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findings brief

key findings

- Substantial geographic variation exists in Medicare costs, but to determine the source and extent of this variation requires proper accounting for population health differences.
- While physician practice patterns likely affect Medicare geographic cost variations, population health explains at least 75 to 85 percent of the variations—more than previously estimated.
- Policy strategies should consider the magnitude of the impact of beneficiary health status on Medicare costs in order to address geographic variation.

Patient Health Causes Substantial Portion of Geographic Variation in Medicare Costs

Overview

Large geographic variations in Medicare costs have long been documented. However, the size and source of this variation has been the subject of dispute. There are many factors that influence spending per Medicare beneficiary, including, and perhaps most importantly, patients' health status. Understanding the sources of spending variation is critical for policymaking, since strategies may differ depending on whether system inefficiency or patient factors explain regional variation. Casemix adjustment, or controlling for area population health, is critical to developing geographic variation estimates. Absent objective clinical measurement of patient health, studies have utilized various approaches to control for patient health. In a HCFO-funded study, James Reschovsky, Ph.D., Center for Studying Health System Change, and colleagues examined and compared these alternative casemix adjustment approaches to inform the use of geographic variation estimates and to draw policy inferences.[1]

Early versions of the *Dartmouth Atlas* applied only minimal casemix adjustments using age, sex, and race, and subsequently added adjustments for hospitalization rates of five acute conditions. Yet, these controls were generally seen as inadequate to adjust for area differences in Medicare beneficiary health. Subsequent studies have found that more comprehensive casemix controls accounted for greater portions of area cost variation in the Medicare population, suggesting that less variation is potentially attributable to health system efficiency or treatment intensity. Researchers often use diagnoses from insurance claims data to make casemix adjustments. Yet, there is concern that diagnoses could reflect local physician practice patterns in testing or coding rather than regional differences in population health. As an alternative, others—most notably researchers associated with the *Dartmouth Atlas* project—use per capita expenditures among persons close to death, in order to classify high- and low-cost sites based on practice patterns. This approach rests on the assumption that population health differences are

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controlled because persons close to death are of equal health. But this approach, too, has been criticized as being biased. In their study, Reschovsky and colleagues examined 1) the validity of end-of-life expenditures and diagnosis-based casemix control methods, and 2) how best to specify a diagnosis-based casemix adjustment.

Data

Reschovsky and colleagues analyzed 1,565,147 elderly Medicare fee-for-service beneficiaries residing in 60 nationally representative metropolitan and nonmetropolitan communities who received any medical care during 2004-2006 from physicians sampled from the same communities and responding to the 2004-2005 Community Tracking Study (CTS) Physician Survey. The researchers analyzed 12 months of claims, excluding beneficiaries who had end-stage renal disease, became eligible for Medicare, or enrolled in Medicare Advantage. The researchers weighted the beneficiary sample to make it representative of beneficiaries in each community as well as nationally. They also standardized beneficiary costs by controlling for geographic variations in Medicare prices that reflect regional input costs (e.g. wage rates), disproportionate share payments, and other rules that pay different rates to classes of providers that provide identical services. These "standardized costs" provide a better measure of differences in medical service use across areas and result in somewhat less geographic variation when compared to variations in unstandardized Medicare payments.

Geographic Variations in the Study Sample

Average standardized costs were 76 percent higher in the highest cost quintile of sites than in the lowest cost quintile ($11,643 vs. $6,612; p<.001). Physician and hospital supply were significantly greater in the most costly quintile of sites than in the least costly quintile, and the crude death rate, percentage of institutionalized beneficiaries, and mean beneficiary age were also significantly greater in the most costly quintile. While significant variation is apparent, these preliminary findings leave ambiguous the relative roles of population health and market characteristics in explaining cost differences prior to casemix adjustment.

Results

End-of-Life Spending Approach to Casemix Adjustment Found Inadequate

To test the assumption underpinning the end-of-life spending approach—that persons close to death are of roughly equal health status—the researchers subset their sample to beneficiaries who died in 2006 (N=125,285) and examined their claims over the preceding 12 months, controlling for age, sex, and race. The sample was divided into quintiles by the mean standardized cost of the CTS site. The researchers then added more comprehensive patient health controls by regressing decedent costs on variables contained in the hierarchical condition category (HCC) model, which was developed for the Centers for Medicare and Medicaid Services to risk adjust capitation payments made to Medicare Advantage Plans. The HCC model classifies diagnoses into Diagnostic Cost Groups and aggregates these groups into 70 clinically meaningful conditions designed to predict medical expenditures. If persons close to death are of roughly equal health status, adding the HCC variables as controls for the presence of health conditions should have little effect on geographic variations or on the difference in spending between high and low cost sites.

Among those that died in 2006, the difference in mean costs between the most and least costly sites was substantial: $20,514 (after adjusting for patients' age, sex, and race). When more comprehensive patient health controls are applied using the full HCC model variables, the difference between the costs in the highest and lowest quintiles of sites falls dramatically to $3,333, an 83.8 percent reduction in the estimate of geographic variation in costs between these sites. This large reduction indicates that even after adjustment for demographic characteristics, health status explains a substantial portion of the variation in Medicare costs among those near death. Similar results were found when using the full sample of beneficiaries. This finding suggests that the end-of-life spending adjustment is not sufficient to control for casemix in geographic variations estimates.

Bias in Diagnosis-Based Casemix Likely To Be Small

The researchers also tested whether controlling for patient health with diagnostic information from claims reflects physician testing or coding behavior, which might vary regionally. Although the researchers were unable to perform a formal test of bias, they conducted descriptive and analytic tests to assess whether such bias is a serious concern.

First, Reschovsky and colleagues noted that certain diagnoses are relatively unambiguous and presumably unaffected by physician practice (e.g., fractured hip) while other diagnoses (e.g., angina or asthma) may be more sensitive to the supply of specialists and local practice patterns. Consequently, one should observe greater differences in the prevalence of conditions for which the diagnosis may be more discretionary between high- and low-cost communities than for conditions where physicians have little or no discretion in diagnoses. The researchers, who included a physician, conducted a clinical review of the diagnosis codes assigned to each HCC variable and grouped them into seven categories ranging from those where diagnoses and coding are unambiguous to diagnoses that are more subject to local practice patterns and coding bias. They then calculated the prevalence of each HCC condition category in the most versus least costly quintiles of CTS sites, formed by mean standardized costs, unadjusted for health.

All HCC conditions were much more prevalent in the most costly quintile of sites than the least costly. Even hip fractures were 58 percent more prevalent in high-cost sites than in low-cost ones.

Results

- Of two methods used to control for area health differences in geographic variation studies:
  - The age-sex-race adjusted end-of-life expenditure approach is not sufficient to adequately adjust for casemix.
  - Bias due to using diagnosis information from claims data to characterize beneficiary health is relatively small.

Prevalence ratios between high- and low-cost areas did not systematically differ from those associated with conditions that, based on *a priori* clinical judgment, were potentially far more subject to local diagnostic and coding behavior. This suggests that bias in diagnosis-based casemix adjustment, if it exists, is not substantial.

Second, the researchers examined beneficiary costs and HCC variables and calculated how much controlling for HCC variables reduced the difference in beneficiaries' annual costs between those living in the most and least expensive quintile of CTS sites. Then, they added additional controls to the regression that included variables hypothesized to be related to local practice patterns (e.g., physician supply) and examined whether these additional controls attenuated the influence of HCC casemix variables on geographic variation estimates. The HCC model alone reduced the difference in per capita costs between those in the most and least expensive sites from $5,031 to only $326, a 93 percent reduction. Adding the additional codes to account for local market practices attenuated this reduction by only one half of a percentage point, again suggesting that any bias in diagnostic-based casemix control is small.

Third, the researchers modified the HCC model, primarily by eliminating condition variables which, based on their *a priori* clinical review, were most likely to be subject to bias due to physician discretion in diagnostic testing and coding. Use of this modified HCC model resulted in an 84 percent reduction in the cost difference between beneficiaries in the highest and lowest quintiles of areas, a modest reduction from the 93 percent reduction resulting from the full HCC model.

Additionally, Reschovsky and colleagues tested whether the results of casemix control differ when conditions are defined using current year diagnoses compared with prior year diagnoses (as other researchers have done). Their findings show that using current year diagnoses results in estimates of the portion of geographic variation attributed to patient health about twice as large compared to when conditions are based on prior year diagnoses. Moreover, the two approaches result in large differences in the ranking of specific communities on the 'costliness continuum.' They recommend using current year diagnoses in casemix adjustment, as this approach captures geographic variations in acute conditions more accurately, while use of prior year diagnoses does not address any of the bias questions associated with diagnosis-based casemix control.

Limitations

The researchers noted several limitations, including the indirectly drawn beneficiary sample, the age of the data, the lack of information on health outcomes and Medicare Advantage enrollees, and the possibility that other physicians might classify the discretionary nature of HCC conditions somewhat differently. Despite these limitations, the researchers note that there is little reason that methodological findings would be particularly sensitive to changes that have occurred since 2005-2006. Additionally, they ran analyses to control for Medicare Advantage penetration. Finally, the study uses individual beneficiary observations to control for health status, aggregating results to the area level, a method likely to be superior to the small area estimation techniques often used in other geographic variation studies.

Discussion and Policy Implications

Casemix, or patient health, is clearly an important driver of geographic variation in Medicare costs. While other factors, including local physician practice patterns, may also influence geographic variations, examining the potential role of these other factors requires use of appropriate casemix control. The researchers' findings suggest that population health plays a much larger role in explaining geographic variations in Medicare costs than previously thought—at least 75 to 85 percent of cost variations across fixed areas.

Reschovsky and colleagues' findings suggest that the age-sex-race adjusted end-of-life expenditure approach is not sufficient to adequately control for casemix. Their findings demonstrate that a Medicare decedent's prior health accounts for a substantial portion of the geographic variation in standardized Medicare costs in their last year of life.

In terms of the potential bias in claims-based diagnoses, the researchers conclude that, although such bias may exist, its magnitude is relatively small and does not sufficiently explain the regional variation in health status or Medicare costs. Additionally, the researchers found that both discretionary diagnoses as well as diagnoses less sensitive to diagnostic and coding practices were much more prevalent in high-cost sites than in low-cost sites. The findings suggest that population health, not physician practice patterns, is the predominant driver of geographic variation in Medicare costs.

Conclusion

Geographic variations in health care costs have been used to suggest rampant inefficiency in the U.S. health care system. The authors do not dispute that our health care system is inefficient but that this inefficiency is not as strongly associated with geography as others have suggested. Recent research has confirmed that inter- and intra-area variations in healthcare costs are far more complex than commonly thought, and patterns may be specific to treatment of specific conditions. Moreover without adequate casemix control, associations between area cost levels and clinical outcomes could be confounded. The perfect casemix control methodology may be elusive, but this analysis demonstrates that if geographic variations research is used to inform policy, proper accounting for population health differences is essential.

For More Information

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Endnotes

1. Reschovsky, J.D., Hadley, J., and Romano, P.S. "Geographic Variation in Fee-for-Service Medicare Beneficiaries' Medical Costs Is Largely Explained by Disease Burden." Medical Care Research and Review, May 2013, pp. 1-22.