Medicare Ground Ambulance Data Collection System (GADCS) Report

Year 1 and Year 2 Cohort Analysis

December 2024

Project Report

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Andrew W. Mulcahy, Sara E. Heins, Petra W. Rasmussen, Jonathan H. Cantor, Rose Kerber, Jennifer Gildner, and Sarah Dalton

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About This Report

Section 1834(l)(17) of the Social Security Act requires the Centers for Medicare & Medicaid Services (CMS) to collect cost, revenue, utilization, and other information from representative samples of ground ambulance organizations. CMS developed the Medicare Ground Ambulance Data Collection System (GADCS) to meet this requirement. This report presents findings from analysis of data submitted by the first two "Year 1" and "Year 2" cohorts of ground ambulance organizations selected to participate in the GADCS.

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Executive Summary

Ground ambulance organizations serve as the cornerstone for emergency medical response and pre-hospital care across most U.S. communities. Despite this crucial, lifesaving role, the United States has historically lacked comprehensive data on the composition, economics, and resiliency of the ground ambulance industry. This lack of data limits the extent to which policymakers and others can describe the numbers and types of ground ambulance services provided to patients, target ground ambulance-related policy interventions, identify and track evolving trends and shorter-term disruptions, and address the central question of what appropriate and sustainable payment rates for ground ambulance services might be. From the perspective of Medicare, which covers and pays for certain ground ambulance services via its Medicare Part B Ambulance Fee Schedule (AFS), clear and comprehensive information describing the resources involved in furnishing ambulance services can serve as a useful anchor to inform payment policy and specific rates.

GADCS Overview

In response to a new statutory requirement for ground ambulance data collection, the Centers for Medicare & Medicaid Services (CMS), after conducting a comprehensive environmental scan of the ground ambulance industry, developed and implemented a new Medicare Ground Ambulance Data Collection System (GADCS). The GADCS includes a survey-based data collection "instrument" (or "questionnaire"), a web-based data entry and submission portal, and an approach to select representative samples of ground ambulance organizations to collect and report data. CMS randomly selected four cohorts of organizations defined by their ten-digit National Provider Identifier (NPI),[1] which together approximate the more than 10,500 ground ambulance organizations billing Medicare for ground ambulance services each year. Each selected organization must first collect data on its service volume, costs, and revenue over a continuous 12-month data collection period and then report these data to CMS via the web-based portal before the end of a five-month reporting period. Participation in the GADCS is required, and selected organizations without sufficient responses are subject to a one-year, 10 percent payment reduction on AFS services in a subsequent calendar year. The same statutory change requiring new Medicare data collection also requires the Medicare Payment Advisory Commission (MedPAC) to submit a report to Congress describing the collected data and assess, among other topics, the adequacy of Medicare payment rates for ground ambulance services.

[1] NPIs are unique identification numbers assigned to health care providers in the United States by CMS. To obtain an NPI, a health care provider must apply through the National Plan and Provider Enumeration System (NPPES). For more information, please visit https://nppes.cms.hhs.gov.

GADCS Status and Report Overview

As of July 2024, data collection and reporting were complete for the more than 5,000 organizations selected in the first two GADCS cohorts (called "Year 1" and "Year 2" organizations). This report describes the GADCS itself, response rates for Year 1 and Year 2 organizations, data cleaning and validation, statistics summarizing Year 1 and Year 2 responses, and econometric analyses exploring relationships between costs per service and organizational characteristics. A planned future report will expand these analyses to include organizations selected as part of the Year 3 and Year 4 GADCS cohorts.

Response Rates and Weights

Most Year 1 and Year 2 organizations selected to participate in the GADCS completed their reporting requirement as of July 15, 2024, which CMS designated as the cutoff date for inclusion in this report. **Among 4,529 selected organizations actively billing Medicare in 2023, 95 percent (*n* = 4,321) started the GADCS process, and, of those, 3,694 selected organizations, or 85 percent, completed reporting as of July 15, 2024.**

Some selected organizations ceased operation or stopped providing ground ambulance services between CMS sampling (2017 for Year 1 and 2018 for Year 2) and reporting deadlines (usually in 2023 for Year 1 and Year 2 organizations). Some "inactive" organizations also reported information (n = 162) for **a total of 3,856 (i.e., 3,694 plus 162) Year 1 and Year 2 responses**. However, many of these inactive responders (n = 120 of 162 inactive NPIs) and a small number of active responders (n = 24) indicated at an early stage of the reporting process that they did not bill Medicare for ground ambulance services during the applicable data collection period. Despite their completing GADCS reporting, we excluded these organizations (n = 144 or 120 plus 24) from our analysis because they did not submit detailed information across the entire GADCS instrument.

In all, **a total of 3,712 Year 1 and Year 2 GADCS responses contributed to the analyses presented in this report.**[2] Response rates were robust across subgroups of ground ambulance organizations, including the specific groups used in Medicare's stratified random sampling approach (defined by Medicare provider[3] [e.g., hospital] versus stand-alone ambulance supplier status, Medicare ground ambulance transport volume, ownership category, and service area

[2] The number of total responses contributing to analyses is equal to the difference between 3,856 complete Year 1 and Year 2 GADCS responses and 144 complete responses that, per the GADCS instructions, did not include detailed information across the entire GADCS instrument.

[3] Medicare providers of services are hospitals, skilled nursing facilities, and other facility-based providers enrolled in the Medicare program as providers. Some Medicare providers, primarily Critical Access Hospitals and other hospitals, provide ground ambulance services. Most ground ambulance organizations are Medicare suppliers rather than providers.

population density[4]). **However, some organizations, including those with relatively lower Medicare transport volume and those in the for-profit ownership category (vs. non-profit or government), had relatively lower response rates.** These lower rates may reflect a relatively higher reporting burden for smaller organizations, many of which would have had to update or add to existing accounting and data systems in order to collect GADCS data; practical limits on staff time and resources at lower-volume organizations; or a comparison of the costs involved in reporting versus the magnitude of the payment reduction by some organizations. To prevent biased results from differential non-response in some groups of organizations versus others, we calculated and applied weights in most analyses so that the information from these 3,712 responses more closely approximates the characteristics of the full set of 5,317 selected Year 1 and Year 2 organizations.

Data Validation and Cleaning

Information submitted by selected organizations in Year 1 and Year 2 was generally complete and consistent with the GADCS instructions. As in any survey-based data collection, some reported values were outliers or potentially inconsistent with other information from the same submission. We applied a range of transparent, reproducible internal validation and cleaning steps to ensure that no single organization's response to a GADCS question had undue influence on reported descriptive statistics. For example, for the many GADCS questions where responses were right-skewed (in other words, with most organizations reporting relatively small magnitudes and a small share of organizations reporting much larger magnitudes), we often top-coded, or "winsorized," responses, capping responses at an upper-bound limit such as the 99th percentile of the distribution across all responses to reduce the influence of the largest outliers. See Appendix B for a detailed accounting of data validation and cleaning steps.

Descriptive Statistics

The data reported via the GADCS dramatically expand the scope and depth of our understanding of ground ambulance organizations, including their characteristics, services offered, costs, and revenue. Table S.1 lists key results from the analysis of Year 1 and Year 2 GADCS data, with a focus on new and noteworthy findings.

[4] CMS defines rural, super rural, and urban areas for ambulance services reimbursement purposes as follows: rural: an area outside of an urban area, or a rural census tract within a Metropolitan Statistical Area (MSA); super rural: the lowest quartile of nonmetropolitan ZIP Codes by population density; and urban: an MSA modified to recognize rural census tracts in MSAs. For additional information on the classification, see Michael Ratcliffe, Charlynn Burd, Kelly Holder, and Alison Fields, "Defining Rural at the U.S. Census Bureau: American Community Survey and Geography Brief," U.S. Census Bureau, ACSGEO-1, December 2016. The list of CMS ZIP Codes and their designations can be found in the ZIP Code to Carrier Locality file available at CMS, "Ambulance Fee Schedule," webpage, last accessed August 16, 2023.

Table S.1. Selected GADCS Descriptive Statistics

Section	Findings
Section 2 (Organizational Characteristics)	• Only **17 percent** of for-profit organizations used volunteer labor, as compared with **61 percent** of non-profit organizations. • Just over half **(57 percent)** of for-profit organizations, compared with **over 99 percent** of government organizations, responded to emergency calls for service. • Most government organizations (**68 percent**) used a static staffing model—where the same number of ambulance units are available at all times—compared with **27 percent** of for-profit organizations. • Over half (**53 percent**) of ground ambulance organizations (regardless of ownership type) were part of an organization that also provided fire, police, or other public safety services.
Section 3 (Service Area)	• For-profit and very high-volume organizations had larger primary service areas—i.e., areas where the organization is primarily responsible for providing ground ambulance services—on average (**1,336 and 1,568 sq. miles**, respectively) than government and low-volume organizations (**362 and 441 sq. miles**, respectively). • Nearly half (**49 percent**) of organizations reported having a secondary service area—i.e., an area where the organization regularly responds to calls for service when needed through mutual and auto-aid agreements with neighboring communities. • Organizations typically reported an average ground ambulance trip time—which is also called "time on task" and measures the time from when an ambulance begins a response to a call for service to when the same ambulance is ready to respond to another call—under one hour (**48 percent**) or between one and two hours (**44 percent**). Only **4 percent** of organizations reported an average trip time of over two hours.
Section 4 (Emergency Response Time)	• Emergency response times were right-skewed, with a median response time of **9 minutes**. A small number of longer response times, particularly from organizations serving rural areas, contributed to a higher mean time of **12 minutes**. • Roughly **one-quarter** of organizations are incentivized, such as by contract with a municipality, to meet response time targets.
Section 5 (Service Volume)	• Of **31.2 million** total reported ground ambulance responses, most (**73 percent**) resulted in a transport. • The top **10 percent** of organizations ranked by transport volume contributed to **67 percent** of the total transports reported via the GADCS. • Roughly **10 percent** of ground ambulance responses involved medical treatment at the scene only, without a resulting transport. • Half of organizations reported participating in joint responses. First responders from another organization often participated in joint responses.

Section	Findings
Section 6 (Service Mix)	• Overall, 72 percent of responses were emergency responses. • Over half—**56 percent**—of transports were at the basic life support (BLS) level. • Advanced life support, level 1 (ALS1) services accounted for an additional **42 percent** of transports. • Advanced life support, level 2 (ALS2) and specialty care transport (SCT) services combined accounted for **3 percent** of total transports. • Government organizations had a much higher average share of advanced life support (ALS) vs. BLS services compared with for-profit organizations (**58 vs. 33 percent**). • For-profit organizations reported substantially higher shares of interfacility transports (**45 percent**) versus other organizations (**12 percent**).
Section 7 (Labor Costs)	• Across all organizations, **94 percent** had emergency medical technician (EMT)-Basic staff, and **75 percent** used EMT-Paramedic labor. • While **36 percen**t of organizations used volunteers, volunteer hours accounted for **less than 1 percent** of total ground ambulance hours worked. • Organizations reported over **500 million** total hours worked and **$25 billion** in total compensation for labor via the GADCS, with roughly 80 percent of each associated with ground ambulance operations. • Response personnel—particularly EMT-Basics and EMT-Paramedic staff—accounted for **90 percent** of ground ambulance labor costs. • Administration/facilities staff collectively accounted for **10 percent** of labor costs. • Across all organizations, average ground ambulance labor expenses—**$3.65 million**—were many times larger than the median (**$551,000**), suggesting (as in several other key GADCS variables) a right-skewed distribution of labor expenses where a small number of organizations have much higher than typical costs.
Section 8 (Facilities Costs)	• For-profit organizations had **almost twice** the facility costs of non-profit organizations, driven by larger facilities, fewer facilities owned outright or donated, and higher taxes. • Urban organizations' facilities were **over twice** as large as rural and super rural facilities.
Section 9 (Vehicle Costs)	• Fire trucks cost **over twice** as much as ground ambulances per vehicle, and public safety–based organizations, either in accordance with state or local laws or based on community preferences, often sent these vehicles on ground ambulance calls. • Other than the cost of vehicles themselves, fuel was the largest vehicle cost, with an annual per-organization median cost of **approximately $23,000**.
Section 10 (Equipment, Consumable, and Supply Costs)	• Most **(57 percent)** organizations reported making a capital medical equipment purchase during the data collection period. • Nearly all **(96 percent)** organizations reported costs for medical equipment and supplies.
Section 11 (Other Costs)	• **Nine in ten** organizations reported purchasing contracted services from a third party. • The most common contracted service was billing (**78 percent** of organizations), with an average annual ground ambulance-related expense across all organizations of **$79,000**. • **Sixty percent** of organizations reported training expenses, with an average annual amount of nearly **$18,000** per organization.

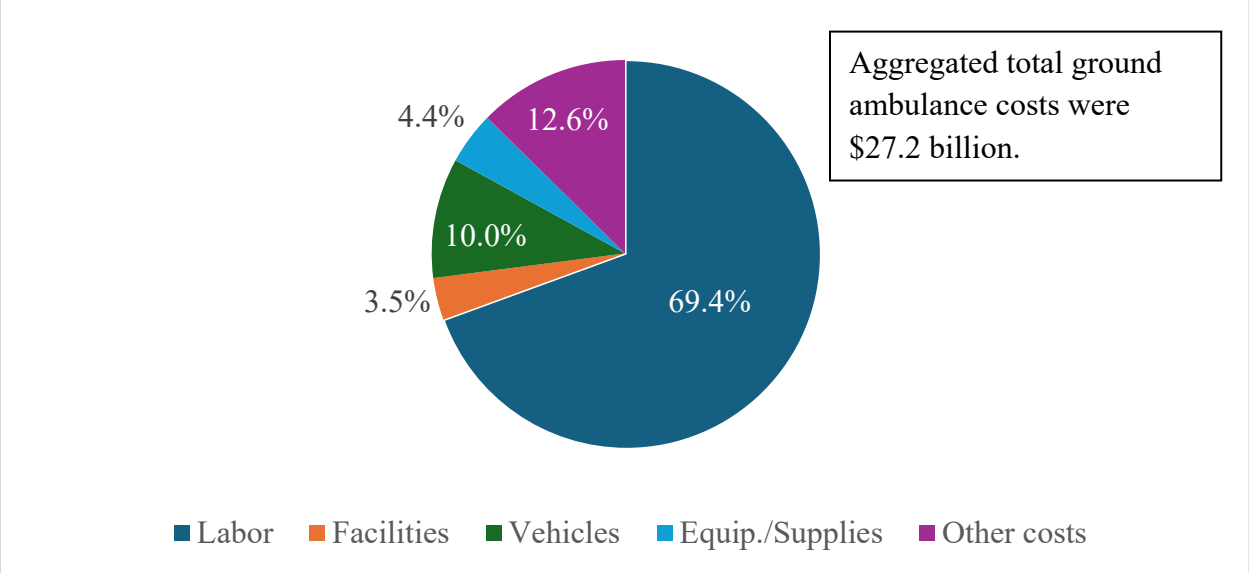
Section	Findings
Section 13 (Revenues)	• Traditional (fee-for-service [FFS]) Medicare accounted for **25 percent** of total, aggregated transport revenue, while Medicare Advantage ("Medicare managed care") plans accounted for an additional **17 percent** of total transport revenue. • The Traditional Medicare share of total transport revenue varied across organization-level service area population density, ownership category, and other characteristics, ranging from **20 percent** (for-profit NPIs) to **37 percent** (rural NPIs). Traditional Medicare, Medicare Advantage, and commercial insurers together accounted for **approximately 75 percent** of transport revenue on average. • About **one in five** organizations reported that they did not always bill patients in one or more payer categories for transports.

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: Although there are 13 sections in the GADCS, we only include 11 in this table. Section 1 (General Instructions) only has instructions for organizations, so it does not have any results to include in this report, and Section 12 (Total Cost) only has a single question on organizations' total costs. We used responses from Section 12 only in our data validation findings (reported in Appendix B).

Decomposing Total Ground Ambulance Costs

After aggregating ground ambulance costs across all Year 1 and Year 2 organizations, labor costs accounted for 69 percent of total expenses, 10 percent for vehicle expenses, 4 percent for facilities expenses, 4 percent for equipment and supplies, and 13 percent for "other" costs, including contracted services (e.g., dispatch, billing, and maintenance contracts), training, licenses, and other expenses combined (Figure S.1).

Figure S.1. Relative Contribution to Aggregated Total Ground Ambulance Costs



SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: "Equip." is equipment.

Limitations

There are limitations of the GADCS and our analysis. It is important to emphasize that the GADCS was not designed to do the following:

- assess the quality of ground ambulance services or related clinical outcomes,
- determine Medicare payments for ground ambulance services under the AFS,
- determine guidelines for Medicare's coverage for ground ambulance services,
- provide information on communities' broader first response financing needs, or
- quantify the extent of uncompensated care (e.g., bad debt and charity care).

In addition, there are several methodological and data limitations. First, ground ambulance organizations self-report data via the GADCS. Despite GADCS system-side logic validation and logic checks and the additional validation and cleaning steps, there may be errors and systematic biases in the reported data and, therefore, in our analyses.

Broadly, our findings show that many organizations operate shared services, such as fire departments or public safety organizations. These shared services complicate an "apples to apples" comparison of ground ambulance expenses and revenue if organizations are not able to fully separate and report only a ground ambulance share of expenses and revenue. Allocating total, organization-level costs to ground ambulance and other functions is a recurring challenge. For example, we think that organizations under-reported revenue (or amounts paid) by local governments and from other sources beyond payments for ground ambulance services. Further analysis, refinement of the GADCS, and education and outreach to ground ambulance organizations could help address these concerns in future rounds of data collection.

In terms of our regression models (presented in Chapter 6), while our models included several covariates, there was information that was not available to us and, therefore, was not included in the model. This includes payer mix across services (because volume of transports by payer is not gathered through GADCS), patient mix, varying state and local regulations, and reporting differences across ground ambulance organizations.[5] In addition, the models suggest associations between different provider characteristics and costs and revenue per service. While this allows us to examine differences across organizational characteristics while holding other factors included in the model equal, these results should not be interpreted causally.

Finally, the data used in the analyses included in this report come from the first half of the full data collection period and thus are not representative of all sampled organizations across the first four annual cohorts selected to participate in the GADCS. Future reports will include analyses of data from the full sample of organizations contributing to the GADCS.

[5] Regression models examined three ground ambulance service measures: (1) ground ambulance responses, (2) transports, and (3) relative value units (RVUs). RVUs differentiate between the relative resources involved in furnishing different services on Medicare Fee Schedules—for example, the AFS. The quantity of RVUs assigned to one service versus another translates into payment rates that, all else equal, differ exactly in terms of this ratio.

Conclusions

The data collected via the GADCS provide an unprecedented overview of the U.S. ground ambulance industry, the characteristics of diverse organizations, and major drivers of both costs and revenue. The findings described in this report reinforce several common themes from prior studies—for example, highly skewed distributions of service volume, costs, and revenue; considerable variation in costs across organizations of different types; and the preeminence of labor costs as a driver of total expenses. In addition, our findings provide robust and generalizable information on key aspects of ground ambulance operations that previously were opaque to policymakers and to the industry itself due to the lack of data. These findings and other information contained in the GADCS data and this report will provide Congress, MedPAC, and CMS with a foundation for both future analysis and policymaking.

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Chapter 1. Introduction and Overview

Despite serving as the foundation of pre-hospital care across much of the United States, policymakers and the public have historically lacked holistic, industry-wide data describing organizations providing ground ambulance services. The Bipartisan Budget Act (BBA) of 2018 amended section 1834(l) of the Social Security Act ("the Act") to require a new ground ambulance data collection effort to be implemented by the Centers for Medicare & Medicaid Services (CMS).[6] In response, CMS developed the Medicare Ground Ambulance Data Collection System (GADCS). Since 2023, representative samples of organizations billing Traditional (fee-for-service [FFS]) Medicare for ground ambulance transports have reported cost, revenue, utilization, and other required information to CMS via the GADCS. Now collected from roughly half of the more than 10,500 ground ambulance organizations billing Medicare annually, GADCS data offer a new, industry-level viewpoint into the characteristics, service mix, cost structure, and sources of revenue among ground ambulance organizations.

The same BBA-originated changes to the Act require CMS to publicly post information related to the results of data collection on the CMS website.[7] This report, developed by researchers at RAND for CMS, satisfies the public information requirement. The report describes the data collection system and presents results from an analysis of data submitted by ground ambulance organizations in the first two of four GADCS cohorts. CMS intends to produce a second public report once data from the third and fourth GADCS annual cohorts have been analyzed.

Separately, the BBA amended the Act to require the Medicare Payment Advisory Commission (MedPAC) to analyze the collected data and submit a report to Congress which must, in part:

1. describe the information submitted to CMS
2. assess the adequacy of Medicare payments for ground ambulance services
3. describe geographic variations in the cost of furnishing services.[8]

CMS provided the same data analyzed for the current public report to MedPAC to facilitate the development of MedPAC's report to Congress.

[6] Section 50203(b) of the BBA amended the Social Security Act ("the Act") at section 1834(l)(17) to require the Secretary of the U.S. Department of Health and Human Services (HHS) to develop a new system to collect cost, revenue, utilization, and other information from representative samples of ground ambulance organizations over a four-year period. The same statutory changes require CMS to release a public summary of the collected data and the Medicare Payment Advisory Commission (MedPAC) to use the collected data to assess the adequacy of Medicare payment rates for ground ambulance services, among other topics, in a subsequent report to Congress.
[7] See section 1834(l)(17)(G) of the Act and 42 CFR § 414.626 (f) for the public information web posting requirement.
[8] See section 1834(l)(17)(F) of the Act for the MedPAC report requirement.

GADCS Development Overview

In 2018, CMS commissioned the Health Federally Funded Research and Development Center ("the Health FFRDC") to conduct an environmental scan of the ground ambulance industry.[9] The resulting publicly available report included recommendations to CMS regarding data collection modality and format, sampling approaches, and the scope of the GADCS data collection in terms of topics and questions. The report also included a complete draft data collection instrument.[10] Based on these recommendations, CMS proposed and finalized a GADCS survey-based data collection approach, a data collection instrument, and a sampling strategy in its calendar year (CY) 2020 Physician Fee Schedule (PFS) proposed rule (84 FR 40482) and final rule (84 FR 62864-97), respectively.[11]

Sampling Approach

Section 1834(l)(17)(B)(ii) of the Act requires that the GADCS data be collected from representative samples of ground ambulance providers (i.e., hospitals and other Medicare defined providers of ground ambulance services) and suppliers (i.e., all other organizations supplying ground ambulance services) and the geographic locations in which they furnish ground ambulance services.[12] CMS developed a stratified sampling approach at the National Provider Identifier (NPI)[13] level based on historical Medicare FFS claims data and enrollment data to ensure coverage across four key organizational characteristics:

1. enrollment as a Medicare provider versus supplier[14]

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[9] The Health FFRDC, formerly operated as the CMS Alliance to Modernize Healthcare (CAMH), was and continues to be led by MITRE, a non-profit operator of FFRDCs. RAND, a non-profit research organization, led the development of the "Recommendations" report (Andrew Mulcahy, Kristen Becker, Jonathan Cantor, Scott Ashwood, Jeanne Ringel, Lisa Sontag-Padilla, Christine Buttorff, Michael Robbins, Susan Lovejoy, Thomas Goughnour, Sara Heins, Beverly Weidmer, Monique Martineau, Mike Oelrich, Jennifer Gildner, Gina Karimi, and Thomas Goode, *Medicare's Ground Ambulance Data Collection System: Sampling and Instrument Considerations and Recommendations*, MITRE Corporation, Task Order No. HHSM-500-T0052, July 30, 2019) and the draft GADCS data collection instrument as a Health FFRDC partner.

[10] Mulcahy et al., 2019.

[11] CMS proposed and finalized clarifying language in some instrument questions in the CY 2022 PFS final rule (86 FR 65306-65317), proposed and finalized further clarifications and changes in the CY 2023 PFS final rule (87 FR 70014), and most recently proposed and finalized changes and clarifications to the GADCS instrument in the CY 2024 PFS final rule (88 FR 79294).

[12] Pub. L. 115-123, 2018, section 50203[b], and sections 1834[l][12] and [13] of the Act.

[13] An NPI is a unique ten-digit identification number assigned to health care providers in the United States by CMS. It is used to streamline the billing process and improve the efficiency of the health care system by uniquely identifying health care providers in all administrative and financial transactions. To obtain an NPI, a health care provider must apply through the National Plan and Provider Enumeration System (NPPES). For more information, please visit https://nppes.cms.hhs.gov.

[14] Medicare providers of services are hospitals, skilled nursing facilities, and other facility-based providers enrolled in the Medicare program as providers. Some Medicare providers, primarily Critical Access Hospitals and other hospitals, provide ground ambulance services. Most ground ambulance organizations are Medicare suppliers rather than providers.

2. ownership category (non-profit, for-profit, or government)
3. service area population density (super rural, rural, or urban categories as defined by Medicare for other purposes)[15]
4. volume of Medicare ground ambulance transports.[16]

CMS decided to select four consecutive, annual samples, each covering one-fourth of the total U.S. ground ambulance providers and suppliers (herein "organizations" or "NPIs") billing Medicare for services during a prior year for which Medicare FFS claims data were sufficiently complete.[17] CMS used historical data from CY 2017 and CY 2018, respectively, as the basis for sampling the first and second ("Year 1" and "Year 2") annual GADCS cohorts; these were sampled prior to the onset of the coronavirus disease 2019 (COVID-19) pandemic and public health emergency (PHE). The Year 1 and Year 2 cohorts combined included 5,317 organizations, or roughly half of ground ambulance organizations in operation in 2017 and 2018.[18] After selecting these two cohorts, CMS delayed GADCS data collection and reporting timelines, aiming to allow ground ambulance organizations to focus on patient care rather than data collection during the COVID-19 PHE. CMS used data from 2020 to select the third and fourth ("Year 3" and "Year 4") annual GADCS cohorts covering roughly the other half of organizations not previously selected in the Year 1 or Year 2 cohorts.

GADCS Data Collection and Reporting Process

Figure 1.1 summarizes the general process that organizations selected to participate in the GADCS must follow to satisfy the reporting requirement.

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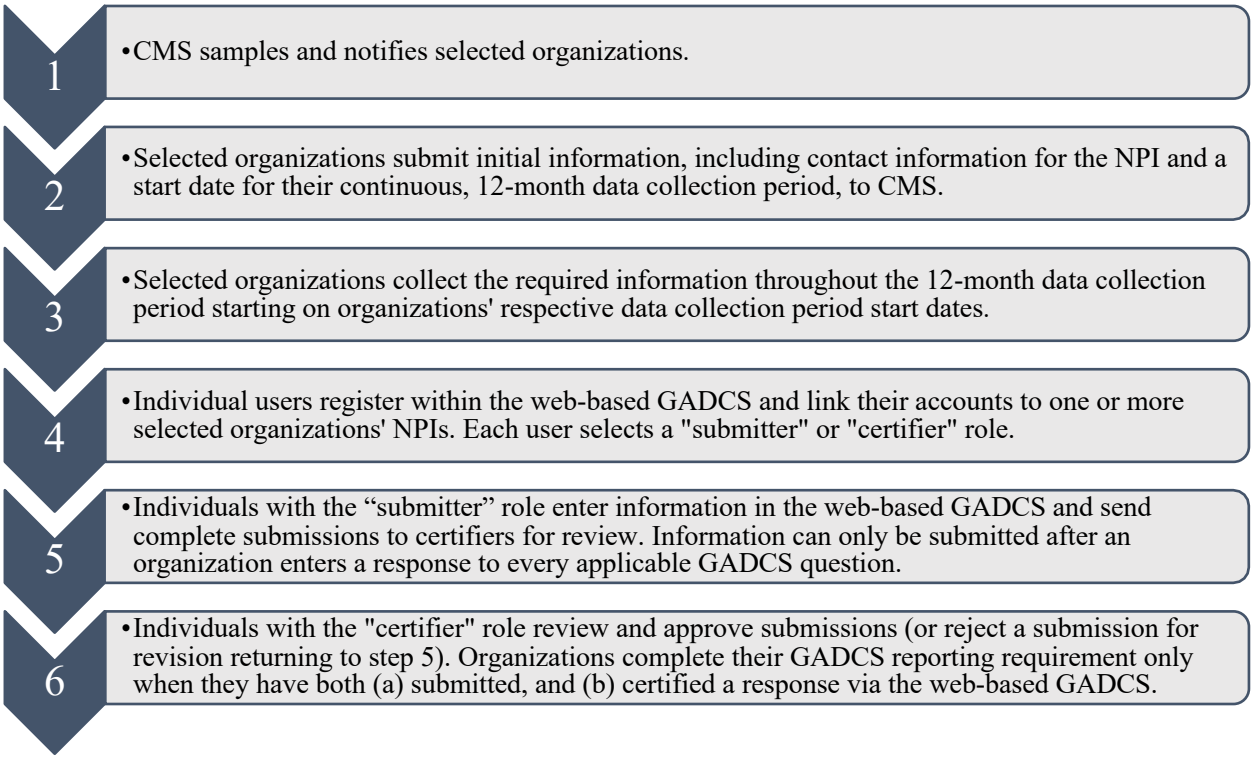
[15] CMS defines rural, super rural, and urban areas for ambulance services reimbursement purposes as follows: rural: an area outside of an urban area, or a rural census tract within a Metropolitan Statistical Area (MSA); super rural: the lowest quartile of nonmetropolitan ZIP Codes by population density; and urban: an MSA modified to recognize rural census tracts in MSAs. For additional information on the classification, see Michael Ratcliffe, Charlynn Burd, Kelly Holder, and Alison Fields, "Defining Rural at the U.S. Census Bureau: American Community Survey and Geography Brief," U.S. Census Bureau, ACSGEO-1, December 2016. The list of CMS ZIP Codes and their designations can be found in the ZIP Code to Carrier Locality file available at CMS, "Ambulance Fee Schedule," webpage, last accessed August 16, 2023.

[16] We use the term *Medicare ground ambulance transports* to refer to separately billed Medicare ground ambulance services using Healthcare Common Procedure Coding System (HCPCS) codes A0426, A0427, A0428, A0429, A0432, A0433, and A0434, excluding the ground ambulance mileage HCPCS code A0425. HCPCS code A0432, Paramedic Intercept (PI), rural area, transport furnished by a volunteer ambulance company which is prohibited by state law from billing third party payers, is where services are provided by an entity that is under contract with the volunteer ambulance company that does not provide the transport but is paid for their paramedic intercept service (only the State of New York meets these requirements).

[17] Ground ambulance organizations in all 50 states, as well as the District of Columbia and U.S. territories, were eligible for selection.

[18] The two cohorts do not cover exactly half of organizations in any single year due to entry and exit (or "churn") of individual organizations from year to year. See Jonathon Cantor, Sara Heins, Petra W. Rasmussen, Christine Buttorff, and Andrew W. Mulcahy, *Ground Ambulance Industry Trends, 2017–2022: An Analysis of Ground Ambulance Organization Entrance and Exit*, Centers for Medicare & Medicaid Services, Task Order No. GS-10F-0275P 75FCMC22F0002, April 2024, for an in-depth Medicare FFS claims–based assessment of churn in the ground ambulance industry.

Figure 1.1. GADCS Data Collection and Reporting Process Overview



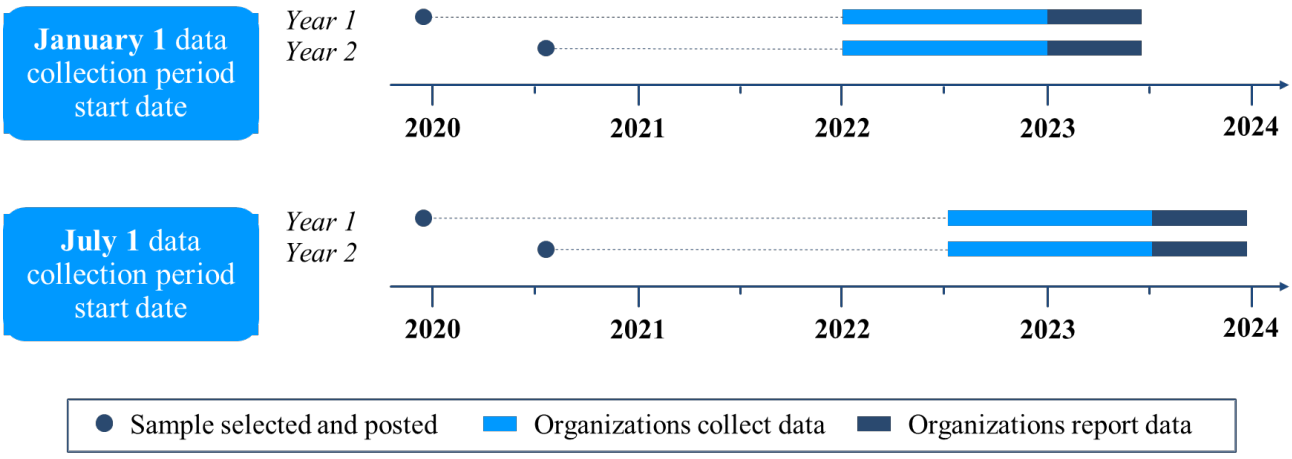
NOTE: One of CMS’ Medicare Administrative Contractors (MACs), Palmetto GBA, collects initial information via a web-based form on behalf of CMS.

CMS allows organizations to select a data collection period start date that is (1) January 1 of the relevant CY or (2) the start of the organization’s annual accounting period in the relevant CY. Data collection periods must begin in CY 2022 for Year 1 and Year 2 organizations and in CY 2023 for Year 3 and Year 4 organizations.

Organizations’ flexibility to choose among different data collection period start dates resulted in a difference of up to 364 days between the first and last reporting deadline for Year 1 and Year 2 organizations.[19] Despite differences in start dates and reporting deadlines, the GADCS data collection and reporting timeline is identical across all organizations, with each having a continuous 12-month data collection period followed immediately by a five-month data reporting period. As an illustrative example, Figure 1.2 compares data collection and data reporting periods for Year 1 and Year 2 organizations with January 1, 2022, and July 1, 2022, data collection period start dates.

[19] While most Year 1 and Year 2 organizations had May 31, 2023, reporting deadlines, a small number of Year 1 and Year 2 organizations had data reporting periods ending May 30, 2024.

Figure 1.2. Example GADCS Data Collection and Reporting Timelines



The GADCS Instrument

The GADCS collects comprehensive information on costs, revenue, utilization, and other operational details from representative samples of ground ambulance organizations across 13 sections:

1. General survey instructions (requires acknowledgement but does not include questions)
2. Organizational characteristics
3. Service area
4. Emergency response time
5. Ground ambulance service volume
6. Service mix
7. Labor costs
8. Facilities costs
9. Vehicle costs
10. Equipment, consumable, and supply costs
11. Other costs
12. Total cost
13. Revenues.

The initial instructions in the GADCS instrument establish the scope of data collection and reporting to cover the entire scope of selected organizations' ground ambulance activities, including activities, expenses, and revenue unrelated to providing services to Medicare enrollees. The instructions also describe how to report information in cases where organizations provide services outside the scope of ground ambulance services (e.g., fire, police, air ambulance, or broader health care delivery services). To minimize reporting burden, organizations have some flexibility in accounting practices (e.g., the use of accrual or cash-basis accounting) and approaches to measuring and reporting key data (e.g., response times). The "printable" version of

the GADCS instrument available in Adobe Acrobat format on CMS' website includes further reporting details.[20]

Web-Based System

CMS developed, with the support of its contractors RAND and the Data Computer Corporation of America (DCCA), a web-based system allowing organizations selected to participate in the GADCS and associated staff and representatives to take the following actions:

1. Register for individual (i.e., person-level) accounts.
2. Link individual user accounts to one or more selected NPIs.
3. Select GADCS submitter and/or certifier roles for each individual.[21]
4. Enter NPI-level information following "skip patterns" in a survey format instrument.[22]
5. Review entered NPI-level information.
6. Report approved NPI-level information to CMS.

The instructions and questions in the web-based GADCS mirror those in the printable GADCS instrument.[23] CMS updates both the web-based and printable versions of the GADCS as it makes clarifications and refinements through annual PFS rulemaking cycles. CMS opened the GADCS portal for reporting by Year 1 and Year 2 ground ambulance organizations on January 1, 2023.

CMS Follow-Up and Scope of Year 1 and Year 2 Data Reflected in This Report

Organizations selected to participate in the GADCS that do not submit a sufficient response are subject to a 10 percent payment reduction on Ambulance Fee Schedule (AFS) services in the following CY. CMS initially notified organizations selected to participate in the GADCS via letters mailed to the address listed in their provider or supplier enrollment record.[24] Medicare also emailed initial notification letters and posted lists of all selected organizations and their NPIs on CMS' website.

After initial notification, CMS conducted extensive outreach to Year 1 and Year 2 non-responders, including mailed and emailed non-response letters and phone outreach, and

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[20] CMS, *Medicare Ground Ambulance Data Collection System Instrument*, November 2, 2023.

[21] GADCS submitters enter information into the system and submit information to organizations' certifiers for review. Certifiers may return a submission to submitters for review and correction prior to data for the organization being reported to CMS.

[22] Skip patterns refer to pre-programmed relationships between the answers to a preliminary question and the questions or responses presented to a user in subsequent questions. Skip patterns can help tailor survey questions to the circumstances and characteristics of individual users, thereby lessening responder burden and. in many cases. improving data quality.

[23] CMS, "Medicare Ground Ambulance Data Collection System," webpage, undated.

[24] As described in a later chapter, Medicare provider and supplier enrollment information is stored in CMS' Provider Enrollment, Chain, and Ownership System (PECOS). While providers and suppliers are responsible for keeping PECOS records up to date, the enrollment data may in some cases have outdated information or contact information for a third-party service handling enrollment for a provider or supplier.

conveyed the importance of reporting during many GADCS educational webinars, ambulance open door forums, question and answer sessions, and outreach to national ground ambulance organizations. Most of these educational and outreach materials and sessions continue to be available on CMS' website. CMS continues to accept information from Year 1 and Year 2 organizations after the formal reporting deadline and continues to follow up with Year 1 and Year 2 non-responders hoping to minimize the number of organizations subject to the 10 percent payment reduction.

As discussed in later chapters, most Year 1 and Year 2 ground ambulance organizations submitted and certified complete GADCS responses. Given that participation in the GADCS is required and there is a monetary penalty for non-response, we expected that most Year 1 and Year 2 organizations that ultimately report data would do so by July 15, 2024, the cutoff date for GADCS data to be included in this report. However, CMS will undoubtedly receive GADCS submissions from some Year 1 and Year 2 organizations after July 15, 2024. We expect that these future Year 1 and Year 2 submissions will likely stem from two scenarios:

1. CMS granted some organizations short reporting extensions and, in a few cases, hardship exemptions for the first year of GADCS data collection so that they could complete data collection and submission. A few of these extensions extend past July 15, 2024.
2. Continued outreach to Year 1 and Year 2 non-responders through mid-2024 will result in additional submissions after this date.

As a result, later analyses of Year 1 and Year 2 GADCS results may differ slightly from those reported here.

Prior Research and Findings Overview

RAND's aforementioned Recommendations Report[25] to CMS includes a review of studies related to the ground ambulance industry completed prior to 2019, including

- the Moran Company Statistical and Financial Data Survey (the "Moran survey") and the American Ambulance Association recommended framework for data collection[26,27]
- the Ground Emergency Medical Transportation Cost Report form and instructions from California's Medicaid program, Medi-Cal[28]
- the Emergency Medical Services Cost Analysis Project framework[29]

[25] Mulcahy et al., 2019.
[26] The Moran Company, *Final Report Detailing "Hybrid Data Collection Method" for the Ambulance Industry: Beta Test Results of the Statistical & Financial Data Survey & Recommendations*, 2014.
[27] American Ambulance Association, "Recommendations to CMS for Ground Ambulance Industry Data Collection," 2018.
[28] State of California, "Ground Emergency Medical Transportation Services Cost Report General Instruction for Completing Cost Report Forms," SPA 09-024, 2013.
[29] E. Brooke Lerner, Graham Nichol, Daniel W. Spaite, Herbert G. Garrison, and Ronald F. Maio, "A Comprehensive Framework for Determining the Cost of an Emergency Medical Services System," *Annals of Emergency Medicine*, Vol. 49, No. 3, March 2007.

- a 2012 Government Accountability Office (GAO) ambulance survey[30]
- an HHS report to Congress on hospital ambulance data[31]
- the Rural Ambulance Service Budget Model.[32]

The Recommendations Report provides more detailed descriptions and comparisons for these studies and the helpful context they provided for the development of the GADCS.[33] However, the GADCS collects data on a wider range of ground ambulance organizations than any prior study or data collection proposal (e.g., several prior studies excluded public safety organizations due to the complexity of allocating ground ambulance expenses from total expenses). The GADCS also collects more detailed information on service volume and mix, expenses, and revenue than any prior data collection effort. Furthermore, both RAND's recommendations and CMS' decisions regarding the GADCS necessarily aligned with specific statutory requirements for Medicare ground ambulance data collection.

This report also builds on previous analyses of Medicare FFS claims and other data conducted by RAND on behalf of CMS. These analyses include changes in the organizational characteristics of the ground ambulance industry from 2017 to 2020,[34] ground ambulance organizations' entry and exit from the industry prior to and during the COVID-19 PHE,[35] and trends in Traditional Medicare transport volume prior to and during the COVID-19 PHE.[36] Therefore, the GADCS differs from prior data collection initiatives in terms of both content and scope.

Report Overview

This report contains the results from RAND's analysis of the data submitted by the first two cohorts of organizations selected to participate in the GADCS. Chapter 2 describes the sources of data and provides an overview of general methods and approaches for data cleaning, data validation, differential non-response adjustment, and econometric modeling. Chapter 3 focuses on response rates for these GADCS cohorts and discusses the results of adjustments for

[30] U.S. Government Accountability Office, *Ambulance Providers: Costs and Medicare Margins Varied Widely; Transports of Beneficiaries Have Increased*, GAO-13-6, 2012.
[31] HHS, *Report to Congress: Evaluations of Hospitals' Ambulance Data on Medicare Cost Reports and Feasibility of Obtaining Cost Data From All Ambulance Providers and Suppliers*, 2015.
[32] Health Resources and Services Administration, *Rural Ambulance Service Budget Model*, 2019.
[33] Mulcahy et al., 2019.
[34] Andrew W. Mulcahy, Christine Buttorff, Jonathan Cantor, J. Scott Ashwood, Sara E. Heins, and Jennifer Gildner, *Ground Ambulance Industry Trends, 2017–2020: Analysis of Medicare Fee-for-Service Claims*, RAND Corporation, Task Order No. HHSM-500-T0052, November 2022.
[35] Jonathon Cantor, Sara Heins, Petra W. Rasmussen, Christine Buttorff, and Andrew W. Mulcahy, *Ground Ambulance Industry Trends, 2017–2022: An Analysis of Ground Ambulance Organization Entrance and Exit*, Centers for Medicare & Medicaid Services, Task Order No. GS-10F-0275P 75FCMC22F0002, April 2024.
[36] Petra W. Rasmussen, Jonathan Cantor, Jennifer Gildner, Sara Heins, and Andrew W. Mulcahy, *Ground Ambulance Industry Trends, 2017–2022: Analysis of Medicare Fee-for-Service Claims*, RAND Corporation, Task Order No. GS-10F-0275P 75FCMC22F0002, April 2024.

differential non-response to ensure that reported data approximate the characteristics of the full set of selected Year 1 and Year 2 organizations. Chapter 4 presents descriptive statistics for key GADCS questions organized by the sections of the GADCS instrument. Chapter 5 presents results from a decomposition of total costs across GADCS sections, and Chapter 6 contains the results of econometric modeling of ground ambulance costs and revenue per service. The report concludes with key takeaways and a discussion of potential implications for Medicare policy in Chapter 7.

Chapter 2. Data and Methods Summary

This chapter outlines the general data sources and methods used across the analyses described in the report. Later chapters and appendices provide more detailed descriptions of methods involved in narrower sets of analyses. Specifically, see Chapter 3 for details on methods to address differential non-response and Appendix C for details on our econometric modeling approach.

Data Used to Construct the GADCS Sampling Frame

The earlier Recommendations Report[37] suggested a random sampling approach for the GADCS stratifying ground ambulance organizations based on four dimensions: Medicare provider versus supplier status,[38] service area population density, ownership category, and Medicare ground ambulance transport volume. CMS implemented a stratified sampling approach with the same four organization-level characteristics because each is likely systematically associated with ground ambulance expenses and revenue and each is available in CMS claims and administrative data.[39] More specifically, information on these characteristics is derived from two sources: CMS' Provider Enrollment, Chain, and Ownership System (PECOS) data and Medicare FFS claims data, as described below.

PECOS

PECOS is the CMS system of record for enrolling providers of services (e.g., hospitals, skilled nursing facilities, etc., some of which provide ground ambulance services) and suppliers (notably, ground ambulance organizations that are not providers, as well as group practices) into the Medicare program. Providers and suppliers without a PECOS enrollment record cannot generally be paid for services furnished to Medicare enrollees. The structure and format of information submitted to PECOS differ between providers and suppliers: Providers use form CMS-855A, while suppliers use form CMS-855B. Although there is significant overlap in such general enrollment information as submission dates, contact information, physical addresses, and enrollment status, there are noticeable differences. For instance, the CMS-855B supplier form

[37] Mulcahy et al., 2019.

[38] Medicare providers of services are hospitals, skilled nursing facilities, and other facility-based providers enrolled in the Medicare program as providers. Some Medicare providers, primarily Critical Access Hospitals and other hospitals, provide ground ambulance services. Most ground ambulance organizations are Medicare suppliers rather than providers.

[39] CMS proposed and finalized clarifying language in some instrument questions in the CY 2022 PFS final rule (86 FR 65306-65317), proposed and finalized further clarifications and changes in the CY 2023 PFS final rule (87 FR 70014), and most recently proposed and finalized changes and clarifications to the GADCS instrument in the CY 2024 PFS final rule (88 FR 79293-79296).

includes a separate template to report ambulance vehicle information that does not appear in the CMS-855A provider form. We received extracts of PECOS data for all organizations with Medicare FFS claims for ground ambulance services in each year from 2016 through 2023. The PECOS data include linkages between enrollment IDs and NPIs,[40] and a given NPI can be associated with multiple enrollment records within a single year and across years. We matched PECOS enrollment information for each NPI in FFS claims data. Generally, we used the most recent PECOS enrollment record linked to a given NPI to assign NPIs to categories for the relevant point in time. For example, when establishing NPI-level characteristics for Year 1 sampling in 2019, we used the most recent PECOS enrollment record from our 2018 PECOS extract (see details below).

Claims

Medicare FFS claims data include information on the ground ambulance services paid by Traditional Medicare, including the level of service (e.g., basic life support [BLS], advanced life support [ALS] levels 1 and 2 [ALS1 and ALS2], and specialty care transport [SCT]), the mileage from the patient's point of ambulance pickup to the nearest appropriate facility that can treat the patient's condition, and the origin and destination of the ambulance transport (e.g., dialysis center, home, and hospital). Additionally, the FFS claims data include payment amounts for these services.

We accessed Medicare FFS claims via CMS' Integrated Data Repository (IDR) and created annual, NPI-level extracts summarizing organizational characteristics and Medicare ground ambulance service volume. We limited our IDR extracts to final action, paid professional, and outpatient facility claim types,[41] and we only included claim lines listing one of the Medicare AFS Healthcare Common Procedure Coding System (HCPCS) codes.[42] To ensure sufficient time for claims submission and adjudication for services rendered in a given CY, we pulled FFS claims for that year approximately 90 days after the end of the CY.

NPI-Level Characteristics

We used historical PECOS and Medicare FFS claims data to construct four NPI-level characteristics for sampling NPIs to participate in the GADCS. Importantly, the GADCS itself asks respondents to submit information closely related to each of these four characteristics. As a

[40] NPIs are unique identification numbers assigned to health care providers in the United States by CMS. To obtain an NPI, a health care provider must apply through the National Plan and Provider Enumeration System (NPPES). For more information, please visit https://nppes.cms.hhs.gov.
[41] These are common inclusion criteria in studies analyzing Medicare FFS claims data. We operationalized "paid" claims as those with a payment amount greater than $0. Limiting extracts to final action claims excludes some claims that are not completely adjudicated. We limited our extracts to certain claim types (71 and 72 for professional services and 40 for outpatient facility services) and, for outpatient facility services, to revenue center codes 540–549.
[42] Ground ambulance services are HCPCS codes A0425, A0426, A0427, A0428, A0429, A0432, A0433, A0434, and A0999.

result, for GADCS responders, we can compare NPIs' characteristics at the time of sampling and as measured in CMS administrative and claims data with the same NPIs' self-reported characteristics, albeit several years after being sampled.

Provider Versus Supplier Designation

We assigned NPIs linked exclusively to supplier (i.e., form CMS-855B) enrollment records with the "ambulance service provider" specialty to the "supplier" category. Similarly, we assigned NPIs linked exclusively to provider (i.e., CMS-855A) records to a "provider" category. For providers, we used the most recent provider enrollment record at the time of sampling (or, as relevant, analysis) to identify a provider type. Nearly all providers that furnished Medicare Part B ground ambulance services were hospitals; only a few were other provider types. We identified a small number of NPIs that were linked to both ambulance supplier and provider enrollment records. We assigned these NPIs to the supplier category under the assumption that they provided ground ambulance services under the auspices of the separate ambulance enrollment.

Ownership

We assigned each NPI to an ownership category using PECOS data and, for some NPIs, supplemental web searches, following a hierarchical approach. First, we assigned NPIs with the most recent enrollment record indicating "proprietary" or "non-profit" ownership status to initial "for-profit" and "non-profit" ownership categories, respectively. Second, regardless of the assignment in the prior step, we reassigned NPIs with certain government-related keywords in the organization type free text field (e.g., "municipality," "gov't," and "government") to a third "government" ownership category. We also made a small number of adjustments to the initial for-profit and non-profit assignments based on additional keyword searches (e.g., for enrollment records flagged as "proprietary" but then with a "non-profit" write-in response in the organization type field). Finally, for NPIs not assigned to the government category and with unevaluated write-in responses in the organization type field, we conducted targeted internet searches to determine the appropriate ownership category. We assigned a small number of unclassifiable NPIs to the "for-profit" category. As a result, the three final ownership categories are government, non-profit, and for-profit/unclassifiable (referred to hereafter as "for-profit").

Medicare Transport Volume

We calculated transport volume for each NPI by counting line-level professional and outpatient facility claims with AFS HCPCS codes, excluding separately billed mileage code A0425, with service dates during a CY.[43] We classified NPIs into one of four volume categories

[43] While earlier RAND analyses compared volume in terms of both claim lines and units of service, we measure volume only in terms of claim lines in this report. Through earlier analyses, we found that organizations bill Medicare for practically all ground ambulance transports with a single transport (i.e., a single unit of service) on each claim line such that there is no practical need to separately count units of service.

based on the number of transports: low (200 or fewer claim lines), medium (201–800 claim lines), high (801–2,499 claim lines), and very high (2,500 or more claim lines). We selected these volume thresholds based on a review of the existing literature and the distribution of NPI-level claim line counts in historical Medicare data.[44]

Service Area Population Density

We categorized each NPI into one of three service area population density (i.e., urbanicity) categories—urban, rural, or super rural—by further analyzing the same set of ground ambulance FFS claims used to assign NPIs to transport volume categories.[45] CMS uses a crosswalk of ZIP Codes to urban, rural, and super rural categories for the purposes of implementing long-standing "add-on" payments under the AFS; the U.S. Census Bureau maintains the underlying methodology and mapping.[46] We linked each claim line to a ZIP Code, either the pickup ZIP Code reported directly on the claim line for professional lines or the practice location ZIP Code for outpatient facility lines, as these claim lines do not include pickup ZIP Codes. After applying the ZIP Code crosswalk, we calculated the share of transports for each service area population density category (urban, rural, or super rural) for each NPI and assigned the NPI to the category with the largest share, breaking ties between categories randomly.

Response Rate and Adjustments for Differential Non-Response Overview

CMS selected 5,317 NPIs across the GADCS Year 1 and Year 2 cohorts combined. However, RAND and CMS anticipated that fewer than 100 percent of selected organizations would report data.[47,48] Differential non-response—where respondents differ systematically from non-respondents in terms of key characteristics like those used to select and stratify the sample—is a common concern in survey and data collection research. Findings from analyses of data collected in this case are likely biased: Because responders and non-responders differ, and because those analyzing the data have access only to data from responders, descriptions of the data will not represent the overall population. For example, if NPIs with low Traditional Medicare transport volume are less likely to submit and certify their responses than NPIs with very high Traditional

[44] See Mulcahy et al., 2019, for additional details related to volume threshold selection.
[45] CMS defines rural, super rural, and urban areas for ambulance services reimbursement purposes as follows: rural: an area outside of an urban area, or a rural census tract within a Metropolitan Statistical Area (MSA); super rural: the lowest quartile of nonmetropolitan ZIP Codes by population density; and urban: an MSA modified to recognize rural census tracts in MSAs. For additional information on the classification, see Michael Ratcliffe, Charlynn Burd, Kelly Holder, and Alison Fields, "Defining Rural at the U.S. Census Bureau: American Community Survey and Geography Brief," U.S. Census Bureau, ACSGEO-1, December 2016. The list of CMS ZIP Codes and their designations can be found in the ZIP Code to Carrier Locality file available at CMS, "Ambulance Fee Schedule," webpage, last accessed August 16, 2023.
[46] The classification is used to calculate add-on payments for urban, rural, and super rural services.
[47] Mulcahy et al., 2019.
[48] CMS, "Medicare Program; CY 2020 Revisions to Payment Policies Under the Physician Fee Schedule and Other Changes to Part B Payment Policies," *Federal Register*, Vol. 84, No. 221, 2019, pp. 62888–62893.

Medicare transport volume, and if we assumed that the information gathered from those NPIs that submitted and certified their responses was representative of the full sample of NPIs who were asked to complete the GADCS, we would end up with data suggesting that all ground ambulance organizations look too much like those with very high Traditional Medicare transport volume than is actually the case.

To address differential non-response across sampled ground ambulance organizations, we calculated and applied weights so that analyses of reported data approximate the characteristics of the full set of selected Year 1 and Year 2 organizations. See Chapter 3 of this report for information on our weighting approach and methods.

Data Validation and Cleaning Overview

In addition to real-time system edits and logic checks, we performed many internal and external data validation checks and cleaning steps on GADCS data after submission. These checks sometimes led to recoding submitted data (e.g., through imputation) so that extreme outlier and implausible values did not unduly affect reported results. See Appendix B for a detailed description of the cleaning checks and their implications. With a few exceptions, the validation checks and corresponding cleaning steps fell into four broad categories:

- **Organizations input data where no data were expected:** The GADCS includes several programmed checks to prevent data from being entered where it is not expected. For example, organizations that do not indicate responding to emergency calls did not see questions about emergency response time. However, a small number of non–public safety organizations were able to report on staff with public safety responsibilities and public safety hours. These instances were rare but were recoded when they occurred (e.g., hours worked related to public safety for non–public safety organizations were recoded as hours worked related to all other responsibilities).
- **Organizations input costs that likely occurred prior to the data collection period:** Several organizations appeared to have misinterpreted questions about vehicles purchased and, to a lesser extent, facilities purchased during the data collection period. For example, many organizations input purchase costs for every ground ambulance vehicle purchased, even though an analysis of outside data suggested that many of those vehicles were purchased prior to the data collection period. Where this appears to have occurred, we adjusted the total vehicle purchase price using assumptions from outside data.
- **Organizations input unreasonably high values:** In some cases, organizations entered values that were implausibly high. Follow-up discussions with organizations (detailed in Appendix B) revealed that these organizations often included decimal values as integers (e.g., $50,000 became $5,000,000) or simply made an error in typing or copying and pasting from another source. Cleaning these values was complicated by the fact that some large outlier values were both expected and reasonable for very large organizations.

Where possible, we used other data points to assess whether this was the case (e.g., whether high total compensation aligned with a high count of total hours worked in Section 7 [Labor Costs]). To address outliers with much higher values than expected, we top-coded, or "winsorized," data (i.e., set values above a certain threshold, typically the 99th percentile for right-skewed data, to that threshold value),[49] set upper bounds based on outside benchmarks (e.g., research on the maximum price of new ground ambulance vehicles), used hot deck imputation,[50] or used regression-based imputation, depending on the context and available data.

- **Organizations input unreasonably low values:** In some cases, organizations entered unreasonably low values. These may have been entered in error, or the organization may have incorrectly answered a prior question and received a question that they should not have received (e.g., the organization incorrectly indicated that they had a certain staff category and entered a nominal value of "1" when asked for staff compensation for that category rather than going back and changing their prior answers). In other cases, organizations appeared to have misinterpreted requests for dollar amounts as requests for percentages (e.g., when asked about revenue from paid transports, some organizations input the percentage of their transports for which they received payment). Strategies for addressing these varied by question and included winsorizing extreme values, using outside benchmarks (e.g., minimum wage), or using hot deck imputation, depending on context.

All analyses and results described in the report reflect GADCS data after the application of these cleaning and recoding steps unless otherwise stated.

Approach to Calculating and Reporting Descriptive Statistics

For each section, we report one-way tabulations of responses to questions with categorical response options and summary statistics (mean, median, standard deviation [SD], interquartile range [IQR], 95 percent confidence interval [CI])[51] to describe responses to questions asking for a numeric (typically continuous) response. We break down these frequencies and summary statistics by relevant organization-level characteristics, often in terms of the NPI-level

[49] Winsorization caps the highest and/or lowest reported values at fixed thresholds, often the 1st and 99th percentile calculated across all reported values, to limit the effects of outliers on reported statistics.
[50] Hot deck imputation is the process of replacing a missing value with a non-missing value from another observation with similar characteristics. In this case, outliers were replaced with non-outlier values from another random organization sharing similar characteristics. Characteristics are defined in detail in Appendix B.
[51] The mean is the result of dividing the sum of a set of figures by the number of figures. The median is the value at which there are as many instances above as there are below. The SD is the square root of the arithmetic mean of the squared deviations of each class frequency from the overall arithmetic mean of the frequency distribution. The IQR is the range of values between the upper and lower quartiles in a statistical distribution (i.e., the span encompassing the half of organizations falling in the second and third quartiles). The 95 percent CI is the range of values within which one can be 95 percent confident that the true mean of the population lies.

characteristics initially used for sampling (provider versus supplier, ownership category, service area population density, and Medicare transport volume).

Our presentation of descriptive statistics follows several reporting conventions. First, to mitigate the potential for identification of specific organizations by inference, we do not report results from groups of fewer than 20 unweighted GADCS responses. We flag these instances with "N/R" for not reported and include a table or figure note. Second, given the survey format of the GADCS and frequent programming and skip logic, we report the denominator for analyses either in the text or in a table or figure note.

For many of the summary statistics, we report percentages, costs, or revenues that are "ground ambulance-related." In most cases, the percentage that is considered ground ambulance-related was reported directly by the organization. Though the GADCS instructions do not prescribe specific methods for allocation, CMS provided several resources to organizations to provide guidance on potential ways to allocate, including a GADCS User Guide,[52] a tip sheet,[53] and a webinar.[54]

All summary statistics in the report reflect the organizations' 12-month data collection period starting in 2022 unless otherwise stated.

Regression Model Approach Overview

Counts of Medicare ground ambulance transports[55] have long been available to CMS via FFS claims and Medicare Advantage encounter data. However, information on transports across all payers and information on ground ambulance responses, many of which do not ultimately result in a patient transport, are newly available to CMS in data collected via the GADCS. We conducted a series of multivariate regression analyses to more fully explore how costs and revenue per response, transport, and relative value unit (RVU—the unit that CMS uses to establish the relative valuations between AFS services for payment purposes[56]) may differ across

[52] CMS, *Medicare Ground Ambulance Data Collection System (GADCS) User Guide*, Version 3.0, January 1, 2024.
[53] CMS, "Medicare Ground Ambulance Data Collection System (GADCS): Allocating Costs and Revenues Tip Sheet," undated.
[54] CMS, "Medicare Ground Ambulance Data Collection Instrument: Allocating Expenses and Revenue," July 21, 2022.
[55] We use the term *Medicare ground ambulance transports* to refer to separately billed Medicare ground ambulance services using Healthcare Common Procedure Coding System (HCPCS) codes A0426, A0427, A0428, A0429, A0432, A0433, and A0434, excluding the ground ambulance mileage HCPCS code A0425. HCPCS code A0432, Paramedic Intercept (PI), rural area, transport furnished by a volunteer ambulance company which is prohibited by state law from billing third party payers, is where services are provided by an entity that is under contract with the volunteer ambulance company that does not provide the transport but is paid for their paramedic intercept service (only the State of New York meets these requirements).
[56] RVUs differentiate between the relative resources involved in furnishing different services on Medicare Fee Schedules—for example, the AFS. The quantity of RVUs assigned to one service versus another translates into payment rates that, all else equal, differ exactly in terms of this ratio.

ground ambulance organization characteristics.[57] By estimating expenses and revenue per discrete unit of service, these regression analyses may serve as a stepping stone to later analyses related to Medicare payment rates for ground ambulance services and the broader financing of emergency medical services (EMS) and the ground ambulance industry.

Regression Models

Even after the data cleaning and imputation steps described in brief above and in detail in Appendix B, there were several NPIs with very high total costs and revenue and high total costs and revenue per service. To address these remaining outliers so that they would not have undue influence on our regression analyses, we implemented additional data cleaning to construct updated total ground ambulance cost and total ground ambulance revenue variables (details described in Appendix C). We then estimated multivariate regression models for the following outcomes:

1. total ground ambulance expense per ground ambulance service (response, transport, and RVU)
2. total ground ambulance revenue per ground ambulance service (response, transport, and RVU).

The models contained several explanatory variables, including the four organizational characteristics used as sampling strata for the GADCS (provider versus supplier, ownership category, service area population density, and Medicare transport volume). In addition, we included key organizational characteristics in the models that were not available to CMS at the time of sampling but are now available in the GADCS data. We selected explanatory variables that, according to our earlier work,[58] may be associated with higher or lower per-service costs on average (detailed in Appendix C).[59]

We chose a particular form of count model—specifically, negative binomial models—for our regression analysis. Negative binomial models accommodate highly skewed dependent variables like GADCS cost per service variables where most organizations have smaller magnitude values while a small share have a much larger values.[60] Rather than report estimated coefficients directly, we instead report average marginal effects (AMEs). AMEs report the estimated incremental change in the model's dependent variable (here, costs or revenue per service) from a

[57] The count of ground ambulance responses and transports are reported directly via the GADCS. We calculated the total number of RVUs for each organization by summing the products of total transport volume, transport volume by AFS HCPCS code, and the number of RVUs per HCPCS code from the AFS.
[58] Mulcahy et al., 2019.
[59] We explored adding a variable to the model to control for differences in the start of data collection timing within the Year 1 and Year 2 cohorts, which could vary by organization, implemented as a count of days between January 1 and each organization's data collection period start date (with a range of 0 to 364 days and with most organizations assigned a 0 because their data collection period start date was January 1). However, the inclusion of this variable did not have a material impact on the results and thus was not included in our final model specification. We did find a very modest inflationary effect over time.
[60] J. M. Hilbe, *Negative Binomial Regression*, Cambridge University Press, 2007.

discrete change in one or more independent variables. For example, the AME for the provider flag in the cost per response model is an estimate of the average incremental increase or decrease in modeled cost per response by assuming that all organizations are providers versus suppliers (and vice versa).

Chapter 3. Response Rate and Adjustments for Differential Non-Response

This chapter describes the response rate among the 5,317 organizations selected in the Year 1 and Year 2 GADCS cohorts and our approaches to address differential non-response across organizations with different characteristics using weighting. Most Year 1 and Year 2 organizations submitted and certified a GADCS response as of July 15, 2024. As a preview of the main finding described in detail below, of organizations actively billing Medicare in 2023, 95 percent (n = 4,321 of 4,529) submitted initial information to CMS as required and, of those, 85 percent (n = 3,694) submitted and certified a complete GADCS response as of July 15, 2024. A small number of organizations that were *not* actively billing Medicare in 2023 also submitted data, for a total of 3,856 total submitted and certified GADCS responses as of July 15, 2024.

The analytic file used as an input into this report excludes a small number of these 3,856 organizations that did not bill Medicare for ground ambulance services during the relevant data collection period and therefore completed the GADCS reporting requirement without submitting detailed information across all 13 sections of the instrument. In total, 3,712 organizations (or 70 percent of the initial 5,317 Year 1 and Year 2 organizations selected to participate in the GADCS) contributed data to the main analytic file.

Likely Drivers of GADCS Non-Response

While most NPIs[61] selected into the Year 1 and Year 2 GADCS cohorts reported data as required, some did not. Based on our discussions and other communication with many GADCS non-responders, most fall into one of the following five scenarios:

1. **NPIs were no longer in operation.** NPIs that ceased operations after being selected to participate in the GADCS and before reporting deadlines may not have received notification letters, may not have staff and other resources to collect required information, and are not affected by the 10 percent payment reduction for non-response.
2. **NPIs were still in operation but were no longer used to bill Medicare for ground ambulance services.** This is more common among hospitals and other providers of service where the provider sells or simply disbands an ambulance service while continuing to bill Medicare for broader medical services under the same NPI. While the NPI is still in operation, the NPI will not be affected by the 10 percent payment reduction

[61] NPIs are unique identification numbers assigned to health care providers in the United States by CMS. To obtain an NPI, a health care provider must apply through the National Plan and Provider Enumeration System (NPPES). For more information, please visit https://nppes.cms.hhs.gov.

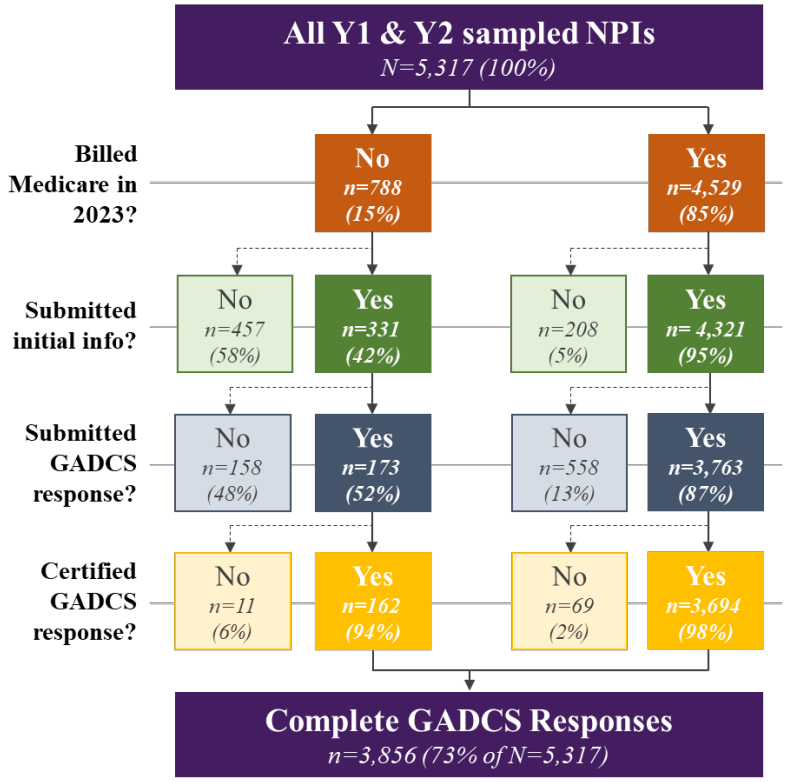
to AFS services because it is no longer used to bill Medicare for ground ambulance services paid under the AFS.

3. **NPIs were involved in mergers, acquisitions, or other major reorganizations.** Related to scenarios 1 and 2, organizations often adopt a new NPI and cease using old NPIs after major reorganizations and shifts in ownership. In these cases, only the selected NPI is required to collect and report GADCS data. Defunct NPIs will not be affected by the 10 percent payment reduction, and newly merged or reorganized organizations may no longer have easy access to data for an older, unused NPI.
4. **NPIs opted not to respond after weighing response burden against the payment reduction.** Some organizations may conclude that the magnitude of the payment reduction is less than their expected costs of collecting and reporting GADCS information. This scenario may be relatively more common for smaller organizations and for organizations without robust accounting and data systems (where data collection would involve higher levels of effort). In some cases, organizations may start collecting and/or reporting data via the GADCS and may opt to stop prior to certifying a complete response.
5. **NPIs did not receive notification.** Not all organizations keep Medicare enrollment records updated with current contact information. Despite CMS' many outreach attempts over the span of years, some organizations may not know that they need to collect and report data. Staff turnover in management and administrative positions may contribute to non-response even if the organization did receive and acknowledge notification.

GADCS Response Rate

Figure 3.1 provides a detailed accounting of the response and follow-up rates during the GADCS reporting process. It begins with all Year 1 and Year 2 sampled organizations as the initial denominator (n = 5,317, represented by the purple box). At the next level (orange-shaded), we distinguish between organizations that billed Medicare for ground ambulance services in 2023—indicating that the organization is "active" and capable of reporting GADCS data—and those that appear "inactive."

Figure 3.1. Flow Chart of the Number of Included Observations at Each Step in the GADCS Process



SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: Lighter-shaded boxes indicate organizations that did not contribute GADCS data used in our analysis. Except for the final percentage for complete GADCS responses, all other percentages are relative to the count of organizations in the prior box. Percentages may not add to 100 due to rounding. Y1 = Year 1. Y2 = Year 2.

As noted above, we anticipated a much lower response rate from inactive NPIs. Across all organizations, 4,529 (85 percent) were classified as "active," while the remaining 788 (15 percent) were classified as "inactive" (orange box level in Figure 3.1). Of active organizations, 4,321 (95 percent) submitted their initial information to CMS by July 15, 2024 (green box level in Figure 3.1). As expected, a smaller proportion of inactive organizations (42 percent) submitted initial information. Organizations that did not submit initial information cannot access the web-based GADCS and are therefore considered GADCS non-responders.

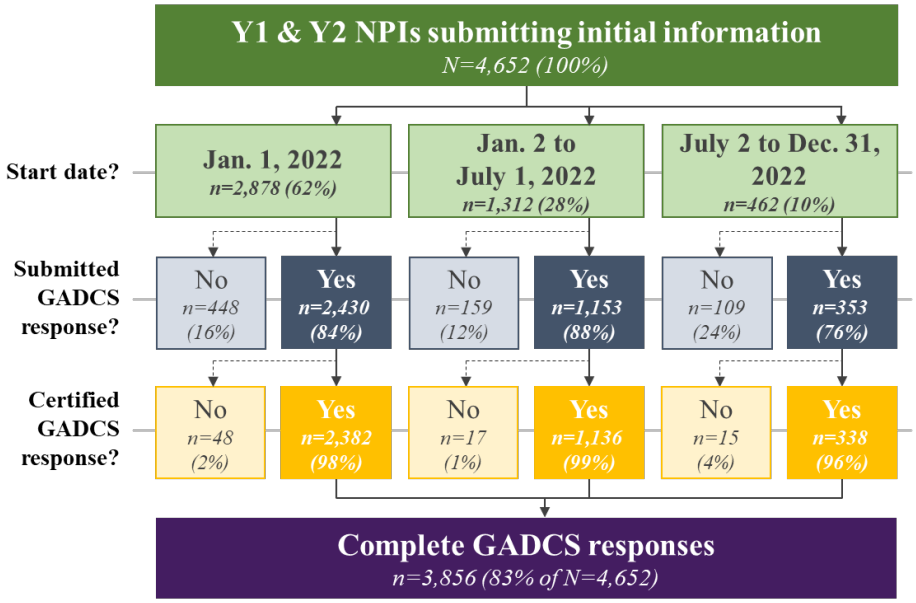
As of July 15, 2024, 3,763 (87 percent) of organizations that billed in 2023 and submitted initial information had also submitted a GADCS response (blue box level in Figure 3.1). Of those, nearly all subsequently certified their response to complete the GADCS reporting requirement, totaling 3,694 organizations (98 percent; yellow box level in Figure 3.1). Inactive organizations had a lower GADCS submission rate compared with active organizations (52 percent vs. 87 percent) although their rates of certified responses were similar (98 percent vs. 94 percent). The few organizations that submitted but did not certify GADCS responses by July 15,

2025 (69 active NPIs and 11 inactive NPIs) are perhaps among the most likely to ultimately complete the GADCS reporting requirement, despite their data not being reflected in this report.

Overall, GADCS response rates were high, particularly among active organizations still billing Medicare for ground ambulance services. Of the 4,529 *active* Year 1 and Year 2 NPIs, 3,694 (82 percent) had certified GADCS responses by July 15, 2024. When considering the full denominator of 5,317 Year 1 and Year 2 NPIs, including both *active and inactive* NPIs, 3,856 (or 73 percent) had certified GADCS responses by the same date.

Figure 3.2 shows the distribution of data collection start dates and response rates among organizations that submitted initial information (i.e., those that submitted a data collection period start date and contact information to CMS; see Chapter 1 for a process overview). Most organizations (62 percent) selected CY-based start dates (i.e., January 1). The second most common start date was July 1, which marks the beginning of Quarter 3 of the CY and is a common fiscal year start date for local municipalities. This was followed by April 1 and October 1, corresponding to the start for Quarters 2 and 4, respectively. Only about one in ten organizations selected a data collection period start date that was not one of these four specific dates. While the due date for all Year 1 and Year 2 organizations had passed by July 15, 2024, those with earlier data collection start dates had additional time after the end of their data collection period to submit and certify their responses.

Figure 3.2. GADCS Response and Certification by Data Collection Start Date Among Organizations Submitting Initial Information



SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file and initial data submissions to Palmetto GBA.
NOTE: Y1 = Year 1. Y2 = Year 2.

Section 2, Question 1 Responses

The first question in the GADCS, Section 2 (Organizational Characteristics), asks respondents if the organization used the specific sampled NPI to bill Medicare for ground ambulance services throughout the organization's entire 12-month data collection period. Organizations answering "yes, throughout the organization's continuous, 12-month data collection period" to this question (response b) proceed through the remainder of the GADCS instrument. For organizations that provide other responses to Section 2, Question 1, the GADCS presents a series of follow-up questions leading to three possible outcomes:

- **Incorrect NPI linkages.** The GADCS connects the respondent with the CMS Help Desk to resolve incorrect linkages between individual GADCS user accounts and NPIs (responses a.i and a.iv). If necessary, CMS and/or the user update NPI linkages, and the organization restarts the GADCS, likely answering "yes" to Section 2, Question 1.
- **Partial-period billing.** The respondent reports using the selected NPI to bill Medicare for ground ambulance services during only part of the 12-month data collection period (response c). In this case, the organization reports the period during which it used the selected NPI to bill Medicare for ground ambulance services and then proceeds through the remainder of the GADCS, reporting information covering the indicated partial period (i.e., a period less than 12 months).
- **No billing during the period**. The respondent confirms that the NPI was not used to bill Medicare for ground ambulance services at any time during the organization's 12-month data collection period (responses a.ii and a.iii). In this case, the organization's GADCS reporting requirement is complete, and the organization is not asked any other GADCS questions.

Very few organizations (fewer than 20) fell into the first two Section 2, Question 1 response categories.

Relatively more organizations reported that the selected NPI was not used to bill Medicare for ground ambulance services during the applicable data collection period. Unsurprisingly, most inactive NPIs (120, or 74 percent of 162 inactive NPIs with certified responses) indicated that the selected NPI was not used to bill Medicare for ground ambulance services during the data collection period. The remaining 42 inactive NPIs (or 26 percent) reported that they did use the selected NPI to bill Medicare for ground ambulance services and continued to report information across the full set of GADCS questions. Given the wording of Section 2, Question 1; distinctions between Traditional Medicare and Medicare Advantage; and discrepancies between billed versus paid Medicare claims, we assume that these 42 NPIs accurately responded to Section 2, Question 1 despite the lack of paid Medicare FFS claims.

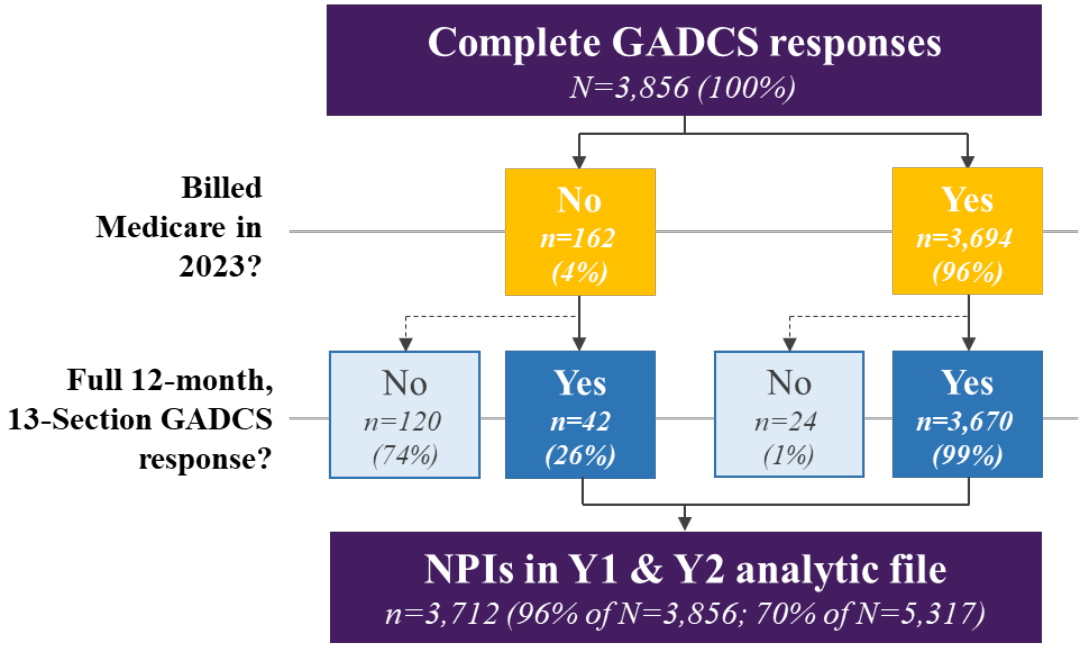
Among *active* NPIs with 2023 Medicare claims for ground ambulance services, n = 24 (less than 1 percent of 3,694 active NPIs with certified responses) reported in Section 2, Question 1 that the selected NPI was not used to bill Medicare for ground ambulance services during the

applicable data collection period. As above, certain scenarios, such as ceasing and then resuming Medicare billing, may allow organizations to have paid Medicare claims in 2023 while at the same time reporting that they did not use the NPI to bill Medicare for ground ambulance services during the data collection period beginning in 2022.

The combined 144 NPIs with NPIs that were not used to bill Medicare for ground ambulance services—including 120 inactive NPIs and 24 active NPIs—technically fulfilled their GADCS reporting requirement and are counted as "responders" in Figure 3.1 and in the response rate statistics described above. However, these organizations did not submit any GADCS information beyond their response to Section 2, Question 1.

Unless otherwise noted, for the purposes of calculating weights and for all analyses described below, we considered these 144 NPIs and the few NPIs with partial-year responses to be "non-responders" even though they did submit and certify a complete response. Figure 3.3 illustrates the final step in identifying the ultimate set of 3,712 NPIs (3,670 active NPIs and 42 inactive NPIs) with full, 12-month GADCS responses that contributed to later analyses.

Figure 3.3. Shares of Organizations With Complete GADCS Responses Contributing to Analytic File



SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: Y1 = Year 1. Y2 = Year 2.

Response Rates by Organization Characteristics

Table 3.1 presents unweighted response rates for Year 1 and Year 2 sampled organizations as of July 15, 2024, using the original Year 1 and Year 2 sampling frames as the denominator and presenting separate rates for combinations of organizational characteristics. In aggregate,

response rates were similar for providers versus suppliers and across urban, rural, and super rural[62] service area population density categories.[63]

For suppliers, response rates were relatively lower for organizations with fewer Medicare ground ambulance transports,[64] regardless of ownership or service area population density category.[65] This may reflect organizations' weighing of response burden versus the magnitude of the payment reduction for non-response. Additionally, we consistently found that government and non-profit supplier organizations had higher response rates compared with for-profit suppliers, regardless of volume or service area population.[66] Across categories, urban, for-profit, low-volume suppliers had the lowest response rate (29 percent), while urban, government, very high-volume suppliers had the highest response rate (97 percent). While not reported, response rates for Year 1 and Year 2 organizations were very similar and the difference in rates between the groups was not statistically distinguishable from zero.

[62] CMS defines rural, super rural, and urban areas for ambulance services reimbursement purposes as follows: rural: an area outside of an urban area, or a rural census tract within a Metropolitan Statistical Area (MSA); super rural: the lowest quartile of nonmetropolitan ZIP Codes by population density; and urban: an MSA modified to recognize rural census tracts in MSAs. For additional information on the classification, see Michael Ratcliffe, Charlynn Burd, Kelly Holder, and Alison Fields, "Defining Rural at the U.S. Census Bureau: American Community Survey and Geography Brief," U.S. Census Bureau, ACSGEO-1, December 2016. The list of CMS ZIP Codes and their designations can be found in the ZIP Code to Carrier Locality file available at CMS, "Ambulance Fee Schedule," webpage, last accessed August 16, 2023.

[63] We estimated coefficients from separate logistic regression models for each organization characteristic and a constant to determine whether response rates differed significantly. There was no difference in the Year 1 and Year 2 response rates between providers and suppliers ($p = 0.691$), nor was there a difference based on population service area density ($p = 0.829$).

[64] We use the term *Medicare ground ambulance transports* to refer to separately billed Medicare ground ambulance services using Healthcare Common Procedure Coding System (HCPCS) codes A0426, A0427, A0428, A0429, A0432, A0433, and A0434, excluding the ground ambulance mileage HCPCS code A0425. HCPCS code A0432, Paramedic Intercept (PI), rural area, transport furnished by a volunteer ambulance company which is prohibited by state law from billing third party payers, is where services are provided by an entity that is under contract with the volunteer ambulance company that does not provide the transport but is paid for their paramedic intercept service (only the State of New York meets these requirements).

[65] From the logistic regression models described above, pairwise differences between each of the medium-, high-, and very high-volume versus the low-volume category were all significantly different than zero ($p < 0.001$).

[66] Pairwise differences between government organizations and both non-profit and for-profit/unknown organizations were both significant at $p < 0.001$, as was the pairwise difference between for-profit and non-profit organizations ($p < 0.001$).

Table 3.1. Year 1 and Year 2 GADCS Response Rates, by Sampling Strata Characteristics

	Urban		Rural		Super Rural	
	n	%	*n*	%	*n*	%
Government suppliers						
Low volume	301	68.4	238	69.0	257	68.0
Medium volume	388	87.2	177	86.3	124	86.7
High volume	226	90.4	139	89.1	24	80.0
Very high volume	120	96.8	28	100.0	N/A	N/A
For-profit suppliers						
Low volume	42	29.0	25	39.1	36	46.8
Medium volume	51	42.9	26	54.2	18	58.1
High volume	81	52.9	54	71.1	21	72.4
Very high volume	215	69.1	44	78.6	N/A	N/A
Non-profit suppliers						
Low volume	150	51.7	133	51.8	97	57.7
Medium volume	171	70.1	85	73.9	30	83.3
High volume	76	80.9	41	73.2	12	92.3
Very high volume	50	84.7	18	85.7	N/A	N/A
Providers	81	66.9	45	62.5	88	74.6
All respondents	**1,952**	**69.8**	**1,053**	**70.2**	**707**	**69.1**

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: Denominator is restricted to the 5,317 organizations sampled to report data for the Year 1 and Year 2 GADCS. Percentages may not add to 100 due to rounding. "N/A" indicates not applicable. We combined high- and very high-volume NPIs in the super rural service area population density category to ensure a sufficient number of organizations in each cell. In these cases, counts and percentages in the high-volume category reflect the combined high and very high-volume category values.

Adjustments for Differential Non-Response

Except where noted, we calculated and applied weights to address concerns stemming from differential response rates across categories of organizations. We weighted data used in our analysis so the results described in the report reflect the full set of Year 1 and Year 2 organizations rather than only those Year 1 and Year 2 organizations that responded to the GADCS. As a simplified example, if selected non-profit organizations were less likely to respond and selected government organizations were more likely to respond than the average organization, non-response weights would be relatively larger for non-profit than for government organizations and each response from non-profit organizations would contribute more to our overall GADCS analyses than each response from government organizations.

Using information for all 5,317 Year 1 and Year 2 NPIs, we estimated a logistic regression model expressing the likelihood of GADCS response as a function of a constant, the NPI-level characteristics used for sampling, and other NPI-level information. The full set of covariates

included urbanicity, state, provider vs. supplier status,[67] and ownership type at the time of sampling; whether the NPI had any paid Medicare FFS claims in each year from 2017 through 2022; the NPI's Traditional Medicare transport volume in 2023; the percentage of the NPI's Medicare FFS claims that were to or from a dialysis center in 2023; and the percentage of the NPI's Medicare FFS claims that were for emergent transports in 2023.

Using the estimated coefficients from this model, we predicted the likelihood of GADCS response for each NPI and defined NPI-level weights equal to the inverse of this likelihood. Initially, weights ranged from 1 to 98.25. We winsorized the weights for 36 NPIs at 20 so that organizations with particularly large weights would not have an undue influence on the results. Due to this winsorizing, the sum of weights across the 3,712 responder NPIs was 5,023, slightly below the total 5,317 sampled NPIs. Except where noted, analyses below reflect the weighted 5,023 organizations.

Table 3.2 compares the organizational characteristics of all sampled NPIs with NPIs that completed the GADCS, both before and after weights are applied. Overall, the addition of weights reduces the differences between the sampled group of NPIs and the NPIs that completed the survey on several characteristics, including ownership type and Traditional Medicare ground ambulance transport volume. Because our prior analyses have indicated that Traditional Medicare ground ambulance transport volume has changed significantly since sampling,[68] it was particularly important for the weights to address this issue. For provider vs. supplier designation and urbanicity, the weights have widened the difference between the two groups of NPIs, although the difference is not as substantial as it was with other characteristics.

[67] Medicare providers of services are hospitals, skilled nursing facilities, and other facility-based providers enrolled in the Medicare program as providers. Some Medicare providers, primarily Critical Access Hospitals and other hospitals, provide ground ambulance services. Most ground ambulance organizations are Medicare suppliers rather than providers.

[68] Petra W. Rasmussen, Jonathan Cantor, Jennifer Gildner, Sara Heins, and Andrew W. Mulcahy, *Ground Ambulance Industry Trends, 2017–2022: Analysis of Medicare Fee-for-Service Claims*, RAND Corporation, Task Order No. GS-10F-0275P 75FCMC22F0002, April 2024.

Table 3.2. Summary of Unweighted and Weighted Samples

	All Sampled NPIs		NPIs That Completed the GADCS			
	Unweighted		*Unweighted*		*Weighted*	
	n	%	n	%	n	%
Total	5,317	100.0%	3,712	100.0%	5,023[a]	100.0%
Provider vs. supplier						
Supplier	5,006	94.2%	3,498	94.2%	4,673	93.0%*
Provider	311	5.8%	214	5.8%	350	7.0%*
Ownership type						
For-profit or unclassifiable	1,124	21.1%	616	16.6%*	950	18.9%*
Government	2,644	49.7%	2,093	56.4%*	2,591	51.6%
Non-profit	1,549	29.1%	1,003	27.0%*	1,482	29.5%
Urbanicity						
Urban	2,795	52.6%	1,952	52.6%	2,585	51.5%
Rural	1,499	28.2%	1,053	28.4%	1,388	27.6%
Super rural	1,023	19.2%	707	19.0%	1,050	20.9%
Medicare transport volume						
Low volume	2,256	42.4%	1,332	35.9%*	2,123	42.3%
Medium volume	1,482	27.9%	1,140	30.7%*	1,416	28.2%
High volume	940	17.7%	733	19.7%*	884	17.6%
Very high volume	639	12.0%	507	13.7%*	600	11.9%

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file and Responder/Non-Responder Data.
NOTE: NPI = National Provider Identifier.
[a] The total weighted sample size is less than 5,317 because of the winsorizing we implemented. For example, an NPI whose weight was recoded from 98 to 20 would reduce the total weighted sample by 78. Percentages (and counts of weighted organizations) may not add to 100 (or the 5,023 sum of weights) due to rounding.
* Statistically significant difference from the proportion from all sampled NPIs at $p < 0.05$.

Chapter 4. GADCS Descriptive Statistics

The following sections describe key findings from RAND's analysis of Year 1 and Year 2 GADCS data organized by GADCS instrument section, starting with Section 2 (Organizational Characteristics). Section 1 (General Instructions) only has instructions for organizations, so it does not have any results to include in this report. Section 12 (Total Cost) only has a single question on organizations' total costs—including those not partly or entirely related to ground ambulance operations. We used responses from the single Section 12 question in our data validation findings (reported in Appendix B), but we do not report results in this chapter. Finally, a separately downloadable codebook accompanying this report includes descriptive statistics for GADCS variables after applying the data cleaning and weighting methods that are described in Chapters 2 and 3, respectively.

Section 2: Organizational Characteristics

Section 2 Content Overview

- Ownership and organizational type
- Response to emergency calls for service and provision of other services
- Use of volunteer labor and staffing models
- Contracting out of core ground ambulance functions

Overview

Section 2 (Organizational Characteristics) collects information on organizational characteristics, including ownership, types of services provided, staffing models, and other high-level information. Many Section 2 responses determine (via programming logic) which questions the organization must respond to in later sections. For example, the GADCS only presents questions related to volunteer labor in Section 7 (Labor Costs) if the organization reported using volunteer labor in Section 2, Question 6. Our description of results from Section 2 omits Section 2, Question 1 (on whether the organization used the selected NPI[69] to bill Medicare for ground ambulance services, discussed in Chapter 3 of this report); Section 2, Question 2 (on whether the organization falls under a broader "parent" organization operating multiple NPIs, addressed later in Chapter 4 of this report); Section 2, Question 3 (confirming the organization's name); and Section 2, Question 4 (which confirms contact information previously submitted to CMS by users submitting data for the organization).

[69] NPIs are unique identification numbers assigned to health care providers in the United States by CMS. To obtain an NPI, a health care provider must apply through the National Plan and Provider Enumeration System (NPPES). For more information, please visit https://nppes.cms.hhs.gov.

Key Section 2 (Organizational Characteristics) Findings

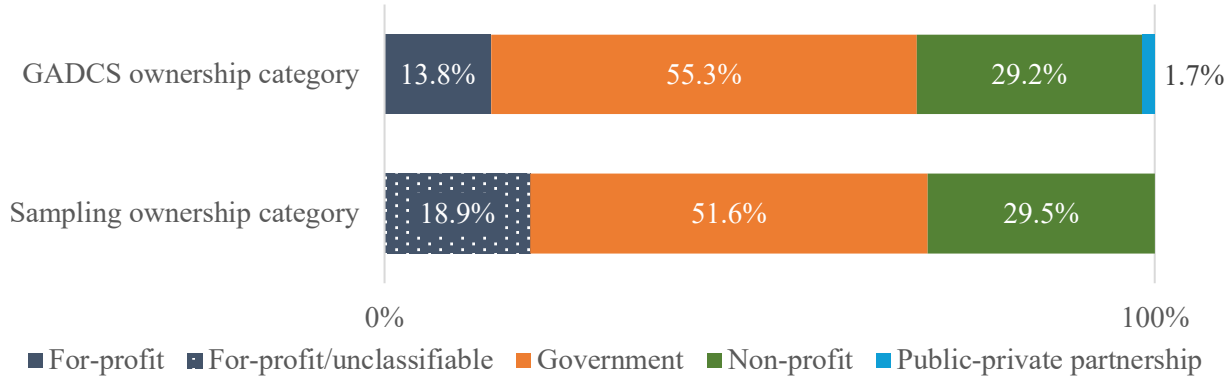
- Ground ambulance organizations differ from one another at basic, fundamental levels that affect their structure, staffing, and services offered, and these differences likely drive differences in expenses and revenue.
- While these disparate organizations are equally responsible for collecting and reporting information via the GADCS, they represent very different shares of Medicare transports, face different economic incentives (for example, maximizing margins and profit in the case of for-profit organizations or providing EMS as a public good for government organizations), and play different roles in communities' broader provision of emergency services.
- For-profit and high-volume ground ambulance suppliers appear different from other organizations on multiple dimensions. Organizations in these categories are less likely to use volunteer labor, less likely to respond to emergency calls for service, and less likely to use static staffing models (i.e., have the same number of staffed ambulances ready for response at all times).
- Small, government-based or non-profit organizations with an EMS focus are a second major group. These organizations are in many ways the inverse of large, for-profit ground ambulance suppliers, typically using volunteer labor, focusing on EMS responses, and using static staffing models. Organizations in this group are also very likely to be combined ambulance and fire departments.

Ownership Category

Section 2, Question 5 asks organizations to self-identify in one of four ownership categories: for-profit, non-profit excluding government, government, or public-private partnership (a collaborative agreement between government and private entities to deliver services or projects that benefit the public). These categories are similar to the ownership categories used for sampling, with the exceptions of an additional public/private partnership category and a for-profit category that does not include unclassifiable organizations. More than half of organizations (55 percent) reported government ownership, with smaller shares in the non-profit (29 percent) and for-profit (14 percent) categories and very few organizations (2 percent) in the public-private partnership category (Figure 4.2.1, top bar). For comparison, self-reported ownership categories aligned closely with ownership categories used in sampling, with some reassignment for unclassifiable NPIs assigned to the for-profit/unclassifiable category during sampling to other categories (Figure 4.2.1, bottom bar).[70]

[70] RAND's prior analyses found that ownership categories inferred from PECOS data and web searches were very consistent over time.

Figure 4.2.1. GADCS-Reported Versus Sampled Ownership Categories



SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: Unit of analysis is an NPI weighted to address differential non-response (sum of weights = 5,023). For the sampling ownership category bar, the "for-profit" category also includes unclassifiable NPIs. The "public-private partnership" category was not part of the sampling categorization scheme.

Organization Type and Services Provided

Questions 7, 8, and 9 in Section 2 (Organizational Characteristics) collectively describe the type of organization responding to the GADCS, focusing mainly on the broad services provided by the organization. The first question in this set, Question 7, asks respondents to select one of the following organization types as the best fit for their organization:

a. fire department–based
b. police or other public safety department–based
c. government stand-alone emergency medical services (EMS) agency
d. hospital or other Medicare provider of services
e. independent/proprietary organization primarily providing EMS services
f. independent/proprietary organization primarily providing non-emergency services
g. other.

The most common responses were fire department–based (41 percent), independent/proprietary organization primarily providing EMS services (23 percent), and government stand-alone EMS agency (18 percent; see Table 4.2.1). As expected, based on prior analyses of claims data, 9 percent of organizations described themselves as a hospital or other Medicare provider of service. Findings from prior claims-based analyses also align with the 6 percent of organizations that self-identified as independent/proprietary organizations providing primarily non-emergency services. Many of the "other" write-in responses appeared to align with one of the existing response options (e.g., a write-in "fire department" response). When the link to an existing response option was clear, we recoded write-in "other" responses as appropriate.

Table 4.2.1. Ground Ambulance Organization Type

Category	*N*	%
Fire department–based	2,082	41.4
Independent organization primarily providing EMS services	1,177	23.4
Government stand-alone EMS agency	899	17.9
Hospital or other Medicare provider of service	453	9.0
Independent organization providing non-emergency services	301	6.0
Other	73	1.5
Police or other public safety department–based	38	0.8

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: EMS = emergency medical services. Unit of analysis is an NPI weighted to address differential non-response (sum of weights = 5,023). Cells represent column percentages. Percentages across rows may not sum to 100 due to rounding.

The GADCS presented organizations identifying as fire department–based, as a hospital or other Medicare provider of services, or as police or other public safety department–based in Question 7 (n = 2,573) with a follow-up Question 8 asking whether the organization had shared operational costs between ground ambulance and, as applicable, fire, police, or Medicare provider services. The motivation for this question is to differentiate between organizations with shared costs requiring allocation and those that for historical, cultural, or other reasons may identify as one of these organization types but without practical links in terms of accounting and expenses. Most organizations (n = 2,357, or 92 percent) reported sharing operational costs, with the highest percentage among fire department–based organizations.

The final question in this series (Section 2, Question 9) asks organizations whether they also provide fire, police, or other public safety services; services as a Medicare provider of services; broader health care services (such as a clinic); or air ambulance services, regardless of their prior answers. The number of organizations that were presented the first three response options varied depending on organizations' responses to Section 2, Question 7: Organizations identifying as fire department–based, as police or other public safety department–based, or as a hospital or other Medicare provider of services were not presented with the associated response option in Section 2, Question 9.

Taken together, the responses to Section 2, Questions 7–9 can yield the number of organizations with shared services. Table 4.2.2 shows how the questions fit together and presents shares of organizations reporting that they provided specific services and operations in Section 2, Question 7; in Section 2, Question 9; and in either question. Responses to Section 2, Question 9 increased the number of organizations with potentially shared expenses with a fire department and with a hospital or other Medicare provider of services. Question 9 increased the number and share of organizations indicating shared costs with a police or other public safety department substantially (from 1 percent to 8 percent of all 5,023 organizations). The other Question 9 response categories were not addressed in Question 7. For these categories, few organizations

reported providing broader health care services, such as outpatient care in a clinic or urgent care center (6 percent of all 5,023 organizations) or air ambulance services (2 percent of 5,023 organizations). We refer to organizations counted in the top two rows of the rightmost column of Table 4.2.2 as "public safety" organizations because they share costs with a fire department, a police department, or another public safety department.

Table 4.2.2. Synthesis of Responses Related to Shared Costs

Question 7–9 response option services/operations	**Starting point:** Relevant Question 7 response: *n (% of 5,023 total NPIs)*	**Minus:** Relevant Question 8 negative response: *n (% of 5,023 total NPIs)*	**Plus:** Question 9 positive response: *n (% of 5,023 total NPIs*	**Total NPIs with shared costs: n (% of 5,023 NPIs)**
A fire department	2,082 (41.4%)	120 (2.4%)	143 (2.9%)	**2,105 (41.9%)**
A police or other public safety department	38 (0.8%)	N/R	386 (7.8%)	**420* (8.4%)**
A hospital or other Medicare provider of services	453 (9.0%)	81 (1.6%)	55 (1.2%)	**427 (8.5%)**
Other health care delivery operations such as a clinic or urgent care center	N/A	N/A	283 (5.6%)	**283 (5.6%)**
An air ambulance operation	N/A	N/A	81 (1.6%)	**81 (1.6%)**

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: NPI = National Provider Identifier. The "Total NPIs with shared costs" column equals the sum of Question 7 and Question 9 NPI counts minus relevant Question 8 NPI counts. "N/A" is not applicable: Neither Section 2, Question 7 nor Section 2, Question 8 includes response options related to these services/operations. "N/R" is not reported due to small cell count. Unit of analysis is an NPI weighted to address differential non-response (sum of weights = 5,023). * Statistic randomly perturbed to prevent the calculation of a second value that was not reported due to small cell count. Counts and percentages within a row may not aggregate to totals when summed due to rounding.

Services Provided

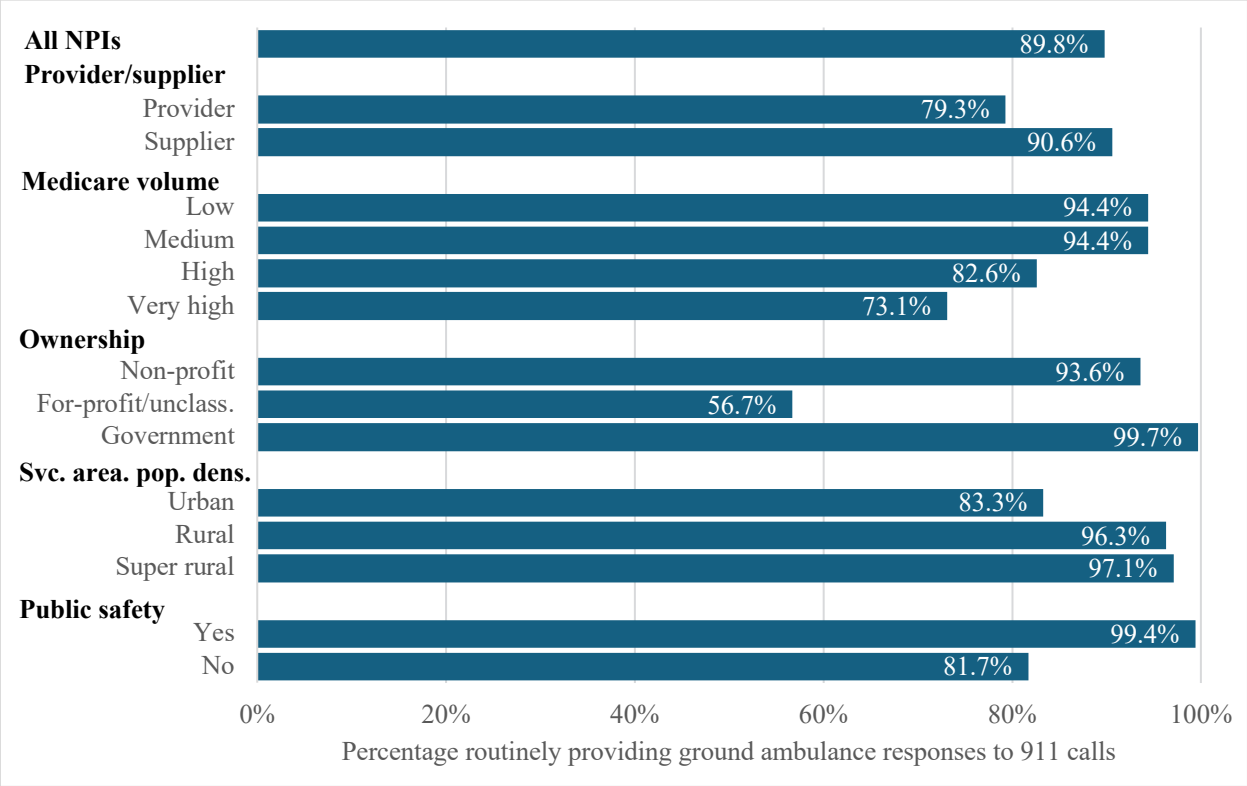
Medicare defines "ground ambulances" as either land-based or water-based ambulances (as opposed to air ambulances). Section 2, Questions 11, 12, and 13, ask whether organizations operate land, water, and air ambulances, respectively. Organizations' responses to these questions have important implications on the services offered by the organization and, in the GADCS, serve as screening responses informing which questions organizations see in later sections. Unsurprisingly, practically all organizations reported operating land-based ambulances.[71] Fewer than 20 organizations reported operating water-based ambulances. Of the 81 organizations

[71] Fewer than 20 organizations reported not operating ground ambulances. Certain AFS HCPCS codes, particularly paramedic intercept (A0432), where an ambulance service provides ALS staff (but, notably, not necessarily an ambulance) to meet a non-profit BLS ground ambulance response from a separate organization, may explain these rare cases.

reporting shared costs with an air ambulance operation in Section 2, Question 9, only 62 (80 percent) reported operating air ambulances in Section 2, Question 13. Overall, these responses reinforce the importance of land-based ambulances to ground ambulance organizations.

Section 2, Question 10 asks whether organizations routinely respond to emergency calls for service. Overall, most organizations—90 percent of 5,023 total NPIs—responded "yes" to this question (Figure 4.2.2).

Figure 4.2.2. Share of Organizations Routinely Responding to Emergency Calls for Service



SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: NPI = National Provider Identifier. "Svc. area. pop. dens." is service area population density. All percentages are out of 5,023 weighted total NPIs.

However, shares varied across subsets of organizations, with the following subgroups more likely to report responding to emergency calls for services:

- Suppliers were more likely to respond to emergency calls for service than providers (91 vs. 79 percent), although this difference was only marginally significant ($p = 0.054$).
- Relatively larger shares of low- and medium-volume organizations reported responding to emergency calls for service compared with both high- and very high-volume organizations. Furthermore, high-volume organizations were more likely to respond to emergency calls than very high-volume organizations (pairwise differences between all categories were statistically significant at $p < 0.05$, except the difference between low- and medium-volume organizations was not distinguishable from zero).

- Nearly all government-owned organizations reported responding to emergency calls for service (between 99 and 100 percent) compared with a smaller share of non-profit organizations (94 percent) and a much smaller share of for-profit organizations (57 percent).
- Nearly all super rural (97 percent) and rural (96 percent) organizations reported responding to emergency calls for service compared with a smaller share of urban organizations (all pairwise differences were significant at $p < 0.001$).[72]
- Public safety–based organizations were more likely than other organizations to respond to emergency calls for service (99 vs. 82 percent, difference significant at $p < 0.001$).

Organizations reporting that they responded to emergency calls for service ($n = 4{,}510$) reported later in Section 2 (Question 15) whether they provide these services around the clock (sometimes called "24/7/365"); 98 percent of organizations answering this question reported that they did. Even among for-profit organizations, where the smallest share of total organizations reported responding to emergency calls for service, more than nine in ten organizations responding to Section 2, Question 15 reported providing around the clock emergency response.

Section 2, Question 16 asks whether organizations provide paramedic intercept services—i.e., deploying paramedics (i.e., ALS staff) as part of a joint response with another organization that ultimately transports the patient in a BLS-level ambulance—meeting other requirements in Medicare's formal definition of this service.[73] Separately, Section 2, Question 17 asks whether organizations provide paramedic intercept services but without meeting CMS' additional requirements. From the perspective of the organization responding to the GADCS, paramedic intercepts may account for substantial vehicle, labor, and other expenses, even though the organization does not ultimately transport the patient. As of August 2024, only certain non-profit ambulance organizations in New York State qualify to meet Medicare's formal definition of paramedic intercept and can bill Medicare for these services.

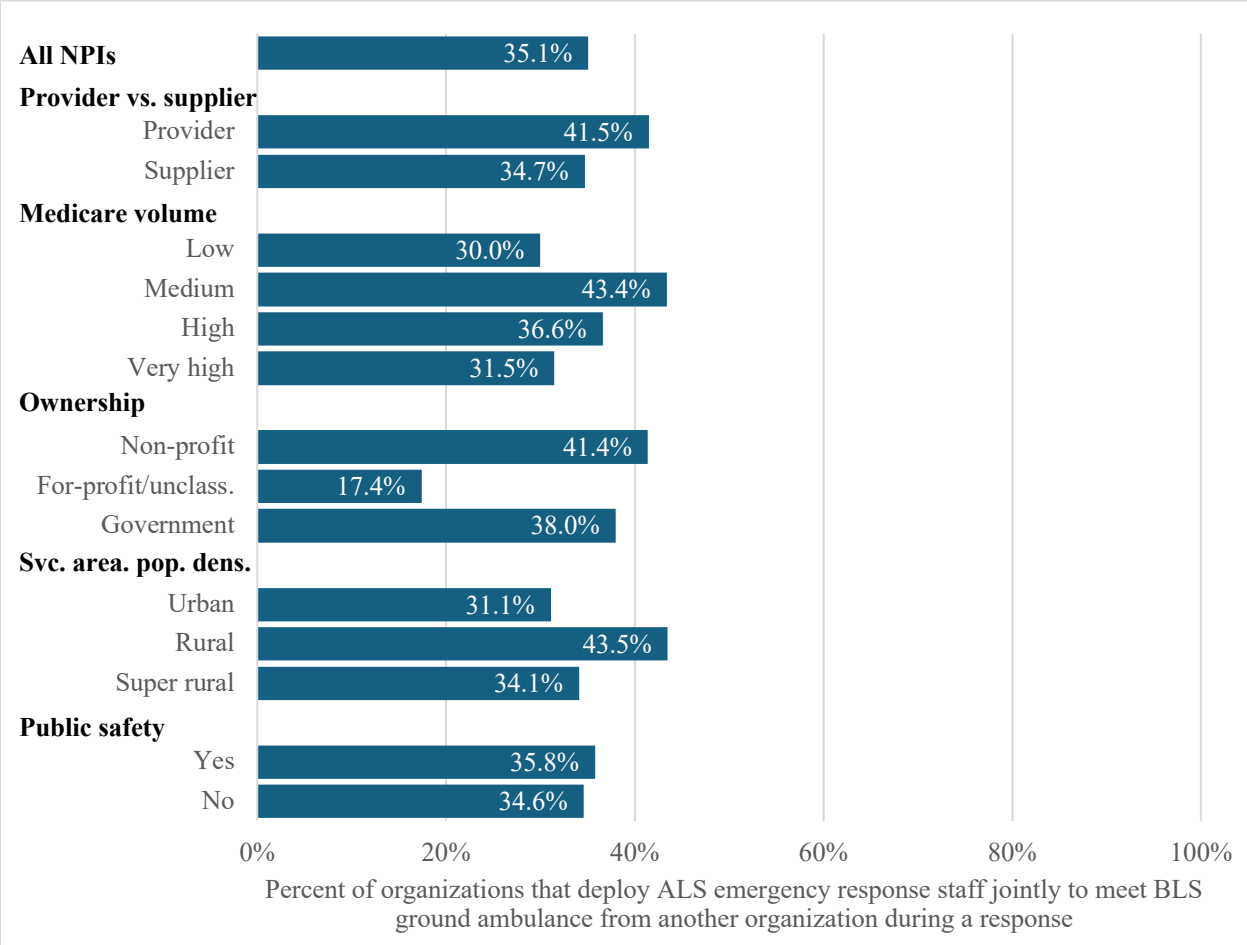
While only 2.1 percent of respondents reported providing paramedic intercept services meeting Medicare's definition, a much larger share of organizations (35 percent) reported providing broader ALS services as part of joint responses. Responses to Section 2, Question 17 varied across subsets of organizations, with for-profit organizations indicating they provide these

[72] CMS defines rural, super rural, and urban areas for ambulance services reimbursement purposes as follows: rural: an area outside of an urban area, or a rural census tract within a Metropolitan Statistical Area (MSA); super rural: the lowest quartile of nonmetropolitan ZIP Codes by population density; and urban: an MSA modified to recognize rural census tracts in MSAs. For additional information on the classification, see Michael Ratcliffe, Charlynn Burd, Kelly Holder, and Alison Fields, "Defining Rural at the U.S. Census Bureau: American Community Survey and Geography Brief," U.S. Census Bureau, ACSGEO-1, December 2016. The list of CMS ZIP Codes and their designations can be found in the ZIP Code to Carrier Locality file available at CMS, "Ambulance Fee Schedule," webpage, last accessed August 16, 2023.

[73] Medicare's definition of paramedic intercept is an ALS level of service that CMS defines as a rural area transport furnished by a volunteer ambulance company which is prohibited by state law from billing third-party payers where services are furnished by an entity that is under contract with the volunteer ambulance company that does not provide the transport but is paid for their service (only the State of New York meets these requirements).

services relatively less (17 percent) than non-profit (41 percent) or government (38 percent) organizations (all differences were significant at $p < 0.001$). See Figure 4.2.3 for additional comparisons.

Figure 4.2.3. Provision of ALS Emergency Response Staff as Part of a Joint Response



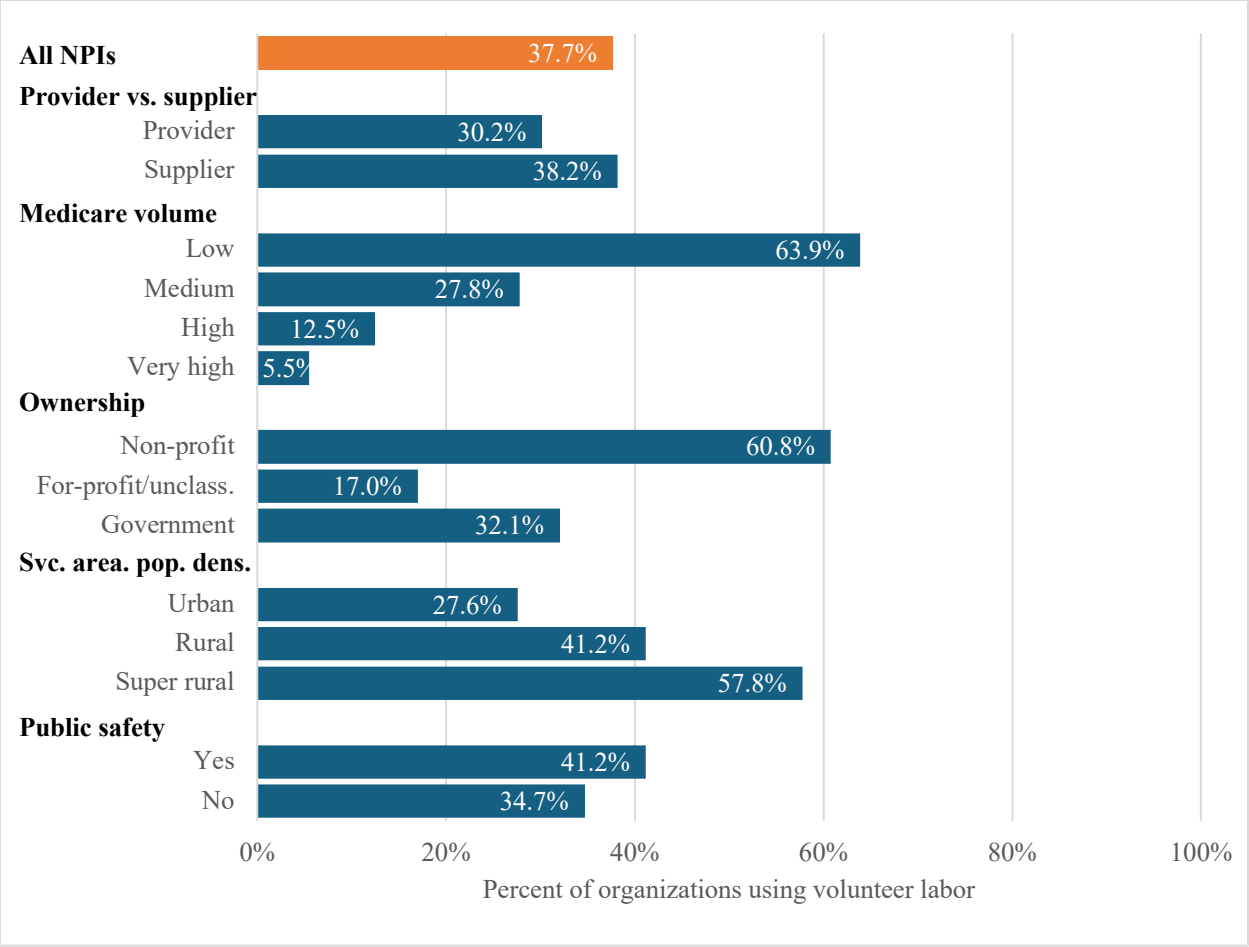
SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: NPI = National Provider Identifier. "Svc. area. pop. dens." is service area population density. ALS = advanced life support. BLS = basic life support. All percentages are out of 5,023 weighted total NPIs.

Staffing and Deployment Model

Section 2, Question 6 asks organizations whether they used any volunteer labor during their data collection period: Answering "yes" presents the organizations with questions related to volunteer labor in Section 7 (Labor Costs). Overall, 38 percent of organizations reported using volunteer labor. Shares varied substantially across subsets of organizations: Low-volume organizations were over 15 times more likely to use volunteer labor compared with very high-volume organizations; non-profit organizations were much more likely to use volunteer labor than either government or for-profit organizations; and super rural organizations were more likely to use volunteers than rural or urban organizations (Figure 4.2.4; all pairwise differences

were significant at $p < 0.01$ except for provider vs. supplier, which was not statistically significant).

Figure 4.2.4. Use of Volunteer Labor



SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: NPI = National Provider Identifier. "Svc. area. pop. dens." is service area population density. All percentages are out of 5,023 weighted total NPIs.

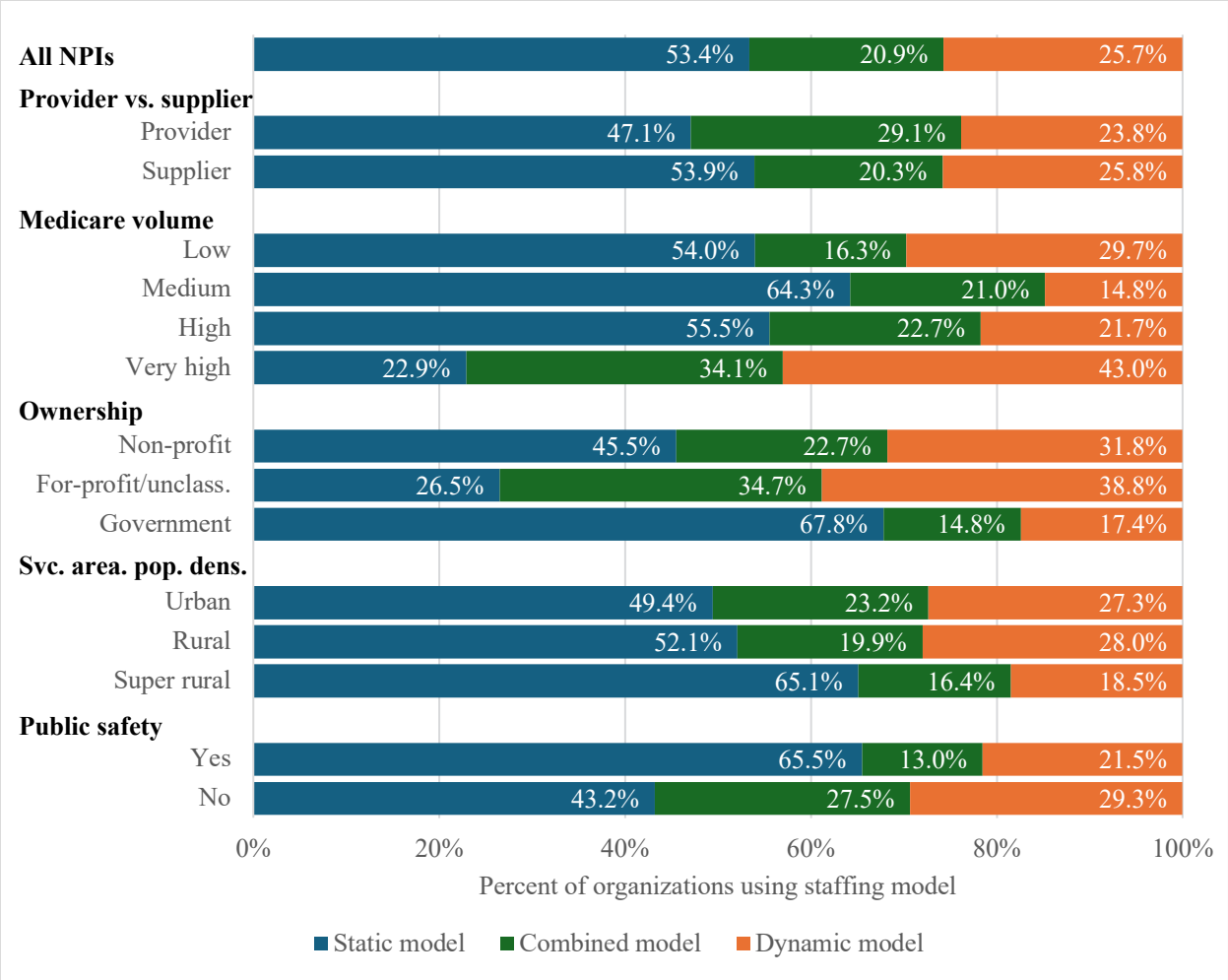
Section 2, Question 14 asks which of three staffing models best applies to the selected organization:

1. a **static deployment model** where the same number of fully staffed ambulance units are available at all times
2. a **dynamic deployment** model where the number of fully staffed ambulance units varies by day and/or over time
3. a **combined deployment** model which is a combination of static and dynamic deployment models at different times.

Over half of organizations (53.4 percent) used a static deployment model (Figure 4.2.5). The largest differences across subsets of organizations were a substantially higher share of higher-

volume, for-profit, and non–public safety organizations reporting the use of dynamic or combined rather than static models.

Figure 4.2.5. Staff Deployment Model



SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: NPI = National Provider Identifier. "Svc. area. pop. dens." is service area population density. All percentages are out of 5,023 weighted total NPIs.

Contracting Core Ground Ambulance Functions

Section 2, Question 18 asks whether organizations contract other organizations to provide core ground ambulance functions for the selected organization, including EMS labor or the provision of staffed and equipped ambulance units. Organizations responding that they do broadly contract out for these core ambulance functions were shown supplemental instructions requiring that some information—such as hours worked, ambulances used, and facilities used—by their contractor must be reported in later GADCS sections, while the associated contract expense must be reported in Section 11, Question 1. The response to this question has important implications for the distribution of section-specific expenses in later sections of the report.

Holding all else equal, organizations broadly contracting out core ambulance functions will likely report lower expenses in later sections like Section 7 (Labor Costs) and higher expenses in Section 11 (Other Costs), which asks for expenses related to contracted services. Most organizations (91 percent) reported not contracting with other organizations to provide EMS labor or ambulance units. Small shares of organizations indicated contracting for EMS labor (4 percent of 5,023 total NPIs), broader ground ambulance services like fully staffed and equipped ambulances (3 percent), or both (2 percent).

Section 3: Service Area

Section 3 (Service Area) Content Overview

- Extent of primary and secondary service areas
- Whether the organization is the main EMS organization in its primary service area
- Average trip time

Overview

Section 3 (Service Area) of the GADCS collects information on organizations' service areas. Respondents report a list of ZIP Codes comprising their "primary service area," which is the area where the organization is primarily responsible for providing ground ambulance services at one or more levels. If applicable, organizations also report a list of ZIP Codes comprising a "secondary service area," which is an area where the organization does not have primary responsibility for providing ambulance services but where the organization regularly provides services through mutual or auto-aid agreements.[74] Organizations have the flexibility to determine service area scope and whether they have a secondary service area at all. Section 3 also collects information on the average trip time within both the primary and, if applicable, secondary service areas separately.

Key Section 3 (Service Area) Findings

- Organizations' primary service areas varied in terms of both square mileage and population.
- Some organizations fit the stereotypical "urban" scenario (small service area, large population), and others fit the "rural" case (large service area, small population).
- However, for many organizations, service area characteristics appear to be more nuanced and not always clearly aligned with "urban," "rural," and "super rural" service area population density categories.
- Across all organizations, every 10 percent increase in primary service area square mileage was associated with a 3.4 percent increase in population within the service area.
- About half of organizations reported having a secondary service area.
- For organizations with both primary and secondary service areas, secondary service areas were, on average, larger than primary service areas.
- For organizations with both primary and secondary service areas, each 10 percent increase in primary service area square mileage was associated with a 5.2 percent increase in secondary service area square mileage.
- Most organizations reported an average trip time—defined as the time from when an ambulance starts a response to the time the same ambulance is ready to respond to another call—of under one hour (48 percent) or between one and two hours (44 percent); only 4 percent of organizations reported an average trip time of over two hours.
- Average trip times were typically similar or longer in secondary versus primary service areas.

[74] A mutual aid agreement is a formal arrangement between neighboring ambulance organizations that agree to assist each other, upon request, during times of emergency or when additional resources are needed. An auto-aid agreement between ambulance organizations ensures the automatic dispatch of ambulance services from neighboring jurisdictions to improve response times by mobilizing resources from multiple organizations without requiring a formal request.

Service Area

Section 3, Question 1 provides organizations with several methods to enter the set of ZIP Codes comprising its primary service area.[75] Importantly, ZIP Codes often do not coincide with municipal boundaries along which many ground ambulance organizations define primary service areas. Approximately two in every three ZIP Codes were reported as being part of the primary service area by one or more Year 1 or Year 2 organizations. The remaining one-third of ZIP Codes are likely served by other ground ambulance organizations. Later analysis of combined GADCS data from Year 1, Year 2, Year 3, and Year 4 organizations will be better suited to assess the extent of service area coverage and overlap across the entire United States.

Table 4.3.1 compares the size of organizations' reported primary service areas in terms of square miles.[76] The distribution of square mileage across all organizations was highly skewed, with a much larger mean (607 square miles) versus median (217 square miles).

Table 4.3.1. Primary Service Area Square Mileage

	Mean	Median	25th Percentile	75th Percentile
All NPIs	607	217	65	608
Provider vs. supplier status				
Supplier	550	195	60	557
Provider	1,367	775	390	1,993
Medicare transport volume				
Low	441	167	62	426
Medium	408	163	40	457
High	684	330	82	828
Very high	1,568	789	324	1,667
Ownership category				
Non-profit	577	197	73	566
For-profit	1,336	557	145	1,676
Government	362	170	47	460
Service area pop. density				
Urban	553	98	33	423
Rural	454	272	119	517
Super rural	937	564	247	1,077
Public safety				
No	897	419	144	993
Yes	269	106	35	286

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: NPI = National Provider Identifier. Statistics calculated over 4,976 weighted NPIs with fewer than 300 reported primary service area ZIP Codes.

We found similarly skewed distributions within each subset of organizations, along with large differences in service area size between groups. Median service area square mileage was over three times as large for providers, many of which are critical access hospitals in rural areas,

[75] Note that results in this section related to ZIP Codes in service areas are not weighted.
[76] We used data from the United States Postal Service to calculate the total square mileage for each organization.

compared with suppliers. Unsurprisingly, super rural organizations had relatively larger service areas compared with rural and urban organizations.

Similarly, the median square mileage of the primary service area increased from smaller to larger Medicare transport volume categories, suggesting a link between service area size and population served beyond service area population density alone. The median primary service area for for-profit organizations was over double the square mileage of non-profit and government organizations. Public safety organizations reported primary service areas much smaller in square mileage compared with non–public safety organizations. These final two comparisons suggest important service area size differences between larger, for-profit organizations and smaller, government, public safety organizations.

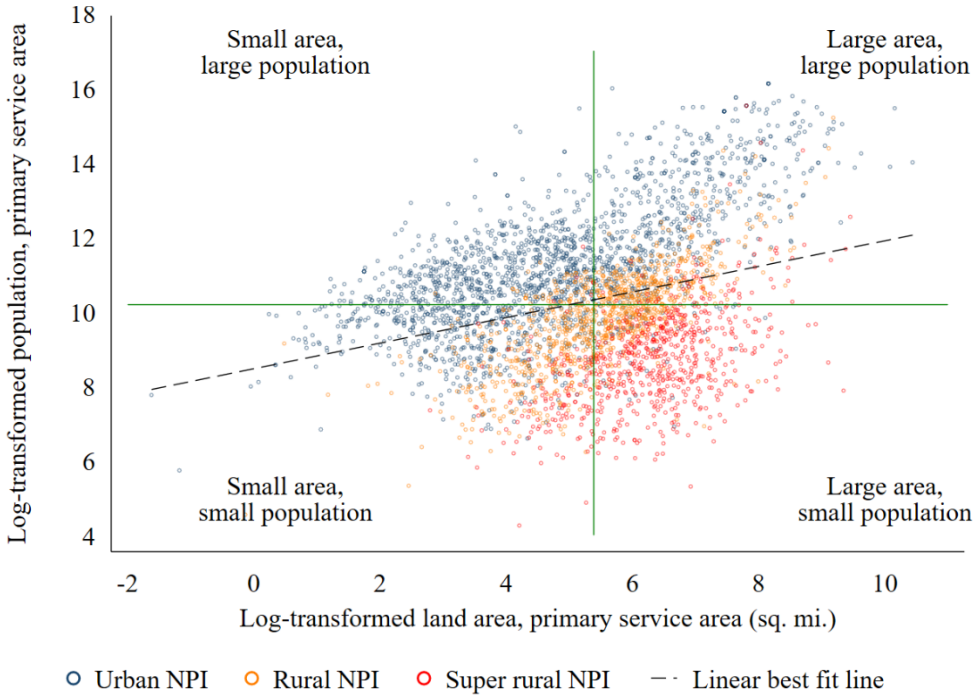
Interestingly, primary service area square mileage was also relatively larger for very high-volume and for-profit organizations compared with other Medicare transport volume and ownership categories. We found a positive association between primary service area square mileage and the population residing in the primary service area.[77]

Figure 4.3.1 plots log-transformed primary service area population on the vertical axis versus log-transformed primary service area square mileage on the horizontal axis for nearly all organizations.[78] Each point in Figure 4.3.1 represents a ground ambulance organization, with markers in blue, orange, and red indicating urban, rural, and super rural organizations, respectively. The horizontal and vertical reference lines bisect organizations on both axes (at the medians of each) such that 25 percent of organizations are in each of the four labeled quadrants. For example, the upper right quadrant includes the top half of organizations by primary service area square mileage and the top half of organizations by primary service area population. Finally, the dashed line is a linear best-fit line estimated using data from all plotted organizations. The slope of this line can be interpreted as an elasticity: For every 1 percent increase in primary service area square mileage, we estimate a 0.34 percent increase in primary service area population ($p < 0.001$). While smaller areas with larger populations tend to be served by "urban" organizations and larger areas with smaller populations by "rural" and "super rural" organizations (the upper left and lower right quadrants of Figure 4.3.1), we found much more variation for service areas that are relatively large and high-population and relatively small and low-population (the lower left and upper right quadrants).

[77] We used ZIP Code Tabulation Area (ZCTA) 2022 five-year population estimates available from the U.S. Census Bureau at https://data.census.gov/.

[78] We excluded a small number of organizations reporting primary service areas composed of more than 300 ZIP Codes. The figure and related statistics reflect data from 4,976 of 5,023 total NPIs.

Figure 4.3.1. Primary Service Area Square Mileage Versus Population



SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: NPI = National Provider Identifier. "Sq. mi." is square mile. Statistics calculated over 4,976 weighted NPIs with fewer than 300 reported primary service area ZIP Codes.

Primary Service Area Role

Section 3, Question 2 asks whether the organization was the primary emergency ground ambulance service in most or all of its reported primary service area. Across all organizations indicating that they respond to emergency calls for services in Section 2, Question 10 (n = 4,510), 94 percent (n = 4,252) reported that they did serve in this role. Mirroring responses from earlier questions in Section 2, for-profit organizations (at 72 percent) and very high-volume organizations (at 84 percent) were less likely than other organizations, such as government and super rural organizations (both at 99 percent), to fill the primary EMS role in their primary service area.

Secondary Service Area

Organizations that respond to calls in neighboring communities, often via formal mutual or auto-aid agreements,[79] can report having a secondary service area in Section 3, Questions 4 and 5. Because organizations describe the extent of both primary and secondary service areas using

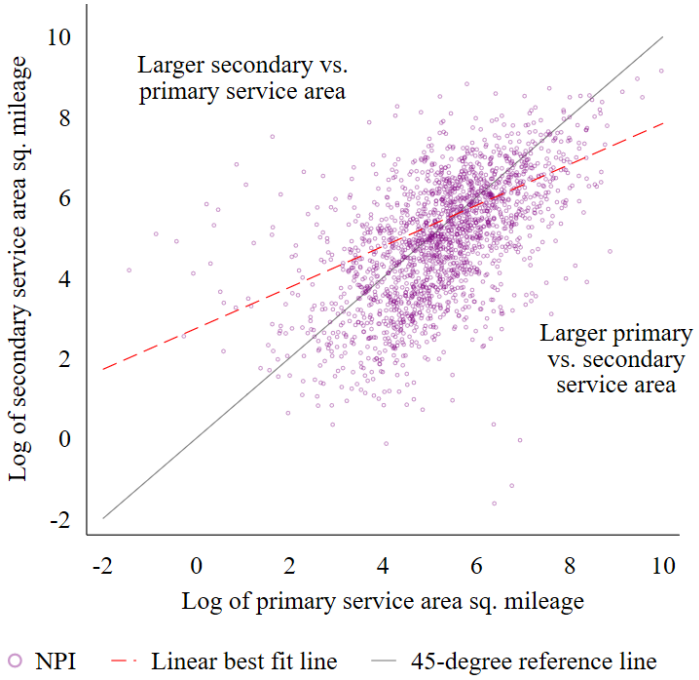
[79] A mutual aid agreement is a formal arrangement between neighboring ambulance organizations that agree to assist each other, upon request, during times of emergency or when additional resources are needed. An auto-aid agreement between ambulance organizations ensures the automatic dispatch of ambulance services from neighboring jurisdictions to improve response times by mobilizing resources from multiple organizations without requiring a formal request.

ZIP Codes, and because ZIP Codes do not align with municipal boundaries, organizations can report the same ZIP Code as contributing to both their primary and secondary service areas. The GADCS instructions advise that ZIP Codes served only very rarely (such as once a year) or in exceptional circumstances should not be included in organizations' secondary service areas.

Overall, 49 percent of 5,023 total NPIs reported having a secondary service area, with higher shares for government and non-profit organizations (52 and 54 percent, respectively) compared with for-profit organizations (34 percent; pairwise differences versus for-profit organizations were both significant at $p < 0.001$). When comparing secondary versus primary service area square mileage for only those NPIs with secondary service areas ($n = 2{,}479$), secondary service areas were larger on average (440 square miles) than primary service areas (363 square miles).

Furthermore, mean and median secondary service area square mileage was often larger than primary service area square mileage across subsets of organizations. Figure 4.3.2 plots log-transformed secondary versus primary service area square mileage for the 2,479 weighted NPIs that reported having a secondary service area. As in Figure 4.3.1, the slope of the best-fit line can be interpreted as an elasticity, with every 1 percent increase in primary service area square mileage associated with a 0.52 percent increase in secondary service area square mileage ($p < 0.001$).

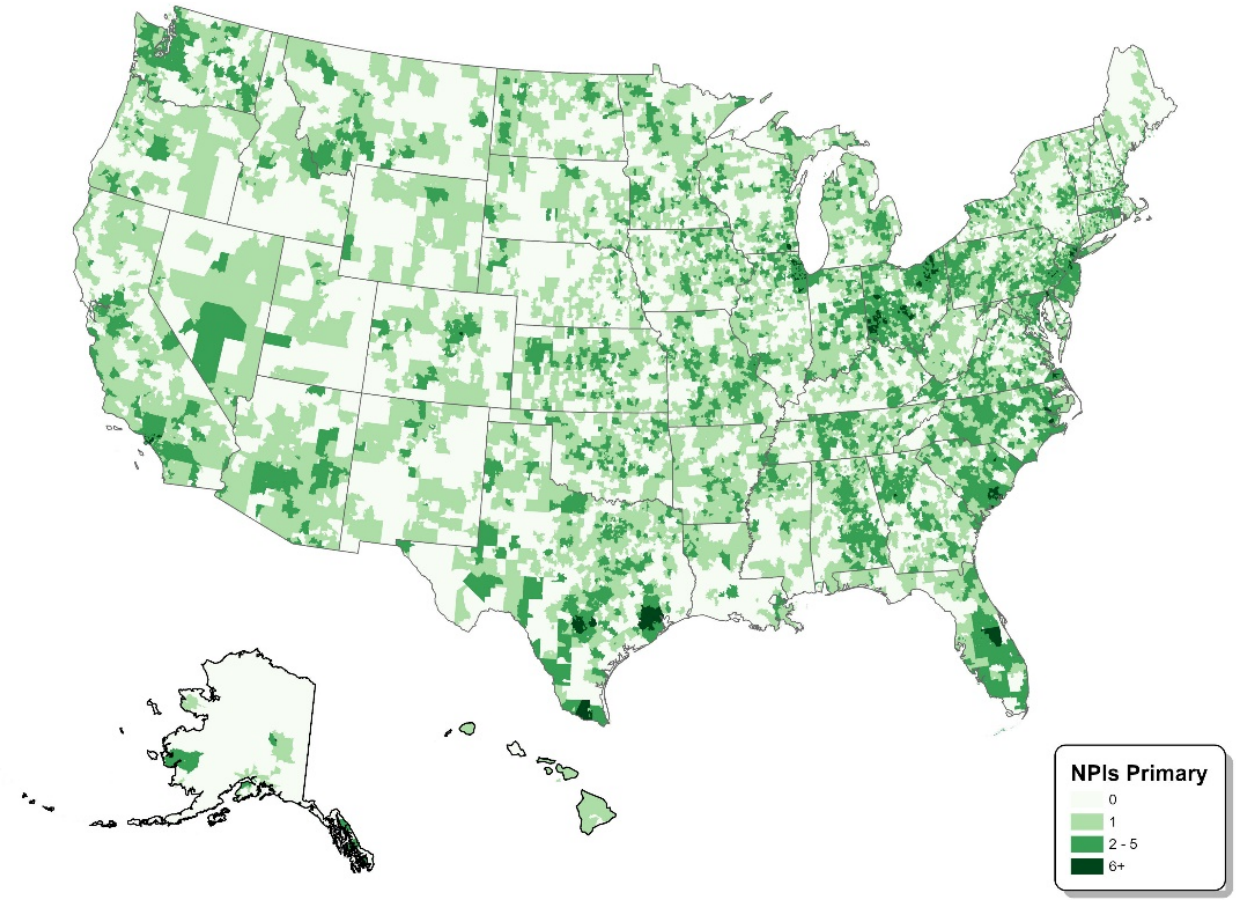
Figure 4.3.2. Ratio of Mean and Median Secondary to Primary Service Area Square Mileage



SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: NPI = National Provider Identifier. "sq." is square. These statistics were calculated over 2,479 weighted NPIs that reported having a secondary service area and with fewer than 300 reported secondary service area ZIP Codes.

For a spatial comparison of primary service areas, Figure 4.3.3 illustrates the number of coinciding Year 1 and Year 2 organization primary service areas by ZIP Code.[80] ZIP Codes around major urban centers (e.g., Cleveland, Columbus, and Cincinnati in Ohio; Orlando in Florida; San Antonio and Houston in Texas) often have more ground ambulance organizations than other areas. Figure 4.3.4 illustrates Year 1 and Year 2 organization primary and secondary service areas by ZIP Code.

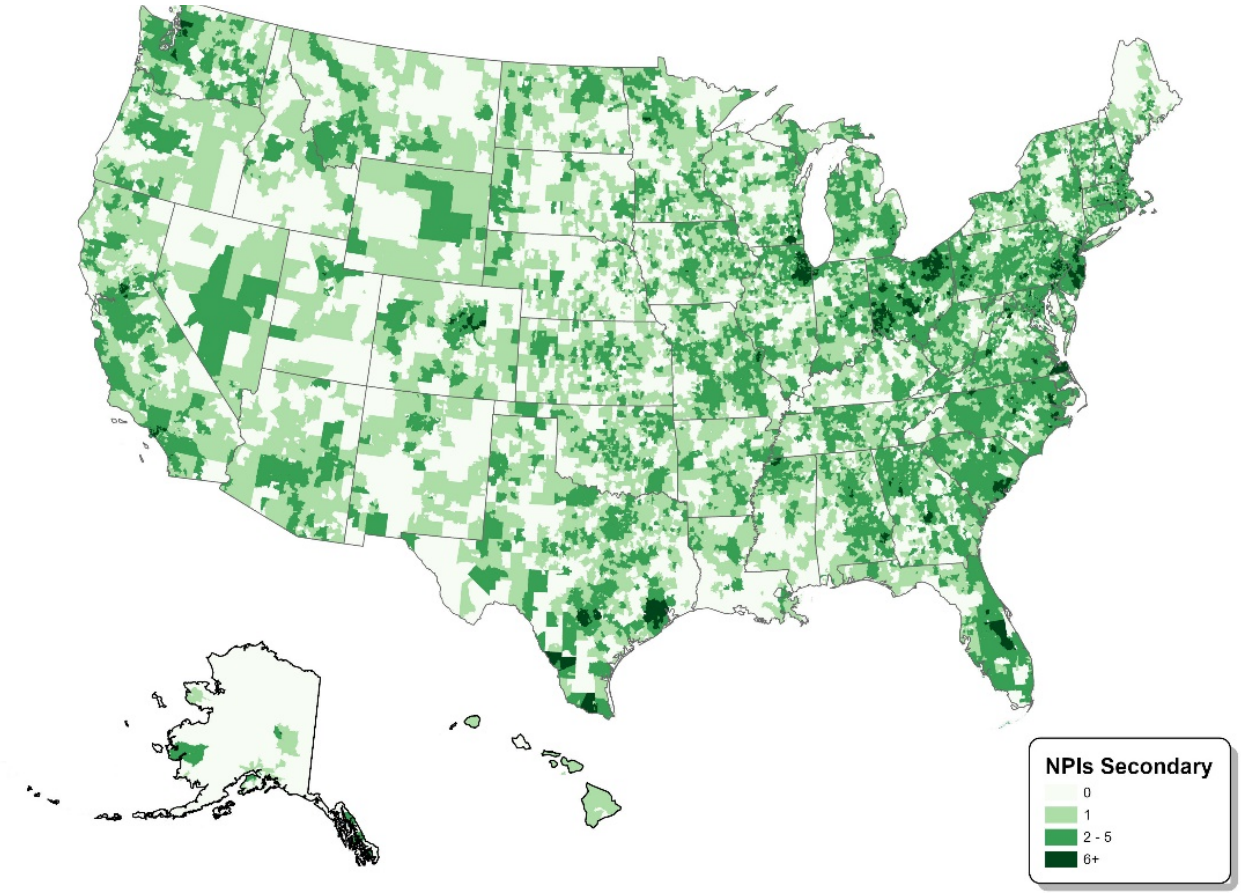
Figure 4.3.3. Count of Organizations Reporting Each ZIP Code as Part of Their Primary Service Area



SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: NPI = National Provider Identifier. Map regions are U.S. ZIP Codes. Unit of analysis is an NPI–ZIP Code pair (unweighted).

[80] We did not expect the primary service areas for Year 1 and Year 2 organizations, which collectively account for approximately half of ground ambulance organizations, to cover the entire United States.

Figure 4.3.4. Count of Organizations Reporting Each ZIP Code as Part of Their Primary or Secondary Service Areas

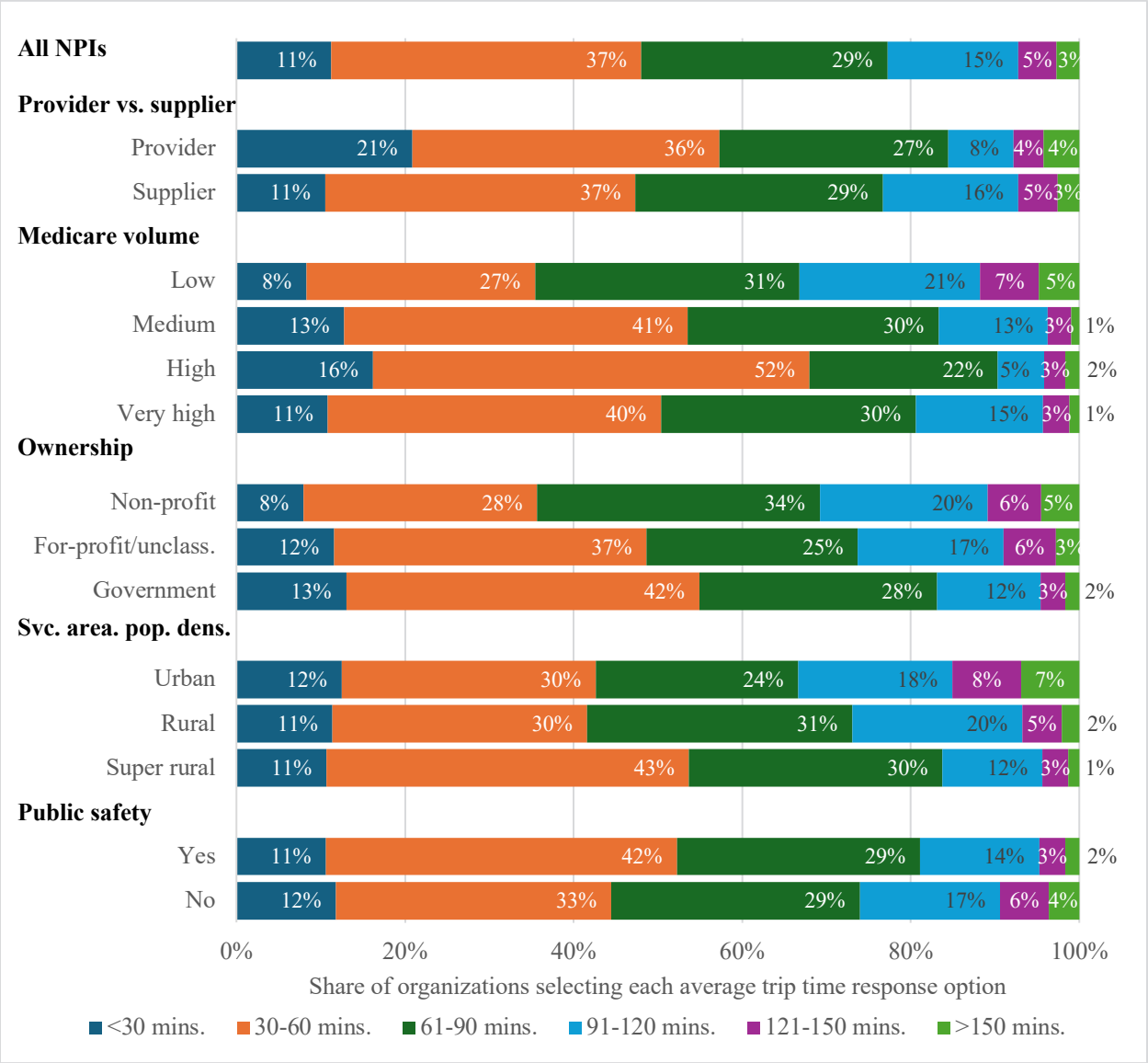


SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: NPI = National Provider Identifier. Map regions are U.S. ZIP Codes. Unit of analysis is an NPI–ZIP Code pair (unweighted).

Average Trip Time

Section 3, Questions 3 and 6 ask organizations to report the average trip time, also called "time on task," in their primary and secondary service areas, respectively. The GADCS defines average trip time as the time from an ambulance beginning a response to the time the ambulance is available to respond to another call for service. Average trip time is different than response time (which falls under Section 4 [Emergency Response Time] of the GADCS) and can include waiting at the destination, travel time back to the station, and other components after the patient reaches the destination. Figure 4.3.5 summarizes average trip time responses across all 5,023 organizations and for subsets of organizations.

Figure 4.3.5. Average Trip Time in Primary Service Area



SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file (July 15, 2024, imputed).
NOTE: NPI = National Provider Identifier. "Svc. area. pop. dens." is service area population density. "Mins." is minutes. Unit of analysis is an NPI.

Overall, 48 percent of organizations indicated that their average trip time, or "time on task," was less than one hour, while a small share of organizations (8 percent) had average response times longer than two hours. Some subsets of organizations—for example, low-volume, non-profit, urban, and rural organizations—had relatively smaller shares of organizations with average trip time below one hour. Many of these same subsets of organizations had higher shares of organizations reporting an average trip time beyond two hours. For example, 35 percent of low-volume organizations reported an average trip time of less than one hour, compared with 12 percent with a time over two hours, and the remaining 52 percent in between.

Most organizations with secondary service areas reported the same or a longer average trip time for their secondary versus primary service area (see Table 4.3.2 for detailed response comparison). Across all organizations, 58 percent reported the same average response time for both service areas, while 38 percent reported a longer average response time for secondary versus primary service areas; only 4 percent reported a longer average response time for primary versus secondary service areas.

Table 4.3.2. Primary Versus Secondary Average Trip Time Responses

Primary Service Area	Secondary: <30 Mins.	Secondary: 30–60 Mins.	Secondary: 61–90 Mins.	Secondary: 91–120 Mins.	Secondary: 121–150 Mins.	Secondary: >150 Mins.
<30 mins.	5.2%[a]	3.8%	N/R	N/R	N/R	N/R
30–60 mins.	N/R	21.4%[a]	13.1%	1.6%	N/R	N/R
61–90 mins.	N/R	2.0%	19.4%[a]	8.6%	1.1%	N/R
91–120 mins.	N/R	N/R	0.7%	8.4%[a]	4.2%	1.2%
121–150 mins.	0.0%	N/R	N/R	N/R	2.1%[a]	1.3%
>150 mins.	0.0%	0.0%	N/R	N/R	N/R	1.5%[a]

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: These statistics were calculated over 2,483 weighted NPIs that reported having a secondary service area. "Mins." is minutes. "N/R" is not reported due to small cell size. [a] Shaded cells on the diagonal indicate the same average trip time response for both primary and secondary service areas.

Section 4: Emergency Response Time

Section 4 (Emergency Response Time) Content Overview

- Response time measurement definition
- Average response time for emergency responses
- Incentives to meet response times

Overview

Section 4 (Emergency Response Time) collects information on emergency response times from organizations reporting in Section 2, Question 10 that they respond to emergency calls for service (n = 4,510 organizations, which is the denominator for all statistics described for Section 4). The GADCS defines *response time* as the time "from when the call comes into dispatch to when the ground ambulance or another EMS response vehicle arrives on the scene." However, to reduce respondent burden, the GADCS asks how organizations already measure emergency response times and allows organizations to use their current measurement approach rather than the precise GADCS definition. The GADCS also allows organizations that do not track emergency response times to report estimates for certain questions. Because average response times will likely be longer for mutual or auto-aid responses in neighboring communities, Section 4 asks about response times in organizations' primary and secondary service areas (as applicable) separately. Section 4 closes with questions on whether organizations face contractual or other response time targets and financial incentives.

Key Section 4 (Emergency Response Time) Findings

- Four out of five organizations responding to emergency calls for service reported using the default GADCS response time definition (from the time a call comes into dispatch to the time the first vehicle arrives at the scene).
- Nearly nine in ten organizations measure and track emergency response times; the GADCS asks other organizations to report estimates.
- Emergency response times are right-skewed with a considerably longer mean primary service area response time (12 minutes) compared with the median (9 minutes).
- Response times in secondary service areas were longer than those in primary service areas.
- Roughly one-quarter of organizations are incentivized to meet response time targets.

Emergency Response Time Definition

Most (80 percent) of organizations used the default GADCS definition of response time (from dispatch *receiving* a call for service to the time the first vehicle arrives at the scene) in Section 4, Question 1. The GADCS presents two alternate response time definitions and allows a third write-in option in Section 4, Question 1. Another 14 percent of organizations reported using the first alternative definition of response time as the span between when the *organization* (rather than dispatch) receives a call for service to when the first vehicle arrives at the scene. Four percent of organizations selected the second alternative (from a ground ambulance leaving the station to the first vehicle arriving at the scene). Only 2 percent of organizations selected the write-in option.

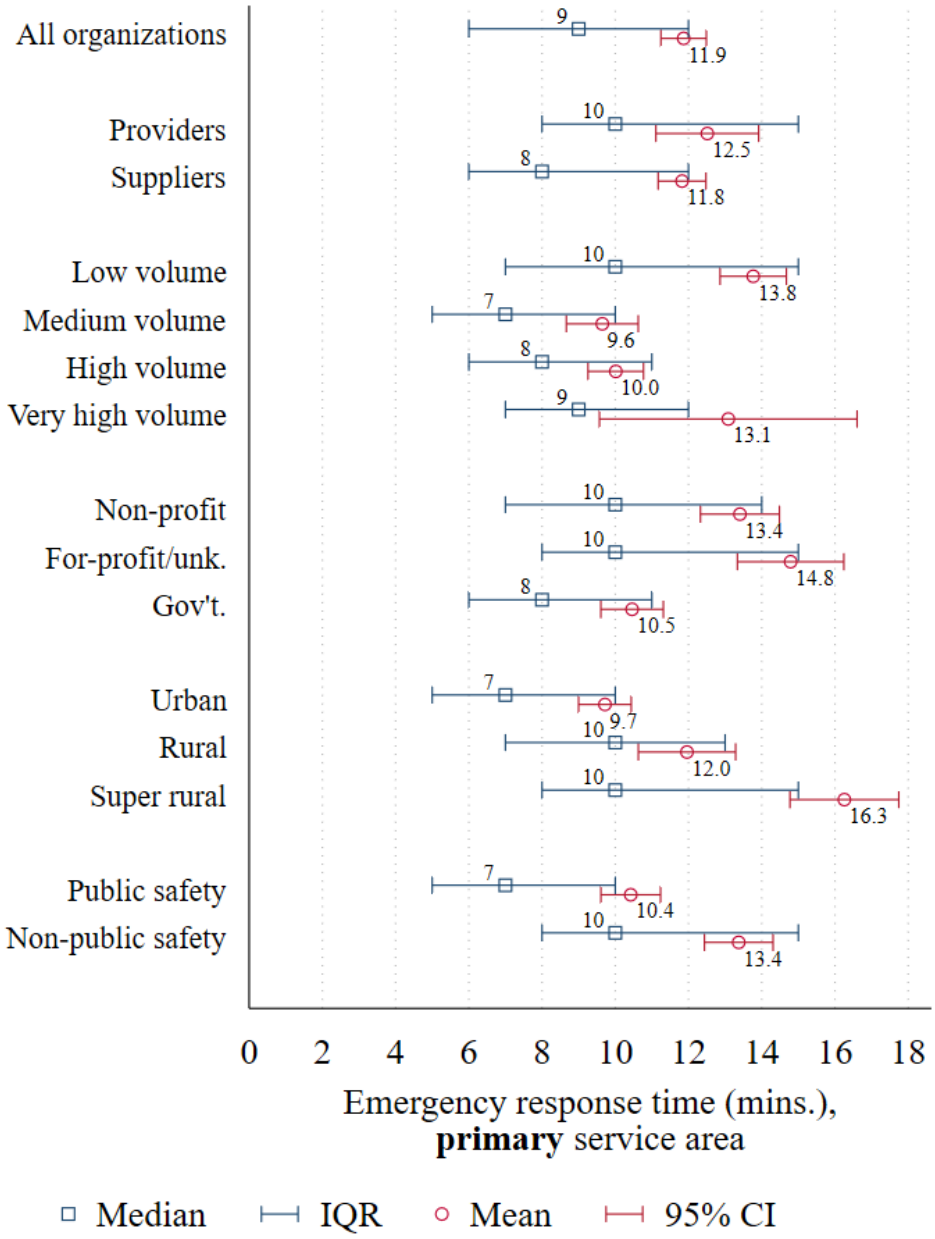
Emergency Response Times

Section 4, Question 3 asks organizations to report (1) an average response time for responses within the organization's primary service area; (2) the share of responses in the organization's primary service area that take twice as long as the reported average; and (3) the average response time for responses within the organization's secondary service area, if applicable. Organizations have two options to report this information: either by reporting measured response time data (86 percent of organizations) or by reporting estimates if these data were not available (14 percent of organizations).[81] We combined responses reported under these alternative approaches for this analysis.

We found that response times in both primary (Figure 4.4.1) and secondary (Figure 4.4.2) service areas were right-skewed, with shorter median than mean times across subsets of organizations.

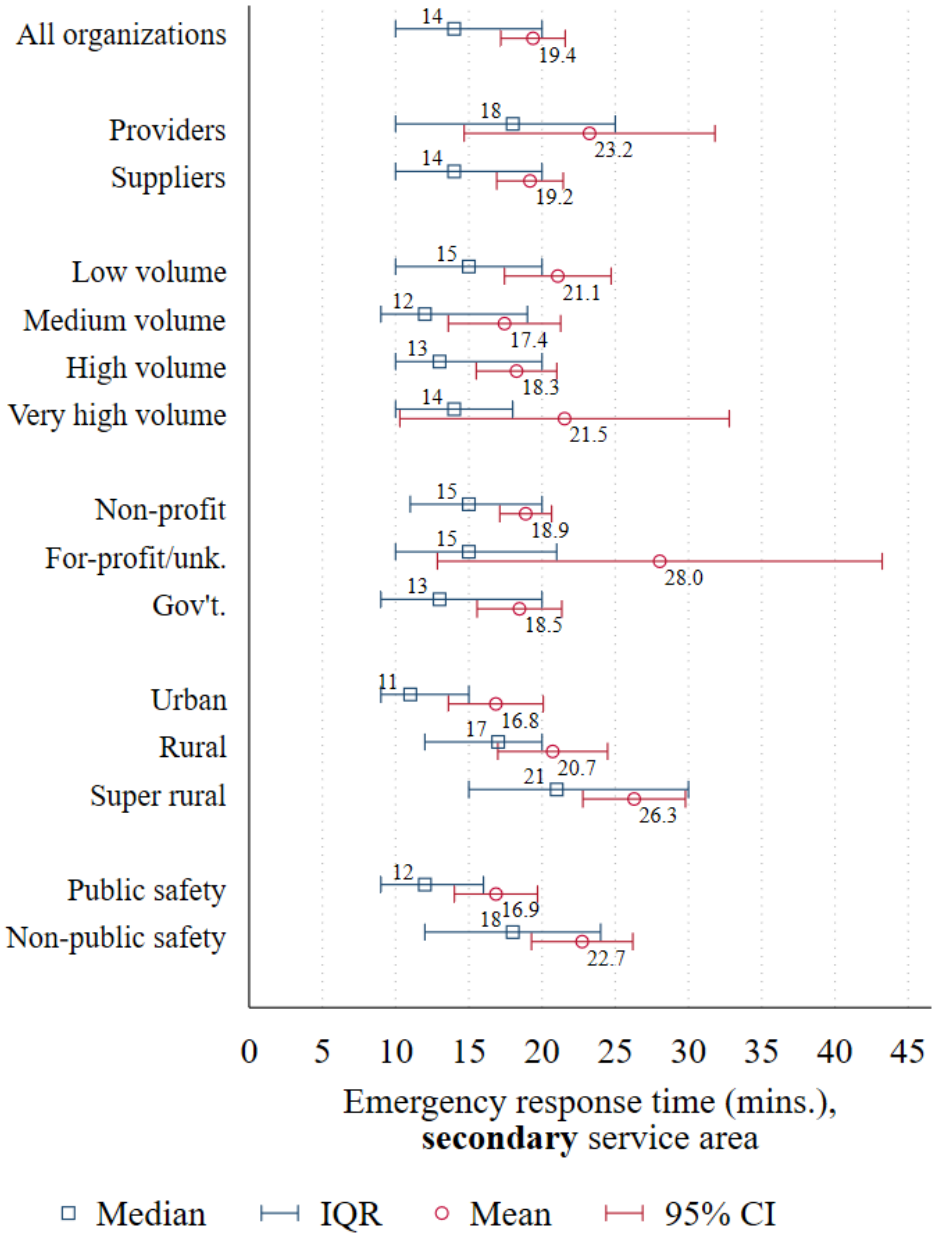
[81] The median response time for organizations that measured their response times was 8 minutes in the primary service area and 14 minutes in the secondary service area. In contrast, organizations that estimated their response time had a median of 10 minutes for the primary service area and 20 minutes for the secondary service area.

Figure 4.4.1. Emergency Response Time Descriptive Statistics, Primary Service Area



SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: IQR = interquartile range (i.e., the span encompassing the half of organizations falling in the second and third quartiles). CI = confidence interval. "Gov't" is government. "Unk." is unknown/unclassified. "(mins.)" is minutes.

Figure 4.4.2. Emergency Response Time Descriptive Statistics, Secondary Service Area



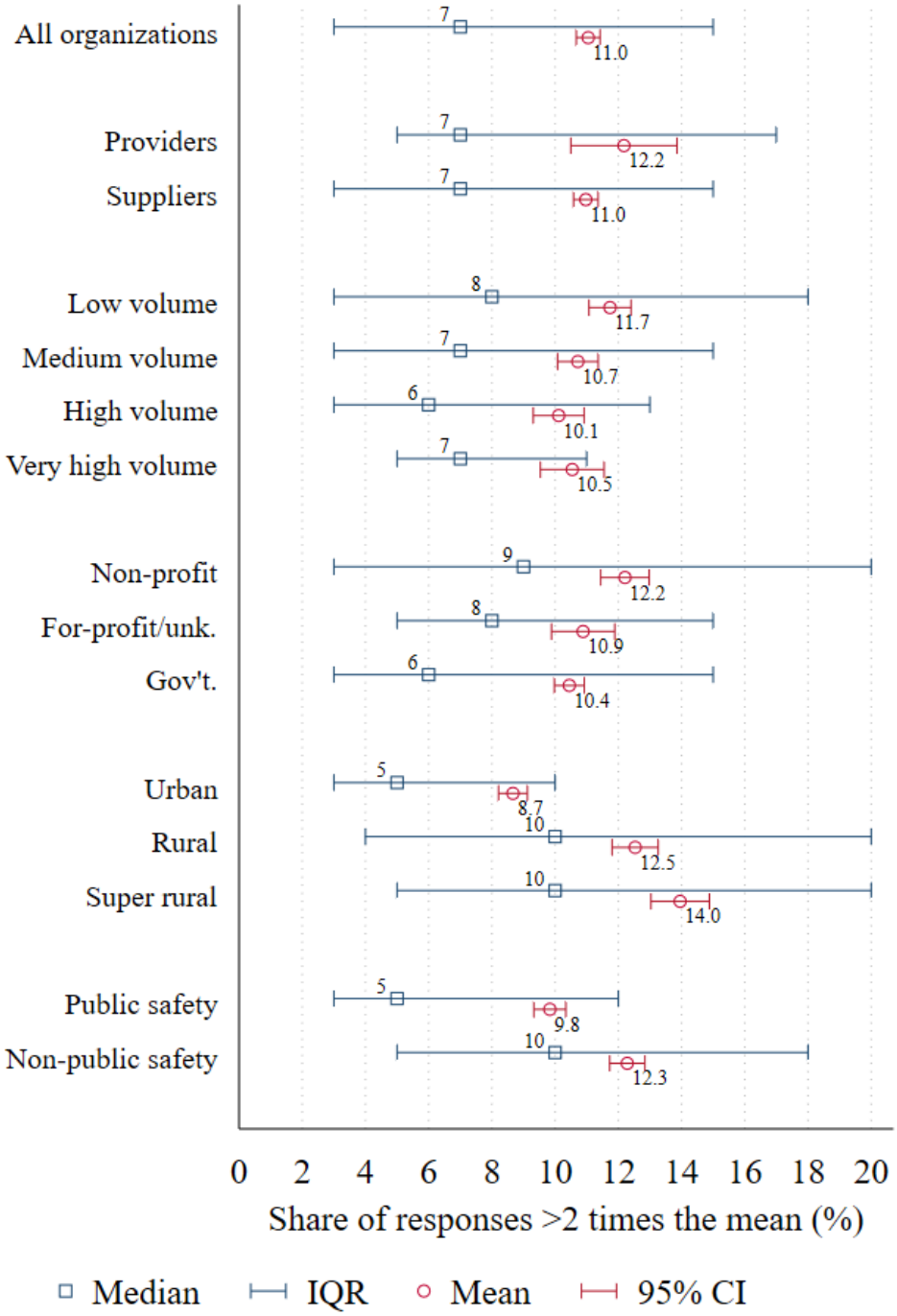
SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: IQR = interquartile range. CI = confidence interval. "Gov't" is government. "Unk." is unknown/unclassified. "(mins.)" is minutes.

Some types of organizations had, on average, shorter primary service area response times than others—for example, government versus other organizations, public safety versus non–public safety, urban versus rural and super rural, and medium- and high-volume versus low-volume organizations (pairwise differences all $p < 0.001$). Both means and medians were longer and more variable for average response times in secondary service areas. For-profit and very high-volume organizations, two subsets often including the same organizations, as well as super

rural organizations, had substantially longer secondary service area average response times with wider 95 percent CIs compared with other subsets of organizations.

Section 4, Question 3 also asks for the share of primary service area responses that were substantially above—more than twice—the mean primary service area response time. Most organizations reported relatively small shares of very long response times (Figure 4.4.3). On average, very long response times were more common among rural and super rural organizations.

Figure 4.4.3. Share of Primary Service Area Emergency Responses Taking Twice the Mean



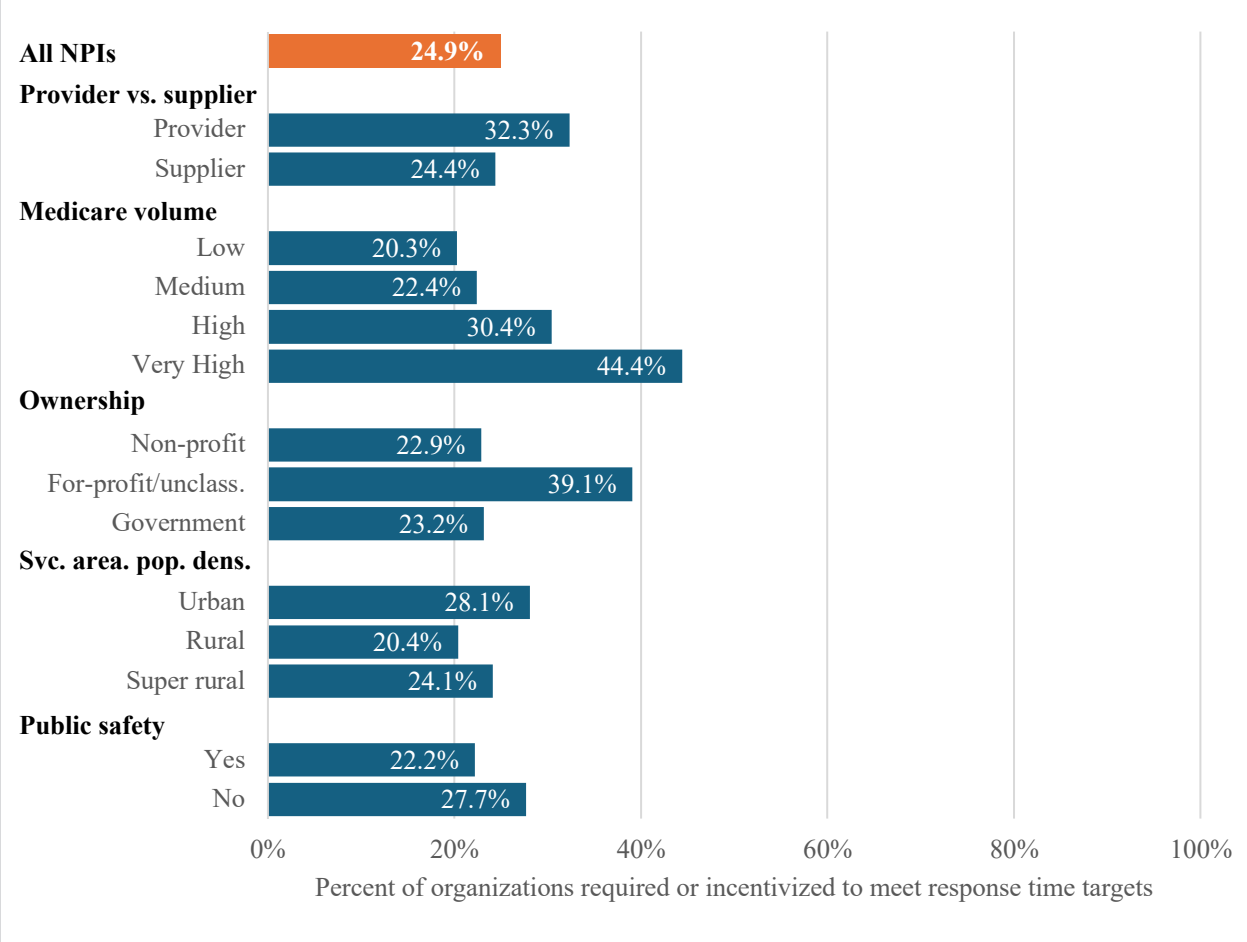
SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: IQR = interquartile range. CI = confidence interval. "Gov't" is government. "Unk." is unknown/unclassified.

Incentives

Section 4, Question 4 asks organizations whether they are required or incentivized to meet response time targets. Overall, 25 percent (n = 1,123) of all organizations reported response time targets (Figure 4.4.4). This percentage was higher for very high-volume and for-profit

organizations (44.4 and 39 percent, respectively). Based on our earlier qualitative research, larger, for-profit ground ambulance companies often provide EMS services to communities under contract with payment in part explicitly linked to performance relative to response time targets.[82]

Figure 4.4.4. Share of Organizations Required or Incentivized to Meet Response Time Targets



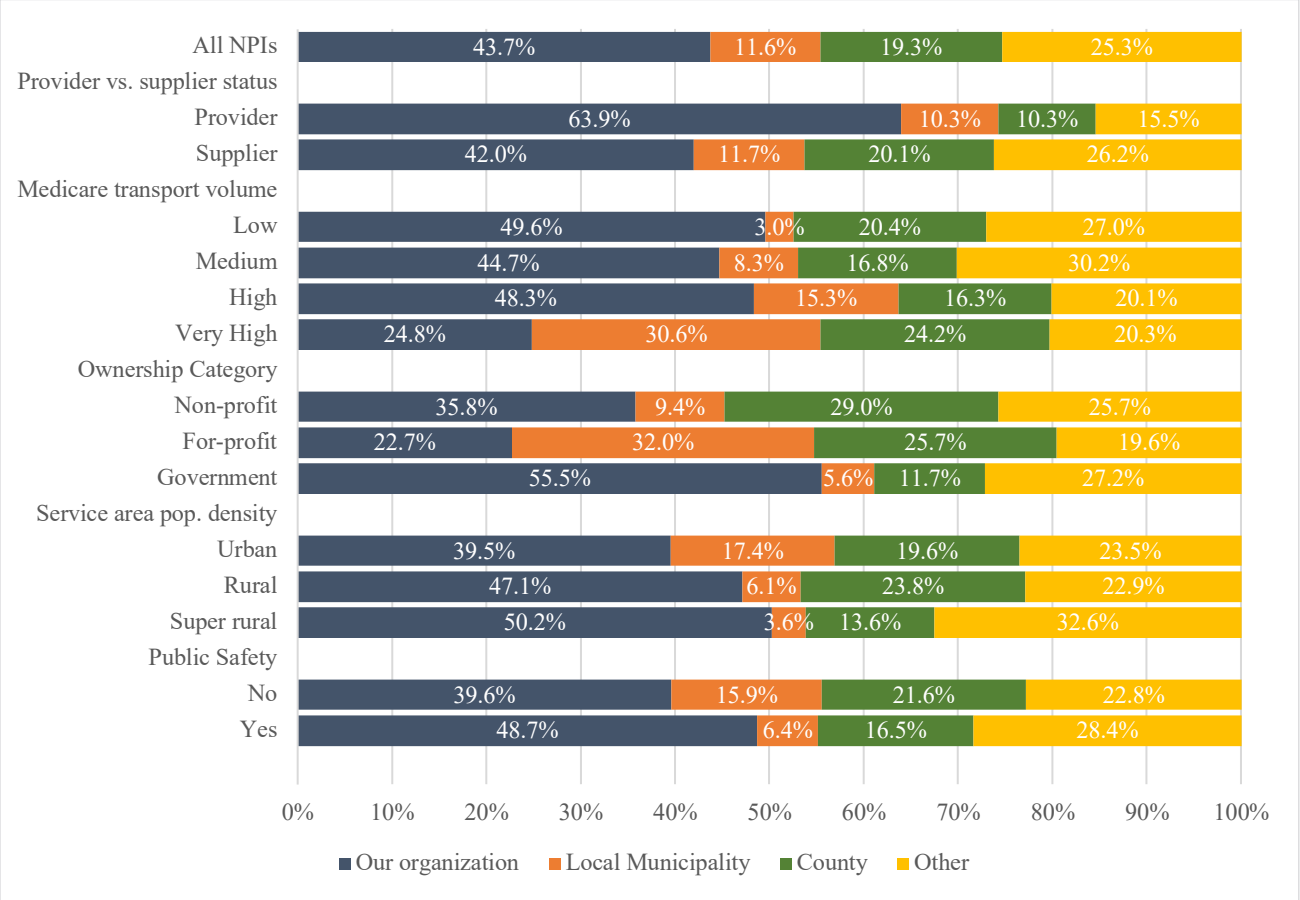
SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: NPI = National Provider Identifier. "Svc. area. pop. dens." is service area population density.

Figure 4.4.5 is a stacked bar chart that describes where response time targets (for organizations that have them) come from. More than half of providers and government organizations with response time targets and 44 percent of organizations overall indicated that the organization itself set response time targets. High-volume and for-profit organizations—the same organizations that were most likely to have response time targets—were more likely to have response time targets set by local municipalities or counties.

[82] Mulcahy et al., 2019.

The GADCS includes a question about whether organizations faced monetary penalties for exceeding response time targets. Only a small percentage (12 percent) of organizations that were required or incentivized to meet response time targets reported being penalized for not meeting them. However, for-profit organizations (36 percent) and very high-volume organizations (35 percent) are significantly more likely to face penalties.

Figure 4.4.5. Who Determines Response Time Targets?



SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: NPI = National Provider Identifier. "pop." is population. Unit of analysis is an NPI. The "other" category could include accreditation and standards bodies, states, etc., as well as responses indicating specific municipalities or counties reported via this option rather than the separate "Local Municipality" and "County" options.

We found that organizations facing response time targets had shorter unadjusted average response times (10.0 vs. 12.5 minutes across all organizations, difference significant at $p < 0.001$). Response times remained shorter for organizations with response time targets after adjusting for the four organization-level characteristics used in sampling (provider vs. supplier status,[83] ownership category, service area population density, and Medicare transport volume

[83] As noted above, Medicare providers of services are hospitals, skilled nursing facilities, and other facility-based providers enrolled in the Medicare program as providers. Some Medicare providers, primarily Critical Access

category), with an average response time difference of 1.8 minutes versus organizations without response time targets (AME significant at $p < 0.001$). Importantly, these associations are likely driven by factors other than just response time targets and should not be interpreted as a direct relationship.

Hospitals and other hospitals, provide ground ambulance services. Most ground ambulance organizations are Medicare suppliers rather than providers.

Section 5: Ground Ambulance Service Volume

Section 5 (Service Volume) Content Overview

- Counts of responses, transports, paid transports, and other services
- Distinctions between responses that did and did not result in a transport
- Information on joint responses

Overview

Section 5 (Ground Ambulance Service Volume) collects information on the number of services of different types (i.e., service volume) provided by organizations during their data collection periods. Section 5 begins by defining relevant service types, including ground ambulance responses and ground ambulance transports (see the "Section 5 (Service Volume) Service Type Definitions" box). Many of these service types are interrelated—for example, an organization's number of paid ground ambulance transports cannot exceed its count of total transports—and the GADCS includes several system-based validation checks. As described in Appendix B, we applied additional validation checks and, for a minority of responses, imputation, to address remaining outliers and highly unlikely response combinations.

Key Section 5 (Service Volume) Findings

- Of 31.2 million total reported ground ambulance responses, 22.9 million (73 percent) resulted in a transport.
- Ratios of ground ambulance responses to transports and transports to paid transports were relatively constant across subsets of organizations.
- Relatively few ground ambulance responses involved medical treatment at the scene only (and no transport).
- As described in prior Medicare FFS claims–based analyses, all service count measures were highly right-skewed, with a small share of organizations contributing very large shares of total service counts: For example, the top 10 percent of organizations ranked by transport volume contributed nearly two-thirds of transports.
- Half of organizations reported participating in joint responses. First responders from another organization often participated in joint responses.

Section 5 (Service Volume) Service Type Definitions (from the GADCS instrument instructions)

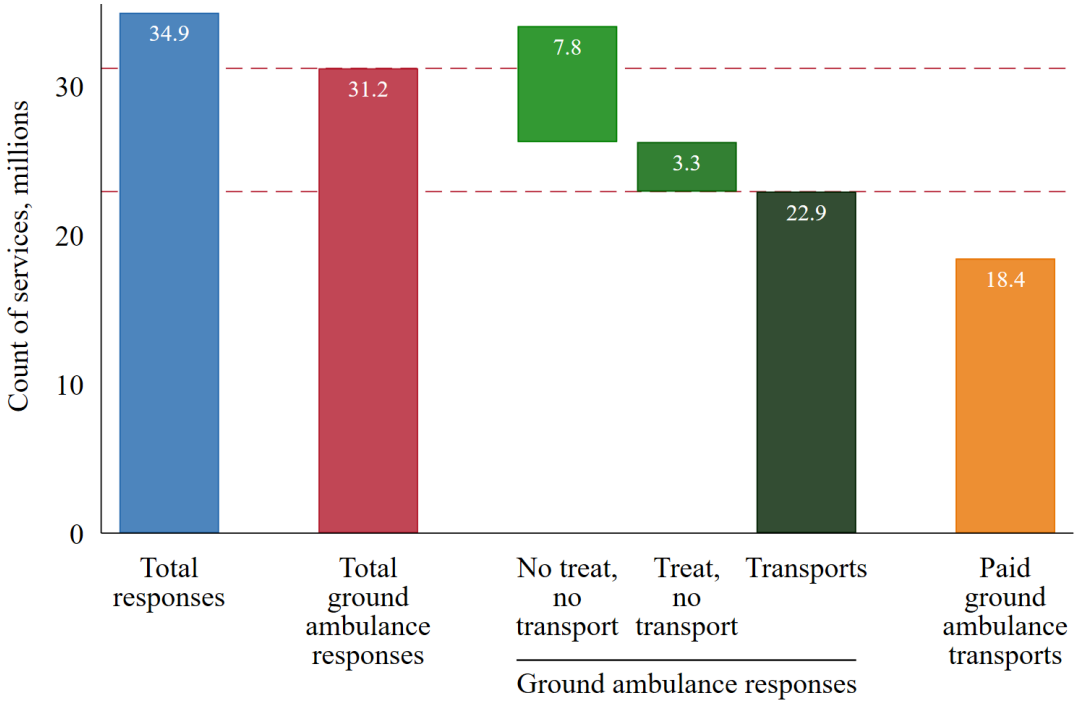
- **Total responses** are defined as the total number of responses by your organization regardless of whether a ground ambulance was deployed and regardless of whether or not a patient was transported. Include emergency responses that did not involve a ground ambulance (e.g., responses only involving a pickup truck or sport-utility vehicle (SUV), including quick response vehicles (QRVs), "fly-cars," or "sprint" vehicles). If more than one vehicle is sent to the scene, count this as one response. Include emergency responses that did not involve a ground ambulance, such as those involving only fire trucks, other fire/rescue vehicles, police cars and/or other public safety vehicles.
- A **ground ambulance response** is a response to a call for service by a fully equipped and staffed ground ambulance, scheduled or unscheduled, with or without a transport, and with or without payment. If more than one vehicle is sent to the scene, count this as one response. A standby event may count as a response if your organization provided medical services on scene. Please note that every ground ambulance response will count towards your reported number of total responses, but not all responses are ground ambulance responses.
- A **ground ambulance transport** is the use of a fully staffed and equipped ground ambulance responding to a request for service to provide a medically necessary transport (based on the rules relevant to the applicable payer).
- A **paid ground ambulance transport** refers to a ground ambulance transport furnished during your organization's data collection period for which your organization has been paid in full or in part by a payer and/or patient only by the time you are reporting data to CMS. Please note that some questions ask only about paid ground ambulance transports, and other questions ask about both paid ground ambulance transports and ground ambulance transports that are not paid, either because your organization did not bill for them or because your organization billed but did not collect payment for them.

Main Volume Measures

See Figure 4.5.1 for a graphical representation of relationships between the five main Section 5 service types.[84] Organizations reported a combined 34.9 million total responses to calls for service; of these, 31.2 million, or 89 percent, were ground ambulance responses with a fully staffed and equipped ground ambulance.[85]

[84] Section 5, Questions 1 and 2 collect information on total and ground ambulance responses, respectively; Section 7, Question 5 asks for a count of ground ambulance responses that did not result in a transport; and Section 5, Questions 6 and 7 address total and paid ground ambulance transports, respectively.
[85] The remaining 11 percent of total responses were responses with quick response vehicles, fire trucks, etc.

Figure 4.5.1. Aggregated Service Volume Count Comparison, All Organizations



SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: Sums across graphed values may not exactly equal aggregated results described in text due to rounding. Conceptually, the combined height of the three "Ground ambulance responses" bars should approximately equal the height of the "Total ground ambulance responses" bar. However, the GADCS instructions and definitions address scenarios where an exact match is not expected.

As expected, the 31.2 million total ground ambulance responses were approximately equal to the sum of reported ground ambulance responses that did not result in a transport (11.1 million, with and without treatment at the scene) and that did result in a transport (22.9 million).[86] The ratio of responses that did not result in a transport—about one in three—aligns with qualitative findings from our earlier report.[87] Organizations reported receiving payment in part or in full for 18.4 million ground ambulance transports, 80 percent of all transports.

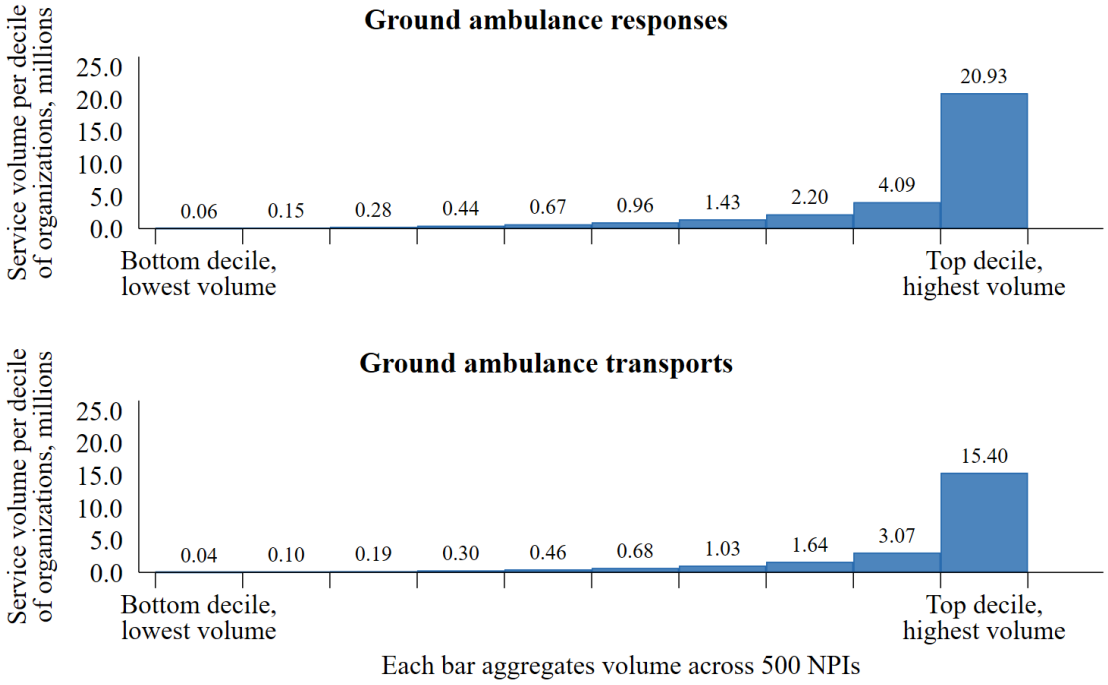
Relatively little is known about organizations' activities during responses that do not result in transport. To address this gap, the GADCS asked respondents to report the share of these no-transport responses involving medical treatment at the scene. Of the 11.1 million ground ambulance responses that did not result in a transport, organizations reported that 3.3 million (or about 30 percent) involved the provision of medical treatment at the scene.

[86] The GADCS service type definitions and instructions direct respondents to count each response only once, even if multiple ambulances were dispatched to the scene, and to count each transported patient separately. As a result, the sum of ground ambulance responses that did not result in a transport and ground ambulance transports can, for some organizations, exceed the total number of ground ambulance responses. The GADCS displays a programmed warning when respondents attempt to enter counts of responses that did not result in a transport and ground ambulance transports that together exceed the previously reported number of total ground ambulance responses.
[87] Mulcahy et al., 2019.

Prior claims-based analyses found that organization-level ground ambulance service volumes were highly right-skewed, where most organizations have relatively modest volumes and a small number of organizations have much higher volumes.[88] As expected, each GADCS volume measure was also highly skewed. Figure 4.5.2 illustrates the distribution of ground ambulance responses and ground ambulance transports by deciles of organizations.

Each bar in Figure 4.5.2 represents the collective volume reported by 500 organizations, or about one-tenth of the total 5,023 Year 1 and Year 2 GADCS cohort. The bars are organized so that the 500 organizations with the lowest reported volume are in the leftmost bar (i.e., the bottom decile), with each bar to the right including the next 500 organizations ranked by volume, up to the rightmost bar including the top 500 organizations ranked by volume (the top decile). Both distributions are highly skewed. The top 10 percent of organizations by volume (rightmost bar) accounted for 20.9 million ground ambulance responses (67.1 percent of total ground ambulance responses) and 15.4 million ground ambulance transports (or 67.2 percent of all ground ambulance transports). In contrast, the bottom 10 percent of organizations by volume (leftmost bar) accounted for about 60,000 responses and 40,000 transports, or only 0.2 percent of both volume measures.

Figure 4.5.2. Ground Ambulance Response Volume by Decile



SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: NPI = National Provider Identifier.

[88] Petra W. Rasmussen, Jonathan Cantor, Jennifer Gildner, Sara Heins, and Andrew W. Mulcahy, *Ground Ambulance Industry Trends, 2017–2022: Analysis of Medicare Fee-for-Service Claims*, RAND Corporation, Task Order No. GS-10F-0275P 75FCMC22F0002, April 2024.

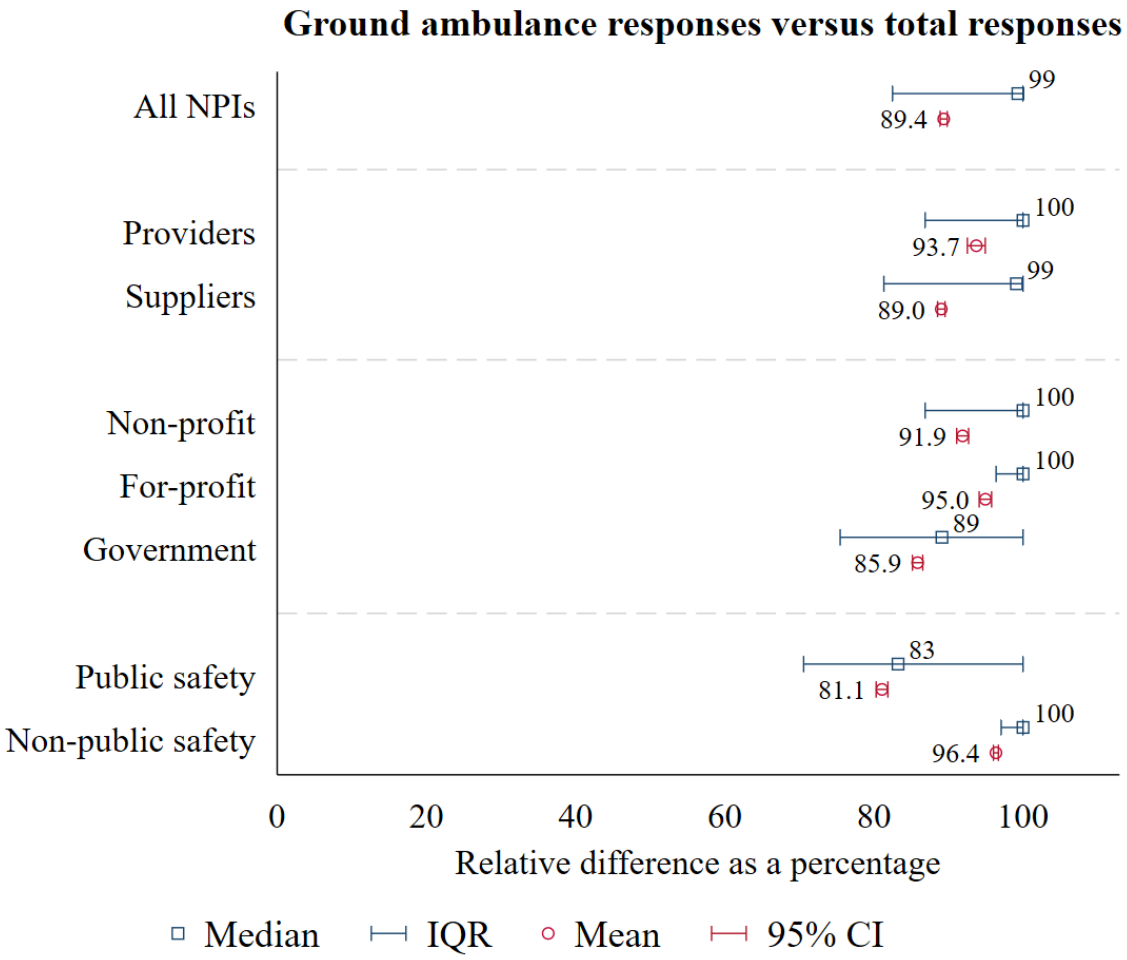
Figure 4.5.3 plots summary statistics for selected organization-level percentages comparing one volume measure with another—for example, ground ambulance responses and total responses—overall and for key subgroups of organizations. While the average organization reported that 89 percent of total responses were ground ambulance responses in aggregate (see Figure 4.5.1 for reference), this percentage was higher (96 percent) among non–public safety organizations and lower (81 percent) for public safety organizations, meaning that the average fire, police, and other public safety–based organizations reported that roughly one in five total responses did not involve a fully staffed and equipped ground ambulance.[89]

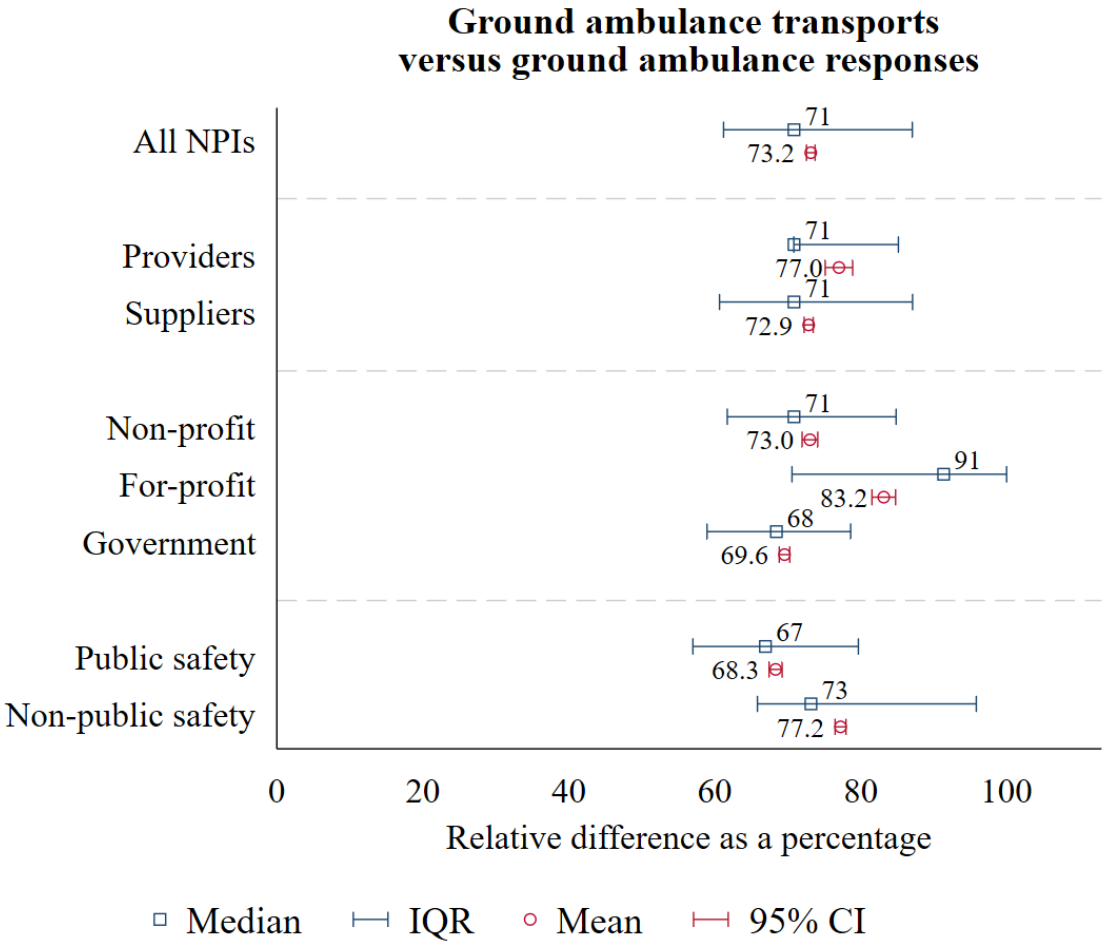
The average percentage of ground ambulance responses that resulted in a transport was lower for public safety–based organizations (68 percent) than for other organizations (77 percent). The same percentage was also lower for government and non-profit organizations (at 70 and 73 percent, respectively) compared with for-profit organizations (83 percent). While CIs around means were narrow across all Figure 4.5.3 panels and subgroups, IQRs were comparatively wider, particularly for the percentage of ground ambulance responses that did not result in a transport. This variation in transport/non-transport outcomes after ground ambulance responses is notable and has important implications for revenue stemming from ground ambulance transports, as we discuss below.

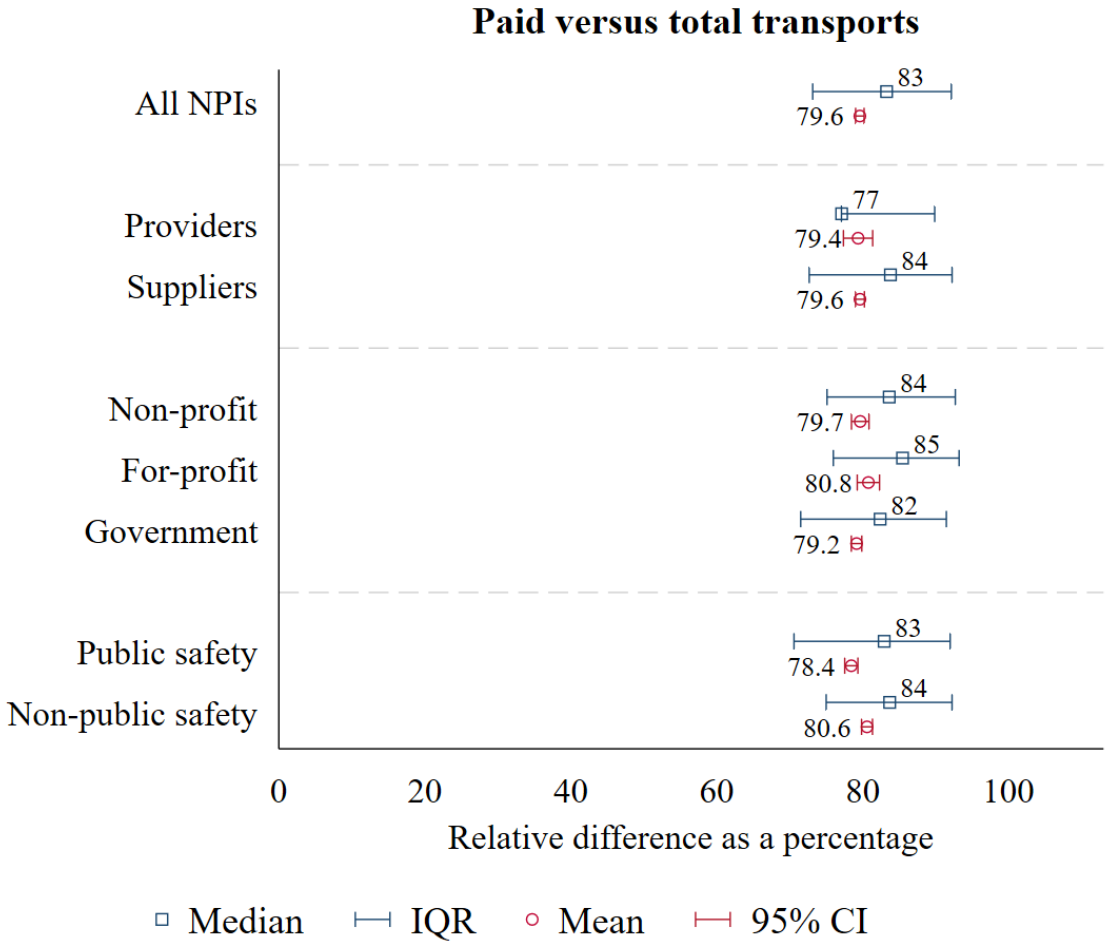
The bottom panel of Figure 4.5.3 reports the average percentage of ground ambulance transports that were paid by the time of data reporting. Across all organizations, this percentage was 80 percent overall, with relatively few differences across subgroups. The GADCS instructions require organizations to determine whether transports furnished during their data collection periods were paid in full or in part by the end of the organization's data collection period. Given GADCS reporting timelines and the sometimes-lengthy claims adjudication and payment processes, organizations will ultimately receive payment for a larger share of transports. In other words, the 80 percent overall result should be viewed as a lower bound.

[89] The one in five total responses without a fully staffed and equipped ground ambulance may have involved only fire trucks, rescue vehicles, quick response vehicles, etc. Staff arriving to the scenes by means other than a ground ambulance may still have provided medical treatment at the scene. However, because a ground ambulance was not present, the patient could not have been transported.

Figure 4.5.3. Mean and Median Organization-Level Ratios Between Volume Measures




Ground ambulance transports
versus ground ambulance responses
All NPIs
Providers
Suppliers
Non-profit
For-profit
Government
Public safety
Non-public safety
71
73.2
71
77.0
71
72.9
71
73.0
91
83.2
68
69.6
67
68.3
73
77.2
0
20
40
60
80
100
Relative difference as a percentage
Median
IQR
Mean
95% CI

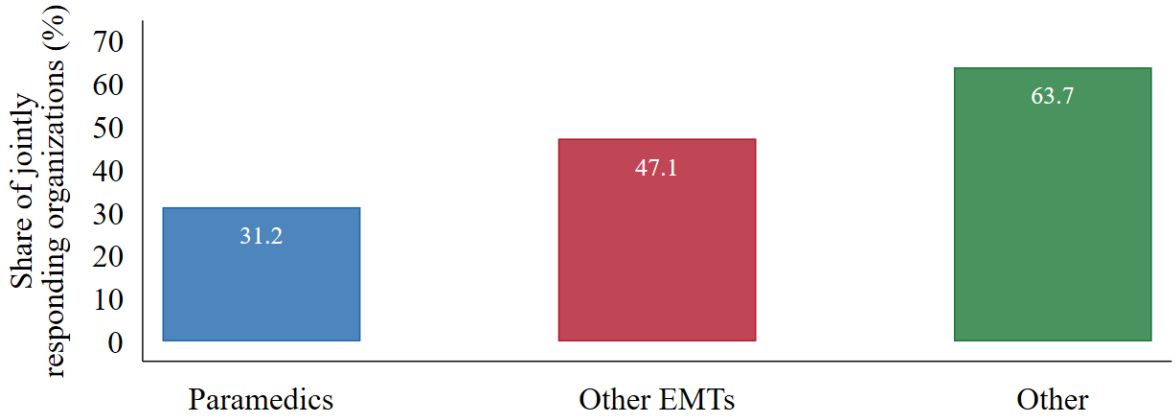


SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: IQR = interquartile range. CI = confidence interval. NPI = National Provider Identifier.

Joint Responses

Section 5, Question 3 asks whether organizations participated in joint responses with another non-transporting agency—for example, a separate fire or police department—and just over half of respondents (51.6 percent) indicated that they did so. These respondents most frequently reported "other" staff (i.e., not paramedics or other emergency medical technicians [EMTs]) from other organizations as contributing to joint responses. Many of the write-in entries accompanying each "other" response described non-EMT first responders, such as firefighters and law enforcement staff. Roughly half of organizations participating in joint responses reported contributions from non-paramedic EMTs, while about 30 percent indicated joint responses with EMT-Paramedics from other organizations (Figure 4.5.4). Organizations participating in joint responses reported that a median of 20 percent and a mean of 31.6 percent of their total responses involved staff from another, non-transporting organization. This important contextual information may help explain relatively lower ground ambulance labor expenses for organizations that participate in joint responses.

Figure 4.5.4. Percentage of Non-Transporting Organization Staff Involved in Joint Responses



SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: Denominator includes all NPIs that reported participating in joint responses. EMT = emergency medical technician.

Other Section 5 Information

Section 5, Question 4 asks organizations that reported in Section 3 having a secondary service area what portion of ground ambulance responses originated in the secondary service area rather than the primary service area. Table 4.5.1 shows descriptive statistics for these questions. Respondents to this question reported median and mean percentages of 8 and 13 percent, respectively.[90] These relatively small shares are consistent with the definition of a secondary service area as an area where the organization does not have a primary response role and typically operates under mutual and auto-aid arrangements. Most ground ambulance organizations reported participating in standby events in Section 5, Question 8 (82 percent of all 5,023 organizations). Finally, 106 organizations that indicated that they provided Medicare paramedic intercept services and 1,765 organizations that provided broader ALS intercept services, both in Section 2, reported the volume of these services in Section 5, Questions 9 and 10, respectively. Overall, volumes of these services were low, with a median of just six and two services, respectively, and substantially higher means indicating that some organizations provided a considerably higher volume.

[90] The denominator for Section 5, Question 4 was the 2,483 organizations that reported having a secondary service area in Section 3 (Service Area).

Table 4.5.1. Miscellaneous Section 5 Responses

Section 5 Question	Denom.	Mean (95% CI)	25th Pctl.	Median	75th Pctl.
Question 4: Share of ground ambulance responses in secondary service area	2,483	13.1 (12.4, 13.7)	3.0	8.0	18.0
Question 8: Participation in standby events	5,023	82.2 (80.9, 83.4)	100.0	100.0	100.0
Question 9: Count of paramedic intercept responses using Medicare's definition	106	112.9 (-5.7, 231.5)	0	6	32.0
Question 10: Count of non-paramedic intercept joint ALS responses meeting a BLS ambulance from another organization	1,765	81.0 (65.3, 96.7)	0.0	2.0	20.0

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: ALS = advanced life support. BLS = basic life support. CI = confidence interval. "Denom." is denominator and indicates the weighted NPI denominators for each question. "Pctl." is percentile.

Section 6: Service Mix

Section 6 (Service Mix) Content Overview
- Shares of emergency vs. non-emergency responses
- Shares of transports by billing code
- Share of transports that were interfacility

Overview

Section 6 (Service Mix) builds on volume information reported in Section 5 (Ground Ambulance Service Volume)—specifically, counts of ground ambulance responses and transports—by asking follow-up questions on the mix of services within each of these broad service categories. For example, Section 6 questions ask for the share of total ground ambulance responses that are emergency and non-emergency (Section 6, Question 1) and for shares of ground ambulance transports across the six HCPCS codes listed on Medicare's AFS (Section 6, Question 3). We present results first unweighted by service volume—in other words, comparing service mix across organizations counting each organization equally—and then weighted by service volume (i.e., with higher-volume organizations contributing relatively more information to reported statistics than lower-volume organizations). The former focuses more on differences between organizations, while the latter approach focuses on differences across ground ambulance services.

Key Section 6 (Service Mix) Findings
- Overall, roughly four of five responses reported to the GADCS were emergency responses.
- However, for-profit organizations provided a relatively larger share of non-emergency responses. This is consistent with results from prior analyses that identified a set of high-volume, for-profit organizations providing primarily non-emergency, scheduled transports to and from dialysis facilities.
- The same general findings apply to emergency versus non-emergency transports and to breakdowns of services across HCPCS billing codes.
- Public safety and government organizations had larger shares of ALS transports than BLS transports compared with other organizations.
- Two AFS services, ALS2 transports and SCT, accounted for very small shares of total transports.
- For-profit organizations reported substantially higher shares of interfacility transports than other organizations.

AFS Ground Ambulance Transport Billing Code Definitions (from the GADCS instrument instructions)
- **Advanced life support, level 1 (ALS1**): is the transportation by ground ambulance vehicle . . . and the provision of medically necessary supplies and services . . . including the provision of an ALS assessment by ALS personnel [emergency medical technician-intermediate (EMT-Intermediate) or paramedic] or at least one ALS intervention. CMS' Medicare Benefit Policy Manual, Chapter 10, Ambulance Services, Section 30.1.1, Definition of Ground Ambulance Services, describes qualifying ALS assessments and interventions in detail.
- **Advanced life support, level 2 (ALS2):** is the transportation by ground ambulance vehicle and the provision of medically necessary supplies and services including (1) at least three separate administrations of one or more medications by intravenous (IV) push/bolus or by continuous infusion (excluding crystalloid fluids) or (2) ground ambulance transport, medically necessary supplies and services, and the provision of at least one of the ALS2 procedures listed in CMS' Benefit Policy Manual and also 42 CFR § 414.605.
- **Basic life support (BLS):** is transportation by ground ambulance vehicle . . . and the provision of medically necessary supplies and services . . . including BLS ambulance services as defined by the state. The ambulance vehicle must be staffed by at least two people who meet the requirements of the state and local laws where the

services are being furnished, and at least one of the staff members must be certified at a minimum as an emergency medical technician-basic (EMT-Basic) by the state or local authority where the services are being furnished and be legally authorized to operate all lifesaving and life-sustaining equipment on board the vehicle. These laws may vary from state to state or within a state.

- **Specialty care transport (SCT):** is the interfacility transportation of a critically injured or ill beneficiary by a ground ambulance vehicle, 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 beneficiary's condition requires ongoing care that must be furnished by one or more health professionals in an appropriate specialty area, for example, emergency or critical care nursing, emergency medicine, respiratory care, cardiovascular care, or an EMT-Paramedic with additional training.
- **Interfacility transport**: are transports where "the origin and destination are one of the following: a hospital or skilled nursing facility that participates in the Medicare program or a hospital-based facility that meets Medicare's requirements for provider-based status.

Emergency Versus Non-Emergency Shares of Responses and Transports

Section 6, Question 1 asks respondents to report the share of ground ambulance responses that were emergency versus non-emergency. Across all organizations, emergency responses accounted for 80 percent of total responses on average (Figure 4.6.1 top panel). This percentage was higher—above 90 percent—for public safety and government-based organizations and notably lower for for-profit organizations, where, on average, 35 percent of responses were emergency responses.

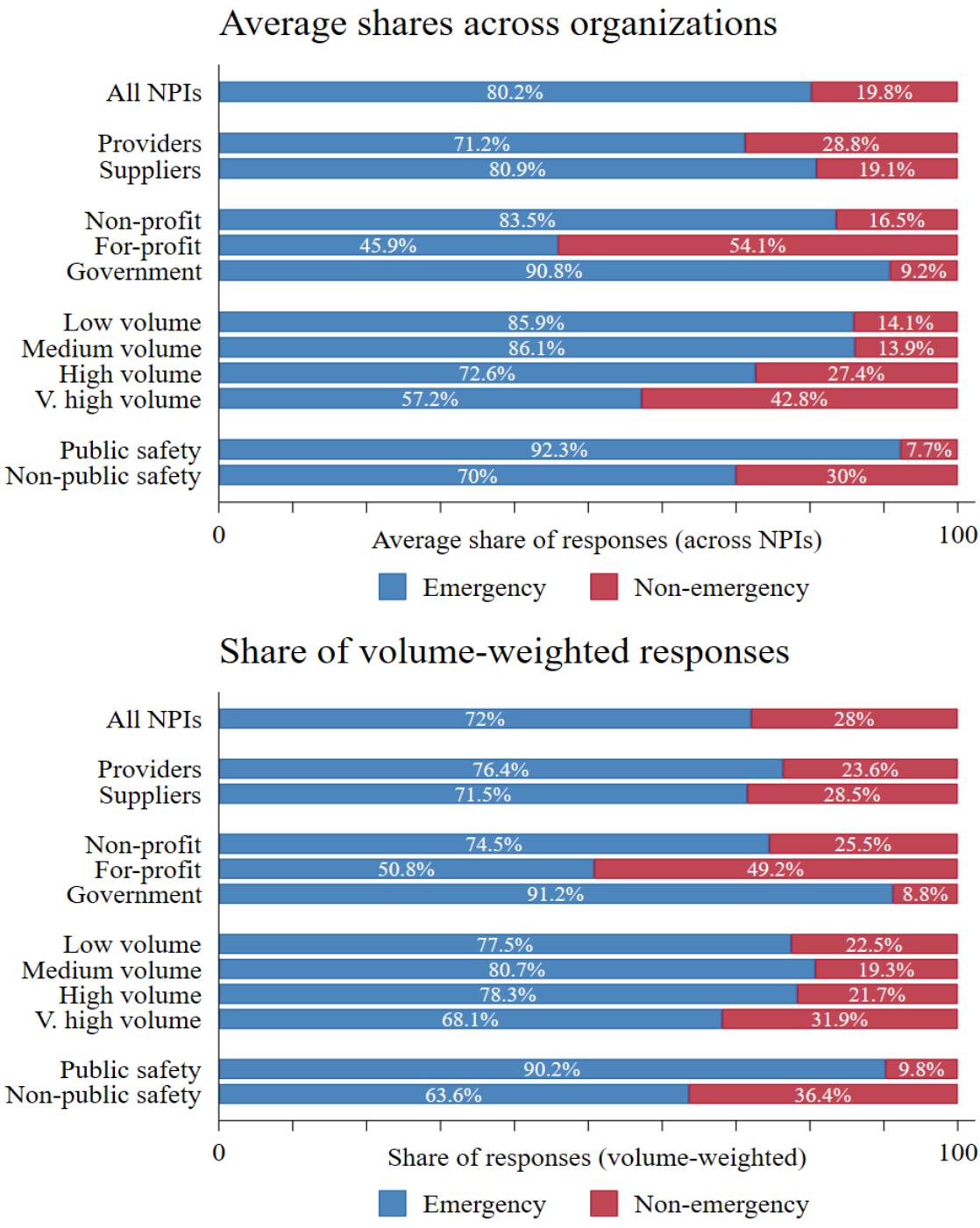
The bottom panel of Figure 4.6.1 also illustrates shares of emergency and non-emergency responses but weighted by organizations' service volume rather than counting each organization equally as in the top panel. In other words, the bottom panel of Figure 4.6.1 presents shares across all ground ambulance responses reported to the GADCS, with higher-volume organizations contributing relatively more to the reported shares than smaller-volume organizations. Across all *responses*, 72 percent were emergency, which, given that 72 percent is less than the 80 percent average across *organizations*, suggests that organizations with relatively more responses have smaller shares on average that are emergency responses.

Section 6, Question 3 asks organizations to report on the mix of transports by billing code. We combined responses for non-emergency (A0426 and A0428) and emergency (all other AFS HCPCS codes) services to compare shares of emergency versus non-emergency transports (rather than responses as in Section 6, Question 1). The resulting organization average and volume-weighted shares of transports were very similar to those reported for ground ambulance responses (Figure 4.6.2).

We also combined billing-code-level responses to Section 6, Question 3 accounting for whether each service code was at the BLS (A0428 and A0429) or ALS (A0426, A0427, and A0433) level of service, including SCT services (A0434) for reporting purpose in the ALS category for this chart. Over half (56 percent) of all transports were BLS, with relatively higher shares for non–public safety organizations, for-profit organizations, and organizations in the

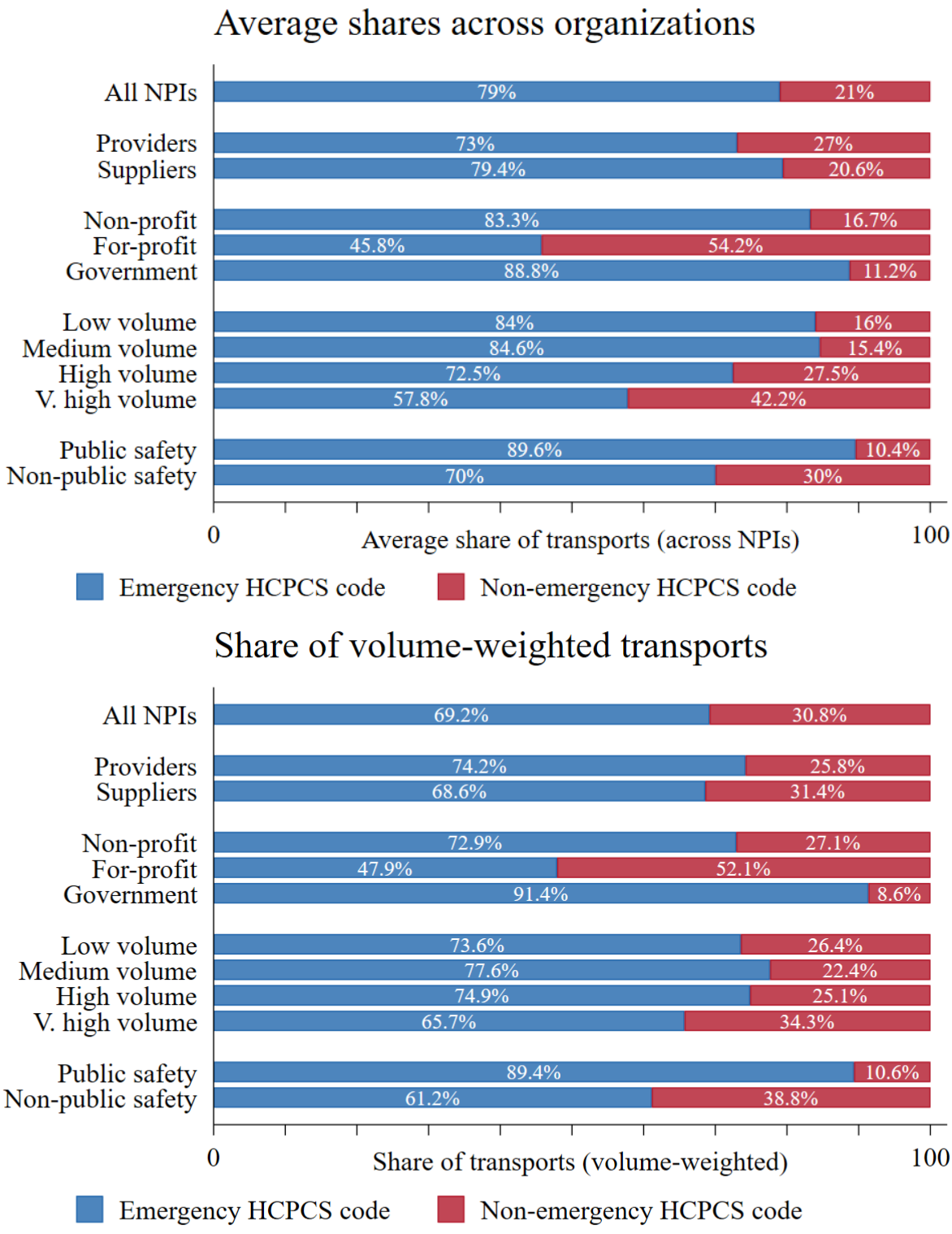
lowest- and highest-volume categories compared with other organizations (Figure 4.6.3). Government and public safety organizations had relatively larger shares of ALS/SCT transports.

Figure 4.6.1. Shares of Emergency and Non-Emergency Responses by Organization and With Volume Weights



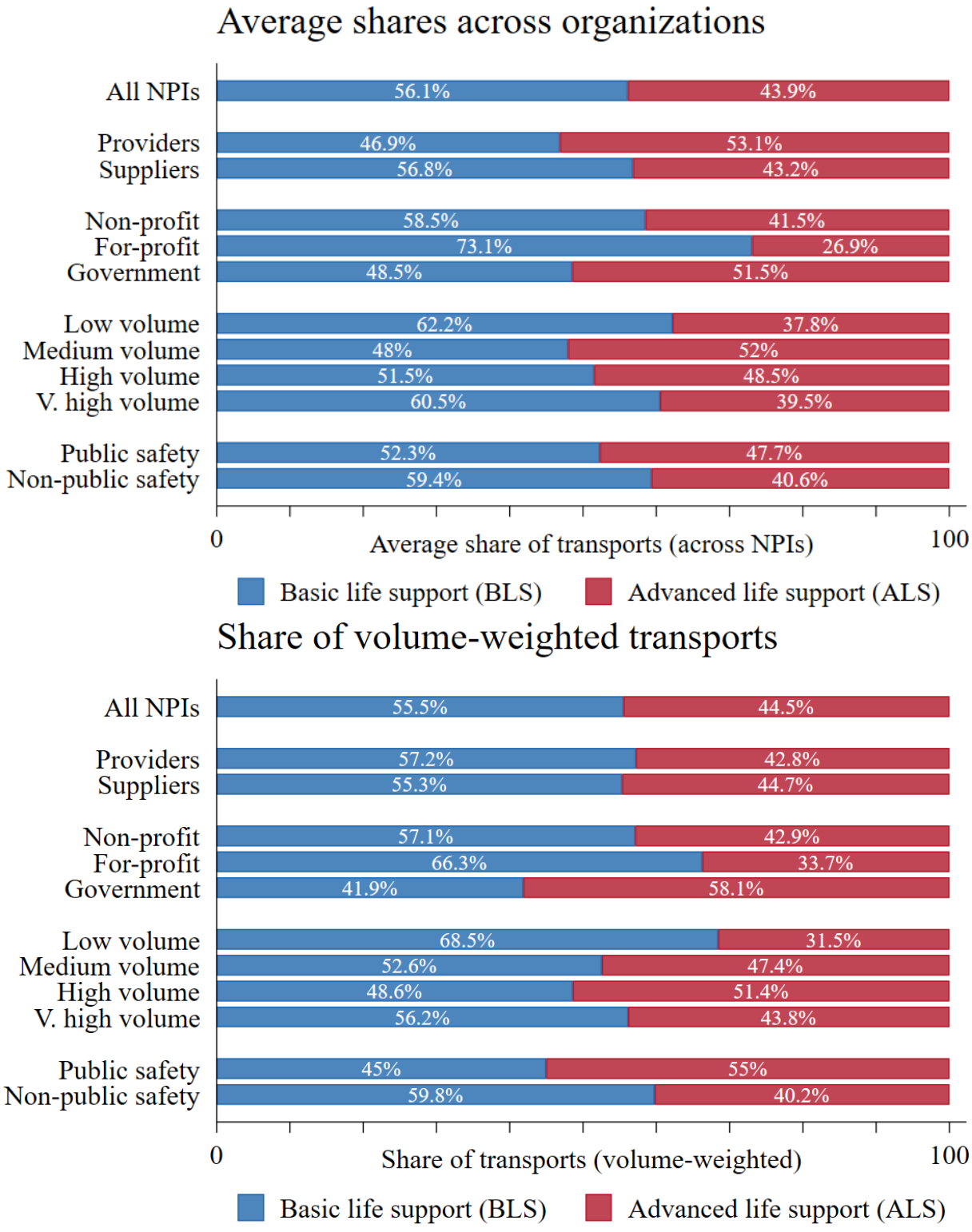
SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: NPI = National Provider Identifier. Averages are calculated counting each organization equally in the top panel and weighting based on volume in the bottom panel.

Figure 4.6.2. Shares of Emergency and Non-Emergency Transports by Organization and With Volume Weights



SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: NPI = National Provider Identifier. HCPCS = Healthcare Common Procedure Coding System. Averages are calculated counting each organization equally in the top panel and weighting based on volume in the bottom panel.

Figure 4.6.3. Shares of BLS and ALS Transports by Organization and With Volume Weights



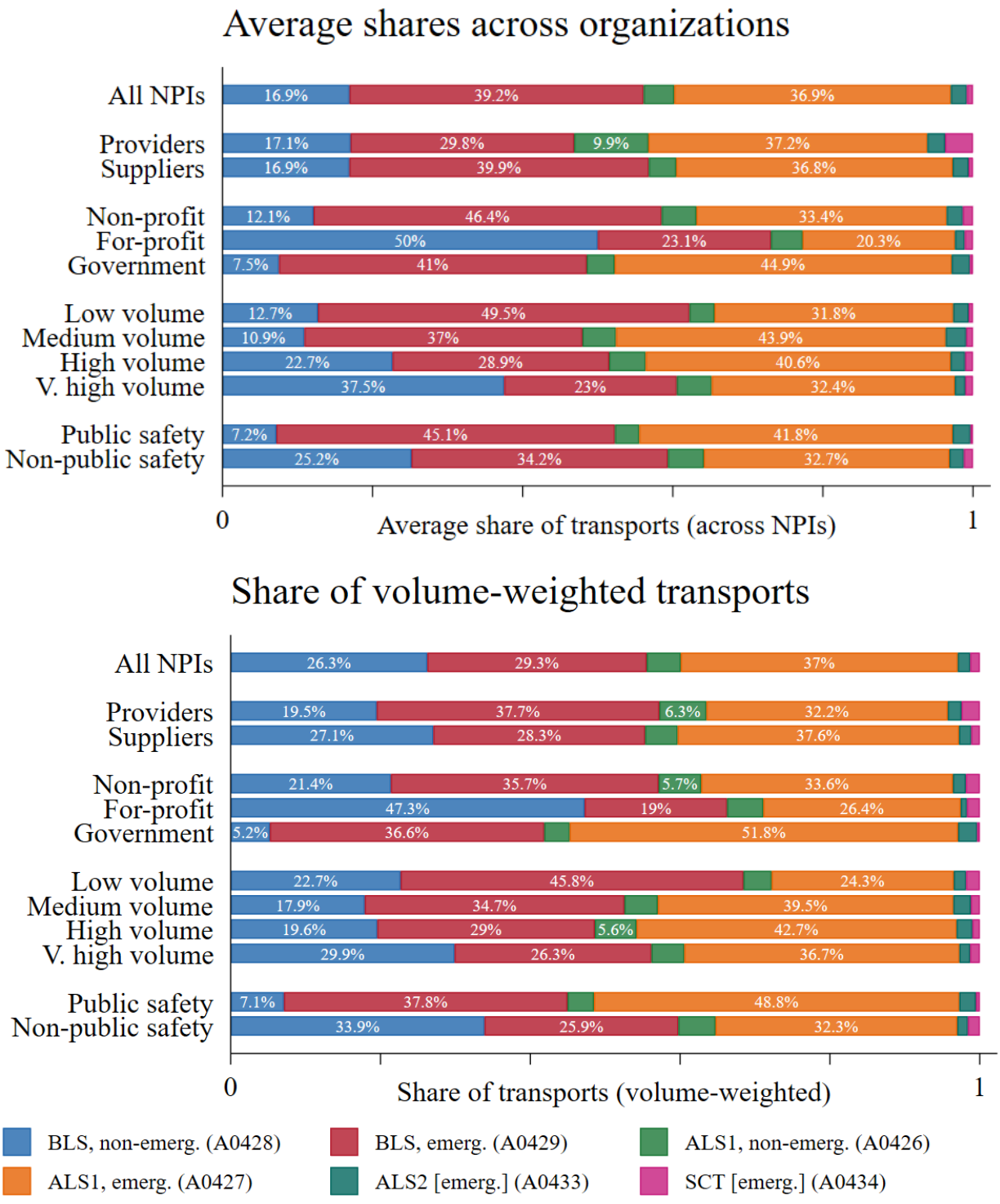
SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.

NOTE: NPI = National Provider Identifier. Averages are calculated counting each organization equally in the top panel and weighting based on volume in the bottom panel.

As a final approach to summarize information reported in Section 6, Question 3, we calculated shares of organizations and (volume-weighted) shares of transports by unaggregated billing codes. The HCPCS code–level shares in Figure 4.6.4 mirror the higher-level emergency versus non-emergency and BLS versus ALS breakdowns presented earlier in this section. The breakdown of transport mix by billing code highlights the very modest contributions of ALS2 and SCT services relative to other service codes, with and without volume weighting. Figure 4.6.4 also emphasizes cases where a specific HCPCS code accounts for a relatively larger share of transports for one subset of organizations versus others. For example:

- For-profit organizations have relatively large shares of BLS non-emergency transports (average share 50 percent, volume weighted share 47 percent, versus 17 and 26 percent unweighted and weighted, respectively, across all organizations).
- Low volume organizations have relatively large shares of BLS emergency transports (average share 50 percent, volume weighted share 46 percent, versus 39 and 29 percent unweighted and weighted, respectively, across all organizations).
- Providers have relatively large shares of ALS1 non-emergency transports (average share 10 percent, volume weighted share 6 percent, versus 5 and 4 percent unweighted and weighted, respectively, across all organizations).
- For-profit organizations have relatively small shares of ALS1 emergency transports (average share 20 percent, volume weighted share 26 percent, versus 37 percent both unweighted and weighted across all organizations).

Figure 4.6.4. Shares of Transports by HCPCS Code, by Organization and Volume-Weighted



SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: NPI = National Provider Identifier. BLS = basic life support. ALS = advanced life support. "non-emerg." is non-emergency. "emerg." is emergency. SCT = specialty care transport.

The final Section 6 question, Question 4, asks organizations to report the share of transports that were interfacility—in other words, from one medical facility to another. These transports are often between outpatient hospital departments, end-stage renal disease (ESRD) facilities, skilled nursing facilities, and other types of facility-based settings. Overall, organizations reported that a mean of 17 percent and a median of 1 percent of transports were interfacility. However, the distribution of Section 6, Question 4 responses was highly skewed, with some organizations reporting that 80 to 100 percent of transports were interfacility (Table 4.6.5). For-profit organizations in particular reported much higher shares of interfacility transports (mean 45 percent and median 36 percent). Among for-profit organizations, the distribution of Section 6, Question 4 responses was bimodal, with relatively larger shares of organizations reporting values around 0 and 100 percent and relatively fewer in between.

Table 4.6.1. Shares of Transports That Were Interfacility Transports

Share of Transports That Were Interfacility Transports	**All Organizations** *(% of total)*	**For-Profit Organizations Only** *(% of total)*	**All Organizations Excluding For-Profit Organizations** *(% of total)*
0 to 20 percent	74%	36%	80%
21 to 80 percent	19%	41%	16%
81 to 100 percent	7%	22%	5%

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: Percentages may not total to 100 percent due to rounding.

Section 7: Labor Costs

Section 7 (Labor Costs) Content Overview

- Use of paid, unpaid, and volunteer staff by labor category
- Explanations for why certain staff categories were not used
- Hours worked and total compensation by labor category
- Costs associated with volunteer labor

Overview

Section 7 (Labor Costs) collects information on ground ambulance organization hours worked, total compensation for staff,[91] and certain other costs related to paid and volunteer labor. Prior studies identified staffing costs as one of the largest drivers of total expenses for ground ambulance organizations.[92] However, given the variation across organizations in terms of staffing models and mix, types of services provided, and use of volunteer labor, we expect substantial variation in measured labor costs. Aligning with this anticipated variation, the response options available in Section 7 depend on answers to screening questions in Section 2 (Organizational Characteristics) on whether the ground ambulance organization also provides fire, police, or other public safety services and on whether the organization uses volunteer labor.

GADCS Labor Categories

<u>EMT/Response Staff</u>

- EMT-Basic
- EMT-Intermediate
- EMT-Paramedic
- Nurse, doctor, or other medical staff
- Emergency medical responder (EMR)
- Ground ambulance driver (non-EMT/EMR)

<u>Medical Director</u>

<u>Administration/Facilities Staff</u>

- Administrative (clerical, human resources, billing, information technology [IT] support, etc.)
- Management (executive, public information officer, etc.)
- Dispatch/call center
- Vehicle maintenance
- Facilities maintenance (janitorial, laundry, repairs, etc.)
- Other not reported above (write-in option)

Key Section 7 (Labor Costs) Findings

- Nearly all organizations used EMT-Basic labor, and roughly three of four organizations used EMT-Paramedics.
- Less than half of organizations used staff in any other labor category.
- Only one-quarter to one-third of organizations reported using dedicated vehicle maintenance, facilities maintenance, or dispatch staff. However, following the GADCS instructions, staff with these roles may have been assigned to an EMT/response labor category.
- While many organizations reported using volunteer labor, volunteers accounted for a relatively small share of total labor hours for these organizations and across all organizations.
- Volunteer ambulance drivers and EMRs were disproportionally reported as staff by volunteer organizations and were among the labor categories most likely to be filled by volunteers rather than paid staff.

[91] In the GADCS, "Total compensation" includes salary, wages, benefits (e.g., health care, paid time off, retirement, stipends, life insurance), employer payroll taxes, overtime, training time, and callback and standby pay for paid staff.

[92] Mulcahy et al., 2019.

- Across all organizations, average ground ambulance labor expenses per organization ($3.65 million) were many times larger than the median ($551,000).

To further tailor Section 7 questions to individual respondents, the section opens with a screening response matrix asking respondents to report which staff categories the organization employed during its data collection periods. Then, based on the categories selected by respondents, the three Section 7 subsections ask

1. questions related to hours worked and compensation for paid EMT and response staff (Subsection 7.1)
2. questions related to hours worked and compensation for paid administration and facilities staff (Subsection 7.2)
3. questions related to hours worked, the number of individual staff members, and associated expenses for volunteer staff (Subsection 7.3).

Use of Staff Categories

All organizations used the same set of staff category descriptions to respond to the initial Section 7, Question 1 screening matrix (see the "GADCS Labor Categories" box at the beginning of Section 7; these categories defined the "rows" for the screening matrix).[93] Based on responses to Section 2 questions, the GADCS also presented respondents with one, two, or four "columns" to further distinguish between staff falling within a given staff category (Table 4.7.1). For the purposes of describing Section 7, Question 1 responses, we first report the share of all responding NPIs using labor in each category (i.e., considering whether there was any box checked in each row), and then we describe the breakdown between organizations using paid and volunteer staff and staff with and without public safety roles within a category.

[93] The GADCS User Guide (CMS, *Medicare Ground Ambulance Data Collection System (GADCS) User Guide*, Version 3.0, January 1, 2024) directs respondents to choose the most appropriate labor category in cases where the levels of licensure or certification in the organization's state or context differs from the listed GADCS staff categories. For example, organizations may categorize EMT-Advanced staff as EMT-Intermediate staff for the purposes of Section 7 reporting.

Table 4.7.1. Section 7, Question 1 Response Cases

Case	Section 2 Response: Public Safety?	Section 2 Response: Volunteer?	Column Header Labels
A	No	No	1.) Paid staff
B	No	Yes	1.) Paid staff 2.) Volunteer staff
C	Yes	No	1.) Paid staff without public safety role 2.) Paid staff with public safety role
D	Yes	Yes	1.) Paid staff without public safety role 2.) Volunteer staff without public safety role 3.) Paid staff with public safety role 4.) Volunteer staff with public safety role

SOURCE: Author adaptation of GADCS instrument instructions.

EMT/Response Staff

We found that nearly all ground ambulance organizations (94.4 percent) used EMT-Basic labor and the majority (74.6 percent) employed EMT-Paramedics, while less than half of organizations used staff in other individual categories (Table 4.7.2). The smaller share of organizations with any EMT-Paramedic staff aligns with the earlier finding that only a portion of ground ambulance organizations provide services at the ALS1, ALS2, or SCT level, each of which often requires EMT-Paramedic staff.

Table 4.7.2. Use of EMT/Responder Staff Categories by Organizational Type

	All NPIs *(n, % of 5,023)*	**Volunteer NPIs** *(n, % of 1,811)*	*...with volunteer staff in-category (n, % of left)*	**Public safety NPIs** *(n, % of 2,302)*	*...with public safety staff in-category (n, % of left)*
EMT-Basic	4,744 (94.4%)	1,786 (98.6%)	*1,518 (85.0%)*	2,116 (91.9%)	*1,767 (83.5%)*
EMT-Intermediate	2,196 (43.7%)	821 (45.3%)	*566 (68.9%)*	868 (37.7%)	*706 (81.3%)*
EMT-Paramedic	3,747 (74.6%)	963 (53.2%)	*568 (59.0%)*	1,702 (73.9%)	*1,463 (86.0%)*
Nurse, doctor, etc.	512 (10.2%)	170 (9.4%)	*134 (78.8%)*	131 (5.7%)	*68 (51.9%)*
EMR	1,082 (21.5%)	628 (34.7%)	*561 (89.3%)*	474 (20.6%)	*372 (78.5%)*
Driver	1,685 (33.5%)	1,086 (60.0%)	*986 (90.8%)*	659 (28.6%)	*481 (73.0%)*

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: NPI = National Provider Identifier. EMT = emergency medical technician. EMR = emergency medical responder. Overall denominator of 5,023 reflects sampling weights. Percentages in the table may not add up to 100 because of rounding.

Organizations using volunteer labor more often reported using EMR and ambulance driver staff and less often reported using paramedics compared with organizations on average (for

paramedics, 53.2 percent for volunteer organizations vs. 74.6 percent for all NPIs, difference significant at $p < 0.001$). Of the 53.2 percent of volunteer organizations with *any* paramedic staff ($n = 963$), only 566 (59.0 percent) had volunteer paramedic staff specifically; the remaining 41.0 percent had only paid paramedic staff despite having volunteer staff in other labor categories. Together, these differences suggest a different labor mix and cost structure for volunteer vs. non-volunteer organizations, with volunteers most commonly reported in lower-compensation labor categories (e.g., EMT-Basic, EMR, and ambulance drivers).

Public safety organizations reported using a broadly similar mix of labor categories compared with all NPIs collectively. Most staff categories used by public safety organizations included at least some staff with public safety roles. For example, across public safety organizations, 91.9 percent reported using EMT-Basic staff, and, of those organizations, 83.5 percent reported that EMT-Basics had some public safety role. The same was generally the case for EMT-Paramedics. The exception was the nurse, doctor, and other medical staff category, where only 51.9 percent of the (few) organizations using staff in that category indicated a public safety role, likely signaling the more specialized medical expertise from staff in this category.

Administration/Facilities Staff

Outside EMT/responder labor categories, most ground ambulance organizations reported using administration (74.1 percent of NPIs) and management staff (63.4 percent). Smaller proportions of organizations used other labor categories, such as dispatch and vehicle maintenance.

Table 4.7.3. Use of Administration/Facilities Staff Categories by Organizational Type

	All NPIs *(n, % of 5,023)*	**Volunteer NPIs** *(n, % of 1,811)*	*...as volunteers (n, % of left)*	**Public safety NPIs** *(n, % of 2,302)*	*...as public safety (n, % of left)*
Administration	3,720 (74.1%)	1,221 (67.4%)	*565 (46.3%)*	1,670 (72.5%)	*1,048 (62.8%)*
Management	3,185 (63.4%)	1,016 (56.1%)	*606 (59.6%)*	1,348 (58.6%)	*1,096 (81.3%)*
Dispatch/call center	1,274 (25.4%)	227 (12.5%)	*68 (30.0%)*	426 (18.5%)	*302 (70.9%)*
Vehicle maintenance	1,699 (33.8%)	654 (36.1%)	*454 (69.4%)*	805 (35.0%)	*541 (67.2%)*
Facility maintenance	1,457 (29.0%)	673 (37.2%)	*489 (72.7%)*	636 (27.6%)	*417 (65.6%)*
Other	220 (4.4%)	67 (3.7%)	*37 (55.2%)*	69 (3.0%)	*57 (82.6%)*

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: NPI = National Provider Identifier. Overall denominator of 5,023 reflects sampling weights. Percentages in the table may not add up to 100 because of rounding.

Other findings related to administration and facilities staff categories include the following:

- Volunteer organizations often reported volunteer contributions to vehicle and facility maintenance (for 69.4 and 72.7 percent of NPIs using these labor categories, respectively).

- Public safety organizations often reported that administration, management, and dispatch/call center staff had both ground ambulance and public safety roles.
- The write-in "other" category was rarely used and typically noted miscellaneous labor categories.

These findings suggest that key roles like dispatch, vehicle maintenance, and facilities maintenance are often filled by third-party vendors, provided at no cost, handled by staff that also serve in EMT/response roles and are reported under an EMT/response labor category per the GADCS instructions. Respondents describe contracted services provided by third parties in Section 11 (Other Costs). In Section 7, Question 3 asks respondents to indicate why they reported not having administration/facilities staff in the labor categories with specific response options to report (a) labor provided at no cost to the organization and (b) labor categories used at the organization but where staff were reported under another category per the instructions.

Table 4.7.4 summarizes Section 7, Question 3 responses where 5 percent or more of all NPIs reported that staff in an administration/facilities staff category were provided at no cost by another entity or were included in another labor category per the GADCS instructions. Dispatch/call center staff was the only labor category where a meaningful share of organizations reported that another entity provided staff at no cost. In some communities, local government agencies provide dispatch/call center staff to all ground ambulances operating in their jurisdiction, even if the ground ambulance organizations are not government-operated.

Table 4.7.4. Selected Reasons Why Administration/Facilities Staff Categories Were Not Reported in Section 7, Question 1

Labor Category (Paid for or Provided at no Cost by Another Entity)	**NPIs not using labor category** *(n, % of 5,023 total)*	**Respondents reporting labor category provided at no cost** *(n)*	*...% of 5,023 total NPIs*	*...% of NPIs not using labor category*
Dispatch/call center	3,749 (74.6%)	290	5.8%	7.7%
Labor Category (Staff Assigned to Another Role per the GADCS Instructions)	**NPIs not using labor category** *(n, % of 5,023 total)*	**Respondents reporting staff in another labor category** *(n)*	*...% of 5,023 total NPIs*	*...% of NPIs not using labor category*
Administration	1,303 (25.9%)	260	5.2%	19.9%
Management	1,838 (36.6%)	533	10.6%	29.0%
Vehicle maintenance	3,324 (66.2%)	377	7.5%	11.3%
Facility maintenance	3,566 (71.0%)	710	14.1%	19.9%

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: NPI = National Provider Identifier. Overall denominator of 5,023 reflects sampling weights. Percentages in the table may not add up to 100 because of rounding.

Respondents more often indicated that they did not report using staff in a particular category because, following the GADCS instructions, they assigned staff performing applicable functions to other labor categories. Roughly 20 percent of organizations reporting that they did not use administration and facility maintenance staff indicated that they do have staff performing these functions that were reported in an EMT/response category. This aligns with our earlier qualitative finding that staff, especially in smaller and volunteer organizations, often wear multiple "hats"—for example, helping with administration while also serving as an EMT or other responder.[94] This share was larger for management (about 30 percent) and smaller but still notable for vehicle maintenance (at about 10 percent).

Medical Directors

Section 7 provides respondents with two ways of reporting medical director staff: either as employees in Section 7, Question 1 or as contractors in Section 7, Question 2. Table 4.7.5 summarizes information combined across these two responses. Volunteer organizations were nearly twice as likely to report an on-staff medical director in Section 7, Question 1 than a contracted medical director in Section 7, Question 2, while public safety organizations more often had contracted medical directors than on-staff medical directors. Across all NPIs and for volunteer and public safety organizations, about one-third of organizations reported not having either an on-staff or contracted medical director; questions later in the GADCS provide other avenues to report medical director expenses outside of labor expenses.

Table 4.7.5. Section 7, Medical Director Response Overview

	All NPIs *(n, % of 5,023)*	**Volunteer NPIs** *(n, % of 1,811)*	*...as volunteers (n, % of left)*	**Public safety NPIs** *(n, % of 2,302)*	*...as public safety (n, % of left)*
Reported on-staff medical director in Section 7, Question 1	1,752 (34.9%)	862 (47.6%)	*653 (75.8%)*	625 (27.2%)	*349 (55.8%)*
Reported contracted medical director in Section 7, Question 2	1,464 (29.1%)	323 (17.8%)	*N/R*	762 (33.1%)	*N/R*
Neither	1,807 (36.0%)	626 (34.6%)	*N/R*	915 (39.7%)	*N/R*

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: NPI = National Provider Identifier. Overall denominator of 5,002 reflects sampling and post-stratification weights. Sums of counts and percentages may not exactly equal 5,002 NPIs and 100 percent due to rounding. "N/R" is not reported. Only Section 7, Question 1 differentiates between staff with volunteer and public safety roles (versus not).

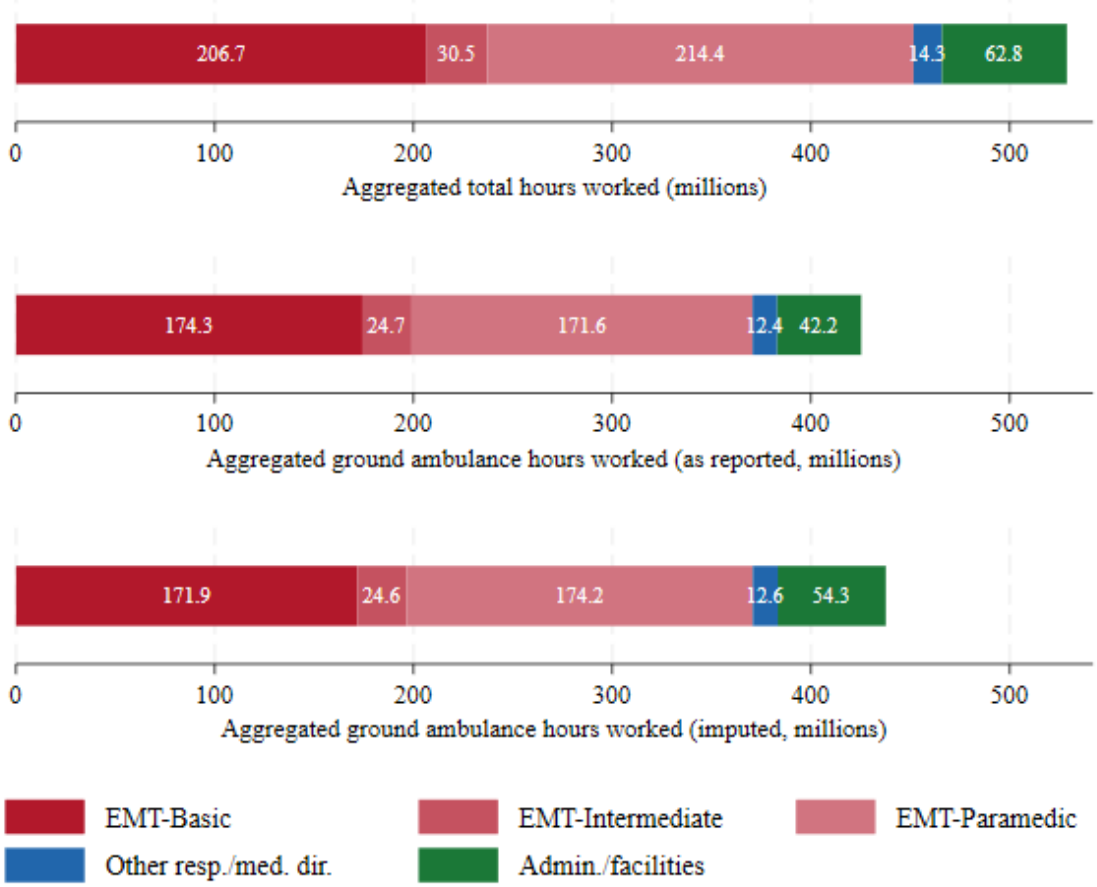
[94] Mulcahy et al., 2019.

Hours Worked and Compensation

Section 7.1, Question 1 and Section 7.2, Question 1 collect information on both hours worked and total compensation for paid staff, with total labor compensation reported as a single figure and hours worked split across ground ambulance, public safety, and other categories as described above. Across both questions, organizations reported over 500 million total hours worked to the GADCS, with roughly four of five total hours worked related to ground ambulance operations (Figure 4.7.1). Organizations reported total labor compensation of nearly $25 billion, with nearly $20 billion of those costs being ground ambulance-related (Figure 4.7.2).[95]

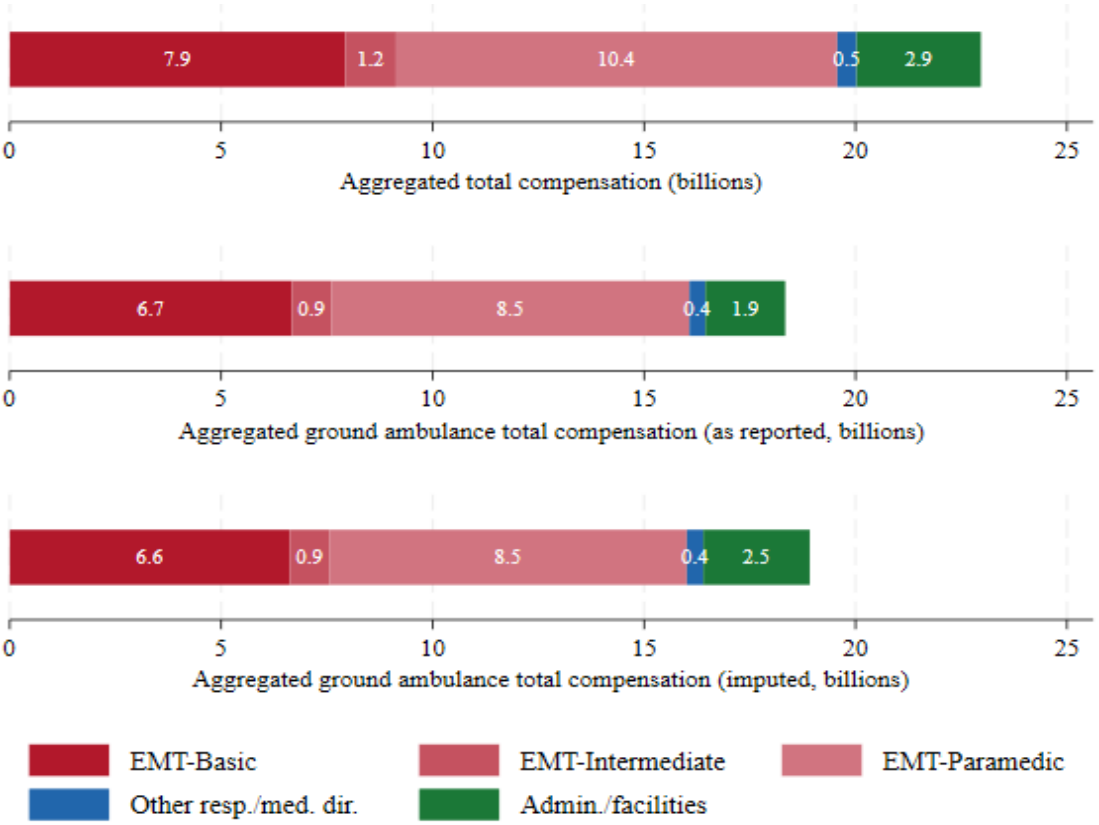
Response personnel—and specifically EMT-Basic and EMT-Paramedic staff—accounted for the bulk of both hours worked and total compensation. Other categories of response staff and medical directors accounted for much smaller shares of hours worked and total compensation. Collectively, administration and facilities staff accounted for roughly 10 percent of total hours worked and total compensation.

Figure 4.7.1. Aggregated Total Hours Worked by Labor Category



[95] Unless otherwise noted, we calculated ground ambulance total compensation in most cases as the product of total compensation and the ground ambulance share of total hours worked for each labor category.

Figure 4.7.2. Aggregated Total Compensation by Labor Category

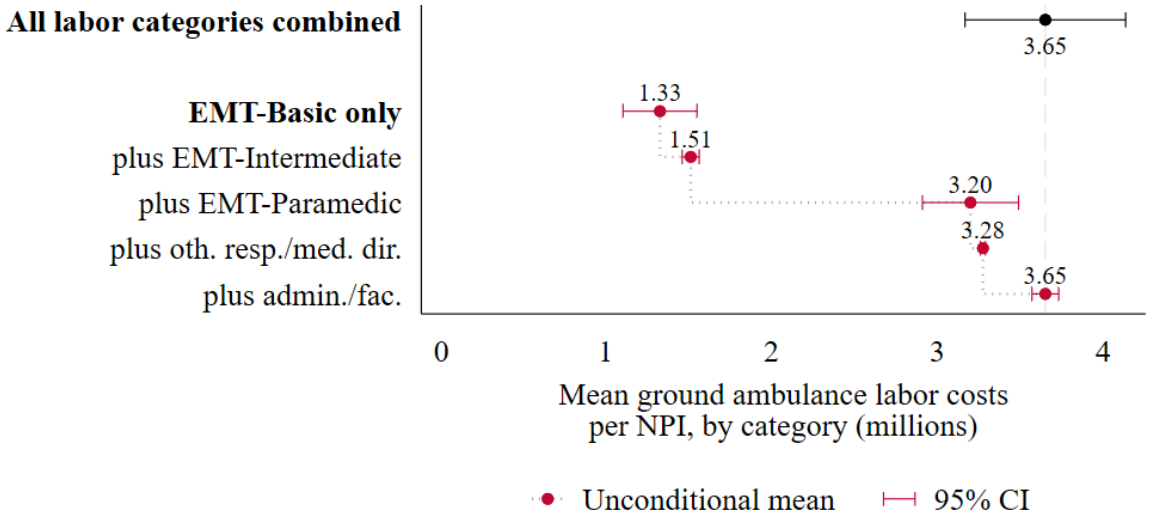


SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: "Admin." is administration, "med. dir." is medical director, and EMT is emergency medical technician. "Other resp." is other response staff, including emergency medical responders (EMRs) and ground ambulance drivers without EMT certification. EMT = emergency medical technician.

Figure 4.7.1 and Figure 4.7.2 also illustrate two approaches to estimate a ground ambulance share of total hours worked and total compensation: the first using ratios of ground ambulance to total hours worked as reported by organizations in the GADCS and the second imputed using the share of total responses that were ground ambulance responses (as compared to other responses, such as fires where no ground ambulance responded). The two approaches yielded broadly similar quantities, particularly for response personnel, although ground ambulance hours worked and compensation were relatively higher for administration and facilities staff under the response-based allocation approach. This suggests that organizations estimates of the percentage of labor hours that are related to ground ambulance are roughly in line with their percentage of their total responses that were ground ambulance responses.

Figure 4.7.3 decomposes the overall average ground ambulance compensation expense—3.65 million per organization—by the relative contributions across labor categories. Consistent with the main points from Figure 4.7.1 and Figure 4.7.2, EMT-Basic and EMT-Paramedic staff contribute much larger average amounts ($1.33 and $1.69 million, respectively) to the overall total.

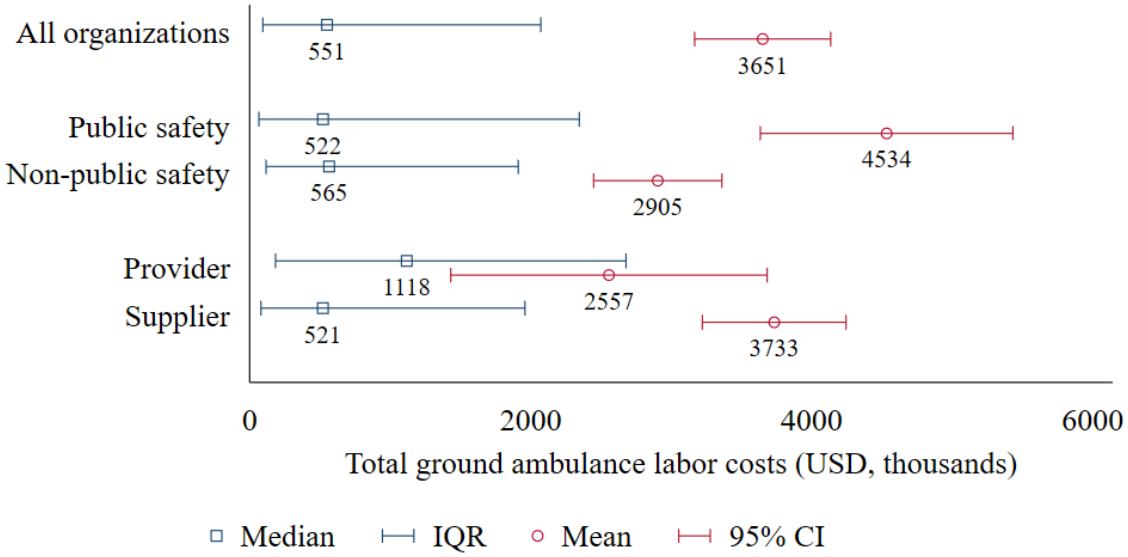
Figure 4.7.3. Decomposition of Average Ground Ambulance Labor Compensation per Organization



SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: NPI = National Provider Identifier. EMT = emergency medical technician. CI = confidence interval. Point labels report cumulative totals, while 95 percent CIs are specific to the individual labor category contribution. "plus oth. resp./med. dir." is plus other responder or medical director staff. "plus admin./fac." is plus administrator or facilities staff.

Figure 4.7.4 illustrates differences in average and median ground ambulance labor costs across subsets of organizations. Across all organizations, average ground ambulance labor expenses ($3.65 million) were many times larger than the median ($551,000). The same skewed distribution of labor costs was observed across subgroups of organizations.

Figure 4.7.4. Comparison of Total Labor Compensation Between Organization Categories

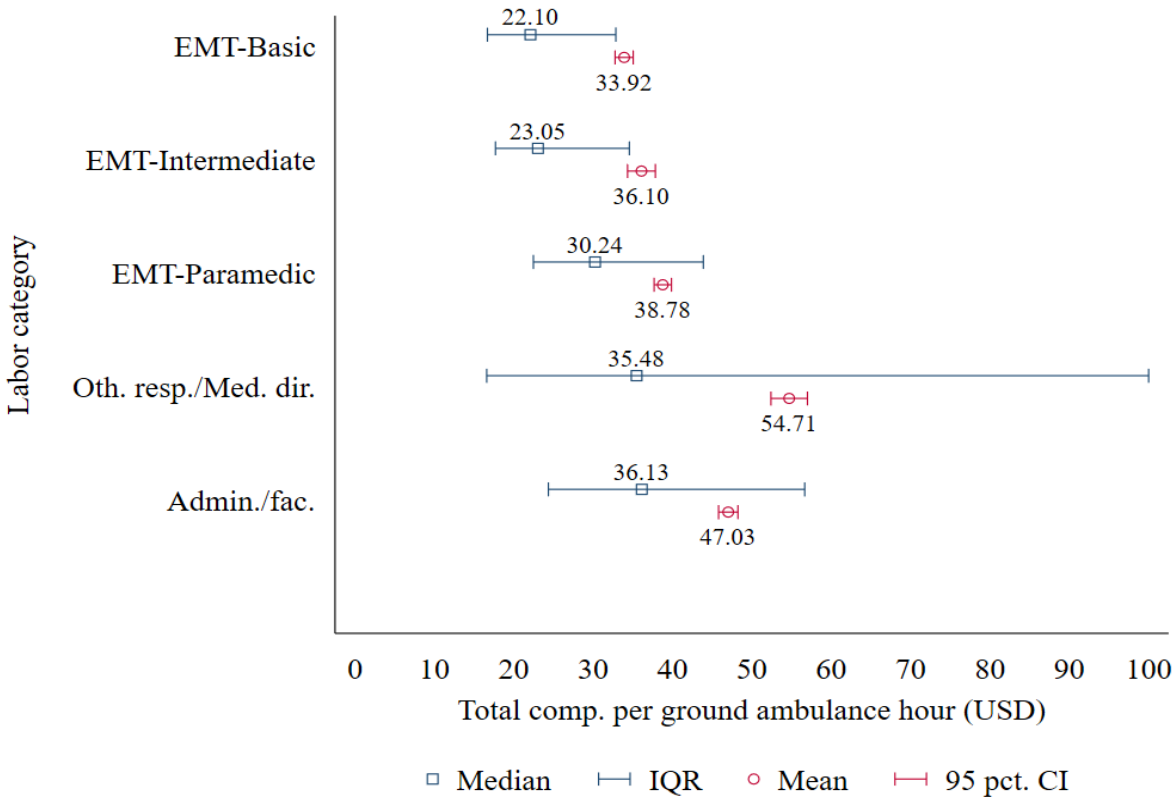


SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.

NOTE: USD = US dollars. IQR = interquartile range. CI = confidence interval.

Using the information in Section 7.1, Question 1 and Section 7.2, Question 1, Figure 4.7.6 presents average and median ground ambulance compensation per hour worked by labor category. As expected, hourly compensation increases from EMT-Basic to EMT-Intermediate to EMT-Paramedic as licensure requirements and training increase. As in many other descriptive statistics throughout this report, we found right-skewed compensation per hour with larger means than medians across categories. The IQR for other response and medical director staff was very wide. This wide range may reflect differences in how organizations record medical director hours worked in cases where the medical director receives a lump-sum payment. Finally, mean and median administration and facilities staff compensation per hour were relatively high. This could reflect the broad scope of this category including administrative support as well as managers and executives.

Figure 4.7.5. Distribution of Ground Ambulance Compensation per Hour by Labor Category



SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: USD = US dollars. IQR = interquartile range. CI = confidence interval. "pct." is percent.

Volunteer Labor Hours

While roughly one-third of organizations reported using volunteer labor, we found that volunteer labor hours reported in Section 7.3 accounted for very small shares of total labor hours

(i.e., including paid and unpaid hours; see Table 4.7.6). Overall, just 0.5 percent of total ground ambulance hours worked were for volunteers; this share remained modest (4 percent) even when restricting to organizations using volunteer labor. One labor category, other responders and medical directors, which includes EMRs and ambulance drivers, had relatively larger shares of hours contributed by volunteers. Among organizations using volunteer labor, 39 percent of hours worked in this category were from volunteers.

Table 4.7.6. Volunteer Share of Total Hours

Labor Category	Volunteer Hours (aggregated)	Share of Total Hours: All Organizations	Share of Total Hours: Volunteer Organizations Only
All categories combined	1,989,187	0.5%	4.4%
EMT-Basic	574,067	0.3%	2.8%
EMT-Intermediate	99,072	0.4%	3.7%
EMT-Paramedic	104,370	0.1%	0.6%
Other resp./med. dir.	882,062	7.1%	39.0%
Administration/facilities	329,616	0.8%	9.8%

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: "resp." is response. "med. dir." is medical director.

Section 8: Facilities Costs

Section 8 (Facilities Costs) Content Overview

Section 8.1 (Facility Information)

- Number of facilities
- Square footage of facilities
- Percentage of facility that is ground ambulance-related
- Whether facility is rented, owned, or donated

Section 8.2 (Annual Lease, Mortgage, and Other Costs of Ownership for Facilities)

- Costs of facility rental or ownership
- Costs of facility rental or ownership for multi-NPI organizations

Section 8.3 (Insurance, Maintenance, Utilities, and Taxes)

- Insurance, maintenance, and utilities costs
- Facilities taxes
- Percentage of costs that are ground ambulance-related
- Costs of insurance, maintenance, utilities, and taxes for multi-NPI organizations

Overview

Section 8 (Facilities Costs) collects information on facilities that are partially or entirely used to support the ground ambulance operations of selected organizations. Prior studies found facilities to be a modest driver of costs (e.g., a prior GAO study found that facilities costs made up approximately 5 percent of ambulance organizations' total costs).[96] However, facilities are also potentially one of the costs with the largest variability by organization type, facility ownership status, and accounting practices. In prior discussion with ground ambulance organizations, we learned that many government organizations have few annual facilities costs because they own the facilities outright and are sometimes exempt from paying property taxes.[97] On the other hand, for organizations that rent, facilities may be a larger percentage of their total costs.

Key Section 8 (Facilities Costs) Findings

- For-profit organizations tend to lease more facilities and have fewer donated facilities than non-profit and government organizations.
- For-profit organizations have higher facility taxes than non-profit and, particularly, government organizations.

Calculating facilities costs specifically related to ground ambulance organizations can also be very challenging. Annual ambulance or EMS department budgets for government-based organizations often do not include facilities expenses directly. The GADCS instructions direct government organizations to collect this information from other parts of the government, but it is not always clear whether this happens. Furthermore, government-based, fire-based, and hospital-based organizations often share facilities with non–ground ambulance services. For example, a single facility may support both ground ambulance and fire operations. The GADCS instructions allow organizations to allocate a percentage of facility space and costs that are related to ground ambulance operations.

Section 8 contains three subsections—Section 8.1 (Facility Information), Section 8.2 (Annual Lease, Mortgage, and Other Costs of Ownership for Facilities), and Section 8.3 (Insurance,

[96] U.S. Government Accountability Office, *Ambulance Providers: Costs and Medicare Margins Varied Widely; Transports of Beneficiaries Have Increased*, GAO-13-6, 2012.
[97] Mulcahy et al., 2019.

Maintenance, Utilities, and Taxes)—that collect information on characteristics and costs of facilities (see the box at the beginning of this section). With only a few exceptions, Sections 8.1 and 8.2 are structured to report information (e.g., square footage, rental costs) for each facility separately, while all the questions in Section 8.3 ask about aggregate costs (e.g., utilities and maintenance costs) across all facilities.

In Section 8.2, when reporting costs for facilities owned outright, organizations are given the option to either report the depreciation amount[98] of facilities or report on a cash basis (i.e., actual expenditures toward purchases that were made during the data collection period). The options to report depreciation or on a cash basis were again given later in the GADCS for reporting costs of vehicles in Section 9 (Vehicle Costs) and capital equipment in Section 10 (Equipment, Consumable, and Supply Costs).

Facility Information

There was substantial variation in the number of facilities used by ground ambulance organizations and whether the facilities were leased, mortgaged, or owned outright (Table 4.8.1). Overall, organizations averaged approximately three facilities, with most facilities owned outright, followed by leased facilities, and finally mortgaged facilities. Unsurprisingly, organizations with higher Medicare transport volume and organizations that were serving urban areas had more facilities than those with lower Medicare transport volumes or in more rural areas. There were also differences in whether facilities were leased, mortgaged, or owned outright depending on organization type. Government organizations tended to have more facilities owned outright, while for-profit organizations tended to have more leased facilities. Public safety organizations, which are usually government organizations, also tended to have more facilities owned outright.

Table 4.8.1. Number of Facilities by Organizational Characteristics

	N	# Facilities, Mean (95% CI)	# Facilities Leased, Mean (95% CI)	# Facilities Mortgaged, Mean (95% CI)	# Facilities Owned Outright, Mean (95% CI)
All NPIs	5,020	2.66 (2.51, 2.81)	0.68 (0.60, 0.75)	0.10 (0.09, 0.11)	1.84 (1.72, 1.97)
Provider vs. supplier status					
Suppliers	4,671	2.68 (2.52, 2.84)	0.66 (0.58, 0.74)	0.10 (0.09, 0.11)	1.87 (1.73, 2.00)
Providers	349	2.49 (2.10, 2.88)	0.91 (0.66, 1.15)	0.06 (0.01, 0.10)	1.52 (1.28, 1.75)
Medicare transport volume					
Low	2,121	1.39 (1.33, 1.45)	0.21 (0.18, 0.24)	0.07 (0.06, 0.08)	1.09 (1.03, 1.15)
Medium	1,416	1.96 (1.86, 2.06)	0.25 (0.21, 0.28)	0.12 (0.10, 0.15)	1.56 (1.46, 1.65)
High	884	3.33 (3.10, 3.56)	0.69 (0.57, 0.80)	0.11 (0.08, 0.14)	2.50 (2.28, 2.72)

[98] *Depreciation* refers to the lost value of an asset over the data collection period.

	N	# Facilities, Mean (95% CI)	# Facilities Leased, Mean (95% CI)	# Facilities Mortgaged, Mean (95% CI)	# Facilities Owned Outright, Mean (95% CI)
Very high	600	7.85 (6.86, 8.83)	3.33 (2.85, 3.81)	0.13 (0.07, 0.19)	4.22 (3.37, 5.07)
Ownership category					
Non-profit	1,481	1.99 (1.82, 2.15)	0.55 (0.45, 0.65)	0.12 (0.09, 0.15)	1.28 (1.18, 1.39)
For-profit	950	2.89 (2.49, 3.30)	2.12 (1.78, 2.46)	0.08 (0.05, 0.10)	0.66 (0.51, 0.82)
Government	2,589	2.96 (2.73, 3.20)	0.22 (0.17, 0.27)	0.09 (0.08, 0.11)	2.60 (2.38, 2.81)
Service area pop. density					
Urban	2,584	3.40 (3.13, 3.68)	0.93 (0.80, 1.06)	0.12 (0.10, 0.14)	2.29 (2.06, 2.52)
Rural	1,388	2.04 (1.89, 2.18)	0.51 (0.41, 0.61)	0.08 (0.06, 0.10)	1.43 (1.33, 1.53)
Super rural	1,048	1.67 (1.56, 1.78)	0.29 (0.24, 0.35)	0.07 (0.04, 0.10)	1.29 (1.19, 1.39)
Public safety					
No	2,718	2.44 (2.27, 2.61)	1.13 (1.00, 1.26)	0.09 (0.08, 0.11)	1.21 (1.12, 1.30)
Yes	2,302	2.93 (2.66, 3.19)	0.15 (0.10, 0.19)	0.10 (0.08, 0.13)	2.59 (2.34, 2.84)

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: NPI = National Provider Identifier. CI = confidence interval. Overall denominator of 5,020 reflects sampling weights and excludes organizations who reported 0 percent of all facilities as ground ambulance-related. Facilities owned outright include donated facilities.

Organizations had variation in the total square footage of facilities used for their ambulance organizations (Table 4.8.2). Organizations with super rural service area population density had the smallest total facility square footage, followed by organizations with rural service area and urban service areas. Similarly, organizations with low Medicare transport volume had the smallest total facility square footage, and organizations with medium, high, and very high Medicare transport volumes had increasingly larger total facility square footage. For example, the median total square footage of facilities was approximately four times larger for organizations with very high transport volume as compared with organizations with low transport volume.

The facility square footage related to ground ambulance operations was often considerably less than the total facility square footage. Notably, public safety organizations reported considerably less of their total square footage as ground ambulance-related as compared with other organizations. Somewhat surprisingly, providers had less square footage and reported approximately the same percentage of square footage related to ground ambulance operations as compared with suppliers. This indicates that few provider organizations reported large hospital facilities. This may be because they often house ground ambulance services in separate facilities or only reported hospital square footage related to ground ambulance services instead of the entire hospital.

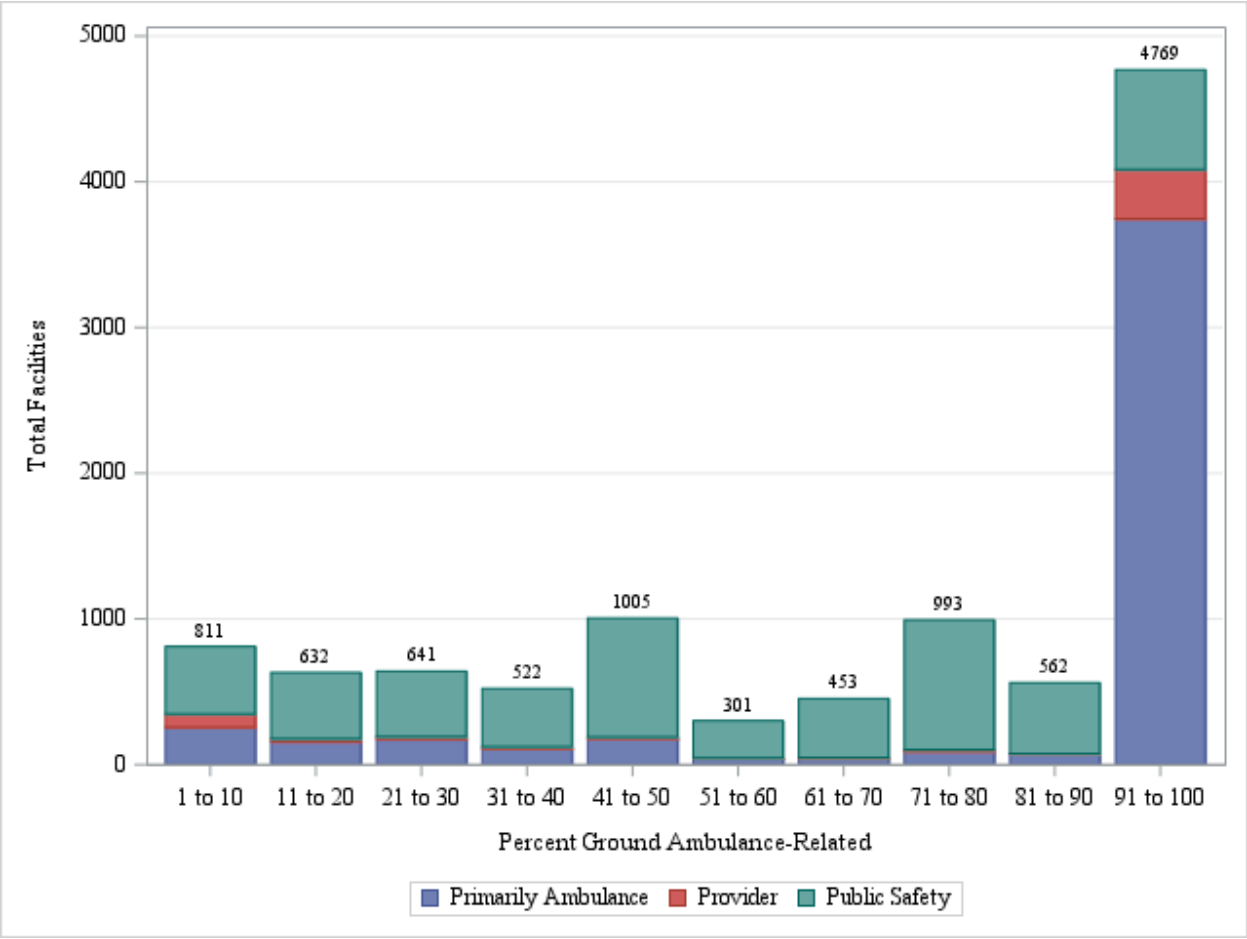
Table 4.8.2. Facility Square Footage

	N	Total Square Footage, Mean (95% CI)	Total Square Footage, Median	Total Ground Ambulance Sq. Footage, Mean (95% CI)	Total Ground Ambulance Sq. Footage, Median
All NPIs	5,020	22,071 (20,600; 23,542)	9,282	12,304 (11,337; 13,272)	5,000
Provider vs. supplier status					
Suppliers	4,671	21,155 (19,659; 22,651)	9,185	12,547 (11,520; 13,573)	4,989
Providers	349	34,334 (27,381; 41,288)	10,676	9,061 (7,300; 10,822)	5,257
Medicare transport volume					
Low	2,121	11,478 (10,261; 12,695)	6,500	4,730 (4,307; 5,152)	2,500
Medium	1,416	18,080 (16,860; 19,299)	10,575	8,804 (8,237; 9,372)	5,823
High	884	30,027 (26,984; 33,069)	14,279	16,024 (14,417; 17,631)	9,213
Very high	600	57,204 (48,353; 66,056)	24,300	41,849 (35,508; 48,189)	19,440
Ownership category					
Non-profit	1,481	17,248 (15,317; 19,180)	7,700	8,655 (7,783; 9,527)	4,300
For-profit	950	16,250 (13,448; 19,052)	6,250	12,911 (10,744; 15,078)	4,500
Government	2,589	26,965 (24,622; 29,308)	12,000	14,169 (12,592; 15,747)	5,576
Service area pop. density					
Urban	2,584	30,930 (28,263; 33,596)	13,256	17,601 (15,820; 19,383)	7,050
Rural	1,388	14,047 (12,913; 15,180)	8,276	8,090 (7,393; 8,787)	4,400
Super rural	1,048	10,867 (9,708; 12,027)	6,000	4,832 (4,369; 5,295)	3,025
Public safety					
No	2,718	16,427 (14,999; 17,855)	6,650	9,958 (9,132; 10,783)	4,550
Yes	2,302	28,736 (26,063; 31,408)	13,490	15,075 (13,230; 16,921)	5,600

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: NPI = National Provider Identifier. CI = confidence interval. Overall denominator of 5,020 reflects sampling weights and excludes organizations who reported 0 percent of all facilities as ground ambulance-related.

Figure 4.8.1 shows the distribution of the percentage of facilities that were allocated as ground ambulance-related. The figure shows the percentage of facilities allocated as ground ambulance-related by organization type (i.e., "public safety" defined as a fire department or police or other public safety organization in Section 2, Question 7; "provider" defined as a hospital or other Medicare provider in Section 2, Question 7; or "primarily ambulance" defined as all other organization types). Across all organizations, most facilities were reported as 100 percent related to ground ambulance operations. However, most public safety organizations' (as determined by their primary organization type) facilities were reported as less than 100 percent related to ground ambulance. Provider organizations reported most of their facilities as 100 percent related to ground ambulance and reported a cluster of facilities reported being 10 percent or less ground ambulance-related. The facilities that were 10 percent or less ground ambulance-related may be large hospitals of which only a small percentage of the building is ground ambulance-related.

Figure 4.8.1. Number of Facilities Grouped by Percentage of Facility Allocated as Ground Ambulance-Related



SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: Unit of analysis is unweighted facilities. Only facilities with ground ambulance-related square footage are included.

Organizations were directed to estimate the percentage of their facilities related to ground ambulance operations using data-driven approaches—such as calculating the physical space occupied by ground ambulance staff and equipment or, for fire departments, using the percentage of calls that were primarily fire vs. EMS to allocate shared spaces. There was a distribution of responses across all percentages, although there were clusters of responses at certain values (e.g., 8 percent of all facilities were allocated as being exactly 50 percent ground ambulance-related, and there were local maxima[99] at multiples of 5 and 10 percent) that indicate that some organizations may have made somewhat arbitrary allocations.

[99] *Local maxima* are points on a graph where the y axis value (in this case, frequency) are higher than the points just to the left or the right on the x axis. For example, a local maximum at 25 percent means that many more facilities were reported as 25 percent ground ambulance-related than were reported as 24 or 26 percent ground ambulance-related. This is consistent with data being reported based on estimating round numbers as opposed to using a data-driven approach.

Costs of Facility Lease and Ownership

Table 4.8.3 shows facility lease and ownership costs for facilities. Most facilities were owned, and, of organizations that owned facilities, more chose to report costs during the data collection period instead of reporting depreciation costs. The facilities owned by organizations that chose to depreciate tended to be larger and more costly facilities, as evidenced by the higher average total costs per facility. Depreciating facility costs spreads these costs out over multiple years, while reporting on a cash basis skews results toward a small number of organizations with large purchase costs in a given year. This is evidenced in the table below, where a small number of organizations that had large acquisition costs in a single year drove up the average facility costs, even as most organizations had no facility costs of ownership during the data collection period.

Table 4.8.3. Facility Lease and Ownership Costs

	Costs for Leased Facilities	**Costs for Facilities Owned Outright (No Depreciated Facilities)***	**Costs for Facilities Owned Outright (With Depreciated Facilities)****
Organizations contributing to category, *N*	1,303	2,264	1,437
Total costs, median (IQR)	23,250 (6,000; 90,500)	0 (0; 0)	52,871 (12,230; 191,594)
Total costs, mean (95% CI)	93,761 (80,968; 106,553)	151,131 (93,502; 208,760)	303,266 (240,937; 365,595)
Total costs per facility, mean (95% CI)	40,410 (35,661; 45,160)	79,563 (50,026; 109,101)	127,344 (99,933; 154,755)
Total costs per square foot, mean (95% CI)	6.37 (5.85; 6.90)	10.72 (8.73; 12.72)	8.36 (5.75; 10.97)
Total ground ambulance-related costs, mean (95% CI)	78,264 (66,184; 90,344)	72,217 (46,602; 97,833)	169,677 (127,107; 212,247)
Total ground ambulance-related costs per facility, mean (95% CI)	32,796 (28,466; 37,125)	38,848 (23,388; 54,308)	64,132 (46,763; 81,502)
Total ground ambulance-related costs per square foot, mean (95% CI)	5.73 (5.24; 6.23)	6.41 (5.22; 7.60)	5.22 (3.16; 7.27)
Facilities in category with zero costs, %	N/A	87.9%	9.4%

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.

NOTE: IQR = interquartile range. CI = confidence interval. Overall denominator of 4,577 organizations reflects sampling weights. Organizations that contract out broader ground ambulance functions other than labor or that only reported facilities as 0 percent ground ambulance-related are not included in this table.
* Includes mortgage principal and interest payments for mortgaged facilities, acquisition costs for facilities purchased outright during the data collection period, other facility costs, and facilities with no costs of ownership. Only organizations that do not depreciate facility costs are included.
** Includes depreciation costs (including $0 costs for fully depreciated facilities), mortgage interest payments, and acquisition costs for facilities purchased outright during the data collection period. Only organizations that depreciate some or all of their facility costs are included.

Other Facility Costs

Table 4.8.4 shows the distribution of other facility costs: insurance, maintenance, taxes, and utilities. The table shows that utilities and maintenance were the largest other drivers of cost after lease or ownership costs, followed by insurance and taxes.

Table 4.8.4. Section 8, Other Facilities Costs

	Insurance	Maintenance	Taxes	Utilities
Total costs, median (IQR)	5,650 (869; 20,691)	9,906 (1,200; 33,466)	0 (0; 0)	15,629 (5,694; 37,810)
Total costs, mean (95% CI)	33,672 (30,017; 37,328)	54,399 (48,159; 60,638)	2,389 (1,967; 2,810)	50,039 (45,378; 54,700)
Total costs per facility, mean (95% CI)	15,993 (14,182; 17,803)	23,461 (20,116; 26,806)	994 (783; 1,205)	22,129 (19,474; 24,784)
Total costs per square foot, mean (95% CI)	2.39 (2.19; 2.60)	2.55 (2.38; 2.71)	0.17 (0.15; 0.19)	3.04 (2.83; 3.26)
Total ground ambulance-related costs, mean (95% CI)	17,625 (15,627; 19,624)	33,276 (29,291; 37,262)	1,944 (1,577; 2,312)	29,942 (27,253; 32,630)
Total ground ambulance-related costs per facility, mean (95% CI)	8,109 (7,242; 8,975)	11,807 (10,809; 12,805)	712 (569; 855)	11,242 (10,227; 12,257)
Total ground ambulance-related costs per square foot, mean (95% CI)	1.64 (1.48; 1.80)	1.78 (1.64; 1.91)	0.14 (0.12; 0.16)	2.08 (1.93; 2.23)

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: IQR = interquartile range. CI = confidence interval. Overall denominator of 4,577 organizations reflects sampling weights. Organizations that contract out broader ground ambulance functions other than labor or that only reported facilities as 0 percent ground ambulance-related are not included in this table. Costs represent costs in dollars to organizations.

Taxes were a large cost for some organizations, but the majority of organizations did not report any costs from taxes (Table 4.8.5). This is consistent with interviews we conducted with organizations that noted that they generally did not have tax costs on government-owned facilities.

Table 4.8.5. Section 8, Taxes by Ownership Category

	N	Median (IQR)	Mean (SD)
Non-profit	1,320	0 (0; 0)	1,412 (11,303)
For-profit	855	0 (0; 5,000)	8,413 (28,412)
Government	2,403	0 (0; 0)	782 (7,841)

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: IQR = interquartile range. SD = standard deviation. Overall denominator of 4,577 organizations reflects sampling weights. Organizations that contract out broader ground ambulance functions other than labor or that only reported facilities as 0 percent ground ambulance-related are not included in this table.

Total Facility Costs

Table 4.8.6 shows the total facility costs, including costs of rent, ownership, and other facilities costs by organization characteristics. The ground ambulance-related portion of total facility costs and the ground ambulance-related portion of total facility costs by ground ambulance-related square footage are also included.

Provider organizations had much higher average total facility costs, although costs were more comparable when restricted to ground ambulance-related facility costs. Government organizations had the lowest ground ambulance-related costs per square foot, less than half of those from for-profit organizations, potentially due to having more facilities owned outright and lower average facility taxes, as noted previously. Urban organizations had significantly higher costs per square foot as compared with both rural and super rural organizations.

As expected, organizations with high Medicare transport volume had higher overall facility costs. However, when looking at facility costs by facility and by square footage, costs were more comparable. Public safety organizations had much higher total facility costs than did non–public safety organizations, but the ground ambulance-related facility costs were similar for the two organization types.

Table 4.8.6. Section 8, Overall Facility Costs by Organization Characteristics

	N	Total Facility Costs, Mean (95% CI)	Total Ground Ambulance-Related Facility Costs	Total Ground Ambulance-Related Facility Costs per Square Foot
All NPIs	4,577	339,663 (300,364; 378,962)	198,381 (175,352; 221,410)	79,323 (69,090; 89,555)
Provider vs. supplier status				
Suppliers	4,246	310,725 (270,879; 350,572)	195,519 (172,537; 218,502)	73,984 (64,142; 83,827)
Providers	331	710,592 (523,350; 897,834)	235,061 (106,157; 363,964)	147,751 (78,821; 216,681)

	N	Total Facility Costs, Mean (95% CI)	Total Ground Ambulance-Related Facility Costs	Total Ground Ambulance-Related Facility Costs per Square Foot
Medicare transport volume				
Low	1,876	174,800 (132,258; 217,342)	81,065 (56,157; 105,973)	60,300 (46,272; 74,329)
Medium	1,316	311,639 (250,533; 372,746)	163,809 (128,880; 198,737)	96,526 (72,551; 120,501)
High	849	506,308 (381,044; 631,571)	294,154 (225,053; 363,255)	89,435 (64,498; 114,373)
Very high	536	721,465 (579,894; 863,035)	542,113 (452,622; 631,604)	87,651 (77,407; 97,894)
Ownership category				
Non-profit	1,320	272,797 (209,343; 336,251)	157,272 (108,283; 206,260)	93,271 (67,544; 118,997)
For-profit	855	226,570 (186,756; 266,384)	195,351 (159,538; 231,164)	65,899 (56,713; 75,084)
Government	2,403	416,622 (353,865; 479,380)	222,039 (190,030; 254,048)	76,436 (63,339; 89,533)
Service area pop. density				
Urban	2,402	481,034 (412,311; 549,757)	293,806 (252,450; 335,161)	107,019 (88,482; 125,557)
Rural	1,250	187,985 (148,873; 227,098)	106,197 (86,931; 125,462)	49,382 (41,620; 57,144)
Super rural	925	177,668 (131,452; 223,883)	75,256 (57,875; 92,637)	47,889 (39,098; 56,680)
Public safety				
No	2,423	252,316 (221,558; 283,073)	160,029 (138,151; 181,907)	73,420 (63,067; 83,773)
Yes	2,154	437,893 (363,097; 512,689)	241,511 (199,746; 283,275)	85,961 (67,776; 104,146)

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: NPI = National Provider Identifier. CI = confidence interval. Overall denominator of 4,577 organizations reflects sampling weights. Organizations that contract out broader ground ambulance functions other than labor or that only reported facilities as 0 percent ground ambulance-related are not included in this table.

Section 9: Vehicle Costs

Section 9 (Vehicle Costs) Content Overview

Section 9.1 (Ground Ambulance Vehicles)

- Number of ground ambulance vehicles
- Whether ground ambulances are leased or owned and whether they have been remounted
- Costs of lease or ownership

Section 9.2 (Other Vehicle Costs [Non-Ambulance])

- Number and types of non-ambulance vehicles supporting ground ambulance operations
- Whether vehicles are leased or owned
- Costs of lease or ownership

Section 9.3 (Other Costs Associated With Vehicles)

- Registration costs (across all vehicles)
- License costs (across all vehicles)
- Maintenance costs (by vehicle type)
- Fuel costs (by vehicle type)

Overview

Section 9 (Vehicle Costs) collects information on the characteristics and costs related to vehicles used by ground ambulance organizations (see box). Section 9.1 (Ground Ambulance Vehicle Costs) focuses on ground ambulance vehicles; Section 9.2 (Other Vehicle Costs [Non-Ambulance]) focuses on the costs of non-ambulance vehicles that are partially or entirely used to support ground ambulance operations (e.g., fire trucks, supervisor vehicles, water rescue vehicles); and Section 9.3 (Other Costs Associated With Vehicles) looks at other related costs, such as registration, fuel, and maintenance costs. Some of these non-ambulance vehicles are used to respond to an EMS call ahead of or in conjunction with ground ambulances. Land and water rescue vehicles not meeting the definitions of ground ambulances are often used to transport patients from a difficult-to-reach location to one that a ground ambulance is able to reach. Other non-response vehicles, such as supervisor vehicles, are used to support ground ambulance operations through transport of ground ambulance staff to ground ambulance-related meetings, trainings, and events.

Key Section 9 (Vehicle Costs) Findings

- There was wide variation in how much of shared costs were allocated as being ground ambulance-related. Use of expensive vehicles, such as fire trucks, to respond to ground ambulance calls can be large drivers of costs for some organizations.
- Fuel costs were the largest other cost associated with vehicles.

As in the facilities section, the first two subsections of Section 9 are mostly reported at the individual vehicle level, while the last section reports on costs aggregated across vehicles. Prior studies have found vehicles and fuel to be among the largest cost drivers behind labor costs, accounting for approximately 11 percent of costs.[100] The report also found that rising fuel costs were one of the biggest drivers of cost *increases* for ambulance organizations from year to year.

Ground ambulance vehicle costs may vary somewhat depending on whether organizations lease or own their ground ambulances and whether the vehicles were purchased new, used, or

[100] U.S. Government Accountability Office, *Ambulance Providers: Costs and Medicare Margins Varied Widely; Transports of Beneficiaries Have Increased*, GAO-13-6, 2012.

remounted.[101] Organizations are not asked to allocate costs of ground ambulance vehicles (i.e., the costs of ground ambulance vehicles are assumed to be 100 percent related to ground ambulance operations). Many organizations also use non-ambulance vehicles to support ground ambulance operations. As in other sections, the GADCS allows respondents to estimate the percentage of non-ambulance vehicle costs that are attributable to supporting ground ambulance operations. These may be significantly cheaper (e.g., supervisor vehicles) or significantly more expensive (e.g., fire trucks) than ground ambulance vehicles. Furthermore, organizations that use fire trucks may vary in how often these vehicles are used to respond to emergency medical service calls. In some cases, a fire truck may respond to nearly every emergency medical service call, while in others they may be almost entirely used to respond to fire calls. The percentage of fire truck costs attributed to supporting ground ambulance operations may be a significant driver of variation in vehicle costs.

The GADCS also allows respondents to either depreciate their vehicle costs or, if an organization operates on a cash basis, to only report on actual expenditures (e.g., vehicle payment or full vehicle purchase price) made during the data collection period. Organizations operating on a cash basis may have more variability in vehicle expenditures, as prices could be very high if several vehicles were purchased during the data collection period or very low if all the vehicles used were purchased prior to the data collection period. By contrast, organizations who depreciate vehicle costs may have less variability.

Number and Types of Vehicles

Table 4.9.1 presents the number of each type of vehicle used to support ground ambulance operations by organization type (public safety or not). The number of owned and leased ground ambulance vehicles used by organizations during the data collection period were reported in Section 9.1, Questions 1 and 2, and the number and types of owned and leased non-ambulance vehicles were reported in Section 9.2, Question 5.

Table 4.9.1. Number of Vehicles of Each Type by Public Safety or Not

		Non–Public Safety		**Public Safety**
N		2,721		2,302
	% Organizations With Vehicle	**Mean (SD)***	**% Organizations With Vehicle Type**	**Mean (SD)***
# ground ambulances	100%	9.23 (21.44)	100%	4.74 (12.29)
# land rescue	13.11%	2.24 (2.07)	17.83%	1.98 (3.07)
# water rescue	0.97%	2.00 (0.79)	6.47%	3.18 (16.19)
# fire trucks	0.43%	4.46 (4.75)	76.05%	5.68 (13.49)

[101] A *remounted* ambulance refers to an ambulance where the ambulance box (i.e., the box in which the patient and attending EMTs ride) was reused and placed on a new chassis (i.e., the base frame of the ambulance). Remounting can save costs as compared with purchasing an entirely new ambulance.

		Non–Public Safety		Public Safety
# non-transport response vehicle	79.83%	3.21 (4.48)	73.35%	4.27 (9.38)
# other vehicles	28.71%	3.19 (4.35)	15.66%	6.70 (38.04)

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: SD = standard deviation. Overall denominator of 5,023 organizations reflects sampling weights. Means, SDs, and *N*s (#) represent organizations that had specific vehicle cost.

As expected, ground ambulances made up the largest share of vehicles used by ground ambulance organizations to support ground ambulance operations. However, the majority of organizations had at least one non-transport response vehicle, and the majority of public safety organizations had at least one fire truck that was at least partially used to support ground ambulance operations. Other types of vehicles, including land rescue, water rescue, and other vehicles, were used less frequently.

Table 4.9.2 shows the number of owned, leased, donated, and remounted ground ambulance and non-ambulance vehicles (reported in Section 9.1, Question 5). For-profit organizations tended to have the largest number of ground ambulances, although government organizations tended to have the largest number of vehicles overall. As with facilities, most vehicles were owned, but for-profit organizations had more leased vehicles on average than did non-profit or government organizations. Organizations had very few donated ground ambulances and donated non-ambulance vehicles, but non-profit organizations had more donated vehicles on average than did for-profit or government organizations. The average number of remounted ground ambulances was low overall but was higher for non-profit and government organizations than for for-profit organizations.

Table 4.9.2. Ground Ambulance Vehicles Leased or Owned, by Organization Type

	Non-Profit	For-Profit	Government	All Organizations
N	1,482	950	2,591	5,023
Ground ambulances				
# owned	2.60 (5.55)	6.27 (15.41)	2.85 (8.86)	3.42 (9.72)
# leased	0.60 (4.98)	2.05 (20.46)	0.25 (3.16)	0.69 (9.07)
# donated	0.19 (2.70)	0.04 (0.52)	0.09 (2.13)	0.11 (2.14)
# remounted	0.33 (1.68)	0.19 (2.03)	0.29 (2.30)	0.28 (2.11)
Non-ambulance vehicles				
# owned	4.44 (7.42)	5.39 (10.80)	8.86 (30.88)	7.13 (24.95)
# leased	0.13 (0.86)	0.18 (1.27)	0.16 (1.10)	0.16 (1.08)
# donated	0.16 (0.61)	0.03 (0.21)	0.13 (0.75)	0.12 (0.67)

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: Overall denominator of 5,023 organizations reflects sampling weights. Values represent mean (standard deviation [SD]). Donated vehicles are also considered to be owned vehicles.

Vehicle Mileage

Table 4.9.3 shows the mean and median distribution of total miles traveled by ground ambulance (reported in Section 9.1, Questions 2 and 3) and non–ground ambulance vehicles (reported in Section 9.2, Questions 3 and 4). Overall, ground ambulances traveled more total miles than did non-ambulance vehicles. As expected, high-transport-volume organizations had significantly higher total mileage for both ground ambulance and non-ambulance vehicles. Rural and super rural organizations had lower total mileage than did urban organizations. Although rural and super rural organizations may have more mileage per response or transport, this is likely offset by the lower overall response and transport volume.

Table 4.9.3. Section 9, Ground Ambulance and Non-Ambulance Vehicle Mileage

	N	Total Ground Ambulance Miles (95% CI)	Total Ground Ambulance Miles, Median	Total Non-Ambulance Vehicle Miles, Mean (95% CI)	Total Non-Ambulance Vehicle Miles, Median
All NPIs	5,023	155,563 (139,826; 171,300)	60,343 (49,437; 71,250)	34,263 (10,000; 110,000)	16,902 (5,000; 43,720)
Provider vs. supplier status					
Suppliers	4,673	154,162 (137,586; 170,738)	62,097 (50,684; 73,510)	31,046 (9,380; 100,780)	16,402 (4,870; 44,187)
Providers	350	174,251 (132,893; 215,609)	29,641 (21,547; 37,736)	95,826 (40,000; 196,856)	20,000 (10,000; 32,336)
Medicare transport volume					
Low	2,123	22,984 (20,619; 25,349)	15,725 (11,514; 19,935)	9,384 (3,538; 20,928)	6,000 (1,510; 17,467)
Medium	1,416	64,433 (59,921; 68,944)	27,158 (24,158; 30,158)	41,500 (23,500; 75,000)	15,344 (5,863; 31,694)
High	884	186,406 (156,669; 216,143)	70,511 (50,607; 90,416)	105,349 (58,718; 179,730)	31,930 (12,000; 63,633)
Very high	600	793,836 (696,538; 891,135)	210,097 (150,693; 269,501)	469,238 (211,117; 954,077)	73,000 (25,000; 169,956)
Ownership category					
Non-profit	1,482	132,062 (107,699; 156,425)	30,701 (23,500; 37,903)	34,263 (9,558; 100,000)	10,574 (2,907; 30,831)
For-profit	950	381,314 (310,133; 452,495)	71,733 (47,761; 95,706)	105,349 (19,434; 356,000)	25,000 (10,000; 62,484)
Government	2,591	86,241 (76,176; 96,306)	72,041 (54,992; 89,090)	25,386 (9,206; 72,178)	17,801 (5,500; 47,252)

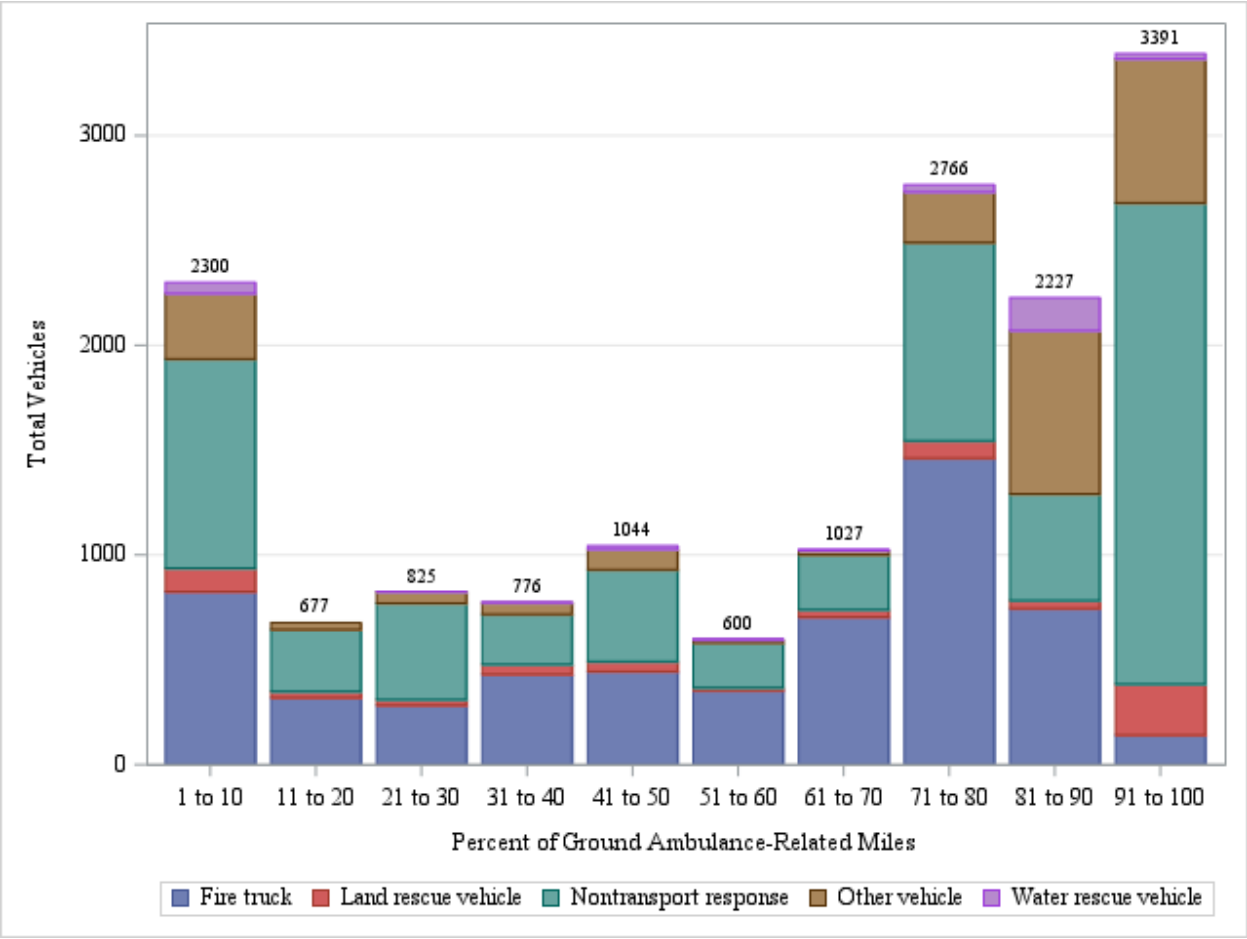
	N	Total Ground Ambulance Miles (95% CI)	Total Ground Ambulance Miles, Median	Total Non-Ambulance Vehicle Miles, Mean (95% CI)	Total Non-Ambulance Vehicle Miles, Median
Service area pop. density					
Urban	2,585	220,381 (191,707; 249,055)	81,139 (64,006; 98,272)	43,872 (15,000; 149,267)	22,000 (7,242; 55,000)
Rural	1,388	114,609 (99,814; 129,404)	27,672 (23,638; 31,705)	34,500 (7,928; 111,322)	11,467 (3,592; 31,762)
Super rural	1,050	50,200 (41,209; 59,192)	19,662 (14,871; 24,452)	15,750 (4,410; 49,754)	10,000 (1,628; 24,000)
Public safety					
No	2,721	226,338 (198,809; 253,867)	43,491 (36,707; 50,276)	60,000 (15,640; 177,328)	16,010 (5,000; 38,200)
Yes	2,302	71,857 (61,220; 82,494)	73,261 (54,728; 91,795)	20,000 (6,800; 51,420)	17,424 (5,000; 47,003)

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: NPI = National Provider Identifier. CI = confidence interval. Overall denominator of 5,023 organizations reflects sampling weights.

Figure 4.9.1 shows the percentage of miles traveled by non-ambulance vehicles that organizations reported as being ground ambulance-related (reported in Section 9.2, Question 5). Looking across all types of vehicles, the modal (i.e., most commonly reported) allocation was 100 percent ground ambulance-related (21 percent of vehicles). The other 79 percent of non-ambulance vehicles were not fully related to ground ambulance operations. As expected, organizations reported very few fire trucks (approximately 1 percent) as having all miles related to ground ambulance operations. While many organizations routinely send fire trucks on ground ambulance calls, fire trucks are also routinely used to respond to fires and other public safety emergencies. The allocation of fire truck miles as being ground ambulance-related was distributed fairly evenly, from 1 percent to 100 percent, with the modal allocation being 50 percent and the median allocation being 65 percent. Fire trucks can constitute large costs for organizations and tend to be significantly more expensive than ground ambulances (see additional detail later in this section), so differential use of fire trucks to respond to ground ambulance calls has the potential to drive variation in overall ground ambulance organization costs among public safety organizations.

Land rescue, non-transport response vehicles, other vehicles, and water rescue vehicles on average had higher ground ambulance-related allocations than did fire trucks but still spanned the full range of allocation percentages. As with facilities, there were local maxima at allocations of 50 percent and 75 percent, indicating that many organizations may have selected round numbers rather than use a data-driven approach to estimating the percentage of vehicle miles that are ground ambulance-related.

Figure 4.9.1. Section 9 Distribution of Percent of Miles That Are Ground Ambulance-Related by Vehicle Type



SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: Unit of analysis is unweighted vehicles.

Ground Ambulance Costs

Table 4.9.4 shows total costs of leased, owned, and remounted ground ambulances (as reported in Section 9.1, Question 5). The majority of organizations did not depreciate ground ambulance costs and instead reported the costs incurred during the data collection period. As with facilities, organizations that depreciated ground ambulance costs tended to be larger and have higher total costs of ground ambulance ownership. However, these organizations also had less variability in costs.

Organizations must typically replace or remount ground ambulances every four years[102] and appeared to have little use of fully depreciated ambulances, as indicated by the small percentage of organizations with zero purchase and depreciation costs. Some organizations remounted ground ambulances during the data collection period, with $120,542 as the average cost per

[102] The Moran Company, *Final Report Detailing "Hybrid Data Collection Method" for the Ambulance Industry: Beta Test Results of the Statistical & Financial Data Survey & Recommendations*, 2014.

remounted ambulance. Based on our analysis of the data and follow-up conversations with ground ambulance organizations (described further in Appendix B), Section 9.1, Question 5 was one of the most frequently misinterpreted questions, with many organizations appearing to report costs incurred prior to the data collection period. These variables underwent extensive cleaning (also described in Appendix B) but may still reflect some costs that were incurred prior to the data collection period.

Table 4.9.4. Ground Ambulance Vehicle Costs

	Total Ground Ambulance Lease Costs*	Total Costs for Owned Ground Ambulances (no depreciated ground ambulances)**	Total Costs for Owned Ground Ambulances (with depreciated ground ambulances)***	Total Costs for Remounting****
Organizations contributing to category, *N*	340	3,005	1,632	573
Total costs to organization, median (IQR)	26,541 (1,000; 76,800)	127,600 (0; 374,560)	77,177 (32,682; 217,300)	160,000 (110,817; 309,116)
Total costs to organization, mean (95% CI)	108,300 (63,927; 152,672)	284,306 (259,450; 309,163)	220,016 (198,196; 241,836)	268,005 (236,342; 299,668)
Total costs per ground ambulance, mean (95% CI)	25,545 (20,339; 30,751)	76,925 (73,214; 80,636)	24,063 (22,631; 25,496)	120,542 (115,915; 125,169)
Ground ambulances in category with zero costs, %	N/A	19.2%	1.0%	N/A

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: IQR = interquartile range. CI = confidence interval. Overall denominator of 4,789 organizations reflects sampling weights. Organizations may contribute to multiple categories. Organizations that contract out broader ground ambulance functions other than labor are not included in this table.
* Only organizations that lease ground ambulances and leased ground ambulances are included in this column.
** Includes vehicle purchase costs, payments on vehicles, and other costs of ownership to organizations during the data collection period. Includes vehicles that are fully paid off and have zero costs of ownership. Only organizations that do not depreciate ground ambulance costs are included in this column.
*** Includes depreciation costs (including $0 costs for fully depreciated vehicles), interest payments, and purchase costs or payments made during the data collection period. Only organizations that depreciate some or all of their ground ambulance vehicle costs are included in this column.
**** Includes remount costs incurred during the data collection period. A ground ambulance may contribute costs to both this column and one of the other ownership columns.

Non-Ambulance Vehicle Costs

In addition to costs of leasing and owning ground ambulances, organizations incurred lease and ownership costs for non-ambulance vehicles (as reported in Section 9.2, Question 5; Table 4.9.4). The table shows the mean total non-ambulance vehicle costs to organizations, the mean cost per non-ambulance vehicle for organizations, and the total ground ambulance-related non-ambulance vehicle costs to organizations. Total ground ambulance-related costs to organizations were determined by multiplying the total cost for each non-ambulance vehicle by the percentage that the organization reported as ground ambulance-related. Fire trucks had the highest overall costs, the highest ground ambulance-related costs, and the highest total costs per vehicle of any vehicle type among organizations with that vehicle type. Land rescue vehicles were the second most expensive vehicle category.

Table 4.9.5. Non-Ambulance Vehicle Costs

	N Organizations With Type of Vehicle	Total Costs to Organization, Mean (95% CI)*	Total Costs per Vehicle, Mean (95% CI)	Total Ground Ambulance-Related Costs to Organization, Mean (95% CI)
Land rescue vehicles	418	121,963 (84,259; 159,668)	62,159 (43,286; 81,031)	77,160 (50,702; 103,617)
Water rescue vehicles	108	27,932 (10,313; 45,551)	17,451 (7,357; 27,546)	11,604 (1,254; 21,953)
Fire trucks	1,146	728,481 (612,557; 844,405)	206,050 (185,205; 226,896)	332,480 (256,634; 408,326)
Non-transport Vehicles	2,014	56,190 (47,701; 64,679)	20,901 (19,179; 22,624)	28,732 (24,453; 33,010)
Other vehicles	564	31,346 (24,649; 38,042)	14,504 (11,936; 17,072)	16,256 (12,583; 19,929)

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: CI = confidence interval. Overall denominator of 4,789 organizations reflects sampling weights. Organizations that contract out broader ground ambulance functions other than labor are not included in this table. Costs reported in the table include both lease and ownership costs.
* For organizations that indicated having at least one vehicle in category, includes lease, depreciation, and ownership costs incurred during data collection period. Values represent mean and SD costs for organization. Includes $0 costs for vehicles owned outright and purchased prior to the data collection period and fully depreciated vehicles.

Other Vehicle Costs

Table 4.9.6 shows other vehicle costs, including insurance, maintenance, license and registration, and fuel costs, as reported in Section 9.3, Questions 1–5. Ground ambulance-related costs for insurance and maintenance were based on the number of ground ambulances (reported in Section 9.1, Questions 1 and 2) out of the total vehicles supporting ground ambulance operations (Section 9.2, Question 2) and the percentage of non-ambulance vehicles that organizations reported as being ground ambulance-related (Section 9.2, Question 5). Organizations were asked to separately allocate ground ambulance-related costs for fuel and maintenance because some vehicles (e.g., fire trucks) may have relatively higher fuel and maintenance costs per vehicle. Consistent with prior results from the GAO report,[103] fuel was a large driver of other vehicle costs. Maintenance costs were the second highest other vehicle cost, followed by license and registration. Vehicle insurance costs were generally low, with many organizations reporting no costs.

[103] U.S. Government Accountability Office, *Ambulance Providers: Costs and Medicare Margins Varied Widely; Transports of Beneficiaries Have Increased*, GAO-13-6, 2012.

Table 4.9.6. Other General Vehicle Costs

	Insurance	License and Registration	Maintenance	Fuel
Total costs to organization, median (Q1, Q3)	0 (0; 196)	8,970 (2,706; 25,173)	20,910 (5,000; 63,831)	23,957 (6,966; 67,979)
Total costs to organization, mean (95% CI)	1,070 (766; 1,374)	41,317 (36,409; 46,226)	83,209 (72,063; 94,355)	86,152 (77,958; 94,347)
Total costs per vehicle, mean (95% CI)	60 (54; 66)	3,402 (3,214; 3,591)	6,099 (5,852; 6,346)	6,487 (6,249; 6,724)
Total ground ambulance-related costs to organization, mean (95% CI)	1,029 (734; 1,324)	37,732 (32,997; 42,466)	71,725 (62,322; 81,129)	78,890 (71,303; 86,476)
Total ground ambulance-related costs per vehicle, mean (95% CI)	58 (52; 64)	3,074 (2,914; 3,234)	5,410 (5,183; 5,637)	6,006 (5,775; 6,237)

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: Q1 = question 1. Q3 = question 3. CI = confidence interval. Overall denominator of 4,789 organizations reflects sampling weights. Organizations that contract out broader ground ambulance functions other than labor are not included in this table. Costs reported in the table are at the organization level and include costs for ground ambulance and non-ambulance vehicles. $0 costs are included.

Section 10: Equipment, Consumable, and Supply Costs

Section 10 (Equipment, Consumable, and Supply Costs) Content Overview

Section 10.1 (Medical Equipment/Supplies)

- Capital medical equipment
- Medications
- Medical equipment, supplies, and consumables

Section 10.2 (Non-Medical Equipment/Supplies)

- Capital non-medical equipment
- Uniforms
- Non-medical supplies

Overview

Section 10 (Equipment, Consumable, and Supply Costs) collects information on equipment, supplies, and medications used by ground ambulance organizations. Section 10.1 (Medical Equipment/Supplies) includes capital medical equipment (such as defibrillators and ventilators) and non-capital medical equipment, supplies, and consumables (such as reusable oxygen masks, gauze and bandages). Section 10.2 (Non-Medical Equipment/Supplies) includes non-medical equipment (such as computers and photocopiers) and non-medical supplies (such as paper and printer ink) that are fully or partially used to support ground ambulance operations. Medications are also reported in Section 10.1. These are typically 100 percent ground ambulance-related, although in some cases costs may be shared by other lines of service, such as in a hospital. Both Sections 10.1 and 10.2 also include questions about maintenance and certification costs for equipment. The prior GAO report found that approximately 7 percent of costs were related to equipment and supplies.[104]

As in previous sections, supply and equipment costs may vary by size of the organization, with larger organizations requiring more equipment and supplies but also seeing some cost savings with economies of scale, particularly for expensive and less frequently used medical equipment.

Section 10 also asks separately for costs of capital equipment (i.e., more-expensive equipment that can withstand repeated use) and non-capital equipment, supplies, and consumables (i.e., lower-cost purchases that are replaced more frequently). As in Sections 8 and 9, the GADCS allows organizations the option to depreciate the cost of capital equipment, to report on a cash basis, or to report rental costs. Costs related to maintenance or certification of equipment are also reported in this section.

Key Section 10 (Equipment, Consumable, and Supply Costs) Findings

- Overall, medical equipment and supplies costs were higher than non-medical equipment and supplies costs.
- Large but infrequent capital medical equipment costs made up nearly half of medical equipment and supplies costs overall and contribute to variability in equipment and supply costs over a given data collection period.
- Provider organizations, for-profit organizations, and non–public safety organizations all had relatively larger medical equipment and supply costs than non-medical equipment and supply costs.

[104] U.S. Government Accountability Office, *Ambulance Providers: Costs and Medicare Margins Varied Widely; Transports of Beneficiaries Have Increased*, GAO-13-6, 2012.

Equipment and Supply Costs

Table 4.10.1 shows the percentage of organizations reporting costs, mean costs, and mean ground ambulance-related costs by type of equipment or supply cost (as reported in Sections 10.1 and 10.2, Questions 1–3). Most organizations reported a purchase cost for capital medical equipment during their data collection periods. A smaller percentage of organizations reported depreciation or rental and interest costs of capital medical equipment. Similar patterns were observed for capital non-medical equipment. Nearly all (96.27%) organizations reported having other medical equipment and supply costs, and most (89.08%) reported having other non-medical equipment and supply costs.

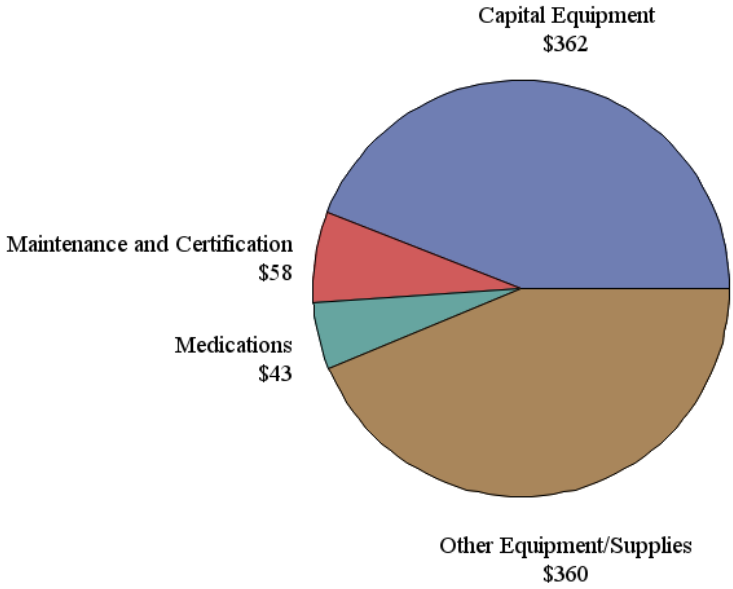
Table 4.10.1. Medical and Non-Medical Equipment and Supply Costs

	Percentage of Organizations Reporting Cost	Total Cost, Mean (95% CI)	Ground Ambulance-Related Cost, Mean (95% CI)
Capital medical equipment (depreciation)	30.90%	87,360 (77,401; 97,320)	78,290 (69,323; 87,257)
Capital medical equipment (purchase)	57.76%	77,127 (70,465; 83,790)	73,191 (66,776; 79,606)
Capital medical equipment (rental and interest costs)	7.88%	19,082 (16,299; 21,864)	18,615 (15,862; 21,367)
Capital medical equipment maintenance and certification costs	61.30%	19,262 (17,585; 20,940)	18,238 (16,644; 19,832)
Medications	38.13%	19,129 (16,620; 21,637)	19,129 (16,620; 21,637)
Other medical equipment and supplies	96.35%	79,344 (72,346; 86,342)	71,902 (65,676; 78,127)
Capital non-medical equipment (depreciation)	16.63%	69,725 (57,337; 82,112)	53,043 (42,896; 63,190)
Capital non-medical equipment (purchase)	47.43%	54,579 (48,134; 61,023)	39,541 (34,754; 44,329)
Capital non-medical equipment (rental and interest costs)	6.75%	8,395 (7,159; 9,630)	7,293 (6,168; 8,418)
Capital non-medical equipment maintenance and certification costs	26.65%	21,167 (18,494; 23,841)	17,668 (15,337; 19,998)
Uniforms	79.17%	22,458 (20,655; 24,261)	26,521 (17,094; 35,948)
Other non-medical equipment and supplies	89.66%	28,396 (25,040; 31,751)	20,452 (17,988; 22,916)

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: CI = confidence interval. Overall denominator of 4,789 organizations reflects sampling weights. Organizations that contract out broader ground ambulance functions other than labor are not included in this table.

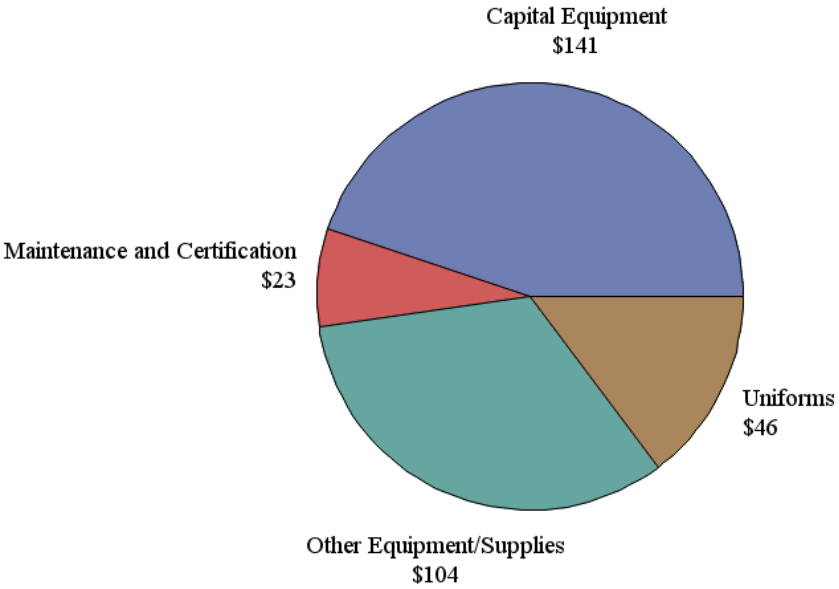
Figure 4.10.1 shows the relative contribution of different types of medical equipment and supplies to overall medical equipment and supply costs (as reported in Section 10.1, Questions 1–3) across the entire analytic sample. Similarly, Figure 4.10.2 shows the relative contribution of different types of non-medical equipment and supplies to overall non-medical equipment and supply costs (as reported in Section 10.2, Questions 1–3) across the entire analytic sample. Overall, medical equipment and supplies had higher costs than non-medical equipment and supplies. Overall costs were nearly equal for medical capital equipment and other equipment and supplies, with maintenance and certification of medical equipment and medications contributing smaller shares of the overall medical equipment and supply costs. For non-medical equipment and supplies, capital equipment contributed the largest share of costs, followed by other equipment and supplies, uniforms, and maintenance and certification.

Figure 4.10.1. Total Weighted Ground Ambulance-Related Medical Equipment and Supplies Costs (in Millions) Across Organizations



SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.

Figure 4.10.2. Total Weighted Ground Ambulance-Related Non-Medical Equipment and Supplies Costs (in Millions) Across Organizations



SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.

Table 4.10.2 shows the total ground ambulance-related medical and non-medical equipment and supply costs (as reported in Sections 10.1 and 10.2, Questions 1–3) by organization type. As expected, organizations with higher Medicare transport volume had higher overall medical and non-medical equipment and supply costs.

Overall, the mean cost of medical equipment and supplies was more than double the mean cost of non-medical equipment and supplies. However, this did not hold true across organization types. Notably, provider and supplier organizations had similar mean non-medical equipment and supply costs, but provider organizations had nearly double the medical equipment and supply costs. It is possible that provider organizations were incorrectly allocating non–ground ambulance-related costs as being ground ambulance-related, or provider organizations may have more expensive medical equipment and supplies needed for SCT. For-profit organizations also had higher medical equipment and supply costs relative to non-medical equipment and supply costs, as compared with non-profit and government organizations.

Table 4.10.2. Total Equipment and Supply Costs by Organization Type

	N	Ground Ambulance-Related Medical Equipment and Supply Costs, Mean (95% CI)	Ground Ambulance-Related Non-Medical Equipment and Supply Costs, Mean (95% CI)
All NPIs	4,789	153,706 (142,722; 164,690)	61,598 (55,411; 67,784)
Provider vs. supplier status			

	N	Ground Ambulance-Related Medical Equipment and Supply Costs, Mean (95% CI)	Ground Ambulance-Related Non-Medical Equipment and Supply Costs, Mean (95% CI)
Suppliers	4,451	144,677 (133,685; 155,669)	61,526 (55,071; 67,980)
Providers	338	272,598 (213,996; 331,201)	62,546 (41,448; 83,643)
Medicare transport volume			
Low	2,031	46,321 (41,020; 51,621)	17,028 (14,210; 19,846)
Medium	1,360	102,675 (93,355; 111,996)	42,928 (36,938; 48,917)
High	861	217,888 (195,757; 240,018)	93,266 (78,573; 107,959)
Very high	537	586,002 (520,996; 651,008)	226,595 (188,057; 265,133)
Ownership category			
Non-profit	1,423	138,376 (117,041; 159,711)	46,202 (37,604; 54,800)
For-profit	885	175,952 (144,223; 207,680)	56,013 (40,771; 71,255)
Government	2,481	154,563 (141,012; 168,114)	72,424 (63,135; 81,713)
Service area pop. density			
Urban	2,470	209,063 (190,137; 227,989)	95,140 (84,070; 106,211)
Rural	1,321	117,474 (102,586; 132,363)	32,963 (26,434; 39,491)
Super rural	998	64,638 (56,776; 72,500)	16,467 (13,148; 19,786)
Public safety			
No	2,592	176,642 (159,722; 193,562)	48,844 (41,631; 56,056)
Yes	2,197	126,649 (113,346; 139,952)	76,643 (66,285; 87,000)

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: NPI = National Provider Identifier. IQR = interquartile range. CI = confidence interval. Overall denominator of 4,789 organizations reflects sampling weights. Organizations that contract out broader ground ambulance functions other than labor and with non-zero costs are not included in this table.

Section 11: Other Costs

Section 11 (Other Costs) Content Overview

- Outside contracted services
- Medical or ground-ambulance-related expenses
- Administrative and general expenses
- Fees, fines, and taxes
- Insurance

Overview

Section 11 (Other Costs) of the GADCS addresses additional costs directly related to supporting the organization's ground ambulance services that were not covered in previous sections of the instrument. The section begins with costs incurred for outside contracted services that required a fee and that were not reported elsewhere in the GADCS. Possible services include billing, accounting, vehicle maintenance/repair, dispatch/call center, facilities maintenance, IT support, EMT/response labor, and other services. When applicable, the organization must enter the total dollar amount for each service's cost and then report the percentage of the cost attributable to ground ambulance services. Next, if the organization indicated having a parent organization in Question 2 of Section 2 (Organizational Characteristics), it must report the portion of costs allocated to the parent organization.

Finally, the GADCS respondent must indicate if they incurred a set of expenses during the data collection period. Organizations should include expenses related to providing support for their ground ambulance services. The expenses are grouped into several categories: medical or ground ambulance-related expenses, administrative and general expenses, fees, fines and taxes, insurance, and any other expenses not reported elsewhere. Again, for organizations that responded yes to Question 2 of Section 2, they must report the portion of costs allocated to the parent organization.

Key Section 11 (Other Costs) Findings

- Organizations that contracted with other organizations to provide services had mean and median annual contract expenses of $1,629 and $481, respectively, with the largest expenses coming from EMT/response labor.
- Organizations that outsourced EMT labor and ground ambulance services faced much higher contracting costs compared with those that did not outsource or only outsourced EMT labor. This means that operating ground ambulance services substantially increases the costs for organizations.
- Almost all organizations reported incurring external costs, with administrative and general expenses being the most common, at 83.4 percent of organizations.
- For-profit organizations were more likely to incur costs in every category compared with government and non-profit organizations.

Outside Contracted Services

We found the total amount of contracted services to be heavily skewed across organizations, with a mean of $211,521 for organizations incurring a cost and a median of $48,142. Table 4.11.1 breaks down each of the costs by the categories asked in the GADCS. The largest contracted costs are for EMT/response labor (with a conditional mean of $257,265 and a

conditional median of $89,217). These labor costs are significantly higher compared with the next largest categories: dispatch/call center services, billing, and vehicle maintenance/repair services. Provider organizations had substantially higher billing and vehicle maintenance/repair costs compared with suppliers.

Table 4.11.1. Annual Contracted Services Costs

	Percentage With Contracted Cost (% of panel *n*)	Conditional Mean	25th Percentile	Median	75th Percentile
All NPIs (*n* = 5,023)					
Total	91.8%	211,521	13,247	48,142	150,971
Billing	77.8%	86,214	6,895	23,034	65,588
Accounting	36.2%	11,988	1,692	5,000	12,360
Vehicle maintenance/repair	27.0%	40,065	3,750	13,209	44,555
Dispatch/call center	25.3%	92,088	7,012	27,205	96,940
Facilities maintenance	17.5%	16,056	1,788	5,200	17,215
IT support	27.7%	24,509	2,048	6,983	19,461
EMT/response labor	10.0%	257,265	11,557	89,217	373,500
Other	16.7%	56,910	2,941	10,328	39,257
Did not contract out broader ground ambulance services (*n* = 4,595)					
Total	91.9%	190,288	12,709	44,409	133,167
Billing	78.0%	82,786	6,740	22,694	64,549
Accounting	36.0%	12,160	1,692	5,050	12,486
Vehicle maintenance/repair	26.6%	39,209	3,598	12,955	42,064
Dispatch/call center	25.3%	92,021	7,012	27,225	96,940
Facilities maintenance	17.3%	16,005	1,600	5,206	17,255
IT support	28.2%	24,174	2,124	7,188	19,429
EMT/response labor	7.1%	209,771	6,453	52,316	254,688
Other	16.6%	53,540	2,704	9,100	37,910
Contracted out EMT labor or broader ground ambulance services (*n* = 427)					
Total	91.3%	440,996	36,621	88,357	401,638
Billing	75.8%	124,130	10,150	27,408	82,737
Accounting	38.3%	10,254	1,608	3,775	10,140
Vehicle maintenance/repair	30.9%	48,002	5,176	14,721	68,308
Dispatch/call center	24.4%	92,836	7,216	25,195	100,855
Facilities maintenance	19.3%	16,548	3,120	4,859	10,908
IT support	21.6%	29,207	1,000	4,206	25,569
EMT/response labor	41.3%	345,310	49,850	167,620	577,538
Other	18.4%	89,551	5,804	10,800	87,658

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: NPI = National Provider Identifier. IT = information technology. EMT = emergency medical technician. Table is stratified by responses to Section 2, Question 18. Conditional mean, median, 25th percentile, and 75th percentile are limited to organizations with a cost greater than zero. "Other" is a write-in category that included other contracted services, such as human resources, legal, payroll, and tax preparation.

The median costs for all contracted services increased monotonically by volume regardless of the category, indicating that larger-volume organizations incurred higher contracting costs than smaller-volume organizations. Similarly, urban organizations had higher contracted costs than

both rural and super rural organizations. EMT/response labor costs for urban and rural organizations were much higher than those for super rural organizations. This difference could be related to the volume of services delivered.

We stratified our analyses based on responses to Section 2, Question 18. Organizations that contracted for their core ground ambulance functions incurred higher mean costs compared with those that did not. Similarly, organizations that contracted for both EMT labor and broader ambulance services (e.g., contracted with another organization to provide fully staffed and equipped ground ambulance units) faced higher contracted service costs than those that only contracted for EMT labor. Specifically, organizations that outsourced both EMT labor and broader ambulance services experienced higher costs for each contracted service compared with organizations that did not contract out ground ambulance services or only contracted EMT labor. Additionally, organizations that only outsourced EMT labor had higher mean EMT/response and other costs compared with those that did not contract out ground ambulance services. Our results show that organizations that contract out ground ambulance services have different costs compared with those that do not.

Other Cost Expenses (Section 11, Question 3)

Table 4.11.2 lists the expenses that the organization incurred during the data collection period. Substantial differences exist between the means and medians for each measure, with mean values significantly larger than medians, indicating a rightward skew in the expenses. Less than half of all the organizations reported a specific expense during the data collection period. The lone exception was training and continuing education costs (60.4 percent). The largest mean costs across organizations were for taxes ($88,650), workers' compensation insurance ($57,693), general insurance ($53,537), miscellaneous administrative fees ($41,703), and liability/malpractice insurance ($39,517).

Table 4.11.2. Other Expenses Incurred During the Data Collection Period

	Share Reporting Expense	Mean	Median	25th Percentile	75th Percentile
Medical or Ground Ambulance-Related Expenses					
Biohazard waste and medication removal fees	24.7%	$2,811	$995	$350	$2,992
Fees to physician(s) to oversee the paramedics and provide quality assurance	5.1%	$10,088	$8,000	$3,000	$16,884
Laundry	11.5%	$4,214	$2,069	$320	$5,166
Administrative and General Expenses					
Travel other than for training	18.2%	$10,451	$2,729	$762	$9,964
Subsidies paid to other organizations	3.3%	$16,650	$7,155	$960	$42,107
Funds paid to other ground ambulance organizations for services	12.0%	$21,434	$4,394	$1,650	$16,900

	Share Reporting Expense	Mean	Median	25th Percentile	75th Percentile
Funds paid to other non-transporting organizations for services	2.1%	$7,121	$6,380	$1,140	$12,703
Board of directors/trustees expenses	7.7%	$6,576	$3,400	$1,380	$9,950
Advertising, including any type of advertising in any medium	30.4%	$7,858	$1,500	$361	$6,300
Event/meeting costs	27.6%	$6,410	$2,247	$708	$6,428
IT software, licensing fees	35.8%	$32,008	$7,865	$2,400	$24,791
Training and continuing education costs	60.4%	$17,898	$4,901	$1,638	$15,000
Interest paid	9.6%	$28,243	$9,276	$1,872	$30,454
Physicals and medical assessments	24.8%	$10,369	$3,000	$840	$11,136
Recruiting expenses	10.4%	$11,279	$4,217	$1,000	$15,727
Audit fees, legal fees, and other professional fees	30.4%	$28,254	$6,351	$1,605	$23,160
Miscellaneous administrative fees/costs not reported in Section 10.2 or Section 3	34.1%	$41,703	$7,444	$2,013	$28,072
Fees, Fines, and Taxes					
911 service fees	3.6%	$13,987	$3,146	$800	$29,825
Fees for toll roads	10.5%	$2,905	$500	$102	$2,560
Fees paid to local jurisdictions required as condition of providing ground ambulance service	2.1%	$3,538	$2,824	$181	$6,925
Fees for regulatory compliance or accreditation	16.8%	$5,433	$1,000	$200	$3,020
Business regulation and related fees	8.7%	$2,826	$599	$120	$2,545
Licenses	18.5%	$2,553	$700	$250	$2,400
Fines, forfeitures, and citations	2.0%	$1,557	$1,946	$320	$2,620
Taxes	13.5%	$88,650	$26,139	$5,000	$103,230
Insurance					
Liability/malpractice insurance	35.2%	$39,517	$9,977	$3,000	$31,657
Workers' compensation insurance	45.6%	$57,693	$19,500	$5,678	$52,312
General insurance	25.9%	$53,537	$11,312	$3,095	$49,862

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: IT = information technology. Mean, median, 25th percentile, and 75th percentile are limited to organizations with a cost greater than zero.

We also predicted that the types of costs that organizations incur would differ based on their characteristics. Table 4.11.3 reports the percentage of organizations within each sampling stratum that incurred each type of cost mentioned in Section 11 of the GADCS. Approximately 90 percent of organizations incurred a cost, but the types of costs varied significantly. The most common costs were administrative and general expenses, followed by insurance. Less than half of the organizations incurred costs from fees, fines, taxes, or medical and ground ambulance-related expenses.

We observed important differences in the types of costs. For example, suppliers exhibited higher rates for all cost types except for medical or ground ambulance-related expenses. Over twice as many suppliers incurred insurance costs compared with providers. The share of organizations incurring any category of costs, except for insurance, increased monotonically

from lower- to higher-volume categories. This result indicates that larger organizations tend to incur a higher number of costs.

The share of organizations with a cost was relatively similar by ownership, service area population density, and public service status. However, there were notable differences. For instance, a higher share of for-profit organizations incurred costs in each category compared with government and non-profit organizations. Public safety organizations were less likely to incur costs in each category compared with non–public safety organizations. Finally, urban organizations were more likely to incur each type of cost compared with super rural organizations, while rural organizations were more likely to incur insurance costs compared with both urban and super rural organizations.

Table 4.11.3. Percentage of Organizations That Incurred an Expense During the Data Collection Period by Category of Expense and Organization Characteristic

	Any	Medical or Ground Ambulance-Related Expenses	Administrative and General Expenses	Fees, Fines, and Taxes	Insurance
All NPIs	89.5	32.7	83.4	41.9	59.0
Provider vs. supplier status					
Providers	84.1	31.4	74.2	32.6	29.5
Suppliers	89.9	32.8	84.1	42.6	61.2
Medicare transport volume					
Low	84.5	18.4	76.2	32.0	53.6
Medium	92.1	35.4	86.6	40.4	60.6
High	92.5	42.1	87.7	49.1	59.9
Very high	96.5	63.4	94.7	70.1	72.5
Ownership category					
Non-profit	90.1	26.6	83.0	39.5	56.5
For-profit	90.7	49.8	86.5	65.5	70.4
Government	88.6	30.0	82.4	34.7	56.2
Service area pop. density					
Urban	89.6	38.8	84.3	45.8	58.3
Rural	91.8	28.5	84.6	40.5	63.5
Super rural	86.0	23.3	79.5	34.3	54.7
Public safety					
No	90.4	37.5	84.7	49.8	66.1
Yes	88.4	27.0	81.8	32.6	50.5

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.

NOTE: NPI = National Provider Identifier.

Section 13: Revenues

Section 13 (Revenues) Content Overview

- Total revenue (from ground ambulance and other sources)
- Ground ambulance transport revenue by payer
- Ground ambulance revenue from all other sources

Overview

Prior studies of the ground ambulance industry assessed ground ambulance organization "margins" (in other words, revenue net of expenses) by combining information on both expenses and revenue. Section 13 (Revenues) changes the focus of GADCS questions from costs to revenue, including revenue from billed ground ambulance services and from other sources. Many of the same GADCS reporting principles for expenses (e.g., allocating amounts to focus on ground ambulance-specific shares and ensuring that dollar amounts are reported only once) also apply to revenue reported in Section 13. We discuss Section 13, Question 1, which asks organizations to report total revenue, including ground ambulance and non–ground ambulance revenue, in a later section of this chapter. Section 12 (Total Costs) is only used for validation purposes (please see Appendix B) and is not presented in this report.

Section 13 (Revenues) Findings

- Organizations with lower transport volume and smaller revenue from billed ground ambulance services were more likely to report transport revenue as a single sum rather than by payer. This finding held even after controlling for observable organization-level characteristics, suggesting an unmeasured role of billing companies or another driver of this difference.
- Traditional (FFS) Medicare, Medicare Advantage, and commercial insurers accounted for roughly three-quarters of organization revenue on average, with much smaller average shares of revenue from Medicaid and other payers. These ratios were consistent across subgroups of organizations.
- Roughly one in five organizations reported that they did not always bill patients for transports in one or more payer categories.
- Both the share of organizations reporting non-transport revenue by category and the dollar amounts for this revenue were much lower than expected.

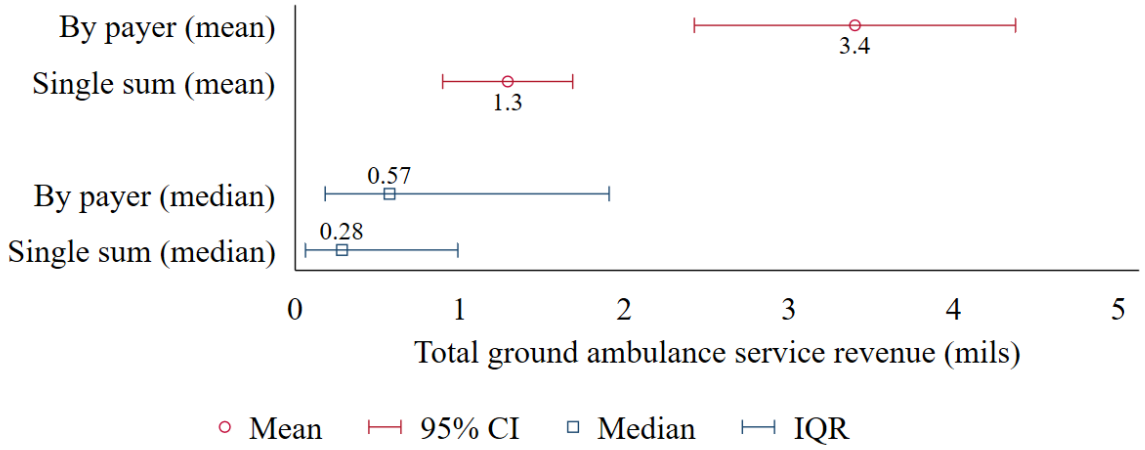
Revenue From Billed Ground Ambulance Services

Section 13, Question 2 asks whether organizations are able to report revenue from billed ground ambulance services separately by payer category. Twenty-six percent of organizations answered that they could not do so. These organizations reported one overall revenue amount in Section 13, Question 3. Organizations that could report separately by payer reported revenue across the following categories: Traditional Medicare, Medicare Advantage, FFS Medicaid, Medicaid managed care, TRICARE, Veterans Health Administration (VHA), commercial insurance, workers' compensation, and patient self-pay.

Figure 4.13.1 compares the total revenue from ground ambulance services for organizations that reported a single sum (n = 1,322) versus those reporting by payer (aggregated across payer categories; n = 3,701). Organizations with lower overall revenue from ground ambulance

services were more likely to report a single sum rather than by payer, perhaps due to more limited data and billing infrastructure, fewer dedicated billing staff, or less reliance on separate billing companies. Even after controlling for volume category, ownership category, service area population density, and provider versus supplier status, organizations reporting revenue by payer were likely to report higher revenue amounts ($p < 0.001$, results from regression of log-transformed revenue on organization-level observables not shown). This residual difference could reflect more double counting of revenue (contrary to GADCS instructions) when reporting by payer category, the role of third-party billing companies in reporting by payer category while simultaneously maximizing billed revenue, variation in effort invested in collecting unpaid amounts, and other factors.

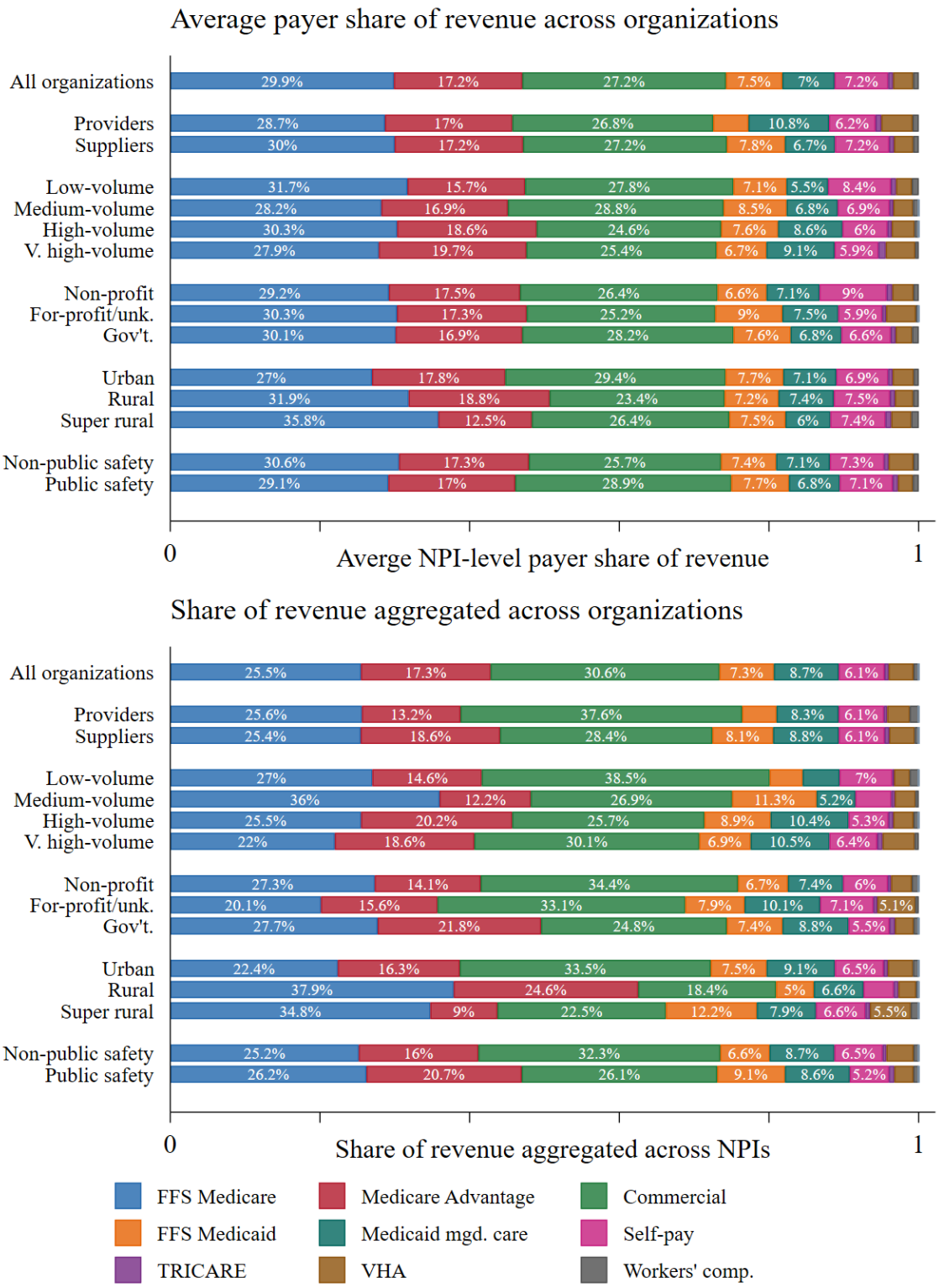
Figure 4.13.1. Total Annual Revenue From Ground Ambulance Services, by Reporting Approach



SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: CI = confidence interval. IQR = interquartile range. "Mils" is millions ($).

Across payers, Traditional Medicare, Medicare Advantage, and commercial coverage represented the largest shares of transport revenue on average at the organization level, with relatively little variation across subgroups (Figure 4.13.2, top panel). The most notable difference across organization categories was an increasingly larger average share of revenue from Traditional Medicare as organizations' service area population density decreased, from 27 percent for urban organizations to 36 percent for super rural organizations. This difference could reflect Medicare's explicitly larger add-on payments for rural and super rural (versus urban) areas. It may also relate to Medicare Advantage penetration: The average share of revenue from Medicare Advantage was lowest for super rural organizations (13 percent) and higher for urban and rural organizations (18 and 19 percent, respectively). Self-pay, which includes patients paying out of pocket for transports, as well as cost-sharing in some cases, accounted for 7 percent of revenue on average across all organizations and never more than 9 percent of average revenue across subgroups of organizations.

Figure 4.13.2. Organization-Level Revenue Shares, by Payer



SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: NPI = National Provider Identifier. FFS = fee-for-service. VHA = Veterans Health Administration. "Gov't." is government. "mgd." is managed. "comp." is compensation. Value labels suppressed < 5 percent.

Revenue shares differed more across subsets of organizations in terms of total revenue aggregated across all 5,023 organizations (Figure 4.13.2, bottom panel). For example, for-profit organizations received proportionally less revenue from Traditional Medicare and Medicare Advantage compared with non-profit and government organizations. Some differences between groups are difficult to explain. For example, medium-volume organizations had a larger share of revenue from Traditional Medicare, which again may be due to differences in Medicare Advantage penetration. As another example, rural organizations had a substantially larger share of revenue from Medicare (Traditional Medicare and Medicare Advantage, individually and combined) compared with urban and super rural organizations. Relatively higher Medicaid enrollment in urban and super rural areas compared with rural areas could drive this difference.

Table 4.13.1 reports average organization-level revenue in dollar terms overall and by payer (with TRICARE, VHA, and workers' compensation combined). Providers, high- and very high-volume organizations, for-profit organizations, those primarily serving areas with high service area population density, and organizations without public safety roles all had higher revenue on average than organizations with other characteristics. For example, urban organizations had average revenue of $4.3 million compared with average revenue of $691,000 for super rural organizations. As another example, and as expected, revenue scaled with Medicare service volume, with average revenue for very high- versus low-volume organizations of $10.6 million and $1.3 million, respectively.

Table 4.13.1. Average Payer Revenue by Organization Type

	N	Total Payer Revenue	*N*	Traditional FFS Medicare	*N*	Medicare Advantage
All NPIs	5,023	$2,843,762	3,588	$893,412	3,226	$675,498
Provider vs. supplier status						
Suppliers	4,673	$2,390,757	3,339	$731,180	2,965	$602,675
Providers	350	$8,887,597	249	$3,073,129	261	$1,502,142
Medicare transport volume						
Low	2,123	$1,343,558	1,336	$544,751	1,160	$339,875
Medium	1,416	$1,339,257	1,063	$514,205	986	$187,908
High	884	$3,587,803	700	$954,511	632	$836,265
Very high	600	$10,604,857	489	$2,582,907	448	$2,391,325
Ownership category						
Non-profit	1,482	$3,419,915	1,011	$1,231,471	939	$686,214
For-profit/unknown	950	$4,258,949	586	$1,192,420	484	$1,116,230
Government	2,591	$1,995,266	1,991	$633,759	1,803	$551,660
Service area pop. density						
Urban	2,585	$4,260,242	1,969	$1,132,496	1,795	$903,173

	N	Total Payer Revenue	*N*	Traditional FFS Medicare	*N*	Medicare Advantage
Rural	1,388	$1,834,395	1,006	$774,829	896	$565,771
Super rural	1,050	$690,612	613	$320,171	534	$94,698
Public safety						
Yes	2,302	$1,683,870	1,723	$542,322	1,577	$468,861
No	2,721	$3,825,083	1,865	$1,217,835	1,649	$873,162

	N	Medicaid	*N*	Commercial Insurance	*N*	Patient Self-Pay	*N*	All Other Payers
All NPIs	3,257	$541,854	3,511	$1,095,078	3,330	$230,757	3,701	$155,268
Provider vs. supplier status								
Suppliers	3,025	$472,595	3,241	$840,312	3,073	$191,212	3,431	$127,252
Providers	232	$1,419,652	271	$4,145,275	257	$703,147	271	$510,349
Medicare transport volume								
Low	1,114	$179,429	1,299	$798,803	1,174	$161,886	1,401	$67,755
Medium	1,016	$226,153	1,070	$382,179	1,041	$70,056	1,106	$50,160
High	661	$715,482	662	$1,015,999	645	$215,815	705	$150,379
Very high	466	$2,043,734	481	$3,588,931	471	$778,588	489	$650,713
Ownership category								
Non-profit	927	$595,636	1,030	$1,520,931	978	$278,649	1,074	$174,389
For-profit/unknown	526	$1,023,658	555	$2,069,596	510	$485,215	610	$343,325
Government	1,804	$367,412	1,926	$586,762	1,843	$134,977	2,017	$88,178
Service area pop. density								
Urban	1,835	$818,330	1,930	$1,730,006	1,833	$353,435	2,019	$230,915
Rural	916	$232,982	962	$394,358	931	$89,551	1,032	$66,243
Super rural	507	$173,874	619	$205,244	566	$65,922	651	$61,747
Public safety								
Yes	1,518	$356,412	1,691	$551,066	1,596	$117,119	1,772	$79,761
No	1,740	$712,159	1,821	$1,600,196	1,734	$335,311	1,929	$224,613

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: NPI = National Provider Identifier. NPIs that did not report total revenue by payer are only included in the Total Revenue column. Otherwise, statistics reflect only those NPIs that reported revenue by payer.

For comparison, Table 4.13.2 reports median revenue by organization type, with medians calculated over only those organizations reporting positive revenue in each category. As described above, median revenue by payer was often only a fraction of the average amount.

Table 4.13.2. Median Payer Revenue by Organization Type

	N	Total Payer Revenue	*N*	Traditional FFS Medicare	*N*	Medicare Advantage
All NPIs	5,023	$480,417	3,588	$160,267	3,226	$110,350
Provider vs. supplier status						
Suppliers	4,673	$440,460	3,339	$142,949	2,965	$99,805
Providers	350	$1,934,601	249	$567,357	261	$446,899
Medicare transport volume						
Low	2,123	$113,019	1,336	$38,007	1,160	$21,040
Medium	1,416	$595,916	1,063	$166,322	986	$109,870
High	884	$1,625,712	700	$472,803	632	$326,690
Very high	600	$5,489,591	489	$1,611,692	448	$1,321,747
Ownership category						
Non-profit	1,482	$390,890	1,011	$148,073	939	$105,736
For-profit/unknown	950	$980,558	586	$406,224	484	$314,675
Government	2,591	$437,357	1,991	$132,662	1,803	$83,788
Service area pop. density						
Urban	2,585	$724,830	1,969	$200,755	1,795	$154,042
Rural	1,388	$422,026	1,006	$152,120	896	$112,843
Super rural	1,050	$214,608	613	$80,138	534	$39,259
Public safety						
Yes	2,302	$329,028	1,723	$106,571	1,577	$72,650
No	2,721	$671,924	1,865	$241,502	1,649	$173,847

	N	Medicaid	*N*	Commercial Insurance	*N*	Patient Self-Pay	*N*	All Other Payers
All NPIs	3,257	$57,606	3,511	$149,370	3,330	$28,657	3,701	$12,512
Provider vs. supplier status								
Suppliers	3,025	$50,921	3,241	$136,371	3,073	$27,663	3,431	$10,960
Providers	232	$236,489	271	$257,454	257	$51,480	271	$51,977
Medicare transport volume								
Low	1,114	$11,033	1,299	$34,041	1,174	$7,861	1,401	$2,190
Medium	1,016	$63,043	1,070	$164,872	1,041	$30,901	1,106	$15,175
High	661	$201,510	662	$398,483	645	$74,658	705	$41,963
Very high	466	$842,206	481	$1,545,128	471	$285,850	489	$260,407
Ownership category								
Non-profit	927	$43,602	1,030	$133,769	978	$32,047	1,074	$13,326
For-profit/unknown	526	$146,127	555	$354,204	510	$65,135	610	$26,758

	N	Medicaid	*N*	Commercial Insurance	*N*	Patient Self-Pay	*N*	All Other Payers
Government	1,804	$54,014	1,926	$137,438	1,843	$23,005	2,017	$10,968
Service area pop. density								
Urban	1,835	$75,757	1,930	$242,490	1,833	$41,482	2,019	$15,823
Rural	916	$55,320	962	$118,271	931	$26,279	1,032	$11,750
Super rural	507	$24,972	619	$68,641	566	$13,850	651	$7,318
Public safety								
Yes	1,518	$37,331	1,691	$111,281	1,596	$19,480	1,772	$8,168
No	1,740	$80,901	1,821	$203,236	1,734	$45,490	1,929	$21,384

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file
NOTE: NPI = National Provider Identifier. NPIs that did not report total revenue by payer are only included in the Total Revenue column. Otherwise, statistics reflect only those NPIs that reported revenue by payer.

Some ground ambulance organizations may not be able to differentiate between revenue from closely related payer categories—for example, Traditional Medicare versus Medicare Advantage. To assess whether this was a practical challenge for responders, Figure 4.13.3 plots the association of log-transformed Traditional Medicare versus Medicare Advantage revenue from transports as reported in Section 13, Question 3. Overall, responses suggest a near one-to-one association between higher log-transformed Traditional Medicare revenue and log-transformed Medicare Advantage revenue (with an elasticity of 0.95, $p < 0.001$). This suggests that, as transport volume increases, organizations' revenue from both Traditional Medicare and Medicare Advantage increases roughly in equal proportions.

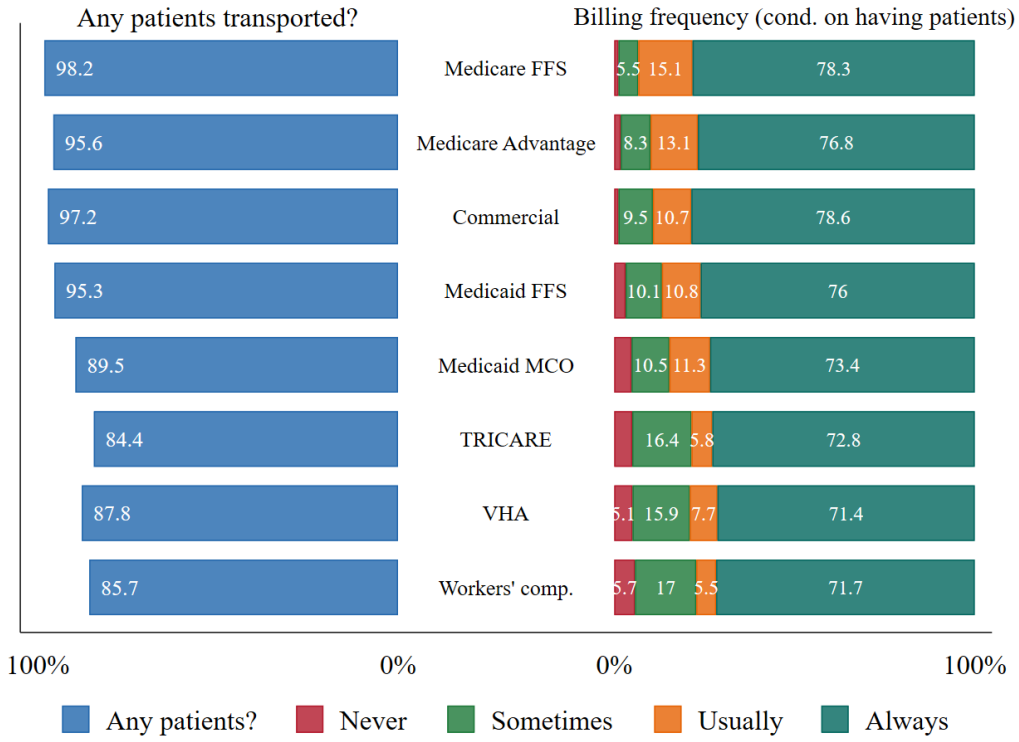
Figure 4.13.3. Association Between Log-Transformed Traditional Medicare and Medicare Advantage Transport Revenue

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file

Section 13, Question 4 asks whether organizations always, usually, sometimes, or never bill patients with different sources of coverage for ground ambulance services. This question stems from earlier findings from qualitative work where some organizations reported not billing patients as a matter of policy. Section 13, Question 4 also asks organizations to indicate if they never transported a patient covered by a given payer category.

We found that nearly all organizations transported patients covered by payers accounting for relatively larger shares of revenue (e.g., Traditional Medicare; Figure 4.13.4, left panel). Most organizations reported transporting patients covered by payer categories accounting for smaller shares of overall revenue, such as TRICARE, VHA, and workers' compensation. While the majority of organizations reported "always" billing for transports across payer categories, many organizations appear to choose to bill for less than 100 percent of their total transports. Conditional on having transported a patient in a given payer category, organizations "always" billed patients within that category at least 71 percent of the time and up to nearly 80 percent for Traditional Medicare and commercial insurers (Figure 4.13.4, right panel). Shares of organizations indicating that they "never" or "sometimes" bill patients in a given category were higher for smaller payer categories. In some cases, organizations may simply not feel that the burden of billing a payer and navigating the claims adjudication process is worthwhile when the volume of transports for patients with that source of coverage is very low.

Figure 4.13.4. Billing Frequency by Payer



SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: "cond." is conditional. VHA = Veterans Health Administration. "Comp." is compensation. MCO = managed care organization. FFS = fee-for-service. "Cond." is conditional. Billing frequency value labels are suppressed for values < 5 percent.

Revenue From Other Sources

Section 13, Question 5 is the final question in both Section 13 and the GADCS instrument. This question asks organizations to report revenue from sources other than billed ground ambulance services. Question 5 lists a wide array of revenue categories, such as payments for contracted services, local government funding, grants, donations, and membership fees. Three-quarters of organizations reported some non-transport revenue, with an average of $1.6 million annually.

In general, the shares of organizations reporting revenue across these categories were lower than expected. Furthermore, the conditional mean dollar amounts—i.e., the average reported revenue within a category calculated among only those organizations reporting an amount greater than $0—were also smaller than expected. This finding could point to ambiguities in the GADCS instructions around Section 13, Question 5; difficulties allocating revenue to apply only to ground ambulance operations; or other factors.

Table 4.13.3. Share of Organizations With Revenue and Conditional Annual Mean and Median Revenue for Section 13, Question 5 Revenue Categories

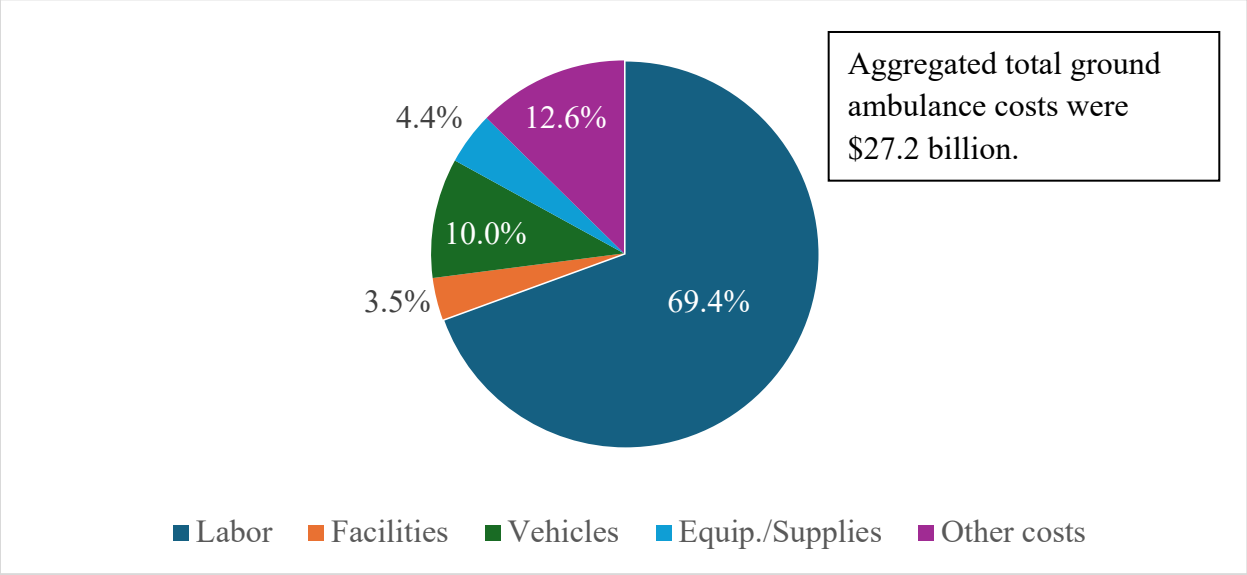
Category	Share With Section 13, Question 5 Revenue >$0 *(%)*	Conditional Mean *(on >$0, in $)*	Conditional Median *(on >$0, in $)*
Total across all Question 5 categories	**75.0%**	**1,610,595**	**136,990**
Contracts with facilities	18.9%	499,865	41,976
Revenue from payers for non-transport EMS/medical services	11.5%	405,613	18,169
Revenues for subcontracted ground ambulance services	4.6%	193,575	32,560
Fees for standby events	24.5%	66,939	5,000
Membership fees	7.5%	118,315	37,430
Charitable donations	26.7%	37,995	5,027
Executive loan programs	N/R	N/R	N/R
Program-related investments	4.0%	123,487	7,621
Local taxes earmarked for EMS	22.4%	2,763,621	301,677
Contract revenue from local governments in return for services	16.4%	443,246	100,000
Enterprise funds and utility rates	0.7%	1,644,214	146,250
Sale of assets and services	8.4%	118,344	9,100
Bond or debt financing	1.2%	1,036,261	190,880
State or local donations of surplus vehicles or equipment	N/R	N/R	N/R
Other donations	4.1%	23,331	6,000
Special-purpose grants	23.3%	152,239	17,763
Matching grants	4.5%	67,785	10,954
Technical assistance	1.8%	243,371	5,311
Demonstration grants	2.5%	336,930	105,000
Congressional earmarks	0.7%	568,054	37,237
Other	21.2%	1,121,203	26,540

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: EMS = emergency medical services. “N/R” is not reported due to small cell size. See the printable GADCS instrument for full Section 13, Question 5 response categories and instructions. Note that reported dollar amounts are allocated to represent a ground ambulance portion of total revenue only.

Chapter 5. Decomposition of Total Costs

This chapter describes the relationships between ground ambulance expenses calculated within each of Sections 7 (Labor Costs), 8 (Facilities Costs), 9 (Vehicle Costs), 10 (Equipment, Consumables, and Supply Costs), and 11 (Other Costs) versus total ground ambulance costs summed across these same sections. First we aggregated total ground ambulance costs across all organizations and found that labor costs accounted for the largest shares of total expenses, followed by a combined equipment, consumables, and supply cost and other cost category, then vehicle costs, and finally facilities costs (Figure 5.1). We also calculated the relative contribution of cost categories to aggregated total ground ambulance costs stratified by different organization types and found that there were differences across categories (Table 5.1). For example, labor costs constituted a larger share of aggregated total ground ambulance costs for government-owned organizations than for for-profit or unknown ownership type organizations.

Figure 5.1. Relative Contribution of Cost Categories to Aggregated Total Ground Ambulance Costs



SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: "Equip." is equipment.

Table 5.1. Aggregated Ground Ambulance Costs by Organization Type

	Labor Costs		Facilities Costs		Vehicles Costs		Equipment and Other Costs	
	Dollars (millions)	*% Total*	*Dollars (millions)*	*% Total*	*Dollars (millions)*	*% Total*	*Dollars (millions)*	*% Total*
All NPIs	$18,869	69.4%	$960	3.5%	$2,727	10.0%	$4,622	17.0%
Provider vs. supplier status								
Suppliers	$17,907	70.1%	$880	3.4%	$2,433	9.5%	$4,330	16.9%
Providers	$961	59.1%	$80	4.9%	$294	18.1%	$292	17.9%
Medicare transport volume								
Low	$1,486	55.8%	$158	5.9%	$506	19.0%	$512	19.2%
Medium	$4,536	73.1%	$224	3.6%	$508	8.2%	$937	15.1%
High	$4,421	70.3%	$255	4.1%	$564	9.0%	$1,047	16.6%
Very high	$8,426	70.1%	$323	2.7%	$1,149	9.6%	$2,127	17.7%
Ownership category								
Non-profit	$4,285	67.8%	$220	3.5%	$732	11.6%	$1,088	17.2%
For-profit/unknown	$3,484	60.5%	$185	3.2%	$734	12.7%	$1,361	23.6%
Government	$11,099	73.6%	$555	3.7%	$1,261	8.4%	$2,174	14.4%
Service area pop. density								
Urban	$14,759	70.8%	$742	3.6%	$1,909	9.2%	$3,424	16.4%
Rural	$3,070	65.6%	$144	3.1%	$585	12.5%	$881	18.8%
Super rural	$1,040	62.5%	$73	4.4%	$233	14.0%	$317	19.1%
Public safety								
Yes	$10,779	75.0%	$549	3.8%	$1,093	7.6%	$1,948	13.6%
No	$8,090	63.2%	$411	3.2%	$1,634	12.8%	$2,674	20.9%

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: NPI = National Provider Identifier. Dollars are presented in millions.

Average shares of cost categories varied across organization types (Table 5.2). For example, low-volume organizations, non-profit organizations, and super rural[105] organizations had substantially smaller average shares of total expenses from labor costs. The remaining tables in Chapter 5 report mean (Table 5.3) and median (Table 5.4) costs across organizations by section in dollar terms.

[105] CMS defines rural, super rural, and urban areas for ambulance services reimbursement purposes as follows: rural: an area outside of an urban area, or a rural census tract within a Metropolitan Statistical Area (MSA); super rural: the lowest quartile of nonmetropolitan ZIP Codes by population density; and urban: an MSA modified to recognize rural census tracts in MSAs. For additional information on the classification, see Michael Ratcliffe, Charlynn Burd, Kelly Holder, and Alison Fields, "Defining Rural at the U.S. Census Bureau: American Community Survey and Geography Brief," U.S. Census Bureau, ACSGEO-1, December 2016. The list of CMS ZIP Codes and their designations can be found in the ZIP Code to Carrier Locality file available at CMS, "Ambulance Fee Schedule," webpage, last accessed August 16, 2023.

Table 5.2. Average Share of Total Ground Ambulance Costs by Organization Type

	N	Labor Costs	Facilities Costs	Vehicles Costs	Equipment and Other Costs
All NPIs	5,023	43.1%	6.0%	23.1%	27.8%
Provider vs. supplier status					
Suppliers	4,673	42.7%	5.8%	23.2%	28.3%
Providers	350	48.7%	8.7%	21.3%	21.3%
Medicare transport volume					
Low	2,123	29.7%	7.9%	31.5%	30.9%
Medium	1,416	50.1%	5.2%	18.6%	26.1%
High	884	54.6%	4.7%	15.4%	25.3%
Very high	600	56.9%	3.4%	15.1%	24.6%
Ownership category					
Non-profit	1,482	36.1%	7.0%	25.2%	31.7%
For-profit/unknown	950	42.4%	4.7%	24.8%	28.2%
Government	2,591	47.3%	5.9%	21.2%	25.5%
Service area pop. density					
Urban	2,585	47.7%	5.8%	19.8%	26.6%
Rural	1,388	40.2%	5.2%	26.2%	28.4%
Super rural	1,050	35.5%	7.5%	26.9%	30.1%
Public safety					
Yes	2,302	43.8%	6.4%	23.1%	26.8%
No	2,721	42.5%	5.7%	23.1%	28.7%

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file
NOTE: NPI = National Provider Identifier. "*N*" indicates the sum of GADCS weights across organizations within each subgroup.

Table 5.3. Average Ground Ambulance Costs per Organization, by Organization Type

	N	Total Costs	Labor Costs	Facilities Costs	Vehicle Costs	Equipment and Other Costs
All NPIs	5,023	$5,410,790	$3,756,649	$191,034	$542,879	$920,227
Provider vs. supplier status						
Suppliers	4,673	$5,468,042	$3,832,455	$188,240	$520,641	$926,705
Providers	350	$4,646,961	$2,745,275	$228,317	$839,570	$833,798
Medicare transport volume						
Low	2,123	$1,253,692	$700,047	$74,195	$238,489	$240,961
Medium	1,416	$4,382,069	$3,203,330	$158,030	$358,835	$661,874
High	884	$7,114,490	$5,003,678	$288,545	$637,843	$1,184,424
Very high	600	$20,035,421	$14,038,982	$538,664	$1,914,064	$3,543,711
Ownership category						
Non-profit	1,482	$4,266,373	$2,890,690	$148,264	$493,683	$733,735
For-profit/ unknown	950	$6,068,997	$3,668,951	$194,309	$772,843	$1,432,894
Government	2,591	$5,824,395	$4,284,346	$214,309	$486,730	$839,010
Service area pop. density						
Urban	2,585	$8,060,136	$5,709,927	$287,219	$738,485	$1,324,504
Rural	1,388	$3,371,026	$2,210,897	$103,773	$421,555	$634,801
Super rural	1,050	$1,584,496	$991,068	$69,590	$221,653	$302,185
Public safety						
Yes	2,302	$6,242,279	$4,682,600	$238,460	$474,891	$846,329
No	2,721	$4,707,313	$2,973,253	$150,910	$600,401	$982,749
Contract out key functions*						
Yes	427	$6,917,125	$4,542,975	$207,765	$804,652	$1,941,347
No	4,595	$5,270,681	$3,683,511	$190,218	$530,107	$870,404

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: NPI = National Provider Identifier. * For facilities costs, vehicle costs, and equipment and other costs, the definition of whether organizations contract out key functions is different. 234 weighted NPIs contract out key functions, and 4,789 do not.

Table 5.4. Median Ground Ambulance Costs per Organization, by Organization Type

	N	Total Costs	Labor Costs	Facilities Costs	Vehicle Costs	Equipment and Other Costs
All NPIs	5,023	$1,390,644	$561,474	$41,755	$247,688	$286,966
Provider vs. supplier status						
Suppliers	4,673	$1,355,663	$529,660	$39,752	$244,391	$282,315
Providers	350	$2,309,181	$1,297,299	$72,771	$394,030	$444,016
Medicare transport volume						
Low	2,123	$464,335	$110,194	$15,318	$112,826	$95,878
Medium	1,416	$1,768,370	$814,159	$52,662	$234,914	$357,018
High	884	$3,663,075	$1,922,979	$86,148	$422,429	$731,828
Very high	600	$9,382,738	$5,059,475	$235,254	$1,226,318	$2,246,275
Ownership category						
Non-profit	1,482	$982,562	$330,543	$34,962	$207,247	$247,800
For-profit/unknown	950	$1,604,642	$688,431	$59,188	$335,187	$385,000
Government	2,591	$1,593,635	$695,127	$41,667	$250,677	$288,650
Service area pop. density						
Urban	2,585	$2,343,586	$1,034,012	$68,766	$339,916	$453,000
Rural	1,388	$1,198,121	$475,740	$31,224	$231,260	$251,692
Super rural	1,050	$612,637	$176,128	$16,300	$116,816	$118,060
Public safety						
Yes	2,302	$1,406,846	$537,941	$40,822	$245,422	$271,652
No	2,721	$1,379,502	$584,773	$42,468	$248,400	$315,238
Contract out key functions*						
Yes	427	$1,360,329	$409,823	$2,134,984	$832,723	$54,648
No	4,595	$1,393,465	$584,699	$1,377,344	$552,987	$34,786

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: NPI = National Provider Identifier. * For facilities costs, vehicles costs, and equipment and other costs, the definition of whether organizations contract out key functions is different. 234 weighted NPIs contract out key functions, and 4,789 do not.

Chapter 6. Regression Models and Analysis Results

Analyses of Ground Ambulance Costs per Service

As described in Chapter 2, we implemented additional data cleaning to construct updated total ground ambulance cost and total ground ambulance revenue variables to address outliers that remained after our overall data cleaning and imputation steps. We implemented this additional data cleaning so that the outliers would not have undue influence on our multivariate regression analyses (details described in Appendix C).

Table 6.1 describes the unadjusted mean and median total cost per service across all NPIs and by organizational characteristics after implementing our additional data cleaning.

Table 6.1. Summary Table of Unadjusted Total Cost Per Service

	Total Cost per Response			Total Cost per Transport			Total Cost per RVU	
	N	**Mean**	**Median**	***N***	**Mean**	**Median**	**Mean**	**Median**
All NPIs	5,023	$1,845	$959	5,000	$2,673	$1,340	$1,624	$811
Provider vs. supplier status								
Suppliers	4,673	$1,906	$998	4,650	$2,777	$1,409	$1,689	$851
Providers	350	$1,031	$592	350	$1,299	$798	$766	$529
Medicare transport volume								
Low	2,123	$2,457	$1,366	2,101	$3,652	$1,980	$2,227	$1,189
Medium	1,416	$1,771	$961	1,416	$2,554	$1,379	$1,498	$811
High	884	$1,258	$731	884	$1,711	$1,032	$1,062	$590
Very high	600	$719	$473	600	$946	$608	$640	$406
Ownership category								
Non-profit	1,482	$1,784	$830	1,478	$2,438	$1,141	$1,474	$710
For-profit/unknown	950	$1,413	$512	932	$1,788	$610	$1,173	$447
Government	2,591	$2,039	$1,266	2,589	$3,127	$1,859	$1,872	$1,076
Service area pop. density								
Urban	2,585	$1,636	$865	2,585	$2,401	$1,227	$1,437	$760
Rural	1,388	$1,825	$898	1,366	$2,549	$1,224	$1,543	$767
Super rural	1,050	$2,388	$1,340	1,050	$3,505	$1,829	$2,192	$1,092
Public safety								
Yes	2,302	$2,280	$1,369	2,285	$3,510	$2,050	$2,097	$1,181
No	2,721	$1,478	$683	2,716	$1,970	$928	$1,226	$573

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: NPI = National Provider Identifier. Three NPIs did not have a transport after data cleaning, reducing the weighted sample size to 5,000 for these analyses. Sum of Ns may not equal total for subcategories due to rounding. Data that would allow costs to be calculated separately for emergency vs. non-emergent transports are not available.

The results of the regression analyses on cost per service (Figure 6.1 and Appendix Tables C.1–C.3) provide a more nuanced understanding of how various organizational characteristics influence operational costs, after controlling for all variables included in the model. As mentioned in the regression methods section of Chapter 2, we report AMEs, which estimate an incremental change in the outcome (cost per service) from a change in one of the independent variables (e.g., comparing providers to suppliers). The following are the top findings from the cost-related regression analyses:

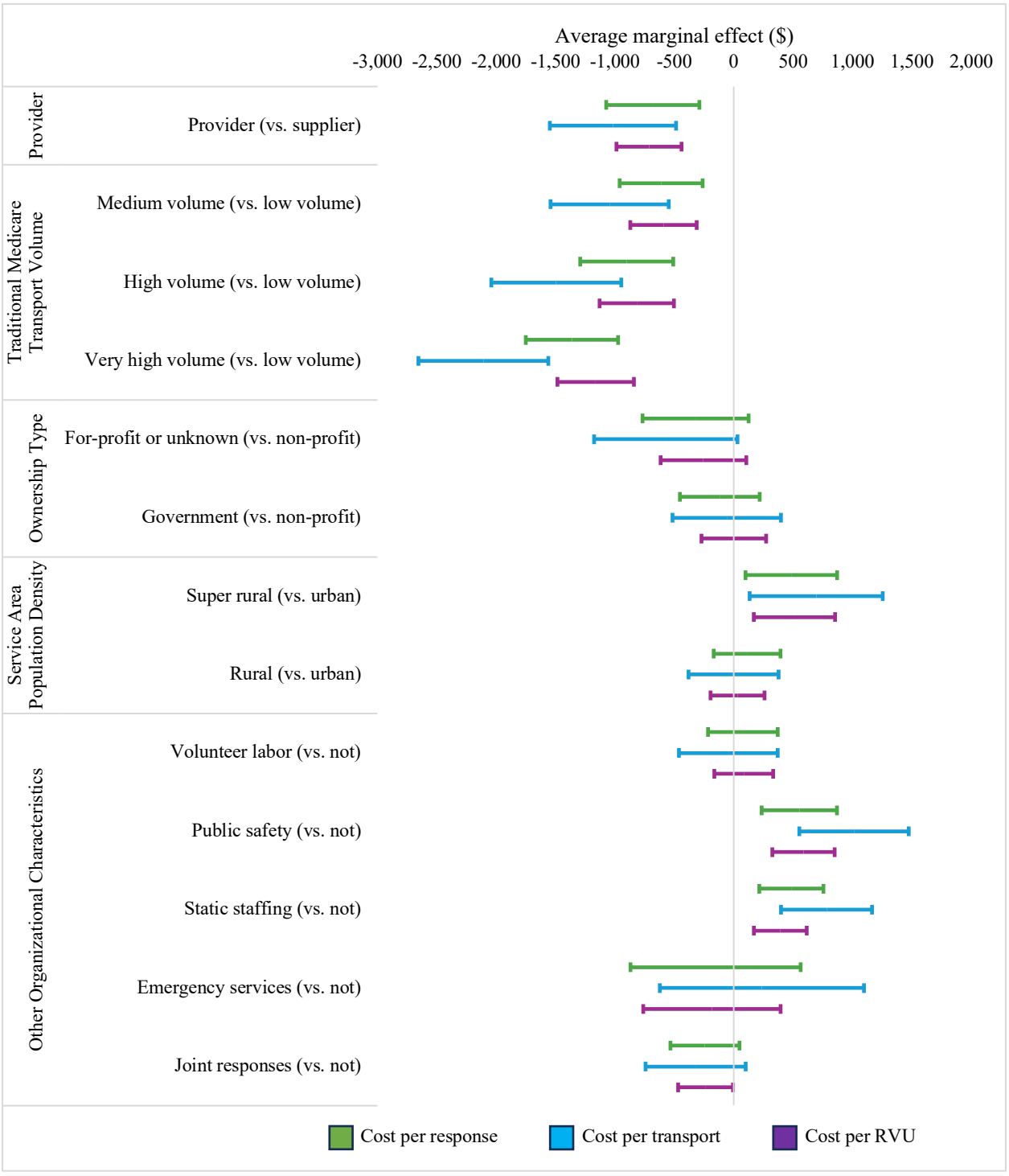
- **Provider/supplier:** Providers have lower total costs per service compared with suppliers. Specifically, providers' total costs were $681 per response, $1,017 per transport, and $713 per RVU[106] lower than those of suppliers.
- **Traditional Medicare transport volume:** Higher Traditional Medicare ground ambulance transport volume is associated with lower costs per service. On average, ground ambulance organizations with very high Traditional Medicare transport volumes at the time of sampling spend $1,362 less per response, $2,108 less per transport, and $1,162 less per RVU compared with those with low transport volumes.
- **Ownership type:** There were no statistically significant differences in total cost per service by ownership type.
- **Service area population density:** Super rural[107] organizations spend more per response, per transport, and per RVU compared with organizations in urban areas. On average, super rural organizations spend $485 more per response, $694 more per transport, and $511 more per RVU than urban organizations. There were no statistically significant differences between rural and urban organizations in total cost per service.
- **Differences by other organizational characteristics:**
    - There were no statistically significant differences between organizations with and without volunteer staff in their cost per response, per transport, or per RVU.
    - Public safety organizations spend more per response, per transport, and per RVU compared with non–public safety organizations.

[106] RVUs differentiate between the relative resources involved in furnishing different services on Medicare Fee Schedules—for example, the AFS. The quantity of RVUs assigned to one service versus another translates into payment rates that, all else equal, differ exactly in terms of this ratio.
[107] CMS defines rural, super rural, and urban areas for ambulance services reimbursement purposes as follows: rural: an area outside of an urban area, or a rural census tract within a Metropolitan Statistical Area (MSA); super rural: the lowest quartile of nonmetropolitan ZIP Codes by population density; and urban: an MSA modified to recognize rural census tracts in MSAs. For additional information on the classification, see Michael Ratcliffe, Charlynn Burd, Kelly Holder, and Alison Fields, "Defining Rural at the U.S. Census Bureau: American Community Survey and Geography Brief," U.S. Census Bureau, ACSGEO-1, December 2016. The list of CMS ZIP Codes and their designations can be found in the ZIP Code to Carrier Locality file available at CMS, "Ambulance Fee Schedule," webpage, last accessed August 16, 2023.

- Organizations with static staffing models spend more per response, per transport, and per RVU than those with dynamic or combined deployment staffing models.
- There were no statistically significant differences between organizations with 24/7/365 emergency response capabilities and those without in their cost per response, per transport, or per RVU.
- Organizations that engage in joint responses spend less per RVU than those that do not. There were no statistically significant differences between the groups in their cost per response or per transport.

Our main cost models did not include geographic adjustors beyond service area population density categories. As a robustness check, adding state fixed effects (i.e., controlling for average differences in cost per service between states) had some substantive effects on our findings. More specifically, the super rural service area population density AME was no longer statistically significant, while the for-profit AME was greater than zero and statistically significant. Appendix Tables C.13–C.15 show the results of the revenue per service regression models with state fixed effects.

Figure 6.1. Estimated Regression Model AMEs, Total Cost per Service



SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: RVU = relative value unit. AMEs report the estimated incremental change in the model's dependent variable from a discrete change in one or more independent variables. For example, the AME for the provider flag in the cost per response model is an estimate of the average incremental change in modeled cost per response by assuming that all organizations are providers versus suppliers. The bars on each line in the figure represent the 5th and 95th percentiles.

Analyses of Ground Ambulance Revenue per Service

Table 6.2 describes the unadjusted mean and median total revenue per service across all NPIs and by organizational characteristics after implementing our additional data cleaning.

Table 6.2. Summary Table of Unadjusted Revenue Per Service

	Total Revenue per Response			Total Revenue per Transport			Total Revenue per RVU	
	N	Mean	Median	*N*	Mean	Median	Mean	Median
All NPIs	5,023	$795	$447	5,000	$1,147	$625	$697	$385
Provider vs. supplier status								
Suppliers	4,673	$785	$447	4,650	$1,145	$629	$696	$388
Providers	350	$930	$413	350	$1,175	$565	$702	$366
Medicare transport volume								
Low	2,123	$940	$511	2,101	$1,425	$754	$854	$464
Medium	1,416	$709	$446	1,416	$1,021	$641	$601	$372
High	884	$753	$406	884	$992	$531	$615	$343
Very high	600	$549	$367	600	$699	$466	$491	$322
Ownership category								
Non-profit	1,482	$818	$465	1,478	$1,139	$652	$674	$387
For-profit/unknown	950	$640	$364	932	$801	$461	$578	$341
Government	2,591	$839	$464	2,589	$1,276	$693	$752	$409
Service area pop. density								
Urban	2,585	$717	$393	2,585	$1,040	$545	$637	$357
Rural	1,388	$809	$453	1,366	$1,130	$645	$677	$384
Super rural	1,050	$970	$628	1,050	$1,431	$849	$871	$517
Public safety								
Yes	2,302	$788	$418	2,285	$1,233	$641	$720	$376
No	2,721	$802	$459	2,716	$1,074	$618	$677	$392

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: NPI = National Provider Identifier. Three NPIs did not have a response or transport after data cleaning, reducing the weighted sample size to 5,000 for these analyses. Sum of Ns may not equal total for subcategories due to rounding. Data that would allow revenue to be calculated separately for emergency vs. non-emergent transports (or other service categories) are not available.

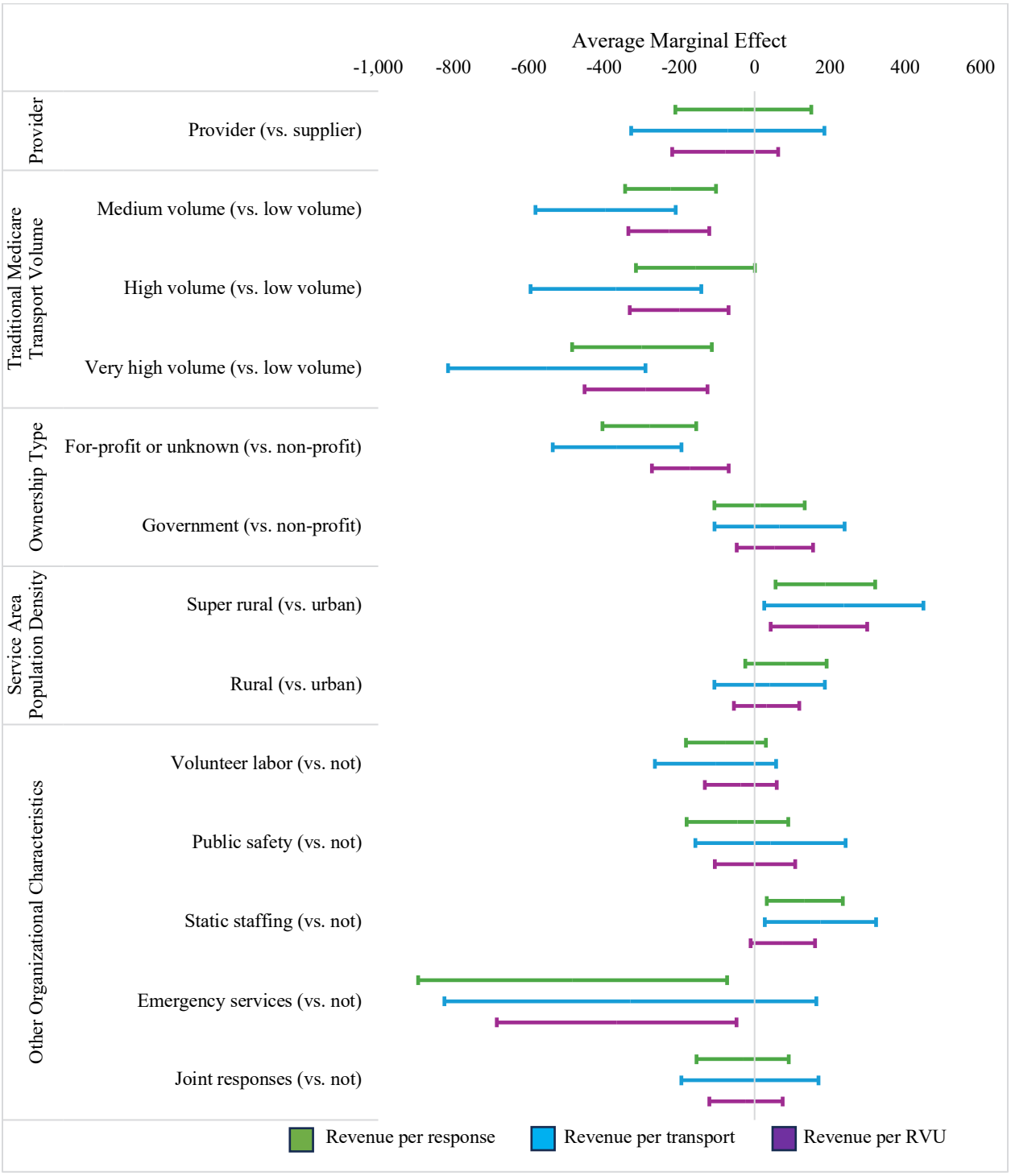
The results of the regression analyses on total revenue per service (Figure 6.2 and Appendix Tables C.4–C.5) reveal several key insights about how different organizational characteristics are associated with revenue per service after controlling for other factors in the model. The following are the top findings from the revenue-related regression analyses:

- **Provider/supplier:** There were no statistically significant differences between providers and suppliers in their revenue per response, transport, or RVU.[108]
- **Traditional Medicare transport volume:** Higher Traditional Medicare ground ambulance transport volume is associated with lower revenue per response, per transport, and per RVU. For example, on average, ground ambulance organizations with very high Traditional Medicare transport volumes at the time of sampling earn $299 less per response, $365 less per transport, and $171 less per RVU, compared with those with low transport volumes.
- **Ownership type:** For-profit or unknown ownership type is associated with lower revenue per response, per transport, and per RVU than non-profit ownership. On average, for-profit or unknown ownership-type organizations earn $280 less per response, $365 less per transport, and $171 less per RVU than their non-profit counterparts. There were no statistically significant differences between government-owned organizations and non-profit organizations in revenue per service.
- **Service area population density:** Super rural organizations have higher revenue per response, per transport, and per RVU compared with urban organizations. On average, super rural organizations earn $188 more per response, $237 more per transport, and $171 more per RVU than their urban counterparts. There were no statistically significant differences between rural and urban organizations.
- **Differences by other organizational characteristics:**
    - There were no statistically significant differences in total revenue per service between organizations with and without volunteer staff.
    - There were no statistically significant differences between public safety organizations and non–public safety organizations in their total revenue per service.
    - Organizations with static staffing models receive higher revenue per response and per transport than those with dynamic or combined deployment staffing models. There were no statistically significant differences in total revenue per RVU between the different organization staffing models.
    - Organizations with 24/7/365 emergency response capabilities have less revenue per response and per RVU than those without around-the-clock capabilities. There were no statistically significant differences in total revenue per transport between organizations based on emergency response capabilities.
    - There were no statistically significant differences in total revenue per response, per transport, or per RVU between organizations that engage in joint response and those that do not.

[108] RVUs differentiate between the relative resources involved in furnishing different services on Medicare Fee Schedules—for example, the AFS. The quantity of RVUs assigned to one service versus another translates into payment rates that, all else equal, differ exactly in terms of this ratio.

Although state fixed effects were not in our main model, when we added state fixed effects to the models for our sensitivity analyses, service area population density no longer was statistically significant in the models. Appendix Tables C.16–C.18 show the results of the revenue per service regression models with state fixed effects.

Figure 6.2. Estimated Regression Model AMEs, Total Revenue per Service



SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: RVU = relative value unit. AMEs report the estimated incremental change in the model's dependent variable from a discrete change in one or more independent variables. For example, the AME for the provider flag in the cost per response model is an estimate of the average incremental change in modeled cost per response by assuming that all organizations are providers versus suppliers. The bars on each line in the figure represent the 5th and 95th percentiles.

Volume-Weighted Regression Results

The results presented in prior sections of this chapter consider each reporting NPI equally. For example, a large, urban, fire department–based organization with tens of thousands of annual transports and a small, rural, volunteer-based organization with ten annual transports each have the same leverage on the results. NPI-level analyses are helpful when assessing differences between organizations, particularly when the majority of ground ambulance organizations provide relatively few services while a small minority provide most services.

In other cases, policymakers are interested in the average cost and revenue associated with a "typical" ground ambulance service—in other words, the cost that one should expect if one randomly selected a single ground ambulance transport out of all of the ground ambulance transports Medicare paid for over a given year. These service-level average costs are more likely to reflect the costs and revenue per service for the small number of larger organizations that provide a substantial share of total Medicare ground ambulance services.

To more directly assess the costs and revenue associated with a "typical" ground ambulance service, we also compared volume-weighted costs and revenue per response. We found that volume-weighted mean and median costs per ground ambulance response ($815 and $496, respectively) were substantially below the unweighted mean and median reported in Table 6.1 ($1,845 and $959, respectively). For revenue, we found a volume-weighted mean and median of $533 and $364, respectively, compared with a larger unweighted mean and median ($795 and $447, respectively). Future analyses should assess whether volume-weighted or unweighted descriptive statistics are most applicable as inputs into AFS valuations and ratesetting.

Chapter 7. Discussion, Limitations, and Conclusion

Discussion

The data collected via the GADCS provide unprecedented insight into the U.S. ground ambulance industry, the characteristics of its diverse organizations, and major drivers of both costs and revenue for these organizations and the industry as a whole. For the first-ever annual GADCS reporting cycle, we found a robust response rate across organizations selected into the Year 1 and Year 2 GADCS cohorts, with participation across all categories of organizations. The GADCS data were generally consistent within and across submissions, although, as in any survey-based data collection, some data cleaning was necessary prior to analysis.

The findings described in this report reinforce several common themes from prior studies—for example, highly skewed distributions of service volume, costs, and revenue; considerable variation in costs across organizations of different types; and the preeminence of labor costs as a driver of total expenses. In addition, our findings provide robust and generalizable information on key aspects of ground ambulance operations that previously were opaque to policymakers and to the industry itself due to the lack of data.

Limitations

There are limitations of the GADCS and our analysis. Although several limitations were covered earlier in the report, they warrant restatement here. It is important to emphasize that the GADCS was not designed to do the following:

- assess the quality of ground ambulance services or related clinical outcomes,
- determine Medicare payments for ground ambulance services under the AFS,
- determine guidelines for Medicare's coverage for ground ambulance services,
- provide information on communities' broader first response financing needs, or
- quantify the extent of uncompensated care (e.g., bad debt and charity care).

In addition, there are several methodological and data limitations. First, ground ambulance organizations self-report data via the GADCS. Despite GADCS system-side logic validation and logic checks and the additional validation and cleaning steps described in this report, there may be errors and systematic biases in the reported data and, therefore, in our analyses.

Broadly, our findings show that many organizations operate shared services, such as fire departments or public safety organizations. These shared services complicate an "apples to apples" comparison of ground ambulance expenses and revenue if organizations are not able to fully separate and report only a ground ambulance share of expenses and revenue. Allocating total, organization-level costs to ground ambulance and other functions appear in our interactions with ground ambulance organizations and in our analyses described in this report to be a

recurring challenge. For example, we think that organizations under-reported revenue (or amounts paid) by local governments and from other sources beyond payments for ground ambulance services. It also appears that the ground ambulance share of expenses in some categories—for example, labor and vehicles—may have been systematically too high. Further analysis, refinement of the GADCS, and education and outreach to ground ambulance organizations could help address these concerns in future rounds of data collection.

In terms of our regression models, while our models included several covariates, there was information that was not available to us and, therefore, was not included in the model. This includes payer mix across services (because volume of transports by payer is not gathered through GADCS), patient mix, varying state and local regulations, and reporting differences across ground ambulance organizations. In addition, the models suggest associations between different provider characteristics and costs and revenue per service. While this allows us to examine differences across organizational characteristics while holding other factors included in the model equal, these results should not be interpreted causally.

Finally, the data used in the analyses included in this report come from the first half of the full data collection period and thus are not representative of all sampled organizations across the first four annual cohorts selected to participate in the GADCS. Future reports will include analyses of data from the full sample of organizations contributing to the GADCS.

Conclusion

The findings in this report and other information contained in the GADCS data and this report will provide Congress, MedPAC, and CMS with a foundation for both future analysis and policymaking. Future iterations of GADCS data collection and analysis can help describe trends in industry characteristics, costs, and revenue over time. Understanding how the industry and ground ambulance services evolve over time, particularly through the end of the COVID-19 PHE and transitioning into a new status quo, can provide policymakers with real-world, recent data to use as the basis for evolving ground ambulance services policies.

Appendix A. Instrument Development and Implementation Overview

Background

CMS covers and pays for medically necessary ground ambulance services provided to Medicare beneficiaries to transport them to the nearest appropriate facility when all other forms of transport are contraindicated. While some Medicare ground ambulance transports that involve inpatients at facilities are covered under the Part A hospital benefit, most Medicare ground ambulance transports are covered under Part B and paid under the AFS.

Established in 2002 by negotiated rulemaking and updated annually, the AFS includes three payment components: a base payment, a mileage payment, and a Geographic Adjustment Factor (GAF). The GAF adjusts payments to account for regional cost differences; applies to 70 percent of the ground ambulance base rate, based on the non-facility practice expense (PE) of the geographic practice cost index (GPCI) from the Medicare PFS; and is updated annually. Payments also include RVUs.

The AFS incorporates one permanent and three temporary add-on payments for ground ambulance transports. The permanent add-on is a 50 percent increase in the standard mileage rate for transports originating in rural areas with travel distances between one and 17 miles. The temporary add-ons include a 3 percent increase for transports originating in rural areas, a 2 percent increase for transports originating in urban areas, and a 22.6 percent increase for transports originating in super rural areas.[109] These add-ons have been repeatedly extended since 2002, most recently by division FF of section 4103 of the Consolidated Appropriations Act, 2023.

The AFS base and mileage rates are updated annually by an Ambulance Inflation Factor (AIF), which is derived from the Consumer Price Index for All Urban Consumers (CPI-U), reduced by the Total Factor Productivity (TFP).

Section 1834(l) (17)(A) of the Act mandated that the Secretary of the HHS establish a new data collection system to gather information on costs, revenue, utilization, and other information from representative samples of ground ambulance organizations. The statute specified that this data collection system should apply to both Medicare ambulance "providers" (hospitals and other

[109] CMS defines rural, super rural, and urban areas for ambulance services reimbursement purposes as follows: rural: an area outside of an urban area, or a rural census tract within a Metropolitan Statistical Area (MSA); super rural: the lowest quartile of nonmetropolitan ZIP Codes by population density; and urban: an MSA modified to recognize rural census tracts in MSAs. For additional information on the classification, see Michael Ratcliffe, Charlynn Burd, Kelly Holder, and Alison Fields, "Defining Rural at the U.S. Census Bureau: American Community Survey and Geography Brief," U.S. Census Bureau, ACSGEO-1, December 2016. The list of CMS ZIP Codes and their designations can be found in the ZIP Code to Carrier Locality file available at CMS, "Ambulance Fee Schedule," webpage, last accessed August 16, 2023.

facilities that are Medicare "providers of service") and Medicare ambulance "suppliers" (all other organizations that enroll in Medicare specifically to provide and bill for ground ambulance services). Section 1834 (l) (17)(F) of the Act requires MedPAC to utilize the data collected by this new system to assess and submit to Congress a report on the adequacy of payments for ground ambulance services and geographic variations in the cost of furnishing such services.

Development

As an initial step to fulfill these requirements, CMS sought assistance from the Alliance to Modernize Healthcare FFRDC (now known as the Health FFRDC) to develop a set of recommendations to CMS related to data collection modalities, sampling approaches, and the scope and content of the data collection instrument.

The Health FFRDC team, composed of researchers from the MITRE Corporation and RAND, conducted a comprehensive environmental scan of the ground ambulance industry, including a review of peer-reviewed articles, government reports, and existing ambulance data collection tools. The team also conducted an analysis of Medicare FFS claims data and enrollment data to investigate the organizational characteristics, volume, payments, and service mix of all ground ambulance organizations that billed Medicare for ground ambulance services in 2016.

To support this work, the Health FFRDC also collected information through direct engagement with stakeholders, involving

- one-on-one conversations with representatives from 31 ambulance organizations to discuss their relevant cost and revenue domains, definitions of terms, preferences for administration modalities, and potential respondent burden
- nine cognitive interviews to assess understanding of draft instrument instructions and questions, whether the requested information was readily available, and potential respondent burden
- several discussions with relevant national organizations (including the American Ambulance Association, the International Association of Fire Chiefs, and the National Volunteer Fire Council) to identify previous data collection efforts and collect their input on a wide range of topics, including sampling and instrument design.

In 2019, the Health FFRDC published its summary report,[110] which provided CMS with a set of recommendations for the development of the data collection system and sampling plan, along with a draft data collection instrument. Key recommendations included

[110] Mulcahy et al., 2019.

- sampling ground ambulance organizations at the NPI[111] level and stratifying based on provider or supplier status,[112] ownership, transport volume, and service area population density. These characteristics both are likely to be systematically associated with ground ambulance expenses and revenue and are available in Medicare FFS claims and administrative data.
- using a single, web-based survey instrument that can accommodate complex skip patterns to tailor questions based on organizational characteristics and previous responses
- to reduce burden, focusing on a set of key topics related to cost and revenue (e.g., organizational characteristics, service area, response and transport times, and service volume)
- conducting further stakeholder education and outreach to prepare ground ambulance organizations to submit high-quality data
- providing detailed instructions for respondents, especially for organizations with shared costs between ground ambulance and other activities (e.g., fire)
- evaluating the quality of the data collected following system implementation and considering revisions to the data collection instrument to address any identified issues.

Establishment of a Medicare Ground Ambulance Data Collection System

Based on these recommendations, CMS proposed and finalized the Medicare GADCS, including policies, sampling plan, and a "printable" version (i.e., Adobe Acrobat format) of the instrument, in its CY 2020 PFS proposed rule (84 FR 40482)[113] and final rule (84 FR 62864-97),[114] respectively. CMS subsequently refined the instrument in the CY 2022 PFS Final Rule (86 FR 65306-65317),[115] the CY 2023 PFS Final Rule (87 FR 70014-70023),[116] and the CY 2024 PFS Final Rule (88 FR 79293-79296).[117]

[111] NPIs are unique identification numbers assigned to health care providers in the United States by CMS. To obtain an NPI, a health care provider must apply through the National Plan and Provider Enumeration System (NPPES). For more information, please visit https://nppes.cms.hhs.gov.

[112] Medicare providers of services are hospitals, skilled nursing facilities, and other facility-based providers enrolled in the Medicare program as providers. Some Medicare providers, primarily Critical Access Hospitals and other hospitals, provide ground ambulance services. Most ground ambulance organizations are Medicare suppliers rather than providers.

[113] CMS, "Medicare Program; CY 2020 Revisions to Payment Policies Under the Physician Fee Schedule and Other Changes to Part B Payment Policies," *Federal Register*, August 14, 2019.

[114] CMS, "Medicare Program; CY 2020 Revisions to Payment Policies Under the Physician Fee Schedule and Other Changes to Part B Payment Policies," *Federal Register*, November 15, 2019.

[115] CMS, "Medicare Program; CY 2022 Payment Policies Under the Physician Fee Schedule and Other Changes to Part B Payment Policies," *Federal Register*, November 19, 2021.

[116] CMS, "Medicare and Medicaid Programs; CY 2023 Payment Policies Under the Physician Fee Schedule and Other Changes to Part B Payment Policies," *Federal Register*, November 18, 2022.

[117] CMS, "Medicare and Medicaid Programs; CY 2024 Payment Policies Under the Physician Fee Schedule and Other Changes to Part B Payment Policies," *Federal Register*, November 16, 2023.

Initial Sampling Approach

Ground ambulance organizations selected to participate are required to collect and report information or be subject to a potential 10 percent payment reduction under the Medicare Part B AFS. In the CY 2020 PFS final rule, CMS described a stratified, NPI-level sampling approach based on historical Medicare FFS claims data and enrollment data to ensure coverage across the four key organizational characteristics, as recommended in the Health FFRDC report. CMS opted to select four consecutive, annual samples (Year 1 through Year 4), each covering one-fourth of the total ground ambulance organizations billing Medicare for services. In response to the COVID-19 pandemic and PHE, CMS subsequently revised this schedule such that the first two samples (Year 1 and Year 2) began data collection concurrently in 2022, and the last two samples (Year 3 and Year 4) began data collection concurrently in 2023.

Creation of the Web-Based GADCS

CMS worked with RAND and DCCA to develop and refine a web-based portal that allows representatives from ground ambulance organizations to register an account, linked to an NPI, and to access an online version of the instrument for GADCS data submission and certification. The web-based GADCS allows users to take the following actions:

1. Register for individual (i.e., person-level) accounts.
2. Link individual user accounts to one or more selected NPIs.
3. Select either a GADCS submitter or certifier role.
4. Enter and submit information following "skip patterns" in a survey format.
5. Review submitted information.
6. Certify reviewed information and deliver to CMS.

The instructions and questions in the web-based GADCS mirror those in a "printable" version of the GADCS instrument available in Adobe Acrobat format on CMS' website. Through the PFS rulemaking cycles, as described above, CMS updates both the web-based and printable versions concurrently.

Sampling and Notification

CMS sampled ground ambulance organizations for the Year 1 and Year 2 cohorts in 2019 and 2020, respectively. CMS posted the lists of selected providers and suppliers publicly on its website,[118] and all selected organizations received notification letters from their MAC. The MACs transmitted these letters as hard copies through the mail and, when possible, through email.

[118] Centers for Medicare & Medicaid Services, "Medicare Ground Ambulance Data Collection System," webpage, undated.

Sampled organizations were required to report certain information within 30 days following receipt of the notification letter. This information, collected online by one of CMS' MACs, Palmetto GBA, through its website (palmettogba.com), includes

- acknowledgement of receipt of notification
- the name and contact details for at least one and not more than three staff member(s) who CMS can contact
- the chosen start date for that organization's continuous 12-month data collection period.

Education and Outreach

To support selected ground ambulance organizations in fulfilling their data reporting requirement and to improve the quality of the information they provide, CMS and its contractors developed and published numerous instructional resources; hosted frequent educational sessions; shared information and updates via the Medicare Learning Network and social media (e.g. Twitter); engaged in outreach to interested parties, such as the Office of Program Operations and Local Engagement, the rural health Federal Advisory Committee Act (FACA) committee, specialty societies, and trade associations (such as the National EMS Advisory Council); and conducted targeted outreach to individual ground ambulance organizations.

Educational Sessions and Resources

CMS established the GADCS website[119] as a hub for information and updates on the data collection system. Table A.1 presents a list of posted GADCS educational resources including guides, tips sheets, and a comprehensive video walkthrough of the full GADCS instrument.

Table A.1. List of GADCS Posted Educational Materials

Resource	URL
GADCS User Guide	https://www.cms.gov/files/document/gadcs-user-guide.pdf
Video Walkthrough of the GADCS	https://www.youtube.com/watch?v=hSf8YlOWSys
GADCS Frequently Asked Questions	https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AmbulanceFeeSchedule/Downloads/Medicare-Ground-Ambulance-FAQs.pdf
Quick Reference Guide	https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AmbulanceFeeSchedule/Downloads/Medicare-Ground-Ambulance-Quick-Reference.pdf
Quick Tips on Registration and Requesting Access to the GADCS Portal	https://www.cms.gov/files/document/quick-tips-registration-and-requesting-access-gadcs-portal.pdf

[119] Centers for Medicare & Medicaid Services, "Medicare Ground Ambulance Data Collection System," webpage, undated.

Resource	URL
Printable Ground Ambulance Data Collection Instrument (English)	https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AmbulanceFeeSchedule/Downloads/Medicare-Ground-Ambulance-Data-Collection-System-Instrument.pdf
Printable Ground Ambulance Data Collection Instrument (Spanish)	https://www.cms.gov/files/document/medicare-ground-ambulance-data-collection-instrument-printable-spanish-version.pdf
Five Top GADCS Tips for Year 1 and 2 Selected Ground Ambulance Organizations	https://www.cms.gov/files/document/five-top-gadcs-tips-selected-ground-ambulance-organizations-year-1-and-year-2-are-required-report.pdf
Five Top GADCS Tips for Year 3 and 4 Selected Ground Ambulance Organizations	https://www.cms.gov/files/document/five-top-medicare-ground-ambulance-data-collection-system-gadcs-tips-selected-year-3-and-year-4.pdf
Tip Sheet: Allocating Costs and Revenues	https://www.cms.gov/files/document/tip-sheet-allocating-costs-and-revenues.pdf
Tip Sheet: Provider Considerations	https://www.cms.gov/files/document/tip-sheet-reporting-provider-organizations.pdf
Tip Sheet: Public Safety Considerations	https://www.cms.gov/files/document/tip-sheet-reporting-public-safety-organizations.pdf
Tip Sheet: Contracting Scenarios	https://www.cms.gov/files/document/tip-sheet-reporting-expenses-contracted-services.pdf
Tip Sheet: Government Organizations	https://www.cms.gov/files/document/tip-sheet-reporting-government-based-organizations.pdf
Tip Sheet: Rural and Super Rural Organizations	https://www.cms.gov/files/document/reporting-rural-and-super-rural-organizations.pdf
Video: Medicare Ground Ambulance Data Collection System (GADCS) Instrument: Public Safety Organizations	https://www.youtube.com/watch?v=dyEwfw7vM18&feature=youtu.be
Video: Medicare Ground Ambulance Data Collection System (GADCS) Instrument: Volunteer Organization Requirements	https://www.youtube.com/watch?v=gZIYn2etkFo&feature=youtu.be
Medicare Ground Ambulance Data Collection System (GADCS) Instrument: Labor Costs	https://www.youtube.com/watch?v=H5Hdd0kElTE

NOTE: This list is current as of July 15, 2024.

Live GADCS educational sessions are held virtually, over Zoom, to reach our national sample of ground ambulance organizations. CMS also records these live webinars and posts the recording and meeting materials, including presentation slides, on its Ambulance Events website.[120] GADCS educational sessions include introductory and overview presentations, topic-specific webinars, ambulance open door forums (ODFs), and live question and answer sessions. Table A.2 includes a complete list of GADCS educational sessions.

[120] CMS, "Ambulance Events," webpage, undated.

Table A.2. List of GADCS Educational Sessions

Educational Session	Date
Ambulance ODF: CY 2020 PFS Proposed Rule	08/28/2019
Ambulance ODF: CY 2020 PFS Final Rule	11/7/2019
National Provider Call: Instrument Walkthrough	12/05/2019
Ambulance ODF	02/06/2020
Ground Ambulance Organizations: Reporting Volunteer Labor Call	02/20/2020
Ground Ambulance Organizations: Data Collection for Public Safety-Based Organizations Call	03/12/2020
Ambulance Open Door Forum: GADCS Delay for Year 1 and Year 2	02/25/2021
Ambulance ODF	08/12/2021
GADCS Labor Session	10/07/2021
Q&A Session	09/14/2021
Q&A Session	10/12/2021
GADCS Volunteer Organizations	10/14/2021
GADCS Public Safety	10/21/2021
GADCS Revenue	10/28/2021
GADCS Providers	11/04/2021
GADCS Multiple NPIs	11/18/2021
Ambulance ODF	12/09/2021
Q&A Session	12/14/2021
Q&A Session	01/18/2022
Q&A Session	03/29/2022
Ambulance ODF	05/12/2022
GADCS Allocation Tips	07/21/2022
GADCS Facility and Vehicle Templates	08/04/2022
Ambulance ODF	08/18/2022
Ambulance ODF	12/01/2022
GADCS: Overview of the Data Submitter Role	12/08/2022
GADCS Overview of the Data Certifier Role	12/15/2022
Q&A Session	02/23/2023
Ambulance ODF	03/16/2023
GADCS Office Hours Session	04/27/2023
Ground Ambulance and Patient Billing (GAPB) Advisory Committee Public Meeting	05/03/2023
GADCS Office Hours	05/18/2023
Ambulance ODF	07/27/2023
Ambulance ODF	11/30/2023
GADCS Overview Session	01/18/2024
GADCS Office Hours	03/29/2024

NOTE: This list is current as of July 15, 2024.

GADCS Ambulance Resource Mailbox

CMS established and monitors the Ambulance Resource Mailbox (available at AmbulanceDataCollection@cms.hhs.gov). The mailbox is available to all ground ambulance organizations and stakeholders who would like to ask CMS a GADCS-related question directly or report a GADCS-related issue. CMS, with RAND and DCCA, responds directly to organization inquiries.

Outreach to Non-Responsive Organizations

To encourage non-responsive ground ambulance organizations to meet their data reporting requirements and avoid payment reductions, CMS and RAND have reached out to all non-responsive Year 1 and Year 2 organizations through mailed letters, emails, and phone calls.

Appendix B. Data Validation Findings

Data Validation Checks

Prior to analyzing the data, we conducted a number of data validation checks to determine whether organizations' answers were internally consistent. These checks are summarized in Table B.1.

Table B.1. Data Validation Checks

Section	Questions	Consistency Check—Expected Answer to Each Question Is "Yes"	Rationale
Section 3	3, 6	Is the average trip time in the primary service area less than or equal to the average trip time in the secondary service area (if applicable)?	Expect average trip time in the primary service area to be shorter or equal to that of the secondary service area. Failing this check is theoretically possible, but unlikely.
Section 4	3b	Is the average response time in Section 4 less than the average trip time reported in Section 3 (relevant only to organizations reporting data for Section 4)?	Expect average response time for primary service area to be shorter than average trip time in same area. Failing this check is theoretically possible, but unlikely.
Section 4	3b	Is the average response time for primary service area greater than one minute? (Among those using CMS definition of response time)	Expect responses to take more than one minute. Failing this check is theoretically impossible.
Section 4	3d	Is the average response time in Section 4 for the secondary service area less than the average trip time reported in Section 3 (relevant only to organizations reporting secondary service areas)?	Expect average response time for secondary service area to be shorter or equal to the average trip time in same area. Failing this check is theoretically possible, but unlikely.
Section 4	3b & 3d or 3e & 3g	Is the organization's average response time in their primary service area shorter than the average response time in their secondary service area (relevant only to organizations reporting secondary service areas)?	Expect average response time in primary service area to be shorter than that in their secondary service area. Failing this check is theoretically possible, but unlikely.
Section 4	3c or 3f	Is the share of responses that take twice more than the average less than 50 percent (it should be mathematically impossible to have a share over 50 percent)?	Expect fewer than 50 percent of responses to take twice as long as average response time. Failing this check is theoretically impossible.
Section 5	1 & 2	Is the total number of ground ambulance responses less than or equal to the total number of responses?	Expect the number of ground ambulance responses to be less than or equal than all responses (including non–ground ambulance responses). Failing

Section	Questions	Consistency Check—Expected Answer to Each Question Is "Yes"	Rationale
			this check is theoretically impossible.
Section 5	4	Is the percentage of ground ambulance responses in the secondary service area less than 50 percent?	Expect the majority of responses to take place in the primary service area. Failing this check is theoretically possible, but unlikely.
Section 5	2 & 5	Is the number of ground ambulance responses that did not result in a transport less than the number of ground ambulance responses?	Expect the number of responses that did not result in a transport ot be less than the total number of responses. Failing this check is heoretically impossible.
Section 5	2 & 6	Is the number of ground ambulance transports less than the number of ground ambulance responses?	Expect transports to be less than responses, as not all responses result in a transport. Failing this check is theoretically possible, but unlikely.
Section 5	6 & 7	Is the number of paid ground ambulance transports less than the number of ground ambulance transports?	Expect the number of paid transports to be less than total number of transports. Failing this check is theoretically impossible.
Section 5	2 & 9 or 10	Is the number of responses reported in either 9 or 10 less than or equal to the number of ground ambulance responses?	Expect number of responses reported in either question to be less than or equal to total number of responses. Failing this check is theoretically impossible.
Section 7.1	1	Is the average dollar per hour paid to EMT staff less than $900/hour?	Expect average EMT staff to make less than $900/hour (equivalent of more than $1.8 million/year). Failing this check is impossible.
Section 7.2	1	Is the average dollar per hour paid to administrative, facility, and Medical Director staff less than $900/hour?	Expect average administrative, facility, and Medical Director staff to make less than $900/hour (equivalent of more than $1.8 million/year). Failing this check is impossible.
Section 7.3	1 & 2, 3, 4, 5	Is the number of hours per volunteer less than 2,080 (the upper bound of 40 hours per week for 52 weeks)?	Expect average number of volunteer hours to not exceed 40 hours per week for 52 weeks. Failing this check is theoretically possible, but unlikely.
Sections 7–11, 12	All cost questions	Is the total cost reported in Sections 7–11 less than or equal to the total cost reported in Section 12?	Among organizations only offering ground ambulance services, expect the sum of the individual costs reported in Sections 7–11 to be less than or equal to the total cost reported in Section 12.
Section 13	1, 2 or 3, 5	Is the total revenue reported in questions 2 or 3 and 5 less than or equal to the revenue reported in 1?	Among organizations only offering ground ambulance services, expect the sum of the individual sources of revenue

Section	Questions	Consistency Check—Expected Answer to Each Question Is "Yes"	Rationale
			reported in questions 2, 3, and 5 to be less than or equal to the total revenue reported in question 1.

NOTE: A ground ambulance response is defined in the GADCS as "a response to a call for service by a fully equipped and staffed ground ambulance, scheduled or unscheduled, with or without a transport, and with or without payment."

The results of the internal consistency checks are presented in Tables C.2 to C.5. Overall, organizations' results were largely internally consistent, with less than 5 percent of respondents flagged by most checks. However, there were two checks that were failed more commonly: checks on total costs and revenue (volunteer hours were also somewhat problematic). All results of the internal consistency checks presented were performed prior to any data cleaning.

Table B.2. Internal Consistency Checks, S3 and S4—Average Trip and Response Times

Section	Questions	Consistency Check—Expected Answer to Each Question Is "Yes"	Number Eligible for Check	Number Flagged by Check	Number Flagged With Additional Tolerance	Description of Tolerance
3	3 & 6	Is the average trip time in the primary service area less than or equal to the average trip time in the secondary service area (if applicable)?	1,929	76	15	Allows primary service area average trip time to be at most one category[1] longer than secondary service area average trip time
3 4	3 3b	Is the average response time in S4 less than the average trip time reported in S3 (relevant only to organizations reporting data for S4)?	3,040	25	16	Allows average response time to be at most one category[1] longer than average trip time
4	3b	Is the average response time for primary service area greater than one minute? (Among those using CMS definition of response time)	2,359	7	-	N/A
3 4	6 3d	Is the average response time in S4 for the secondary service area less than the average trip time reported in S3 (relevant only to organizations reporting secondary service areas)?	1,608	10	6	Allows average response time to be at most one category[1] longer than average trip time
4	3b & 3d	Is the organization's average response time in their primary service area shorter than the average response time in their secondary service area (relevant only to organizations reporting secondary service areas)?	1,607	41	22	Assumes that secondary service area average response time is 25% higher than reported
	3e & 3g		383	6	6	Assumes that secondary service area average response time is 25% higher than reported
4	3c	Is the share of responses that take twice more than the average less than 50 percent (it should be mathematically impossible to have a share over 50 percent)?	3,040	0	-	N/A
	3f		383	0	-	N/A

SOURCE: Authors' analysis of the GADCS data file from July 15, 2024.
NOTE: Checks with tolerances described as "N/A" were not conducted as they should not have been possible, as opposed to those consistency checks where failing them is theoretically possible but unlikely. S = Section.

[1] The questions on average trip time for primary and secondary service areas are reported as categorical variables (i.e., less than 30 minutes, 30–60 minutes, 61–90 minutes, 91–120 minutes, 121–150 minutes, or more than 150 minutes). For the checks with tolerances, we allowed the two questions being examined to be at most one category separate from one another (e.g., less than 30 minutes for one question and 30–60 minutes for the other).

Table B.3. Internal Consistency Checks, S5 (Service Volume)

Section	Questions	Consistency Check—Expected Answer to Each Question Is "Yes"	Number Eligible for Check	Number Flagged by Check	Number Flagged With Additional Tolerance	Description of Tolerance
5	1 & 2	Is the total number of ground ambulance responses less than or equal to the total number of responses?	3,712	0	-	N/A
5	4	Is the percentage of ground ambulance responses in the secondary service area less than 50 percent?	1,929	0	0	Allows the percentage of ground ambulance responses in the secondary service area to be less than 75 percent
5	2 & 5	Is the number of ground ambulance responses that did not result in a transport less than the number of ground ambulance responses?	3,712	0	-	N/A
5	2 & 6	Is the number of ground ambulance transports less than the number of ground ambulance responses?	3,712	52	19	Assumes that the number of ground ambulance responses is 25% higher than reported
5	6 & 7	Is the number of paid ground ambulance transports less than or equal to the number of ground ambulance transports?	3,712	0	-	N/A
5	2 & 9	Is the number of responses reported in Q9[a] less than or equal to the number of ground ambulance responses?	82	0	-	N/A
5	2 & 10	Is the number of responses reported in Q10[b] less than or equal to the number of ground ambulance responses?	1,398	5	-	N/A

SOURCE: Authors' analysis of the GADCS data file from July 15, 2024.
NOTE: Checks with tolerances described as "N/A" were not conducted as they should not have been possible, as opposed to those consistency checks where failing them is theoretically possible but unlikely. Q = Question.
[a] Q9 asked respondents to report the number of responses for which their organization provided paramedic intercepts.
[b] Q10 asked respondents to report the number of responses for which their organization provided an ALS intervention as a joint response to meet a BLS ground ambulance from another organization, excluding paramedic intercepts.

Table B.4. Internal Consistency Checks, S7 (Labor)

Section	Questions	Consistency Check—Expected Answer to Each Question Is "Yes"	Number Eligible for Check	Number Flagged by Check	Number Flagged With Additional Tolerance	Description of Tolerance
7.1	1	Is the average dollar per hour paid to EMT staff less than $900/hour?	3,270	79	-	N/A
7.2	1	Is the average dollar per hour paid to administrative, facility, and Medical Director staff less than $900/hour?	2,970	63	-	N/A
7.3	1 & 2	Is the number of hours per EMT/response volunteer less than 2,080 (the upper bound of 40 hours per week for 52 weeks)?	1,072[a]	45	31	Increases upper bound to be 3,000 hours
7.3	3 & 4	Is the number of hours per administration/facility volunteer less than 2,080 (the upper bound of 40 hours per week for 52 weeks)?	591[b]	243	241	Increases upper bound to be 3,000 hours
7.3	5	Is the number of hours per medical director volunteer less than 2,080 (the upper bound of 40 hours per week for 52 weeks)?	445	4	2	Increases upper bound to be 3,000 hours

SOURCE: Authors' analysis of the GADCS data file from July 15, 2024.
NOTE: Checks with tolerances described as "N/A" were not conducted as they should not have been possible, as opposed to those consistency checks where failing them is theoretically possible but unlikely.
[a] Respondents who reported the hours that volunteers worked in S7.3Q2 but reported having zero volunteers in S7.3Q1 were excluded from this check. Similarly, respondents who reported having some volunteer workers in S7Q1 but then reported no hours of volunteer work and no volunteers in S7.3 were excluded.
[b] Respondents who reported the hours that volunteers worked in S7.3Q4 but reported having zero volunteers in S7.3Q3 were excluded from this check. Similarly, respondents who reported having some volunteer workers in S7Q1 but then reported no hours of volunteer work and no volunteers in S7.3 were excluded.

To examine total cost estimates, we summed the separate responses given on component costs in Sections 7 through 11, considering ground ambulance allocation factors so that only ground ambulance costs were summed, and compared that total with the total estimate of costs reported by organizations in S12Q1 (Table B.5). Among ground ambulance–only organizations, we found that 324 respondents out of 1,517 (21 percent) had higher summed total costs from Sections 7 through 11 than the total estimates of costs reported in S12Q1. Even with a 25 percent tolerance, there were still 255 organizations that failed this check.

To examine total revenue estimates, we summed the separate responses given on component revenue sources in Section 13 (Revenues) and compared that total with the total estimated revenue reported by organizations in S13Q1. Among ground ambulance–only organizations, we found that 228 (15 percent) had higher summed revenue estimates than they reported in S13Q1.

Including a tolerance of a 25 percent increase in the total revenue reported in S13Q1 reduced the number of organizations failing the check; however, 61 (4 percent) of organizations still failed this check.

Table B.5. Internal Consistency Checks, Costs and Revenue

Section	Questions	Consistency Check—Expected Answer to Each Question Is "Yes"	Number Eligible for Check	Number Flagged by Check	Number Flagged With Additional Tolerance	Description of Tolerance
7–11, 12	All cost questions	Are the total costs reported in S7 through S11 less than or equal to the total costs reported in S12? (Ground ambulance–only organizations)	1,517	324	255	Assumes that total cost in S12 is 25% higher than reported
13	1, 2 or 3, 5	Is the total revenue reported in questions 2 or 3 and 5 less than or equal to the revenue reported in 1? (Ground ambulance–only organizations)	1,517	228	61	Assumes that total revenue in Q1 is 25% higher than reported

SOURCE: Authors' analysis of the GADCS data file from July 15, 2024.
NOTE: S = Section.

Summary of Outreach Activities

To further investigate the results of the internal validity checks outlined above, we conducted follow-up phone conversations with a sample of organizations with one or more failed internal validity checks suggesting a submission error. The goal of these follow-up calls was to understand whether there were common root causes that would inform data cleaning steps, interpretation of the data, or changes to the GADCS instrument in future cycles. We selected organizations to contact that had the largest number of failed validation checks or had the largest magnitude difference of the ratios of total costs or revenues to the sum of individual costs and revenues. In total, we contacted 35 organizations and met with 21 of these organizations. The other 14 organizations refused or did not respond to multiple follow-up attempts. Of the 21 organizations with whom we spoke, we determined that 19 had true submission errors, while the other two had unusual circumstances resulting in correct but unexpected answers. We summarize the root causes of failed validation checks common to multiple organizations in Table B.6. Other root causes, such as mistyping a number or misinterpreting a question that was not identified by other organizations we spoke with, were not considered systematic issues and are not addressed.

Table B.6. Root Causes of Failed Validity Checks

Root Cause	Impacted Questions	Implications for Data Cleaning, Interpretation, or GADCS Instrument
Entering or copying and pasting numbers with decimals resulted in answer off by a factor of 100 (e.g., "500,105.95" was recorded as "$50,010,959").	All cost and revenue questions in S7–S13	Data cleaning needed to address outliers (see next section). Adding function to GADCS to automatically round decimals to nearest whole number may prevent this issue.
Table headings were truncated in programmed version with full instructions in the printable instrument and mouseover text. Many organizations did not read the full instructions and reported purchase prices for all vehicles, not just those purchased during the data collection period.	S9.1, Q5; S9.2, Q5	Data cleaning needed to address high total vehicle costs (see next section). Adding full instructions for reporting purchase price in table header may prevent this issue.
Total revenue did not include tax revenue	S13, Q1	Data cleaning needed to address low revenue outliers (see next section). Emphasizing the importance of including tax revenue in the instructions may prevent this issue.
Labor hours reported in multiple categories	S7.1, Q1; 7.3, Q1	Data cleaning needed to address high labor cost outliers (see next section).

Data Cleaning

Based on our discussions with organizations and additional inconsistencies or outliers identified when analyzing the data, we implemented cleaning protocols for several questions. Some questions underwent multiple cleaning protocols to address different issues. We summarize these in Table B.7.

Table B.7. Data Cleaning Procedures

Question or Issue Type	Questions Recoded	Summary of Cleaning Steps and Rationale
Organization type	S2, Q7	Organizations could select "Other" organization type and write in another organization type. Several write-in responses fell clearly within one of the defined categories (e.g., "government entity operating fire and EMS services" should have been classified as "fire department–based"). In these cases, we reclassified the write-in options to the appropriate category. In other cases, it was possible that the organization fit into one of the defined categories, but the organization did not include sufficient information to determine the category (e.g., several organizations wrote in "ambulance service"). In these cases, we did not recode the response. We redefined the "Other" category as "Other/unknown" for the purposes of reporting.
Hot deck imputation	S4, Q3c; S4, Q3f	These questions ask about the share of an organization's ground ambulance emergency responses that are twice the average response time. It is mathematically impossible for more than 50% of responses to be twice the average. We recoded these values as missing and then used hot deck imputation based on sampling strata to impute answer.
Responses and transports	S5, Q1; S5, Q2; S5, Q5; S5, Q6; S5, Q7	These questions represent total responses, ground ambulance responses, ground ambulance responses not resulting in transport, ground ambulance transports, and paid ground ambulance transports, respectively. Though the GADCS includes some data validation (e.g., the number of ground ambulance responses reported cannot be larger than the number of total responses), we identified some impossible and improbable response patterns. We merged 2022 Medicare FFS claim lines into the GADCS data and checked for the following circumstances: (1) paid ground ambulance transports greater than Medicare FFS claim lines, (2) total transports greater than Medicare FFS claim lines, (3) total transports less than 110% of ground ambulance responses (one ground ambulance response can occasionally result in multiple

Question or Issue Type	Questions Recoded	Summary of Cleaning Steps and Rationale
		transports, but many ground ambulance responses do not result in transport), (4) ground ambulance responses less than or equal to the sum of transports and ground ambulance responses not resulting in transport, (5) sum of ground ambulance transports and ground ambulance responses not resulting in transport greater than 125 percent of ground ambulance transports, and (6) number of total responses twice the number of ground ambulance responses for non–public safety organizations or four times the number of ground ambulance responses for public safety organizations. We calculated the ratio of values between S5, Q01; S5, Q2; S5, Q5; S5, Q6; S5, Q7 and 2022 Medicare FFS claim lines for organizations that did not fail any checks. We used these ratios as a source for hot deck imputation and applied it to organizations that failed only one check. This resulted in a set of responses that used reported data whenever possible and were internally consistent. When organizations failed two or more checks, we used a regression approach to impute values of S5, Q01; S5, Q2; S5, Q5; S5, Q6 and S5, Q7 based on responses to the transport revenue questions in Section 13.
Recoding answers where data should not be present	S7, Q1; S7.1, Q1; S7.2, Q1; S7.3, Q2; S8.1, Q1–Q3; S8.2, Q1–Q3; S9.1, Q1; S9.1, Q2; S9.1, Q5; S9.2, Q1; S9.2, Q2; S9.2, Q4; S9.2, Q5	In general, skip logic in the programmed instrument prevented non–public safety organizations from seeing questions about staff with public safety roles or reporting public safety hours. However, a small number of non–public safety organizations (as defined in S2, Q7 and Q9) were able to report on staff with public safety responsibilities and public safety hours. Where this occurred, we reclassified the staff in corresponding staff category "without public safety role" and reclassified the hours worked on public safety as "hours worked related to all other responsibilities." Similarly, a few organizations that reported that they did not use volunteer labor in S2, Q6 were able to report volunteer staff in S7, Q1, though these hours were all reported in the relevant paid category. Where this occurred, we reclassified staff in the corresponding paid staff category in S7, Q1. The instructions noted that vehicles and facilities that were 0 percent ground ambulance-related should not be included in the GADCS. When an organization reported a facility or vehicle as 0 percent ground ambulance-related or when an organization did not check the box confirming that the vehicle was used to support ground ambulance operations, the facilities and vehicles did not contribute to total facility and vehicle counts and costs.

Question or Issue Type	Questions Recoded	Summary of Cleaning Steps and Rationale
		When an organization reported having no water response vehicles, we recoded S9.2, Q4 (total number of statute miles traveled by non-ambulance water vehicles) as zero.
High outliers for continuous variables (winsorize 99th percentile of overall answer)	S4, Q3b; S4, Q3d; S4, Q3e; S4, Q3g; S5, Q9; S5, Q10; S7.1, Q1; S7.2, Q1; S8.1, Q3; S8.2, Q3; S9.1, Q6; S10.1, Q1–Q3; S10.2, Q1–Q3; S11, Q1; S11, Q4	For some responses, organizations input unreasonably high values. We took different approaches to cleaning these high values depending on the question, examination of the data, and the availability of outside benchmarks. Where outside benchmarks were not available, we winsorized at the 99th percentile.
High outliers for continuous variables (winsorize 99th percentile of per unit answer)	S8.1, Q3; S9.1, Q3; S9.2, Q5; S9.3, Q1; S9.3, Q2; S9.3, Q3; S9.3, Q4; S9.3, Q5	In some cases, we winsorized at the 99th percentile, applied at a per unit level, then recalculated total responses. For example, we winsorized square footage per facility at the 99th percentile, then we multiplied the number of facilities (assumed to be correct because organizations had to input information for each facility) by the adjusted square footage per facility to calculate total square footage per facility. We applied the same strategy to non-ambulance vehicle purchase, lease, and depreciation costs (with the exception of fire trucks, which are more expensive than other vehicles and for which we found outside benchmarks; see the row after the next for more details). We also applied this strategy to vehicle insurance, license, registration, maintenance, and fuel costs. In these instances, we winsorized each relevant cost per vehicle instead of to the total cost across all vehicles.
High outliers for continuous variables (winsorize 95th percentile of per unit answer)	S7.3, Q2	In the case of volunteer hours, we winsorized the 95th percentile of total hours per response, then recalculated total hours as the product of the total number of responses and the winsorized total hours per response. We then applied the percentages of total hours related each to ground ambulance, public safety (as applicable), and "all other responsibilities" that were initially reported and applied those to the recoded total hours to obtain new values for hours worked related to ground ambulance operations, public safety (as applicable), and all other responsibilities.
High outliers for continuous variables (set per unit upper and lower limits	S7.1, Q1; S7.2, Q1, S9.1, Q5; S9.2, Q5	We capped maximum hourly compensation at $121.90, which is the 2022 Bureau of Labor Statistics hourly wage for civilian chief executives, the highest-paid labor category assumed to be included in the broad administration/facilities labor category.[a] When the hourly rate exceeded the upper cap, we assumed hours to be correct

Question or Issue Type	Questions Recoded	Summary of Cleaning Steps and Rationale
to outside benchmark)		and recalculated total compensation using the maximum hourly rate. We set the minimum hourly compensation to equal the 2022 national minimum wage ($7.25). When the reported hourly rate fell below the minimum, we assumed that compensation was correct and recalculated hours using the minimum hourly rate. As above, after recoding total hours worked, we applied the percentages of total hours related each to ground ambulance, public safety (as applicable), and "all other responsibilities" that were initially reported and applied those to the recoded total hours to obtain new values for hours worked related to ground ambulance operations, public safety (as applicable), and all other responsibilities. We set the maximum purchase price for a ground ambulance vehicle at $400,000 based on internet searches. We set the maximum depreciation for a ground ambulance vehicle at $100,000 based on a lower-end useful-life-of-vehicle estimate of four years, as reported by the Moran survey.[b] We capped maximum lease costs for ground ambulance vehicles at $140,000 and maximum other costs at $42,000 based on internet searches. We capped maximum remount costs at $300,000 based on internet searches indicating that remount costs are typically 50 to 75 percent of vehicle purchase costs. We capped maximum costs of fire trucks at $2,000,000 based on internet searches.
Adjustment for vehicle costs where full purchase price listed for every vehicle.	S9.1, Q5; S9.2, Q5	In Section 9.1, Q5 and Section 9.2, Q5, organizations were asked to list all ground ambulance vehicles and all non-ambulance vehicles supporting ground ambulance operations owned or leased during the data collection period. For organizations operating on a cash basis, they could include costs toward purchase of these vehicles incurred during the data collection period. Based on follow-up discussions with ground ambulance organizations and analysis of GADCS and PECOS data, we concluded that many organizations listed full purchase costs for all vehicles used by the organization, not just expenses incurred during the data collection period. To estimate the expected percentage of vehicles purchased in a given year, we compared the 2022 and 2023 ground ambulances and non-ambulance vehicles supporting ground ambulance operations reported to PECOS. Based on this data, we calculated that approximately 10% of vehicles used by ground ambulance organizations in 2023 were purchased during 2022. Whenever an organization reported having three or more ground ambulances or

Question or Issue Type	Questions Recoded	Summary of Cleaning Steps and Rationale
		three or more non-ambulance vehicles averaging over $200,000 purchase cost per vehicle, we assumed that the organization was reporting purchase costs for all vehicles, not just costs incurred during the data collection period, and multiplied each vehicle purchase cost by 10 percent.

[a] Bureau of Labor Statistics, "Series WMU00000001020000001110112500, Average Hourly Wage for Full-Time Chief Executives in the U.S., Civilian Full Time," webpage, 2024.
[b] The Moran Company, *Final Report Detailing "Hybrid Data Collection Method" for the Ambulance Industry: Beta Test Results of the Statistical & Financial Data Survey & Recommendations*, 2014.

Appendix C. Methods Details

As described in Chapter 3, we calculated weights to apply to the data for our analyses to account for differential non-response to the GADCS. The weights ranged from 1 to 98.25 before we winsorized the final version of the weights at 20, which led to 36 NPIs having their weights decreased to 20. We winsorized the weights at 20 so that those with particularly high weights would not have an undue influence on the results. When we examined the distribution of the weights across all organizations, the average organization has a weight of 1.35, and 50 percent of organization have a weight of 1.12 or below.

Calculating Total Number of RVUs per Organization

For our regression analyses, we examined total cost and revenue per RVU. To do so, we calculated the total RVUs for all of the transports that an NPI reported. In Section 5, NPIs report their total number of transports for the data collection period. In Section 6, they report the share of those transports per HCPCS code. We calculated the total number of transports per HCPCS code by multiplying the reported share per HCPCS code in Section 6 by the total number of transports. We then multiplied the total number of transports per HCPCS code by the RVU assigned to that HCPCS code (A0428 = 1 RVU; A0429 = 1.6 RVUs; A0426 = 1.2 RVUs; A0427 = 1.9 RVUs; A0433 = 2.75 RVUs; A0434 = 3.25 RVUs).[121] We then summed the total number of RVUs across all HCPCS codes and used this as our denominator for our analyses examining total costs and total revenue per RVU.

Additional Data Cleaning for Regression Models

To address outliers remaining after implementing our overall data cleaning and imputation steps (described in Appendix B) that could affect our regression analyses, we top- and bottom-coded NPI-level ground ambulance total costs and total payer revenue such that they were neither lower nor higher than the product of each NPI's count of ground ambulance responses and

for cost:

a.) the 1st percentile ground ambulance cost per response ($169)

b.) the 99th percentile ground ambulance cost per response ($25,877).

for revenue:

a.) the 1st percentile ground ambulance revenue per response ($94)

[121] HCPCS code A0432 was not included as a possible ground ambulance transport type in the GADCS when organizations reported the percentage of their transports that fell into each HCPCS code category.

b.) the 99th percentile ground ambulance revenue per response ($11,014).

We used costs/revenue per response rather than per transport because responses are a more granular count of ground ambulance activity. Given that our recoding criteria were based on 2 percent (the 1st and 99th percentiles combined) of the remaining 3,712 sample NPIs, this step replaced total cost estimates with a winsorized value for 37 NPIs (1 percent of the sample) and with a bottom-coded value for 37 NPIs (the other 1 percent).

Additional Explanatory Variables Included in Regression Models

In addition to the organizational characteristics used as sampling strata for the GADCS, we included in our models additional explanatory variables that we found in our earlier work[122] could be associated with higher or lower per-service costs on average, including

- use of volunteer labor (response from Section 2 [Organizational Characteristics], Question 6 [Use of Volunteer Labor])
- provision of fire, police, or other public safety services in addition to ground ambulance services (response from Section 2, Question 7 [Ground Ambulance Organization Category])
- use of a static staffing model (i.e., the same number of staffed and equipped ambulance "units" available for dispatch at all times), a dynamic staffing model (i.e., the number of available units varies by day, time, or season), or a mixed staffing model (i.e., a blend of the two other models) (response to Section 2, Question 14 [Staffing Model])
- provision of "around the clock" (sometimes called "24/7/365") response to 911 emergency calls for service (response to Section 2, Question 15 [Emergency Service Provision])
- response to calls for service with another organization (response to Section 5 [Ground Ambulance Service Volume], Question 3 [Joint Responses]).

To calculate AMEs, we held each NPI's full set of modeled characteristics constant as reported by organizations, with the exception of the one characteristic for which we were calculating the AME. We generated two predicted values out of the model using estimated coefficients and each NPI's data, one with the variable of interest equal to 0 and the other with the variable of interest equal to 1 (or an appropriate reference value as indicated). The AME is the average difference between these two predicted values.

[122] Mulcahy et al., 2019.

Full Regression Model Results

Table C.1. Estimated Regression Model AMEs, Total Cost per Response

	AME ($)	95% CI		*P*-Value
Provider (vs. supplier)	–681	–1,074	–289	0.001
Traditional Medicare Transport Volume (vs. low volume)				
Medium volume	–611	–961	–262	0.001
High volume	–901	–1,293	–509	<0.001
Very high volume	–1,362	–1,751	–974	0.000
Ownership Type (vs. non-profit)				
For-profit or unknown	–321	–768	125	0.159
Government	–117	–453	219	0.494
Service Area Population Density (vs. urban)				
Super rural	485	99	871	0.014
Rural	113	–169	394	0.433
Other Organizational Characteristics				
Volunteer labor (vs. not)	77	–216	371	0.606
Public safety (vs. not)	553	235	870	0.001
Static staffing (vs. not)	485	215	755	<0.001
Emergency services (vs. not)	–153	–870	564	0.676
Joint responses (vs. not)	–242	–533	49	0.103

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: AME = average marginal effect. CI = confidence interval.

Table C.2. Estimated Regression Model AMEs, Cost per Transport

	AME ($)	95% CI		*P*-Value
Provider (vs. supplier)	–1,017	–1,549	–485	<0.001
Traditional Medicare Transport Volume (vs. low volume)				
Medium volume	–1,045	–1,543	–547	<0.001
High volume	–1,494	–2,041	–947	<0.001
Very high volume	–2,108	–2,655	–1,561	<0.001
Ownership Type (vs. non-profit)				
For-profit or unknown	–572	–1,176	32	0.063
Government	–59	–516	398	0.801
Service Area Population Density (vs. urban)				
Super rural	694	134	1,255	0.015
Rural	–1	–381	378	0.995
Other Organizational Characteristics				
Volunteer labor (vs. not)	–45	–462	371	0.830
Public safety (vs. not)	1,013	552	1,474	<0.001
Static staffing (vs. not)	782	398	1,165	<0.001
Emergency services (vs. not)	237	–622	1,097	0.588
Joint responses (vs. not)	–321	–743	101	0.136

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: AME = average marginal effect. CI = confidence interval.

Table C.3. Estimated Regression Model AMEs, Cost per RVU

	AME ($)	95% CI		*P*-Value
Provider (vs. supplier)	–713	–988	–439	<0.001
Traditional Medicare Transport Volume (vs. low volume)				
Medium volume	–591	–871	–312	<0.001
High volume	–817	–1,130	–503	<0.001
Very high volume	–1,162	–1,485	–840	<0.001
Ownership Type (vs. non-profit)				
For-profit or unknown	–255	–616	106	0.166
Government	1	–272	273	0.996
Service Area Population Density (vs. urban)				
Super rural	511	169	854	0.003
Rural	32	–195	260	0.782
Other Organizational Characteristics				
Volunteer labor (vs. not)	84	–163	332	0.504
Public safety (vs. not)	587	325	850	<0.001
Static staffing (vs. not)	392	170	615	0.001
Emergency services (vs. not)	–184	–762	395	0.534
Joint responses (vs. not)	–237	–468	–6	0.044

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: AME = average marginal effect. CI = confidence interval.

Table C.4. Estimated Regression Model AMEs, Revenue per Response

	AME ($)	95% CI		*P*-Value
Provider (vs. supplier)	–30	–211	151	0.746
Traditional Medicare Transport Volume (vs. low volume)				
Medium volume	–223	–344	–102	<0.001
High volume	–157	–315	1	0.051
Very high volume	–299	–485	–114	0.002
Ownership Type (vs. non-profit)				
For-profit or unknown	–280	–404	–155	<0.001
Government	13	–107	133	0.829
Service Area Population Density (vs. urban)				
Super rural	188	56	321	0.005
Rural	83	–25	191	0.131
Other Organizational Characteristics				
Volunteer labor (vs. not)	–76	–182	30	0.160
Public safety (vs. not)	–46	–181	90	0.509
Static staffing (vs. not)	133	32	235	0.010
Emergency services (vs. not)	–483	–894	–73	0.021
Joint responses (vs. not)	–32	–154	91	0.612

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: AME = average marginal effect. CI = confidence interval.

Table C.5. Estimated Regression Model AMEs, Revenue per Transport

	AME ($)	95% CI		*P*-Value
Provider (vs. supplier)	–71	–328	186	0.587
Traditional Medicare Transport Volume (vs. low volume)				
Medium volume	–396	–582	–210	<0.001
High volume	–368	–595	–141	0.001
Very high volume	–552	–815	–290	<0.001
Ownership Type (vs. non-profit)				
For-profit or unknown	–365	–536	–194	<0.001
Government	66	–106	239	0.452
Service Area Population Density (vs. urban)				
Super rural	237	26	449	0.028
Rural	40	–107	187	0.593
Other Organizational Characteristics				
Volunteer labor (vs. not)	–104	–265	57	0.206
Public safety (vs. not)	42	–157	242	0.678
Static staffing (vs. not)	175	27	323	0.020
Emergency services (vs. not)	–330	–824	164	0.191
Joint responses (vs. not)	–12	–195	170	0.894

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: AME = average marginal effect. CI = confidence interval.

Table C.6. Estimated Regression Model AMEs, Revenue per Transport

	AME ($)	95% CI		*P*-Value
Provider (vs. supplier)	–78	–219	63	0.277
Traditional Medicare Transport Volume (vs. low volume)				
Medium volume	–228	–335	–120	<0.001
High volume	–200	–332	–69	0.003
Very high volume	–288	–452	–125	0.001
Ownership Type (vs. non-profit)				
For-profit or unknown	–171	–273	–69	0.001
Government	54	–47	155	0.297
Service Area Population Density (vs. urban)				
Super rural	171	43	299	0.009
Rural	32	–55	119	0.472
Other Organizational Characteristics				
Volunteer labor (vs. not)	–37	–132	59	0.452
Public safety (vs. not)	1	–106	108	0.983
Static staffing (vs. not)	75	–11	161	0.086
Emergency services (vs. not)	–366	–685	–48	0.024
Joint responses (vs. not)	–23	–120	75	0.647

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: AME = average marginal effect. CI = confidence interval.

Sensitivity Analysis

We also ran our regression models where we excluded organizations with total costs per response or total revenue per response that was below the 1st percentile or above the 99th percentile (instead of recoding their data, as we did with the regression models presented in Chapter 6). Below are the results from those analyses.

Table C.7. Estimated Regression Model AMEs With Outliers Excluded, Total Cost per Response

	AME ($)	95% CI		*P*-Value
Provider (vs. supplier)	–569	–803	–335	<0.001
Traditional Medicare Transport Volume (vs. low volume)				
Medium volume	–587	–786	–388	<0.001
High volume	–666	–923	–410	<0.001
Very high volume	–1,026	–1,299	–753	<0.001
Ownership Type (vs. non-profit)				
For-profit or unknown	–147	–456	162	0.352
Government	84	–147	315	0.478
Service Area Population Density (vs. urban)				
Super rural	460	197	724	0.001
Rural	27	–161	215	0.779
Other Organizational Characteristics				
Volunteer labor (vs. not)	24	–164	212	0.801
Public safety (vs. not)	351	151	551	0.001
Static staffing (vs. not)	348	160	537	<0.001
Emergency services (vs. not)	133	–252	519	0.498
Joint responses (vs. not)	–229	–400	–59	0.008

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: AME = average marginal effect. CI = confidence interval.

Table C.8. Estimated Regression Model AMEs With Outliers Excluded, Cost per Transport

	AME ($)	95% CI		*P*-Value
Provider (vs. supplier)	–876	–1,224	–528	<0.001
Traditional Medicare Transport Volume (vs. low volume)				
Medium volume	–1,056	–1,370	–741	<0.001
High volume	–1,242	–1,623	–860	<0.001
Very high volume	–1,719	–2,122	–1,317	<0.001
Ownership Type (vs. non-profit)				
For-profit or unknown	–420	–853	13	0.057
Government	148	–199	494	0.403
Service Area Population Density (vs. urban)				
Super rural	557	167	947	0.005
Rural	–51	–332	231	0.723
Other Organizational Characteristics				
Volunteer labor (vs. not)	–40	–324	244	0.784
Public safety (vs. not)	632	342	922	<0.001

	AME ($)	95% CI		*P*-Value
Static staffing (vs. not)	516	235	797	<0.001
Emergency services (vs. not)	571	96	1047	0.019
Joint responses (vs. not)	–333	–592	–74	0.012

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: AME = average marginal effect. CI = confidence interval.

Table C.9. Estimated Regression Model AMEs With Outliers Excluded, Cost per RVU

	AME ($)	95% CI		*P*-Value
Provider (vs. supplier)	–605	–799	–411	<0.001
Traditional Medicare Transport Volume (vs. low volume)				
Medium volume	–631	–815	–448	<0.001
High volume	–701	–934	–467	<0.001
Very high volume	–974	–1,231	–717	<0.001
Ownership Type (vs. non-profit)				
For-profit or unknown	–174	–435	88	0.192
Government	113	–100	326	0.297
Service Area Population Density (vs. urban)				
Super rural	422	176	669	0.001
Rural	–7	–178	164	0.933
Other Organizational Characteristics				
Volunteer labor (vs. not)	59	–118	235	0.515
Public safety (vs. not)	384	200	568	<0.001
Static staffing (vs. not)	252	78	426	0.005
Emergency services (vs. not)	13	–375	401	0.947
Joint responses (vs. not)	–214	–373	–54	0.009

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: AME = average marginal effect. CI = confidence interval. RVU = relative value unit.

Table C.10. Estimated Regression Model AMEs With Outliers Excluded, Revenue per Response

	AME ($)	95% CI		*P*-Value
Provider (vs. supplier)	2	–146	150	0.980
Traditional Medicare Transport Volume (vs. low volume)				
Medium volume	–155	–232	–77	<0.001
High volume	–125	–226	–25	0.015
Very high volume	–171	–326	–16	0.030
Ownership Type (vs. non-profit)				
For-profit or unknown	–171	–265	–77	<0.001
Government	–18	–99	63	0.659
Service Area Population Density (vs. urban)				
Super rural	192	98	286	<0.001
Rural	31	–39	101	0.380
Other Organizational Characteristics				
Volunteer labor (vs. not)	–46	–111	20	0.175
Public safety (vs. not)	–21	–93	50	0.556
Static staffing (vs. not)	104	41	167	0.001

	AME ($)	95% CI		*P*-Value
Emergency services (vs. not)	–240	–476	–4	0.046
Joint responses (vs. not)	11	–52	75	0.725

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: AME = average marginal effect. CI = confidence interval.

Table C.11. Estimated Regression Model AMEs With Outliers Excluded, Revenue per Transport

	AME ($)	95% CI		*P*-Value
Provider (vs. supplier)	–38	–234	157	0.699
Traditional Medicare Transport Volume (vs. low volume)				
Medium volume	–262	–377	–148	<0.001
High volume	–263	–402	–124	<0.001
Very high volume	–319	–526	–111	0.003
Ownership Type (vs. non-profit)				
For-profit or unknown	–234	–369	–99	0.001
Government	8	–111	128	0.890
Service Area Population Density (vs. urban)				
Super rural	228	86	369	0.002
Rural	–21	–117	76	0.675
Other Organizational Characteristics				
Volunteer labor (vs. not)	–47	–147	52	0.351
Public safety (vs. not)	48	–55	150	0.364
Static staffing (vs. not)	145	53	237	0.002
Emergency services (vs. not)	–43	–297	211	0.740
Joint responses (vs. not)	30	–62	121	0.525

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: AME = average marginal effect. CI = confidence interval.

Table C.12. Estimated Regression Model AMEs With Outliers Excluded, Revenue per Transport

	AME ($)	95% CI		*P*-Value
Provider (vs. supplier)	–39	–155	78	0.513
Traditional Medicare Transport Volume (vs. low volume)				
Medium volume	–160	–231	–90	<0.001
High volume	–158	–243	–72	<0.001
Very high volume	–175	–314	–35	0.014
Ownership Type (vs. non-profit)				
For-profit or unknown	–91	–176	–7	0.035
Government	14	–57	86	0.695
Service Area Population Density (vs. urban)				
Super rural	154	69	240	<0.001
Rural	–7	–65	52	0.815
Other Organizational Characteristics				
Volunteer labor (vs. not)	–11	–73	50	0.723
Public safety (vs. not)	18	–45	80	0.581
Static staffing (vs. not)	67	10	125	0.022

	AME ($)	95% CI		*P*-Value
Emergency services (vs. not)	–217	–431	–2	0.048
Joint responses (vs. not)	20	–36	76	0.487

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: AME = average marginal effect. CI = confidence interval.

As discussed in Chapter 6, we also ran our regression models with state fixed effects. Below are the results from those analyses.

Table C.13. Estimated Regression Model AMEs With State Fixed Effects, Total Cost per Response

	AME ($)	95% CI		*P*-Value
Provider (vs. supplier)	–638	–980	–297	<0.001
Traditional Medicare Transport Volume (vs. low volume)				
Medium volume	–618	–930	–307	<0.001
High volume	–1,022	–1,354	–691	<0.001
Very high volume	–1,477	–1,793	–1,160	<0.001
Ownership Type (vs. non-profit)				
For-profit or unknown	–445	–832	–57	0.025
Government	–45	–354	264	0.776
Service Area Population Density (vs. urban)				
Super rural	74	–266	415	0.668
Rural	133	–139	406	0.338
Other Organizational Characteristics				
Volunteer labor (vs. not)	–24	–292	244	0.861
Public safety (vs. not)	505	227	782	<0.001
Static staffing (vs. not)	345	118	573	0.003
Emergency services (vs. not)	–160	–669	348	0.537
Joint responses (vs. not)	–182	–394	31	0.093

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: State fixed effects were also included in the model. AME = average marginal effect. CI = confidence interval.

Table C.14. Estimated Regression Model AMEs With State Fixed Effects, Cost per Transport

	AME ($)	95% CI		*P*-Value
Provider (vs. supplier)	–973	–1,449	–496	<0.001
Traditional Medicare Transport Volume (vs. low volume)				
Medium volume	–1,088	–1,543	–634	<0.001
High volume	–1,699	–2,184	–1,213	<0.001
Very high volume	–2,303	–2,767	–1,839	<0.001
Ownership Type (vs. non-profit)				
For-profit or unknown	–714	–1,253	–176	0.009
Government	–10	–452	433	0.966
Service Area Population Density (vs. urban)				
Super rural	–19	–526	488	0.941

	AME ($)	95% CI		*P*-Value
Rural	–52	–429	325	0.787
Other Organizational Characteristics				
Volunteer labor (vs. not)	–123	–504	258	0.526
Public safety (vs. not)	865	464	1,266	<0.001
Static staffing (vs. not)	596	273	919	<0.001
Emergency services (vs. not)	211	–427	849	0.516
Joint responses (vs. not)	–229	–540	82	0.149

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: State fixed effects were also included in the model. AME = average marginal effect. CI = confidence interval.

Table C.15. Estimated Regression Model AMEs With State Fixed Effects, Cost per RVU

	AME ($)	95% CI		*P*-Value
Provider (vs. supplier)	–666	–924	–407	<0.001
Traditional Medicare Transport Volume (vs. low volume)				
Medium volume	–653	–915	–390	<0.001
High volume	–981	–1,264	–698	<0.001
Very high volume	–1,326	–1,593	–1,059	<0.001
Ownership Type (vs. non-profit)				
For-profit or unknown	–332	–665	0	0.050
Government	18	–242	277	0.894
Service Area Population Density (vs. urban)				
Super rural	53	–250	356	0.731
Rural	6	–219	231	0.958
Other Organizational Characteristics				
Volunteer labor (vs. not)	–4	–233	225	0.973
Public safety (vs. not)	515	273	757	<0.001
Static staffing (vs. not)	285	91	480	0.004
Emergency services (vs. not)	–198	–631	235	0.369
Joint responses (vs. not)	–175	–358	8	0.061

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: State fixed effects were also included in the model. AME = average marginal effect. CI = confidence interval.

Table C.16. Estimated Regression Model AMEs With State Fixed Effects, Revenue per Response

	AME ($)	95% CI		*P*-Value
Provider (vs. supplier)	–39	–202	124	0.640
Traditional Medicare Transport Volume (vs. low volume)				
Medium volume	–252	–366	–139	<0.001
High volume	–161	–321	–1	0.049
Very high volume	–384	–539	–230	<0.001
Ownership Type (vs. non-profit)				
For-profit or unknown	–310	–427	–194	<0.001
Government	–15	–128	98	0.796
Service Area Population Density (vs. urban)				

	AME ($)	95% CI		*P*-Value
Super rural	84	–47	214	0.208
Rural	59	–42	160	0.252
Other Organizational Characteristics				
Volunteer labor (vs. not)	–69	–176	37	0.203
Public safety (vs. not)	–104	–213	5	0.063
Static staffing (vs. not)	103	16	190	0.021
Emergency services (vs. not)	–422	–719	–126	0.005
Joint responses (vs. not)	–40	–134	54	0.404

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: State fixed effects were also included in the model. AME = average marginal effect. CI = confidence interval.

Table C.17. Estimated Regression Model AMEs With State Fixed Effects, Revenue per Transport

	AME ($)	95% CI		*P*-Value
Provider (vs. supplier)	–85	–308	138	0.454
Traditional Medicare Transport Volume (vs. low volume)				
Medium volume	–463	–641	–285	<0.001
High volume	–399	–632	–166	0.001
Very high volume	–688	–915	–461	<0.001
Ownership Type (vs. non-profit)				
For-profit or unknown	–396	–546	–246	<0.001
Government	15	–142	172	0.853
Service Area Population Density (vs. urban)				
Super rural	77	–116	270	0.433
Rural	8	–130	145	0.915
Other Organizational Characteristics				
Volunteer labor (vs. not)	–92	–246	63	0.244
Public safety (vs. not)	–80	–237	77	0.316
Static staffing (vs. not)	131	8	255	0.038
Emergency services (vs. not)	–274	–633	85	0.135
Joint responses (vs. not)	–3	–136	130	0.965

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: State fixed effects were also included in the model. AME = average marginal effect. CI = confidence interval.

Table C.18. Estimated Regression Model AMEs With State Fixed Effects, Revenue per Transport

	AME ($)	95% CI		*P*-Value
Provider (vs. supplier)	–81	–207	46	0.210
Traditional Medicare Transport Volume (vs. low volume)				
Medium volume	–282	–387	–177	<0.001
High volume	–235	–374	–97	0.001
Very high volume	–391	–526	–257	<0.001
Ownership Type (vs. non-profit)				
For-profit or unknown	–181	–270	–91	<0.001

	AME ($)	95% CI		*P*-Value
Government	23	–69	115	0.619
Service Area Population Density (vs. urban)				
Super rural	74	–42	191	0.210
Rural	17	–64	98	0.679
Other Organizational Characteristics				
Volunteer labor (vs. not)	–42	–134	50	0.368
Public safety (vs. not)	–59	–150	31	0.199
Static staffing (vs. not)	56	–18	131	0.136
Emergency services (vs. not)	–331	–567	–95	0.006
Joint responses (vs. not)	–10	–86	67	0.805

SOURCE: RAND analysis of GADCS Year 1 and Year 2 analytic file.
NOTE: State fixed effects were also included in the model. AME = average marginal effect. CI = confidence interval.

Abbreviations

AFS	Ambulance Fee Schedule
AIF	Ambulance Inflation Factor
ALS	advanced life support
ALS1	advanced life support, level 1
ALS2	advanced life support, level 2
AME	average marginal effect
BBA	Bipartisan Budget Act
BLS	basic life support
CI	confidence interval
CMS	Centers for Medicare & Medicaid Services
COVID-19	coronavirus disease 2019
CPI-U	Consumer Price Index for All Urban Consumers
CY	calendar year
DCCA	Data Computer Corporation of America
EMR	emergency medical responder
EMS	emergency medical services
EMT	emergency medical technician
ESRD	end-stage renal disease
FACA	Federal Advisory Committee Act
FFRDC	Federally Funded Research and Development Center
FFS	fee-for-service
GADCS	Ground Ambulance Data Collection System
GAF	Geographic Adjustment Factor
GAO	Government Accountability Office
GPCI	geographic practice cost index
HCPCS	Healthcare Common Procedure Coding System
HHS	U.S. Department of Health and Human Services
IDR	Integrated Data Repository
IQR	interquartile range
IT	information technology
MAC	Medicare Administrative Contractor
MedPAC	Medicare Payment Advisory Commission
MSA	Metropolitan Statistical Area
N/R	not reported
NPI	National Provider Identifier

NPPES	National Plan and Provider Enumeration System
ODF	open door forum
PE	practice expense
PECOS	Provider Enrollment, Chain, and Ownership System
PFS	Physician Fee Schedule
PHE	public health emergency
PI	Paramedic Intercept
QRV	quick response vehicle
RVU	relative value unit
SCT	specialty care transport
SD	standard deviation
SUV	sport-utility vehicle
TFP	Total Factor Productivity
USD	U.S. dollar
VHA	Veterans Health Administration

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