Geographic Differences in Healthcare Utilization:
Moving Forward

Allen J. Taylor MD FACC FAHA
Director, Advanced Cardiovascular Imaging
Washington Hospital Center
Professor of Medicine
Georgetown University
“It’s déjà vu all over again!”
How much variation is too much variation?

“I wish I had an answer to that because I’m tired of answering that question.”

• To the extent that evidence on how best to care for a patient is unavailable or ambiguous, a certain degree of variation in practice- and spending- is expected.
The weak correlation between the level of medical spending and the level of drug spending is consistent with drugs’ being a substitute for medical care for some patients and a complement to medical care for others.
Hospital admissions for ambulatory care sensitive conditions, 2009

National Average = 6,291 per 100,000

- < 5,000
- 5,000 – 6,499
- 6,500 – 7,999
- ≥ 8,000
OBJECTIVE: To determine the association between hospital spending and risk-adjusted inpatient mortality.


PATIENTS: 2,545,352 patients hospitalized during 1999 to 2008 with 1 of 6 major medical conditions.

Odds ratios of inpatient mortality for a given hospital spending quintile are calculated with respect to the lowest quintile. Vertical bars represent 95% CIs around the predicted lives saved. AMI = acute myocardial infarction; CHF = congestive heart failure; GI = gastrointestinal.
The Association Between Hospital Outcomes and Diagnostic Imaging: Early Findings

David W. Lee, PhD\textsuperscript{a}, David A. Foster, PhD\textsuperscript{b}

**Purpose:** Resource use variation across the United States prompts the important question of whether “more is better” when it comes to health care services. The aim of this study was to examine correlations between the use of 4 common imaging modalities (CT, MR, ultrasound, and radiography) and in-hospital mortality and costs.

**Methods:** Using clinical and utilization data for 1.1 million inpatient admissions at 102 US hospitals during 2007, two hospital-specific, risk-adjusted imaging utilization measures for each modality were constructed that controlled for patients’ demographic and clinical characteristics and for hospital characteristics were constructed for each modality. First, logistic regression was used to estimate the odds that each type of imaging service would be provided during an admission. Second, the mean number of services per admission was estimated using output from a two-part ordinary least squares model. Hospital-specific, risk-adjusted inpatient mortality and total hospital costs were also computed, and correlations between the imaging utilization measures and the mortality and cost outcome measures were then assessed using Pearson’s correlation coefficients ($P < .05$). The correlation analyses were weighted by hospital admission volume.

**Results:** Hospitals in which patients were more likely to receive imaging services during admissions had lower mortality, even after controlling for potential confounders. Correlation coefficients were $-0.2$ for all modalities ($P = .02-.05$). Weaker correlations existed between mean services per admission and mortality, while costs trended insignificantly higher with greater utilization.

**Conclusions:** This study lays the foundation for further exploration of the relationship between resource use and the clinical and economic outcomes associated with imaging utilization.

**Key Words:** Outcomes assessment, diagnostic imaging, inpatients

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<table>
<thead>
<tr>
<th>Risk-Adjusted Imaging Measures</th>
<th>Mortality</th>
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<th>Cost</th>
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<tr>
<td>Risk-Adjusted Imaging Measures</td>
<td>Correlation</td>
<td>$P$</td>
<td>Correlation</td>
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<tr>
<td>Receipt of $\geq 1$ imaging service</td>
<td></td>
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<tr>
<td>CT</td>
<td>$-0.2245$</td>
<td>.0233</td>
<td>$0.0176$</td>
</tr>
<tr>
<td>MR</td>
<td>$-0.1964$</td>
<td>.0490</td>
<td>$0.1275$</td>
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<tr>
<td>Ultrasound</td>
<td>$-0.2397$</td>
<td>.0152</td>
<td>$0.0200$</td>
</tr>
<tr>
<td>Radiography</td>
<td>$-0.2096$</td>
<td>.0345</td>
<td>$-0.0224$</td>
</tr>
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Expenditures or Growth Rate?

State Ranking by Medicare Spending per Beneficiary

State Ranking by Growth in Medicare Spending per Beneficiary
• Medicare: growth ~5%/year
• Part B payments to cardiologists a minority of imaging expenditures
  – Imaging services to cardiologists accounted for 8.7% of physician expenditures in 2006

Imaging growth in Canada similar to US

10% annual growth in perfusion studies
Many factors drive spending variation

Resource supply is one easily identifiable factor.
How important is it?
Variation in the burden of chronic conditions and their risk factors contributes to variation in spending patterns.
Variation in the burden of chronic conditions and their risk factors contributes to variation in spending patterns.
Unadjusted Medicare spending per beneficiary-2006

Adjusted for wages, health status, and medical education/DS H

National Average = $7,846
- < $6,500
- $6,500 – $7,000
- $7,001 – $7,500
- $7,501 – $8,000
- > $8,000

National Average = $7,400
- < $6,500
- $6,500 – $7,000
- $7,001 – $7,500
- $7,501 – $8,000
- > $8,000
• Resource supply/ownership is simply NOT synonymous with increased utilization.

• Policy proposals that fail to account for the complexities surrounding geographic variation in practice could create unintended consequences for providers, patients, and communities.
“Always go to other people’s funerals, otherwise they won’t go to yours.”
Wennberg

- Promote organized systems of health care delivery
- Establish informed patient choice as the ethical and legal standard
- Improve the science of health care delivery
- Constrain undisciplined growth in health care capacity and spending

N.B. (1)- The American College of Cardiology is actively engaged in each of these potential system solutions.

N.B. (2)- Note that “self referral” is not specifically identified by Wennberg
Why All the Focus on Cardiac Imaging?

Leslee J. Shaw, PhD,* Thomas H. Marwick, MBBS, PhD,† William A. Zoghbi, MD,‡ W. Gregory Hundley, MD,§ Christopher M. Kramer, MD,‖ Stephan Achenbach, MD,¶ Vasken Dilizian, MD,# Morton J. Kern, MD,** Y. Chandrashekhar, MD, DM,†† Jagat Narula, MD, PhD***

- Reduce reimbursement
- Mandatory pre-authorization
- Appropriate use criteria
- Patient education
- Acceptance of growth for new clinical settings and demonstrated indications
- Acceptance of growth as a trade off against clinical cost
- Limit point of care access through specialty consultation
- Changes in the reimbursement model
“The future ain’t what it used to be.”
EXHIBIT 3

Nationwide Outpatient Rates Of Nuclear Medicine Use Per 1,000 Medicare Fee-For-Service Beneficiaries, 2000–2007

SOURCE Medicare Physician/Supplier Procedure Summary Master Files. NOTES Vertical axis shows outpatient nuclear medicine exams per 1,000 Medicare fee-for-service beneficiaries. Office = all studies done on outpatients in private physician offices or imaging centers. Hosp OPD = all studies done in hospital outpatient facilities. Total = the total of the 2, all outpatient studies.
Medicare Part B Physician Payments for MPS, Echo, Cath, and ETT

“When you come to a fork in the road, take it.”
“The success of any reform effort to address unwanted variation will also depend on the emergence of professional leadership…. When confronted with practice variation, practicing physicians, nurses and other health professionals have stood up and done the right thing.”
FOCUS Voluntary Community Report
Community Demographics

This map displays the spread of physicians enrolled in the FOCUS community throughout the country.
Measure Values

This graph displays the overall average (for all months) of appropriate, inappropriate, & uncertain usage rates for all participants who have completed stage 1.
This graph displays the breakdown of inappropriate usage in Stage 1 into its distinct categories and the change they have seen over time.
Physicians were asked “What action are you going to perform that will result in an improvement” when formulating their action plans. This chart displays the percentage of physicians who responded with goals in these categories.
“You can observe a lot by watching.”
Measure Values

Overall average (for all months) of appropriate, inappropriate & uncertain usage rates after stage 1 for ONLY participants who completed both stage 1 and stage 2

Overall average (for all months) of appropriate, inappropriate & uncertain usage rates after stage 2 for ONLY participants who completed both stage 1 and stage 2

Reduction in the inappropriate rate from 12% to 6% (p<.0001)
This graph displays the various categories of inappropriateness and their rate between stage 1 and 2.
Effect of Computerized Order Entry with Integrated Decision Support on the Growth of Outpatient Procedure Volumes: Seven-year Time Series Analysis

Christopher L. Sistrom, MD, MPH
Pragash Liang, MD
Jeffrey D. Wallberg, MD
Keith D. Dryer, DO, PhD
Daniel L. Rosenhal, MD
James H. Thrall, MD

Purpose: To determine the effect of a computerized radiology order entry (ROE) and decision support (DS) system on growth rate of outpatient computed tomography (CT), magnetic resonance (MR) imaging, and ultrasound (US) procedures volumes over time at a large metropolitan academic medical center.

Methods and Methods: Institutional review board approval was obtained for this study of deidentified aggregate administrative data. The research was compliant with HIPAA; informed consent was waived. This was a retrospective study of outpatient advanced imaging utilization before, during, and after implementation of a Web-based ROE and DS system. Dependent variables were the quarterly volumes of outpatient CT, MR imaging, and US examinations from quarter 4 of 2000 through quarter 4 of 2007. Outpatient visits during each quarter were included as control variables. These data were analyzed as three separate time series with piecewise linear regression for simultaneous estimation of quarterly examination volume trends before and after ROE and DS system implementation. This procedure was repeated with lag-transformed quarterly volumes to estimate percentage growth rates.

Results: There was a significant decrease in CT volume growth (274 per quarter) and growth rate (2.25% per quarter) after ROE and DS system implementation (p < .001). For MR imaging, growth rate decreased significantly (1.2%, p = .014) after ROE and DS system implementation; however, there was no significant change in quarterly volume growth. With US, quarterly volume growth was 99, p = .016) and growth rate (2.1%, p = .001) decreased significantly after ROE implementation. These changes occurred during a steady growth in clinic visit volumes in the associated referral practices.

Conclusions: Substantial decreases in the growth of outpatient CT and US procedure volume coincident with ROE implementation (supplemented by DS for CT) were observed. The utilization of outpatient MR imaging decreased less impressively, with only the rate of growth being significantly lower after interventions were in effect.

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Screenshot of the DS feedback displayed after submitting a request for MR imaging of the lumbar spine with symptom of “back pain improved with exercise” and abnormal result at previous examination of “abnormal x-ray DJD [degenerative joint disease].” PCP's = primary care physicians.

Sistrom C L et al. Radiology 2009;251:147-155
Coincident with the implementation of a computerized ROE and DS system for the pool of referring physicians, yearly growth of imaging was reduced:

CT: 12% → 1%
MR imaging: 12% → 7%
Ultrasound: 9% → 4%
FOCUS Program Continuum – Performance Driven Intensity

- Medicalis diagnostic imaging ordering system (Reason for Test and Patient History of Testing)
  AUC Pattern Tracking

- Annual 60 day evaluation of AUC patterns

- ACC education and QI tools

- Local consults by cardiology or performing peers

Medicalis point of order AUC clinical decision support

NO DENIALS

HIGH PERFORMING  AUC PERFORMANCE  NEEDS IMPROVEMENT
“If the world was perfect, it wouldn’t be”

To the extent that evidence on how best to care for a patient is unavailable or ambiguous, a certain degree of variation in practice- and spending- is expected.

Seek to minimize variation through continued focus within ongoing healthcare reform efforts emphasizing:

- Value
- Quality
- Patient Centered
- Accessible
- Innovation
“I really didn’t say everything I said.”

“If you ask me a question I don’t know, I’m not going to answer”