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AMBULANCE PROVIDERS

Costs and Medicare Margins Varied Widely; Transports of Beneficiaries Have Increased

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Why GAO Did This Study

Since 2004, Congress has authorized supplemental temporary payments, called “add-on” payments, to augment Medicare fee schedule payments to ambulance providers. The add-on payments increased payments for transports in urban, rural, and super-rural (the least densely populated) areas by \$175 million in calendar year 2011, according to the Medicare Payment Advisory Commission. In 2007, GAO reported a decline in transports by beneficiaries in super-rural areas and recommended that the Centers for Medicare & Medicaid Services (CMS) monitor beneficiary use of ambulance transports to ensure access to services, particularly in super-rural areas. The Middle Class Tax Relief and Job Creation Act of 2012 required GAO to update the 2007 report. GAO examined, for 2010 (the most recent year complete data were available when GAO began the study), (1) ground ambulance provider costs for transports, (2) the relationship between Medicare payments and provider costs, and (3) beneficiary use of ground ambulance transports. To do this work, GAO sent a survey to a sample of eligible providers based on the 2007 report sample asking for provider costs and characteristics. The sample is representative of all ground ambulance providers that billed Medicare in 2003 and 2010, were operational in 2012, and did not share costs with nonambulance services or air ambulance services. GAO also performed a regression analysis to examine factors that affect costs, analyzed Medicare claims and enrollment data, and interviewed representatives of ambulance provider organizations. CMS reviewed a draft of this report and had no comments.

View [GAO-13-6](#). For more information, contact James C. Cosgrove, (202) 512-7114 or cosgrovej@gao.gov.

AMBULANCE PROVIDERS

Costs and Medicare Margins Varied Widely; Transports of Beneficiaries Have Increased

What GAO Found

Ground ambulance providers’ costs per transport for 2010 varied widely. The median cost per transport for the providers in GAO’s sample was \$429, ranging from \$224 to \$2,204 per transport. Provider characteristics that affected cost per transport were volume of transports (including both Medicare and non-Medicare transports), intensity of transports (the proportion of Medicare transports that were nonemergency), and the extent to which providers received government subsidies. Higher volume of transports, higher proportions of nonemergency transports, and lower government subsidies were associated with lower costs per transport. Providers reported that personnel cost was the largest cost component in their 2010 total costs and the biggest contributor to increases in their total costs from 2009 to 2010.

The median Medicare margin, including add-on payments, was about +2 percent in 2010 (meaning that providers’ Medicare payments per transport exceeded their overall costs per transport) for the providers in GAO’s sample, but Medicare margins varied widely for those providers. When GAO removed the add-on payments, payments decreased for the providers in the sample, resulting in a lower median Medicare margin of -1 percent. Due to the wide variability of Medicare margins for providers in the sample, GAO cannot determine whether the median provider among the providers in the population that the sample represents had a negative or positive margin. The median Medicare margin with add-on payments ranged from about -2 percent to +9 percent, while the median Medicare margin without add-on payments ranged from about -8 percent to +5 percent.

Ground ambulance transports for all Medicare fee-for-service beneficiaries grew 33 percent from 2004 to 2010. Transports by beneficiaries nationwide grew the most in super-rural areas (41 percent) relative to urban and rural areas. The increase overall is attributable primarily to an increase of 59 percent over this period in basic life support (BLS) nonemergency transports, which include noninvasive interventions, such as administering oxygen. In comparing this growth by service area, BLS nonemergency transports in super-rural areas grew the most—by 82 percent. Representatives from an ambulance provider organization suggested the increase in transports may be from increased billing by local governments. Some local governments that used to provide Medicare transports free of charge may bill Medicare now because of increased budgetary pressures. The Department of Health and Human Services Office of Inspector General has cited improper payments—which can be the result of billing mistakes—as one potential cause for increases in Medicare ambulance utilization and has stated that the Medicare ambulance transport benefit is highly vulnerable to abuse, with some payments for transports not meeting program requirements.

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Abbreviations

AAA	American Ambulance Association
ALS	advanced life support
BLS	basic life support
CMS	Centers for Medicare & Medicaid Services
EMS	emergency medical services
GPCI	geographic practice cost index
HHS	Department of Health and Human Services
MSA	metropolitan statistical area
NASEMSO	National Association of State EMS Officials
NPI	National Provider Identifier
OIG	Office of Inspector General
PTAN	Provider Transaction Access Number

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United States Government Accountability Office
Washington, DC 20548

October 1, 2012

The Honorable Max Baucus
Chairman
The Honorable Orrin G. Hatch
Ranking Member
Committee on Finance
United States Senate

The Honorable Fred Upton
Chairman
The Honorable Henry Waxman
Ranking Member
Committee on Energy and Commerce
House of Representatives

The Honorable Dave Camp
Chairman
The Honorable Sander Levin
Ranking Member
Committee on Ways and Means
House of Representatives

Since 2004, Medicare payments to ambulance providers have been augmented by supplemental temporary payments. These supplemental payments, called “add-on” payments, increased payments for ground ambulance transports by \$175 million for calendar year 2011, according to estimates from the Medicare Payment Advisory Commission. In calendar year 2010, the most recent year for which complete data were available when we began this study, ambulance providers furnished almost 16.6 million ground ambulance transports for approximately 5.1 million Medicare fee-for-service beneficiaries. The Centers for Medicare & Medicaid Services (CMS), which administers the Medicare program, paid ground ambulance providers approximately \$5.2 billion for these transports, which includes the add-on payments.

We reported in 2007 that the costs of providing ground ambulance transports varied greatly across providers, as did Medicare margins (the relationship between the cost of providing a transport and the Medicare payment for a transport).¹ This variation reflected differences in provider and community characteristics, such as the provider's volume of transports and the service area it predominantly serves. We also found that in super-rural areas (where the population density is the lowest of the rural areas), the number of ground transports per 1,000 Medicare beneficiaries declined from 2001 to 2004. We recommended that CMS monitor the utilization of ambulance transports to ensure that beneficiaries had access to services, particularly in super-rural areas. Subsequently, Congress increased payments for urban and rural transports.²

Because Congress would like information about the adequacy of Medicare payments to ambulance providers and the need to continue authorizing the add-on payments, the Middle Class Tax Relief and Job Creation Act of 2012 required us to update the information in our 2007 report.³ We examined (1) 2010 ground ambulance providers' costs for furnishing transports, (2) the relationship between 2010 Medicare payments and ground ambulance providers' costs, and (3) Medicare beneficiaries' use of ground ambulance transports in 2010.

¹GAO, *Ambulance Providers: Costs and Expected Medicare Margins Vary Greatly*, [GAO-07-383](#) (Washington, D.C.: May 23, 2007). CMS defines urban transports as those that originate within metropolitan statistical areas (MSA) and New England county metropolitan areas. It defines rural transports as those that originate in areas that are outside of MSAs and New England county metropolitan areas, as well as transports that originate from certain areas that are within MSAs and New England county metropolitan areas but that are isolated from central areas by distance or other features, such as mountains. CMS defines super-rural transports as those that originate in the bottom 25 percent of rural areas as defined by population density. For purposes of the add-on payment policies, super-rural transports are a type of rural transport.

²Medicare Improvements for Patients and Providers Act of 2008, Pub. L. No. 110-275, § 146, 122 Stat. 2494, 2548 (amending Social Security Act § 1834(l)(13)).

³Pub. L. No. 112-96, § 3007(d), 126 Stat. 156, 190. In addition, the act directed the Medicare Payment Advisory Commission to study Medicare ambulance payments, including the appropriateness and effects of the add-on payments, and provide recommendations for reforming the ambulance fee schedule, as appropriate. Pub. L. No. 112-96, § 3007(e), 126 Stat. 190.

To examine 2010 ground ambulance providers' costs for transports,⁴ in April 2012, we sent a web-based survey to a random sample of 294 eligible ambulance providers to collect data on their costs, revenues, transports, and organizational characteristics in 2010.⁵ We received completed surveys from 154 providers, for a response rate of 52 percent.⁶ Our sample was based on our 2007 report's sampling frame, which was representative of all ground ambulance providers that billed Medicare in 2003.⁷ Because we found previously that cost data from ambulance providers that shared operational costs with other services, such as those provided by fire departments or air ambulance services, were unreliable, we excluded these providers from our current sample, as was done in the 2007 report; however, unlike the sample for the 2007 report, we also excluded providers that shared operational costs with a hospital.⁸

⁴In our 2007 report and for this report, we limited our review to ground ambulance providers and transports. For purposes of this report, we distinguished an ambulance provider and its service location(s) by the unique combination(s) of its Medicare National Provider Identifier(s) (NPI) and Provider Transaction Access Number(s) (PTAN), which are used by providers to bill Medicare.

⁵Because 2010 was the most recent year for which complete Medicare claims data were available from CMS when we began this study, we asked providers to report cost and transport data for 2010 in the survey. Most providers in our sample submitted relevant information regarding one service location; however, some providers submitted relevant information regarding multiple service locations. See app. I for more information on how we accounted for multiple service locations in our analysis.

⁶We received surveys from 172 providers; however, 11 of these providers were excluded because they reported in their surveys that they shared costs with nonambulance services. We also excluded 3 providers that were not able to provide total cost or total transports information and 1 provider that was not confident in the total cost amount provided. We also excluded 3 providers with costs per transport that were outliers—more than three standard deviations from the mean of the lognormal distribution. We did not obtain complete information for all survey respondents. Therefore, some analyses do not include all 154 respondents.

⁷While CMS uses the term “ambulance providers” to refer to institution-based organizations and the term “ambulance suppliers” to refer to non-institution-based or freestanding organizations, for purposes of this report, we will refer to all organizations that provide ambulance services as ambulance providers.

⁸In the 2007 report, certain providers, including hospital-based providers, were included in the analysis if they said they were able to report costs separately from other services; however, all fire departments were excluded. We found the costs reported by these and other providers with shared costs may reflect inconsistent methods for separating staff time and other resources across different services, raising questions about the reliability of data from providers with shared costs. Because the populations represented by the samples we used for our current report and our 2007 report differ, the results of the two reports are not directly comparable.

Therefore, our sample is representative of the population of approximately 2,900 ground ambulance providers that billed Medicare in 2003 and in 2010, were still operational in 2012, and did not share costs with nonambulance services or air ambulance services (an estimated 26 percent of the ambulance industry in 2010). We selected these providers because they do not have to estimate costs across multiple business lines and represent mature organizations, void of potentially expensive start-up costs.

Using the survey data, we calculated providers' costs per transport and examined how costs per transport varied across providers.⁹ We also determined which of the following cost components most contributed to providers' total cost, as well as to increases in total cost: personnel; vehicle;¹⁰ fuel; medical supplies, equipment, and communications; building or facility; overhead and administration; or other.¹¹ We performed a regression analysis to investigate the relationship between providers' total cost and characteristics such as service area (urban, rural, or super-rural), volume of transports, mix and intensity of Medicare transports,¹² level of government subsidies received, use of volunteer staff,¹³ and type of ownership. We divided predicted total cost by total transports to derive cost per transport.

To ensure the reliability of the survey data, we incorporated internal data checks in the survey instrument, contacted providers that submitted inconsistent or incomplete data, and excluded three providers with

⁹Because providers do not generally track their costs by Medicare and non-Medicare, we obtained information for providers' total costs. For the providers in our sample, we calculated providers' costs per transport for all of their transports and assumed that this cost was similar for Medicare cost per transport and non-Medicare cost per transport.

¹⁰Vehicle costs included lease and maintenance.

¹¹This list of cost components was included in the survey, and providers indicated the percentage that each component contributed to their total cost.

¹²The mix of transports refers to the proportion of Medicare advanced life support (ALS) transports provided (as opposed to basic life support [BLS] transports), while the intensity of transports refers to the proportion of Medicare nonemergency transports provided (as opposed to emergency transports). We used Medicare claims data to determine the mix and intensity of transports covered by Medicare.

¹³For purposes of this report, volunteer staff refers to staff who respond to emergencies and staff ambulance transports (e.g., field staff) but who are not paid or are paid a nominal stipend.

reported costs per transport that were more than three standard deviations from the mean of the lognormal distribution for survey respondents. Using Medicare claims data for all survey recipients, we were able to test for potential nonresponse bias for the characteristics contained in the claims data. The nonresponse analysis did not find any statistically measurable bias that would affect our analyses of providers' costs.

The survey data had some important limitations. We assumed that providers' total cost per transport was equivalent to their Medicare cost per transport. This may introduce some bias since the mix and intensity of ambulance services used by Medicare beneficiaries may be different than those used by non-Medicare beneficiaries, and this could affect providers' Medicare cost per transport. Similarly, providers generally do not track costs by urban, rural, or super-rural transports. Therefore, we classified providers by their predominant service area and there is likely to be some measurement error in identifying the full effect of service area on costs.¹⁴ Cost data reported in the survey are subject to some variability depending on the accounting methodology used by ambulance providers.¹⁵ In addition, the survey data were self-reported. Also, the small sample size and variability of self-reported costs limit the precision with which we can generalize our results.

To provide context for the factors associated with the costs of providing ambulance services, we reviewed wage and workers' compensation insurance data from the Bureau of Labor Statistics, health insurance data

¹⁴As we did in the 2007 report, we classified providers as super-rural if 60 percent or more of their Medicare transports in 2010 originated in a super-rural zip code. We classified providers as rural if they did not meet the super-rural definition and 60 percent or more of their Medicare transports in 2010 originated in rural or super-rural zip codes. We classified providers as urban if they did not meet the rural or super-rural classifications.

¹⁵Providers that use cash-basis accounting record receipts and outlays when cash is received or paid, without regard to when the activity occurs that results in revenue being earned, resources consumed, or liabilities increased. Providers that use accrual-basis accounting record receipts and outlays during the period in which resources are consumed or liabilities are increased, rather than when obligations are made or cash flows occur. For example, a provider that uses cash basis accounting would likely record the full cost of purchasing a new ambulance at the time it was purchased, whereas a provider that uses accrual basis accounting would likely spread the cost of purchasing the ambulance over a number of years. According to the American Ambulance Association (AAA), many private (for-profit and nonprofit) providers use accrual basis accounting, while government providers vary in the accounting method they use.

from the Kaiser Family Foundation, and fuel data from the Department of Energy, and interviewed an official of the National Association of State EMS Officials (NASEMSO).

To determine the relationship of 2010 Medicare payments to ground ambulance providers' costs, we used Medicare claims data to calculate Medicare payments in 2010 for the providers in our sample, and we calculated Medicare margins—the percentage difference between the Medicare payment per transport and cost per transport. Using the Medicare ambulance fee schedule and claims data, we calculated each provider's Medicare payment per transport with and without the add-on payments. We then calculated the Medicare margin for each provider by subtracting its cost per transport (as calculated in the methodology for objective 1) from its Medicare payment per transport and dividing this amount by its Medicare payment per transport.

To examine Medicare fee-for-service beneficiaries' use of ground ambulance transports in 2010, we analyzed 2010 Medicare claims and beneficiary enrollment data to calculate the number of transports per 1,000 beneficiaries. We also analyzed 2004 Medicare claims and beneficiary enrollment data to determine the change in beneficiaries' use of ground ambulance transports from 2004 to 2010. In addition, we interviewed officials of the American Ambulance Association (AAA). We assessed the reliability of Medicare claims and enrollment data and found these data sufficiently reliable for our purposes. (See app. I for additional details about our scope and methodology.)

We conducted this performance audit from April 2012 to September 2012 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

Ground ambulance services are provided by a wide range of organizations that differ in organizational structure, staffing types, types of transports offered, and revenue sources. Medicare payments for ambulance services are made up of two components: a service-level payment for the type of transport provided and a mileage payment.

Diversity of the Ambulance Industry

Providers may be affiliated with an institution (such as a hospital or a fire department) and share resources and operational costs, or they may be independent and freestanding. In addition, providers may be for-profit, nonprofit, or government-based. Providers may rely heavily on volunteers, use both volunteers and paid staff, or use only paid staff. Providers may specialize in nonemergency transports, or offer both nonemergency and emergency (those responding to a 911 call) transports. Also, some providers offer only basic life support (BLS) services, while others offer advanced life support (ALS) services. ALS services require the skills of a medical technician who is more specialized and trained, such as a paramedic, than the technician who can provide BLS services.¹⁶

Revenue sources depend on the resources available in communities and communities' choices about funding ambulance services. They may include community tax support, charitable donations, in-kind contributions, state and federal grants, subscription programs,¹⁷ and payments from Medicare or Medicaid and private health insurance companies (including patient copayments or coinsurance). The mix and amount of revenues available may vary. Communities differ by the level of tax support for specific services, such as ensuring a minimum level of service in remote areas, sophistication of transport vehicles, and the training level of the staff.

Medicare Ambulance Payment Policy

Medicare pays ambulance providers through a national fee schedule. (See fig. 5 in app. I for an overview of the Medicare ambulance payment formula.) Payments have two components:

¹⁶BLS services include basic, noninvasive interventions, such as administering oxygen; ALS services involve invasive or specialized care, such as administering drugs intravenously.

¹⁷A subscription program is an arrangement in which an ambulance provider is paid an annual fee for providing emergency transportation for a community.

-
1. service-level payment: for the type of transport provided, such as an ALS Level 1 transport;¹⁸ and
 2. mileage payment.¹⁹

Currently included in Medicare's payments to ground ambulance providers are different levels of add-on payments for urban, rural, and super-rural transports. The add-on payments increase payments for urban and rural transports by 2 and 3 percent, respectively. There is also an add-on payment applicable to super-rural transports, consisting of the 3 percent rural amount and an additional increase of 22.6 percent for a portion of the super-rural payment.²⁰ The add-on payments were originally implemented under the Medicare Prescription Drug,

¹⁸The service-level payment is determined by a base rate that is adjusted to account for the mix and intensity of the service using a constant multiplier called the relative value unit. The service-specific amount is then adjusted by an estimate of the different costs of operating ambulance services in different regions of the country. Under the Medicare program, there are seven levels of ambulance transports: (1) BLS nonemergency transports, (2) BLS emergency transports, (3) ALS Level 1 nonemergency transports, (4) ALS Level 1 emergency transports, (5) ALS Level 2 transports, (6) specialty care transports, and (7) paramedic intercepts. Paramedic intercepts are when ambulance providers perform ALS services but do not transport the patient. Throughout this report we use the term BLS to refer to BLS nonemergency transports and BLS emergency transports. We use the term ALS to refer to transports that are ALS or higher, including ALS Level 1 nonemergency transports, ALS Level 1 emergency transports, ALS Level 2 transports, specialty care transports, and paramedic intercepts.

¹⁹The mileage payment is determined by the number of miles traveled with a patient during an ambulance transport and the mileage base rate. Since 2002, CMS has increased the rural mileage rate (which also applies to super-rural transports) by 50 percent for miles 1 through 17. See 67 Fed. Reg. 9100 (Feb. 27, 2002) (adding subpart H to 42 C.F.R. part 414); 42 C.F.R. § 414.610(c)(5)(i)(2011) (this mileage rate increase is not set to expire). Also see fig. 5 in app. I for an overview of the Medicare ambulance payment formula.

²⁰The urban and rural add-on payment rates apply to the service-level and mileage payments, whereas, for super-rural transports, the 3 percent increase applies to the service-level and mileage payments and the 22.6 percent increase applies only to the service-level payment. For purposes of this report, we refer to all of these increases as add-on payments.

Improvement, and Modernization Act of 2003,²¹ temporarily extended by subsequent acts,²² and most recently extended through the end of 2012 by the Middle Class Tax Relief and Job Creation Act of 2012.²³

Providers' Costs and Medicare Margins

Providers paid under a fee schedule generally have an incentive to keep their costs to deliver services at or below the fee schedule rate. Some providers rely heavily on Medicare revenues, and adequate Medicare margins for these providers may help ensure that beneficiaries have access to ambulance services. In our 2007 report, we found that providers with lower transport volumes generally had higher costs per transport than providers with greater transport volumes.²⁴ Because of high fixed costs for maintaining readiness—the availability of an ambulance and crew for immediate emergency responses—providers with low volumes, which still need to maintain readiness, tended to have higher costs per transport. Other significant factors that affected cost per transport included level of volunteer staff hours, percentage of Medicare transports that are BLS, percentage of Medicare transports that are super-rural, and level of community tax support.

²¹Medicare Prescription Drug, Improvement, and Modernization Act of 2003, Pub. L. No. 108-173, § 414(c), 117 Stat. 2066, 2279 (adding paragraphs (12) and (13) to Social Security Act § 1834(l)).

²²The Medicare Improvements for Patients and Providers Act of 2008, Patient Protection and Affordable Care Act of 2010, Medicare and Medicaid Extenders Act of 2010, and Temporary Payroll Tax Cut Continuation Act of 2011 all extended and, in some instances, further increased these payments after the provisions in the Medicare Prescription Drug, Improvement, and Modernization Act of 2003 for urban and rural services and for super-rural services expired at the end of 2006 and 2009, respectively. Medicare Improvements for Patients and Providers Act of 2008, Pub. L. No. 110-275, § 146(a), 122 Stat. 2548; Patient Protection and Affordable Care Act of 2010, Pub. L. No. 111-148, § 3105(a) and (c), 124 Stat. 119, 417, 418; Medicare and Medicaid Extenders Act of 2010, Pub. L. No. 111-309, § 106(a) and (c), 124 Stat. 3285, 3287; and Temporary Payroll Tax Cut Continuation Act of 2011, Pub. L. No. 112-78, § 306(a) and (c), 125 Stat. 1280, 1285.

²³Pub. L. No. 112-96, § 3007(a) and (c), 126 Stat. 190.

²⁴This affirmed findings from our 2003 report that volume of transports was a primary driver of cost per transport. See GAO, *Ambulance Services: Medicare Payments Can Be Better Targeted to Trips in Less Densely Populated Rural Areas*, [GAO-03-986](#) (Washington, D.C.: Sept. 19, 2003).

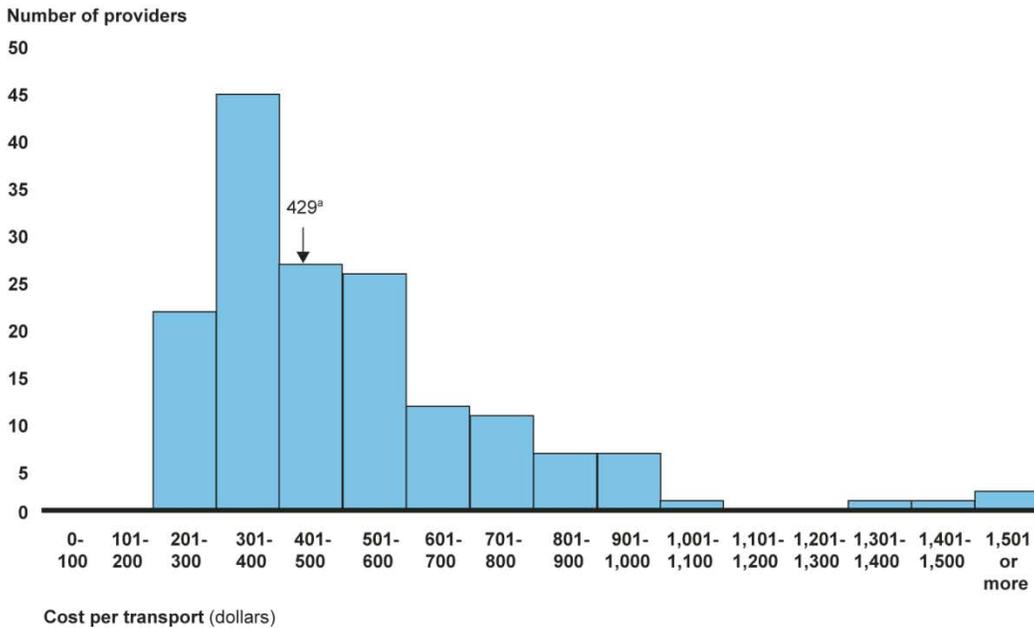
Providers' 2010 Costs per Transport Varied Widely, Reflecting Differences in Certain Characteristics, and Personnel Constituted the Largest Cost Category

Providers' costs for providing ground ambulance transports were highly variable in 2010, ranging from a low of \$224 per transport to a high of \$2,204, with a median cost per transport of \$429. The variability of costs per transport reflected differences in certain provider characteristics, such as volume of transports, intensity of Medicare transports, and level of government subsidies received. Providers reported that personnel costs accounted for the largest percentage of their total costs in 2010 and contributed the most to increases in total costs between 2009 and 2010.

Median Cost per Transport in 2010 Was \$429, but Costs per Transport Varied Widely across All Providers

The median cost per ground ambulance transport for providers in our sample was \$429 in 2010, but providers' costs per transport ranged from a low of \$224 to a high of \$2,204. Five percent of providers had costs per transport that were less than \$253, and 5 percent had costs per transport that were more than \$924. Figure 1 shows the distribution of 2010 costs per transport for providers in our sample.

Figure 1: Ambulance Providers' Distribution of 2010 Costs per Transport



Source: GAO.

Notes: Data were from the 2012 GAO Survey of Ambulance Services. Data represent a sample of 154 ground ambulance providers in the United States that billed Medicare in 2003 and 2010, were still operational in 2012, and did not share costs with nonambulance services or air ambulance services.

^aThe median cost per transport was \$429.

Among the population of providers from which our sample was drawn, the estimated median cost per transport ranged from \$401 to \$475, which represents the 95 percent statistical confidence interval around the median and is the range within which we expect the population median cost per transport to fall in 95 percent of the samples we could have drawn.²⁵

²⁵Because our cost per transport information is estimated from a sample of providers, we report all costs per transport with confidence intervals. The range of the confidence interval is affected by the variability of the data we collected from our sample and the size of our sample. See app. I for a full discussion of our sample, methods, and calculations.

Super-rural providers had estimated median costs per transport that were significantly higher than urban providers (see table 1).²⁶ The variability associated with our survey data did not allow us to conclude that rural providers' estimated median costs per transport were significantly different from super-rural or urban providers. As will be discussed later, when we controlled for other provider characteristics that affected cost per transport using regression analysis, differences in cost per transport by service area were not significant.²⁷ This could mean that provider characteristics other than service area were more important in explaining the variation in cost per transport.

Table 1: Ambulance Providers' 2010 Median Costs per Transport, by Predominant Service Area

Providers' predominant service area ^a	Sample median cost per transport (dollars)	Estimated range of median cost per transport ^b (dollars)
Urban	\$397	\$374 to 410
Rural	469	404 to 550
Super-rural	545	445 to 639

Source: GAO analysis of GAO and CMS data.

Notes: The table shows median costs per transport for providers in our sample and the 95 percent confidence interval of the median costs per transport for the population of providers represented by our sample. Cost data were from the 2012 GAO Survey of Ambulance Services and data on providers' predominant service area were from 2010 Medicare claims. Results are based on a sample of 153 ground ambulance providers, representing approximately 2,900 providers in the United States that billed Medicare in 2003 and 2010, were still operational in 2012, and did not share costs with nonambulance services or air ambulance services. The sample included 70 urban providers, 57 rural providers, and 26 super-rural providers. One provider that was included in the survey data analysis was excluded here because we could not identify complete relevant Medicare claims data.

^aWe classified providers as super-rural if 60 percent or more of their Medicare transports in 2010 originated in a super-rural zip code. We classified providers as rural if they did not meet the super-rural definition and 60 percent or more of their Medicare transports in 2010 originated in rural or super-rural zip codes. We classified providers as urban if they did not meet the rural or super-rural classifications.

^bThe range is the 95 percent confidence interval—the interval that would contain the actual population value for 95 percent of the samples we could have drawn. The range of the confidence interval is affected by the variability of the cost data we collected from our sample and the size of our sample.

²⁶The difference between these medians is statistically significant at the 0.05 level.

²⁷For our regression analysis, we used measures of service area that reflected the percentages of a provider's transports that originated in urban, rural, and super-rural zip codes. This was different from our measure of a provider's predominant service area and enabled us to include more information about a provider's service area in the regression analysis.

Volume of Transports and Other Provider Characteristics Contributed to Differences in Costs per Transport

The variability of costs per transport among providers reflected differences in certain provider characteristics. On the basis of our regression analysis, the provider characteristics that contributed to statistically significant differences in total cost, and therefore cost per transport—after holding other characteristics constant—were volume of transports,²⁸ intensity of Medicare transports,²⁹ and the level of government subsidies received.³⁰ Because some ambulance costs are fixed, and therefore do not increase significantly when a provider completes more transports, it is expected that as the number of transports provided increases, associated costs per transport will be somewhat lower. Figure 2 illustrates the relationship between cost per transport and volume of transports, based on our regression analysis. At approximately 600 transports, the decline in cost per transport becomes less pronounced.³¹

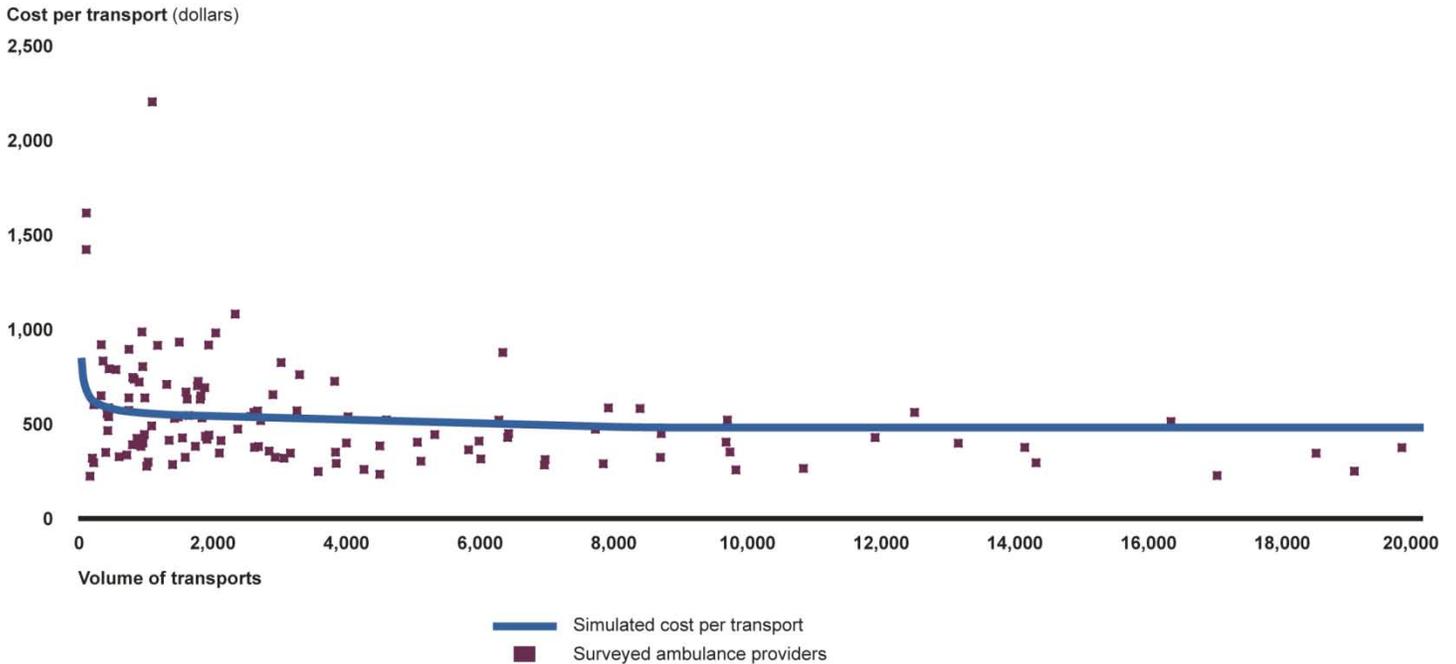
²⁸Total transport volume includes all of a provider's transports, not only those covered by Medicare.

²⁹In our previous report, we found that the intensity of transports—that is, the proportion of emergency transports provided as opposed to nonemergency transports—did not contribute to significant differences in costs per transport. See [GAO-07-383](#).

³⁰We performed a regression analysis to investigate the relationship between providers' total cost and characteristics such as service area (urban, rural, or super-rural), volume of transports, mix and intensity of Medicare transports, level of government subsidies received, use of volunteer staff, and type of ownership. We divided predicted total cost by total transports to derive cost per transport. See table 6 in app. I for additional details about this analysis.

³¹After 600 transports, each increase of 10 transports results in a decrease in cost per transport of less than 0.10 percent.

Figure 2: Illustrated Relationship between 2010 Cost per Transport and Volume of Transports for Ambulance Providers with 20,000 or Fewer Transports, Based on Regression Model



Source: GAO analysis of GAO and CMS data.

Notes: The curve illustrates the cost per transport at different volumes of transports, based on our regression analysis of total costs. The regression analysis included 11 variables, of which 3 were found to be statistically significant in explaining the variation in providers' total costs: transport volume, intensity of Medicare transport (emergency vs. nonemergency), and receipt of government subsidies. Total transport volume includes all of a provider's transports, not only those covered by Medicare. Data were from the 2012 GAO Survey of Ambulance Services, 2010 Medicare claims, and the Medicare Ambulance Fee Schedule Public Use File. The figure represents providers with 20,000 or fewer transports, approximately 85 percent of our sample.

Our regression analysis found two other provider characteristics to be statistically significant in explaining the variation in providers' total costs—the intensity of Medicare transports (that is, the proportion of Medicare nonemergency transports provided) and the level of government subsidies received. With these results, we determined for our sample that when the percentage of Medicare nonemergency transports decreases, the predicted cost per transport increases.³² For example, when the

³²We did this by comparing predicted cost per transport calculated for different values for these variables while holding the values of other variables at their regression sample mean. See app. I for a more-detailed discussion of this methodology.

percentage of Medicare nonemergency transports decreases from the average of about 26 percent to about 19 percent, the predicted cost per transport increases by about 3 percent. This increase in predicted cost per transport results from a higher volume of emergency transports, which are more costly. In contrast, when providers' percentage of revenues accounted for by government subsidies decreases, their predicted cost per transport also decreases. For example, when the level of government subsidies decreases from the average of about 9 percent to about 7 percent, the predicted cost per transport decreases by about 2 percent. Ambulance providers with fewer resources may have more financial pressure to restrain their costs. The Medicare Payment Advisory Commission has found this to be the case in the hospital industry.³³

Characteristics that did not contribute significantly to differences in costs per transport, after holding other characteristics constant, included service area, the mix of Medicare transports, the use of volunteer staff, and type of ownership.³⁴ Although we found that costs per transport for super-rural providers were significantly higher than costs per transport for urban providers (see table 1), these estimates were based on providers' reported cost data. After holding other characteristics constant using regression analysis, we found that service area did not contribute to significant differences in costs per transport.

Providers Reported That Personnel Cost Was the Dominant Factor in 2010 Total Cost and Growth between 2009 and 2010

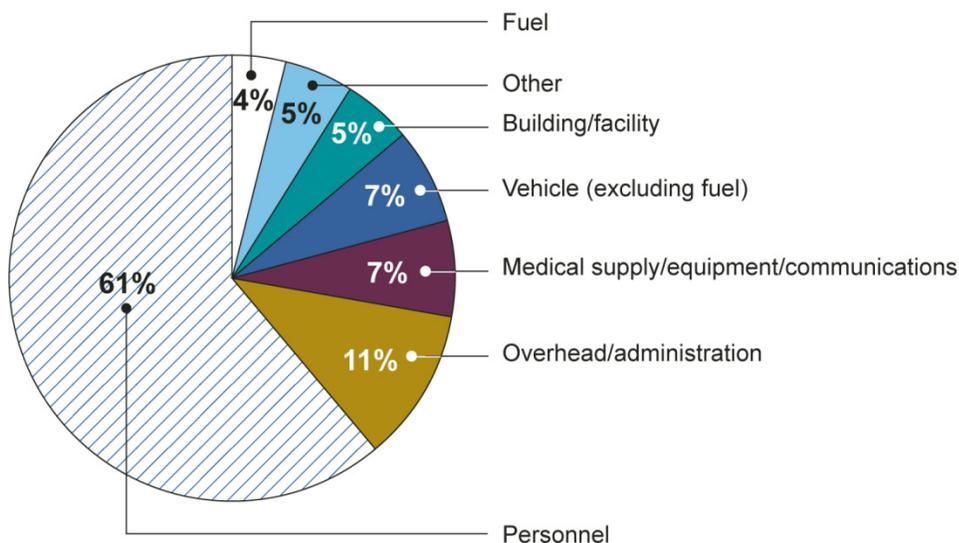
Providers in our sample reported that personnel costs accounted for the largest percentage of their total cost in 2010 and contributed the most to increases in total cost between 2009 and 2010. Of the 143 providers that reported the percentage of their total cost accounted for by certain cost components, 136 reported that personnel costs accounted for the greatest percentage of their total cost in 2010. On average, personnel costs accounted for over 60 percent of these providers' total cost in 2010

³³See Medicare Payment Advisory Commission, *Report to the Congress: Medicare Payment Policy* (Washington, D.C.: March 2011).

³⁴In our previous report, we found that the providers' service area and the mix of Medicare transports—that is, the proportion of Medicare ALS or higher transports provided as opposed to BLS transports—contributed to significant differences in costs per transport. Providers that offered only super-rural transports had estimated average costs per transport that were higher than providers that offered only urban transports. Similarly, providers that offered only ALS or more intensive transports had estimated average costs per transport that were higher than providers that offered only BLS transports. See [GAO-07-383](#).

(see fig. 3). Overall, the percentage of total cost accounted for by various cost components was fairly consistent across urban, rural, and super-rural providers in our sample. One exception was that super-rural providers reported higher proportions of their costs being devoted to medical supplies, equipment, and communication compared to urban and rural providers. A potential explanation for this difference could be that super-rural providers in our sample tended to have higher proportions of Medicare ALS transports, which require the use of more sophisticated supplies and equipment.

Figure 3: Average Percentage of Ambulance Providers' Total Cost Accounted for by Certain Cost Components



Source: GAO.

Notes: Data were from the 2012 GAO Survey of Ambulance Services. Percentages are based on reported data from a sample of 154 ground ambulance providers in the United States that billed Medicare in 2003 and 2010, were still operational in 2012, and did not share costs with nonambulance services or air ambulance services. Analysis excludes 11 providers that could not determine cost component percentages. "Other" category includes percentages for cost components not specified in the survey, such as insurance (including workers' compensation, liability, and building insurance), billing services, bad debt, and depreciation.

In addition, 118 of the 154 providers in our sample reported an increase in their total cost from 2009 to 2010. Of providers that reported an increase, the majority cited personnel costs and fuel costs (100 providers

and 81 providers, respectively) as contributing to the increase in total cost.³⁵ According to the Bureau of Labor Statistics, average hourly wages for the ambulance industry remained fairly stable between 2009 and 2010.³⁶ However, some providers reported that increases in the cost of health insurance and workers' compensation insurance as well as increases in education and training requirements, among other things, contributed to increases in personnel costs.

Consistent with what providers reported, we found national data sources that supported increases in providers' health insurance costs, education and training requirements, and fuel costs between 2009 and 2010. According to the Kaiser Family Foundation, the average annual health insurance premium for family coverage increased 3 percent between 2009 and 2010.³⁷ Additionally, according to a NASEMSO official, many providers experienced increases in education and training costs as a result of transitioning to updated national emergency medical service standards (known as the National Emergency Medical Services [EMS] Education Standards) issued by the Department of Transportation in 2009.³⁸ Although the standards are not required, the vast majority of states adopt them, according to the NASEMSO official. Also, according to the Department of Energy, average fuel costs increased from roughly \$2.50 a gallon in 2009 to \$3.00 a gallon in 2010 (2012 dollars).³⁹ In terms

³⁵Providers were asked to list up to three cost components, in rank order, that contributed to the increase in total cost. Of the 118 providers that reported an increase in total cost, 75 providers ranked personnel costs first as contributing to the increase.

³⁶See U.S. Bureau of Labor Statistics, *Occupational Employment and Wage Estimates: National 5-digit NAICS Industry-Specific Estimates for the Ambulance Services Industry* (Washington, D.C.: 2009 and 2010). The wage estimate from the Bureau of Labor Statistics is a composite of various occupations that participate in the ambulance industry, including management occupations, business and financial operations occupations, health care practitioners and technical occupations, and office and administrative support occupations.

³⁷See The Kaiser Family Foundation and Health Research & Educational Trust, *Employer Health Benefits: 2011 Annual Survey* (Menlo Park, Calif., and Chicago, Ill.: 2011).

³⁸These standards define the competencies, clinical behaviors, and judgments that must be met by entry-level EMS personnel to meet practice guidelines defined in the National EMS Scope of Practice Model. According to a NASEMSO official, to the extent that the updated standards include new medical practice techniques, including the use of new medications and equipment, EMS personnel who were trained using the previous standards will need to be trained in these new techniques.

³⁹These estimates refer to both retail gasoline and diesel prices.

of workers compensation insurance, our survey respondents reported trends that were not substantiated by national data, though it is possible that national data are not generally representative of the ambulance industry. According to the Bureau of Labor Statistics, the average amount that employers paid for workers' compensation insurance decreased slightly between 2009 and 2010, from \$0.44 to \$0.43 per hour worked by an employee.⁴⁰

Median Medicare Margin for Providers in Sample Was about 2 Percent in 2010, but Medicare Margins Varied Widely across Providers

The median Medicare margin, including add-on payments, was about positive 2 percent in 2010 for the 153 providers in our sample.⁴¹ When we removed the add-on payments, we found that payments decreased for the providers in our sample, resulting in a lower median Medicare margin of negative 1 percent for those providers. See table 2.

⁴⁰See U.S. Bureau of Labor Statistics, *Employer Costs for Employee Compensation – December 2009* (Washington, D.C.: March 2010) and U.S. Bureau of Labor Statistics, *Employer Costs for Employee Compensation – December 2010* (Washington, D.C.: March 2011). These estimates are for all civilian workers, which include private industry and state and local government workers.

⁴¹One provider that was included in the survey data analysis was excluded here because we could not identify complete relevant Medicare claims data.

Table 2: Ambulance Providers' 2010 Median Medicare Margins, by Predominant Service Area

Providers' predominant service area^a	Median Medicare payment per transport with add-on payments (dollars)	Median cost per transport (dollars)	Median Medicare margin with add-on payments (percentage)	Median Medicare margin without add-on payments (percentage)
Urban	\$404	\$397	1.6%	-0.5%
Rural	517	469	2.9	0.1
Super-rural	620	545	0.3	-14.3
All providers	\$464	\$429	1.7%	-1.0%

Source: GAO analysis of GAO and CMS data.

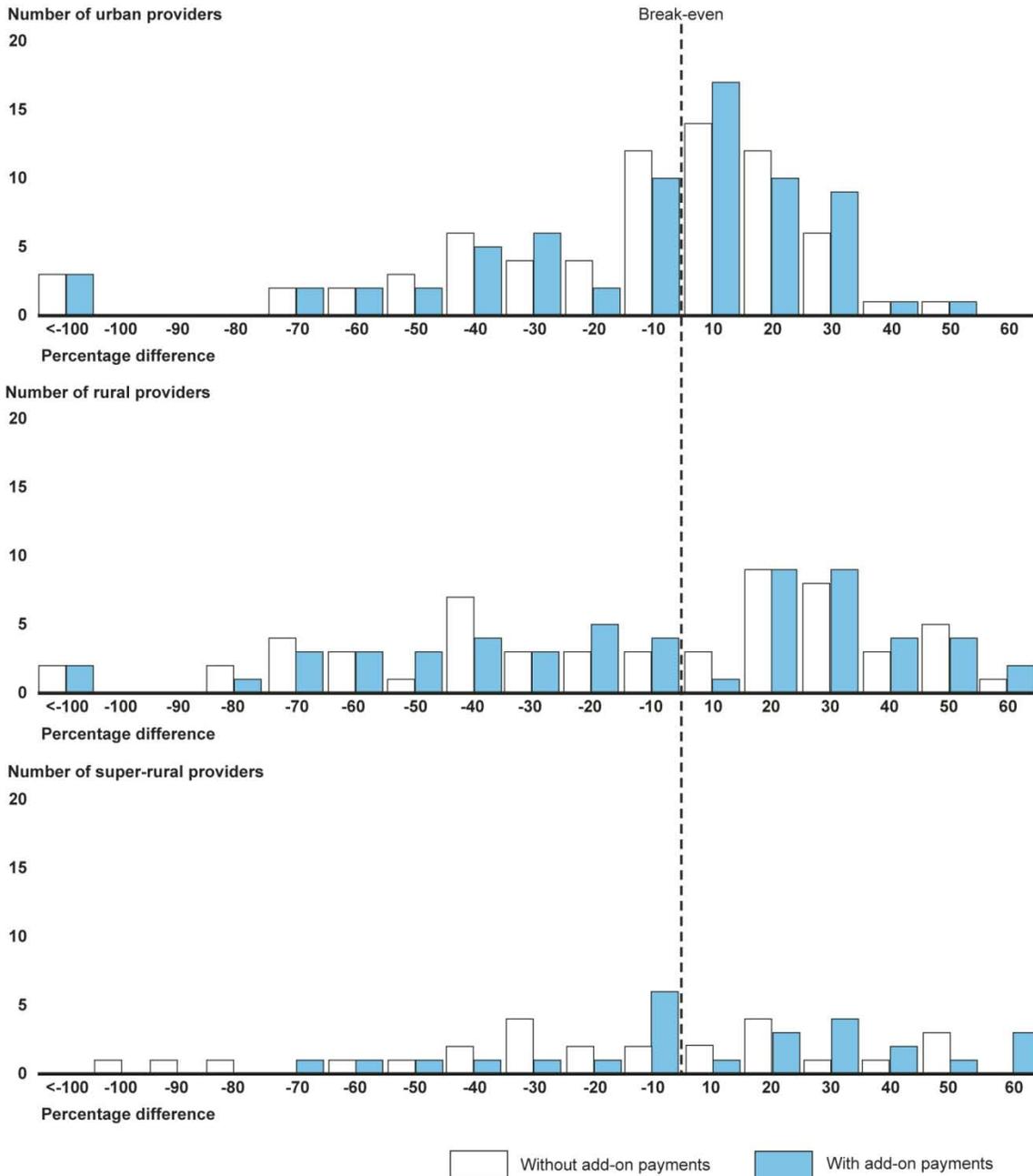
Notes: All payments and costs were expressed in 2010 dollars. Payment data and data on providers' predominant service area were from 2010 Medicare claims, and the payment data assumed that providers charged the maximum allowed amount under the ambulance fee schedule. Cost data were from the 2012 GAO Survey of Ambulance Services. Margins were calculated from 2010 Medicare claims and the 2012 GAO Survey of Ambulance Services. The results represent a sample of 153 ground ambulance providers in the United States that billed Medicare in 2003 and 2010, were still operational in 2012, and did not share costs with nonambulance services or air ambulance services. The sample included 70 urban providers, 57 rural providers, and 26 super-rural providers. One provider that was included in the survey data analysis was excluded here because we could not identify complete relevant Medicare claims data.

^aWe classified providers as super-rural if 60 percent or more of their Medicare transports in 2010 originated in a super-rural zip code. We classified providers as rural if they did not meet the super-rural definition and 60 percent or more of their Medicare transports in 2010 originated in rural or super-rural zip codes. We classified providers as urban if they did not meet the rural or super-rural classifications.

There was wide variability in Medicare margins for all providers, irrespective of their predominant service areas. See figure 4 for the distribution of 2010 Medicare margins with and without add-on payments for the providers in our sample, by predominant service area.⁴²

⁴²A Medicare margin of 0 percent indicates that an ambulance provider broke even on its Medicare transports, that is, its Medicare payment per transport equaled its cost per transport.

Figure 4: Ambulance Providers' Distribution of 2010 Medicare Margins, by Predominant Service Area



Source: GAO analysis of GAO and CMS data.

Notes: Payment data and data on providers' predominant service area were from 2010 Medicare claims, and the payment data assumed that providers charged the maximum allowed amount under the ambulance fee schedule. Cost data were from the 2012 GAO Survey of Ambulance Services. Margins were calculated from 2010 Medicare claims and the 2012 GAO Survey of Ambulance Services. The results represent a sample of 153 ground ambulance providers in the United States that billed Medicare in 2003 and 2010, were still operational in 2012, and did not share costs with nonambulance services or air ambulance services. The sample included 70 urban providers, 57 rural providers, and 26 super-rural providers. One provider that was included in the survey data analysis was excluded here because we could not identify complete relevant Medicare claims data. We classified providers as super-rural if 60 percent or more of their Medicare transports in 2010 originated in a super-rural zip code. We classified providers as rural if they did not meet the super-rural definition and 60 percent or more of their Medicare transports in 2010 originated in rural or super-rural zip codes. We classified providers as urban if they did not meet the rural or super-rural classifications.

We could not assess whether the median provider in the population represented by our sample had a positive or negative Medicare margin because the range of the 95 percent confidence interval for the median Medicare margin—both with and without add-on payments—included both positive and negative margins. (See table 3.) The range of the confidence interval is affected by variability in the size of Medicare payments allowed under the fee schedule, variability in the cost data we collected from our sample, and the size of our sample. As a result, we could not determine the extent of the effect of adding or removing the add-on payments on the median Medicare margin. Similarly, we could not find any significant differences in the median Medicare margins between providers with predominantly urban, rural, or super-rural service areas.

Table 3: Ambulance Providers' Estimated Range of 2010 Median Medicare Margins, by Predominant Service Area

Providers' predominant service area ^a	Medicare payment per transport with add-on payments (dollars)	Median cost per transport (dollars)	Median Medicare margin with add-on payments (percentage)	Median Medicare margin without add-on payments (percentage)
Urban	\$382 to 420	\$374 to 410	-5.3 to 5.2%	-7.5 to 3.3%
Rural	488 to 546	404 to 550	-17.1 to 17.9	-20.6 to 15.3
Super-rural	605 to 648	445 to 639	-6.3 to 24.2	-25.5 to 10.7
All providers	\$434 to 493	\$401 to 480	-2.3 to 9.3%	-8.4 to 5.3%

Source: GAO analysis of GAO and CMS data.

Notes: All payments and costs were expressed in 2010 dollars. Payment data and data on providers' predominant service area were from 2010 Medicare claims, and the payment data assumed that providers charged the maximum allowed amount under the ambulance fee schedule. Cost data were from the 2012 GAO Survey of Ambulance Services. Margins were calculated from 2010 Medicare claims and the 2012 GAO Survey of Ambulance Services. The table shows the range of the 95 percent confidence intervals for the population of providers; the range of the confidence interval was affected by variability in the size of Medicare payments allowed under the fee schedule, the variability of the cost data we collected from our sample, and the size of our sample. The results were based on a sample of 153 ground ambulance providers, representing approximately 2,900 providers in the United States that billed Medicare in 2003 and 2010, were still operational in 2012, and did not share costs with nonambulance services or air ambulance services. The sample included 70 urban providers, 57 rural providers, and 26 super-rural providers. One provider that was included in the survey data analysis was excluded here because we could not identify complete relevant Medicare claims data.

^aWe classified providers as super-rural if 60 percent or more of their Medicare transports in 2010 originated in a super-rural zip code. We classified providers as rural if they did not meet the super-rural definition and 60 percent or more of their Medicare transports in 2010 originated in rural or super-rural zip codes. We classified providers as urban if they did not meet the rural or super-rural classifications.

Ambulance Transports Increased from 2004 to 2010, with the Largest Growth Occurring in Super-Rural Areas

Ambulance transports for all Medicare fee-for-service beneficiaries in the nation increased by 33 percent from 2004 to 2010. All three service areas—urban, rural, and super-rural—experienced growth. Transports per 1,000 beneficiaries in super-rural areas grew the most, by 41 percent, and transports per 1,000 beneficiaries in rural and urban areas increased by 35 percent and 32 percent, respectively.⁴³ (See table 4.)

⁴³To make our 2004 and 2010 calculations of transports per 1,000 beneficiaries comparable, we updated and revised our 2004 calculations from [GAO-07-383](#) to include all beneficiaries who are dually eligible for Medicare fee-for-service and Medicaid.

Table 4: Ambulance Transports per 1,000 Beneficiaries in Urban, Rural, and Super-Rural Areas

Area	Transports, 2004	Transports, 2010	Percentage change, 2004-2010
Urban	348	459	32%
Rural	305	412	35
Super-rural	188	265	41
All	328	436	33%

Source: GAO analysis of CMS data.

The increase in ambulance transports from 2004 to 2010 is attributable primarily to an increase in BLS nonemergency transports, which rose by 59 percent from 2004 to 2010. Super-rural areas experienced the largest increase in BLS nonemergency transports (82 percent). The increase in Medicare beneficiaries' use of ambulance services did not appear to be caused by changes in the demographic characteristics of beneficiaries. For example, factors such as age, race, and sex remained stable from 2004 to 2010 in urban, rural, and super-rural areas.

Representatives we spoke with from one ambulance provider organization suggested that some of the increase in ambulance transports was attributable to increased billing for Medicare ambulance services at the local-government level. Some local governments that provided ambulance transports free of charge had been reluctant in the past to bill insurers such as Medicare because patients would then be financially responsible for out-of-pocket insurance costs, such as deductibles and copayments. The increased out-of-pocket costs for patients had the potential to result in less community support of ambulance providers through fewer charitable contributions and fewer volunteers. However, these local governments have begun to bill Medicare as well as other insurers because of increased budgetary pressures. Representatives we spoke with also added that the introduction of the national fee schedule in 2002 may have contributed to increased billing because it allowed providers to better anticipate the amount of revenue they could receive from Medicare.

The Department of Health and Human Services (HHS) Office of Inspector General (OIG) has explored increases in ambulance utilization and has cited improper payments as one potential cause.⁴⁴ For example, HHS OIG found that nonemergency transports, including BLS nonemergency transports, made up the majority of improper payments for ambulance services, and particularly transports for dialysis services.⁴⁵ HHS OIG also found that Medicare's ambulance transport benefit is highly vulnerable to abuse and found that many ambulance transports paid for by Medicare did not meet Medicare program requirements, including transports that were not medically necessary.

Agency and Industry Comments and Our Evaluation

We provided a draft of this report to HHS and invited representatives of AAA to review the draft. HHS had no general or technical comments on behalf of CMS. The AAA representatives provided oral comments and generally agreed with our findings; however, AAA had some questions regarding our methodology and conclusions, which we clarified in the report where appropriate and discuss below. In addition, AAA provided technical comments, which we incorporated as appropriate.

AAA representatives questioned whether the Medicare margin results were comparable to those of the 2007 report and were concerned that readers would conclude that providers' Medicare margins have increased over time. We clarified in the report that we do not consider the results reported in 2007 and in the current report to be directly comparable because the samples examined in each report were different and we reported median Medicare margins in the current report whereas in 2007 we reported average Medicare margins. AAA representatives noted that our sample contains providers that have been in business since at least 2003 and that the cost data from this sample may not be representative of all ambulance providers. We agree that the providers in our sample

⁴⁴Improper payments can be the result of billing mistakes on the part of ambulance providers as well as fraud and abuse. Fraud generally involves intentional acts of deception or representation to deceive with knowledge that the action or representation could result in gain, while abuse typically involves actions that are inconsistent with sound fiscal, business, or medical practices and result in unnecessary cost. See GAO, *Medicare: Improvements Needed to Address Improper Payments in Home Health*, [GAO-09-185](#) (Washington, D.C.: Feb. 27, 2009).

⁴⁵See HHS OIG, *Medicare Payments for Ambulance Transports* (Washington, D.C.: 2006) and HHS OIG, *Medical Necessity of Medicare Ambulance Services* (Washington, D.C.: 1998).

represent mature and well-established organizations—an advantage because this approach avoids start-up organizations with potentially high start-up costs, as described in our scope and methodology. Despite the differences in the samples and the type of measure used for reporting Medicare margins, both of these studies showed wide variation in costs per transport and Medicare margins.

AAA representatives had some questions about the results of our regression analysis. For example, the regression results suggest that ambulance providers that receive a greater proportion of government subsidies tend to have higher costs. The representatives theorized that providers with higher costs seek additional government support and did not think this finding was consistent with how their industry operates. As described in the report, the Medicare Payment Advisory Commission found an association between increased resources and increased costs in the hospital industry and theorizes that such hospitals face less pressure to control costs. We found an association in the ambulance industry but determining causality was beyond the scope of our work. AAA representatives also questioned the regression analysis results that indicated that providers' use of volunteer staff did not significantly contribute to differences in providers' total costs, because our survey data indicated that personnel costs were, on average, 61 percent of providers' total costs. The results may be a consequence of the relatively small sample size and, in addition, a small proportion of providers in our sample using volunteer staff (21 percent).

Finally, the AAA representatives commented that ground ambulance providers' current Medicare payments are lower than those we calculated for 2010 because of the expiration of a required temporary increase in Medicare payments for certain geographic areas,⁴⁶ the implementation of a policy for reporting fractional mileage,⁴⁷ and the introduction of a productivity adjustment relative to the annual inflation adjustment of the

⁴⁶A required increase in the practice expense portion of the geographic practice cost index (GPCI) for certain areas expired at the end of 2011, resulting in payment reductions for those areas. See Pub. L. No. 111-148, § 3102(b)(2), 124 Stat. 416.

⁴⁷Starting in 2011, for payment purposes, CMS required that providers specify the number of miles traveled during a transport rounded up to the nearest tenth of a mile (up to 100 miles). Previously, providers reported the number of miles rounded up to the nearest whole number. See 75 Fed Reg. 73170 (Nov. 29, 2010) (discussion of policy contained in section VII.B. of preamble).

fee schedule.⁴⁸ In addition, AAA noted that the cost of fuel has increased since 2010. We acknowledge that these factors likely lowered Medicare payments and increased costs for some providers after 2010,⁴⁹ the most recent year for which data were available when we began our study.

We are sending copies of this report to other congressional committees and the Administrator of CMS. In addition, the report is available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staffs have any questions about this report, please contact me at (202) 512-7114 or cosgrovej@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of the report. GAO staff who made major contributions to this report are listed in appendix II.



James C. Cosgrove
Director, Health Care

⁴⁸CMS increases fee schedule rates each year for inflation. However, starting in 2011, the amount of the increase for inflation was reduced by a measure of overall productivity in the economy. See Pub. L. No. 111-148, § 3401(a), 124 Stat. 480.

⁴⁹However, for some providers, Medicare payment rates increased after 2010. Specifically, beginning in 2011, CMS increased the practice expense portion of the GPCI for states meeting certain criteria, deemed as "frontier" states. In 2011, those states were Montana, Nevada, North Dakota, South Dakota, and Wyoming. See Pub. L. No. 111-148, § 10324(c), 124 Stat. 960.

Appendix I: Data and Methods

This appendix describes the data and methods we used to respond to our research objectives. We conducted a survey of ambulance providers to collect data on their costs and other characteristics. We relied on these survey data for much of our analyses and supplemented our survey results with information from other sources, including Medicare claims data, as appropriate. We also analyzed Medicare claims data to determine payments to ambulance providers as well as to determine the number of Medicare ambulance transports. We tested the internal consistency and reliability of the data from our survey and the Medicare claims data and determined that all data sources were adequate for our purposes. We conducted our work from April 2012 through September 2012 in accordance with generally accepted government auditing standards.

National Survey of Ground Ambulance Providers' Costs

To collect data on ground ambulance providers' costs, revenues, transports, and organizational characteristics for calendar year 2010, or for the fiscal year that corresponded to all or the majority of a provider's calendar year 2010 data, we sent a web-based survey to a random, nationally representative sample of 294 eligible ambulance providers.¹ We obtained data from 154 providers for a response rate of 52 percent, after excluding cost outliers and surveys with unreliable data.² We determined that our sample was nationally representative of the approximately 2,900 ambulance providers that billed Medicare in 2003 and 2010, were still operational in 2012, and did not share costs with nonambulance services or air ambulance services.³ However, the small

¹See the section titled "Sample Design" within this appendix for more information on eligible providers.

²We obtained survey data from 172 providers; however, 11 of these providers were excluded because they reported in their surveys that they shared costs with nonambulance services. We also excluded 3 providers that were unable to provide total cost or total transports information and 1 provider that was not confident in the total cost amount provided. We also excluded 3 outliers with a cost per transport more than three standard deviations from the mean of the lognormal distribution. We did not obtain complete information for all survey respondents. Therefore, some analyses do not include all 154 respondents.

³We excluded providers that shared operational costs with nonambulance services because, in our 2007 report, we found costs reported by these types of providers to be highly variable and unreliable. See GAO, *Ambulance Providers: Costs and Expected Medicare Margins Vary Greatly*, [GAO-07-383](#) (Washington, D.C.: May 23, 2007). Because the populations represented by the samples we used for our current report and our 2007 report differ, the results of the two reports are not directly comparable.

sample size and the variability of reported costs reduced the precision of our estimates.

Sample Design

We drew potentially eligible providers for our survey from an existing sample, originally developed for our 2007 report, of 900 non-hospital-based ground ambulance providers that billed Medicare in 2003.⁴ Through Internet searches and phone contacts to ambulance providers, we excluded any providers that (1) were no longer in business; (2) shared costs with nonambulance services, such as those providers affiliated with a fire department; or (3) we were otherwise not able to contact.⁵ As we did for the 2007 report, we excluded ground ambulance providers that also provided air ambulance services. After all exclusions, we had 294 eligible providers for potential survey participation. On the basis of the number of providers that were eligible for our sample and the number of providers that responded to our survey, we calculated sample weights to estimate how many Medicare ambulance providers our sample represented.

Survey Instrument Development

To develop our survey instrument, we modified the survey instrument used for our 2007 report, which was mailed to ambulance providers, to tailor it to our current objectives and format it for use as a web-based survey.⁶ We retained questions about ambulance providers' costs, revenues, and transports, as well as questions to identify organizational characteristics that might affect ambulance providers' costs, such as the

⁴For our 2007 report, we generated a nationally representative list of 900 non-hospital-based ambulance providers from information maintained by the Centers for Medicare & Medicaid Services, the agency that oversees the Medicare program, and the agency's contractors that process Medicare claims. This list was developed from 2003 claims data and was stratified based on the predominant service area of providers (urban, rural, super-rural) and the nine U.S. census divisions.

⁵We obtained contact information for some of these providers from the American Ambulance Association (AAA). We made up to three phone calls to attempt to contact a provider before we excluded it from our survey sample.

⁶To develop the survey instrument for the 2007 report, we reviewed other survey instruments and analyses of ambulance cost data, consulted with experts in survey methods and the ambulance industry, and tested the survey instrument with ambulance providers.

use of volunteer staff.⁷ We added questions related to changes in total cost (increases or decreases) from 2009 to 2010 and the cost components that most contributed to the changes. We also asked providers for their National Provider Identifier (NPI), which providers use to bill Medicare, and their Provider Transaction Access Number (PTAN). These numbers enabled us to identify and analyze Medicare claims for the providers we surveyed.⁸ We needed these current identifiers to link the providers in our sample to Medicare claims data because our sample was based on the sampling frame of our 2007 report, and Medicare has implemented a new identification system since then.

We sought feedback on our survey instrument from both internal and external sources. It was reviewed by internal survey experts and pretested on seven ambulance providers. We also consulted with the American Ambulance Association (AAA), an industry group that represents ambulance providers. On the basis of the feedback we received, we modified the survey instrument as appropriate.

Survey Administration

We sent our survey by e-mail to 294 eligible ambulance providers on April 12, 2012.⁹ We asked providers to complete the survey within 2 weeks of receipt. We later extended this deadline 2 weeks to give providers more time to complete the survey. Providers were encouraged to contact us by e-mail or a toll-free number so that we could resolve any questions or problems. We sent three reminder e-mails to providers that had not yet completed the survey (6, 14, and 21 days after sending the survey to providers) and made two rounds of reminder telephone calls to

⁷For purposes of this report, volunteer staff refers to staff who respond to emergencies and staff ambulance transports (e.g., field staff) but who are not paid or are paid a nominal stipend.

⁸An NPI is a unique national identification number for covered health care providers as established under the Health Insurance Portability and Accountability Act of 1996. See Pub. L. No. 104-191, § 262, 110 Stat. 1936, 2021 (adding Social Security Act § 1173). A PTAN is a Medicare-only number issued by Medicare contractors to providers when they enroll in the Medicare program. For various reasons, such as multiple service locations, some providers have more than one NPI-PTAN combination, and providers submitted the NPI-PTAN combination or combinations that corresponded with the service location(s) we surveyed.

⁹Approximately 2 weeks before sending the survey instrument to providers, we sent an e-mail to the ambulance providers in our sample to notify them about the survey and to verify that we had accurate e-mail addresses.

encourage participation. AAA and the National Association of Emergency Medical Technicians encouraged providers to participate in the survey. When providers returned surveys that were incomplete, invalid, or resulted in conflicting responses to key items, we conducted follow-up by phone and e-mail.

Survey Data Validity and Reliability

We took steps to ensure that the data reported in the survey were valid and reliable. First, we included in the survey instrument questions intended to validate the reported cost data. For example, we asked providers whether certain cost components (such as personnel costs) were included in the total cost amount submitted, and we asked how confident providers were about the total cost amount submitted. As a result, we excluded from our analyses one provider that was not confident in the total cost amount. Second, we conducted analyses to identify any incomplete data or inconsistencies in responses. If we found such data, we contacted the provider to try to obtain complete or corrected data. We excluded three providers that were not able to provide complete data on total cost or total transports. Third, we used a lognormal distribution to exclude outliers with a cost per transport more than three standard deviations from the mean. We excluded three providers with costs per transport that were outliers. All computer programs we used for our analyses were peer reviewed to verify that they were written correctly and executed properly. On the basis of our efforts to validate the data, including computer testing and corrections, we concluded that the data were sufficiently valid and reliable for our purposes.

Interpretation of Confidence Intervals and Analysis of Nonrespondents

All sample surveys are subject to sampling error—that is, the extent to which the survey results differ from what would have been obtained from the population instead of the sample. The sample is only one of a number of samples that we might have drawn. As a result, we reported the results of our analyses with their 95 percent confidence intervals. The 95 percent confidence interval refers to the range of values within which we would expect the true population value to fall in 95 percent of the samples we could have drawn.¹⁰

¹⁰The range of the confidence interval is affected by the variability of the responses within the sample and the size of the sample.

We analyzed 2010 Medicare claims data for the survey nonrespondents and compared this information with similar claims data for providers in our sample.¹¹ Using Medicare claims data for all survey recipients, we were able to test for potential nonresponse bias for the characteristics contained in the claims data. The nonresponse analysis did not find any statistically measurable bias that would affect our analyses of providers' costs.

Modeling Ambulance Costs

We used regression analysis to investigate the relationship between providers' total cost and provider characteristics that may have affected their costs. We opted for a total cost model using a logarithmic functional form because it is well grounded in microeconomic theory. Although we considered using a similar model of the same functional form with cost per transport as the dependent variable, we determined that the parameter estimates of such a model would be similar to the total cost model. Provider characteristics included in our model were: (1) volume of transports, (2) cost of doing business, (3) mix of Medicare transports, (4) intensity of Medicare transports, (5) service area, (6) use of volunteer staff, (7) receipt of government subsidies, and (8) ownership type. We used those results to produce a graph illustrating the relationship between cost per transport and volume of transports. We also used the results of the regression analysis to estimate the effect on providers' cost per transport of reducing the value of each of two variables that were significant in the regression. See table 5 for the characteristics included in the model, how each characteristic was measured, and the data source for each characteristic.

¹¹We were able to identify NPIs and PTANs for approximately 92 percent of our nonrespondents. We were unable to identify NPIs and PTANs for the remainder despite attempting to match available contact information for nonrespondents with the Centers for Medicare & Medicaid Services' (CMS) NPI registry and Medicare claims data.

Table 5: Provider Characteristics Included in Analysis of Total Cost and Cost per Transport, 2010

Characteristic	Measure	Source of data
Volume of transports	Number of transports (Medicare and other) provided	GAO Survey of Ambulance Services
Cost of doing business	Geographic practice cost index (GPCI) for the provider's zip code ^a	Medicare Ambulance Fee Schedule Public Use File
Mix of transports	Percentage of Medicare transports that are ALS	Medicare claims
Intensity of transports	Percentage of Medicare transports that are nonemergency	Medicare claims
Service area ^b	Percentage of Medicare transports that are rural	Medicare claims
	Percentage of Medicare transports that are super-rural	Medicare claims
Use of volunteer staff ^c	Indicator variables for percentage of field staff hours that are volunteer: greater than or equal to 20 percent and less than 20 percent but greater than 0	GAO Survey of Ambulance Services
Receipt of government subsidies	Percentage of total revenues from government subsidies	GAO Survey of Ambulance Services
Ownership type ^d	Indicator variables for ownership type: nonprofit and local government	GAO Survey of Ambulance Services

Sources: GAO and CMS.

^aThe practice expense portion of the GPCI in the physician fee schedule is used to adjust payments in the ambulance national fee schedule to account for the different costs of operating ambulance services in different regions of the country.

^bThe excluded category was the percentage of Medicare transports that are urban. To estimate the regression, one of the service area categories had to be excluded.

^cThe excluded category was no use of volunteer staff. To estimate the regression, one of the volunteer categories had to be excluded.

^dThe excluded category was for-profit ownership type. To estimate the regression, one of the ownership type categories had to be excluded.

Cost Regression Analysis—Methods and Results

Our regression analysis modeled total cost at the provider level as a function of the provider characteristics described above. We used ordinary least squares to model the log of total costs for a provider.¹² The model was specified in log-log form to conform to standard microeconomic theory regarding cost functions. The two continuous independent variables—transport volume and geographic practice cost index (GPCI)—were entered in log form. The remaining variables were not entered in log form because they were either indicator variables (value of 0 or 1) or percentage variables (values ranging from 0 to 1.00). Three of the explanatory variables in the regression were statistically significant at the 1 percent or better level in explaining the variation in providers' total costs: total transports, percentage of revenues from

¹²Ordinary least squares is a standard method of regression analysis.

government subsidies, and percentage of Medicare transports that were nonemergency.¹³ Table 6 shows the regression results.

Table 6: Results for Ambulance Costs Regression—Estimated Effects of Selected Provider and Local Area Characteristics on the Total Cost of Providing Ground Ambulance Transports

Characteristic	Variable used to measure characteristic	Parameter estimate	Standard Error	t-Value	Prob < t
Volume of transports	Log of total transports	0.94	0.03	32.25	<.0001
Cost of doing business	Log of GPCI	0.83	0.61	1.37	0.17
Mix of transports	Percentage of Medicare transports that are ALS	0.09	0.15	0.64	0.53
Intensity of transports	Percentage of Medicare transports that are nonemergency	-0.47	0.18	-2.65	0.01
Service area ^a	Percentage of Medicare transports that are rural	0.02	0.09	0.22	0.82
	Percentage of Medicare transports that are super-rural	0.14	0.11	1.27	0.21
Use of volunteer staff ^b	Use volunteer staff for 20% or more of field staff hours	-0.04	0.10	-0.35	0.73
	Use volunteer staff for less than 20% of field staff hours but more than 0%	0.18	0.12	1.46	0.15
Receipt of government subsidies	Percentage of total revenues from government subsidies	0.83	0.18	4.73	<.0001
Ownership type ^c	Nonprofit	-0.13	0.09	-1.49	0.14
	Local government	-0.09	0.08	-1.03	0.30
	Intercept	6.68	0.29	23.00	<.0001
	Adjusted R-square	0.94			
	Observations	144			

Sources: GAO analysis of GAO and CMS data.

Note: Data were from the 2012 GAO Survey of Ambulance Services, 2010 Medicare claims, and the Medicare Ambulance Fee Schedule Public Use File.

^aThe excluded category was the percentage of Medicare transports that are urban. To estimate the regression, one of the service area categories had to be excluded.

^bThe excluded category was no use of volunteer staff. To estimate the regression, one of the volunteer categories had to be excluded.

^cThe excluded category was for-profit ownership type. To estimate the regression, one of the ownership type categories had to be excluded.

¹³We tested the model for heteroscedasticity and determined that this did not affect our results.

We used the regression results to predict the log of total cost and then converted it to total cost by taking the antilog. We applied an adjustment to the resulting prediction of total cost to account for the fact that our regression was for log total cost rather than total cost.¹⁴ We then divided total cost by total transports to derive cost per transport. We used this method to produce predictions of cost per transport for the range of 1 to 20,000 transports shown in figure 2 of the report.¹⁵

We also used the regression results to estimate the effect on cost per transport of a reduced percentage of revenues from government subsidies and a reduced percentage of nonemergency transports. In each case, we held the other variables in the regression model at their regression sample mean and calculated cost per transport for the sample two ways: one with the value of the variable of interest set at its sample average and another with it set at a value 25 percent less. We reported the difference between these two values for each variable.

Calculating Medicare Ambulance Payments and Use of Transports with Claims Data

To examine the relationship between Medicare payments and providers' costs, we used Medicare claims data to calculate Medicare payments in 2010 for the providers in our sample, and we calculated Medicare margins—the percentage difference between providers' Medicare payments per transport and their costs per transport. To examine ambulance transports per 1,000 Medicare beneficiaries, we used Medicare claims data and Centers for Medicare & Medicaid Services (CMS) 2010 Medicare enrollment data. We found CMS's claims and enrollment data to be sufficiently reliable for the purposes of this report.

¹⁴W. G. Manning and J. Mullahy, "Estimating Log Models: To Transform or Not To Transform," *Journal of Health Economics*, vol. 20, no. 4 (2001). See section 2.1 for a description of the adjustment necessary for converting the predicted log of the dependent variable to its unlogged value.

¹⁵We examined our data for potentially influential observations using four standard tests. Three of the four tests failed to identify any observations that should be deleted on the basis of their influence on the regression results. We had previously excluded three outliers and also had verified that the data for other potential outliers were correct.

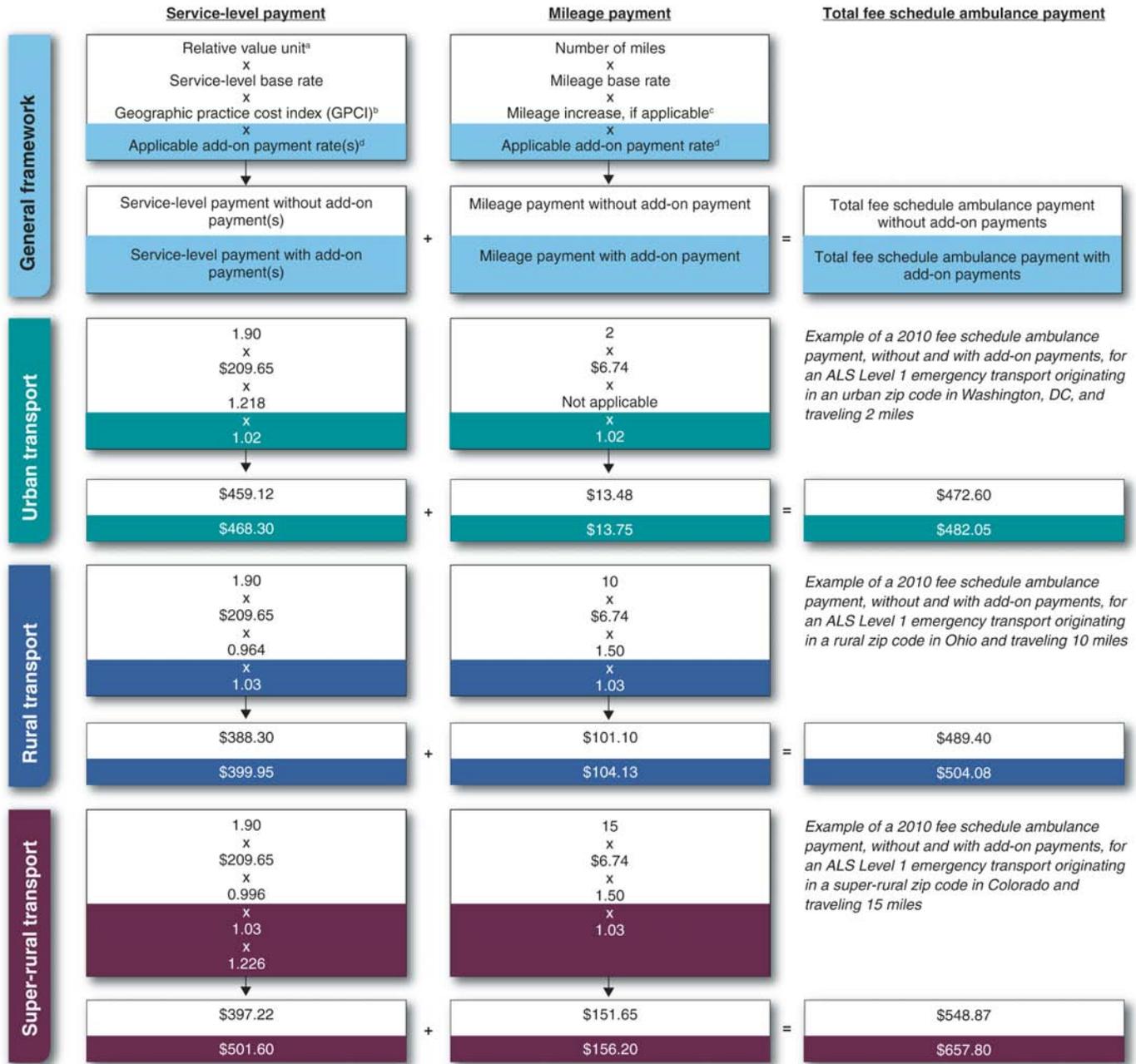
Medicare Payment Calculations

We calculated 2010 Medicare payments for the providers in our sample using Medicare carrier claims data. We identified relevant ambulance claims for 153 providers by using the NPIs (which providers use to bill Medicare) and PTANs reported by providers on the survey.¹⁶ We excluded any Medicare claims without either service-level or mileage payments and any claims with service-level payments that were more than three standard deviations from the mean of the log distribution for all such claims. We also excluded any claims for transports with multiple patients because the calculations for these payments require additional information not available on Medicare claims.

See figure 5 for the payment formulas specified in the Medicare ambulance fee schedule.

¹⁶One provider that was included in the survey data analysis was excluded in the payment and margin analyses because we could not identify complete relevant Medicare claims data.

Figure 5: Medicare Ambulance Payment Formula



Source: GAO analysis of CMS information.

^aThe relative value unit is a constant multiplier that adjusts the service-level base rate to account for the mix and intensity of the service.

^bThe practice expense portion of the GPCI in the physician fee schedule is used to account for the different costs of operating ambulance services in different regions of the country. Of the service-level payment without add-on payments (which is the product of the relative value unit and the service-level base rate), 70 percent is adjusted by the GPCI and the other 30 percent is not adjusted by the GPCI. For example, in the hypothetical example for an urban transport, the full formula for the service-level payment without add-on payments is $(0.70 \times [1.90 \times \$209.65] \times 1.218) + (0.30 \times [1.90 \times \$209.65])$.

^cSince 2002, CMS has provided a 50 percent increase to the mileage payment rate for miles 1 through 17 of transports originating in rural or super-rural zip codes. See 67 Fed. Reg. 9100 (Feb. 27, 2002) (adding subpart H to 42 C.F.R. part 414); 42 C.F.R. § 414.610(c)(5)(i) (2011) (this mileage rate increase is not set to expire).

^dIn 2010, temporary add-on payment policies included a 2 percent increase to service-level and mileage payment rates for transports originating in urban zip codes, a 3 percent increase to service-level and mileage payment rates for transports originating in rural zip codes, and a 22.6 percent increase to rural service-level payment rate for transports originating in super-rural zip codes.

To calculate service-level payments, we used the type of transport identified on the claim to determine the associated relative value unit, which is a constant multiplier that adjusts the service-level base rate to account for the mix and intensity of the service, and we used the 2010 service-level base rate of \$209.65. We used the zip code where the transport originated to determine the adjustment from the geographic practice cost index (GPCI), which is used to account for the different costs of operating ambulance services in different regions of the country.¹⁷ In accordance with CMS's payment methodology, we adjusted 70 percent of the service-level payment by the GPCI, and we did not adjust the other 30 percent by the GPCI. We also used the zip code where the transport originated to determine the applicable urban, rural, or super-rural add-on payment rate. To calculate mileage payments, we used the number of miles reported on the claim and the 2010 mileage base rate of \$6.74. We used the zip code where the transport originated to determine the applicability of the permanent mileage increase for miles 1 through 17 for rural and super-rural transports and to determine the applicable urban, rural, or super-rural add-on payment rate.

The total fee schedule payment for each transport is the sum of the service-level and mileage payments. We calculated payments with and without the applicable add-on payment rates, and we assumed that providers charged the maximum allowed amount under the ambulance

¹⁷We used the GPICs that were in effect for 2010, which included a required temporary increase in the practice expense portion of the GPCI for certain areas; this increase expired at the end of 2011. See Pub. L. No. 111-148, § 3102(b)(2), 124 Stat. 416.

fee schedule.¹⁸ All payments are expressed in 2010 dollars. To ensure that our payment calculations were comparable to actual payments made based on the claims, we compared the payments we calculated with add-ons to the payment amounts on the claims for a random sample of 6,000 urban, rural, and super-rural claims, and we found the difference in the amounts to be less than 1 percent.

For the providers in our sample, we reported the median of providers' Medicare payment per transport by predominant service area (urban, rural, or super-rural) and for all providers.¹⁹ To calculate each provider's Medicare payment per transport, we divided the sum of the provider's Medicare payments by the sum of its Medicare transports.

Medicare Margin Calculations

To calculate each provider's Medicare margin, we used the provider's cost per transport, as calculated from the survey responses, and its Medicare payment per transport, described in the previous section. We subtracted the provider's cost per transport from its Medicare payment per transport, and we divided this amount by the provider's Medicare payment per transport. For the providers in our sample, we reported the median Medicare margin and the distribution of providers' Medicare margins by predominant service area (urban, rural, or super-rural) and for all providers.

Calculating Number of Ambulance Transports per 1,000 Medicare Beneficiaries

To calculate ambulance transports per 1,000 Medicare beneficiaries, we used Medicare carrier and outpatient claims data, and CMS enrollment data—used for purposes of determining Medicare eligibility for covered services—from 2004 and 2010. To calculate the number of transports, we counted any Medicare claims for ground transports in these years for which there was both a service-level and a mileage payment. We

¹⁸In some cases, communities may limit the amount their ambulance providers charge Medicare; however, according to NASEMSO, this is not a common practice.

¹⁹As we did in the 2007 report, we classified providers as super-rural if 60 percent or more of their Medicare transports in 2010 originated in a super-rural zip code. We classified providers as rural if they did not meet the super-rural definition and 60 percent or more of their Medicare transports in 2010 originated in rural or super-rural zip codes. We classified providers as urban if they did not meet the rural or super-rural classifications. Since some providers furnish transports in more than one area, there is likely to be some measurement error in identifying the full effect of service area on costs.

excluded claims with service-level payments outside of three standard deviations from the mean of the log distribution for all such claims for each of these years. We counted Medicare beneficiaries as the number of months beneficiaries were enrolled in Medicare Part A or B in 2010 divided by 12. We then divided the number of transports by the number of enrolled Medicare beneficiaries and multiplied the quotient by 1,000. We also examined the change in transports per 1,000 Medicare beneficiaries from 2004 to 2010.

Medicare Data Reliability

Medicare claims data, which are used by the Medicare program as a record of payments made to health care providers, are closely monitored by both CMS and Medicare Administrative Contractors—contractors that process, review, and pay claims for Medicare Part B–covered services, including ambulance services. The data are subject to various internal controls, including checks and edits performed by the contractors before claims are submitted to CMS for payment approval. Although we did not review these internal controls, we assessed the reliability of Medicare claims data by reviewing related CMS documentation, interviewing agency officials about the data, and comparing payments in a sample of claims to expected payments based on Medicare’s published ambulance fee schedule. We determined that the Medicare claims data were sufficiently reliable for the purposes of this report. In addition, we assessed the reliability of CMS’s enrollment data by reviewing related CMS documentation and comparing the enrollment data to published sources. We determined that Medicare enrollment data were sufficiently reliable for the purposes of this report.

Appendix II: GAO Contact and Staff Acknowledgments

GAO Contact

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Staff Acknowledgments

In addition to the contact named above, Christine Brudevold, Assistant Director; Ramsey Asaly; Carl S. Barden; Stella Chiang; Carolyn Fitzgerald; Leslie V. Gordon; Corissa Kiyon; Rich Lipinski; Elizabeth T. Morrison; Aubrey Naffis; and Eric Wedum made key contributions to this report.

Related GAO Products

Ambulance Providers: Costs and Expected Medicare Margins Vary Greatly. [GAO-07-383](#). Washington, D.C.: May 23, 2007.

Ambulance Services: Medicare Payments Can Be Better Targeted to Trips in Less Densely Populated Areas. [GAO-03-986](#). Washington, D.C.: September 19, 2003.

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