From Theory to Health Care Improvement: The Dartmouth Atlas of Health Care

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Hanover, NH

Organisation for Economic Cooperation and Development
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Small Area Variations in Health Care Delivery

A population-based health information system can guide planning and regulatory decision-making.

John Wennberg and Alan Gittelsohn

Recent legislation has extended planning and regulatory authority in the health field in a number of important areas. The 1972 amendments to the Social Security Act provide authority for regulating the construction of facilities and establish Professional Standard Review Organizations (PSRO's), which are accountable for setting standards and evaluating professional performance. Phase 3 of the Wage and Stabilization Act of 1970 and state insurance commissions provide authority for regulating dollar flow by controlling impact of regulatory decisions on the equality of distribution of resources and dollars and the effectiveness of medical care services.

For technical and organizational reasons, documentation of the health care experience of populations has been restricted to large political jurisdictions such as counties, states, or nations. Studies at this level of aggregation have used indicators that support direct comparisons among areas. Relationships between the supply of manpower, facilities, and expenditures and the mortality in which behalf those twice as high in California as in Arkansas. The number of physicians per thousand persons has been up to three times higher in some states than in others. International comparisons and studies of regions within states show that there are large differences in the rate of delivery of specific surgical procedures (2).

In 1969, there was implemented in the state of Vermont a data system that monitors aspects of health care delivery in each of the 251 towns of the state. When the population of the state is grouped into 13 geographically distinct hospital catchment, or service, areas, variations in health care are often more apparent than they are when the population is divided into fewer, larger areas. Population rates can be used to make direct statistical comparisons between each of the 13 hospital service areas. Since the medical care in each area is delivered predominantly by local physicians, variations tend to reflect differences in the way particular individuals and groups practice medicine. The specificity of the information in Vermont's data system makes it possible to appraise the impact that decisions controlling facility construction, price of insurance, and the real value of service base the line. Darker line shows boundaries of hospital service areas. Circles represent hospitals. Areas without circles are served principally by hospitals in New Hampshire.
The Dartmouth Atlas of Health Care provides national public reporting of health system performance over time through the lens of variation in utilization, cost, quality, and patient experience. The Atlas highlights variation, its causes, and its consequences in order to provide target audiences with compelling data to effect positive changes in the health care system.

www.dartmouthatlas.org
The Dartmouth Atlas of Health Care

Research, surveillance, and public reporting
Variation in Per-Capita Medicare (>age 65) Spending Across Hospital Referral Regions (N=306) (2006)

$8,800 to $16,352 (61)
$8,100 to <$8,800 (61)
$7,550 to <$8,100 (60)
$6,900 to <$7,550 (62)
$5,310 to <$6,900 (62)
Not Populated
Unwarranted variation is variation that cannot be explained by:

- Patient illness
- Patient preference

Unwarranted variation is the variation that is explained by differences in health system performance.
<table>
<thead>
<tr>
<th>Category</th>
<th>Cause</th>
<th>Consequence</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unwarranted variation</td>
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<td>Evidence-based care</td>
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<td>Supply sensitive care</td>
<td>Capacity that is idiosyncratically located and poorly related to outcomes</td>
<td>Higher resource use with marginal or no patient benefit</td>
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</tr>
<tr>
<td>Desired State: Warranted variation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Care in response to differences in patient needs and preferences</td>
<td>Application of evidence-based medicine and Shared Decision Making</td>
<td>Better outcomes, including higher decision quality, and often lower costs</td>
<td></td>
</tr>
</tbody>
</table>
Variation in Evidenced-based care:
Percent of Diabetics (>age 65 - 75) with HbA1c Test (2003-07)
INTRODUCTION

Once considered surgical breakthroughs, hip, knee, and shoulder replacement have become routine procedures. Every year, hundreds of thousands of Americans suffering from pain or disability as a result of degenerative joint disease experience remarkable improvements in quality of life that would not have been possible without the surgery. The procedures are generally safe and effective, and patients are usually highly satisfied with the results, which helps to explain why the procedures are now so common. As the population ages and people expect to live longer and more active lives, demand for joint replacement is likely to continue to grow.

Still, for some patients the potential downsides of joint replacement—or arthroplasty, as it is often referred to in the medical literature—outweigh the likely benefits, even if their condition makes them suitable candidates. Some are not bothered much by their symptoms; others prefer to delay the procedure as long as possible to avoid the risk of needing a second operation if the prosthetic joint fails. If encouraged to take an active role in determining the course of treatment, these patients may opt for non-surgical alternatives to help manage their symptoms. Ideally, each patient would be well informed about the risks and benefits of joint replacement before deciding to undergo the procedure in order to ensure that their treatment matches their personal values and can meet their expectations. In this analysis, however, we found patterns in the use of hip, knee, and shoulder replacement among Medicare beneficiaries that raise concerns about both possible underuse (whether all
Results

Table 1. National average rates of joint replacement per 1,000 Medicare enrollees, 2000-01 and 2005-06

<table>
<thead>
<tr>
<th></th>
<th>2000-01</th>
<th>2005-06</th>
<th>Percent increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hip arthroplasty</td>
<td>3.5</td>
<td>4.0</td>
<td>15%</td>
</tr>
<tr>
<td>Knee arthroplasty</td>
<td>6.0</td>
<td>8.8</td>
<td>48%</td>
</tr>
<tr>
<td>Shoulder arthroplasty</td>
<td>0.5</td>
<td>0.8</td>
<td>67%</td>
</tr>
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</table>
Introduction

More than 1.5 million cancers are diagnosed each year in the United States.¹ This Dartmouth Atlas report examines how elderly patients with poor prognosis cancer are cared for across regions and hospitals and finds remarkable variation depending on where the patients live and receive care. Even among the nation’s leading medical centers, there is no consistent pattern of care or evidence that treatment patterns follow patient preferences. Rather, the report demonstrates that many hospitals and physicians aggressively treat patients with curative attempts they may not want, at the expense of improving the quality of their last weeks and months.

For many cancer patients, medical and surgical care leads to long-term remission or cure. Other patients have aggressive or disseminated (metastatic) cancer at the time of diagnosis or experience a recurrence later in their illness. Despite achievements in cancer detection and treatment, half a million patients die of cancer annually in the United States. The majority of these deaths are in those over age 65.²
Want to spend your last days in the hospital...?

National random survey of 2,847 community dwelling Medicare beneficiaries > 65 years 2003:

<table>
<thead>
<tr>
<th></th>
<th>Non Hispanic White</th>
<th>Hispanic</th>
<th>Black</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>In a hospital</td>
<td>8.0 (6.8-9.2)</td>
<td>15.2 (9.6-23.4)</td>
<td>17.7 (14.4-21.6)</td>
<td>16.3 (10.1-25.3)</td>
</tr>
<tr>
<td>In a nursing home</td>
<td>5.2 (4.3-6.2)</td>
<td>1.9 (0.5-7.3)</td>
<td>7.7 (5.6-10.6)</td>
<td>4.4 (1.6-11.0)</td>
</tr>
<tr>
<td>At home</td>
<td>86.9 (85.3-88.3)</td>
<td>82.9 (74.4-88.9)</td>
<td>74.6 (70.3-78.4)</td>
<td>79.4 (69.9-86.4)</td>
</tr>
</tbody>
</table>

Percent of Poor Prognosis Cancer Patients Dying in Hospital

National Cancer Institute Cancer Centers and Academic Medical Centers (non-NCI)

Westchester Medical Center 57.1
New York Methodist Hospital 54.9
New York-Presbyterian Hospital 46.2
Robert Wood Johnson Univ, NJ 42.4
Univ of Wisconsin Hosp & Clinics 22.5
Univ of Washington Med Ctr 21.3
St. Joseph’s Med Ctr, Phoenix 18.9
Evanston Northwestern 18.7
## Causes, consequences, remedies of variation

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<td>Lower probability of good outcomes</td>
<td>Clinical microsystem improvements</td>
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<td>Preference sensitive care</td>
<td>Provider-driven decisions; patients uninformed and not involved in decisions</td>
<td>Pt. doesn’t receive preferred care: the care with highest individual pt. utility</td>
<td>Shared decision making, decisions aids. Better outcomes research. Research in decision quality</td>
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<td>Supply sensitive care</td>
<td>Capacity that is idiosyncratically located and poorly related to outcomes</td>
<td>Higher resource use with marginal or no patient benefit</td>
<td>Wiser capital and labor investments in health care.</td>
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<td>Application of evidence-based medicine and Shared Decision Making</td>
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Challenges assumptions; stimulates new policy

Informs and motivates clinical improvement

Challenges current practice; fosters engagement

Engages audiences, creating tension for change

Helps redefine value; stimulates new models

Provides model for state-level monitoring, feedback

Stimulates & supports clinical and policy research

Policy Community

Health systems (e.g. hospitals)

Professional Organizations

Media

Payers/Insurance Plans

States

Academic Community

Dartmouth Theories of Change
The Dartmouth Atlas of Health Care

Collaborators
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