

Disparities in Health and Health Care among Medicare Beneficiaries

A Brief Report of the Dartmouth Atlas Project

Authors Elliott S. Fisher, David C. Goodman, Amitabh Chandra *Editor* Kristen K. Bronner

The Robert Wood Johnson Foundation's Aligning Forces for Quality program commissioned this special report by the Dartmouth Atlas Project to highlight the uneven quality of health care being delivered across America and the need to improve the quality of care and reduce disparities in health in every community. Aligning Forces for Quality is working to lift the overall quality of health care in targeted communities across America, and provide models for national reform.

Improving health and health care in communities

There is widespread agreement that the U.S. health care system faces unprecedented challenges. Overall life expectancy has improved, but racial and socioeconomic disparities in mortality and health status have recently been widening. Many Americans fail to receive treatments of proven benefit – a burden that falls most heavily on racial minorities and low-income populations. The safety and reliability of care in hospitals, surgical centers, nursing homes and physician offices is far from assured. Most patients receive care from multiple different physicians who only rarely coordinate their care or ensure that their recommendations are clear, consistent and understood by patients and their families. Health care costs – already the highest in the world – are growing at a rate that poses a serious threat to patients, employers and the nation. And almost 50 million Americans lack health insurance.

In U.S. health care, it's not only who you are that matters; it's also where you live. As numerous studies and previous Dartmouth Atlas reports have documented, income and race are important determinants of both the health care patients receive and of patients' health care outcomes. These disparities are particularly striking when examined across U.S. states and regions. This Dartmouth Atlas Project Brief Report offers a window into both underlying causes and opportunities for reform by focusing on important measures that can be reliably determined from Medicare data. The major findings are as follows.

■ The rate of leg amputation – a devastating complication of diabetes and peripheral vascular disease – is four times greater in blacks than in whites. Rates of amputation also differ by a factor of three among U.S. states and nearly tenfold among regions. Because poverty is an important risk factor for amputations, addressing these remarkable disparities in health outcomes will require attention to the full spectrum of health determinants, ranging from lower levels of schooling, limited health literacy, inadequate housing and lack of transportation, to inadequate access to high quality, well-coordinated primary and specialty care.

■ For evidence-based services, such as screening mammography and appropriate testing for diabetes, disparities across states and regions are substantially greater than the differences by race. In other words, geographic variation in the use of evidence-based services is often larger than the size of racial disparities in care. Furthermore, there are some regions where blacks receive equal or better care than whites but where care for all patients is less than ideal. The data highlight opportunities to improve the quality of ambulatory care for both blacks and whites.

■ Regions differ dramatically in their use of the hospital as a site of care. Although blacks in most regions are somewhat more likely than whites to be hospitalized for conditions that could also be treated outside the hospital, the differences are much greater across regions. These findings (and other recent Dartmouth Atlas reports) underscore the importance of the local delivery system, and its relative emphasis on acute, inpatient care as opposed to ambulatory care, as a determinant of where patients receive care for exacerbations of chronic illness.

The findings highlight the importance of understanding health and health care within a local context – and of efforts to explore and address the underlying causes of disparities within and across regions.

A Note on Methods

The methods used in this report were developed over a number of years and have been described in detail in peer-reviewed publications and in previous editions of the Dartmouth Atlas. The data are drawn from the enrollment and claims data of the Medicare program and are restricted to the fee-for-service population over age 65; HMO patients are not included in our analysis. A brief overview of the approach and measures is provided here. (For more detailed descriptions of the approach see either the Appendix on Methods, downloadable at www.dartmouthatlas.org/af4q.shtm, or Baicker 2004.) The analysis entails four basic steps.

Defining geographic areas to compare. The first step requires defining the relevant geographic areas under study. In this report we present data for three different geographic units: (1) States and the District of Columbia; (2) Hospital Referral Regions (n = 306), which are natural markets for health care defined on the basis of travel for coronary bypass surgery and neurosurgery; and (3) Aligning Forces for Quality (AF4Q) sites, fourteen geographic regions which were selected by the Robert Wood Johnson Foundation for participation in the Aligning Forces for Quality program.

Defining the population under study. Each of the analyses presented in this report focuses on either the entire fee-for-service Medicare population who were eligible for both Part A and B and were between the ages of 65 and 99 or a subset of that population at risk for a specific procedure or service. For example, the analysis of amputations examines the entire Medicare population, while the analysis of testing for diabetes is restricted to Medicare beneficiaries between the ages of 65 and 74 with a diagnosis of diabetes. The study population can be thought of as the denominator of the measure.

Defining the event. The analysis relies upon claims submitted by providers (in this case hospitals, physicians and outpatient facilities) for specific services delivered to the population eligible for the specific measure. For example, the analysis of amputations entailed identifying all hospital discharges of fee-for-service Medicare beneficiaries where an amputation of the leg was recorded. The event can be thought of as the numerator of the measure.

Calculating rates. Each of the measures is either a proportion (e.g. the proportion of women receiving mammography within a two-year period) or a rate (e.g. the count of amputations experienced by Medicare beneficiaries). In the latter case, beneficiaries can have more than one event. When appropriate, statistical adjustments are carried out to account for differences in age, race and sex.

Specific measures. This specific report presents a subset of measures that are being made available online at the Dartmouth Atlas web site. The specific definitions of all of the measures are provided in the Appendix Table.

A note on how race was defined. Although the analysis of treatment and outcomes across all racial and ethnic groups is an important goal, the designation of race/ethnicity in the Medicare data is currently limited. We focus on the comparison of blacks and non-blacks for several practical reasons. Separate analyses of the Hispanic population are challenging because fewer than half of self-designated Hispanics are coded as such in the Medicare data, Hispanics constitute less than 6% of the elderly population, and they are highly clustered in a few communities. Although racial designation for Asians and American Indians is more accurate, their small numbers (less than 3%) also limit the precision of race-specific analyses. At the same time, excluding any of these populations from the regional comparisons in this report was judged to be undesirable. We therefore restricted the analyses in the current report to blacks and non-blacks, and, for ease of exposition, we refer to the non-black population as white. These challenges, and the future growth of the Hispanic population, underscore the importance of improving the coding of race and ethnicity.

Leg Amputations

Amputation of a leg is an infrequent but devastating complication of peripheral vascular disease and diabetes. Inadequate blood supply and nerve damage predispose patients to injury and to infection, which can fail to heal and which can sometimes only be treated by amputation. A broad array of environmental, social and behavioral factors place patients at risk for developing the underlying diseases and for losing a limb. These include smoking, obesity, a sedentary lifestyle, poor blood pressure control, and lack of access to high quality primary and specialty medical care. Rigorous attention to proper foot care is essential for those at risk, including daily self-examination, the use of specially-fitted shoes, and timely attention to what would otherwise be trivial injuries such as calluses, blisters or splinters. Poverty and race represent major risk factors for amputation. Among Medicare beneficiaries who have an amputation, more than 25% have a second amputation within a year and over 30% die within the same period (Dillingham 2005).

Rates of leg amputation vary dramatically depending upon who you are and where you live. During the period 2003-05, in the fee-for-service Medicare population, blacks were on average more than four times more likely to undergo amputation than whites, but amputation rates varied substantially for both blacks and whites across states and were correlated at both the state and regional level ($r = 0.55$ for the 50 regions with the most black Medicare enrollees). The amputation rate for blacks was about 6 per 1,000 in Louisiana, Mississippi and South Carolina but was less than 2 per 1,000 in Colorado and Nevada. Although the rates for whites were much lower, the disparities across states were similar: the amputation rates for whites in Mississippi and Louisiana were around 1.3 per 1,000 but were about half that in Colorado and Nevada.

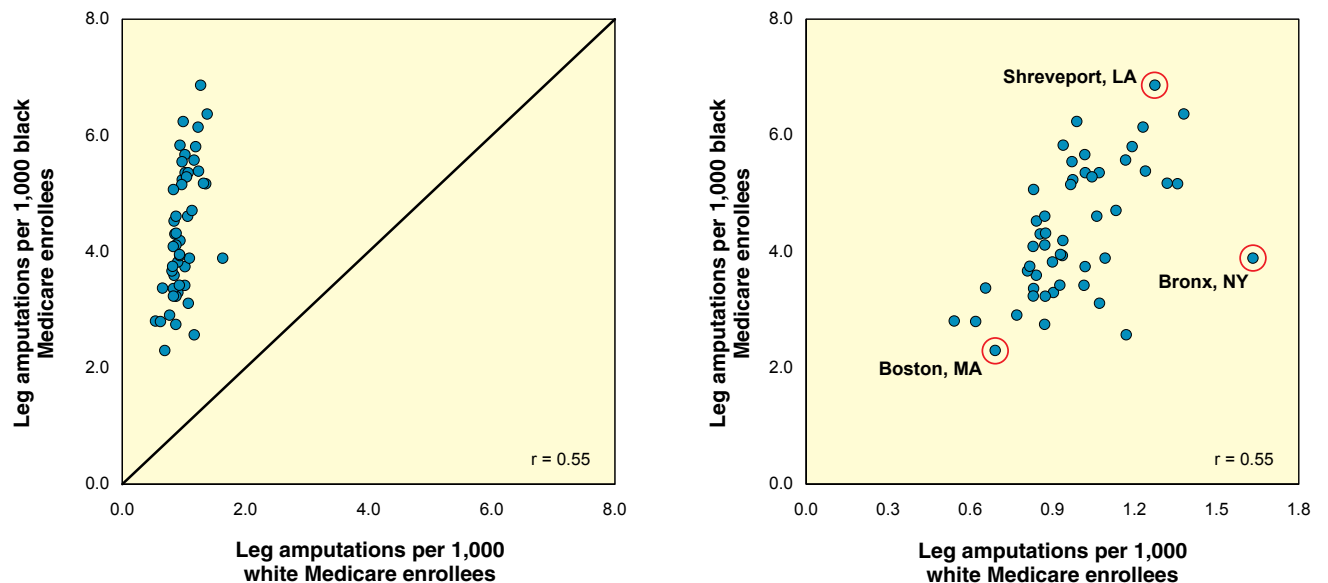
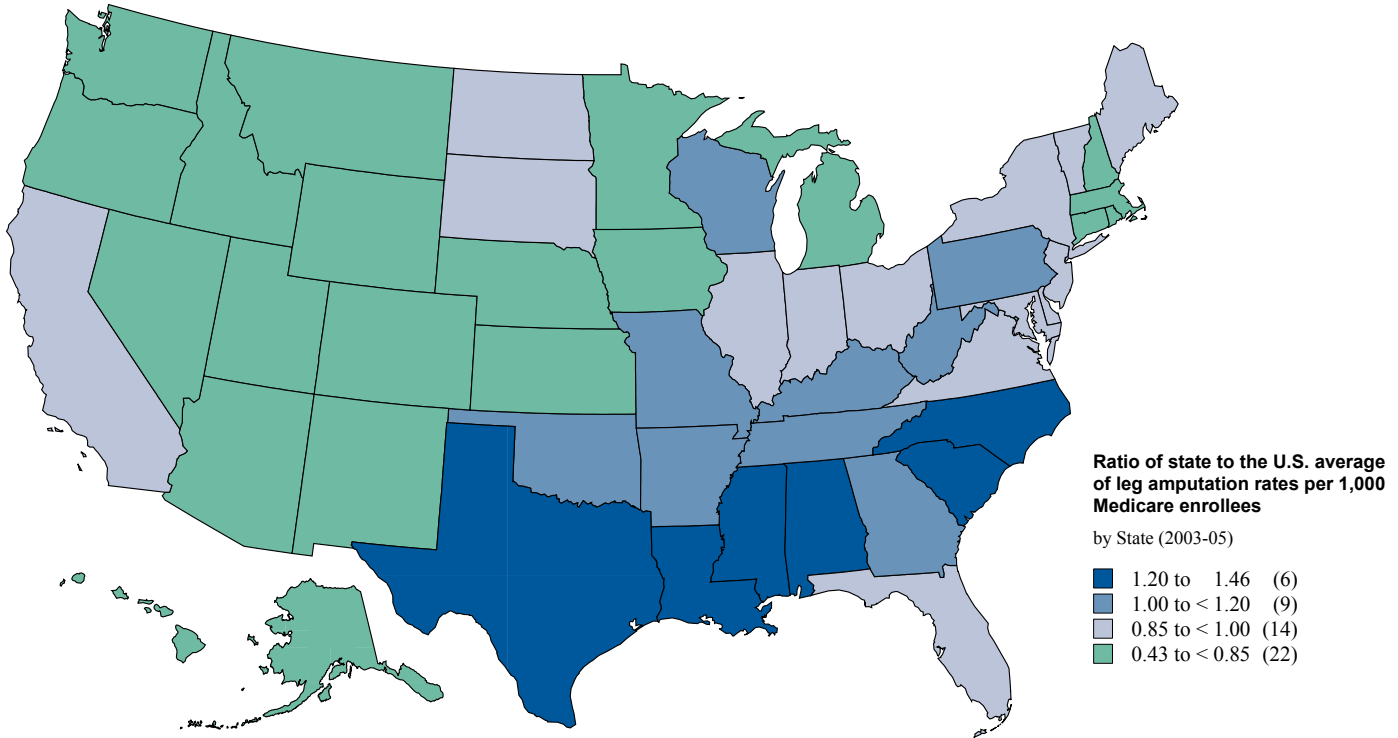


Figure 1. Relationship between rates of leg amputation among black and white Medicare enrollees in hospital referral regions with 50 largest populations of black enrollees (2003-05).

The figure on the left shows leg amputation rates for black and white Medicare enrollees with a 45-degree line. Dots along this line would represent areas where white and black rates were equal; dots above the line represent areas where the rate among blacks was higher than the rate among whites. Black rates for leg amputation exceeded white rates in all areas. The figure on the right shows the same data, with the scale modified to reflect the range of variation among whites and show the strong correlation between black and white amputation rates. Rates for all regions with sufficient sample sizes to report are available from our web site.



Ratio of state to the U.S. average of leg amputation rates per 1,000 Medicare enrollees

by State (2003-05)

- 1.20 to 1.46 (6)
- 1.00 to < 1.20 (9)
- 0.85 to < 1.00 (14)
- 0.43 to < 0.85 (22)

Map 1. Leg amputation, by state (2003-05)

Ratio of overall state rate to the U.S. average															
0.43 to < 0.85				0.85 to < 1.00				1.00 to < 1.20				1.20 to 1.46			
Rates per 1,000 Medicare enrollees															
	Overall	Black	White		Overall	Black	White		Overall	Black	White		Overall	Black	White
CT	0.96	2.88	0.78	IN	1.13	3.49	0.91	GA	1.37	5.21	1.00	LA	1.66	6.14	1.26
NH	0.96	n/a	n/a	VA	1.12	4.11	0.86	WV	1.36	3.88	1.08	MS	1.60	5.61	1.31
NM	0.96	n/a	n/a	NY	1.08	3.47	0.88	TN	1.36	4.57	1.09	SC	1.56	6.04	1.12
RI	0.94	n/a	n/a	OH	1.08	3.31	0.89	AR	1.35	5.38	1.00	TX	1.50	4.20	1.27
MA	0.93	2.30	0.76	SD	1.06	n/a	n/a	PA	1.29	3.35	1.07	AL	1.49	5.37	1.16
HI	0.92	n/a	n/a	NJ	1.06	3.73	0.83	KY	1.27	3.75	1.03	NC	1.40	5.31	1.04
WA	0.92	2.54	0.72	IL	1.05	3.32	0.86	WI	1.20	4.09	0.93				
WY	0.91	n/a	n/a	DE	1.05	3.80	0.81	OK	1.20	3.64	0.96				
MI	0.91	2.99	0.74	ND	1.03	n/a	n/a	MO	1.14	4.19	0.88				
AK	0.90	n/a	n/a	VT	1.02	n/a	n/a								
DC	0.90	3.39	0.47	MD	1.00	3.55	0.79								
KS	0.89	2.42	0.72	CA	0.99	3.30	0.78								
MN	0.88	2.19	0.69	ME	0.98	n/a	n/a								
IA	0.86	3.03	0.67	FL	0.98	4.10	0.73								
AZ	0.85	2.63	0.67												
NE	0.85	2.24	0.67												
OR	0.85	n/a	n/a												
MT	0.82	n/a	n/a												
ID	0.71	n/a	n/a												
NV	0.71	1.50	0.60												
CO	0.67	1.76	0.53												
UT	0.50	n/a	n/a												

NOTE: The map shows the ratio of each state to the national average for leg amputation rates. The column headers (in colors which correspond to the map legend) reflect the ratios displayed in the map, while the numbers in the table itself give the actual rates for each state per 1,000 Medicare enrollees overall, and for black and white Medicare enrollees.

Screening for Breast Cancer

The United States Preventive Services Task Force recommends mammographic screening every one or two years for women age 40 and older. Evidence of benefit is strongest for women age 50 to 69, the age group that was generally included in the clinical trials. The evidence for women age 40 to 49 is weaker and the absolute benefit is smaller than in women age 50 to 69, making it harder to determine whether there is a substantial benefit from screening before age 50. The Task Force concluded that the evidence is generalizable to women over 70 if their life expectancy is not compromised by other medical conditions.

The table and map present data on the average proportion of women age 65 to 69 who underwent screening during the two-year period 2004-05. Data are presented for the population overall and for white and black women. Overall, the proportion of women who had mammograms during the two-year period in the United States was 64%, and varied by a factor of about 1.3 across U.S. states, from less than 57% to 74%.

Blacks were less likely to receive mammographic screening than whites, but there were differences across states in the magnitude of this gap. The greatest gaps in screening rates were in Illinois (white rate = 63%; black rate = 51%) and California (white rate = 60%; black rate = 48%). The smallest gaps were in Delaware and Massachusetts. The correlation between black and white screening rates, however, was strong. Figure 2 shows the relationship between black and white screening rates for the 50 U.S. regions with the greatest numbers of black women in Medicare. The difference across regions (ranging from 42% for blacks in Los Angeles to 74% in Boston) was greater than the differences in screening rates within every region.

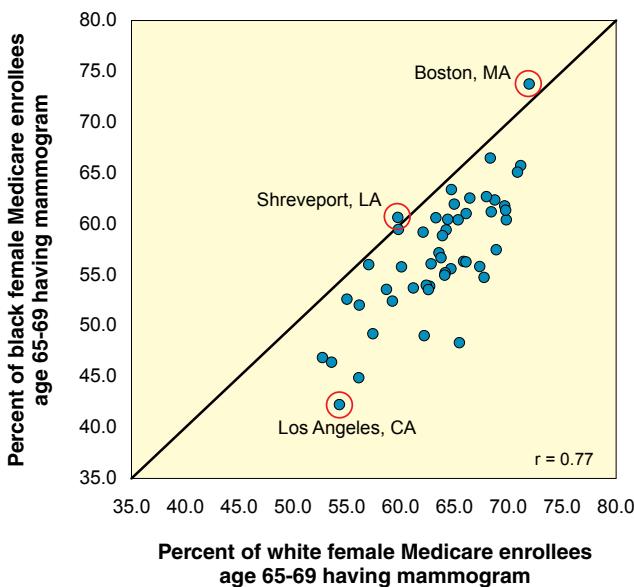
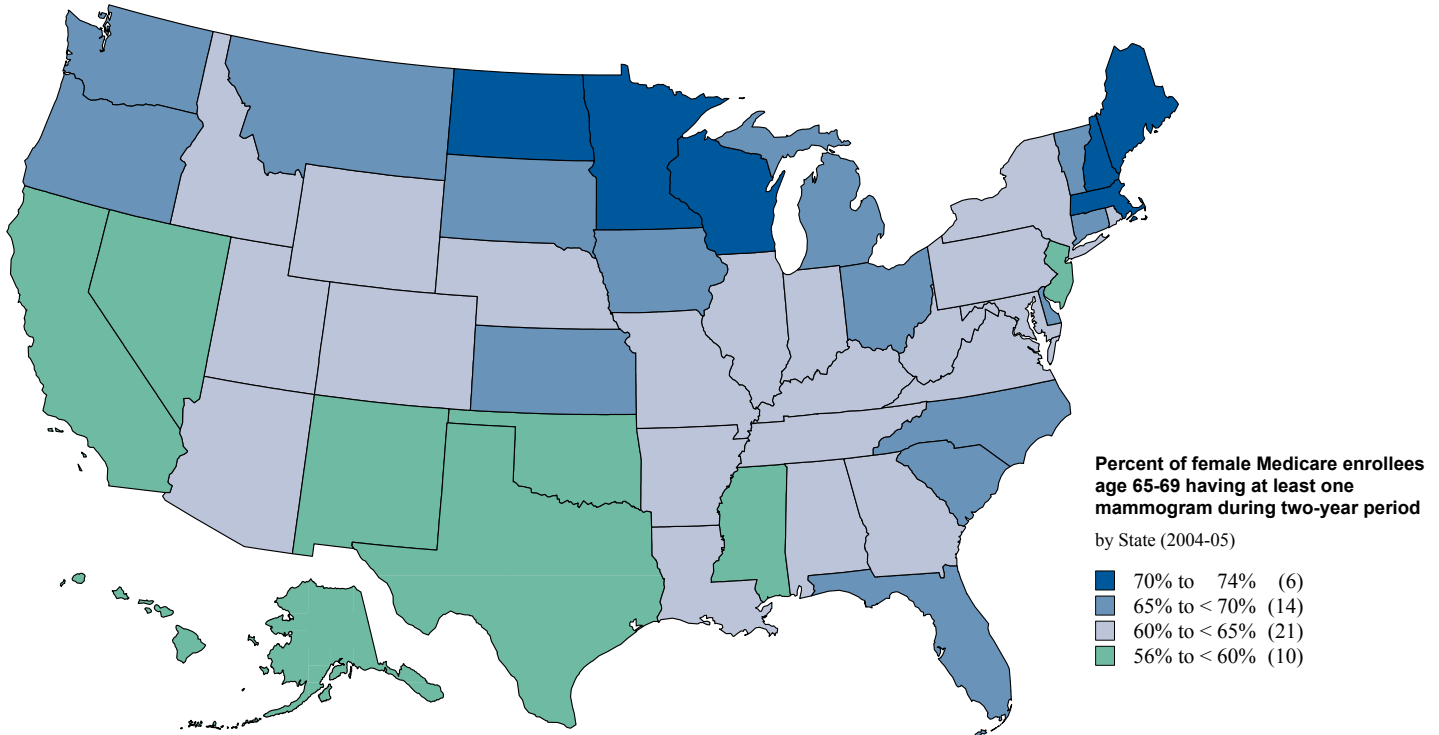


Figure 2. Relationship between mammographic screening for breast cancer among black and white female Medicare enrollees age 65-69 in hospital referral regions with 50 largest populations of black women (2004-05)

The figure shows the proportion of women age 65-69 receiving mammograms for black and white Medicare enrollees. Dots along the 45-degree line represent areas where white and black rates were equal; dots below the line represent areas where the rate among blacks was lower than the rate among whites. Black rates for mammography exceeded white rates in two areas: Shreveport, Louisiana and Boston, Massachusetts. Rates for all regions with sufficient sample sizes to report are available from our web site.



Map 2. Mammography among female Medicare enrollees age 65-69, by state (2004-05)

Percent of female Medicare enrollees															
56% to < 60%				60% to < 65%				65% to < 70%				70% to 74%			
	Overall	Black	White		Overall	Black	White		Overall	Black	White		Overall	Black	White
CA	59.3	47.8	60.0	AZ	64.6	n/a	n/a	MT	70.0	n/a	n/a	ME	74.0	n/a	n/a
NJ	59.1	54.2	59.7	WV	64.4	n/a	n/a	MI	69.8	62.6	70.7	ND	73.5	n/a	n/a
DC	58.9	55.6	65.5	MD	64.1	60.4	65.1	VT	69.6	n/a	n/a	MA	71.9	71.5	71.9
NM	58.8	n/a	n/a	PA	64.0	53.7	64.6	DE	69.4	66.5	69.8	MN	70.7	n/a	n/a
TX	58.7	54.0	59.1	RI	63.7	n/a	n/a	CT	68.8	63.8	69.3	NH	70.6	n/a	n/a
AK	58.3	n/a	n/a	VA	63.6	59.2	64.5	FL	67.6	58.6	68.3	WI	70.2	61.3	70.5
NV	57.9	n/a	n/a	AL	63.5	58.8	64.4	IA	67.3	n/a	n/a				
HI	57.3	n/a	n/a	GA	63.3	57.3	64.9	NC	67.1	60.1	68.5				
OK	57.1	53.9	57.2	NE	63.3	n/a	n/a	OR	66.1	n/a	n/a				
MS	56.9	49.3	59.5	CO	62.7	n/a	n/a	KS	66.0	n/a	n/a				
				TN	62.7	57.8	63.2	WA	65.5	n/a	n/a				
				MO	62.0	59.0	62.3	OH	65.4	62.0	65.7				
				IN	61.9	56.3	62.3	SD	65.3	n/a	n/a				
				KY	61.9	65.2	61.7	SC	65.3	60.3	66.6				
				IL	61.6	51.0	63.0								
				ID	61.1	n/a	n/a								
				UT	61.1	n/a	n/a								
				WY	60.9	n/a	n/a								
				LA	60.9	56.7	62.1								
				NY	60.7	51.6	61.8								
				AR	60.0	52.1	60.8								

Management of Diabetes: Hemoglobin A1c Measurement

Diabetes is a chronic illness that affects almost 21 million Americans. Between 5 and 10% of patients have Type 1 diabetes, caused by the destruction of the insulin-producing cells in the pancreas. Type 2 diabetes is by far the most common type of diabetes, especially in the Medicare population, and is associated with older age, physical inactivity, and overweight. Patients with Type 2 diabetes still produce insulin, but cannot use the insulin effectively. In both types of diabetes, blood sugar levels rise and, without treatment, serious complications can occur. Diabetes is the sixth leading cause of death and is associated with complications including blindness, stroke, heart attack, kidney failure and nerve damage. Clinical trials have shown that proper management of diabetes, including blood sugar and blood pressure control and attention to risk factors for heart disease – such as smoking and elevated cholesterol levels – can reduce the risk of complications.

To help foster improvement in the care of patients with diabetes, the Ambulatory Quality Alliance, representing a broad coalition of professional organizations, health plans, purchasers and government agencies, has recommended an initial set of quality measures for patients with diabetes. These include three measures of whether a diabetic patient has received specific diagnostic tests: testing of their hemoglobin A1c, a retinal exam, and testing of their cholesterol levels. All three measures were implemented and analyzed: regions and states that did well on one measure also did well on the other measures. For this reason, we present only one measure in this report, the average proportion of diabetics receiving a hemoglobin A1c test during a given year (the others will be available online at www.dartmouthatlas.org). The average annual rate for the three-year period 2003-05 is given.

Blacks were less likely to receive annual hemoglobin A1c testing than whites, but the differences between blacks and whites varied across states. The greatest gaps in testing rates were in Colorado (white rate = 84%; black rate = 66%) and Illinois (white rate = 84%; black rate = 70%). The smallest gaps were in Massachusetts and Oklahoma. The correlation between black and white testing rates, however, was strong

at both the state and regional level. Figure 3 shows the relationship between black and white testing rates for the 50 U.S. regions with the greatest numbers of blacks. The difference across regions (ranging from 65% for blacks in Chicago to 88% in Boston) was greater than the differences in screening rates within every region.

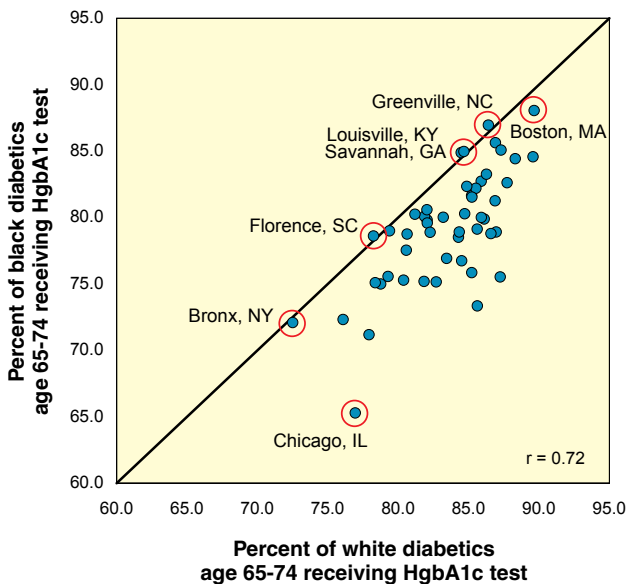
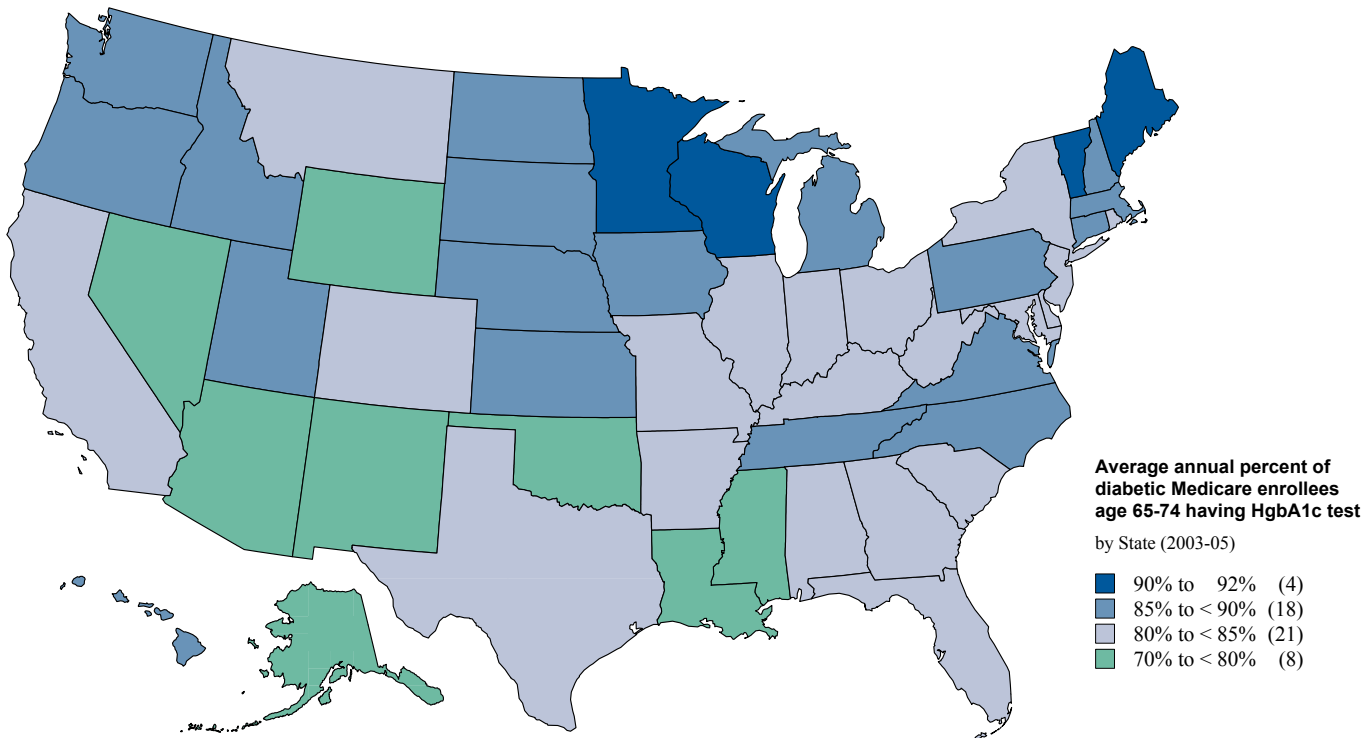


Figure 3. Relationship between rates of hemoglobin A1c testing among black and white diabetic Medicare enrollees in hospital referral regions with 50 largest populations of black diabetics (2003-05)

The figure shows the proportion of diabetics age 65-74 receiving hemoglobin A1c testing for black and white Medicare enrollees. Dots along the 45-degree line represent areas where white and black rates were equal; dots below the line represent areas where the rate among blacks was lower than the rate among whites. Black rates for hemoglobin A1c testing exceeded white rates in four areas: Greenville, North Carolina; Louisville, Kentucky; Savannah, Georgia; and Florence, South Carolina. Rates for all regions with sufficient sample sizes to report are available from our web site.



Map 3. Hemoglobin A1c testing among diabetic Medicare enrollees, by state (2003-05)

Percent of diabetic Medicare enrollees															
70% to < 80%				80% to < 85%				85% to < 90%				90% to 92%			
	Overall	Black	White		Overall	Black	White		Overall	Black	White		Overall	Black	White
LA	79.3	77.1	80.3	MD	84.8	80.7	86.6	IA	89.4	87.1	89.5	VT	91.5	n/a	n/a
NV	78.3	77.1	78.4	OH	84.7	80.1	85.3	NH	89.3	n/a	n/a	WI	90.9	85.4	91.2
WY	78.1	n/a	n/a	FL	84.4	81.5	84.9	WA	89.1	81.6	89.3	ME	90.8	n/a	n/a
MS	77.8	76.4	78.6	RI	84.4	n/a	n/a	MA	89.0	87.8	89.1	MN	90.2	83.2	90.3
OK	77.6	77.2	77.6	MO	84.3	78.1	85.1	ND	88.7	n/a	n/a				
AZ	77.4	80.9	77.3	DE	84.1	79.8	85.2	OR	87.7	n/a	n/a				
NM	73.6	n/a	n/a	WV	83.8	78.3	84.0	NC	87.4	86.1	87.9				
AK	70.9	n/a	n/a	NY	83.6	76.8	84.8	HI	87.3	n/a	n/a				
				GA	83.5	81.4	84.3	NE	87.2	82.7	87.3				
				KY	83.4	84.8	83.3	TN	86.8	81.4	87.8				
				IN	83.1	74.3	84.0	CT	86.5	83.0	87.0				
				CO	83.0	66.1	84.0	UT	86.5	n/a	n/a				
				TX	82.9	80.7	83.2	KS	86.5	76.4	87.2				
				MT	82.7	n/a	n/a	MI	86.1	80.6	87.1				
				AL	82.1	79.3	83.1	VA	85.8	81.9	87.3				
				SC	82.0	79.9	83.1	ID	85.6	n/a	n/a				
				IL	81.7	70.1	84.0	PA	85.5	79.1	86.0				
				DC	81.3	80.8	84.6	SD	85.4	n/a	n/a				
				AR	81.1	76.9	81.8								
				NJ	80.9	74.6	82.1								
				CA	80.0	74.3	80.5								

Primary Care Orientation: Predominant Provider a Primary Care Physician

The care of acute and chronic illness has become increasingly complex: any serious injury or illness requires care from multiple physicians in multiple settings. There is a broad consensus that one of the greatest failings of the U.S. health care delivery system is its inability to coordinate care safely and effectively across time and space. For patients, inadequate coordination and poorly executed care transitions can lead to duplication of tests, erroneous diagnoses, unnecessary prescriptions, inadvertent drug interactions and avoidable hospitalizations.

Primary care physicians play a key role in providing and coordinating high quality health care. For conditions such as diabetes and hypertension, primary care physicians have been shown to provide care that is similar to specialty care in quality and lower in cost. Adequate access to primary care can improve care coordination and reduce the frequency of avoidable hospitalizations.

The Dartmouth Atlas Project and other studies have found that regions with a greater proportion of care provided by primary care physicians have both lower costs and higher quality. In almost all U.S. states, 90% of Medicare beneficiaries were seen at least once in a two-year period by a primary care physician (tables available at www.dartmouthatlas.org). There was, however, substantial variation in the proportion of beneficiaries whose predominant ambulatory physician was a primary care doctor, ranging from over 85% in Nebraska, Maine and South Dakota to less than 70% in Connecticut and New Jersey. Although the differences between blacks and whites were smaller than the variation across regions (Figure 4), blacks were slightly more likely to have a primary care physician as their predominant provider than were whites.

In states and regions where patients tended to have a specialist provider – such as New Jersey and Connecticut – patients were much more likely to have multiple different physicians. Across all U.S. hospital referral regions, the correlation between having a predominant provider who was a primary care physician and seeing 10 or more different physicians in a year was strong and negative ($r = -0.52$).

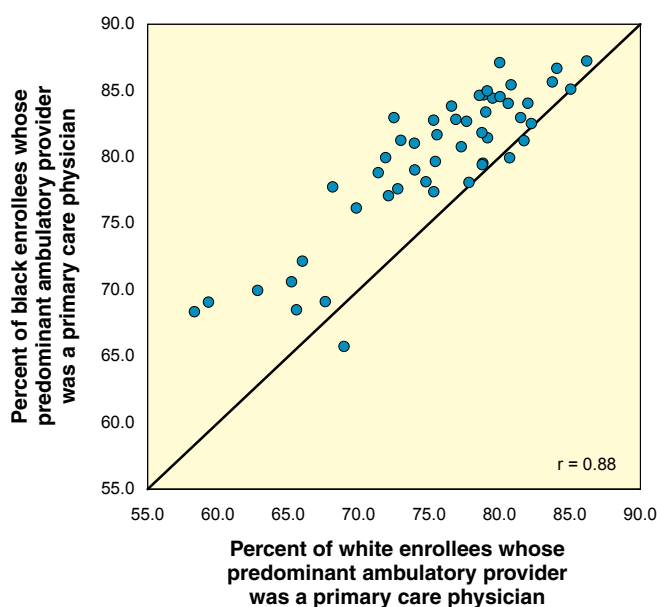
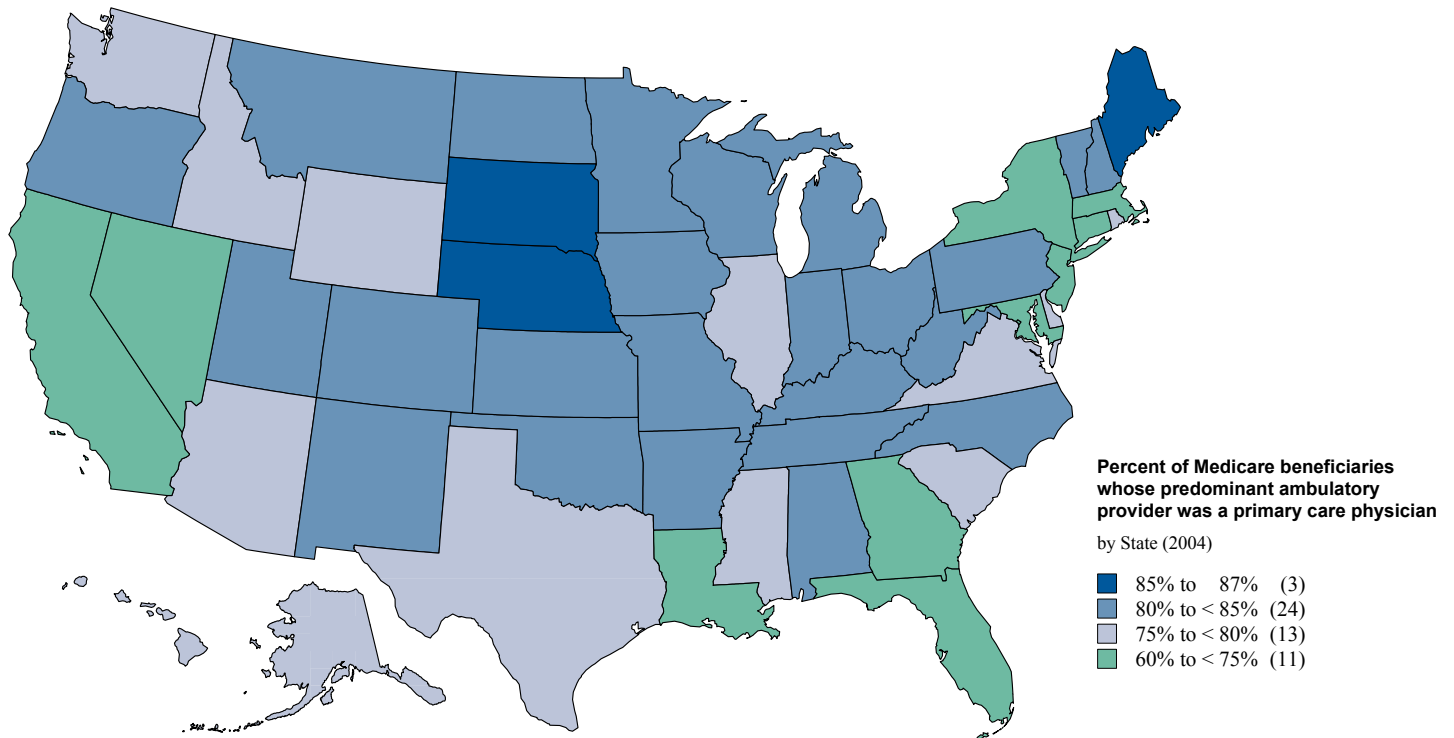


Figure 4. Relationship between the percent of patients having a primary care physician as their predominant ambulatory provider among black and white Medicare enrollees in hospital referral regions with 50 largest populations of black enrollees (2004)

The figure shows the percent of patients whose predominant ambulatory provider was a primary care physician among black and white Medicare enrollees. Dots along the 45-degree line represent areas where white and black rates were equal; dots below the line represent areas where the rate among blacks was lower than the rate among whites. Black rates exceeded white rates in all but three areas: Cincinnati, St. Louis, and Washington, D.C. Rates for all regions with sufficient sample sizes to report are available from our web site.



Map 4. Percent of Medicare enrollees having a primary care physician as their predominant ambulatory provider, by state (2004)

Percent of Medicare enrollees															
60% to < 75%				75% to < 80%				80% to < 85%				85% to 87%			
	Overall	Black	White		Overall	Black	White		Overall	Black	White		Overall	Black	White
GA	74.8	79.0	74.2	SC	80.0	83.9	79.4	KS	84.6	85.5	84.4	NE	86.4	81.8	86.3
MD	74.5	76.6	74.3	WY	79.7	n/a	n/a	MN	83.9	82.0	83.6	SD	86.4	n/a	n/a
MA	74.3	82.2	74.0	WA	79.6	77.6	79.5	IA	83.3	85.0	83.0	ME	85.3	n/a	n/a
NV	72.6	73.2	72.5	HI	79.5	n/a	n/a	OR	83.3	85.1	83.0				
CA	72.4	74.9	72.5	VA	78.9	81.9	78.5	AR	83.2	85.0	83.0				
LA	72.0	78.3	70.7	RI	78.7	83.7	78.4	ND	82.6	n/a	n/a				
FL	71.3	79.2	70.8	TX	78.3	82.5	78.1	VT	82.5	n/a	n/a				
NY	70.5	71.6	70.4	IL	77.1	78.7	77.0	MO	82.3	81.1	82.3				
CT	69.8	72.4	69.6	AK	76.7	n/a	n/a	OH	82.1	83.2	82.0				
NJ	65.3	71.8	64.8	MS	76.6	83.0	75.1	PA	82.1	81.3	82.0				
DC	60.2	63.2	58.0	AZ	75.7	78.7	75.5	KY	82.0	85.1	81.7				
				ID	75.2	n/a	n/a	MI	81.8	82.8	81.7				
				DE	75.0	80.6	74.4	WI	81.6	80.0	81.4				
								AL	81.5	85.3	81.0				
								NC	81.5	84.8	81.1				
								OK	81.3	80.2	81.3				
								UT	81.1	n/a	n/a				
								TN	81.0	82.5	80.9				
								IN	81.0	81.2	80.8				
								NH	81.0	n/a	n/a				
								WV	80.9	79.9	80.7				
								MT	80.5	n/a	n/a				
								CO	80.2	79.2	80.0				
								NM	80.0	82.6	80.0				

Ambulatory Care-Sensitive Hospitalization Rates

Many hospital admissions are for medical conditions – such as poorly controlled diabetes or worsening heart failure – which can be treated in either the inpatient or the outpatient setting, and for which hospitalization can often be prevented by better outpatient management. Although the same can be said for most medical causes of hospitalization, clinicians have identified a group of diagnoses referred to as “ambulatory care-sensitive” conditions. While it may feel safer and easier for the physician, or be the only option for a patient with inadequate home or community-based support, discretionary stays in the hospital pose a risk to patients and a substantial cost to society. Hospitalization rates for these – and for most medical conditions – are highly correlated with the local supply of hospital beds.

Two to threefold variations in ambulatory care-sensitive hospitalization rates were found across U.S. states (Map 5) and regions. States with particularly high rates of hospitalization for ambulatory care-sensitive conditions during the period 2003-05 included West Virginia, Kentucky, Louisiana and Mississippi (all with rates over 100 discharges per 1,000 beneficiaries). States with particularly low rates included Washington (50.0), Utah (47.6) and Hawaii (31.8). The rates for blacks were higher than for whites in 44 states. Comparing rates in the 50 U.S. hospital referral regions with the largest black populations, it is clear that the rates for blacks and whites were highly correlated ($r = 0.68$) and that the general pattern of higher rates in blacks than whites held true, though four regions had relatively equal rates for blacks and whites (whose dots fall along the 45-degree line).

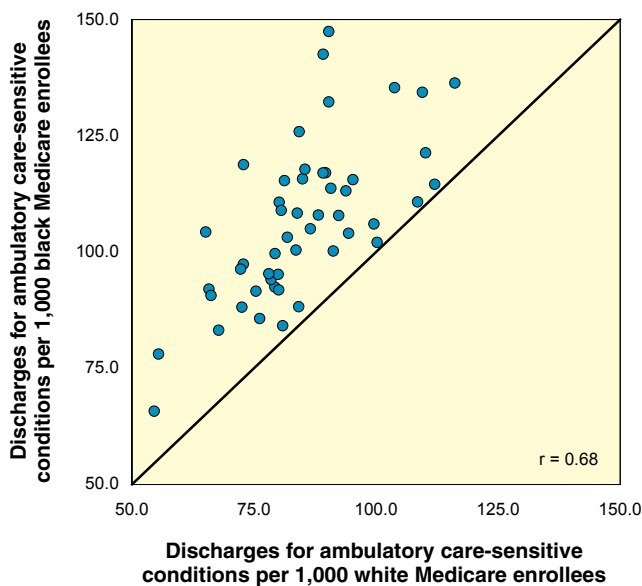
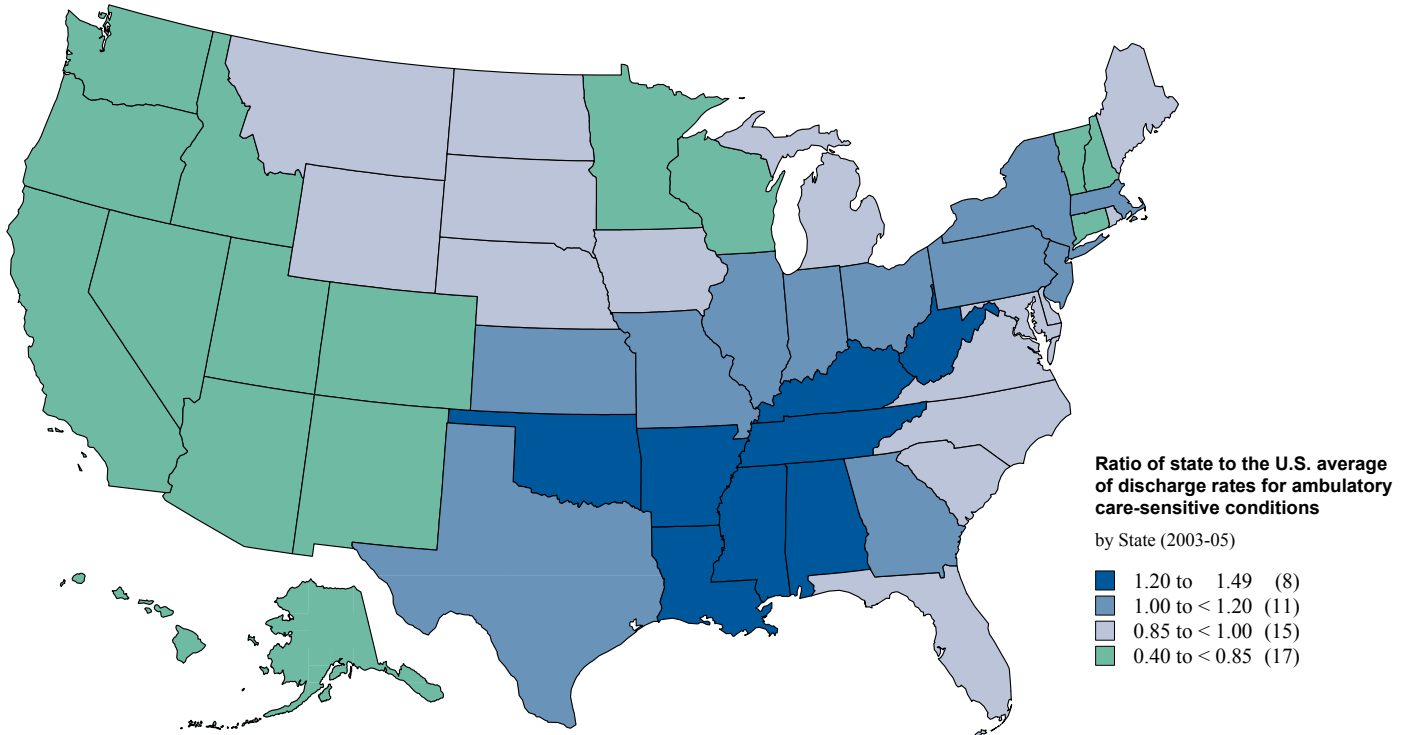


Figure 5. Relationship between discharges for ambulatory care-sensitive conditions among black and white Medicare enrollees in hospital referral regions with 50 largest populations of black enrollees (2003-05)

The figure shows discharge rates for ambulatory care-sensitive conditions among black and white Medicare enrollees. Dots along the 45-degree line represent areas where white and black rates were equal; dots above the line represent areas where the rate among blacks was higher than the rate among whites. Black and white discharge rates differed by less than 5% in five regions: Tallahassee, Florida; Indianapolis, Indiana; Nashville, Tennessee; the Bronx, New York; and Birmingham, Alabama. Rates for all regions with sufficient sample sizes to report are available from our web site.



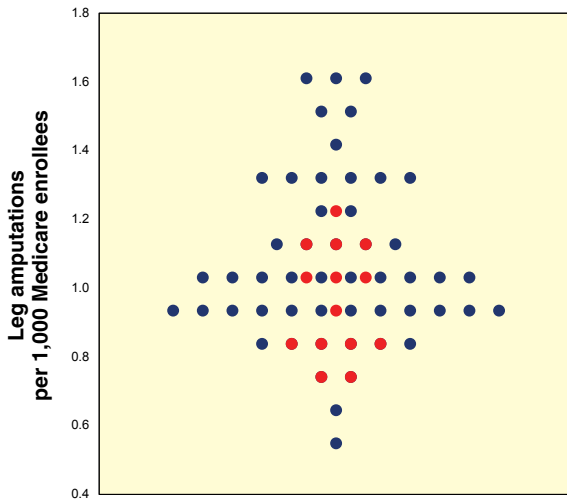
Map 5. Hospitalization for ambulatory care-sensitive conditions, by state (2003-05)

Ratio of overall state rate to the U.S. average															
0.40 to < 0.85				0.85 to < 1.00				1.00 to < 1.20				1.20 to 1.49			
Rates per 1,000 Medicare enrollees															
	Overall	Black	White		Overall	Black	White		Overall	Black	White		Overall	Black	White
CT	65.3	80.6	63.7	RI	77.8	101.9	75.6	TX	88.6	105.8	87.2	WV	116.4	124.0	113.8
NM	64.9	66.5	63.3	SC	77.3	94.3	77.5	IL	87.7	129.9	83.9	KY	112.9	104.5	112.1
MN	64.5	81.2	62.7	MI	76.9	111.7	73.8	OH	87.3	109.0	85.4	LA	109.9	130.4	111.4
CA	64.3	100.1	61.7	NC	76.0	94.0	75.3	MO	87.1	112.8	84.8	MS	109.1	127.9	112.1
DC	64.1	93.4	46.6	SD	76.0	53.0	73.8	PA	84.6	121.7	81.7	TN	98.6	107.6	98.6
NV	63.5	76.3	62.1	MD	75.2	99.6	73.2	NJ	83.9	125.2	80.3	AL	96.5	106.6	98.3
AK	63.4	48.6	62.4	DE	73.3	99.8	70.9	GA	83.1	94.2	84.8	OK	95.4	100.3	93.8
WI	63.2	98.7	61.1	ND	71.5	n/a	n/a	IN	81.8	101.7	79.9	AR	94.7	108.0	94.0
NH	62.7	58.8	61.0	VA	71.2	84.2	71.2	MA	80.1	96.0	78.2				
AZ	59.3	76.0	57.6	NE	70.3	89.6	68.3	KS	79.6	89.2	77.8				
VT	58.7	65.7	57.0	FL	69.8	96.0	67.6	NY	78.7	105.6	76.3				
CO	56.1	65.8	54.7	MT	68.9	63.5	67.0								
ID	55.5	75.1	53.9	WY	68.1	54.1	66.3								
OR	52.3	62.0	50.8	IA	67.8	93.0	65.8								
WA	50.0	64.5	48.6	ME	67.3	67.6	65.4								
UT	47.6	59.4	46.3												
HI	31.8	40.2	30.9												

NOTE: The map shows the ratio of each state to the national average for discharge rates for ambulatory care-sensitive conditions. The column headers (in colors which correspond to the map legend) reflect the ratios displayed in the map, while the numbers in the table itself give the actual rates for each state per 1,000 Medicare enrollees overall, and for black and white Medicare enrollees.

Aligning Forces for Quality: An Opportunity to Learn

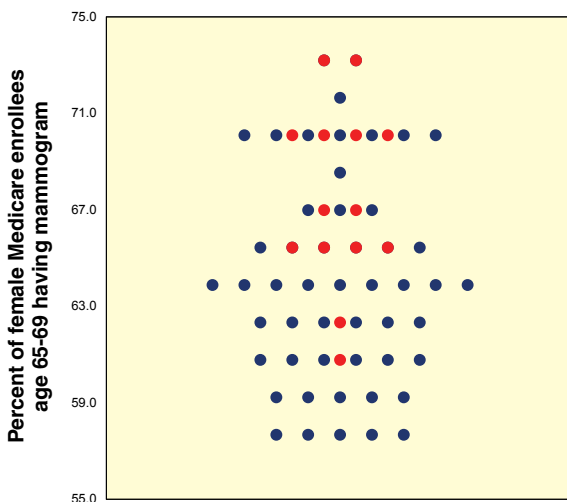
The Robert Wood Johnson Foundation selected fourteen sites to participate in “Aligning Forces for Quality,” a program intended to bring together those who get care, provide care and pay for care to improve the quality and equality of care. The premise underlying the program is that no single person, profession or group can improve care without the support of others. The displays in this section show how each of the fourteen Aligning Forces sites compares to each other and to all U.S. states for four of the measures presented in this report. Data are presented only for sites where the numbers of patients are large enough to support reporting. For regions with few blacks, only the overall rates are presented.



Region	Overall	Black	White
Wisconsin	1.20	4.09	0.93
York, PA	1.17	n/a	n/a
Memphis, TN	1.17	4.64	0.72
Western New York	1.11	1.91	0.99
Cincinnati, OH	1.07	3.75	0.84
Cleveland, OH	1.03	3.29	0.91
Maine	0.98	n/a	n/a
Western Michigan	0.92	3.65	0.70
Minnesota	0.88	2.19	0.69
Seattle, WA	0.86	2.52	0.68
Detroit, MI	0.85	2.92	0.70
Willamette Valley, OR	0.84	n/a	n/a
Kansas City, MO	0.78	2.81	0.60
Humboldt County, CA	0.74	n/a	n/a

The overall age, sex and race adjusted rate of leg amputation was almost as variable across the Aligning Forces sites (red dots) as across U.S. states (blue dots), ranging from below 0.80 per 1,000 in Humboldt County, California and Kansas City, Missouri to over 1.17 per 1,000 in Wisconsin, Memphis, and York, Pennsylvania. The differences between blacks and whites were substantially greater, varying more than fivefold in Memphis and Western Michigan.

Figure 6. Leg amputations per 1,000 Medicare enrollees among AF4Q regions (red dots) and states (blue dots) (2003-05)



Region	Overall	Black	White
Maine	74.0	n/a	n/a
Western Michigan	73.0	n/a	n/a
Minnesota	70.7	n/a	n/a
York, PA	70.4	n/a	n/a
Wisconsin	70.2	61.3	70.5
Humboldt County, CA	69.6	n/a	n/a
Cleveland, OH	67.4	62.7	68.7
Detroit, MI	66.7	61.4	67.9
Kansas City, MO	65.8	64.1	66.1
Willamette Valley, OR	65.7	n/a	n/a
Western New York	65.6	n/a	n/a
Seattle, WA	65.1	n/a	n/a
Cincinnati, OH	62.7	61.1	62.8
Memphis, TN	60.3	55.2	63.9

The percent of female Medicare enrollees having at least one mammogram over two years ranged from a low of about 60% in Memphis to 74% in Maine. In the six regions where there were sufficient numbers of black women to report the measure, blacks were less likely to receive mammograms than whites, with the gap between whites and blacks ranging from a low of 3% in Kansas City (64% for blacks, 66% for whites) and Cincinnati (61% for blacks, 63% for whites) to a high of 16% in Memphis (55% for blacks, 64% for whites).

Figure 7. Percent of female Medicare enrollees age 65-69 having at least one mammogram during a two-year period among AF4Q regions (red dots) and states (blue dots) (2004-05)

The percent of diabetic Medicare enrollees age 65-74 receiving hemoglobin A1c testing ranged from a low of about 83% in Cleveland and Memphis to a high of just over 90% in Minnesota, Maine, Wisconsin, and York, Pennsylvania. In all regions where there were sufficient numbers of blacks to report the measures, blacks were less likely to receive testing than whites, with the gap between white and blacks ranging from just 7% in Wisconsin (85% vs. 91%) to a high of more than 20% in Kansas City (72% for blacks, 87% for whites).

Region	Overall	Black	White
York, PA	91.4	n/a	n/a
Wisconsin	90.9	85.4	91.2
Maine	90.8	n/a	n/a
Minnesota	90.2	83.2	90.3
Western Michigan	89.5	82.7	90.0
Seattle, WA	89.2	81.9	89.6
Willamette Valley, OR	88.2	n/a	n/a
Western New York	86.6	79.7	87.5
Detroit, MI	84.9	79.6	86.7
Cincinnati, OH	84.5	79.0	85.3
Kansas City, MO	84.2	72.0	86.8
Cleveland, OH	83.0	78.7	85.0
Memphis, TN	82.8	78.6	87.7
Humboldt County, CA	n/a	n/a	n/a

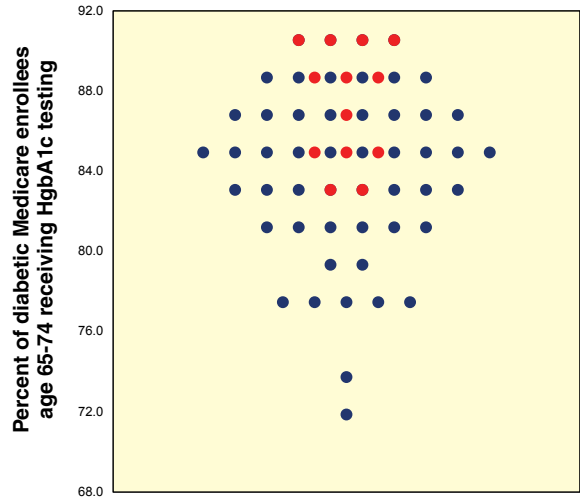


Figure 8. Percent of diabetic Medicare enrollees age 65-74 receiving hemoglobin A1c testing among AF4Q regions (red dots) and states (blue dots) (2003-05)

Ambulatory care-sensitive hospitalization rates varied from under 50 per 1,000 in Oregon's Willamette Valley and Seattle to over 85 per 1,000 in Detroit and Cleveland. Although blacks had higher ambulatory care-sensitive hospitalization rates in all regions, the hospitalization rates for blacks in Seattle and the Willamette Valley were lower than the rates for whites in half of the Aligning Forces regions.

Region	Overall	Black	White
Cleveland, OH	89.2	118.4	86.8
Detroit, MI	85.5	115.5	82.8
Cincinnati, OH	83.3	102.6	81.6
Memphis, TN	77.1	106.9	72.9
Kansas City, MO	76.9	100.4	74.9
Western New York	76.3	93.4	74.6
Maine	67.3	67.6	65.4
Minnesota	64.5	81.2	62.7
Wisconsin	63.2	98.7	61.1
York, PA	59.6	86.4	57.8
Western Michigan	58.0	81.7	56.2
Humboldt County, CA	51.4	n/a	n/a
Willamette Valley, OR	48.7	63.2	47.3
Seattle, WA	47.4	65.6	45.9

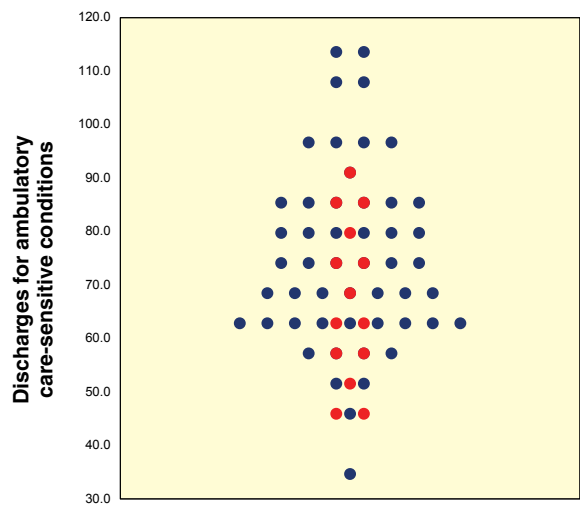


Figure 9. Discharges for ambulatory care-sensitive conditions per 1,000 Medicare enrollees among AF4Q regions (red dots) and states (blue dots) (2003-05)

The Relationship between the Quality of Health Care and Health Care Spending

A major focus of the Dartmouth Atlas of Health Care has been to explore the relationship between the quality of health care and health care spending. To put the findings of the current Brief Report in context, we briefly summarize some of the key findings of this earlier work. A list of further readings and references is provided in the endnotes.

Unwarranted variations and the categories of care. Some variations in practice are clearly justified. “Unwarranted” refers to variations in practice or spending that cannot be explained on the basis of illness, strong scientific evidence, or well-informed patient preferences. The Dartmouth Atlas Project distinguishes three categories of care (Wennberg 2002). **Effective care** consists of evidence-based services such as hemoglobin A1c testing for diabetics. Variations in effective care reflect failure to deliver needed care. **Preference-sensitive care** encompasses treatment decisions where the options have quite different risks and benefits and where patients’ attitudes toward these risks may vary. For example, the decision to undergo bypass surgery for heart disease is likely to improve chest pain but carries a small but real risk of causing memory loss. The Dartmouth Atlas Project has long argued for informed patient choice: ensuring that patients are able to choose based on their own preferences. Finally, **supply-sensitive care** refers to services where the supply of a specific resource (such as the number of hospital beds per capita) has a major influence on utilization rates. The frequency of physician visits, ambulatory care-sensitive hospitalization rates and the propensity to use specialists are all examples of supply-sensitive care.

Variations in spending and the quality of care. Although there are differences in both illness rates and prices across U.S. states and regions, most of the differences in spending are due to differences in the quantity of supply-sensitive services provided to similar patients. Medicare beneficiaries in higher spending states and regions spend much more time in the hospital (e.g. have higher rates of ambulatory care-sensitive hospitalizations), have more frequent physician visits overall, are more likely to have a specialist as their predominant provider and are much more likely to see multiple different physicians. However, higher spending is not associated with better care. On the contrary, patients in higher spending regions are somewhat less likely to receive evidence-based treatments (effective care) and are no more likely to receive elective major surgical procedures (preference-sensitive care) (Wennberg 2002; Fisher 2003a; Baicker 2004). Studies that followed patients with selected serious conditions such as heart attacks over time found that survival was slightly worse in the higher spending regions (Fisher 2003b). Recent studies focused on the care of patients with serious chronic illness at the end of life revealed greater than twofold differences in spending across major U.S. academic medical centers, almost entirely explained by differences in the use of supply-sensitive care (Wennberg 2008). These studies have led many to conclude that the U.S. has important opportunities to improve the efficiency of care.



Implications for reform and for improving the quality of care. The strategies for reform that emerge from this work include the following: developing better scientific evidence on the effectiveness of medical treatments and on how best to provide care for patients with chronic illness; ensuring informed patient choice; fostering local organizational accountability for bringing providers together to improve the quality and costs of care; further development of performance measures that can support improvement efforts; reforming the payment system to reduce current incentives for overuse; and careful attention to managing the growth of the physician workforce. Additional details and evidence are available online (www.dartmouthatlas.org) and in the references.

Selected References and Readings

Baicker K, Chandra A, Skinner J, Wennberg J. Who you are and where you live: how race and geography affect the treatment of Medicare beneficiaries. *Health Affairs* web exclusive, October 7, 2004.

Dillingham TR, Pezzin LE, Shore AD. Reamputation, mortality and health care costs among persons with dysvascular lower-limb amputations. *Arch Phys Med Rehab* 2005; 86:480-486.

Fisher ES, Wennberg DE, Stukel TA, Gottlieb DJ, Lucas FL, Pinder EL. The implications of regional variations in Medicare spending. Part 1: The content, quality, and accessibility of care. *Ann Intern Med* 2003 Feb 18;138(4):273-87.

Fisher ES, Wennberg DE, Stukel TA, Gottlieb DJ, Lucas FL, Pinder EL. The implications of regional variations in Medicare spending. Part 2: Health outcomes and satisfaction with care. *Ann Intern Med* 2003 Feb 18;138(4):288-98.

Goodman DC, Fisher ES. Physician workforce crisis? Wrong diagnosis, wrong prescription. *N Engl J Med* 2008;358:1658-61.

Wennberg JE, Fisher ES, Skinner JS. Geography and the debate over Medicare reform. *Health Affairs* web exclusive, 13 February 2002.

Wennberg JE, Fisher ES, Goodman DC, Skinner JS, Bronner KK, Sharp SM. *Tracking the Care of Patients with Severe Chronic Illness: The Dartmouth Atlas of Health Care 2008*. The Trustees of Dartmouth College, 2008.

Wennberg JE, O'Connor AM, Collins ED, Weinstein JN. Extending the P4P agenda, part 1: How Medicare can improve patient decision making and reduce unnecessary care. *Health Affairs* 2007 Nov;26(6):1564-74.

Wennberg JE, Fisher ES, Skinner JS, Bronner KK. Extending the P4P agenda, part 2: How Medicare can reduce waste and improve the care of the chronically ill. *Health Affairs* 2007 Nov;26(6):1575-85.



Appendix Table. Definitions of Measures

Short description	Label	Definition
Leg Amputation	Leg amputations per 1,000 Medicare enrollees (2003-05)	Numerator: MedPAR claims for inpatient leg amputation procedures (ICD-9 codes 84.15-84.17). Denominator: fee-for-service (FFS) Medicare enrollees age 65-99. Measure is average over three years.
Breast Cancer Screening	Average percent of female Medicare enrollees age 65-69 having at least one mammogram over a two-year period (2004-05)	Numerator: number of women in the denominator having one or more mammograms during the two-year period 2004-05. Denominator: women who were age 66-69 enrolled in fee-for-service (FFS) Medicare during 2005. Women had to be at least 66 years old during the second year to allow for two-year follow-back.
Diabetes: Annual HgbA1c Testing	Average annual percent of diabetic Medicare enrollees age 65-74 having HgbA1c test (2003-05)	Numerator: diabetics age 65-74 having one or more HgbA1c tests during measurement year. Denominator: diabetics age 65-74 enrolled in FFS Medicare. Measure is average over three years.
Predominant Provider a Generalist	Percent of Medicare beneficiaries whose predominant ambulatory provider was a primary care physician (2004)	Numerator: enrollees whose most frequently seen physician was a primary care specialist (family practice, general practice, internist, or geriatrician). Denominator: FFS Medicare enrollees age 65+ with at least one visit during the measurement window.
ACS Discharges	Discharges for ambulatory care-sensitive conditions per 1,000 Medicare enrollees (2003-05)	Numerator: MedPAR claims for discharges for ambulatory care-sensitive conditions (convulsions, COPD, pneumonia, asthma, CHF, hypertension, angina, cellulitis, diabetes, gastroenteritis, kidney/urinary tract infections, dehydration). Denominator: FFS Medicare enrollees age 65-99. Measure is average over three years.
<i>The following measures are not included in this report but will be available from our web site:</i>		
Diabetes: Annual Eye Exam	Average annual percent of diabetic Medicare enrollees age 65-74 having eye exam (2003-05)	Numerator: diabetics age 65-74 having a retinal or dilated eye exam by eye care professional in measurement year or a negative retinal exam. Denominator: diabetics age 65-74 enrolled in FFS Medicare. Measure is average over three years.
Diabetes: Annual Lipid Testing	Average annual percent of diabetic Medicare enrollees age 65-74 having blood lipids test (2003-05)	Numerator: diabetics age 65-74 having at least one low-density lipoprotein-cholesterol (LDL_C) test during measurement year. Denominator: diabetics age 65-74 enrolled in FFS Medicare. Measure is average over three years.
Primary Care Provider	Percent of Medicare beneficiaries who had a primary care physician (2004)	Numerator: enrollees with at least one visit with a primary care specialist (family practice, general practice, internist, or geriatrician). Denominator: FFS Medicare enrollees age 65+ with at least one ambulatory visit during the measurement window.

Disparities in Health and Health Care among Medicare Beneficiaries

A Brief Report of the Dartmouth Atlas Project

The Dartmouth Atlas Project works to accurately describe how medical resources are distributed and used in the United States. The project offers comprehensive information and analysis about national, regional, and local markets, as well as individual hospitals and their affiliated physicians, in order to provide a basis for improving health and health systems. Through this analysis, the project has demonstrated glaring variations in how health care is delivered across the United States.

The Robert Wood Johnson Foundation's **Aligning Forces for Quality** program commissioned this special report by the Dartmouth Atlas Project to highlight the uneven quality of health care being delivered across America and the need to improve the quality of care and reduce disparities in health in every community. Aligning Forces for Quality is working to lift the overall quality of health care in targeted communities across America, and provide models for national reform.