, sex, and comorbidities, measured using both the Elixhauser Comorbidity Index (Healthcare Cost and Utilization Project Elixhauser Comorbidity Software) and Agency for Healthcare Research and Quality comorbidities. We also controlled for region using 3-digit zip codes. Importantly, this risk adjustment accounts for clinical conditions but not variation in use within those conditions. For example, the risk adjustment will account for presence of cardiovascular disease but not for which of the patients with cardiovascular disease experience serious events (eg, heart attacks). The random effects models, using 2 years of pooled data, generate a robust estimate of relative spending per practice adjusted for patient covariates and for randomness associated with smaller practice size. The estimates reflect variation in practice styles and referral patterns, as well as variation in unobserved case mix or variation in partial-year enrollment. We then classify each practice into quartiles. Because we controlled for 3-digit zip code, the quartiles should be interpreted as relative to other practices in their 3-digit zip code.

To assess the role of variation in inpatient prices in driving variation in spending, we focused on inpatient prices because they are easier to measure and because inpatient care drives a substantial portion of the overall spending variation. Specifically, for each admission in the 20 most common diagnosis-related groups (DRGs), we computed inpatient price as the total allowed amount for the facility claim. We regressed prices on the quartile of spending for the patient's PCP practice, DRG fixed effects, Elixhauser comorbidities, 3-digit zip code, age, and sex. To reduce measurement error associated with coding, we limited this analysis to admissions where the patient had only 1 admission in the month.

FIGURE 1. Distribution of Practice Effects, Commercial Enrollees, 2017-2018*



*Mean per-enrollee annual spending is \$7132.21. Spending at the 25th, 50th, and 75th percentiles is \$6085, \$7051, and \$7962, respectively. Spending in the 75th percentile is 31% greater than in the 25th percentile. Savings of \$562 (8%) would result if practices with above-median spending levels brought their spending levels down to the median.

that other factors besides PCP referrals can play significant roles in care usage.⁹ Moreover, research has shown that patients are often unwilling to sacrifice time or money to maintain continuity of care with PCPs; such continuity is associated with better outcomes and more cost-effective care.¹⁰ However, given that PCPs serve as a first contact and main provider for most individuals, identifying variation in practice spending and prices still provides valuable insight into how best to utilize primary care efficiently.

METHODS

Using medical and pharmacy claims for commercially insured adults from a large, national health insurer, we analyzed the variation in per-enrollee total health care spending associated with large primary care practices in 2017 and 2018. Using an approach similar to CMS' method of attribution of Medicare beneficiaries to accountable care organizations, we attributed each individual to a primary care practice.¹¹ Our baseline analysis was restricted to continuously enrolled adults aged 18 to 64 years with at least 1 primary care visit during the sample period and excludes pregnant women. To attenuate concerns related to sampling error, we further restricted the analysis to large practices with a final sample size of at least 50 enrollees in both 2017 and 2018 and pooled the data over

RESULTS

We found significant differences in adjusted annual per-enrollee health care expenditure across primary care practices within their respective 3-digit zip code. Patients in practices at the 75th percentile have 31% higher annual expenditure than patients in practices at the 25th percentile, even after adjusting for covariates. If patients in above-median practices had spending levels of comparable patients in median spending practices in their area, mean per-enrollee spending would drop by approximately 8%, or about \$562 per year, as shown in [Figure 1](#).

These spending differences are primarily driven by differences in facility spending (both inpatient and outpatient) and prescription

drug spending. As reported in **Table 1**, per-enrollee mean inpatient spending accounts for a smaller share of total mean annual spending (16%) than outpatient facility spending (35%). However, inpatient and outpatient settings account for comparable amounts of the excess spending among above-median practices (24% and 30%, respectively) (**Table 2**).

To better understand the variation in inpatient spending (which lends itself better to price measurement than outpatient facility spending), we compared mean per-inpatient admission spending for the 20 most common DRGs in practices in the upper quartile of spending in their 3-digit zip code to that of practices in the lowest quartile. After controlling for DRG, patients' characteristics, age, sex, and comorbidities, we found that patients at practices in the upper quartile of the spending distribution had case mix-adjusted inpatient prices that were, on average, approximately 17% higher than practices in the lowest quartile. These differences were still 11% and 8.5% when the upper quartile was compared with the middle lower and middle upper quartiles, respectively (**Table 3**). The 17% figure suggests that variation in the price of hospitals where PCPs' patients receive care is an important contributor to the variation in spending associated with PCP practices. Yet it is well below the 31% estimate of spending differences, thus suggesting that utilization differences may contribute to the variation. Some of this variation in utilization may reflect inefficient care, whereas some of it may reflect unmeasured case mix or random health events. For example, individuals who start the year with similar risk may experience different health events over the year. Although the random effects models will address some of the random variation, we do not speculate as to the extent to which the differences in utilization are due to inefficient practice patterns as opposed to unmeasured case mix. However, we know that randomness cannot account for all of the variation in spending. As a robustness check, we ran our main spending specification separately for 2017 and 2018. We found that 60% of the practices in the top quartile in 2017 are in the top quartile in 2018; if variation was just random, this share would be 25%.

As an additional robustness check, we conducted a permutation test in which we randomly assigned each patient to our practice identifiers and reestimated our models with the "fake" practice identifiers (**Figure 2**). In doing so, we found only a 16% spending "difference" between the 75th percentile and 25th percentile and savings potential of 5% if patients at above-median practices had spending levels comparable with those of patients at median spending practices in their area. Because our estimated effects are roughly twice the estimates obtained by randomly assigning patients to practices, we are more confident that our estimates are not purely spurious.

DISCUSSION

Our analysis identifies significant within-market variation in risk-adjusted spending associated with the primary care practice to

TABLE 1. Mean Spending per Enrollee per Year (N=2,512,145)

Place of service	Mean	% of total
Office	\$1412	20%
Inpatient	\$1122	16%
Outpatient	\$2510	35%
Prescription drug	\$1533	21%
Other	\$555	8%
Total	\$7132	100%

Data source: medical and pharmacy claims for commercially insured adults from a large, national health insurer.

TABLE 2. Estimated Savings per Enrollee by Place of Service (assuming upper-quartile practices brought in line with median practice)^a

Place of service	Mean (SD)	% of savings
Office	\$57.9 (\$380)	10%
Inpatient	\$137.7 (\$610.5)	24%
Outpatient	\$168.7 (\$643.2)	30%
Prescription drug	\$162.0 (\$866.4)	29%
Total	\$562.2 (\$1319.4)	100%

Data source: medical and pharmacy claims for commercially insured adults from a large, national health insurer.

^aEstimates of total savings correspond to the main regression specification with total per-enrollee annual spending as the outcome variable. Results for office, inpatient, outpatient, and prescription drug are taken from regression specifications focusing on spending specific to those places of service. These sites of care account for the majority of spending (93%) but not all. Thus, the components displayed here do not sum to the total spending effect.

TABLE 3. Inpatient Admission Price Regressions^a

Quartile of spending distribution	Estimated coefficient (SE)	Top quartile price, % greater
1	\$0	17.0%
2	\$879 (\$277.2)	11.0%
3	\$1220 (\$278.8)	8.5%
4	\$3054 (\$296.3)	0.0%
Regression controls		
Zip-3		x
DRG		x
Age*sex		x
Elixhauser		x
N		19,821
R ²		0.4992
Mean admission price		\$21,223

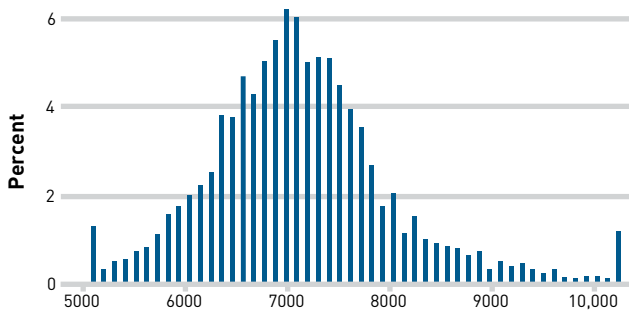
DRG, diagnosis-related group; SE, standard error; zip-3, 3-digit zip code.

^aObservation is a single inpatient admission for individuals we can match to physician practices. Sample is restricted to the top 20 DRGs by volume. "Quartile" indicates the quartile of the individual's physician practice in the spending distribution, estimated using fixed effects model.

which patients are attributed. A large part of this variation is likely due to the prices of the hospitals (and likely, specialists) to which the practice refers. Some may also be due to practice styles, such as propensity to refer or to order various diagnostic tests.

TRENDS FROM THE FIELD

FIGURE 2. Distribution of Randomized Practice Effects, Commercial Enrollees, 2017–2018



*Mean per-enrollee annual spending is \$7132.21. Spending at the 25th, 50th, and 75th percentiles is \$6554, \$7062, and \$7562, respectively. Spending in the 75th percentile is 16% greater than in the 25th percentile. Savings of \$382 (5%) would result if practices with above-median spending levels brought their spending levels down to the median.

Limitations

These estimates have several caveats. First, these estimates capture only associations and are inherently imprecise. Although we pooled data over 2 years and required that practices have at least 50 patients per year, unmeasured health status or socioeconomic status characteristics of attributed enrollees, as well as the skewness of health care spending, may present a significant potential for confounding. For example, it could be the case that the patients at “high-spending” practices have health conditions that are costlier in ways that we do not account for. A primary care practice that excels at treating patients with multiple chronic conditions may draw patients with disproportionately complicated conditions; even if such a practice were identified to be in the top quartile of the spending distribution, it would not necessarily be the case that their patients’ care would be less costly at any other practice in their area. Our analysis of prices is less affected by this concern. Second, and most importantly, we do not assess whether the outcomes at higher-spending practices are better; thus, additional research is needed to assess the relationship, at the practice level, between spending and outcomes.

CONCLUSIONS

The economic downturn associated with COVID-19 is exacerbating pressure on employers to control health care costs. The wide variation in spending within markets, including that driven by price variation, demonstrates significant opportunity for savings if patients are directed to PCPs with more conservative practice styles, resulting in more efficient utilization patterns or referral patterns that steer patients to lower-priced sites of service.

There is likely no magic bullet for reaping these savings. Benefit design, tiered networks, and other instruments can play a role by encouraging patients to use high-value physicians who deliver affordable, high-quality care and by encouraging high-spending

practices to examine their behavior, such as by shifting referrals to lower-cost sites of service. Similarly, innovative payment models can encourage efficient utilization and may promote lower-cost referral patterns. Finally, some policy response to address exceptionally high prices may be warranted. For example, some proposed policies to address surprise billing include provisions that effectively place soft or hard caps on provider prices, which could offer a model for broader policy efforts to address imbalances in market power. Regardless of one’s preferred solution, the documentation of wide variation in total medical spending among PCPs demonstrates that practice style variation is an important factor contributing to unnecessary and potentially avoidable health care costs. Additional research should explore the specific practice characteristics (eg, size, ownership) related to cost variation, utilization, and referral patterns. ■

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Source of Funding: None.

Author Disclosures: Ms Koep, Dr Parker, and Dr Sandy are employees of UnitedHealth Group and own UnitedHealth Group stock. Dr Trenz is an employee of UnitedHealth Group. Dr Chernew is co-editor-in-chief of *The American Journal of Managed Care*[®]; is an unpaid board member of Health Care Cost Institute; is an unpaid advisory board member of Blue Cross Blue Shield Association and Blue Health Intelligence; is a paid advisory board member of National Institute for Health Care Management and Virta Health; and has received speaking honoraria from America’s Health Insurance Plans, Blue Cross Blue Shield of Florida, HealthEdge, Humana, American College of Cardiology, and American Medical Association. Mr Moy reports no relationship or financial interest with any entity that would pose a conflict of interest with the subject matter of this article.

Authorship Information: Concept and design (SM, EK, EDP, LGS, MEC); acquisition of data (EK, EDP, LGS, MEC); analysis and interpretation of data (SM, EK, EDP, HT, MEC); drafting of the manuscript (SM, EK, EDP); critical revision of the manuscript for important intellectual content (SM, EK, EDP, HT, MEC); statistical analysis (SM); administrative, technical, or logistic support (EK, EDP, HT); and supervision (HT, LGS).

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