Variation in Health Care Spending
Target Decision Making, Not Geography
Committee on Geographic Variation in Health Care Spending and Promotion of High-Value Care

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Geographic Variation in Health Care Spending and Quality

For over three decades, experts at Dartmouth have documented significant variation in Medicare spending between geographic regions seemingly unrelated to health outcomes.
Dartmouth Institute Map of Price Adjusted Medicare PMPM Spending by HRR (2008)
Geographic Variation Reflects “Acceptable” and “Unacceptable” Sources of Variation

• “Acceptable” sources of variation include aspects of health status or population demographics.

• “Unacceptable” sources of variation include aspects of system inefficiencies, such as overuse of low-value services and unnecessary service duplication.

• There are also gray areas
Committee Charge

1. To independently evaluate geographic variation in health care spending levels and growth among Medicare, Medicaid, privately insured, and uninsured populations in the U.S.;

2. To make recommendations for changes in Medicare Parts A, B, and C payments, considering findings from task (1) of the study and changes to Medicare payment systems under the ACA; and

3. To address whether Medicare payments for physicians and hospitals should incorporate a “value index based on a composite of appropriate measures of quality and cost that would adjust provider payments on a regional or provider-level basis”¹

¹The Affordable Health Care for America Act, H.R. 3962, 111th Cong., 1st sess. (October 29, 2009)
Research Framework and Statistical Modeling Approach

The Committee addressed two basic questions:

1. How do health care spending, utilization, and quality vary across geographic regions?
2. Should Medicare provider payments be adjusted for regionally-based measures of value?
Geographic Units of Analysis

The Committee examined geographic variation at three levels:

- Hospital Referral Regions (HRR)
- Hospital Service Areas (HSA)
- Metropolitan Core-Based Statistical Areas (Metropolitan CBSA, also known as Metropolitan Statistical Area)
Subcontractors
The following subcontractors supported the Committee’s commissioned analyses:

Acumen, LLC
• Tom MaCurdy, Ph.D., Managing Member and Senior Research Associate

Dartmouth
• Jonathan Skinner, Ph.D., Joan Sloan Dickey Third Century Professor in Economics

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• Michael Chernew, Ph.D., Professor, Department of Health Care Policy

The Lewin Group, Inc.
• Nancy Walczak, F.S.A., Ph.D., Managing Director, Health and Human Services Consulting

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• Yuting Zhang, Ph.D., Assistant Professor, Department of Health Policy and Management

Precision Health Economics
• Darius Lakdawalla, Ph.D., Managing Director

RAND Corporation
• David Auerbach, Ph.D, Policy Researcher, RAND
• Ateev Mehrotra, M.D., M.P.H., M.Sc., Policy Analyst, RAND
Definitions of Key Terms

**Health Care Value** is the amount by which overall health benefit and/or well-being produced by the care exceeds (or falls short of) the costs of producing it.

**Value Index** is a relative measure of value, for example, a measure of improvement in patient-centered, clinical health outcomes per unit of resources used in one area relative to the national average.
Desirable Features of a Geographic Value Index

A geographic value index for Medicare should:

- effectively shift provider behavior toward greater efficiency (i.e., using fewer resources) without substantially diminishing health care outcomes.
- generate hospital and provider payments that are perceived as fair.
Committee Findings

**Conclusion 2.1** Geographic variation in spending and utilization is real, and not an artifact reflecting random noise. The committee’s empirical analyses of Medicare and commercial data confirm the robust presence of variation, which persists across geographic units and health care services and over time.
Ratio of the 90th to the 10th Percentile of Unadjusted Per-Member-Per Month (PMPM) Medicare and Commercial Spending across Geographic Units

<table>
<thead>
<tr>
<th></th>
<th>HSA</th>
<th>HRR</th>
<th>Metropolitan CBSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicare</td>
<td>1.47</td>
<td>1.42</td>
<td>1.38</td>
</tr>
<tr>
<td>OptumInsight (Commercial 1)</td>
<td>1.71</td>
<td>1.42</td>
<td>1.50</td>
</tr>
<tr>
<td>MarketScan (Commercial 2)</td>
<td>1.43</td>
<td>1.36</td>
<td>1.36</td>
</tr>
</tbody>
</table>

NOTE: Unadjusted spending” refers to all-cause spending that has not been adjusted for any factors other than year of analysis and length of beneficiary enrollment.
Growth rates of Medicare spending, adjusted for demographics, health status, and input price, among quintiles of hospital referral regions (HRRs) based on expenditure levels in 1992.
## Across-HRR Correlations Between Medicare and Commercial Spending

<table>
<thead>
<tr>
<th></th>
<th>Medicare &amp; MarketScan</th>
<th>Medicare &amp; OptumInsight</th>
<th>MarketScan &amp; OptumInsight</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>“Raw” Baseline Spending</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.112&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
<td>0.081</td>
<td>0.663</td>
</tr>
<tr>
<td><strong>Input Price Adjusted Baseline Spending</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-0.094</td>
<td>-0.032</td>
<td></td>
<td>0.632</td>
</tr>
</tbody>
</table>

<sup>a</sup> Raw spending refers to all-cause spending, not adjusted for Input-Prices.

<sup>b</sup> Correlation coefficient

**NOTE:** All HRR means have been adjusted for regional differences in age, sex and health status.

**SOURCE:** Precision Health Economics 2013
Relationship between Total Health Care Spending and Payer Specific Spending

There is little correlation between Total Health Care Spending and either Medicare, or Commercial Spending

<table>
<thead>
<tr>
<th></th>
<th>Commercial</th>
<th>Medicare</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total, Input-Price Adjusted Healthcare Spending</td>
<td>0.21</td>
<td>0.30</td>
</tr>
</tbody>
</table>

NOTE: Total Healthcare Spending accounts for populations covered by Medicare, fee for service Medicaid and Commercial Payers, and additionally imputes spending for Medicaid managed care beneficiaries and the uninsured.
SOURCE: Precision Health Economics 2013
Committee Findings

**Conclusion 2.3** The committee’s empirical analysis revealed that after accounting for differences in age, sex, and health status, geographic variation is not further explained by other beneficiary demographic factors, insurance plan factors, or market-level characteristics. In fact, after controlling for all factors measurable within the data used for this analysis, a large amount of variation remains unexplained.
After accounting for age, sex and health status, other factors do not further explain variation in Medicare or Commercial spending

### TABLE 2-8 Ratios of 90th to 10th Percentile HRR-Level Input-Price-Adjusted Spending across Payers When Adjusted for “Clusters” of Predictors

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Ratio: Medicare</th>
<th>Ratio: Commercial 1 (OptumInsight)</th>
<th>Ratio: Commercial 2 (MarketScan)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control:</td>
<td>1.44</td>
<td>1.43</td>
<td>1.33</td>
</tr>
<tr>
<td>Adjusted for Year and Partial-Year Enrollment Only</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cluster 1:</td>
<td>1.44</td>
<td>1.43</td>
<td>1.26</td>
</tr>
<tr>
<td>Adjusted for Control + Age + Sex + Age * Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cluster 2:</td>
<td>1.23</td>
<td>1.37</td>
<td>1.28</td>
</tr>
<tr>
<td>Adjusted for Cluster 1 + Health Status(^d)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cluster 5:</td>
<td>1.25</td>
<td>1.42</td>
<td>1.27</td>
</tr>
<tr>
<td>Adjusted for Cluster 1 + Race + Income + Health Status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cluster 8(^d,e):</td>
<td>1.25</td>
<td>**</td>
<td>1.28</td>
</tr>
<tr>
<td>Adjusted for Cluster 5 + Employer/Insurance Predictors + Market-Level Predictors</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SOURCE: Committee’s analysis of subcontractor data.
Effect of Age, Sex and Health status adjustment on Medicare Input-Price Adjusted Spending

Left: Medicare Unadjusted Spending
Right: Medicare Spending, Adjusted for Age, Sex and Health Status
NOTE: Both are adjusted for regional differences in input-prices
Committee Findings

**Conclusion 2.4** Variation in total Medicare spending across geographic areas is driven largely by variation in the utilization of post-acute care services, and to a lesser extent by variation in the utilization of acute care services.
Variation in Adjusted Medicare Spending, by HRR

(a) Total Monthly Adjusted Differences from the National Mean of Spending across HRRs

(b) Post-Acute Care Monthly Adjusted Differences from the National Mean of Spending across HRRs
## Variation in Post Acute Care Services

### Proportion of Variance Attributable to Each Medicare Service Category

<table>
<thead>
<tr>
<th></th>
<th>Adjusted Total Medicare Spending</th>
<th>Remaining Variance</th>
<th>Reduction in Variance (%)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variation in Total Medicare Spending</td>
<td>6,974</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>If No Variation in Post-Acute Care Only</td>
<td>1,864</td>
<td>73</td>
<td></td>
</tr>
<tr>
<td>If No Variation in Acute Care Only</td>
<td>5,085</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>If No Variation in Either Post-Acute or Acute</td>
<td>780</td>
<td>89</td>
<td></td>
</tr>
<tr>
<td>If No Variation in Prescription Drugs</td>
<td>6,374</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>If No Variation in Diagnostic Tests</td>
<td>5,986</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>If No Variation in Procedures</td>
<td>6,020</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>If No Variation in Emergency Department Visits/Ambulance Use</td>
<td>6,972</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>If No Variation in Other</td>
<td>6,882</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

*The individual reductions sum to more than 100 percent because of covariance terms.*

**NOTE:** Total Medicare spending and each component are input-price- and risk-adjusted. Each row shows the reduction in variance from eliminating only the variation in that service, with the exception of the acute and post-acute care rows.
Ten Lowest Medicare Spending HRR’s after Adjustment

1. Rochester NY
2. Stockton, CA
3. Sacramento, CA
4. Buffalo, NY
5. Bronx, NY
6. Santa Cruz, CA
7. Santa Rosa, CA
8. Medford, OR
9. San Francisco, CA
10. Salem, OR
Ten Highest Spending Medicare HRR’s after Adjustment

1. Miami, FL
2. McAllen, TX
3. Monroe, LA
4. Houston, TX
5. Alexandria, LA
6. Lafeyette, LA
7. Shreveport, LA
8. Baton Rouge, LA
9. Fort Lauderdale, FL
10. Metairie, LA
Committee Findings

**Conclusion 2.2** Variation in spending in the commercial insurance market is due mainly to differences in price markups by providers rather than to the differences in the utilization of health care services.
Variation in Price

• Variation in health care spending reflects variation in both unit price and utilization (quantity of services)

• Whereas CMS sets uniform national base prices, the commercial prices are set through negotiations between payer and provider and vary geographically

• Price variation is larger in the commercial sector than in Medicare, as negotiating power varies across areas
Variation in Price

In the commercial sector, Spending is relatively uncorrelated with Quantity, but highly correlated with Price, after adjustment for patient age, sex, and health status.
## Variation in Commercial Prices

Relative Proportion of Commercial Spending Variation due to Quantity (utilization), Markup, and Input Price, Decomposed by Service Type

<table>
<thead>
<tr>
<th></th>
<th>Quantity (%)</th>
<th>Markup (%)</th>
<th>Input-Price (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Medical Spending</strong></td>
<td>16</td>
<td>70</td>
<td>14</td>
</tr>
<tr>
<td><strong>Inpatient Spending</strong></td>
<td>18</td>
<td>62</td>
<td>20</td>
</tr>
<tr>
<td><strong>Outpatient Spending</strong></td>
<td>21</td>
<td>70</td>
<td>9</td>
</tr>
</tbody>
</table>
Committee Recommendation

RECOMMENDATION 1:

Congress should encourage CMS, and provide the necessary resources, to make accessing Medicare and Medicaid data easier for research purposes. CMS should collaborate with private insurers to collect, integrate, and analyze standardized data on spending, as well as clinical and behavioral health outcomes, to enable more extensive comparisons of payments and quality and evaluation of value-based payment models across payers.
Committee Findings

**Conclusion 3.2** Substantial variation in spending and utilization remains as units of analysis get progressively smaller.

- Within the HRR (HSA level)
- Within the HRR (Hospital level)
- Within single provider practices
- Additionally, individual physician performance varies across individual measures of quality and service use
Example:
Spending variation at the Hospital Level within HRRs for various clinical condition cohorts
Committee Findings

**Conclusion 3.3** Quality across conditions and treatments varies widely within HRRs; spending and utilization across conditions are moderately correlated within HRRs.
## Correlation Coefficients for Input-Price-Adjusted Spending across Cohorts in the Harvard MarketScan Commercial Population

<table>
<thead>
<tr>
<th></th>
<th>LBP</th>
<th>Cataracts</th>
<th>CHF</th>
<th>Breast Cancer</th>
<th>Prostate Cancer</th>
<th>Cholecystectomy</th>
</tr>
</thead>
<tbody>
<tr>
<td>LBP</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cataracts</td>
<td>0.35</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHF</td>
<td>0.52</td>
<td>0.36</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breast Cancer</td>
<td>0.49</td>
<td>0.52</td>
<td>0.37</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prostate Cancer</td>
<td>0.43</td>
<td>0.33</td>
<td>0.39</td>
<td>0.49</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Cholecystectomy</td>
<td>0.40</td>
<td>0.36</td>
<td>0.39</td>
<td>0.42</td>
<td>0.36</td>
<td>1.00</td>
</tr>
</tbody>
</table>

NOTE: CHF = congestive heart failure; LBP = lower back pain.
Committee Findings

**Conclusion 3.4** HRR-level quality is not consistently related to spending or utilization in Medicare or the commercial sector.
Inconsistent Relationship between Spending and Quality of Health Care

Correlations of spending and measures of quality for various diseases were mostly near zero, with both positive and negative signs, for both Medicare and commercial populations.
Committee Recommendation

RECOMMENDATION 2:

Congress should not adopt a geographically based value index for Medicare. Because geographic units are not where most health care decisions are made, a geographic value index would be a poorly targeted mechanism for encouraging value improvement. Adjusting payments geographically, based on any aggregate or composite measure of spending or quality, would unfairly reward low-value providers in high-value regions and punish high-value providers in low-value regions.
Committee Recommendation

RECOMMENDATION 3:
To improve value, CMS should continue to test payment reforms that incentivize the clinical and financial integration of health care delivery systems and thereby encourage their (1) coordination of care among individual providers, (2) real-time sharing of data and tracking of service use and health outcomes, (3) receipt and distribution of provider payments, and (4) assumption of some or all of the risk of managing the care continuum for their populations. Further, CMS should pilot programs that allow beneficiaries to share in the savings due to higher-value care.
Committee Recommendation

RECOMMENDATION 4:
During the transition to new payment models, CMS should conduct ongoing evaluations of the impact on value of the reforms included in Recommendation 3 by measuring Medicare spending and beneficiaries’ clinical health outcomes. CMS should use the results of these evaluations to iteratively improve these payment models. CMS should also monitor how these reforms impact Medicare beneficiaries’ access to medical care.
Committee Recommendation

RECOMMENDATION 5:
If evaluations of specific payment reforms demonstrate increased value, Congress should give CMS the flexibility to accelerate the transition from traditional Medicare to new payment models.
Thank You!