



Dartmouth Atlas Project

A Progress Report

OVERVIEW: WHAT IS THE DARTMOUTH ATLAS PROJECT?

*In the early 1970s, John E. Wennberg, M.D., M.P.H., and biostatistician Alan Gittelsohn, Ph.D., noticed that a high percentage of children in one Vermont town were having their tonsils removed, while very few children were having tonsillectomies in the next town (where Wennberg and his family lived). Wennberg and Gittelsohn published their investigation of this phenomenon in *Science* in 1973 and went on to find similar geographical variations in common surgeries.*

Their early findings became the impetus for the Dartmouth Atlas Project, which has for almost 20 years used Medicare data to document variations in how medical resources are distributed and used in the United States. (For a list of project leaders, see the [Appendix](#).)

"The overarching objective is to report local and regional variation in the performance of U.S. health care to policy-makers and health systems and to provide interpretation of unwarranted variation that guides policy formulation and clinical improvement," according to David Goodman, M.D., M.S., Dartmouth Atlas co-principal investigator.

Dartmouth Atlas of Health Care. *The Dartmouth Atlas of Health Care was first published in 1996 by Wennberg and a team of researchers at Dartmouth Medical School. The atlas analyzes Medicare claims data for hospital and outpatient care to provide information about the distribution and use of health care resources in 306 hospital referral regions¹ and 3,436 hospital service areas² nationwide.*

By offering comprehensive data for continuous comparative information on spending, resource inputs, utilization and outcomes, the atlas gives those who use, provide, pay for and make policy about America's health care system the opportunity to compare the effectiveness and efficiency of states, regions, individual hospitals and associated physicians in treating chronically ill patients.

¹ Hospital referral regions are regional market areas for tertiary medical care, with at least one hospital that performs major cardiovascular procedures and neurosurgery.

² Hospital service areas are local health care markets for hospital care. Each hospital service area is a collection of zip codes whose residents receive most hospitalizations from area hospitals.

As of 2000, the atlas became a free, Web-based publication with interactive capability that allows visitors to view specific regions and conduct comparisons and analyses. The atlas and [related analytical reports](#) are available on the atlas website. The project is now based at the Dartmouth Institute for Health Policy and Clinical Practice.

Research Based on the Dartmouth Atlas Data. The Dartmouth Atlas Project investigators also use atlas data to study specific regions or disease conditions, and to conduct subset analyses that are more finely tuned, provide greater detail on a narrower topic or allow for better risk-adjustment calculations. Investigators report findings in peer-reviewed [journal articles](#), most of which are also posted on the atlas [website](#).

Atlas data are also available to independent researchers to conduct their own studies, offering them a chance to draw conclusions that differ from those of the Dartmouth investigators.

"I like that," says Dartmouth Institute economist Jonathan S. Skinner, Ph.D. "That means the atlas data really are the building blocks where you can build something completely different and engage in a meaningful debate. It is a resource for anyone to tap into—both health researchers and also consumers."

Role of the Robert Wood Johnson Foundation

The Robert Wood Johnson Foundation (RWJF) has supported the Dartmouth Atlas Project since 1994 with funding for the purchase of the Medicare database, analyses by project investigators, the production of research reports, the redesign of the atlas website and the engagement of a communications firm.

WHAT ARE VARIATIONS IN CARE AND WHY DO THEY MATTER?

Studies comparing similar patients have found that those in higher-spending regions are more likely to be admitted to the hospital, spend more time in the hospital, receive more discretionary tests, see more medical specialists and have many more physicians involved in their care. Yet analyses by Dartmouth Atlas researchers of the extra care show that it does not produce better outcomes overall or better quality, whether one looks at measures of technical quality (such as providing appropriate medication to heart attack patients) or survival following such serious conditions as a heart attack or hip fracture. Higher spending also does not result in improved patient perceptions of the accessibility or quality of medical care.

Dartmouth Atlas investigators have identified three categories of health care that may show unjustified geographic variations, that is, either too little or too much is provided in relation to what is appropriate:

- *Evidence-based care.* Care decisions are clear for most people since the benefits have been established and outweigh the potential risk. An example is the administration of life-saving drugs following a heart attack or childhood immunizations.
- *Preference-sensitive care.* This is care for conditions for which there are two or more options, each with its own benefits and tradeoffs. The choice between mastectomy or lumpectomy for early stage breast cancer is one example. Much of the variation reflects physician preferences for a particular style of care. Care will be improved when patients are well informed about treatment choices and included in decision-making.
- *Supply-sensitive care.* This care is related to the level of resources in an area. According to Goodman, "supply-sensitive care is the cause of the majority of the variation in Medicare spending. The supply of resources has very little impact on outcomes, but a large impact on costs, as it influences how many days you spend in a hospital for a particular condition or how many physician visits you have in the course of a year."

"We are interested in the causes, consequences and remedies of variation," says Goodman. "How you engineer solutions is different, depending upon the type of variation and the characteristics of the patients." For example:

- Variations in rates of childhood immunization, which is an example of evidence-based care, may highlight a systemic issue—a community with low rates may benefit from a public health campaign or stronger advocacy.
- In contrast, variations in end-of-life care may reflect physician preferences as well as patient preferences. Some elderly patients may want care at home through hospice while others may want aggressive treatment to the very end. "In preference sensitive care we want to inform about tradeoffs and listen more than advocate," says Goodman. "Part of this is to legitimize the preferences of patients in health care decision-making."

WHAT ARE THE PROJECT'S MOST IMPORTANT ACCOMPLISHMENTS?

In 2010, key atlas studies of variation in health care delivery and spending included:

- [Quality of End-of-Life Cancer Care for Medicare Beneficiaries](#). The researchers found that care varied markedly across the nation's hospitals and that there was no consistent pattern of care or evidence that treatment patterns follow patient preferences, even among the nation's leading academic medical centers. The report was covered by the CBS Evening News, the *Washington Post*, Reuters and the *Los Angeles Times*.

"The end-of-life cancer report," says Elliott S. Fisher, M.D., M.P.H., Dartmouth Atlas co-principal investigator, "really brought to the public's attention, in a very

compelling way, the variations in care at the end of life for patients with advanced cancer. It showed the importance of engaging patients and their families in having conversations with their providers and of developing systems that allow us to improve the care of patients with advanced cancer."

- **Regional and Racial Variation in Primary Care and the Quality of Care Among Medicare Beneficiaries.** The report, which studied the fee-for-service Medicare population from 2003 to 2007, shows that improving access to primary care alone does not always keep people with chronic conditions out of the hospital, improve their chances of getting the optimal care recommended for their condition or improve health outcomes. Researchers also found that patients' access to and use of primary care, the quality of overall care and their likelihood of hospitalization varied markedly in different locations.

The findings suggest that, despite the central role that primary care can play, access is not always enough to ensure that patients receive high-quality care. Achieving the benefits of primary care, according to Goodman, is likely to require both improving the services provided by primary care clinicians and more effective integration and coordination with other providers.

Project researchers are also "trying to figure out better ways of risk adjusting for illness" [i.e., determining a population's level of risk for illness], says the Dartmouth Atlas founder, Wennberg, "There were a lot of complaints that we weren't adequately risk adjusting. [But] we're coming up with some fairly astounding results. It turns out that when you risk adjust according to the ways that people thought you should, you basically way overcorrect for illness in regions with lots of doctors and lots of diagnoses, which is not related at all to illness. It's related to the intensity of observation."

This result is shown in the first in a series of articles stemming from this work, published in the *New England Journal of Medicine* in July 2010.³ Researchers found that, for patients with similar baseline levels of risk:

- A move to a region with a higher intensity of health care diagnostic practice (i.e., more diagnostic testing and imaging) was associated with a greater increase in diagnoses and higher illness risk scores than for a move to a lower-intensity region.
- Survival rates for beneficiaries moving to the high- and the low-intensity regions were similar.

Goodman notes other recent atlas reports that are "important in their own right and highly valued by policy-makers, hospitals and providers," such as:

³ Song Y, Skinner J, Bynum J et al. "Regional Variations in Diagnostic Practices." *New England Journal of Medicine*, 363(1): 45–53, 2010. Available [online](#).

- Studies of specific domains of care where "we need to improve the decision-making, such as orthopedic services," according to Goodman. (See, for example, the surgical variation study *Trends and Regional Variation in Hip, Knee, and Shoulder Replacement* from April 6, 2010.)
- Studies of the physician workforce and the primary care workforce. (See, for example, the topic brief *Hospital and Physician Capacity Update* from March 30, 2009.)

"My favorite finding of 30 years of research," says Fisher, "was the finding that in the high-spending regions, which had 35 percent more hospital beds per capita and 65 percent more specialists per capita, there was a greater perception of scarcity. Physicians said it was harder to get their patients into the hospital and harder to get their patients in to see a high-quality specialist." This work was published in 2006 in the *Annals of Internal Medicine*.⁴

According to Fisher, this underscores that "demand for health care is not a function of the population, it's a function of the providers. The policy prescription that the perception of a shortage means you need more of an asset, is wrong. It's not how many doctors you have. It's how you organize and deliver care that's important."

WHAT ROLE HAS THE DARTMOUTH ATLAS PLAYED IN THE HEALTH CARE REFORM DEBATE?

During the health care debate, policy-makers drew upon atlas data, and the research based on it, to make the case that it is possible to improve quality and efficiency at the same time. With cost concerns running deep, the idea of cutting the considerable waste in the system, which atlas researchers estimate to be up to 30 percent of current spending, was highly attractive.

"There are many parts of the health care reform legislation that respond to the concerns about variation in the volume and effectiveness of services patients are receiving," says Goodman. "What lies beneath the Dartmouth Atlas contribution to health care reform is many years of research published in peer-reviewed journal articles and numerous atlas reports."

Building Quality and Efficiency

The data "really did persuade a pretty broad audience of policy-makers and health care leaders that it was possible to provide better care at lower cost," says Fisher. "Not that it will be easy to get there, but it is possible."

⁴ Sirovich B, Gottlieb DJ, Welch G and Fisher ES. "Regional Variations in Health Care Intensity and Physician Perceptions of Quality of Care." *Annals of Internal Medicine*, 144(9): 641–649, 2006.

RWJF-funded studies that looked at variations in spending and their relationship to outcomes "provided the most empiric evidence that we're wasting lots of money in U.S. health care." Skinner calls these papers, published in 2003 in the *Annals of Internal Medicine*,^{5,6} "the classics" that "had the biggest effect on federal health policy." Other studies that proved important in the health reform debate included those that considered a possible connection between variations and patient preference or prices paid.

"The information the Dartmouth researchers provided was really critical," says RWJF Senior Program Officer Claire Gibbons, M.P.H., Ph.D. "It really helped the supporters of health reform make a case that it needs to happen."

Policy Impact

At the same time, the demonstrated variations in spending led to policy proposals to cut payments to high-spending regions and use those savings to increase payments to low-spending regions. Providers in high-spending regions were, not surprisingly, concerned.

Rather than simply transferring payments from high-spending regions to low-spending ones, the more thoughtful response, says Fisher, is to ask "How do we help health care systems improve their care in ways that allow them to achieve savings, while improving quality—which is really delivery-system redesign. The ideas behind accountable care organizations⁷ came out of that work: cutting a path that leads to high-spending regions reducing their growth in spending."

Moving forward, Fisher is "hopeful that the atlas can play an even more important role. Now that we have everybody interested in trying to improve value, providers all over the country and policy-makers in different states will be more and more interested in how we are doing and how much it costs per capita. The kinds of findings the Dartmouth Atlas has produced should be just as relevant, if not more so, as we move from fee-for-service payment to more value-based payment."

Skinner agrees. "If you want to reward quality and reduce costs, you have to be able to measure quality and measure costs. That's where we need to be and where I hope we'll be in contributing to the debate on health care."

⁵ Fisher ES, Wennberg DE, Stukel TA et al. "The Implications of Regional Variations in Medicare Spending. Part 1: The Content, Quality, and Accessibility of Care." *Annals of Internal Medicine*, 138(4): 273–287, 2003.

⁶ Fisher ES, Wennberg DE, Stukel TA et al. "The Implications of Regional Variations in Medicare Spending. Part 2: Health Outcomes and Satisfaction with Care." *Annals of Internal Medicine*, 138(4): 288–298, 2003.

⁷ An accountable care organization is a provider-led organization that manages the full continuum of patient care and is accountable for the overall costs and quality of care for a defined population.

WHAT IS CONTROVERSIAL ABOUT THIS WORK?

The Dartmouth Atlas Project findings related to variations in care have periodically generated controversy in some quarters, especially in regions with high-volume care.

According to Goodman, "the study of variation, dating back to the early '70s, has always provoked discussion and always gained a fair amount of media attention. Many of the findings have been questioned and there are always a few places that are really angry. Our work is now on a national scale, but the questions are the same: Are the populations similar? Are you making fair comparisons? Are differences in spending caused by price or volume? Are patients benefitting from more care? The work has stimulated an ongoing discourse. And that discussion continues to shape the research methods and questions."

"Just showing the variation has been provocative," notes Kristen K. Bronner, M.A., Dartmouth Atlas managing editor, "without getting into the reasons or solutions." Wennberg agrees. "Understanding practice variation scares people," he says, "because they assume that health care is science-driven, and they have to confront the fact that it's not—or to a large extent it's not."

With the attention to health reform, interest in and scrutiny of the atlas intensified and became more public.

In a June 2009 *New Yorker* article, "[The Cost Conundrum](#),"⁸ author Atul Gawande, M.D., used Dartmouth Atlas data to compare McAllen, Texas, the second most expensive health care market in the United States, with El Paso County, Texas, which has a demographically similar population. McAllen's Medicare expenditures per enrollee are twice those of El Paso County, yet health outcomes are poorer. Gawande also looked at models that provide high-quality care at lower cost, including the Mayo Clinic in Rochester, Minn., and the health care system in Grand Junction, Colo.

Gawande's article became required reading at the White House as the Obama administration tackled health care reform. White House officials also began citing Dartmouth Atlas findings as it pushed for a system overhaul. Although the atlas investigators seek to be "provocative, but not political...this turned the political ire of the bill's opponents" onto the atlas, says Bronner.

Further attention came when the *New York Times* ran a front-page article on June 3, 2010, challenging the utility of some of the atlas data ([online](#)). Researchers responded with two rebuttals (see [first](#) and [second](#) responses, posted on the atlas website) and the Times offered a follow-up [posting](#) on its website).

⁸ Gawande A. "The Cost Conundrum." *New Yorker*, June 1, 2009.

"It's very interesting that as long as the data didn't matter, most people just didn't bother with it," observes Wennberg. "But when the Obama administration started paying attention to the big differences in spending and utilization, naturally the places that were quite high on the expenditure scale became quite interested in attacking the data.

"You might not like the idea of controversy, but you won't get anywhere with health reform if you don't have controversy," says Wennberg.

WHAT ROLE HAS THE MEDIA PLAYED?

Public reporting has been integral to the mission of the Dartmouth Atlas since its inception, says Goodman, "and, if done honestly, has an important role in motivating change. But it does make some providers uncomfortable."

Reporting data and analysis, and responding to media inquiries, is also time-consuming. During the health care reform debate, "we got requests from the Congressional Budget Office, Senate staffers and White House staffers. That was a once-in-a-generation opportunity and also a stress on our project team," says Goodman. Although the attention made it difficult for the small Dartmouth team to get other work done, says Fisher "there was a window of opportunity to influence policy."

RWJF Funds Professional Communications Support

The communications firm [Manning Salvage & Lee](#) (MS&L) has handled all atlas and report releases since 2007 (see that [section](#) of the website). This has been important "with the media attention around health reform," says Bonner.

According to Bronner, MS&L:

- Issues press releases and data alerts.
- Maintains a media e-mail list.
- Distributes embargoed versions of significant new reports to the media so reporters and major newspapers are ready with a story in advance of a major release.
- Triages interview requests for investigators.
- Facilitates contacts with congressional staffers.
- Serves as the primary phone number for press contacts on the website. A trained MS&L staff person can find data on the website and answer press questions on data-related issues. Bronner responds only to very detailed methodology questions.

WHAT IS NEXT FOR THE DARTMOUTH ATLAS PROJECT?

Dartmouth Atlas Project staff will continue to produce the atlas and conduct and publish research. Project activities include:

- **Updating the existing database.** "It is important to keep in mind that the basic idea behind the atlas was a continuing report card on practice variations," says Wennberg. "There is a core set of measures that we need to continually come back to and to monitor trend lines for. Over the next year, one thing the atlas should focus on is its mission for sustained feedback."
- **Examining the under-65 population.** "Being limited to the Medicare data has been a challenge," notes Fisher. "There is a growing recognition that utilization patterns for the under-age 65 population are similar because hospitals and single-specialty physician groups have the capacity to drive up prices as a result of their market power."

"If we want to create stewardship of health care resources as a value that health care organizations must pursue, given the growing unaffordability of health care for ourselves and our children, then having the under-65 data will be increasingly important. Over the next few years we hope to start doing that kind of work."

Doing this will also enable researchers to address types of care not represented in the Medicare population, such as perinatal, pediatric and maternal care, care of young cancer patients, and surgical procedures in younger populations.

- Providing new data or different takes on current data, such as:
 - Measuring care longitudinally over patient populations.
 - Looking at patients' care over time across institutions.
 - Offering more data at the provider level. "We hope to produce additional data describing the performance of the natural hospital-physician networks that exist and make that available to help guide health care reform," says Fisher.
- **Developing measures for the evaluation of the RWJF *Aligning Forces for Quality* national program.** *Aligning Forces for Quality* is RWJF's signature effort to lift the overall quality of health care in targeted communities, reduce racial and ethnic disparities, and provide models for national reform.

Strategic Planning

With success come new challenges. Dartmouth Atlas project staff would like to both update existing data and broaden into new areas of research.

To point the way forward, the research team is engaged in an RWJF-funded six-month strategic planning process, with help from [The Bridgespan Group](#), a strategic and organizational nonprofit consulting firm. The plan should:

- Clarify leadership and structure.
- Identify the most important questions to address over the next several years as health care changes—"how to leverage the assets we have to make a difference in health care," says Fisher.
- Plan for the long-term financial future of the atlas. RWJF is the largest funder of the Dartmouth Atlas Project; other funders include the WellPoint Foundation, the United Health Foundation and the California HealthCare Foundation. The plan will broaden the funding base for the atlas.

"The fundamental expectation that we all have," says Wennberg, "is that the mission of the Atlas as a source of feedback on the performance of the U.S. health care system will remain.

"These are tremendously important societal issues, particularly at a time when the economy continues to be weak and health care continues to grow. Eventually our discussion about limits and about value are going to have to be widely debated. The atlas is a forerunner in bringing these issues to the country's attention."

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APPENDIX

Project Leadership

Leadership of the Dartmouth Atlas Working Group, Dartmouth Institute for Health Policy and Clinical Practice, includes:

- Elliott S. Fisher, M.D., M.P.H., Director, Center for Health Policy Research, Dartmouth Institute for Health Care Policy and Clinical Practice; Dartmouth Atlas Co-Principal Investigator, Dartmouth Atlas of Health Care
- David C. Goodman, M.D., M.S., Director, Center for Health Policy Research, Dartmouth Institute for Health Policy and Clinical Practice; Co-Principal Investigator, Dartmouth Atlas of Health Care
- John E. Wennberg, M.D., M.P.H., Peggy Y. Thomson Professor (Chair) in the Evaluative Clinical Sciences; Founder and Director Emeritus, Dartmouth Institute for Health Policy and Clinical Practice; Founder, Dartmouth Atlas of Health Care
- Kristen K. Bronner, M.A., Research Associate, Dartmouth Institute for Health Policy and Clinical Practice; Managing Editor, Dartmouth Atlas of Health Care
- Jonathan S. Skinner, Ph.D., John Sloan Dickey Third Century Chair of Economics, Dartmouth College; Professor of Community and Family Medicine, Dartmouth Institute for Health Policy and Clinical Practice; a key atlas author and faculty member