



Published in final edited form as:

J Manipulative Physiol Ther. 2012 February ; 35(2): 101–109. doi:10.1016/j.jmpt.2011.12.004.

Geographic variations in availability and use of chiropractic under Medicare

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Abstract

Objective—The purpose of this study was to measure geographic variations in the availability and use of chiropractic under Medicare.

Methods—A cross-sectional design was employed to analyze a large nationally representative sample of Medicare data. Data from a 20% representative sample of all paid Medicare Part B fee for service claims for 2007 were merged with files containing beneficiary and provider data. The sample was restricted to adults aged 65–99. Measures of chiropractic availability and use were described and selectively mapped by state. Geographic variations were quantified. Spearman's test was used to evaluate for correlation between chiropractic availability and use.

Results—The average number of doctors of chiropractic (DC) by state was 1,135; average DC per 1,000 beneficiaries was 2.5 (SD 1.1). The average number of chiropractic users by state was 34,502 (SD 30,844); average chiropractic users per 1,000 beneficiaries was 76 (SD 41). Chiropractic availability by state varied six-fold and chiropractic use varied nearly thirty-fold. Availability was strongly correlated with use (Spearman's rho 0.86, $p < .001$). Expenditures per DC were highest in the upper Midwest and lowest in the far west; expenditures per user were highest in New England and New York, and lowest in the West.

Conclusion—Chiropractic availability and use by older adults under Medicare predominated in rural states in the north central US. Expenditures were higher in the East and Midwest, and lower in the far West. Chiropractic availability and use by state were highly correlated. Future analyses should employ small area analysis and statistical modeling to identify factors predictive of chiropractic use.

MeSH terms

Chiropractic; Aged; Medicare

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No conflicts of interest were reported for this study.

Introduction

Chiropractic services are covered under the Medicare system in the United States (US), but the scope of covered services is tightly restricted. The chiropractic profession wants the Department of Health and Human Services to make chiropractic care more accessible to Medicare beneficiaries by expanding the scope of allowable chiropractic services, but chiropractic has been described as “a significant vulnerability” for Medicare, due to ongoing concerns about the cost of unnecessary services.¹ Furthermore, a demonstration project conducted by Medicare to determine the effect of expanding allowable services concluded that expansion would increase overall costs to Medicare.² Considerable uncertainty surrounds the question of whether the scope of allowable chiropractic services should be expanded under the Medicare program.

Little is known about the availability and use of chiropractic care currently provided under Medicare. Government reports on chiropractic use under Medicare have focused for the most part upon identifying and controlling the provision of unnecessary services, with limited and inconsistent evaluation of chiropractic use overall.^{1, 3-6} Other studies of chiropractic use under Medicare were limited to analysis of procedure rates,⁷ or to relatively small samples of survey respondents.^{8, 9} Recent national studies on chiropractic utilization and expenditures and on the supply and demand of chiropractic did not focus specifically on the Medicare beneficiary population.^{10, 11} Few studies have measured geographic variations in chiropractic care, and no nationally representative study has been conducted on geographic variations in the availability and use of chiropractic under Medicare. Evaluation of the availability and use of chiropractic under Medicare will inform chiropractic organizations, policy makers and other stakeholders.

To evaluate these characteristics, availability and use may be measured in various terms; for example, measures of availability may include third party coverage, affordability, distance to point of service, clinic hours, and allowed scope of practice. Chiropractic availability can be measured as the ratio of Doctors of Chiropractic (DC) to potential chiropractic users, use can be measured as the ratio of chiropractic users to potential users, and costs can be measured as allowed charges and payments for chiropractic services. This investigation analyzed a large nationally representative sample of Medicare data to measure chiropractic availability and use for older US adults using the above parameters. This study generated and selected measures that were mapped to illustrate geographic variations.

Methods

Design and Sampling

A cross-sectional design was employed to analyze Medicare data. Claims data from the Medicare *Carrier File* for 2007 were merged on unique beneficiary identifier with beneficiary data from the Medicare *Denominator File* for 2007. The resultant file was subsequently merged on unique provider identifier with data from the Medicare *Provider UPIN File*. The *Carrier File* provided a 20% representative sample (randomly generated based upon the last two digits of the the social security number portion of the claim number) of all paid Medicare Part B fee for service claims for chiropractic care. The study sample was restricted to adults aged 65–99 (living as of January 1st of each year), for the year 2007, and to claims records for services provided by chiropractic physicians practicing within the 50 US states and the District of Columbia. For the sake of simplicity, in this paper the District of Columbia is considered to be a state. Chiropractic claims were identified by provider specialty code 35. Excluded from the analysis were records for unallowed claims and duplicate claims for the same patient, provider, procedure and date of service. To reduce the likelihood of individual identification, Medicare beneficiaries older than 99 were

excluded. The data used in this study were obtained under a data user agreement with The Centers for Medicare and Medicaid Services. The research plan was reviewed and approved by the Committee for the Protection of Human Subjects, Dartmouth College, Hanover NH. The data were tabulated in EXCEL 2007 (Microsoft Corp, Redmond, WA) and analyzed in EXCEL and STATA 11 (Statacorp, College Station, TX). Data mapping was performed with ArcMap 10.0 (ESRI, Redlands, CA).

Analysis

Medicare claims administration is handled by regional carriers known as Medicare Administrative Contractors (MACs). A MAC is assigned to each of the 15 Medicare administrative contractor jurisdictions (MACJs), which are typically comprised of a block of 3–4 contiguous states. The claims data were aggregated primarily to the state level, and secondarily to the MACJ, using the current configuration of jurisdictions. The data were analyzed using the state as the geographic unit of analysis for availability and use, and the MACJ as the unit of analysis for costs. Data fields with fewer than 11 observations were suppressed to reduce the likelihood of individual identification. Results of analysis of the 20% sample were multiplied by a factor of five to generate 100% estimates. Descriptive statistics for chiropractic availability (defined as Medicare-servicing chiropractors per 1,000 Medicare Part B beneficiaries) and chiropractic users (defined as Medicare beneficiaries with at least one paid claim for chiropractic care on a date-of-service in 2007) were generated. Selected measures of chiropractic availability, use and cost were mapped to illustrate geographic variations, and geographic variations were quantified by coefficient of variation (CV), extremal ratio (ER) and interquartile ratio (IR).¹² Spearman's test was used to evaluate for correlation between chiropractic availability and use.

Results

Availability

Nationally, the total number of chiropractors in 2007 was 57,912. The number of DCs per state ranged from 40 in the District of Columbia to 4,507 in California (mean 1,135; standard deviation (SD) 1,065).[Table 1] The average number of DCs per 1,000 beneficiaries ranged from 0.9 in Mississippi to 5.6 in South Dakota (mean 2.5; SD 1.1). Figure 1 illustrates variation by state in quintiles of chiropractic physicians per 1,000 beneficiaries. Chiropractic availability to the Medicare beneficiary population was highest in the North and West, with a large block of greater availability in the northern plains and mountain states, and lowest in the South and Hawaii. Chiropractic availability by state varied six-fold overall (CV 0.44; ER 6.02; IR 1.97).

Use

The estimated national total of Medicare beneficiaries who were chiropractic users in 2007 was 1,759,615. By state, the estimated number of chiropractic users ranged from 295 in the District of Columbia to 111,170 in California (mean 34,502; SD 30,844). After California, the states with the greatest number of both DCs and users were Florida, New York and Illinois. Chiropractic users per 1,000 beneficiaries ranged from seven in the District of Columbia to 204 in South Dakota (mean 76; SD 41). Figure 2 illustrates variation by state in quintiles of chiropractic users per 1,000 beneficiaries. Users were more highly concentrated in the northern and western United States, with a large block of higher use in the northern plains and prairie states. States with the lowest rates of use were in the Southeast, southern New England and Hawaii. Chiropractic use by state varied nearly thirty-fold (CV 0.54; ER 29.36; IR 1.63). When analyzed by state, the number of users per thousand beneficiaries was strongly correlated with DCs per 1,000 beneficiaries (Spearman's rho 0.86, $p < .001$).[Figure 3]

Each chiropractic physician provided care to an average of 30 Medicare beneficiaries in 2007. The average number of users per DC ranged from seven in the District of Columbia to 47 in Iowa (mean 30; SD 8). The states with the largest average numbers of users per DC were the rural heartland states of Iowa, Kansas, Nebraska and North Dakota. In most of the large urbanized states, the average number of users per DC was below the mean of 30.

Cost

Total allowed charges by MACJ ranged from \$14 million in MACJ seven (Arkansas, Louisiana and Mississippi) to \$73 million in MACJ six (Illinois, Minnesota and Wisconsin). Total payments ranged from \$10 million to \$53 million.[Table 2] Average payment per procedure ranged from \$20.57 in MACJ fifteen (Kentucky and Ohio) to \$24.97 in MACJ twelve (Delaware, District of Columbia, Maryland, New Jersey, Pennsylvania). Average allowed charges per DC ranged from \$7,000 in MACJ one (California, Hawaii and Nevada) to \$14,000 in MACJ five (Iowa, Kansas, Missouri and Nebraska). Average payments per DC ranged from \$5,000 to \$10,000.[Figure 4] Average allowed charges per chiropractic user ranged from \$279 in MACJ three (Arizona, Montana, North Dakota, South Dakota, Utah and Wyoming) to \$395 in MACJ fourteen (Maine, Massachusetts, New Hampshire, Rhode Island, Vermont). Average payments per user ranged from \$203 to \$293.[Figure 5] Overall variation in cost (measured as average payment per procedure) was relatively low (CV 0.06; ER 1.21; IR 1.12) compared to variations in availability and use

Discussion

Summary of Findings

In general, the most populous and urbanized states were found to have the most DCs. However, the ratio of DCs to potential chiropractic users is a more specific indicator of availability than the absolute number of DCs. Measured as a ratio of DCs to beneficiaries, the chiropractic availability to aged Medicare beneficiaries was higher in rural states. Among the states the average availability was 2.5 DCs per 1,000 Medicare beneficiaries. Chiropractic care was generally more available to Medicare beneficiaries in the North and West, and less available in the Southeast.

As with the number of DCs, absolute numbers of older adult chiropractic users were found in the most highly populated areas, but higher proportions of users predominated in the northern and western United States, especially the northern plains and prairie states. States with lower proportions of users were located mostly in the South and East. By state, chiropractic users averaged 76 per 1,000 Medicare beneficiaries. Expenditures per DC were highest in the upper Midwest and lowest in the far west; expenditures per user were highest in New England and New York, and lowest in the West. Expenditures per procedure were highest in the Northeast and lowest in the South. Chiropractic use among older US adults was strongly correlated with availability.

Comparison with Findings of Previous Studies

Cherkin and Mootz reported that in 1995 the states with the lowest DC to population ratios included the District of Columbia, Louisiana, Maryland and Mississippi.¹³ The results of this analysis show the the same four states with the lowest availability to the Medicare beneficiary population. Cherkin and Mootz reported the highest DC to population ratios for Arizona, Colorado, and Hawaii, but the Dakotas and Minnesota top the list in availability to Medicare beneficiaries. Arizona also had relatively high availability to the Medicare population, but relative availability in Hawaii was low.

The supply of 2.39 DCs for every 10,000 US adults reported by Davis and colleagues for 2004¹⁰ was equivalent to an availability ratio of 2.7 DCs per 1,000 Medicare beneficiaries in 2004,¹⁴ close to the average availability of 2.5 DCs per 1,000 Medicare beneficiaries reported here for 2007. Grier and Lepnurm attempted to model an ideal DC: population ratio based upon the prevalence of musculoskeletal problems in the general population, and arrived at an ideal ratio of 1 DC per every 2,588 persons, or 0.38 DCs per 1,000.¹⁵ By that standard, the average availability ratio reported here of 2.5 DCs per 1,000 beneficiaries would be excessive for the Medicare population but suboptimal as a supply ratio for the general population. However, given current trends in the supply of US DCs, as the population ages and an increasing share of the burden of musculoskeletal problems is borne by older adults, the chiropractic availability ratio for Medicare beneficiaries is likely to decrease.¹⁰

Wolinsky and colleagues estimated the rate of use of chiropractic among Medicare beneficiaries to be 4.6%.⁹ Foster and colleagues reported in 2001 that 11% of US adults over age 65 used chiropractic.¹⁶ Based upon an analysis of claims data from 2001 the US Dept of Health and Human Services estimated a rate of 6% chiropractic usage among Medicare beneficiaries.¹ Evans and colleagues reported that among a subset of survey respondents 65 years of age and older, 8.7% had used chiropractic or osteopathic manipulation within the past 12 months.¹⁷ In the present study, when analyzed by state, the number of chiropractic users averaged 76 beneficiaries per 1,000, or 7.6% of beneficiaries. Conversion to an average user rate weighted by the Medicare beneficiary population in each state yields a national rate of use of 6.9%. Both weighted and unweighted average rates are in line with previous estimates cited above. The Centers for Medicare and Medicaid Services has reported allowed charges for chiropractic services in 2007 totaling \$703 million, approximately 20% higher than the totals we report here.¹⁸ CMS however does not disclose the methods used to generate this statistic. If the beneficiary population included individuals younger than 65 years or residents outside the 50 US states, or if the included claims were not restricted by provider specialty code and CPT code range, higher estimates would be expected.

Implications

Although Medicare is a federal program and Medicare claims are handled by regional administrative contractors, chiropractic practice is licensed and regulated by the states, so analysis of chiropractic use by state can be informative from a policy point of view. Information on availability of chiropractic services by state may aid planning for resource allocation, and may help DCs to decide where to locate their practices. Chiropractic was founded in Iowa and most of the early development of the chiropractic profession took place there and in surrounding states. By several measures, chiropractic appears to maintain its strongest presence in Iowa and nearby states such as Kansas, Nebraska, Minnesota and the Dakotas. Doctors of chiropractic tend to locate their practices in the more populous states, but those in many of the more sparsely populated states appear to have busier practices on average, at least with regard to older adults. Perhaps the most striking finding reported here is the low cost of chiropractic care under Medicare. By MACJ, Medicare's average expenditure in 2007 was \$21–25 per chiropractic procedure. Under Medicare, payment per chiropractic procedure is equivalent to payment per chiropractic office visit, because Medicare allows only one procedure per visit.

This investigation is the first nationally representative study of geographic variations in the availability and use of chiropractic services under Medicare. In 1973 Wennberg published the first in a series of studies that described unexplained geographic variations in medical care.¹⁹ Since then, numerous reports have been published on variations in the distribution and use of medical services.^{20–24} Such variations are likely to be unwarranted if they cannot

be explained on the basis of differences in illness rates or patient preferences and characteristics.^{20, 25} To explain variations in medical care, health care services may be categorized as *necessary*, *preference-sensitive*, or *supply-sensitive*.²⁶ These categories may also prove useful in evaluations of the clinical appropriateness of chiropractic care.²⁷ *Necessary care* is treatment that has been proven to be effective and safe. When the best treatment choice is not clear-cut (as in the care of non-specific low back pain), care is considered to be *preference-sensitive*, and choice of treatment should be based upon patient preferences and a well-informed shared decision-making process.²⁸ Shannon and colleagues have argued that patient beliefs and preferences should play a more prominent role in clinical decision making about integrative medicine.²⁹ *Supply-Sensitive Care* is governed by the local supply of health care providers, and the availability of facilities and services: the greater the supply, the higher the rate of use, irrespective of necessity or patient preference.²⁶

The phenomenon of supply sensitive care is likely widespread in fee for service payment systems, due to ubiquitous provider self interest. The high degree of correlation between chiropractic availability and use reported here suggests the possibility that chiropractic care for older adults may be supply sensitive in certain areas. However, an effect-cause relationship is also possible: DCs are likely to establish practices in areas where demand for their services is expected to be higher. Furthermore, local health care markets (geographic areas within which patient populations use clinical services) tend not to be determined by political boundaries.³⁰⁻³² Patients cross municipal, county and even state lines to use clinical services, and large metropolitan areas often contain multiple local health care markets. Thus, significant local variations were likely smoothed over in our state-level analysis. Identification of supply sensitivity in chiropractic care is challenging, in part because the appropriate use of chiropractic care overall has not been determined.²⁷ The challenge is compounded for chiropractic under Medicare, which limits the scope of reimbursable chiropractic practice to spinal manipulation only. The chiropractic profession has argued that expansion of allowable services will allow Medicare beneficiaries to benefit from the full scope chiropractic practice, but Medicare is limited to evaluating the appropriateness of chiropractic care through the narrow lens of practices restricted to spinal manipulation.²⁷ Future analyses of geographic variations in chiropractic availability and use should be performed employing a smaller unit of geographic analysis more likely to reflect actual patterns of use.³⁰ Statistical modeling at the individual level would facilitate determination of factors predictive of chiropractic use among Medicare beneficiaries.

Limitations

This study analyzed only Medicare Part B fee for service claims in 2007, exclusive of claims for expanded chiropractic services provided under a demonstration project that was conducted from 2005 to 2007.² Inferences drawn from the results are applicable only to US Medicare beneficiaries aged 65–99, and cannot be generalized to populations that are younger, outside the US, or not covered by Medicare. The conclusions cannot be generalized to chiropractic practice in general, because Medicare restricts coverage of chiropractic services to spinal manipulation. No predictive modeling was performed to analyze for causation. Reported averages are unweighted, except as noted. The validity of the results of claims-based research may have been limited by inaccurate entry of information on claim forms. US states typically contain multiple local health care markets, so aggregation of data to the state level likely obscured localized variations in use. Chiropractic availability as reported here is a measure of provider availability that is specific to the beneficiary population; this measure should not be misinterpreted as a population-based measure of provider supply.

Allowable charges under Medicare are determined by MACJ, so analysis of costs by region is more appropriate than by state. However, not all 2007 claims were administered by MACJ as depicted in Table 2 and Figure 3. In 2006 CMS began to reconfigure the distribution of MACJs, and reconfiguration continued through 2007.³³ Allowable charges vary by MACJ, are reviewed annually, and may change more than once per year. These ongoing administrative changes make it difficult to compare costs from year to year, or between administrative jurisdictions. The cost data were analyzed using the current configuration of MACJs as the geographic units of analysis.³³ Finally, cost analysis was not a primary focus of this study. Cost issues such as the cost-effectiveness of care, the resource-based evaluation of services, geographic variations in the cost-of-living, and other economic factors were not addressed in this paper, and would be worthy of future investigation.

Conclusions

Chiropractic availability and use by older adults under Medicare predominate in rural states in the North Central US. Medicare expenditures for chiropractic care were generally higher in the Northeast and Midwest, and lower in the South and West. Chiropractic availability and use by state are highly correlated under Medicare. Future analyses should employ small area analysis and statistical modeling at the individual level to identify factors predictive of chiropractic use in older adults.

This study provides the most comprehensive information available to date on geographic variations in the availability and use of chiropractic under Medicare.

An understanding of the availability of chiropractic care may aid planning for resource allocation, and may help doctors of chiropractic to decide where to locate their practices.

Knowledge of chiropractic availability, utilization and cost will inform decision making by chiropractic organizations, federal policy makers and other stakeholders with regard to the current administration and potential future expansion of chiropractic coverage under Medicare.

Acknowledgments

FUNDING SOURCES AND CONFLICTS OF INTEREST

This study was directly funded under a research career development grant from the National Center for Complementary and Alternative Medicine. Grant Number: 5K01AT005092-03.

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https://www.cms.gov/MedicareContractingReform/05_PartAandPartBMACJurisdictions.asp#TopOfPage.

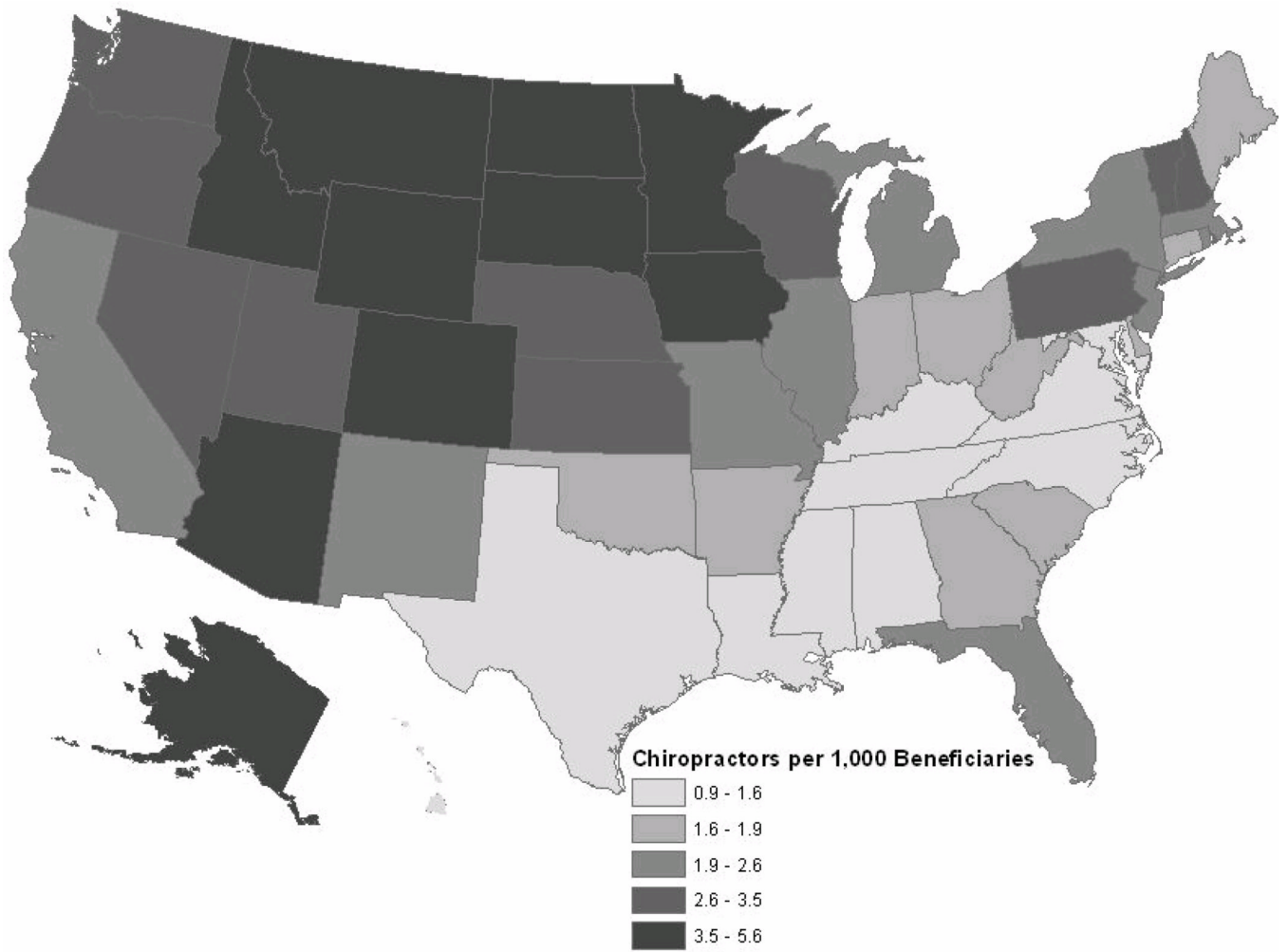


Figure 1. Variation by State of Chiropractic Providers per 1,000 Part B Medicare Beneficiaries, 2007

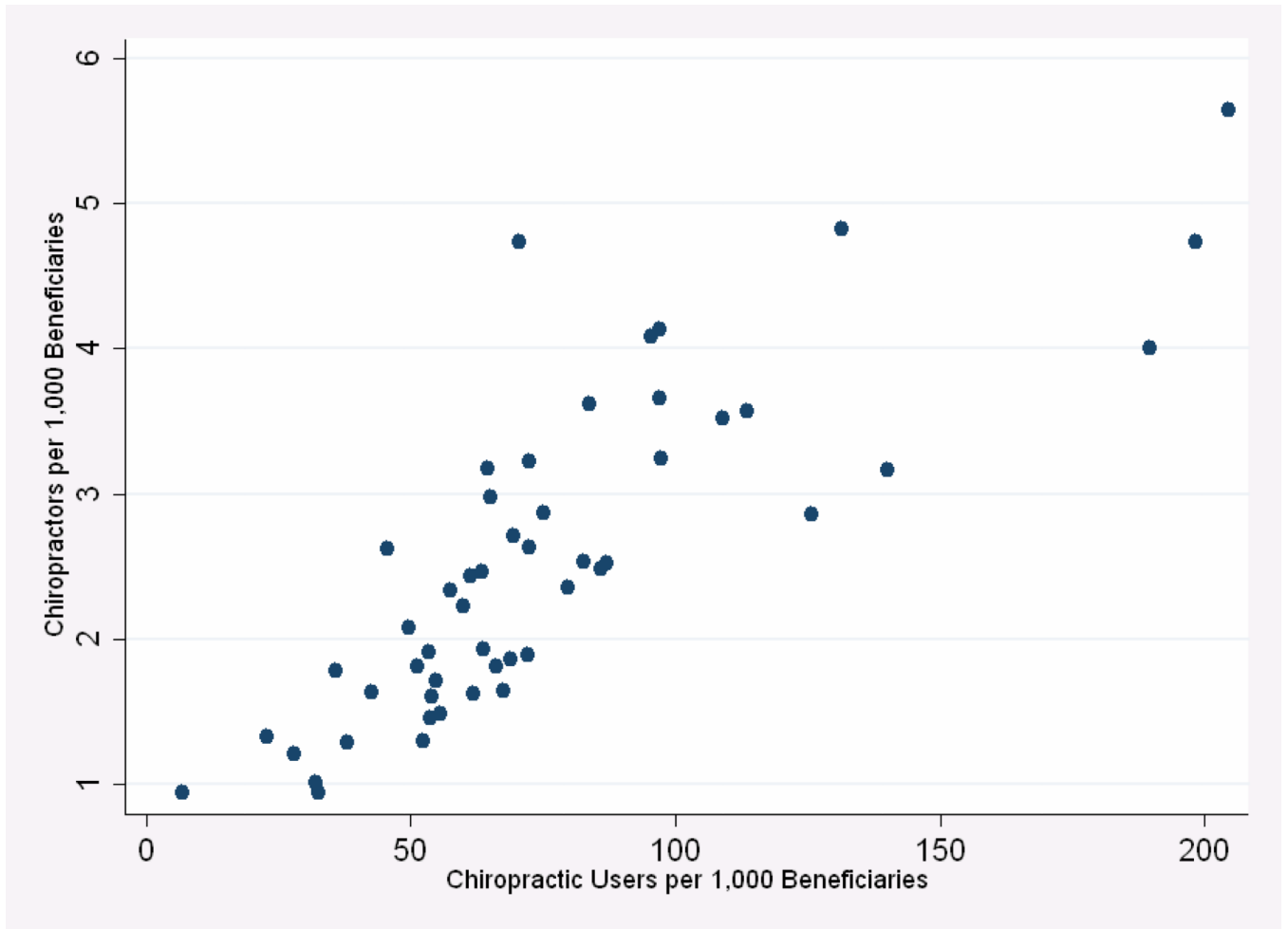


Figure 3. Correlation by State between Availability of DCs and Chiropractic Users, per 1,000 Part B Medicare Beneficiaries, 2007

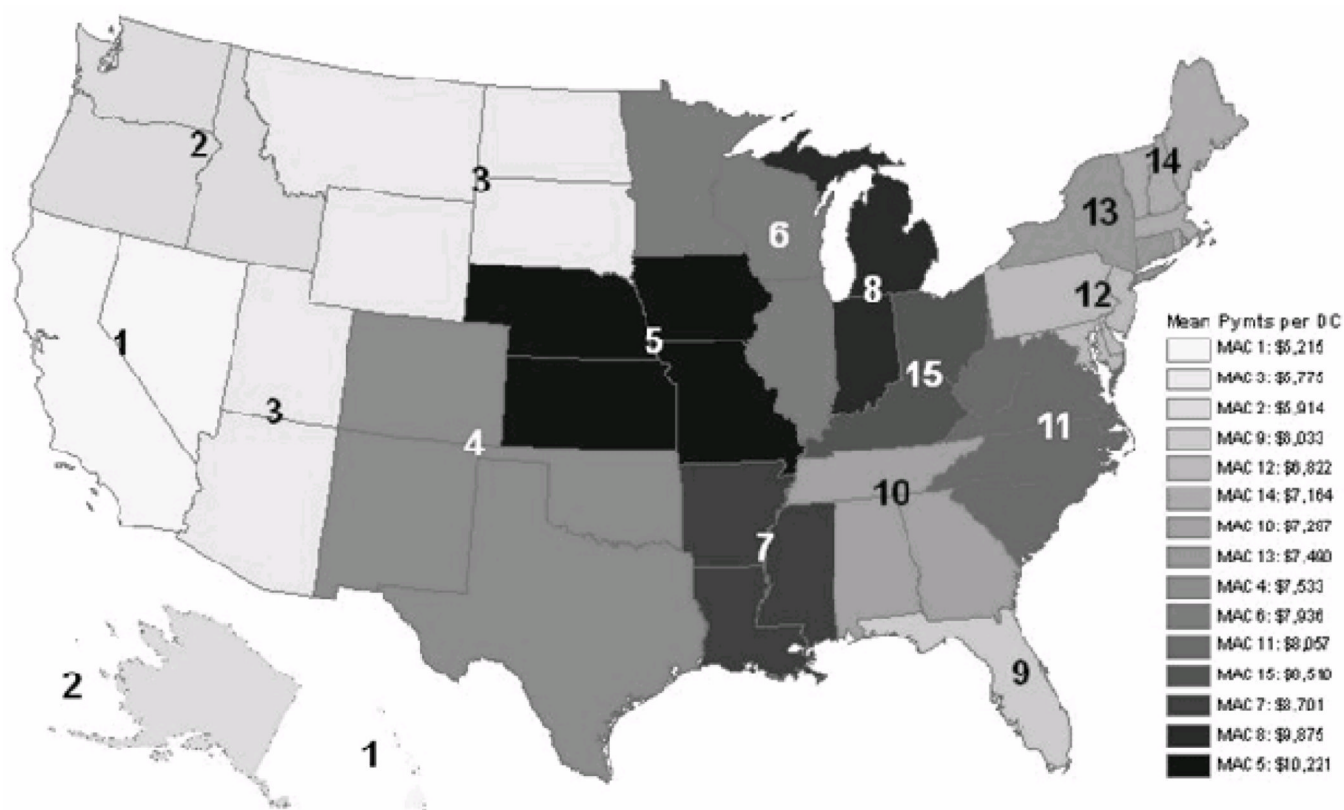


Figure 4. Regional Variations in Expenditures per Chiropractic Physician, 2007. The map illustrates the current Medicare administrative contractor jurisdictions (MACJ) for the 50 US states and the District of Columbia. Not all 2007 claims were administered by MACJ as depicted. Average Medicare payment per DC was calculated by dividing total payments for chiropractic services in the MACJ by the number of Medicare-servicing DCs in that MACJ.

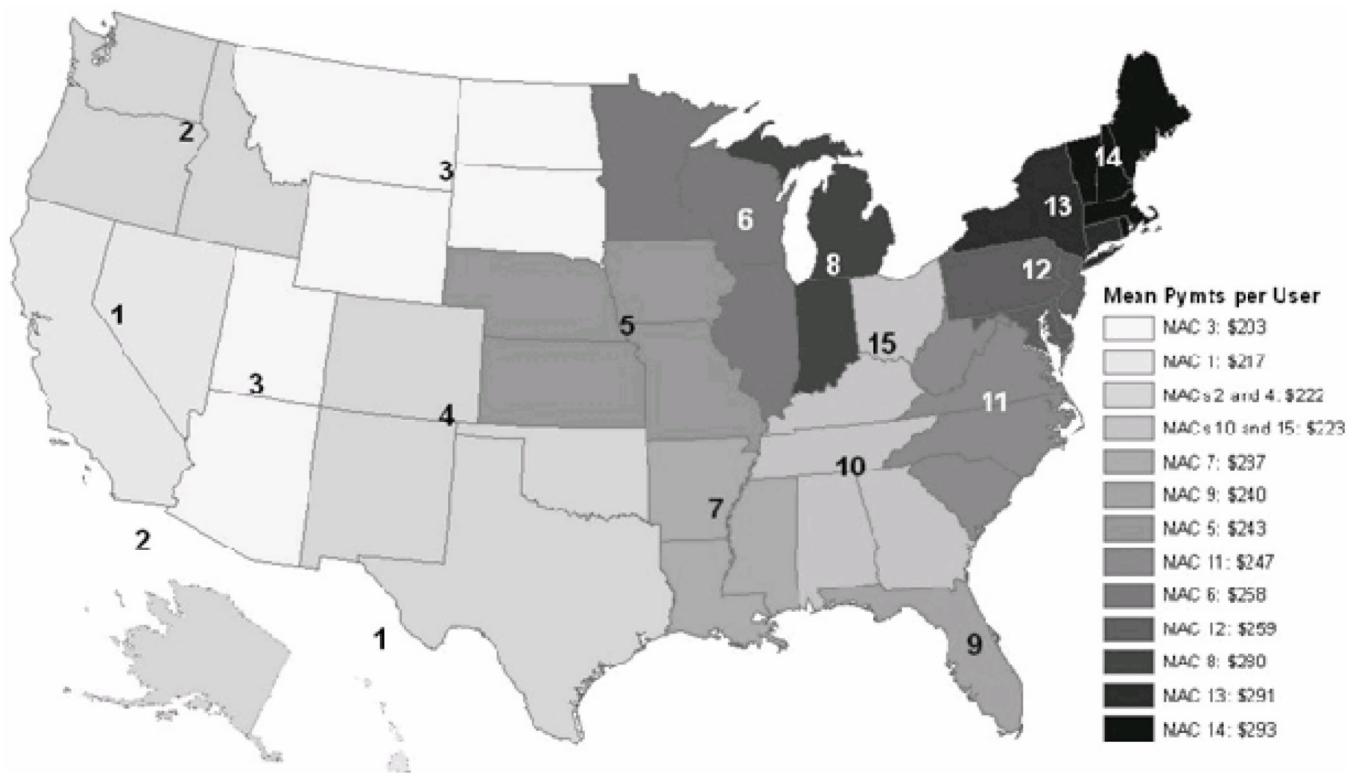


Figure 5. Regional Variations in Expenditures per Chiropractic User, 2007. The map illustrates the current Medicare administrative contractor jurisdictions (MACJ) for the 50 US states and the District of Columbia. Not all 2007 claims were administered by MACJ as depicted. Average Medicare payment per chiropractic user was calculated by dividing total payments for chiropractic services in the MAJC by the number of Part B Medicare Beneficiaries who used chiropractic services in that MACJ.

Table 1
 Availability of DCs under Medicare and Use of Chiropractic by Medicare part B Beneficiaries, 2007

State	DCs	Users*	State	DCs	Users*
Alabama	614	24,735	Montana	387	12,310
Alaska	192	2,860	Nebraska	559	24,580
Arizona	1,674	39,270	Nevada	500	10,160
Arkansas	519	21,355	New Hampshire	440	9,630
California	4,507	111,170	New Jersey	2,156	55,560
Colorado	997	23,030	New Mexico	363	12,275
Connecticut	657	13,155	New York	3,353	90,235
Delaware	197	5,520	North Carolina	1,251	46,090
District of Columbia	40	295	North Dakota	378	15,820
Florida	4,406	110,685	Ohio	2,125	81,155
Georgia	1,248	35,320	Oklahoma	697	25,765
Hawaii	114	1,955	Oregon	782	17,565
Idaho	457	12,115	Pennsylvania	2,866	78,840
Illinois	3063	99,855	Rhode Island	186	3,235
Indiana	1,176	43,010	South Carolina	774	24,815
Iowa	1,427	67,600	South Dakota	550	19,935
Kansas	957	42,315	Tennessee	895	30,190
Kentucky	708	26,860	Texas	2,573	96,165
Louisiana	378	11,980	Utah	419	10,965
Maine	338	11,175	Vermont	204	5,235
Maryland	596	13,770	Virginia	909	26,885
Massachusetts	1,199	28,685	Washington	1,668	50,055
Michigan	2,473	85,470	West Virginia	328	8,560
Minnesota	1,820	49,515	Wisconsin	1,846	57,240
Mississippi	270	9,420	Wyoming	236	5,520
Missouri	1,440	49,710	Total	57,912	1,759,615

* 100% estimates extrapolated from 20% representative sample

Table 2
 Payments for Chiropractic Services Provided under Medicare Part B, by Medicare Administrative Contractor Jurisdiction (MACJ), 2007

MACJ	Included States	Allowed Charges total	Payments: total	per DC**	per User**	per Procedure***
1	California, Hawaii, Nevada	\$36,026,770	\$26,705,261	\$5,215	\$217	\$24.18
2	Alaska, Idaho, Oregon, Arizona, Montana, North Dakota, Colorado, New Mexico,	\$25,168,897	\$18,327,498	\$5,914	\$222	\$21.96
3	Oklahoma,	\$28,979,164	\$21,043,210	\$5,775	\$203	\$21.61
4	Iowa, Kansas, Missouri,	\$47,751,776	\$34,878,862	\$7,533	\$222	\$22.11
5	Illinois, Minnesota, Wisconsin	\$61,853,193	\$44,797,921	\$10,221	\$243	\$22.21
6	Arkansas, Louisiana, Mississippi	\$73,327,324	\$53,400,669	\$7,936	\$258	\$21.47
7	Indiana, Michigan	\$13,879,919	\$10,153,692	\$8,701	\$237	\$21.31
8	Florida	\$49,195,356	\$36,032,193	\$9,875	\$280	\$23.65
9	Alabama, Georgia, Tennessee North Carolina, South Carolina,	\$35,265,383	\$26,579,733	\$6,033	\$240	\$23.80
10	Virginia, West Virginia Delaware, District of Columbia, Maryland, New Jersey,	\$27,366,132	\$20,091,167	\$7,287	\$223	\$22.07
11	Pennsylvania	\$35,542,845	\$26,282,532	\$8,057	\$247	\$22.42
12	Connecticut, New York Maine, Massachusetts, New Hamp-	\$53,457,411	\$39,940,327	\$6,822	\$259	\$24.97
13		\$39,772,086	\$30,036,049	\$7,490	\$291	\$24.43
14		\$22,880,054	\$16,956,394	\$7,164	\$293	\$24.27
15	Kentucky, Ohio	\$32,947,279	\$24,110,031	\$8,510	\$223	\$20.57

* Average Medicare payment per DC was calculated by dividing total payments for chiropractic services in the Medicare administrative contractor jurisdictions (MACJ) by the number of Medicare-servicing DCs in that MACJ.

** Average Medicare payment per chiropractic user was calculated by dividing total payments for chiropractic services in the MAJC by the number of Part B Medicare Beneficiaries who used chiropractic services in that MACJ.

*** Average Medicare payment per procedure was calculated by dividing total payments for chiropractic services in the MACJ by the number of chiropractic procedures allowed in that MACJ.