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AMBULANCE SERVICES

Medicare Payments Can Be Better Targeted to Trips in Less Densely Populated Rural Areas



G A O

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Highlights of [GAO-03-986](#), a report to congressional committees

Why GAO Did This Study

The Centers for Medicare & Medicaid Services (CMS) recently implemented a Medicare ambulance fee schedule in which providers are paid a base payment per trip plus a mileage payment. An adjustment is made to the mileage rate for rural trips to account for higher costs. CMS has stated that this rural adjustment may not sufficiently target providers serving sparsely populated rural areas. The Medicare, Medicaid, and SCHIP Benefits Improvement and Protection Act of 2000 (BIPA) directed GAO to examine rural ambulance costs. GAO identified factors that affect ambulance costs per trip, examined how these factors varied across geographic areas, and analyzed whether Medicare payments account for geographic cost differences. GAO used survey data on ambulance providers and Medicare claims data.

What GAO Recommends

GAO recommends that CMS better target the rural adjustment to trips in less densely populated rural counties by adjusting the base rates for ground ambulance services provided in those counties. CMS stated that the report will be useful as the agency develops a proposed rule to address appropriate payment for ambulance services furnished in rural, low-volume areas.

www.gao.gov/cgi-bin/getrpt?GAO-03-986.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Laura A. Dummit, (202) 512-7114.

AMBULANCE SERVICES

Medicare Payments Can Be Better Targeted to Trips in Less Densely Populated Rural Areas

What GAO Found

Trip volume is the key factor affecting differences in ambulance providers' cost per trip. Ambulance providers' total costs primarily reflect readiness—the need to have an ambulance and crew available when emergency calls are received. Readiness-related costs are fixed, meaning that they do not increase with the number of trips provided, as long as a provider has excess capacity. As a result, providers that make fewer trips tend to have a higher cost per trip than those that make more trips. We also found that the length of providers' trips had little effect on their cost per trip.

The modest variation in Medicare payments to ambulance providers that serve rural counties probably does not fully reflect their differences in costs because the key factor affecting provider costs—the number of trips—varies widely across rural counties. In 2001, the least densely populated quarter of rural counties averaged far fewer trips than the most densely populated quarter. This suggests that the cost per trip is likely higher for providers serving the least populated rural counties. On average ambulance providers are paid somewhat more for trips in the least densely populated rural counties than for those in other rural counties. However, those payment differences are dwarfed by the difference in trip volume. Because trip volume is a strong indicator of costs, the Medicare payment differences across rural counties likely do not fully reflect differences in providers' cost per trip.

In implementing the fee schedule, CMS adjusted the mileage rate for rural trips to account for the higher cost per trip of providers serving rural areas. However, trip volume is a better indicator of providers' cost per trip than is trip length. Thus, adjusting the base rates for rural trips—the portion of Medicare's payment that is designed to pay for providers' fixed costs—is a more appropriate way of accounting for rural low-volume providers' higher cost per trip than adjusting the mileage rate.

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Abbreviations

ALS	advanced life support
ARF	Area Resource File
BBA	Balanced Budget Act of 1997
BIPA	Medicare, Medicaid, and SCHIP Benefits Improvement and Protection Act of 2000
BLS	basic life support
CMS	Centers for Medicare & Medicaid Services
EMT	emergency medical technician
HCFA	Health Care Financing Administration
HHS	Department of Health and Human Services
HRSA	Health Resources and Services Administration
MSA	metropolitan statistical area
OMB	Office of Management and Budget
RUCA	rural-urban commuting area
RUCC	rural-urban continuum code
SCT	specialty care transport
UIC	urban influence code
Y2K	Year 2000

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Congressional Committees

In 2001, Medicare paid over \$2 billion for over 10 million ambulance trips for its 40 million elderly and disabled beneficiaries. Ambulance providers¹ that deliver Medicare-covered services range from small community, one-vehicle operations staffed entirely by volunteers to large privately owned firms or government agencies that operate many vehicles and rely on paid staff. Medicare covers medically necessary ambulance services when other means of transportation, such as a wheelchair van or a taxi, are inadvisable, given the beneficiary's medical condition at the time. Medically necessary ambulance trips include both emergency care, such as responses to 911 calls, and nonemergency care, such as transfers from one hospital to another.

In 2002, the Centers for Medicare & Medicaid Services (CMS) implemented a congressionally mandated ambulance fee schedule that substantially changed the way Medicare pays for ambulance services. Under the fee schedule, providers receive a base payment per trip, which varies by the kind of service provided, and a mileage payment, which varies by the length of the trip. A rural adjustment, which is applied to the mileage payment, increases the payment for trips that begin in rural areas, generally defined as areas outside of metropolitan areas. CMS has stated that this approach to a rural adjustment was the only one feasible at the time the agency was developing the fee schedule. However, as we have stated before² and as CMS has acknowledged, this adjustment may not sufficiently target the increased payments to providers serving sparsely populated rural areas. These providers may incur higher per trip costs than other providers because of their low volume of ambulance trips. We have recommended that CMS develop a more refined rural adjustment, and CMS is exploring alternative approaches to adjusting payments for rural ambulance trips.

¹The Centers for Medicare & Medicaid Services uses the term "provider" to refer to institutional providers of ambulance services, including hospitals and skilled nursing facilities, and uses the term "supplier" to refer to freestanding ambulance providers—that is, those not associated with a hospital, skilled nursing facility, or other facility. In this report, unless otherwise indicated, we use the term "provider" to refer to all organizations that provide Medicare ground ambulance services—both institutional and freestanding.

²U.S. General Accounting Office, *Rural Ambulances: Medicare Fee Schedule Payments Could Be Better Targeted*, HEHS-00-115 (Washington, D.C.: July 17, 2000).

Developing a Medicare payment method for ambulance services that maintains beneficiary access to these services has been complicated by the wide variation in ambulance providers, their volume of trips, and the areas they serve. For example, ambulance providers in rural areas where there are few people are likely to be idle more often than providers in more densely populated areas, and may need to earn more per trip to maintain ambulances and crews. As a result, payments that are appropriate for providers serving densely populated urban areas may not be appropriate for those serving less densely populated rural areas. Recognizing cost differences across providers in the payment method is important because many providers rely on Medicare revenue and their continuing availability is critical to ensuring beneficiaries' access to services.

The Medicare, Medicaid, and SCHIP Benefits Improvement and Protection Act of 2000 (BIPA) directed us to examine the cost of ambulance services in rural areas.³ This report (1) identifies the factors that account for differences in ambulance providers' costs per trip, and (2) analyzes the geographic differences, particularly among rural areas, in the factors affecting ambulance providers' costs and whether Medicare's payments for ambulance services under the fee schedule account for geographic differences in costs.

Our analysis focused on ground ambulance services and did not include air ambulance services, which account for less than 1 percent of annual Medicare-covered ambulance trips. To identify the factors that influence ambulance providers' costs, we used data from the 1999 National Survey of Ambulance Providers, conducted by the Project HOPE Center for Health Affairs.⁴ This survey, the sole national data source on the costs of providing ambulance services, obtained responses from a nationally representative sample of 421 ground ambulance providers that participated in Medicare. To determine how the factors affecting ambulance providers' costs vary geographically, we used data from the 2001 Area Resource File (ARF), which is maintained by the Health Resources and Services Administration (HRSA), to examine the characteristics of urban and rural counties, such as their population and land area. In addition, we used Medicare claims data for 2001 to determine the number and length of Medicare-covered

³Pub. L. No. 106-554, Appendix F, §221(b), 114 Stat. 2763A-463, 486-87 (2000).

⁴The Project HOPE Center for Health Affairs is a nonprofit health policy research organization.

ambulance trips delivered in urban and rural counties, and the number of providers that served those areas.⁵ We also used these data to estimate Medicare's average payments for ambulance trips under the fee schedule. Finally, we interviewed experts from eight industry and professional organizations as well as several ambulance providers. These data were adequate for addressing the issues in this report. Where appropriate, we examined the data for implausible values and tested the data for internal consistency. For more details on our data and methods, see appendix I. We performed our work from November 2001 through September 2003 in accordance with generally accepted government auditing standards.

Results in Brief

Ambulance trip volume is the key factor affecting differences in ambulance providers' average cost per trip. The majority of ambulance providers' total costs are related to their need to have ambulances and crew available when an ambulance is required. As long as a provider has excess capacity, these readiness-related costs are fixed and do not increase with the number of trips. Consequently, providers that make fewer trips tend to have a higher cost per trip than those that make many trips. For example, providers surveyed by Project HOPE that averaged 3 or fewer trips per day had a cost per trip that was nearly twice as high as the average cost per trip among providers that averaged 9 to 12 trips per day.

The modest variation in Medicare payments to ambulance providers that serve rural counties probably does not fully reflect their differences in cost per trip because the key factor affecting provider costs—the number of trips—varies widely across rural counties. In 2001, trip volume was much lower in the least densely populated quarter of rural counties than in the most densely populated quarter. Medicare per-trip payments are somewhat higher on average for trips provided in the least densely populated rural counties than for trips in other rural counties. However, the modestly higher payments are unlikely to fully account for the higher cost per trip of low-volume providers, which are most likely to serve the least densely populated rural counties. The Medicare payment differences are due to the greater length and the resulting higher mileage payments for trips in the least densely populated rural counties. The cost differences, however, are

⁵Our analysis focused on ambulance services paid under Medicare's ambulance fee schedule and therefore excluded services paid for by Medicare managed care organizations. Further, our analysis did not include any ambulance services for Medicare beneficiaries that were not billed to Medicare.

due to a higher fixed cost per trip, for which Medicare's base rates are intended to compensate.

We recommend that the Administrator of CMS better target the Medicare rural payment adjustment to trips provided in rural counties with particularly low population density by adjusting the base rates, rather than the mileage rate, for ground ambulance services provided in those counties.

In written comments on a draft of this report, CMS stated that the report will be useful as the agency develops a proposed rule to address appropriate payment for ambulance services furnished in rural, low-volume areas. The eight ambulance associations that commented on the draft report generally agreed with our findings and recommendation. However, four of the associations raised concerns about using counties to identify rural areas when targeting rural payments.

Background

In recent years, the ambulance industry has experienced several changes. In 2002, CMS implemented a new Medicare fee schedule for ambulance services, replacing the previous system that paid providers on a reasonable cost or reasonable charge basis. In addition, according to industry experts, many volunteer providers have reported greater difficulty maintaining adequate staff. Rural providers in particular have begun to rely more heavily on paid staff. Experts also told us that while many rural volunteer providers have not billed Medicare—or have billed nominal amounts—more of these providers have begun billing for services.

Characteristics of Medicare Ambulance Providers

Recently, both the number of ambulance providers that bill Medicare and the number of ambulance trips paid for by Medicare have increased. From 1998 to 2001, the number of ambulance providers that billed Medicare increased from just under 9,300 to over 9,700, and the total number of trips paid for by Medicare rose from roughly 8 million to over 10 million.

Medicare ambulance providers include a wide variety of provider types. In 1998, about 8,200 freestanding providers and 1,100 hospitals and other institution-based providers billed Medicare for ground trips. Freestanding providers are a diverse group, including private for-profit, not-for-profit, and public entities. They range from small community one-vehicle operations to large fire and rescue departments serving major metropolitan

areas. They include operations staffed almost entirely by community volunteers, public ventures that include a mix of volunteer and paid professional staff, and private firms that use only paid staff. In 1998, volunteer staff accounted for 80 percent or more of full-time equivalent personnel for over one-third of Medicare ambulance providers.⁶ About one-third of freestanding Medicare ambulance providers are managed by local fire departments.

Medicare ambulance providers also vary in the types of services they provide. Some deliver only basic life support (BLS) while others deliver advanced life support (ALS) services.⁷ In addition to responding to emergencies, ambulance providers may provide nonemergency transportation, such as transfers from one hospital to another. For some ambulance providers, nonemergency trips account for a significant share of their trips; for others, such trips account for few or none of their trips. Some ambulance providers are the sole providers serving their communities, while others operate in areas with multiple ambulance providers.

Medicare ambulance providers also differ in the percentage of their trips covered by Medicare and in their reliance on Medicare revenue. In 1998, Medicare beneficiaries on average accounted for about half of the total trips by providers that billed Medicare. However, Medicare beneficiaries accounted for less than one-quarter of trips for 13 percent of Medicare providers, and accounted for over 80 percent of annual trips for 9 percent of providers. On average, Medicare revenue accounted for 41 percent of providers' cash receipts.⁸ Other sources of ambulance providers' revenue include local tax subsidies and payments from private insurers, Medicaid, and individuals.

Requirements affecting ambulance providers vary by location. States and localities may require certain training for ambulance staff, establish maximum payment rates that licensed providers are allowed to charge, or specify response times through contracts with providers. Some

⁶See Penny E. Mohr and others, *Findings from the 1999 National Survey of Ambulance Providers* (Bethesda, Md.: 2000), p.13.

⁷ALS services are provided by personnel with advanced training and involve assessments by them or the provision of advanced interventions or procedures.

⁸See Mohr and others, pp. 19-20.

jurisdictions—such as those that provide financial support to ambulance providers—prohibit providers from billing for services. In addition, some communities require all ambulance providers to maintain ALS capacity on all vehicles.

Medicare Payment for Ambulance Services

CMS recently implemented a Medicare fee schedule that changed the way Medicare pays for ambulance services.⁹ The fee schedule, mandated by the Balanced Budget Act of 1997 (BBA), recognizes seven levels of ground ambulance services, ranging from BLS services to specialty care transports. (See table 1.) Under the previous payment system, Medicare paid institutional providers on a reasonable cost basis and freestanding providers on a reasonable charge basis. This approach led to wide differences in payments across providers for the same services. The new fee schedule standardized payment rates across provider types by applying the same payment rates to both institutional and freestanding providers.¹⁰ The fee schedule's payment rates are updated annually. Medicare's payment is based on the lesser of the actual charge or the applicable fee schedule amount.

⁹The fee schedule took effect April 1, 2002. The BBA had directed that the fee schedule be effective for services furnished on or after January 1, 2000. CMS stated that several factors—other statutory obligations, the scope of systems changes required to implement the fee schedule, and the need to ensure that its computer systems were compliant with Year 2000 (Y2K) requirements—delayed implementation of the fee schedule. 67 *Fed. Reg.* 9100. A federal district court order, issued on January 16, 2003, required the Department of Health and Human Services (HHS) to adopt a fee schedule for freestanding providers for the period of January 1, 2000, through March 31, 2002. *Lifestar Amb. Serv., Inc. v. U.S.*, 211 F.R.D. 688 (M.D. Ga. 2003). On April 16, 2003, CMS published a notice in the *Federal Register* stating that Medicare's fee schedule would apply to ambulance trips provided by freestanding providers during that period. 68 *Fed. Reg.* 18654. Payments would be adjusted retroactively. HHS has appealed the court's decision.

¹⁰Several other changes to the way ambulance services are paid for were introduced with the fee schedule. For example, in accordance with the BBA, all providers must accept the Medicare payment amount as full payment for covered services and may only collect allowed cost-sharing amounts from beneficiaries. In addition, Medicare will pay a BLS rate for services furnished at the BLS level even when an ALS vehicle is used. This latter provision will be phased in over several years. As specified by BIPA, ambulance providers that are critical access hospitals or entities owned and operated by them are exempt from the fee schedule and paid on a reasonable cost basis if there is no other ambulance provider within 35 miles. Critical access hospitals are small, isolated hospitals that have an annual average length of stay of 4 days or less.

Table 1: Ground Ambulance Services Covered by Medicare’s Ambulance Fee Schedule

Level of ambulance service	Definition	Staffing requirements	Base rate (2003) ^a
Basic life support (BLS)	Transportation by ambulance and the provision of medically necessary supplies and services, including the provision of BLS ambulance services as defined by the state.	The ambulance must be staffed by an individual who is qualified in accordance with state and local laws as an emergency medical technician-basic (EMT-Basic).	\$172.42
BLS-emergency	BLS level of service provided in immediate response to a 911 call or the equivalent.	Same as BLS	\$275.87
Advanced life support, level 1 (ALS1)	Transportation by ambulance and the provision of medically necessary supplies and services, including an ALS assessment by ALS personnel or the provision of at least one ALS intervention. ^b	ALS personnel are individuals trained to the level of the emergency medical technician-intermediate (EMT-Intermediate) or EMT-Paramedic. ^c	\$206.90
ALS1-emergency	ALS level of service provided in immediate response to a 911 call or the equivalent.	Same as ALS1	\$327.60
ALS2	Transportation by ambulance and the provision of medically necessary supplies and services, including (1) at least three separate administrations of one or more medications by intravenous push/bolus or by continuous infusion, ^d or (2) the provision of at least one of seven ALS2 procedures. ^e	Same as ALS1	\$474.16
Paramedic ALS intercept	EMT-Paramedic services furnished by a provider that does not furnish the ground ambulance transport, provided the services meet certain requirements. ^f	EMT-Paramedic	\$301.74
Specialty care transport (SCT)	Hospital-to-hospital transportation of a critically injured or ill patient, including the provision of medically necessary supplies and services, at a level of service beyond the scope of the EMT-Paramedic.	SCT is necessary when a patient’s condition requires ongoing care that must be furnished by one or more health professionals in an appropriate specialty area, such as nursing or respiratory care, or a paramedic with additional training.	\$560.37

Source: CMS.

Note: GAO summary based on information in CMS’s final rule as published in the *Federal Register*, a subsequent program memorandum regarding definitions of ambulance services, and the ambulance fee schedule public use file for calendar year 2003. See 67 *Fed. Reg.* 9100, CMS’s Program Memorandum AB-02-130 (Sept. 27, 2002).

^aThis is the base rate for each level of service prior to the geographic adjustment for differences in wages across areas.

^bAn ALS assessment is an assessment performed by an ALS crew as part of an emergency response that was necessary because the patient’s reported condition at the time of dispatch was such that only an ALS crew was qualified to perform the assessment. An ALS assessment does not necessarily result in a determination that the patient requires an ALS level of service. An ALS intervention is a procedure that is, in accordance with state and local laws, beyond the scope of practice of an EMT-Basic.

^cAn EMT-Intermediate is an individual who is qualified, in accordance with state and local laws, as an EMT-Basic and who is also certified, in accordance with those laws, to perform essential advanced techniques and to administer a limited number of medications. An EMT-Paramedic is an individual who has the qualifications of an EMT-Intermediate and, in accordance with state and local laws, has enhanced skills that include being able to perform additional interventions and administer additional medications.

^dThis excludes certain solutions.

^eThese include chest decompression, cardiac pacing, surgical airway, and other procedures.

^fParamedic ALS intercept services are most often furnished for an emergency ambulance trip in which a local volunteer ambulance that can furnish only BLS services is dispatched to transport a beneficiary. If the beneficiary needs ALS services, another provider dispatches a paramedic to meet the BLS ambulance at the scene or enroute to the hospital. The ALS paramedics then provide ALS services for the beneficiary. In general, Medicare payment may be made only to the provider furnishing the trip. However, the BBA provided that payments also could be made for the ALS provider under limited circumstances. CMS has stated that New York is the only state in which providers meet the statutory requirements for Medicare payment.

For most ambulance services, the fee schedule payment is the sum of a base payment and a payment for mileage.¹¹

- The base payment for a trip, which is intended to pay for fixed costs such as staff and equipment, reflects both a base rate and a geographic modifier. The base rate varies by the level of ambulance service provided. The geographic modifier, which is applied to 70 percent of the base rate, is intended to account for wage differences across areas.¹²
- The mileage payment reflects both the length of a trip and the per-mile payment rate. For trips in which the beneficiary is picked up in an urban area, the per-mile rate is \$5.53. Because of the fee schedule's rural adjustment, the per-mile rate for rural trips is 150 percent of the urban mileage rate for each of the first 17 miles (\$8.30) and 125 percent of the urban mileage rate for miles 18 through 50 (\$6.91).¹³ The urban mileage rate applies to every mile over 50 miles. The mileage payment applies

¹¹For paramedic ALS intercept services, there is no separate payment for mileage.

¹²The modifier is the same as that applied to the practice expense component of Medicare's physician fee schedule.

¹³The mileage rate increase for the first 17 miles was not mandated by law, but was specified in CMS's final rule. The increase for miles 18 through 50 is a temporary increase mandated by law. BIPA required that, for miles 18 through 50 of a rural trip, the mileage rate should be increased by at least half as much as the mileage rate increase established for the first 17 miles of a rural trip. BIPA stated that this increase would apply to ground ambulance services provided on or after July 1, 2001, and before January 1, 2004. Pub. L. No. 106-554, §221, 114 Stat. 2763A-463, 486.

only to “loaded miles”—the miles the beneficiary is transported by ambulance.

Under the fee schedule, rural areas are defined as areas outside of metropolitan statistical areas (MSA) and New England County Metropolitan Areas, as well as parts of MSAs that are identified as rural by the Goldsmith modification.¹⁴ MSAs are groups of counties containing a core of at least 50,000 people, together with adjacent areas that have a high degree of economic and social integration with that core.¹⁵ The Goldsmith modification identifies small towns and rural areas within large metropolitan counties that are isolated from central areas by distance or other features, such as mountains. About one-quarter of the roughly 3,100 counties in the United States are in MSAs, and about 75 of those counties have areas that are identified as rural under the Goldsmith modification.

The ambulance fee schedule will be phased in over several years. During this period, payments will be based in part on the fee schedule’s service-specific payment rates and in part on the amounts that Medicare would have paid under the prior payment system. The proportion of the payment based on the fee schedule will increase each year until 2006, when provider payments will be based entirely on the fee schedule.¹⁶ In 2003, payments are based on 40 percent of the fee schedule payment and 60 percent of the rates under the prior system.¹⁷

¹⁴CMS has stated that it could not easily adopt and implement other methods for recognizing geographic differences in population density within the constraints necessary to implement the fee schedule in a timely manner. 67 *Fed. Reg.* 9100.

¹⁵CMS currently uses the MSA definitions established by the Office of Management and Budget (OMB) and in effect prior to June 6, 2003, when OMB announced revised definitions based on the 2000 census.

¹⁶Medicare payment for ambulance services is based on the lesser of the actual charge or the applicable fee schedule amount. During the transition period, the applicable fee schedule amount is a blended payment, not the fee schedule payment.

¹⁷In response to the federal district court order that required HHS to adopt a fee schedule for freestanding providers for the period of January 1, 2000, to March 31, 2002, CMS issued a notice in the *Federal Register* that specified blended payments applicable to 2000, 2001, and early 2002. 68 *Fed. Reg.* 18654-55.

Ambulance Providers' Trip Volume Is the Main Factor Affecting Their Cost Per Trip

Trip volume is the major determinant of differences across providers in the average cost per trip. Ambulance providers' total costs primarily reflect readiness—having an ambulance and crew available when emergency calls are received. These readiness-related costs are fixed costs, meaning that they do not increase with the number of trips provided, as long as the provider has the excess capacity to make additional trips. Consequently, providers that can spread these fixed costs across more trips have a lower average cost per trip than providers that make fewer trips.

Providers' Total Costs Are Predominantly Readiness Related, and Do Not Vary With Trip Volume

The majority of ambulance providers' total costs are related to readiness—the need to have an ambulance and crew available when emergency calls are received. Readiness-related costs include costs of labor, vehicles, building space, and administration, as well as the cost of any back-up vehicles and crew, which constitute a reserve that permits responses to multiple simultaneous calls as well as scheduled maintenance on other vehicles. (See table 2.) Readiness-related costs are fixed, meaning that they do not vary with the number of trips a provider makes, as long as the provider has excess capacity. For example, total vehicle costs do not increase significantly when a provider makes more trips. Likewise, building and administrative costs are largely unaffected by trip volume. However, if a provider were to add another ambulance and crew to respond to higher volume, its fixed costs would rise substantially.

Table 2: Ambulance Providers' Cost Components, 1998

Cost component	Percentage of total costs
Labor costs	65
Administrative costs	14
Vehicle and equipment costs	11
Building costs	6
Supply costs	3
Total costs	100

Source: Project HOPE.

Note: GAO analysis of data from Project HOPE's National Survey of Ambulance Providers. Fuel costs are included in the vehicle and equipment costs category. These data are for full cost providers. Those that did not report costs for all five components were excluded. Full cost providers are defined as those that have 80 percent or more of their staff comprised of paid employees rather than volunteers, and that pay for 80 percent or more of their garage and office space. These data are for the fiscal year preceding the survey, which for most providers included 6 months or more of calendar year 1998. Cost component categories do not add to 100 percent due to rounding.

In contrast, an ambulance provider's costs for fuel and supplies (such as drugs and oxygen) are variable because they increase with the number of trips. These costs, however, account for a small fraction of ambulance providers' total costs.¹⁸

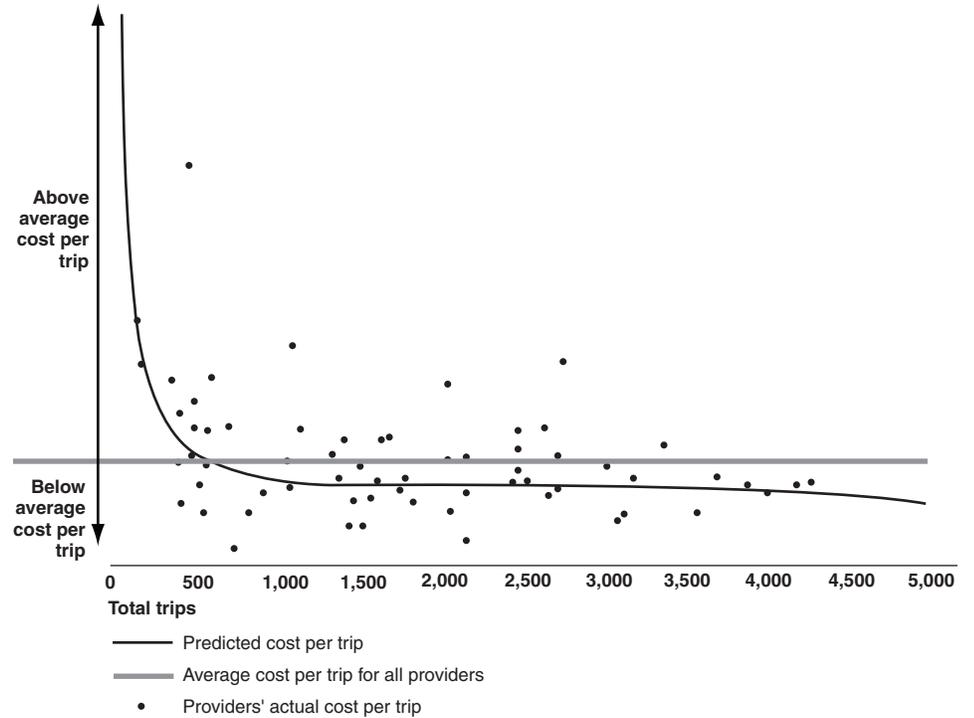
Fewer Trips Linked to a Higher Cost Per Trip

Providers that make fewer trips tend to have a higher cost per trip than those that make more trips. Figure 1 illustrates the average relationship between ambulance providers' cost per trip and their total trip volume, for providers that made 5,000 or fewer trips.¹⁹ As trip volume increases, the cost per trip decreases. Our statistical analysis considered other factors that affect providers' costs, notably trip length, but trip volume was most strongly related to the cost per trip.

¹⁸In the available data on ambulance costs, fuel costs are not always reported separately, so they are included in the vehicle and equipment costs category.

¹⁹Total trip volume includes all of a provider's trips, not just those covered by Medicare.

Figure 1: The Relationship between Cost Per Trip and Total Ambulance Trip Volume for Full Cost Providers With 5,000 or Fewer Annual Trips, 1998



Source: Project HOPE.

Note: GAO analysis of data from Project HOPE's National Survey of Ambulance Providers. The curve represents the predicted average cost per trip, based on our statistical analysis of providers' total costs, controlling for variation in type of service and trip volume, both of which were statistically significant. Total trip volume includes all of a provider's trips, not just those covered by Medicare. These data are for full cost providers. Full cost providers are defined as those that have 80 percent or more of their staff comprised of paid employees rather than volunteers, and that pay for 80 percent or more of their garage and office space. Providers with over 5,000 trips were excluded. We found similar results when we analyzed all full cost providers. These data are for the fiscal year preceding the survey, which for most providers included 6 months or more of calendar year 1998.

In addition, we found that providers surveyed by Project HOPE that averaged 3 or fewer trips per day had an average cost per trip that was nearly twice as high as the cost per trip among those that averaged 9 to 12 trips per day.²⁰ (See table 3.) Providers that averaged 4 to 8 trips per day had a cost per trip that was 1.3 times as high as the average cost among providers with 9 to 12 trips per day.

Table 3: Relative Cost Per Trip for Full Cost Ambulance Providers, 1998

Providers' average number of total trips per day (range)	Cost per trip relative to the average for providers with 9 to 12 trips per day
3 or fewer	1.94
4 to 8	1.30
9 to 12	1.00

Source: Project HOPE.

Note: GAO analysis of data from Project HOPE's National Survey of Ambulance Providers. The relative cost per trip is the ratio of the average cost per trip for each group of providers to the average cost per trip of providers that averaged 9 to 12 trips per day. Total trip volume includes all of a provider's trips, not just those covered by Medicare. These data are for full cost providers. Full cost providers are defined as those that have 80 percent or more of their staff comprised of paid employees rather than volunteers, and that pay for 80 percent or more of their garage and office space. Providers that had daily trip volumes outside the ranges shown above were excluded. The cost differences are statistically significant at the .05 level between the 3 trips or fewer group of providers and the other two groups (4 to 8 trips and 9 to 12 trips). The cost difference between the second and third groups was statistically significant at the .10 level. Significance was assessed using a one-tailed test. These data are for the fiscal year preceding the survey, which for most providers included 6 months or more of calendar year 1998.

²⁰These data are for full cost providers, defined as those that have 80 percent or more of their staff comprised of paid employees rather than volunteers, and that pay for 80 percent or more of their garage and office space. These data are for the fiscal year preceding the survey, which for most providers included 6 months or more of calendar year 1998.

Medicare Ambulance Payments for Trips in Rural Counties Are Unlikely to Fully Reflect Differences in Providers' Cost Per Trip

Although Medicare's payments generally are higher for trips originating in the least densely populated rural counties than in other counties, the payment differential is probably not large enough to account for the higher costs incurred by low-volume providers likely to serve these areas. Far fewer Medicare-covered ambulance trips are typically provided in rural counties than in urban counties. Trip volume also varies widely across rural counties, with the least densely populated generally having substantially fewer trips than the most densely populated. This suggests that the cost per trip is likely higher for providers serving the least densely populated rural counties. Ambulance providers on average are paid more for trips originating in the least densely populated rural counties than for those in the most densely populated rural counties, but the payment differences are modest and unlikely to reflect the higher cost per trip of low-volume providers.

Rural and Urban Counties Differ in Ambulance Trip Volume and Population Density

Rural counties, as defined by Medicare's ambulance fee schedule, tend to have a much lower volume of ambulance trips than counties defined as urban.²¹ In 2001, rural counties averaged about 1,200 Medicare-covered trips (both emergency and nonemergency), while urban counties averaged about 9,100 trips. The lower number of trips in rural counties suggests that providers that serve these areas likely have a higher cost per trip than other providers.

The difference in the volume of Medicare ambulance trips provided in rural and urban counties largely reflects differences in their population density. Not surprisingly, the number of Medicare ambulance trips in a county is strongly related to its population, with counties with fewer residents having fewer trips. Trip volume is also related to a county's land area, although to a lesser extent.²² Population density—the ratio of population to land area—reflects both of these measures. (See table 4.)

²¹We classified counties as urban if they were in an MSA and as rural if they were not in an MSA, using 2001 Area Resource File data. The roughly 75 urban counties that contain areas identified as rural by the Goldsmith modification are included in the urban county group. We used the beneficiary's address as a proxy for where each trip originated, since the 2001 national claims files did not contain that information. (See app. I for details.)

²²Larger counties have somewhat fewer trips than smaller counties, after accounting for county population.

Table 4: Characteristics of Urban and Rural Counties, 2001

	Average number of Medicare ambulance trips	Average length of Medicare ambulance trips (miles)	Average population density (persons/sq. mile)	Average population	Average land area (sq. miles)
Urban counties	9,144	14	747	276,791	844
Rural counties	1,153	23	47	23,942	1,132

Sources: HRSA and CMS.

Note: GAO analysis of HRSA and CMS data. We classified counties as urban if they were in an MSA and as rural if they were not in an MSA. The roughly 75 urban counties that contain rural areas as identified by the Goldsmith modification are included in the urban county group. We used the beneficiary's address as a proxy for where each trip originated.

Dominant Providers in Less Densely Populated Rural Counties Provide Fewer Trips

The number of Medicare ambulance trips provided in rural counties varies markedly with population density, with the least densely populated rural counties tending to have fewer trips than other rural counties. For example, the quarter of rural counties that are the most densely populated, with 52 or more persons per square mile, averaged over 2,200 Medicare trips in 2001.²³ (See table 5.) In contrast, only about 300 Medicare trips, on average, were made in the quarter of rural counties that are the least densely populated, with 11 or fewer persons per square mile. Even fewer Medicare trips—only about 200—were made in frontier counties, which are counties with 6 or fewer persons per square mile.²⁴ This suggests that the cost per trip is likely higher for providers serving the least densely populated rural counties.

²³We also grouped counties according to their Medicare population density. See app. II.

²⁴“Frontier” is a term used to describe counties with very low population density, and in most cases frontier counties are defined as those with six or fewer persons per square mile.

Table 5: Average Number of Medicare Ambulance Trips, Population and Land Area, by Counties Grouped by Population Density, 2001

County categories	Number of counties	Average number of Medicare ambulance trips	Average population	Average land area (sq. miles)
Urban counties	854	9,144	276,791	844
Rural counties	2,273	1,153	23,942	1,132
52+ persons/sq. mile	569	2,254	45,612	502
30-51 persons/sq. mile	568	1,290	25,351	654
12-29 persons/sq. mile	568	771	16,744	898
0-11 persons/sq. mile	568	296	8,021	2,477
7-11 persons/sq. mile	182	470	12,288	1,491
0-6 persons/sq. mile	386	214	6,009	2,942

Sources: HRSA and CMS.

Note: GAO analysis of HRSA and CMS data. We classified counties as urban if they were in an MSA and as rural if they were not in an MSA. The roughly 75 urban counties that contain rural areas as identified by the Goldsmith modification are included in the urban county group. Rural counties are grouped by quartiles of total county population density. The first quartile (0-11 persons per square mile) is further divided into frontier counties (0-6 persons per square mile) and nonfrontier (7-11 persons per square mile). We used the beneficiary's address as a proxy for where each trip originated.

The dominant providers in the least densely populated rural counties tend to have far fewer trips than the dominant providers serving other rural counties. Overall, rural counties vary little in the number of providers serving them. However, in most rural counties, one or two providers dominate, delivering the bulk of Medicare trips, with others having a much smaller share. We found that in 2001, about 70 percent of the trips in a rural county were typically supplied by two providers. The number of trips made by these dominant providers varied with counties' population density. In the quarter of rural counties with the lowest population density, the median number of Medicare trips made by each of the top two providers—in all of the counties they served—was 275.²⁵ (See table 6.) In contrast, the median number of Medicare trips made by the top two providers was much higher—over 2,100 trips—in the quarter of rural counties that were the most densely populated.²⁶

²⁵Providers' trips are not necessarily limited to one county, since providers may serve multiple counties.

²⁶The total number of trips made by these providers would be expected to be double the number of Medicare trips, since Medicare beneficiaries account on average for roughly half of providers' total trip volume.

Table 6: Characteristics of Rural Counties and Their Ambulance Providers, by Counties Grouped by Population Density, 2001

County categories	Number of counties	Number of Medicare providers serving a county ^a (median)	Percentage of a county's Medicare ambulance trips covered by the top 2 providers in a county (median)	Number of Medicare ambulance trips in all counties for each of the top 2 providers (median)
Rural	2,273	5	70	1,100
52+ persons/sq. mile	569	8	68	2,168
30-51 persons/sq. mile	568	6	70	1,422
12-29 persons/sq. mile	568	6	69	832
0-11 persons/sq. mile	568	4	74	275
7-11 persons/sq. mile	182	5	71	433
0-6 persons/sq. mile	386	4	75	215

Sources: HRSA and CMS.

Note: GAO analysis of HRSA and CMS data. We classified counties as rural if they were not in an MSA. Rural counties are grouped by quartiles of total county population density. The first quartile (0-11 persons per square mile) is further divided into frontier counties (0-6 persons per square mile) and nonfrontier counties (7-11 persons per square mile). We used the beneficiary's address as a proxy for where each trip originated.

^aProviders that delivered less than 1 percent of their total Medicare trips in a county were excluded from the count of providers serving that county.

Medicare Ambulance Payments Are Somewhat Higher for Trips in Less Densely Populated Rural Counties

Ambulance providers on average are paid 16 percent more for trips originating in the least densely populated quarter of rural counties than for trips in the most densely populated quarter.²⁷ (See table 7.) Payments for those trips are higher because the trips are generally longer, resulting in a higher mileage payment. In 2001, while trips that began in the most densely populated quarter of rural counties averaged 18 miles, trips in the least densely populated quarter averaged 30 miles. The rural adjustment, which provides a higher per-mile rate for the first 50 miles of rural trips, also contributed to the higher mileage payments.

²⁷Payment estimates were calculated by applying 100 percent of the 2003 Medicare ambulance fee schedule rates to Medicare ground ambulance trips delivered in 2001.

The modest difference in Medicare payment across rural counties is dwarfed by the difference in trip volume: The difference in trip volume between the least and most densely populated quarters of rural counties is nearly eightfold.²⁸ Because trip volume is an indicator of costs, the Medicare payment differences likely do not fully reflect differences across rural counties in providers' cost per trip.²⁹

Table 7: Average Number of Medicare Ambulance Trips, Trip Length, and Estimates of Average Medicare Payment^a per Ambulance Trip, by Rural Counties Grouped by Population Density

County categories	Number of counties	Average number of Medicare ambulance trips	Average length of Medicare ambulance trips (miles)	Average Medicare payment per ambulance trip
Rural counties	2,273	1,153	23	\$463
52+ persons/sq. mile	569	2,254	18	\$434
30-51 persons/sq. mile	568	1,290	21	\$446
12-29 persons/sq. mile	568	771	25	\$465
0-11 persons/sq. mile	568	296	30	\$505
7-11 persons/sq. mile	182	470	27	\$490
0-6 persons/sq. mile	386	214	31	\$512

Sources: HRSA and CMS.

Note: GAO analysis of HRSA and CMS data. We classified counties as urban if they were in an MSA and as rural if they were not in an MSA. The roughly 75 urban counties that contain rural areas as identified by the Goldsmith modification are included in the urban county group. Rural counties are grouped by quartiles of total county population density. The first quartile (0-11 persons per square mile) is further divided into frontier counties (0-6 persons per square mile) and nonfrontier counties (7-11 persons per square mile). We used the beneficiary's address as a proxy for where each trip originated.

^aPayment estimates were calculated by applying 100 percent of the 2003 Medicare ambulance fee schedule rates to Medicare ground ambulance trips delivered in 2001. These estimates reflect the mix of ambulance services provided in the different county categories as well as the geographic adjustment to account for wage differences across areas.

²⁸There is a similar difference in trip volume for the dominant providers serving these counties.

²⁹Differences in trip volume likely result in smaller differences in cost per trip.

Conclusions

Refining Medicare’s ambulance fee schedule to adequately account for cost differences in providing ambulance services across various geographic areas is important to ensuring beneficiaries’ access to services. Access is a particular concern in rural areas, since providers’ cost per trip is likely to be higher because they provide fewer trips. Moreover, our analysis shows that the cost per trip is likely to be highest in the least densely populated rural counties. While the fee schedule incorporates a rural adjustment to raise payments for trips provided in rural areas, its definition of “rural” is broad. As a result, the fee schedule’s rural payment adjustment does not sufficiently target trips provided in the least densely populated rural counties.

In implementing the fee schedule, CMS adjusted the mileage rate for rural trips to account for the higher cost per trip of providers serving rural areas. However, trip volume is a better indicator of providers’ cost per trip than is trip length. Thus, adjusting the base rates for rural trips—the portion of Medicare’s payment that is designed to pay for providers’ fixed costs—is a more appropriate way of accounting for rural low-volume providers’ higher cost per trip than adjusting the mileage rate.

Recommendation for Executive Action

To help ensure that Medicare beneficiaries’ access to ambulance services is adequate, we recommend that the Administrator of CMS better target the rural payment adjustment to trips provided in rural counties with particularly low population density by adjusting the base rates, rather than the mileage rate, for ground ambulance services provided in those counties.

Agency and External Reviewer Comments and Our Evaluation

We received written comments on a draft of this report from CMS. We also received comments from eight ambulance associations: American Ambulance Association,³⁰ American Hospital Association, Association of Air Medical Services, National Association of State Emergency Medical Services Directors, National Volunteer Fire Council, Rural EMS Advocate, American College of Emergency Physicians, and the National Association of EMS Physicians.

³⁰The American Ambulance Association represents many types of ambulance providers. In this section we refer to it as representing ground ambulance providers because they account for the majority of the association’s members.

CMS

CMS stated that the report will be useful as the agency develops a proposed rule to address appropriate payment for ambulance services furnished in rural, low-volume areas. CMS also noted that the report reflects the complexity of the issues and the need for careful analysis to ensure that payment adjustments are made only for those ambulance providers that require additional payment because of their low volume, rather than, for example, inefficiency or competition from another provider. CMS's comments appear in appendix III. CMS also provided technical comments, which we incorporated as appropriate.

Ambulance Associations

The associations that reviewed the draft report generally agreed with our findings and recommendation. All of the associations agreed with the need to address the higher cost of providing ambulance services in rural areas. Six agreed that an area's ambulance trip volume reflects its population density, while the remaining two associations did not address this issue. The majority of the associations agreed that CMS should adjust the base rates to recognize the higher cost per trip of providing ambulance services in areas with low population density. However, three associations went further, proposing to use both mileage and base rates to address the higher costs in rural areas. While supporting the principle of paying higher base rates to providers in rural areas where costs are high, the state EMS directors' and EMS physicians' associations were concerned that higher payments for rural providers could be at the expense of other providers.

Four associations raised concerns about using counties as the geographic areas for applying the adjustment. These associations said that a system that used counties would not accurately target rural ambulance payments. Three of these associations noted that, because counties may include both densely and sparsely populated areas, a system that used counties could overpay some providers and underpay others. They proposed using zip codes as the geographic areas for assessing population density and applying the adjustment. The rural ambulance association, in particular, also advocated the use of multiple rural categories based on population density to adjust payments for rural trips. The fourth association emphasized the need for a system that ensures that all areas with sufficiently low population density are eligible for an appropriate payment adjustment.

Our Response

GAO and the ambulance associations agree with the need to adjust payments for rural trips and that the adjustment should be applied to the base rate. With respect to adjusting payments for rural trips in low population density areas, we believe the adjustment should be applied to the base rate. We believe that the mileage rate for any trip, rural or urban, is best suited to compensating ambulance providers for costs that vary with trip length. As stated in the report, a base rate adjustment is a more appropriate way of accounting for rural low-volume providers' higher costs per trip because base rates reflect fixed costs, and because trip volume is a better indicator of providers' cost per trip than is trip length. With respect to possible payment reductions for other providers, implementing our recommendation could have this effect. If a revised rural adjustment is implemented in a way to keep total Medicare expenditures the same, some providers could face lower payments.

With respect to the geographic unit used to identify trips for the rural adjustment, we agree that, since counties are relatively large geographic units, it is possible for trips in some areas to be overpaid and others underpaid. Moreover, in principle, a rural classification system that uses a smaller geographic unit, such as zip codes, might better target payments to trips in areas with low population density. Yet our analysis indicates that zip codes do not explain variation in trip volume as well as counties. Further, county boundaries tend to be more stable over time than zip code boundaries. In addition, a variety of technical difficulties hinder the use of zip codes for ambulance payments, including the absence of zip codes for some rural areas. With respect to multiple adjustment categories, we did not address whether there should be a single adjustment or whether there should be multiple adjustment amounts to reflect differing levels of population density. A decision on single or multiple categories would require balancing increased precision with increased complexity.

We are sending copies of this report to the Administrator of CMS, appropriate congressional committees, and other interested parties. We will also make copies available to others upon request. This report is also available at no charge on GAO's Web site at <http://www.gao.gov>.

If you or your staffs have any questions, please call me at (202) 512-7114.
Other GAO contacts and staff acknowledgments are listed in appendix IV.

A handwritten signature in black ink that reads "Laura A. Dummit". The signature is written in a cursive style with a large initial 'L' and 'D'.

Laura A. Dummit
Director, Health Care—Medicare Payment Issues

List of Committees

The Honorable Charles E. Grassley
Chairman

The Honorable Max Baucus
Ranking Minority Member
Committee on Finance
United States Senate

The Honorable W.J. "Billy" Tauzin
Chairman

The Honorable John D. Dingell
Ranking Minority Member
Committee on Energy and Commerce
House of Representatives

The Honorable William M. Thomas
Chairman

The Honorable Charles B. Rangel
Ranking Minority Member
Committee on Ways and Means
House of Representatives

Data and Methods

1999 National Survey of Ambulance Providers. To identify the factors that influenced ambulance provider costs, we used the 1999 National Survey of Ambulance Providers. This survey, conducted by the Project HOPE Center for Health Affairs under the sponsorship of the American Ambulance Association, is the only nationally representative source for ambulance providers' costs. Project HOPE selected a stratified random sample of providers that had billed Medicare in 1997, obtained 421 completed questionnaires, and reported a response rate of 56 percent.¹ The survey included questions on costs, total number of trips by type of service, geographic location, and total mileage.

We took several steps to ensure that the Project HOPE data were suitable for our analysis. We examined the accuracy and completeness of the data by testing for implausible values and internal consistency. In addition, we questioned an anomalous result in Project HOPE's initial analysis of its data, which raised concerns about the credibility of the data: emergency advanced life support (ALS) trips cost less than nonemergency basic life support (BLS) trips.² In response, Project HOPE provided us with information about its subsequent analysis, which showed the expected result—ALS trips cost more than BLS trips, after controlling for providers' volume. This result resolved our major concern about the data.

We limited our analysis of the factors affecting differences in providers' costs to full cost providers—those providers that paid for 80 percent or more of their staff and paid for 80 percent or more of their office and garage space. The costs reported by these providers are more likely to reflect the full cost of providing ambulance services. We also excluded ambulance providers that were part of fire departments, because about half could not separate ambulance costs from other costs. Finally, we excluded one provider that reported implausible values. After these exclusions, we had 114 cases for analysis. Certain analyses that did not pertain to all full cost providers used a smaller number of cases. (See tables 8 and 9.)

¹See Penny E. Mohr and others, *Findings from the 1999 National Survey of Ambulance Providers* (Bethesda, Md.: 2000), p.11.

²See Mohr and others, p. 25.

Table 8: Full Cost Ambulance Providers by Average Number of Trips Per Day, 1998

Providers' average number of total trips per day	Percentage of full cost providers
3 or fewer	22
4 to 8	27
9 to 12	9
13 to 20	7
21 or more	35
Total	100

Source: Project HOPE.

Note: GAO analysis of data from Project HOPE's National Survey of Ambulance Providers. Total trip volume includes all of a provider's trips, not just those covered by Medicare. Full cost providers are defined as those that have 80 percent or more of their staff comprised of paid employees rather than volunteers, and that pay for 80 percent or more of their garage and office space. These data are for the fiscal year preceding the survey, which for most providers included 6 months or more of calendar year 1998. The number of full cost providers is 114.

Table 9: Full Cost Ambulance Providers by Average Number of Trips Per Year, 1998

Providers' average number of total trips per year	Percentage of full cost providers
5,000 or fewer	58
5,001 to 10,000	20
More than 10,000	22
Total	100

Source: Project HOPE.

Note: GAO analysis of data from Project HOPE's National Survey of Ambulance Providers. Total trip volume includes all of a provider's trips, not just those covered by Medicare. Full cost providers are defined as those that have 80 percent or more of their staff comprised of paid employees rather than volunteers, and that pay for 80 percent or more of their garage and office space. These data are for the fiscal year preceding the survey, which for most providers included 6 months or more of calendar year 1998. The number of full cost providers is 114.

Area Resource File. The Area Resource File (ARF), which is maintained by the Health Resources and Services Administration (HRSA), is a county-based health resources information database that contains data from many sources, including the U.S. Census. From the 2001 ARF, we obtained county data on land area in 1990 and total population in 2000, which we used to calculate population density. We also obtained data on the number of persons age 65 and over in each county in 1999, which we used as a proxy for Medicare beneficiaries. The ARF is a standard data source that is

well documented and widely used, so we did not independently verify its accuracy or completeness.

Medicare claims files. We used Medicare claims data to determine the volume and length of all ground-based Medicare-covered trips, as well as Medicare's payments for those trips. We used the 2001 national claims history 100 percent nearline file for physicians and suppliers to identify claims for ambulance services by freestanding providers, and the 2001 outpatient 100 percent standard analytic file to identify claims for ambulance services by institutional providers. We used the zip code of the beneficiary's primary address as a proxy for the point where the ambulance picked up the beneficiary because the point of pickup is not recorded in the 2001 data.³ Although we did not independently verify the reliability of the national claims files, we screened the files and excluded claims that were denied, claims that were superseded by an adjustment claim, and claims for services in other years. We retained all final claims for 2001.

Provider interviews. To gain an understanding of the ambulance industry, we interviewed experts from eight industry and professional organizations. We also interviewed several individual ambulance providers.

Factors affecting ambulance providers' costs. To examine the effect of selected factors on ambulance providers' costs, we analyzed the Project HOPE survey data using a simplified version of a model reported by Project HOPE.⁴ In our model, the natural logarithm of total costs is a function of the number of trips, the number of trips squared, and the proportion of the total trips that are ALS.⁵ We tested a number of additional terms, including length of trips, but they were all either statistically insignificant or significant but with very small effects. We restricted our model to

³Beginning January 1, 2001, CMS required ambulance providers to include the point of pick-up zip code on all claims, and on April 1, 2002, began using it for payment, to determine whether the rural adjustment should be applied. Although the CMS contractors—fiscal intermediaries and carriers—that pay the claims have had the point of pick-up zip code in their data bases, it was not incorporated into the national claims history files until April 1, 2003.

⁴See Mohr and others, pp. A1-A3.

⁵The Project HOPE model resembles a type of model frequently used by health services researchers for analyzing costs of health care. For example, see T. Grannemann and others, "Estimating Hospital Costs," *Journal of Health Economics*, vol. 5, no. 2 (1986), and J. Nyman, "The Marginal Cost of Nursing Home Care," *Journal of Health Economics*, vol. 7, no. 4 (1988).

providers with 5,000 or fewer total trips per year because we were primarily interested in rural providers, which generally have fewer trips.⁶ However, our sensitivity analyses showed that the results were broadly similar when the model was applied to all full cost providers.⁷ Our model has an adjusted R² of 0.48, indicating that the model explains 48 percent of the variance in costs. In general, when trip volume declines, the estimated cost per trip increases, although less than proportionately. That is, a 10 percent decrease in trip volume is associated with an increase in cost per trip of less than 10 percent.

Analysis of variation in factors affecting costs across geographic areas. To examine differences between urban and rural areas in factors affecting ambulance costs, we grouped counties with similar characteristics. We followed CMS in classifying counties in metropolitan statistical areas (MSA) as urban counties and counties outside MSAs as rural.⁸ However, for our analysis we did not apply the Goldsmith modification that CMS uses to identify as rural certain areas within MSAs.⁹ These rural areas are typically small, so we did not treat them as rural counties because that would distort our urban and rural comparisons. Our sensitivity analyses determined that our findings would have been generally the same if we had considered these areas as rural counties, although in some cases the differences between urban and rural counties would have been heightened.

To examine differences among rural counties, we grouped them based on their population density. Population density—the ratio of population to land area—is a commonly used measure of rurality. We used population density to group counties into quartiles, and then divided the least densely populated quartile of rural counties into frontier counties—those with six or fewer persons per square mile—and nonfrontier counties, because of our interest in the most sparsely populated rural areas. Using this

⁶Although some rural providers have more than 5,000 total trips per year, most have less than 5,000 total trips per year.

⁷The coefficients had the same signs, although they differed in magnitude.

⁸MSAs are groups of counties containing a core of at least 50,000 people, together with adjacent areas that have a high degree of economic and social integration with that core. New England County Metropolitan Areas are considered urban.

⁹The Goldsmith modification identifies small towns and rural areas within large metropolitan counties that are isolated from central areas by distance or other features, such as mountains. CMS uses a Goldsmith modification based on 1980 census data.

grouping, we found that ambulance trip volume decreased steadily from the most densely populated rural counties to the least densely populated. We also examined several other classification systems: urban influence codes (UIC), which classify counties based on each county's largest city and its proximity to other areas with large, urban populations; rural-urban continuum codes (RUCC), which classify metropolitan counties by the size of the urban area and nonurban counties by the size of the urban population and proximity to a metropolitan area; and rural-urban commuting areas (RUCA), which classify census tracts using patterns of urbanization, population density, and daily commuting patterns, and then map the census tracts into zip codes.¹⁰ These systems are more complex than the system we used, and we found that they did not help explain variation in trip volume as well as counties grouped by population density.

To confirm the effect of population density on trip volume, we did several additional analyses. We regressed counties' annual volume of Medicare trips (expressed as natural logarithms) on population and land area (expressed as natural logarithms). Population had a positive effect on the number of trips, while land area had a negative effect. An increase of 1 percent in population increased the number of trips by about 1 percent in a county, while an increase of 1 percent in land area decreased the number of trips by about 0.1 percent.¹¹ Population density combines the two effects: a 1 percent increase in population density increases the number of trips by 0.7 percent.¹²

¹⁰For more information on UICs, see <http://www.ers.usda.gov/Briefing/Rurality/urbaninf/>; for more information on RUCCs, see <http://www.ers.usda.gov/Briefing/Rurality/ruralurbcon/>; and for more information on RUCAs, see <http://www.fammed.washington.edu/wwamirhrc/rucas/rucas.html>.

¹¹The adjusted R² for the model is 0.74. The adjusted R² is a measure of the proportion of the variation in the dependent variable (the natural logarithm of trips) accounted for by the independent variables (the natural logarithms of land area and population).

¹²The adjusted R² for the model is 0.60.

Characteristics of Rural Counties Grouped by Medicare Population Density

Total population density is strongly related to Medicare population density. (See table 10.) For example, 525 rural counties with the lowest total population density were also lowest in terms of Medicare population density. In total, 83 percent of all rural counties were in the same density quartile, regardless of whether total population or Medicare population was used to group rural counties. Our results with respect to county characteristics and ambulance services would have been similar had we used Medicare population density to group counties rather than total population density. (See tables 11, 12, and 13.)

Table 10: Rural Counties Grouped by Total Population Density and by Medicare Population Density, 2001

Total population density	Medicare population density			
	7.6 + Medicare beneficiaries/sq. mile	4.3-7.5 Medicare beneficiaries/sq. mile	1.8-4.2 Medicare beneficiaries/sq. mile	0-1.7 Medicare beneficiaries/sq. mile
52+ people/sq. mile	505	61	3	0
30-51 people/sq. mile	64	423	79	2
12-29 people/sq. mile	0	83	444	41
0-11 people/sq. mile	0	0	43	525

Source: HRSA.

Note: GAO analysis of the 2001 Area Resource File. Bolded numbers refer to the number of counties that fall in the same quarter of rural counties—whether rural counties are grouped by total population density or Medicare population density. We used the number of persons age 65 and over in each county in 1999 as a proxy for the number of Medicare beneficiaries.

Appendix II
Characteristics of Rural Counties Grouped
by Medicare Population Density

Table 11: Average Number of Medicare Ambulance Trips, Population and Land Area, by Counties Grouped by Medicare Population Density, 2001

County categories	Number of counties	Average number of Medicare ambulance trips	Average population	Average land area (sq. miles)
Urban counties	854	9,144	276,791	844
Rural counties	2,273	1,153	23,942	1,132
7.6+ Medicare beneficiaries/sq. mile	569	2,279	45,362	517
4.3-7.5 Medicare beneficiaries/sq. mile	567	1,265	24,836	646
1.8-4.2 Medicare beneficiaries/sq. mile	569	752	16,584	841
0-1.7 Medicare beneficiaries/sq. mile	568	315	8,961	2,527

Sources: HRSA and CMS.

Note: GAO analysis of HRSA and CMS data. We classified counties as urban if they were in an MSA and as rural if they were not in an MSA. The roughly 75 urban counties that contain rural areas as identified by the Goldsmith modification are included in the urban county group. We used the beneficiary's address as a proxy for where each trip originated. We used the number of persons age 65 and over in each county in 1999 as a proxy for the number of Medicare beneficiaries.

Appendix II
Characteristics of Rural Counties Grouped
by Medicare Population Density

Table 12: Characteristics of Rural Counties and Their Ambulance Providers, by Counties Grouped by Medicare Population Density, 2001

County categories	Number of counties	Number of Medicare providers serving a county^a (median)	Percentage of a county's Medicare ambulance trips covered by the top 2 providers in a county (median)	Number of Medicare ambulance trips in all counties for each of the top 2 providers (median)
Rural counties	2,273	5	70	1,100
7.6+ Medicare beneficiaries/sq. mile	569	9	67	2,080
4.3-7.5 Medicare beneficiaries/sq. mile	567	6	69	1,366
1.8-4.2 Medicare beneficiaries/sq. mile	569	6	71	834
0-1.7 Medicare beneficiaries/sq. mile	568	4	74	308

Sources: HRSA and CMS.

Note: GAO analysis of HRSA and CMS data. We classified counties as rural if they were not in an MSA. We used the beneficiary's address as a proxy for where each trip originated. We used the number of persons age 65 and over in each county in 1999 as a proxy for the number of Medicare beneficiaries.

^aProviders that delivered less than 1 percent of their total Medicare trips in a county were excluded from the count of providers serving that county.

Appendix II
Characteristics of Rural Counties Grouped
by Medicare Population Density

Table 13: Average Number of Medicare Ambulance Trips, Trip Length, and Estimates of Average Medicare Payment^a per Ambulance Trip, by Rural Counties Grouped by Medicare Population Density

County categories	Number of counties	Average number of Medicare ambulance trips	Average length of Medicare ambulance trips (miles)	Average Medicare payment per ambulance trip
Rural counties	2,273	1,153	23	\$463
7.6+ Medicare beneficiaries/sq. mile	569	2,279	19	\$434
4.3-7.5 Medicare beneficiaries/sq. mile	567	1,265	21	\$448
1.8-4.2 Medicare beneficiaries/sq. mile	569	752	25	\$467
0-1.7 Medicare beneficiaries/sq. mile	568	315	29	\$501

Sources: HRSA and CMS.

Note: GAO analysis of HRSA and CMS data. We classified counties as urban if they were in an MSA and as rural if they were not in an MSA. We used the beneficiary's address as a proxy for where each trip originated. We used the number of persons age 65 and over in each county in 1999 as a proxy for the number of Medicare beneficiaries.

^aPayment estimates were calculated by applying 100 percent of the 2003 Medicare ambulance fee schedule rates to Medicare ground ambulance trips delivered in 2001. These estimates reflect the mix of ambulance services provided in the different county categories as well as the geographic adjustment to account for wage differences across areas.

Comments from the Centers for Medicare & Medicaid Services



DEPARTMENT OF HEALTH & HUMAN SERVICES

Centers for Medicare & Medicaid Services

Administrator
Washington, DC 20201

DATE: SEP 11 2003

TO: Laura A. Dummit
Director, Health Care—Medicare Payment Issues

FROM: Thomas A. Scully 
Administrator

SUBJECT: General Accounting Office (GAO) Draft Report: *Ambulance Services: Medicare Payments Can Be Better Targeted to Trips in Less Densely Populated Rural Areas* (GAO-03-986)

Thank you for the opportunity to review the GAO draft report entitled *Ambulance Services: Medicare Payments Can Be Better Targeted to Trips in Less Densely Populated Rural Areas* (GAO-03-986).

We appreciate the data and analysis that went into this report and look forward to using this information as we develop our proposed rule to address the appropriate payment for ambulance services furnished in rural, low volume areas. The report reflects the complexity of the issues and the need for careful analysis to assure that the appropriate payments are made to only those ambulance suppliers/providers who require additional payment because of low volume and not because of some other reason (e.g., inefficiency or competition from another supplier). As the Secretary stated in the ambulance fee schedule final rule (67 FR 9110), ". . . we will consider alternative methodologies that may more appropriately address payment to isolated, low-volume rural ambulance suppliers." The GAO report contributes to the growing amount of data needed to accomplish this stated goal.

We look forward to working with GAO on this and other issues in the future.

GAO Contacts and Staff Acknowledgments

GAO Contacts

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Acknowledgments

Major contributors to this report were Martha Kelly, Robin Burke, Eric Wedum, Michael Kendix, and Jessica Farb.

Related GAO Products

Ambulance Services: Changes Needed to Improve Medicare Payment Policies and Coverage Decisions. [GAO-03-244T](#). Washington, D.C.: November 15, 2001.

Rural Ambulances: Medicare Fee Schedule Payments Could Be Better Targeted. [GAO/HEHS-00-115](#). Washington, D.C.: July 17, 2000.

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