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Ambulance Services for Medicare Beneficiaries: State Differences in Usage, 2012-2014

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Key Findings

- Ambulance usage for Medicare beneficiaries differed by state by the following measures: percent of Medicare beneficiaries using services, number of miles transported per year and per day, and number of days of services used in a year.
- The highest percentage of Medicare beneficiaries using ground ambulance was in New England whereas the least was in the Mountain states.
- Medicare beneficiaries in the South who used ground ambulance services traveled the most miles in a year and the ones in the West traveled the fewest miles.
- Alabama, Kentucky, South Carolina, Tennessee, and West Virginia were the top five states in ambulance usage by all measures for 2012-2014.
- Alaska, Arizona, Colorado, Hawaii, Nevada, and Utah were the bottom six states in ambulance usage by all measures for 2012-2014.
- Air transportation was most prevalent in the West. However, a small fraction of Medicare beneficiaries used air ambulance service compared to ground transportation.

Introduction

Communities provide ambulance services, a valued public service, for their citizens. These services are managed and financed in different ways. Some places are at risk of scaling back or completely dissolving services. As an example, Letcher County, Kentucky, reduced funding to its ambulance service due to a loss of revenue from coal severance tax, a tax collected on coal extraction.¹ For this study, we want to understand the use of these services and how the use varies across communities in the U.S.

We focused our analysis on whether Medicare beneficiaries use ambulance services equally across the U.S. Improved understanding of how beneficiaries, most of whom are elderly, use these services can be vital information for policymakers who set rules and regulations about access to ambulance services. Past research has evaluated access to ambulance service in specific areas such as rural and frontier areas.^{2,3} To our knowledge, no current research exists on ambulance usage by seniors comparing usage across all states and regions of the U.S.

From aggregate statistics, we saw initial evidence of how Medicare beneficiaries use ambulance services and the regional differences in their usage. In the 2013 National Hospital Ambulatory Medical Care Survey, the Centers for Disease Control and Prevention collected data on patients who visited a hospital emergency department (ED).⁴

Patients 65 years and older represented 15.9% of all ED visits, but they represented 32.8% of those arriving to the ED by ambulance, suggesting that seniors arrived disproportionately more by ambulance than the general population. From the same survey for all ED visits by all ages, 38.3% of ED patients living in the South arrived by ambulance as compared to the West (24.9%), Midwest (22.0%) and Northeast (14.8%).

Methods

We defined Medicare ambulance service for this analysis according to the *Medicare Benefit Policy Manual* and the *Medicare Claims Processing Manual* as:

10 Ambulance Service

The Medicare ambulance benefit is a transportation benefit and without a transport there is no payable service.⁵

10.2 Necessity and Reasonableness

To be covered, ambulance services must be medically necessary and reasonable.... Medical necessity is established when the patient's condition is such that use of any other method of transportation is contraindicated.⁵

10.3 The Destination

An ambulance transport is covered to the nearest appropriate facility to obtain necessary diagnostic and/or therapeutic services (such as a CT scan or cobalt therapy) as well as the return transport.... As a general rule, **only** local transportation by ambulance is covered, and therefore, only mileage to the nearest appropriate facility equipped to treat the patient is covered.⁵

20.1.1 General

Payment under the fee schedule for ambulance services...includes a base rate payment plus a separate payment for mileage.⁶

We used data provided by the Centers for Medicare and Medicaid Services, specifically the Medicare Fee-For-Service Provider Utilization and Payment Data: Physician and Other Supplier Public Use File (Physician and Other Supplier PUF). The file included data for providers that submitted Medicare Part B non-institutional claims during the 2012 through 2014 calendar years.⁷ We extracted the list of all providers in each state and the District of Columbia designated as “Ambulance Service Provider.” This excluded any transportation not reimbursed by Medicare and any provider who serviced 10 or fewer beneficiaries in a year. It also excluded ambulance service provided by a hospital. We did not view this omission as a problem, as on average by state, only 6.5% of hospitals supported ambulance services.⁸ While we may have missed other services offered to Medicare beneficiaries, the data provided us with a snapshot of how Medicare beneficiaries use ambulance services across states for emergencies. In addition, the Medicare insurance program is implemented consistently across the U.S., following the same regulations regardless of place, which provided an advantage in making regional comparisons.

Two types of services (by Healthcare Common Procedure Coding System code) interested us: ground mileage (A0425) and air mileage (A0435, A0436). These were separate payments for mileage per the Medicare Benefit Policy Manual and the Medicare Claims Processing Manual⁶ We aggregated the data to the state level to understand differences in Medicare beneficiary utilization of ambulance services. Initially, the data suggested we could perform a county-level analysis; however, approximately 500 counties (16%) had no ambulance data. The county assignment was based on the address of the ambulance company. To understand counties with no data, we investigated 10 counties in Kentucky with no reported services in one or more of the three years of our study. Reasons for no data included joint ambulance service with neighboring counties, so ambulance data were merged with another county's data. Another reason was an ambulance service reporting that it had ceased operation. For these counties, we found two scenarios. First, in the year of the change to the new service provider, data were missing in the transition year but resumed in the following year. Second, the service was provided by a neighboring county, so the data were included in another county's numbers. Our investigation found no counties lacking ambulance service over the three years of the study. This aggregation proved useful because ambulance services typically do not cross state borders

due to differences in state regulations. Since 2012, work has been done to develop a model for legislatures to resolve the problems of emergency service personnel crossing state boundaries.⁹

The Physician and Other Supplier PUF data included the following:

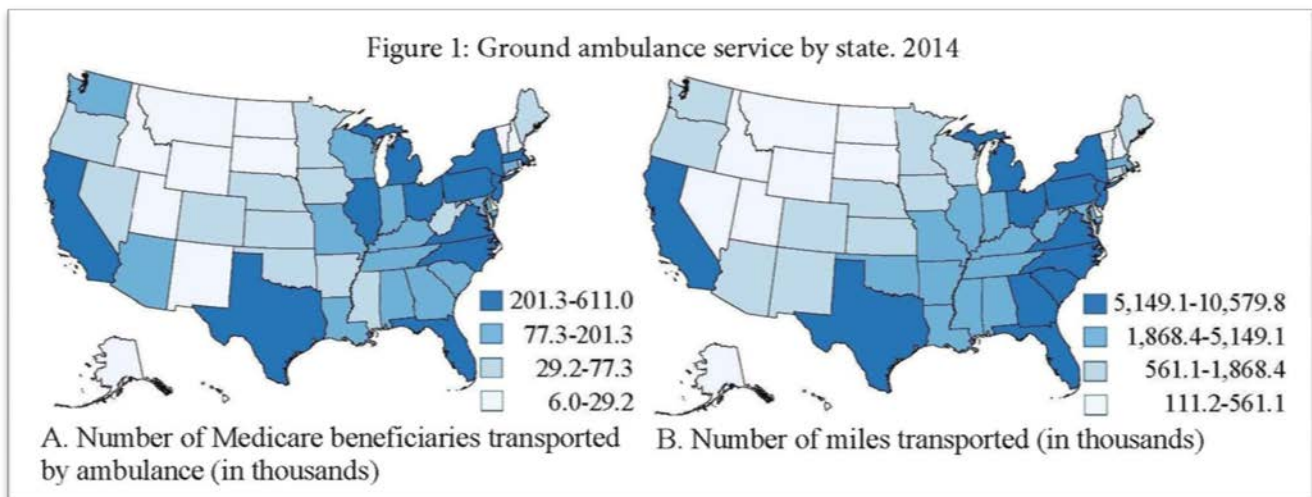
- Number of unique Medicare beneficiaries in a year using a service. (BENE)
- Number of miles beneficiaries are transported via ground or air ambulance service in a year. (MILE)
- Summation over one year of the number of unique beneficiaries using a service per day.
 $\sum_{Day=1}^{365} (Unique\ beneficiaries) = (BENEDAY)$
- Total number of Medicare beneficiaries.¹⁰ (MEDICARE)

We calculated the following ratios for each state per year:

- (1) Number of unique beneficiaries per all Medicare beneficiaries. (BENE/MEDICARE)
- (2) Number of miles transported in a year per unique beneficiary. (MILE/BENE)
- (3) Number of days of service used by beneficiary in a year. (BENEDAY/BENE)
 (For example, five beneficiaries, B1-B5, used an ambulance in one year. Day 1, B1 and B2 used an ambulance (B1+B2), Day 2 (B3+B4), Day 3 (B2+B3+B5) so BENEDAY=2+2+3=7.
 BENE=B1+B2+B3+B4+B5=5. On average in one year, the beneficiaries used ambulance services 1.4 days, 7/5=1.4)
- (4) Number of miles transported per day per unique beneficiary. (MILE/BENEDAY)

Findings

For 2012-2014, Medicare beneficiaries traveled in ambulances for medical emergencies approximately 140 million miles a year for ground transport, 3.4 million miles by helicopter transport, and 2.0 million miles in planes. These services were used by 6.7 million, 56,000 and 9,000 unique beneficiaries in a year, respectively. Figure 1 illustrates the number of unique beneficiaries in a year and the number of ground miles they traveled for Medicare reimbursement by quartile by state in 2014. Most beneficiaries and miles traveled (dark blue is the highest quartile) were in the most populated states: California, Texas, and the eastern states. The fewest beneficiaries and the fewest number of miles transported were in the northern Mountain states.



For our analysis, our interest was in the usage rates by state, specifically how ambulance usage varied by state per Medicare beneficiary who used an ambulance. Below is a summary of the measures described above at the state level for ground transportation:

- On average per year, 12% of Medicare beneficiaries used an ambulance for an emergency with a range of 5% to 25%.

- Annual ground transportation usage ranged from 8 to 42 miles per beneficiary with an average of 22 miles traveled.
- Average number of days of services used by beneficiaries was 1.76 with a range of 1.4 to 2.7 days.
- Daily number of miles ranged from 5 to 25 miles per beneficiary with an average of 12 miles.

Table 1 highlights the mean state-level usage measures (described above) summarized by the nine Census divisions grouped by the four Census regions: Northeast, Midwest, South, and West. We use the Census divisions in the table to illustrate the heterogeneity of ambulance usage across the U.S. The states included in each division are listed in the table footnote. As shown in row one, the greatest percentage of Medicare beneficiaries using ground ambulance service in a year was in the New England division (18%), and the lowest was in the Mountain division (8%). The greatest number of miles transported per beneficiary in a year was in the East South Central division (32 miles). The fewest miles traveled were in the Pacific division (15 miles). While more Medicare beneficiaries in the New England division used ambulance services, they traveled fewer miles (19 miles) in a year than in the East South Central division which had fewer beneficiaries (13%) but traveled more miles (32 miles). The third row in Table 1 shows the number of days a Medicare beneficiary used ground ambulance services in a year. The Mountain and the West North Central divisions had fewer days (1.5 days) than the other divisions, with the Middle Atlantic having the greatest number of days at approximately 2.0 a year.

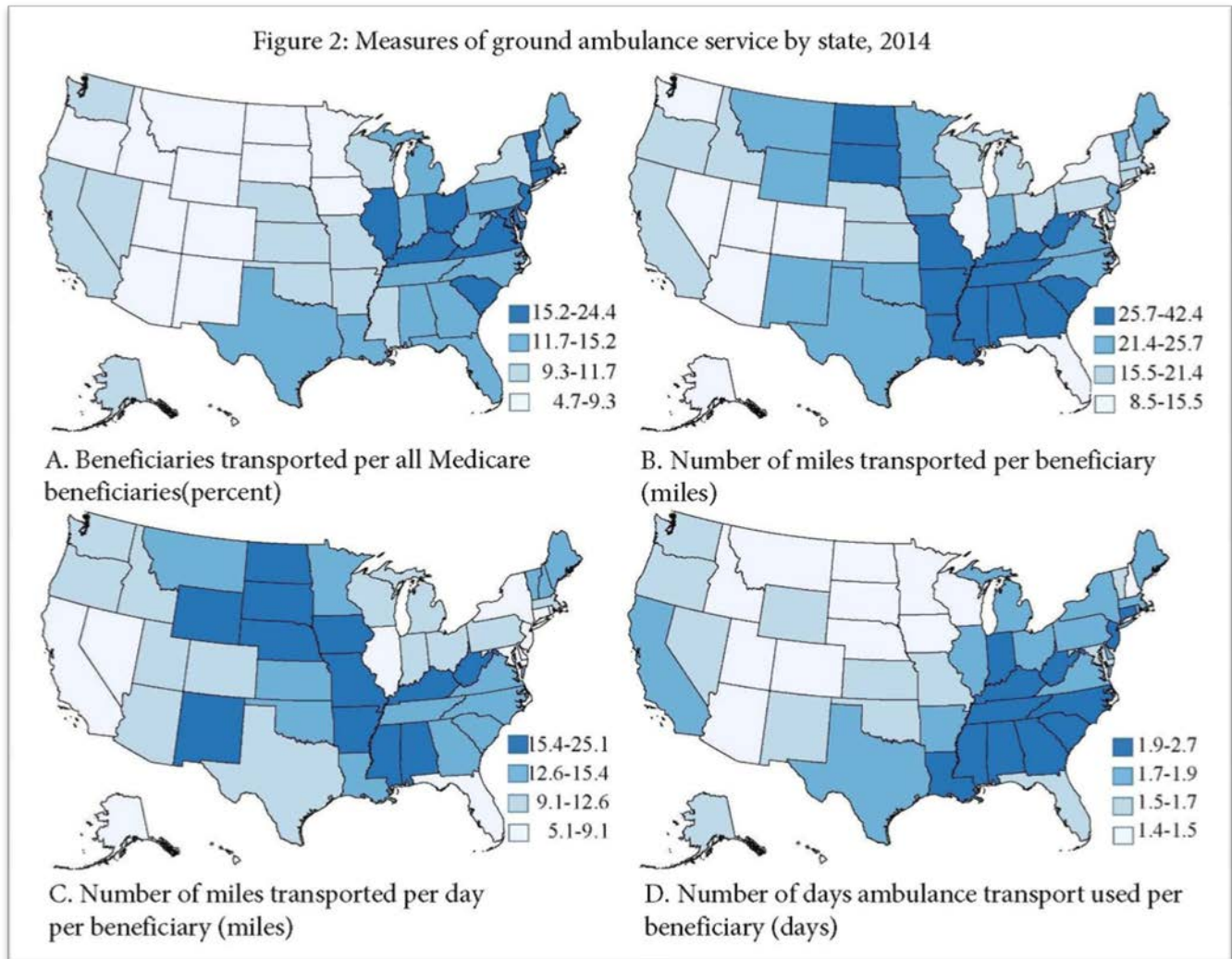
The miles presented in row two of Table 1 are cumulative values for the year. Row four is an estimate of the number of miles transported per day per beneficiary. The West North Central division had the most miles traveled per day per beneficiary (17 miles). This division had a lower beneficiary usage rate (9%), but since each beneficiary traveled 25 miles per year, it resulted in an average of 17 miles per day. In contrast, the Middle Atlantic division had a higher usage rate by beneficiaries (13%), but the number of miles traveled was lower at 18 miles, which averaged 9 miles per beneficiary per day.

Table 1. Ground Ambulance Service: Mean measures across states by Census division per year, 2012-2014 (top in green, bottom in blue)

Calculated Mean Ratios	Northeast		Midwest		South			West	
	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
Beneficiaries per all Medicare beneficiaries	18%	13%	14%	9%	15%	13%	13%	8%	9%
Miles transported per beneficiary	19.11	18.31	19.43	25.38	24.21	32.47	26.53	18.05	14.75
Number of days of service per beneficiary	1.76	2.14	1.79	1.48	1.98	2.06	1.82	1.48	1.62
Miles transported per day per beneficiary	11.04	8.55	10.79	17.24	11.67	15.75	14.64	12.17	9.14

Census divisions (columns): 1=CT, ME, MA, NH, RI, VT; 2=NJ, NY, PA; 3=IL, IN, MI, OH, WI; 4=KS, MN, MO, NE, ND, SD; 5=DE, DC, FL, GA, MD, NC, SC, VA, WV; 6=AL, KY, MS, TN; 7=AR, LA, OK, TX; 8=AZ, CO, ID, MT, NV, NM, UT, WY; 9=AK, CA, HI, OR, WA

The maps in Figure 2 depict an example of the level of use by beneficiaries by state for each of the measures described above (dark blue is the highest quartile) for 2014. Distinct patterns are evident as observed above. Figure 2A illustrates that the greatest percentage of Medicare beneficiaries using ambulance services was in northeastern states such as Connecticut and Ohio, and the lowest percentage was in the mountain states such as Montana and Colorado. Additionally, beneficiaries in the southeastern states such as Kentucky and Alabama traveled further per year (Figure 2B) and per day (Figure 2C) and received transportation (Figure 2D) more often than other areas of the U.S. Furthermore, the West North Central states such as North and South Dakota were transported more miles per day per beneficiary (Figure 2C) as compared to other states, but beneficiaries in these states traveled fewer days per year (Figure 2D).



We compared usage measures by state over the three years of the study. Five states, Alabama, Kentucky, South Carolina, Tennessee, and West Virginia, ranked in the top quartile (darkest blue) for all usage measures. These usage rates were very different from those of Alaska, Arizona, Colorado, Hawaii, Nevada, and Utah, which ranked in the bottom quartiles for ambulance usage by all measures.

One might argue that beneficiaries in western or more rural states used air transportation in place of ground transportation. Air transportation was more prevalent in less densely populated areas where beneficiaries were transported longer distances. In 2014, the top five states in terms of the average number of miles per beneficiary per day in helicopter (rotary) were: Hawaii, Wyoming, Utah, Nebraska, and Arizona; for plane (fixed wing) they were: Alaska, North Dakota, Wyoming, Hawaii, and Kansas. The miles per day traveled averaged up to 190 miles for

helicopter and 348 miles for fixed wing. While these distances are great, the number of Medicare beneficiaries served by air transportation for emergency services is small compared to ground transportation. The number of states reporting air transport was limited: 42 states reported helicopter service, and 28 states reported plane service in 2014.

Conclusion/Discussion

Ambulance usage by Medicare beneficiaries differs across the U.S. The New England states had the greatest percentage of Medicare beneficiaries using ground ambulance services. In addition, the greatest miles traveled in a year were in the East South Central states. The West North Central and Mountain states utilized ambulance services less frequently. Moreover, ground ambulance services represented the largest category of reimbursed transport service, with air service by helicopter and plane being only a small part of Medicare emergency transportation reimbursements.

Table 2. Ground Ambulance Service: Mean characteristics across states by Census division per year, 2012-2014 (top in green, bottom in blue)

Calculated Mean Ratios	Northeast		Midwest		South			West	
	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
Population density per square mile (no DC) ¹¹	475.6	630.2	194.8	41.0	275.5	105.4	78.0	26.5	118.6
% Population living in rural area (no DC) ¹⁰	31.9%	12.9%	23.3%	32.6%	25.8%	41.7%	29.9%	21.3%	16.4%
% Households 65 years and over, poverty rate below 100% ¹²	7.9%	9.4%	8.5%	8.6%	9.2%	11.6%	10.9%	8.6%	8.0%
% 65 years and over with disability ¹²	34.2%	34.0%	35.6%	34.7%	36.5%	42.1%	41.7%	36.5%	37.5%

Census divisions (columns): 1=CT, ME, MA, NH, RI, VT; 2=NJ, NY, PA; 3=IL, IN, MI, OH, WI; 4=KS, MN, MO, NE, ND, SD; 5=DE, DC, FL, GA, MD, NC, SC, VA, WV; 6=AL, KY, MS, TN; 7=AR, LA, OK, TX; 8=AZ, CO, ID, MT, NV, NM, UT, WY; 9=AK, CA, HI, OR, WA

In our future research, we wish to comprehend the reasons for regional differences in ambulance use. In Table 2, we present characteristics one would hypothesize could affect ambulance usage rates. Our first thought was to look at differences in the “ruralness” of a state as it may affect the distances ambulances had to travel. Rows one and two show the mean population density per square mile and the percentage of the population living in a rural area.¹³ The East South Central division, which is less densely populated than most other divisions, had the greatest percentage of its residents living in rural areas. As presented in Table 1, this area’s miles transported per beneficiary per year (32 miles) was higher than other divisions. On the other hand, the lowest population density Mountain division had a smaller percentage of residents living in rural areas and ambulances traveled fewer miles per beneficiary per year (18 miles). Shown in row three, the greatest percentage of households 65 years and older with a poverty rate below 100% was in the East South Central division, which had above average ambulance usage in days per year (2.06 days). Perhaps low-income seniors use more ambulance services. However, the New England division had the lowest rate of seniors below the poverty line, but it had the highest percentage of beneficiaries using services (18%).

In the fourth row, we show the percentage of residents 65 years and older with a disability, which may be associated with greater ambulance use. Again, the East South Central division had the greatest rate of disabled seniors and above average usage in days per year. In contrast, the Middle Atlantic division had the lowest percentage of disabled seniors while at the same time having the highest number of days ambulance services were used. Further study is required to understand the variation in ambulance use in the U.S., as these four characteristics do not fully account for differences we would expect. We would like to expand the study to patients of all ages and include other reasons for transportation such as non-emergency hospital-to-hospital transfers. In order to expand our work, we will explore more comprehensive disaggregated data sources. As stated above, our analysis did not include ambulance services provided by hospitals, which was a limitation of the data. As we measure usage in more geographic detail, we need to revisit the exclusion of hospital-based ambulance services in our analysis and see whether adding these services would alter our usage rates.

From a policy making perspective, knowing where policy will have the largest impact is important. We looked at the states with the greatest number of Medicare beneficiaries in 2014: California (5.5 million), Florida (3.9 million), and Texas (3.5 million). These three states represented 24% of all beneficiaries. Interestingly, none of these states was in the top quartile (darkest blue) for any measure presented in Figure 2 for 2014. Texas led these three states in the number of miles transported (Figure 2B) and the number of days used per beneficiary (Figure 2D). Florida ranked in the top 50% of Medicare beneficiaries using ambulance services (Figure 2A), but it ranked in the bottom quartile for miles traveled (Figure 2B). California ranked in the second quartile for miles traveled (Figure 2B) and percentage of beneficiaries using ambulance services (Figure 2A). While this state ranked lower in these categories, it was in the third quartile for the average number of days beneficiaries used the services. Both Texas and California ranked above the national average of 1.76 days for the number of days beneficiaries used ambulance services, at 1.84 and 1.90, respectively.

Implications/Recommendations

Ambulance service is an important public service in communities. As seen in our study, some communities' seniors relied disproportionately more on ambulance service than seniors in other communities. Several studies have focused on the availability of ambulance services in rural areas or frontier areas of the U.S. Our work took a state-level look at usage across the U.S., the first study to our knowledge to do so. We discovered that not all Medicare beneficiaries used ambulance services equally across the states. For instance, two largely rural states, Kentucky and Utah, used ambulance services very differently. From our study, we believe policymakers and researchers need to consider differences across the regions of the U.S. when evaluating reimbursement and rules about usage. When looking at changes in the supply of ambulance services in an area, we need to consider the current rate of usage of those services. An area which relies more heavily on these services would react differently to a change in policy than an area with lesser usage.

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