Ground Ambulance Industry Trends, 2017–2020:

Analysis of Medicare Fee-for-Service Claims

November 2022

Project Report

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About This Project Report

The Bipartisan Budget Act of 2018 amended the Social Security Act to require a new data collection process for ground ambulance organizations. The Centers for Medicare & Medicaid Services (CMS) developed a new Medicare Ground Ambulance Data Collection System (GADCS) to satisfy this requirement. Starting in 2022, selected ground ambulance organizations are required to begin collecting cost, revenue, utilization, and other data under the GADCS. Selected ground ambulance organizations will begin reporting this information to CMS in 2023. CMS adopted a stratified sampling approach to ensure that representative samples of ground ambulance organizations participate in the GADCS. As part of our ongoing work for CMS, this report updates and expands prior analyses using Medicare fee-for-service claims to describe trends in the number and types of organizations billing Medicare for ground ambulance services.

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Executive Summary

Background

Selected ground ambulance organizations will start collecting data on their costs, revenue, and utilization as part of the Medicare Ground Ambulance Data Collection System (GADCS) in 2022. These organizations must collect information specified in Section 1834(l)(17)(A) of the Social Security Act over a 12-month data collection period. These organizations must then report the information to the Centers for Medicare & Medicaid Services (CMS) within five months after their data collection period ends.

CMS selected Year 1 and Year 2 cohorts of the GADCS ground ambulance organizations in 2019 and 2020, respectively, using a stratified random sampling approach to ensure that the selected organizations were representative of all ground ambulance organizations on four key characteristics: (1) Medicare provider versus supplier designation, (2) ownership category, (3) service area population density, and (4) Medicare ground ambulance transport volume. CMS used the most recent year of complete Medicare claims and enrollment data to select Year 1 and Year 2 organizations (2017 and 2018 data, respectively). The Year 1 and Year 2 samples collectively account for roughly half of the over 10,000 provider and supplier National Provider Identifiers (NPIs) billing Medicare for ground ambulance services annually.

CMS delayed data collection periods and data reporting periods for Year 1 and Year 2 organizations because of the coronavirus disease 2019 (COVID-19) public health emergency (PHE). Although Year 1 and Year 2 organizations were originally going to start collecting data in 2020 and 2021, respectively, organizations in both cohorts will now start collecting data in 2022.

These delays, although important to help ground ambulance organizations focus on patient care during the pandemic, resulted in a longer-than-expected gap between sampling and data collection and reporting. This report updates earlier RAND Corporation analyses for CMS regarding the characteristics of Medicare ground ambulance organizations with a focus on identifying changes over time. Although our prior analysis[1] used Medicare claims and enrollment data from 2016 only, this current report extends that analysis from 2017 to 2020. Our goal is to inform discussions on the extent to which the delay between sampling and data reporting might affect the representativeness of information collected under the GADCS.

[1] 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*, final report, Task Order No. HHSM-500-T0052, McLean, Va.: MITRE Corporation, July 30, 2019.

Data and Methods

Our analyses used two main sources of Medicare data: Medicare fee-for-service (FFS) claims accessed via CMS's Integrated Data Repository (IDR) and CMS Provider Enrollment, Chain, and Ownership System (PECOS) enrollment data. We identified all NPIs billing Medicare for ground ambulance transports in 2017 to 2020 following the methods in our prior analysis. We used a combination of claims and enrollment data to categorize each NPI along four dimensions in each year that the NPI had paid Medicare ground ambulance transport claims:

1. Medicare ground ambulance transport volume (defined as *low* = 200 or fewer Medicare annual transports; *medium* = 201–800 annual transports; *high* = 801–2,499 annual transports; and *very high* = 2,500 or more annual transports).
2. service area population density (urban, rural, and super rural)
3. provider (e.g., hospital) versus supplier designation
4. ownership category (non-profit, government, and for-profit or unclassifiable).

Our descriptive analyses describe trends in the number of Medicare ground ambulance NPIs, in service volume, and in the composition of ground ambulance organizations on the four key characteristics described above between 2017 and 2020.

Results

We found the composition of the ground ambulance industry was relatively stable from 2017 to 2020, with only slight changes in the total number of organizations and their characteristics. For each year (from 2017 to 2020), the typical ground ambulance organization was a supplier (rather than a provider), government-owned (rather than proprietary non-profit or for-profit), and operating in a primarily urban service area (versus rural or super rural).

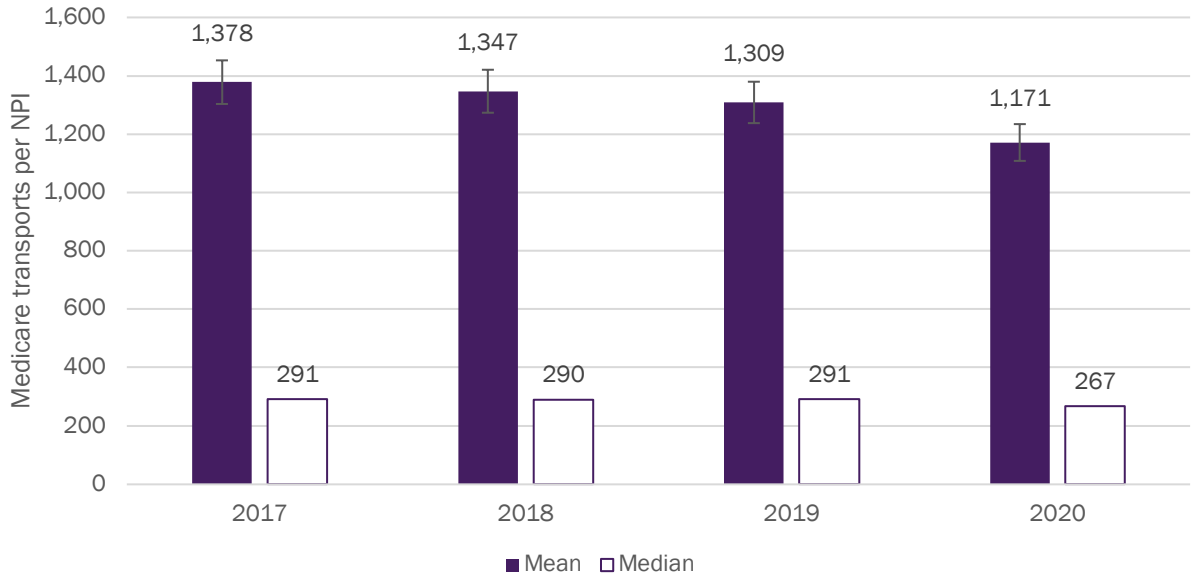
The one notable trend over time was a decline in Medicare transport volume, including year-to-year reductions of roughly 3 percent from 2017 through 2019 and a larger, over 10 percent reduction from 2019 to 2020, which was likely due to the onset of the COVID-19 pandemic. The pre-pandemic reduction could be the result of a variety of factors, including increasing Medicare Advantage enrollment, proliferation of ambulatory urgent care settings, and health care delivery system efforts to avoid the unnecessary use of emergency departments.

In terms of volume per NPI, the mean decreased from 1,378 in 2017 to 1,171 in 2020 (a 15 percent reduction) while the median decreased from 291 to 267 transports over the same period (an 8 percent reduction; see Figure S.1).[2] As in our analysis of 2016 data, we found that a relatively small share of NPIs accounts for very large shares of Medicare ground ambulance transports. In 2020, the top half of NPIs by volume accounted for roughly 95 percent of transport

[2] None of the differences in means between 2017, 2018, and 2019 were statistically significant. However, the 2020 mean was smaller than the 2019 mean ($p = 0.005$) and each of the earlier means ($p < 0.001$).

volume, while the top 10 percent accounted for 60 percent of volume. These relationships were fairly constant over time from 2017 to 2020.

Figure S.1. Transport Volume per NPI, 2017–2020



SOURCE: RAND analysis of FFS Medicare claims accessed via the IRD (run date July 2, 2021).
NOTE: Whiskers report the 95-percent confidence intervals around each mean. The numerators of reported rates are not adjusted for changes in FFS Medicare enrollment over time. The denominators are not adjusted for partial calendar years of claims data for some NPIs.

Limitations

We did not include 2021 claims data in our analysis because they were not complete as of the time of analysis (March 2022). As a result, our analysis captured changes only through the first nine months of the COVID-19 pandemic. The longer-term effects of the pandemic on the number and characteristics of ground ambulance organizations are uncertain. We did not control for potential time-varying drivers of changes in the ground ambulance industry, including changes in Medicare FFS enrollment, in the case mix of Medicare FFS enrollees, in beneficiary supplemental coverage, and in the availability of and access to hospital emergency departments or other sources of care. In some cases, data may be available to control for these time-varying factors in future analyses.

Finally, there are two important limitations of the data available to determine NPI characteristics. First, although ground ambulance organizations typically serve broad populations, we used only Medicare FFS claims and administrative data; therefore, we could not account for transport volume and other factors associated with patients who were not Medicare

enrollees. Second, we relied on ground ambulance organizations' self-reported ownership categories, which in some cases were vague, missing, or incomplete.

Conclusion and Recommendations

We found few changes over time in most characteristics of Medicare ground ambulance organizations. The one exception was decreasing transport volume per organization over time. The decrease in volume was particularly notable from 2019 to 2020, coinciding with the onset of the COVID-19 pandemic. If feasible, we recommend adjusting downward the volume thresholds used to assign NPIs to volume categories when CMS samples Year 3 and Year 4 organizations using 2020 claims data (in 2022). Otherwise, the broad reduction in transport service volume would appear to signal a shift in organizations toward lower-volume categories. We also recommend continued analysis of industry trends when complete data are available.

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Chapter 1. Introduction

Background

Section 1834(l)(17) of the Social Security Act ("The Act") requires the Secretary of the Department of Health and Human Services (HHS) to develop a new system to collect cost, revenue, and other information from representative samples of ground ambulance organizations over four years. The Centers for Medicare & Medicaid Services (CMS) finalized a sampling approach and a survey-based data collection instrument to collect the necessary information in the Calendar Year (CY) 2020 Physician Fee Schedule (PFS) final rule. CMS refers to the instrument and a web-based portal for reporting data under development collectively as the Medicare Ground Ambulance Data Collection System (GADCS).[3] CMS proposed and finalized clarifying language in some instrument questions in the CY 2022 PFS final rule,[4] and more recently proposed further clarifications and changes in the CY 2023 PFS proposed rule.[5] Ultimately, the Medicare Payment Advisory Commission (MedPAC) will use the data to assess the adequacy of Medicare's payments for ground ambulance services.

Section 1834 (l)(17)(A) of the Act specifies that data collection applies to both ambulance *providers*—hospitals and other facilities that are Medicare providers of services as defined by CMS[6]—and ambulance *suppliers*—all other organizations that enroll in Medicare specifically to furnish and bill for ground ambulance services. Data must be collected from four representative annual samples of ground ambulance providers and suppliers (which we refer to collectively as *ground ambulance organizations*). Using recommendations from the Health Federally Funded Research and Development Center,[7] CMS implemented a stratified random sampling approach where 25 percent of ground ambulance organizations are selected each year in combinations of four characteristics:

1. Medicare ground ambulance transport volume (defined as *low* = 200 or fewer Medicare annual transports; *medium* = 201–800 annual transports; *high* = 801–2,499 annual transports; and *very high* = 2,500 or more annual transports).
2. service area population density (urban, rural, and super rural)

[3] CY 2020 Physician Fee Schedule final rule (84 FR 62863–62897).

[4] CY 2022 Physician Fee Schedule final rule (86 FR 65306-65317).

[5] CY 2023 Physician Fee Schedule proposed rule (87 FR 46241–46249)

[6] CMS, "Provider of Services Current Files," webpage, October 29, 2021a.

[7] 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*, final report, Task Order No. HHSM-500-T0052, McLean, Va.: MITRE Corporation, July 30, 2019.

3. provider (e.g., hospital) versus supplier designation
4. ownership category (non-profit, government, and for-profit or unclassifiable).

Sampling is based on provider and supplier National Provider Identifier (NPI), even in cases where a single broader company or other entity operates multiple NPIs. All NPIs paid by Medicare for a ground ambulance organization in a prior year are included in annual sampling frames. For example, the sampling frame for the first year of the GADCS included all NPIs with 2017 ground ambulance transport claims. NPIs sampled each year are excluded from sampling frames for subsequent years.

CMS modified the timing of data collection periods and data reporting periods "to increase flexibility for ground ambulance organizations that would otherwise be required to collect data in 2020–2021 so that they can focus on their operations and patient care" during the coronavirus disease 2019 (COVID-19) public health emergency (PHE).[8] Initially, NPIs sampled in the first year of the GADCS were going to collect information over a continuous 12-month period starting in 2020 and then report data over a five-month period beginning immediately after the end of the data collection period starting in 2021. Similarly, NPIs sampled in the second year were going to collect information starting in 2021 and report information starting in 2022. Although both Year 1 and Year 2 samples of NPIs were selected and posted on CMS' Ambulances Services Center website, CMS issued two blanket waivers in response to the COVID-19 PHE delaying the data collection periods and data reporting periods for Year 1 and Year 2 NPIs. In the CY 2022 PFS final rule, CMS finalized Year 3 and Year 4 sample timeline with data collection periods starting in 2023 and data reporting periods starting in 2024.

These delays related to the COVID-19 PHE resulted in two key issues for the GADCS. First, the delay has caused a longer-than-expected gap between the data used to sample ground ambulance organizations and the organizations that will ultimately collect and report data, particularly for Year 1 and Year 2 organizations. Some NPIs in the Year 1 sampling frame, which drew on 2017 fee-for-service (FFS) Medicare claims and Medicare enrollment data, will no longer be in operation by 2022–2023 or may have changed in terms of key characteristics used for stratification (e.g., their volume or mix of ground ambulance services in urban versus rural areas). Although some turnover and other industry changes are expected, the ongoing pandemic could have led to above-average rates of changes through 2020. Secondly, COVID-19 has also affected the data that might be collected. The effects of COVID-19 on the U.S. health care system, especially during the initial surge in cases in early 2020, are increasingly well documented, and preliminary research suggests that emergency medical service volume across all payers decreased significantly in the early days of the pandemic.[9]

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[8] https://www.cms.gov/files/document/summary-covid-19-emergency-declaration-waivers.pdf.

[9] E. Brooke Lerner, Craig D. Newgard, and N. Clay Mann, "Effect of the Coronavirus Disease 2019 (COVID-19) Pandemic on the U.S. Emergency Medical Services System: A Preliminary Report," *Academic Emergency Medicine*, Vol. 27, No. 8, August 2020.

Prior Analysis Overview

Our previous report detailed considerations and recommendations related to the development of and sampling for the GADCS.[10] As an initial step, we conducted a literature review, environmental scan, and primary data collection through interviews and focus groups to identify the key characteristics of ground ambulance organizations with potential systematic links to costs and revenue. Although we identified many characteristics of ambulance organizations that are potentially related to costs and revenue, four characteristics were particularly significant because they are (a) supported by prior empirical evidence, (b) relevant to every ambulance organization, and (c) available for analysis in Medicare data. As described in our prior report,[11] they are as follows:

1. **Provider versus supplier designation.** Estimates from the U.S. Government Accountability Office (GAO)[12] and HHS[13] reports suggest that per-transport costs for ambulance providers are much higher than those for ambulance suppliers. It is likely that the ground ambulance cost structures for ambulance providers and suppliers differ systematically.
2. **For-profit, non-profit, and government ownership.** For-profit, non-profit, and government ambulance organizations likely have different objectives, business models, and services mix, leading to differences in costs and revenue. Conceptually, for-profit organizations maximize profit and operate only in markets and service areas with positive margins. Non-profit and government organizations more broadly provide emergency service to communities and may be organized and operated in a way that does not maximize profits. GAO (2012) found ambulance organizations with more limited government support are more likely to have incentives to keep costs lower.[14] The GAO study found that for each 2 percent decline in the average level of government subsidy there was a 2 percent decline in the average cost per transport.
3. **Transport volume.** Prior studies found some evidence of economies of scale in the ambulance industry, where the average cost per transport decreased as the number of

[10] Mulcahy et al., 2019.

[11] Mulcahy et al., 2019.

[12] U.S. Government General Accountability Office. GAO-13-6, AMBULANCE PROVIDERS GAO, *Ambulance Providers: Costs and Medicare Margins Varied Widely; Transports of Beneficiaries Have Increased*., report to congressional committees, Washington, D.C., GAO-13-6, October 2012, Available: https://www.gao.gov/assets/650/649018.pdf.

[13] U.S. Department of Health and Human Services. "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. Available: https://www.cms.gov/Medicare/MedicareFee-for-Service-Payment/AmbulanceFeeSchedule/Downloads/Report-To-Congress-September2015.pdf., Washington, D.C., 2015.

[14] GAO, 2012. The GAO study included non-profit and for-profit ground ambulance organizations but excluded those that were fire department-based or hospital-based due complications in data collection in these scenarios.

transports increased. The GAO study found that average costs declined with volume and leveled off after organizations reached 600 transports per year.[15] Similarly, the HHS study found that for every 10 percent increase in the number of transports, there was a 3 percent decrease in the cost per trip.[16]

4. **Service area population density.** There are multiple possible mechanisms linking service area population density to cost. First, paid labor and other inputs necessary to the operation of an ambulance organization may vary in cost between relatively more urban and rural areas. Second, lower-density areas may have a higher per-transport cost as a result of longer distances traveled and more time required per response. Third, organizations providing emergency medical services (EMS) to rural and super-rural communities may incur more fixed costs—such as facilities and vehicles—to provide a target level of response compared with organizations operating in areas with a higher population density. There is mixed evidence as to whether there is a relationship between service area population density and cost. The GAO study found a higher median cost per transport for organizations that provide ambulance services in super-rural areas as opposed to organizations that provide services in urban areas.[17] In contrast, the HHS study found that the median cost per transport was higher in urban areas than the median cost per transport in rural areas.[18]

CMS used these four characteristics as the basis for their stratified sampling approach. Our earlier report includes detailed results from our analyses of 2016 Medicare FFS claims and enrollment information and summarizes how ground ambulance organizations varied in their volume of ground ambulance transports across these four dimensions. In brief, our 2016 findings were as follows:

- **Most (94 percent) ground ambulance organizations were Medicare suppliers rather than providers of services.** About half of the 6 percent of provider-based ground ambulance organizations were critical access hospitals, which are rural hospitals with fewer than 25 inpatient beds and are at least 35 miles from another facility (among other criteria),[19] while nearly all the remaining provider-based ground ambulance organizations were other hospitals.
- **Although for-profit was the least common ownership category, these organizations provided more transports per year than those in other ownership categories.** Only 22 percent of organizations were for-profit; however, these organizations accounted for

[15] GAO, 2012.

[16] HHS, 2015.

[17] GAO, 2012.

[18] HHS, 2015.

[19] Critical access hospitals: https://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/CertificationandComplianc/CAHs CMS, "Critical Access Hospitals," webpage, April 9, 2013.

over half (53 percent) of transports. In contrast, government-owned organizations accounted for nearly half (48 percent) of the organizations but only 28 percent of transports.

- **Relatedly, 2016 Medicare ground ambulance transports were highly concentrated in a few organizations.** Although only 12 percent of organizations (n = 1,309) fell in the "very high" transport volume category with more than 2,500 transports in 2016, these organizations accounted for 72 percent of total transports. In contrast, 43 percent of organizations (n = 4,528) were in the lowest volume category with 1 to 200 transports per year, and these organizations collectively accounted for only 2 percent of transports.
- **Over half (53 percent) of organizations were urban, and these organizations accounted for 80 percent of transport volume.** Rural and super-rural organizations collectively accounted for the remaining 20 percent of transports.

These findings suggest broad heterogeneity across ground ambulance organizations on these characteristics and highlight the importance of ensuring representation of ground ambulance organizations of different types in the GADCS.

Current Report Overview

The earlier report released in July 2019 included analyses of only 2016 Medicare data and there was relatively little evidence on changes in ambulance industry composition and transport volume over time—it did not capture any changes through the onset of the COVID-19 pandemic. The primary goal of this report is to update our prior analyses, using 2017 through 2020 Medicare data to describe trends in ground ambulance organization counts, characteristics, and service volume. Drawing from our findings, we also make recommendations to CMS related to sampling Year 3 and Year 4 organizations.

Chapter 2. Data and Methods

Our analyses used two main sources of Medicare data: Medicare FFS claims data accessed via CMS's Integrated Data Repository (IDR) and the CMS Provider Enrollment, Chain, and Ownership System (PECOS) enrollment data.[20] Each of these data sources and our precise specifications are described in detail below. In brief, FFS claims data include information on the ambulance services billed and paid by Medicare, including the level of service (e.g., basic life support, advanced life support), 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 these ambulance transports (e.g., home, hospital, dialysis center). The PECOS data include information submitted by providers and suppliers through the Medicare enrollment process, including information on the type of organization and its service area.

Claims Data

We accessed line-level Medicare FFS professional and facility claims through CMS's IDR and identified all NPIs that billed ground ambulance services[21] with service dates from 2017 to 2020. Each ground ambulance claim line contains common data elements, including NPI, date of service, paid amount, Healthcare Common Procedure Coding System (HCPCS) codes, and modifier codes. The modifier codes identify the origin and destination of the transports. Professional claims also include the ZIP Code for the point of the ambulance pickup and the allowed amount for the claim line. In order to focus on paid ground ambulance services under Medicare Part B, we did not extract professional claim lines with a payment of zero dollars or institutional claims that were billed under Part A.

Annual Populations of Medicare Ground Ambulance Organizations

The resulting claims extract included lines from 11,399 unique NPIs with claim lines for ground ambulance services at any point from 2017 through 2020. We assigned transport services to calendar years based on service date to determine whether each NPI was active in each year from 2017 to 2020. However, we did not require continuous enrollment or create a stable panel of NPIs; therefore, NPIs could contribute between one and five years of claims data. There are

[20] CMS, "Welcome to the Medicare Provider Enrollment, Chain, and Ownership System (PECOS)," webpage, undated.

[21] Ambulance services are defined by Healthcare Common Procedure Coding System (HCPCS) codes A0425, A0426, A0427, A0428, A0429, A0432, A0433, and A0434 for professional service claims and revenue center code 540-549 for Part B institutional claims. The Part B institutional claims also contain lines with one of the HCPCS codes listed here.

usually two line-level records for each transport, one with the HCPCS code identifying the level of service and one with the HCPCS code that corresponds to mileage. We excluded a small number of organizations each year (fewer than ten annually) with a claim for ground ambulance mileage (A0425) but without an HCPCS level of service transport code in the same year.

PECOS Enrollment Data

We used an extract from the PECOS database provided by CMS that included information for all organizations that billed for ground ambulance services with service dates in 2017 through 2020. The PECOS data extract included information on each initial or change in enrollment based on responses to the CMS-855A and CMS-855B enrollment forms that distinguish between providers and suppliers. For ambulance suppliers, we used the most recent enrollment record for the NPI in which an organization listed its specialty as an "ambulance service supplier."[22] Ambulance providers could have concurrent enrollment records of several types (e.g., as a hospital, critical access hospital, skilled nursing facility, or dialysis facility). We classified each ambulance provider into one of three categories: critical access hospitals, other hospitals, or other providers. The classification was sequential: Organizations with a critical access hospital enrollment record were assigned to that category first, followed by organizations with a hospital enrollment record assigned accordingly, and all other providers assigned to the other providers category. We selected the most recent and relevant provider enrollment record for each NPI that we identified as an ambulance provider in each calendar year.

Categorizing Organizations

In the next sections, we describe how we used Medicare claims and enrollment data to categorize ground ambulance organizations in each year.

Medicare Ground Ambulance Transport Volume

We calculated ground ambulance transport volume by counting line-level claims by NPI and year.[23] Most transport lines represent a single transport (i.e., units of service = 1) where the service "from" and "through" dates are identical. However, we found that some transport claim lines (3.8 percent) cover more than one transport (i.e., units of service >1). In these cases, the "from" and "through" dates can be on different dates, leading to ambiguity on the appropriate

[22] For each enrollment application, a unique number is assigned by PECOS.

[23] Although not all ambulance providers and suppliers billing during a year are enrolled in Medicare for the entire year, many are. In 2016, 96.2 percent of NPIs in the analytic file were enrolled in PECOS for each month in the calendar year (mean number of enrolled months was 11.79 and the median was 12 months). As a result, reported volumes are, on average, biased slightly downward when expressed over the full 12-month year.

calendar year. Thus, we used the "from" service date in these cases and counted claim lines rather than units of service.

For each year separately, we classified NPIs into one of four volume categories based on their annual Medicare ground ambulance transport volume:

- **low** (200 or fewer transports)
- **medium** (201–800 transports)
- **high** (801–2,500 transports)
- **very high** (more than 2,500 transports).

Our choice of volume thresholds was informed by our review of the literature and the distribution of providers and suppliers by volume. GAO analysis[24] found that the decrease in cost per transport diminishes after approximately 600 total transports and Medicare typically accounts for about 30 to 40 percent of total transport volume,[25] so we use 200 Medicare transports (or 33 percent of 600) as the initial cut point for the lowest volume category. The distribution has a large group of organizations with up to approximately 800 transports and then a very long tail with some organizations having an annual volume of over 50,000 transports; thus, we chose 800 Medicare transports per year as the medium volume category cut point. After this point, we see a transition to smaller numbers of higher-volume organizations. The high and very high volume categories are designed to split the remaining organizations relatively evenly across categories.

Service Area Population Density

There are many possible location variables in the enrollment data (e.g., business address, service area) and claims data (e.g., point of ambulance pickup locations) that could be used to assign NPIs to an urban or rural status. For ambulance service suppliers, we chose to use point of ambulance pickup location information from the professional claims data because it provides direct information about where the supplier is rendering services. Each point of ambulance pickup ZIP Code was classified as urban, rural, and super rural using a U.S. Census Bureau crosswalk.[26] We then looked at the distribution of ambulance pickups across these three service areas to assign it to one service area population density category (urban, rural, or super rural). Over half of suppliers, 54 percent, had pickups in only one category of service area and so were easily assigned to that category. The other suppliers had pickups in at least two different types of

[24] GAO, 2012.

[25] We calculated this percentage based on data included in Table 1-1 of Institute of Medicine, *Emergency Medical Services: At the Crossroads*, Washington, D.C.: The National Academies Press, 2007, p. 17.

[26] We used a Census-provided crosswalk to classify ZIP Codes as urban, rural, or super rural. This is the same classification that is used to calculate add-on payments for urban, rural, and super-rural services. For more information about the classification, please see Michael Ratcliffe, Charlynn Burd, Kelly Holder, and Alison Fields, "Defining Rural at the U.S. Census Bureau: American Community Survey and Geography Brief," Washington, D.C.: U.S. Census Bureau, December 2016. CMS's list of zip codes and their designations can be found in the ZIP Code to Carrier Locality file located at CMS, "Ambulance Fee Schedule," webpage, last modified August 23, 2022.

areas (e.g., rural and super rural). For those suppliers, we used the most prevalent service area type to categorize them. For ambulance providers (where ZIP Code information was not available), we used the business location ZIP Code for the institutional claims because point of ambulance pickup location is not available for these claims.

Provider Versus Supplier Designation

We used the type of PECOS enrollment record to assign each NPI to provider versus supplier designation as described above.

Ownership Categories

Assigning each NPI an ownership type required combining several data sources of information in four steps. First, the PECOS enrollment data contain an indicator distinguishing "non-profit" versus "proprietor" organizations, which we used as selected by the organization. Second, the PECOS data include a separate variable on organizational structure. Organizations select one of the following categories: "corporation," "individual," "LLC," "not selected," "partnership," "sole owner," "sole proprietor," and "other." Within the "other" category there are multiple unique (i.e., write-in) responses. Using the information within the codes, we classified organizations into one of three categories: non-profit, for-profit or unclassifiable, and government, to the extent categorization was feasible using the text provided by the organization. Third, we performed relevant internet searches for each of the organizations without an assigned organizational structure. Finally, we assigned all "non-profit" organizations without a "government" organizational structure to a non-profit category, all organizations with a "government" organizational structure to a government category, and all remaining organizations to a for-profit or unclassifiable category.

Describing Trends over Time

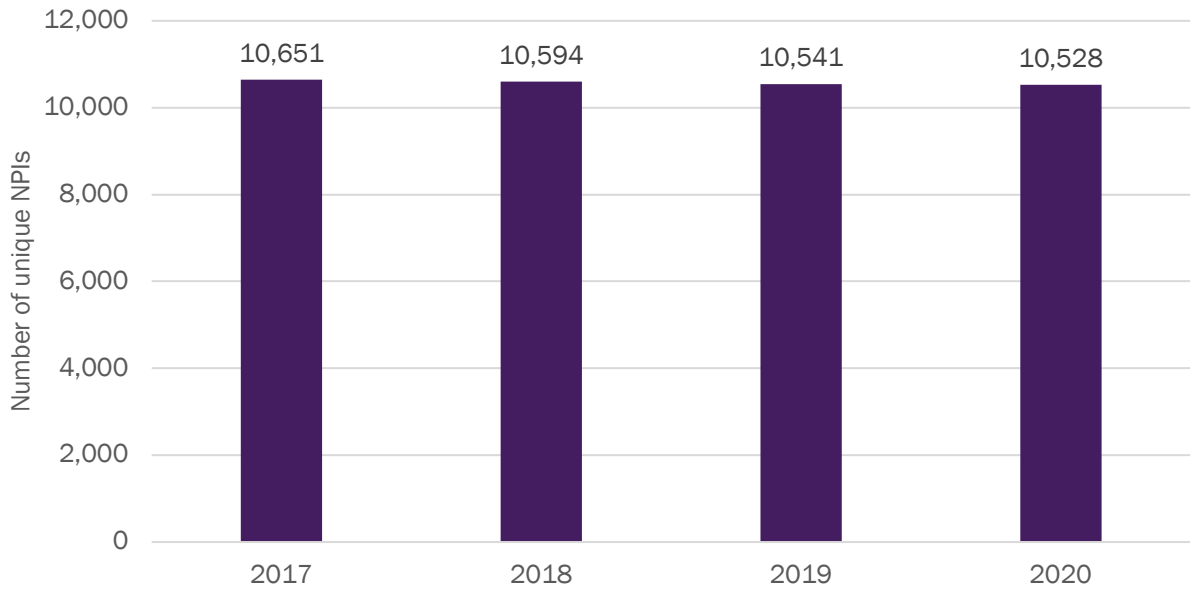
In Chapter 3, we present trends between 2017 and 2020 in Medicare ground ambulance NPIs and service volume, as well as trends in the composition of ground ambulance organizations on the four key characteristics described in this chapter and in Chapter 1. We present standard deviations around some means (e.g., average ground ambulance transports per NPI) for reference. However, we do not typically report test statistics or *p*-values because our analysis includes the universe of Medicare ground ambulance organizations.

Chapter 3. Results

Counts of Ground Ambulance Organizations

We found a slight decline in the number of Medicare ground ambulance NPIs over time, from 10,651 in 2017 to 10,528 in 2020 (a 1.2 percent overall decline, see Figure 3.1).

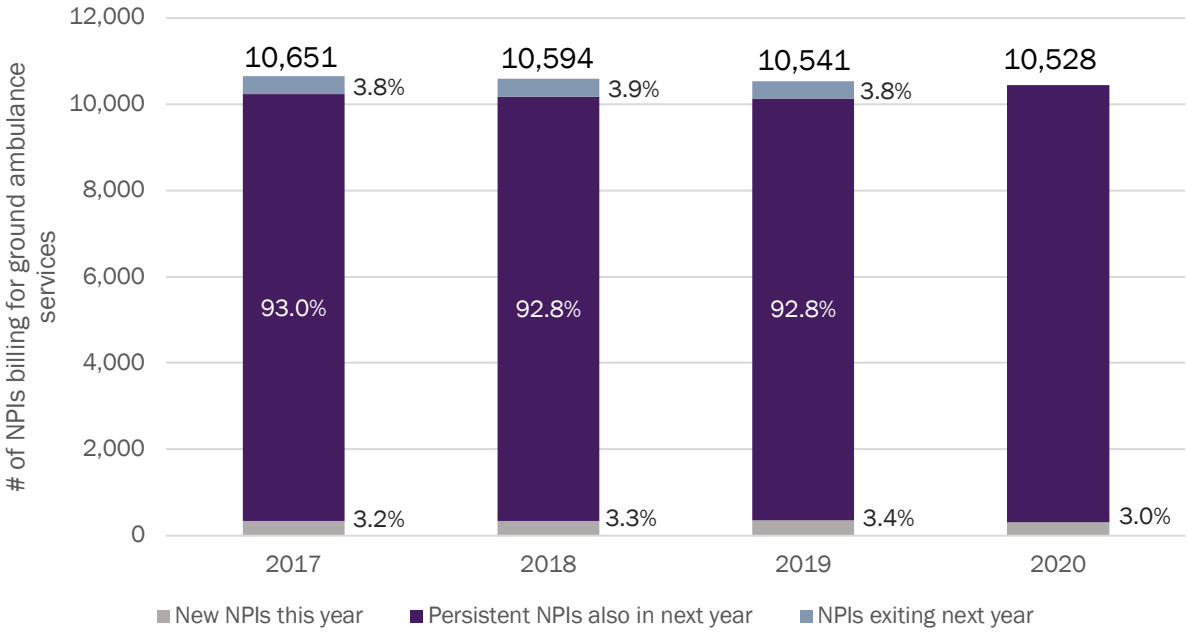
Figure 3.1. NPIs with Paid Medicare Ground Ambulance Claims, 2017–2020



SOURCE: Authors' analysis of FFS Medicare claims accessed via the IRD (run date July 2, 2021).

Figure 3.2 illustrates the rates of NPIs entering and exiting Medicare claims data over time. Just under 4 percent of NPIs ceased billing Medicare for ground ambulance services in each year. For example, of the 10,541 NPIs that billed Medicare for ground ambulance services in 2019, 3.8 percent (n = 397) did not also bill Medicare for ground ambulance services in 2020. On the other hand, just over 3 percent of NPIs billing Medicare in each year did not bill in the prior year. The rate of these new NPIs was lowest (3.0 percent) in 2020.

Figure 3.2. NPI Persistence over Time, 2017–2020

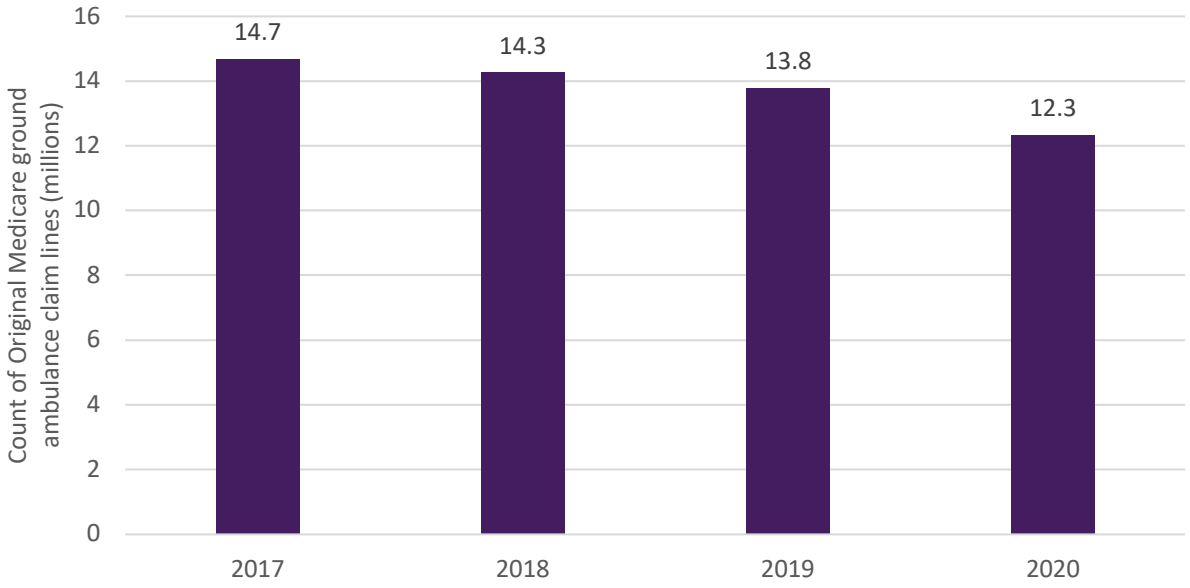


SOURCE: Authors' analysis of FFS Medicare claims accessed via the IRD (run date July 2, 2021).
NOTES: "NPIs exiting next year" and "Persistent NPIs also in next year" are not reported for 2020 because 2021 claims data are incomplete.

Changes in Medicare Ground Ambulance Service Volume

The aggregate volume of Medicare ground ambulance transports also declined over time, although at a greater rate than the decline in NPIs, and the COVID-19 pandemic appears to reduce the number of transports beyond the preexisting trend in 2020 (Figure 3.3). Medicare paid for 14.7 million transports in 2017, 14.3 million in 2018 (a 2.7 percent year-on-year decline), and 13.8 million in 2019 (prior to the COVID-19 pandemic; a 3.3 percent year-on-year decline). In contrast, Medicare paid for 12.3 million transports in 2020, which is a 10.6 percent decline versus 2019 and a 16.0 percent decline versus 2017.

Figure 3.3. Transport Volume, Millions of Claim Lines, 2017–2020

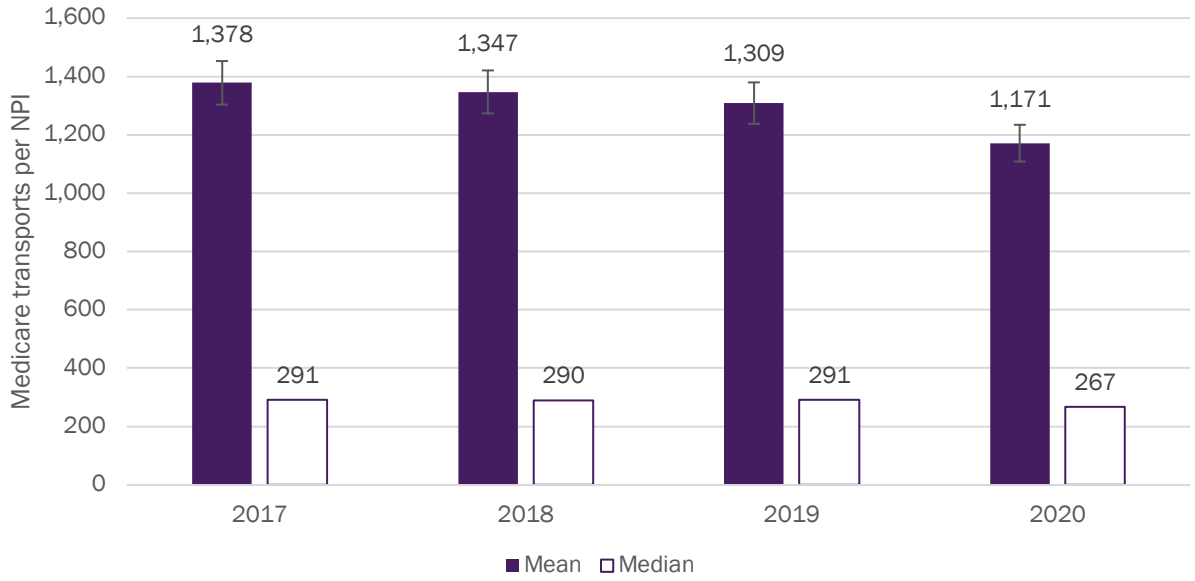


SOURCE: Authors' analysis of FFS Medicare claims accessed via the IRD (run date July 2, 2021).
NOTE: Annual counts are unadjusted for changes in FFS Medicare enrollment. Most claim lines include only one unit of service. As a result, trends are substantively the same when counting units instead of lines.

Combining trends in both the number of NPIs and transports, the mean number of transports per NPI also declined over time (Figure 3.4) from 1,378 in 2017 to 1,171 in 2020 (a 15.0 percent decline, $p < 0.001$). [27] Given the right-skew in the distribution of transports per NPI, we also report the median. The median number of transports per NPI was stable from 2017 through 2019 (at 290 or 291) but declined to 267 transports in 2020. Differences between the means and medians reported in Figure 3.4 suggest that a small number of NPIs had a relatively very high mean annual transport volume compared with that of other NPIs.

[27] None of the differences between 2017, 2018, and 2019 means were statistically significant. The difference between the 2019 and 2020 means was significant at $p = 0.005$.

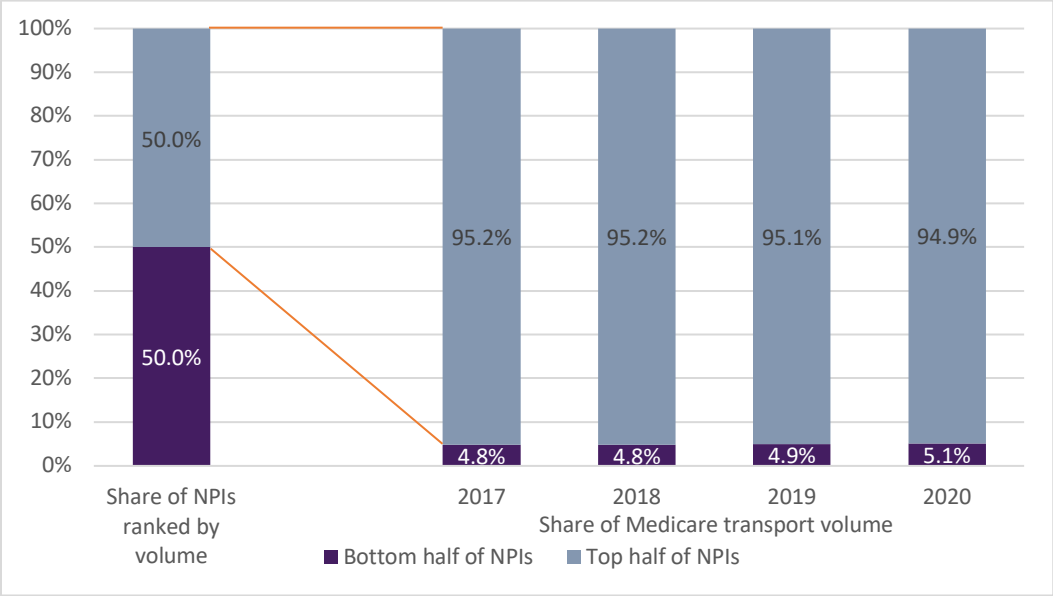
Figure 3.4. Transport Volume per NPI, 2017–2020



SOURCE: Authors' analysis of FFS Medicare claims accessed via the IRD (run date July 2, 2021).
NOTE: Whiskers report the 95-percent confidence intervals around means. The numerators of reported rates are not adjusted for changes in FFS Medicare enrollment over time. The denominators are not adjusted for partial calendar years of claims data for some NPIs.

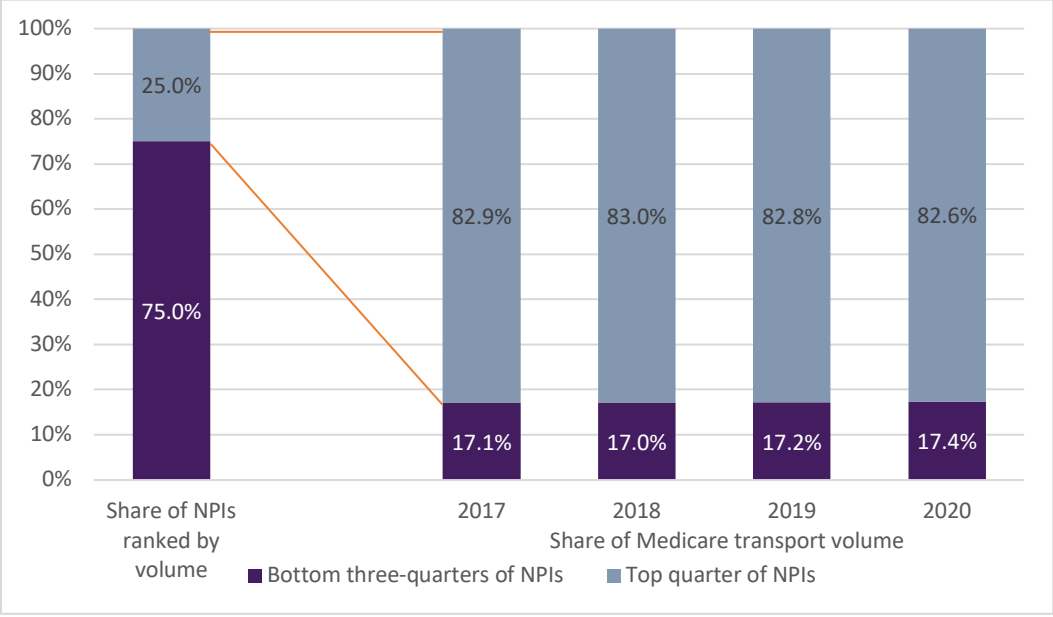
Indeed, when we examined the share of transports among the NPIs with the most transports, we found that transports were heavily concentrated in a relatively small share of NPIs. Figures 3.5a–3.5c describe the share of Medicare transport volume that the top half (Figure 3.5a), top quarter (Figure 3.5b), and top 10 percent (Figure 3.5c) of NPIs (ranked in terms of volume) account for. In 2020, the top half of NPIs by volume accounted for nearly 95 percent of Medicare ground ambulance transport volume, while the bottom half of NPIs by volume accounted for the remaining 5 percent. The top quarter and 10 percent of NPIs by volume accounted for 83 percent and 60 percent of transport volume, respectively. These relationships were fairly constant over time from 2017 to 2020.

Figure 3.5a. Share of Medicare Ground Ambulance Transport Volume, Top Half Versus Bottom Half of NPIs, by Volume, 2017–2020



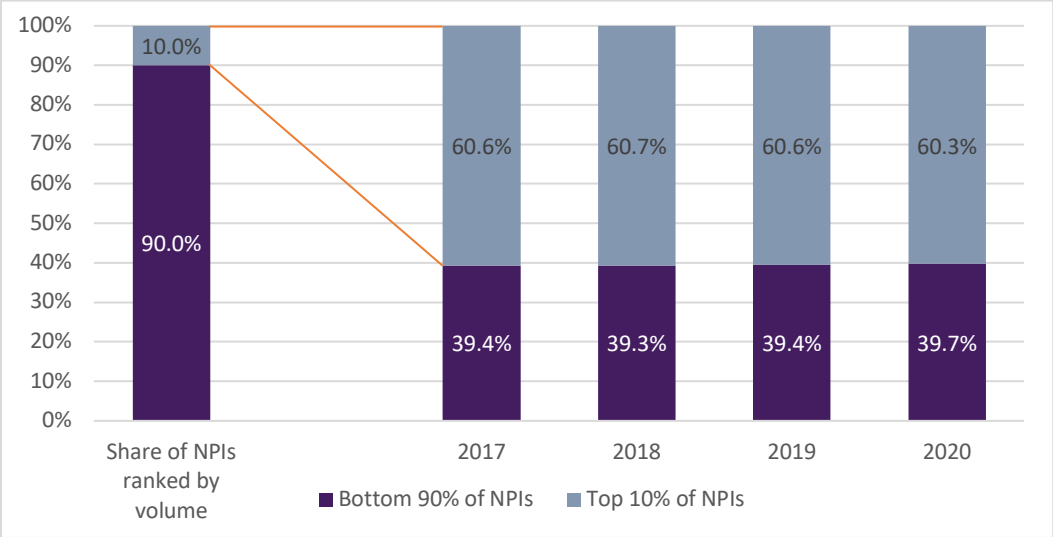
SOURCE: Authors' analysis of FFS Medicare claims accessed via the IRD (run date July 2, 2021).
NOTE: Reported rates are not adjusted for changes in FFS Medicare enrollment over time.

Figure 3.5b. Share of Medicare Ground Ambulance Transport Volume, Top Quarter Versus Bottom Three-Quarters of NPIs, by Volume, 2017–2020



SOURCE: Authors' analysis of FFS Medicare claims accessed via the IRD (run date July 2, 2021).
NOTE: Reported rates are not adjusted for changes in FFS Medicare enrollment over time.

Figure 3.5c. Share of Medicare Ground Ambulance Transport Volume, Top 10 Percent Versus Bottom 90 Percent of NPIs, by Volume, 2017–2020



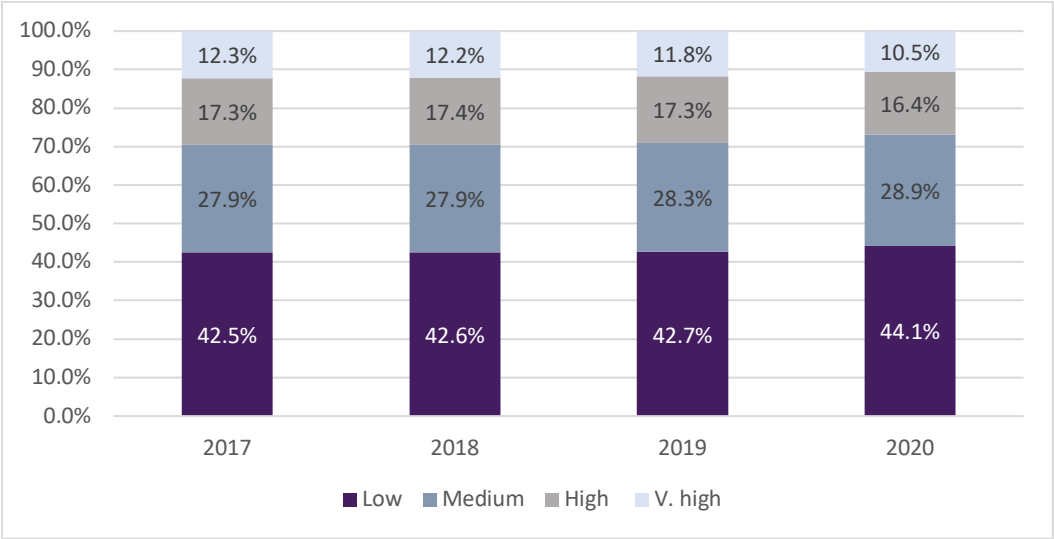
SOURCE: Authors' analysis of FFS Medicare claims accessed via the IRD (run date July 2, 2021).
NOTE: Reported rates are not adjusted for changes in FFS Medicare enrollment over time.

Volume Category Thresholds

Relatively larger shares of NPIs fell in the low and medium volume categories in more recent years, with a more noticeable increase from 2019 to 2020 coinciding with the observed decrease in aggregate ground ambulance service volume (Figure 3.6). The combined share of NPIs in the low and medium categories increased by 3.7 percent from 2017 to 2020, and by 2.9 percent from 2019 to 2020 alone, with corresponding decreases in the high and very high categories. Although this compositional change is modest in magnitude, it is relatively large compared with changes in other ground ambulance organization characteristics as we describe below.

Rather than define the four categories using constant volume thresholds (with 200, 800, and 2,500 annual transports separating the four volume categories), CMS could hold the proportion of organizations in each category fixed and allow the transport threshold to vary over time. Table 3.1 lists what the 2020 volume thresholds would be if the goal were to hold the share of NPIs in the four categories constant at 2019 ratios.

Figure 3.6. Share of Medicare Ground Ambulance NPIs, by Volume Category, 2017–2020



SOURCE: Authors' analysis of FFS Medicare claims accessed via the IRD (run date July 2, 2021).

Table 3.1. Volume Thresholds for 2020 Holding Volume Category Shares at 2019 Levels

Volume Category	Prior Volume Threshold	Prior 2020 NPI Distribution	Alternate Volume Thresholds	Alternate 2020 NPI Distribution
Low	≤ 200	44.1%	< 185	42.7%
Medium	201–800	28.9%	185–719	28.3%
High	801–2,500	16.4%	720–2,249	17.3%
Very High	> 2,500	10.5%	2,250	11.8%

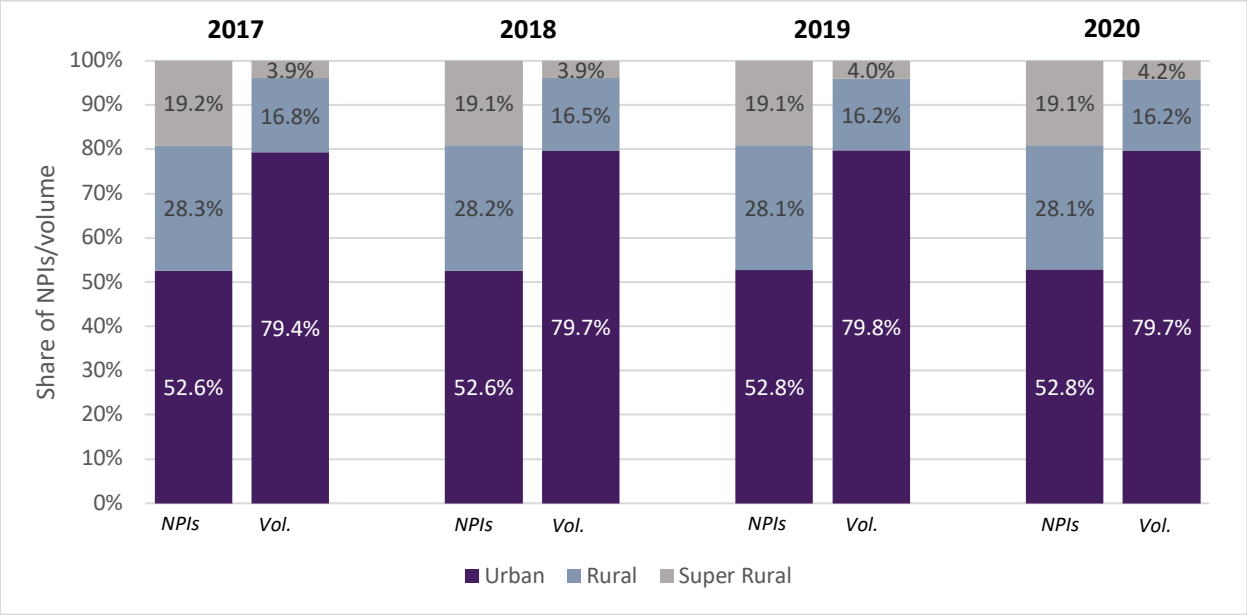
Changes in Other Characteristics

Aside from annual transport volume, we found that other characteristics of ground ambulance organizations did not meaningfully change from 2017 to 2020.

Service Area Population Density

Ground ambulance organizations' service area population density was generally consistent across years (Figure 3.7). Just over half of NPIs were classified as urban (53 percent), followed by rural (28 percent) and super rural (19 percent). Figure 3.7 shows the transport volume shares from each service area population density category, which were also broadly similar across years. Urban NPIs accounted for 80 percent of the transport volume, while rural NPIs accounted for 17 percent, and super-rural organizations accounted for about 4 percent of the total transport volume.

Figure 3.7. Share of Medicare Ground Ambulance Organizations and Transport Volume, by Service Area Population Density, 2017–2020

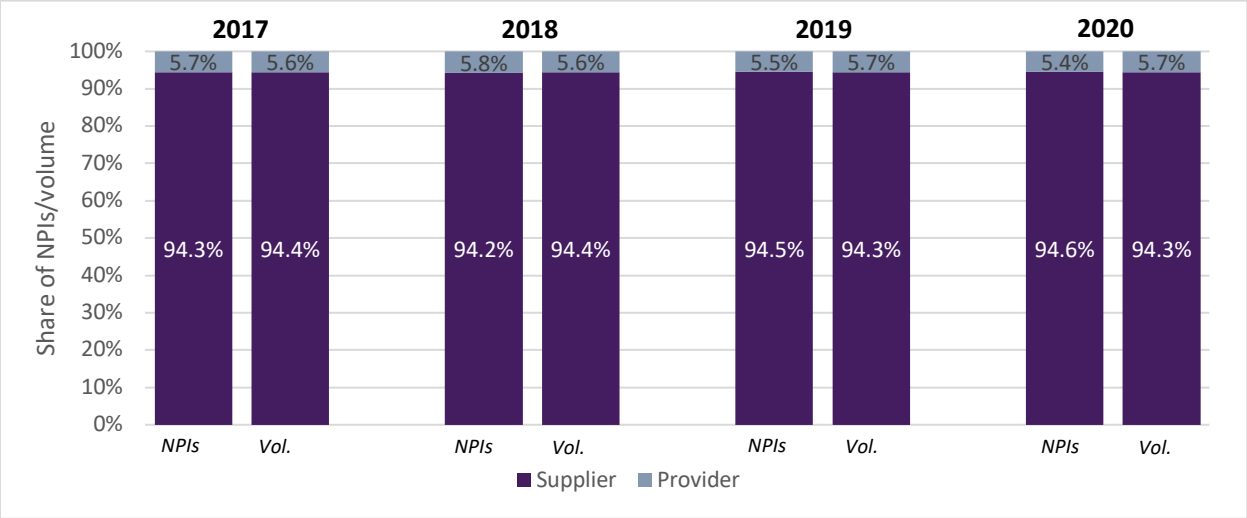


SOURCE: Authors' analysis of FFS Medicare claims accessed via the IRD (run date July 2, 2021).
NOTE: Vol. = transport volume. Totals within columns may not sum to 100 percent because of rounding.

Provider Versus Supplier Designation

The share of organizations designated as provider versus supplier was also fairly consistent across years, both in terms of NPIs and volume (Figure 3.8). Although we found that the share of provider versus supplier NPIs slightly decreased from 2017 to 2020 (from 5.7 to 5.4 percent), the share of transports from provider NPIs actually increased slightly, perhaps due to consolidation in hospital-based delivery systems.

Figure 3.8. Share of Medicare Ground Ambulance Organizations and Transport Volume, by Provider Versus Supplier Designation, 2017–2020



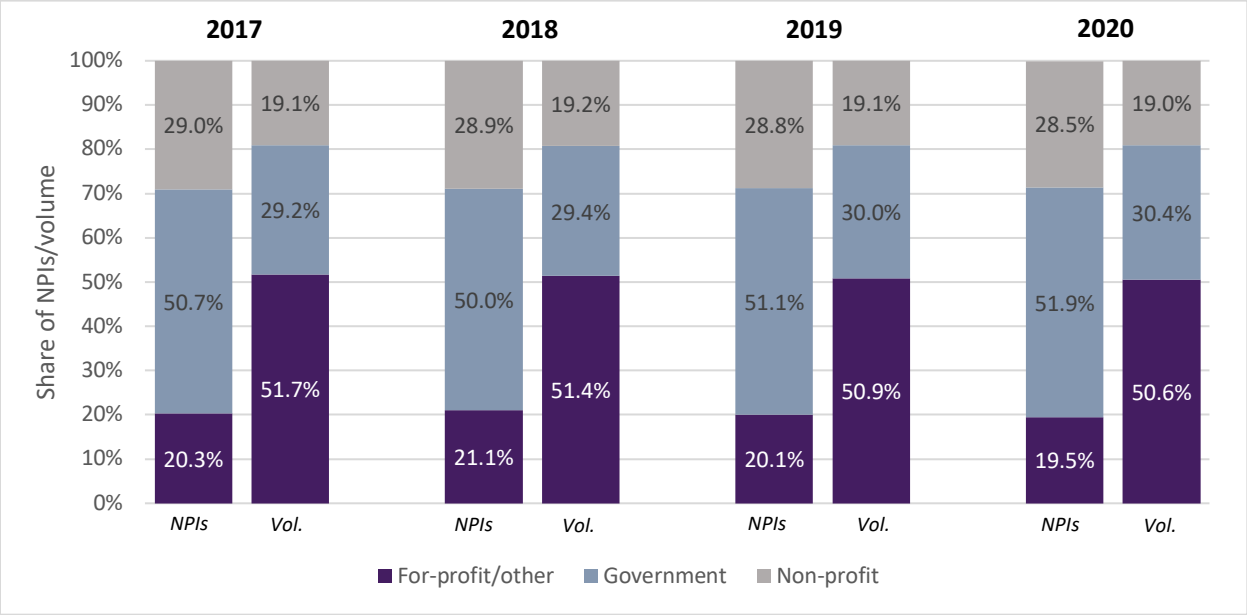
SOURCE: Authors' analysis of FFS Medicare claims accessed via the IRD (run date July 2, 2021).
NOTE: Vol. = transport volume. Annual counts are unadjusted for changes in FFS Medicare enrollment or partial calendar years of claims data for some NPIs.

Ownership Category

The share of organizations in each ownership category (government, for-profit or unclassifiable, non-profit) was consistent across years (Figure 3.9). Government organizations made up about half of the NPIs, for-profits or unclassifiable organizations were about 20 percent of the NPIs, and non-profits, about 30 percent. We found that the share of NPIs consisting of government organizations slightly increased (from 50.7 percent in 2017 to 51.9 percent in 2020).

Figure 3.9 also shows the transport volume shares of each organization type, which were also broadly similar across years. For-profit organizations accounted for approximately half of all transports, followed by government organizations at 29 percent and non-profits at 19 percent. The share of transport volume from government NPIs increased slightly from 2017 to 2020 (less than 1 percent, from 29.2 percent to 30.4 percent) while the share of transport volume of for-profit NPIs decreased from 51.7 percent in 2017 to 50.6 percent in 2020.

Figure 3.9. Share of Medicare Ground Ambulance Organizations and Transport Volume, by Ownership Category, 2017–2020



SOURCE: Authors' analysis of FFS Medicare claims accessed via the IRD (run date July 2, 2021).
NOTE: Vol. = transport volume. "For-profit/other" is for-profit or unclassifiable. Totals within columns may not sum to 100 percent because of rounding.

Chapter 4. Discussion

We found that the composition of the ground ambulance industry was relatively stable from 2017 to 2020, with only slight changes in the total number of organizations and their characteristics. The one notable exception was a decline in Medicare transport volume over time, including year-to-year reductions of roughly 3 percent from 2017 through 2019 and a larger, over–10 percent reduction from 2019 to 2020. The larger 2019-to-2020 reduction is likely the result of lower demand for EMS and health care services through the onset of the COVID-19 pandemic. The downward trend preceding the onset of the pandemic could have several causes, including increasing Medicare Advantage enrollment, the proliferation of ambulatory urgent care settings, and health care delivery system efforts to avoid the unnecessary use of emergency departments.

Although we found few changes over time other than those related to transport volume, some other findings might portend industry changes related to COVID-19 that will persist into 2021 and beyond. The gradual, slight downward trend in the number of NPIs aligns with several broader trends in the U.S. health care delivery system, which include increasing horizontal consolidation (i.e., mergers between ground ambulance organizations) and efforts to treat patients outside the high-intensity and high-cost emergency department setting. There were slightly fewer NPIs first billing Medicare for ground ambulance services in 2020 compared with such billing in prior years. The pandemic may have affected the entry of new ground ambulance organizations and the reorganization (e.g., mergers) of existing ground ambulance organizations in some cases.

Limitations

We did not include 2021 claims data in our analysis because they were incomplete as of the time of our analysis (March 2022). As a result, our analysis captured changes only through the first nine months of the COVID-19 pandemic. It will likely take longer than nine months for the full effects of the COVID-19 pandemic, including the 2020 reduction in volume and revenue, to play out in terms of changes in the ground ambulance industry. For example, there may be higher rates of for-profit NPIs exiting the market in 2021 and 2022 than in prior years because of financial pressure during the pandemic. More broadly, the loss of revenue in 2020 and future years as well as higher operating costs during the pandemic might catalyze a further wave of horizontal consolidation (i.e., ground ambulance organizations merging with other ground ambulance organizations) and vertical consolidation (i.e., hospitals and broader delivery systems acquiring ground ambulance organizations). This could affect both the number of NPIs in 2021 onward and their characteristics.

We did not control for potential time-varying drivers of changes in the ground ambulance industry, including changes in Medicare FFS enrollment, in the case mix of Medicare FFS enrollees, in beneficiary supplemental coverage, and in the availability of and access to hospital emergency departments or other sources of care. In some cases, data may be available to control for these time-varying factors in future analyses.

Our analysis focused only on FFS Medicare claims, and our assignment of ground ambulance organizations to volume categories and other characteristics was based solely on Medicare FFS claims and administrative data. This may result in misclassification relative to a ground ambulance organization's overall operation in some cases, such as for ground ambulance organizations that serve areas around higher education institutions where larger-than-average shares of the population are under age 65 (and therefore less likely to be Medicare beneficiaries). Relatedly, areas with high Medicare-managed care penetration (versus FFS Medicare enrollment) may have a higher overall transport volume relative to their FFS Medicare volume category.

Recommendations

Of the four characteristics used by CMS for GADCS sampling purposes, Medicare ground ambulance transport volume is likely the most volatile and the most likely to be affected by the COVID-19 pandemic. As a result, it may be important to address the downward trend in transport volume over time and particularly from 2019 into 2020 when sampling Year 3 and Year 4 ground ambulance organizations for inclusion in the GADCS. Without adjustment, the broad reduction in transport service volume would appear to signal a shift in organizations toward lower volume categories.

One alternative would be to use lower volume thresholds to preserve the proportional distribution of organizations across volume categories from earlier samples. The resulting samples would be representative of NPIs contributing to the year of claims data used for sampling (likely 2020 or 2021). Another alternative would be to use only pre-pandemic (e.g., 2019) claims data for the purposes of selecting the remaining Year 3 and Year 4 samples. However, using older claims data would lead to a larger share of NPIs ceasing operations prior to data collection and reporting from 2023 to 2025.

Of these alternatives, we recommend using the most recent available (likely 2020 or 2021) Medicare claims data for sampling with adjusted volume thresholds. This approach will result in Year 3 and Year 4 samples that more closely match the organizations providing ground ambulance services in 2023 when Year 3 and Year 4 organizations will start collecting data. If adjusted volume thresholds are not feasible, we recommend that both CMS and MedPAC acknowledge the distributional change toward lower volume categories and potentially adjust for this change in future analysis.

To the extent that the effects of the COVID-19 pandemic continue through 2022 and in future years, which appears likely, CMS and MedPAC should carefully assess the generalizability of cost-per-transport estimates from data collected via the GADCS. Given the volume trends reported in this report, we expect transport volume to remain below 2019 levels, even during a potential recovery through 2022. It may take considerably longer than a year or two for ground ambulance organizations to reduce fixed costs in their industry to respond to this decline in demand. In the short term, estimated cost per transport may be higher than typical.

Because CMS will likely use 2020 or 2021 claims data when selecting Year 3 and Year 4 samples in 2022, monitoring trends including later years may not have immediate implications around GADCS *sampling* per se. However, we recommend closely tracking industry trends over time, including through the most recent year for which complete claims data are available. Updated analyses will be useful for understanding patterns of non-response and modeling the implications of potential changes to payment and coverage policy.

Conclusion

We found that the composition of the ground ambulance industry was fairly consistent from 2017 to 2020, with the exception of a marked decrease in Medicare ground ambulance transport services. The decrease in volume was particularly notable from 2019 to 2020, coinciding with the onset of the COVID-19 pandemic. We recommend using 2020 claims data with adjusted volume thresholds to select Year 3 and Year 4 organizations if feasible. We also recommend continued analysis of industry trends as additional years of complete data are available for analysis.

Abbreviations

CMS	Centers for Medicare & Medicaid Services
COVID-19	coronavirus disease 2019
CY	calendar year
EMS	emergency medical services
FFRDC	federally funded research and development center
FFS	fee-for-service
GAO	U.S. Government Accountability Office
GADCS	Ground Ambulance Data Collection System
HCPCS	Healthcare Common Procedure Coding System
HHS	Department of Health and Human Services
IDR	(CMS) Integrated Data Repository
MedPAC	Medicare Payment Advisory Commission
NPI	National Provider Identifier
PECOS	(CMS) Provider Enrollment, Chain, and Ownership System
PFS	Physician Fee Schedule
PHE	public health emergency

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CMS—*See* Centers for Medicare & Medicaid Services.

GAO—*See* U.S. Government Accountability Office.

HHS—*See* U.S. Department of Health and Human Services.

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