



Ground Ambulance Industry

Trends, 2017–2022

An Analysis of Ground Ambulance
Organization Entrance and Exit

April 2024

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An Analysis of Ground Ambulance Organization Entrance and Exit

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Executive Summary

Section 50203(b) of the Bipartisan Budget Act of 2018 amended section 1834(1)(17)(A) of the Social Security Act to require the Centers for Medicare & Medicaid Services (CMS) to collect cost, revenue, utilization, and other information from representative samples of ground ambulance organizations (hereafter “organizations”). To meet this requirement, CMS developed the Medicare Ground Ambulance Data Collection System (GADCS) and used a stratified sampling approach to select four representative cohorts of organizations covering nearly all of the over 10,000 organizations that bill Traditional (fee-for-service) Medicare annually. CMS’ sampling approach aimed to ensure that the selected organizations were representative across four key organizational characteristics: (1) enrollment as a Medicare provider (i.e., a hospital or other Medicare provider of services) versus a Medicare supplier (i.e., other ambulance organizations), (2) ownership category, (3) service area population density, and (4) Medicare ground ambulance transport volume.

Organizations selected to participate in the GADCS must collect required information over a continuous, 12-month data collection period. Organizations then report this information to CMS via a web-based data collection instrument. As of October 2023, two of the four cohorts (representing over 5,000 organizations) are in the process of reporting GADCS data to CMS; the other two cohorts are in the process of collecting data.

This report includes descriptive analyses of ground ambulance trends from 2017 to 2022, an assessment of which organizational characteristics are associated with organizations’ entry into or exit from the Medicare program, and an examination of the change in Traditional Medicare ground ambulance transport (hereafter “transport”) volume in local markets (in our study, a county) after an organization enters or exits the market. These analyses provide context on changes in the types of organizations that bill Traditional Medicare for transports and investigate the implications of changes in ground ambulance market structure on Medicare enrollees. We used two sources of CMS data: the Medicare Provider Enrollment, Chain, and Ownership System (PECOS) enrollment data and Medicare fee-for-service professional and outpatient facility claims for ground ambulance transports accessed via CMS’ Integrated Data Repository (IDR). We used a combination of both datasets to categorize each organization’s

- enrollment as either a Medicare provider or supplier
- ownership category (non-profit, government, and a third category combining for-profit organizations and those that could not be classified as non-profit or government)
- service area population density (urban, rural, and super rural)
- transport volume (low, medium, high, and very high).

We conducted five analyses. First, we calculated the number of organizations that billed Traditional Medicare for transports between 2017 and 2022.¹ Second, we calculated the share of organizations that entered into the market (i.e., newly billing Traditional Medicare for transports), exited the market (i.e., no longer billing Traditional Medicare for transports), and remained in the market each year between 2017 and 2021. Third, we reported the share of organizations between 2017 and 2021 within each year that entered, exited, and remained in the Medicare ground ambulance market, stratified by each of the four organizational characteristics. Fourth, we estimated organization-level multivariable logistic regressions that predicted entrance and exit as a function of organization-level characteristics. Finally, we estimated county-level regressions that predicted county-level changes in total transport volume based on the entry or exit of an ambulance organization from the county between 2017 and 2022. This analysis helped us understand whether changes in ground ambulance market structure lead to changes in the volume and mix of services provided to Traditional Medicare enrollees.

The number of organizations billing Traditional Medicare declined only slightly between 2017 and 2022, despite the onset of the coronavirus disease 2019 (COVID-19) pandemic in 2020. Similarly, the share of organizations operating in each year that entered into and exited from the industry stayed about the same between 2017 and 2021, including through the onset of the COVID-19 pandemic and public health emergency (effective retroactively January 27, 2020).

In regression analyses, we found some statistically significant differences in the types of organizations that entered and exited between 2017 and 2021. Compared with suppliers, providers were more likely to both enter and exit between 2017 and 2021. For-profit organizations were also more likely to both enter and exit between 2017 and 2021 when compared with non-profit and government organizations. Organizations in the lowest transport volume category were more likely to enter or exit within a given year compared with organizations in higher-volume categories. Super rural organizations were less likely to enter and exit compared with urban organizations.

We found a small decline (1.8 percent cumulatively from 2017 through 2022) in the total number of organizations billing Traditional Medicare for transports. We also found very modest declines in county-level total, emergency, and non-emergency transport volume when an organization exited the market (e.g., a county-level decline of 1.6 percent in total volume in the year following an exit). We did not observe changes in total county-level transport volume if an organization entered the market. These findings appear to be driven primarily by entry and exit of provider (rather than supplier) organizations. Opportunities for future research include examining the longer-run impacts of entry and exit of organizations within communities.

¹ We used Medicare fee-for-service claims accessed via CMS' IDR (run date April 4, 2023) and PECOS data (run date May 2, 2023).

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Introduction

Section 1834(1)(17)(A) of the Social Security Act required the Secretary of the U.S. Department of Health and Human Services to create a system to collect cost, revenue, utilization, and other information from representative samples of ground ambulance organizations (hereafter “organizations”). The Medicare Payment Advisory Commission (MedPAC) will use the data collected via the new Medicare Ground Ambulance Data Collection System (GADCS) to assess the adequacy of Medicare’s payment for ground ambulance services and geographic variations in the cost of furnishing such services.

Originally, the Centers for Medicare & Medicaid Services (CMS) intended to collect the data in four separate years from selected organizations between 2020 and 2023. However, in response to the coronavirus disease 2019 (COVID-19) public health emergency (PHE), CMS delayed some data collection and reporting timelines such that the first two annual cohorts—Year 1- and 2-selected organizations, representing about half of the 10,500 total organizations billing Traditional (fee-for-service) Medicare annually—must collect data starting in 2022, and the third and fourth annual cohorts—Year 3- and 4-selected organizations—must collect data starting in 2023. The Year 1 and Year 2 samples include organizations that billed Traditional Medicare for ground ambulance transports (hereafter “transports”) in 2017 and 2018, respectively. The Year 3 and 4 samples include organizations that billed Traditional Medicare for transports in 2020. The starting date for data collection within the applicable year is either January 1 for an organization aligning with a calendar year or the start date for the organization’s fiscal year, if different. Regardless of the starting date, each organization’s data collection period runs for a continuous 12 months. Organizations must report their collected data via a web-based GADCS portal within five months after their data collection period ends.

Previously, we analyzed Medicare fee-for-service claims data and CMS’ Provider Enrollment, Chain, and Ownership System (PECOS) data to assess trends in the number and characteristics of providers (i.e., ambulance organizations that provide health care services, primarily hospitals and skilled nursing facilities) and suppliers (all other ambulance organizations) that billed Traditional Medicare for transports in each year from 2017 through 2020.² These analyses found that roughly 4 percent of national provider identifiers (NPIs) that billed Traditional Medicare for transports in a given year did not bill Traditional Medicare for transports in the subsequent year. That report also described a gradual decrease in Traditional Medicare transport volume between 2017 and 2020, with a steeper reduction from 2019 to 2020 coinciding with the onset of the COVID-19 pandemic.

² Andrew 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*, PR-A1809-1, 2022.

These earlier analyses provided insight into how the GADCS annual sampling frames could change over time, particularly through the onset of the COVID-19 pandemic. They also helped describe the initial effects of the COVID-19 pandemic on Traditional Medicare ground ambulance utilization. However, these analyses used data only through the end of 2020. Longer-term changes in the ground ambulance industry could have potential spillover effects on the response rate to the GADCS and the generalizability of analyses conducted using GADCS data to the population of organizations currently billing Traditional Medicare for transports. The prior report closed with a recommendation to reassess ground ambulance industry trends over time, particularly when additional years of data covering the ongoing COVID-19 pandemic period were available.

Following from the recommendations of the previous report published in November 2022, and to inform the analysis of GADCS data, this report updates and extends the prior work in several ways. First, we assessed more-recent trends in entry and exit of organizations using Medicare fee-for-service claims with service dates from 2017 through 2022. Recent research suggests a healthcare workforce contraction occurred during the COVID-19 PHE but later than 2020.³ In addition, CMS waived certain requirements for ground ambulance services during the COVID-19 PHE.⁴ Therefore, we assessed more-recent trends to understand the ongoing impacts of the COVID-19 pandemic on the ground ambulance industry.

Second, we provide new analyses that quantify the number of organizations entering (i.e., newly billing Traditional Medicare for transports) and exiting (i.e., no longer billing Traditional Medicare for transports) based on organizational transports between 2017 and 2022. Specifically, we analyzed whether entry and exit differed by the organizational characteristics that our previous work established as potentially linked to costs and revenue. These characteristics include

- enrollment as either a Medicare provider or supplier
- ownership category (government, non-profit, and for-profit)
- transport volume (low, medium, high, and very high)
- service area population density (urban, rural, and super rural).

Third, we assessed the effect of the entry or exit of an organization within a county on the total county-level number of transports and the number of transports broken down by emergency and non-emergency transports. These analyses helped us understand whether changes in ground ambulance market structure lead to changes in the volume and mix of services provided to Traditional Medicare enrollees.

³ Jonathan Cantor, Christopher Whaley, Kosali Simon, and Thuy Nguyen, “US Health Care Workforce Changes During the First and Second Years of the COVID-19 Pandemic,” *JAMA Health Forum*, Vol. 3, No. 2, February 2022.

⁴ CMS, “Ambulances: CMS Flexibilities to Fight COVID-19,” 2023.

Data and Methods

We used two main sources of Medicare data for our analysis. First, we used an extract of Medicare fee-for-service claims data (hereafter “claims data”) obtained via CMS’ Integrated Data Repository (IDR). Second, we used an extract of Medicare PECOS enrollment data.⁵ We combined these data files at the NPI level, and NPI was used as an organization identifier in our analyses.

Claims Data

The claims data contain information on transports billed to and paid by Traditional Medicare, including the level of service, 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 transport. The data include NPI, year of service, paid amount, Healthcare Common Procedure Coding System (HCPCS) codes, and modifier codes.⁶ We extracted line-level professional and outpatient facility claims for transports with service dates from 2016 through 2022 via CMS’ IDR. We used the 2016 data to determine if organizations entered or remained in 2017. The professional claims captured transports from suppliers, and the outpatient facility claims captured transports from providers. The professional claims included the ZIP Code for the point of ambulance pickup and the allowed amount for the claim line. Because facility claims did not include pickup ZIP Code, we used the ZIP Code for the provider’s primary practice location when determining the service area population density for each facility claim line. We excluded professional claim lines with a payment of zero dollars and institutional claims billed under Traditional Medicare Part A. We retrieved these claims data from CMS’ IDR between March 2022 and August 2023.⁷

We used these data to calculate the total volume of transports in a county in each year between 2016 and 2022.⁸ We also calculated the total number of emergency and non-emergency transports. We identified the transport’s county using the origin ZIP Code. We used the county-level volume measure to assess the impact of an organization’s entry or exit within a year on the total number of transports.

⁵ The PECOS data are current as of May 2, 2023.

⁶ Ambulance services are defined by their HCPCS codes. We used HCPCS codes A0425, A0426, A0427, A0428, A0429, A0432, A0433, and A0434 for professional service claims and revenue center codes 540–549 for Medicare Part B institutional claims. One of the HCPCS codes also contains lines in the Part B institutional claims. HCPCS codes A0426 and A0428 are for “Total non-emergency services.” HCPCS codes A0427, A0429, A0432, A0433, A0434, and A0999 are for “Total emergency services.”

⁷ The national-level claims data were retrieved from CMS’ IDR on the following dates: April 26, 2023, for 2017 data; April 27, 2023, for 2018 and 2019 data; March 21, 2022, for 2020 data; July 19, 2022, for 2021 data; and June 7, 2023, for 2022 data. The county-level data were retrieved on August 8, 2023.

⁸ The IDR contains a crosswalk between ZIP Code and Federal Information Processing Standard code.

PECOS Enrollment Data

The PECOS data contain information submitted by providers and suppliers during their Medicare enrollment process. The data include detailed information on the type of organization and its service area. The PECOS data extract, current as of May 2, 2023, included information for most organizations that billed for transports with service dates in 2017 through 2022. The data contain information on all changes in enrollment based on data entered into the CMS-855A (Medicare Enrollment Application for Institutional Providers)⁹ and CMS-855B (Medicare Enrollment Application for Clinics/Group Practices and Other Suppliers)¹⁰ enrollment forms. We classified organizations as providers or suppliers using our existing methodology.¹¹ To identify ambulance suppliers, we used data from the most recent enrollment record in which the specialty was “ambulance service supplier.” To identify ambulance providers, we identified organizations with concurrent enrollment records for hospital, critical access hospital, rural emergency hospital, skilled nursing facility, or dialysis facility.

Organization Categorization

This section describes how we used both the Medicare fee-for-service claims and enrollment data to categorize organizations between 2017 and 2022.

Provider Versus Supplier Designation

We used the most recent PECOS enrollment record in each year to designate each NPI as a provider or supplier, as described above. *Providers* are hospitals and other facilities that are Medicare “providers of service.” In contrast, *suppliers* are all other organizations that specifically furnish and bill for transports.

Ownership Category

We classified each of the ground ambulance organizations into a specific ownership category, as detailed in the prior report published in 2019.¹² The assignment was hierarchical and was based on the PECOS data. The approach consisted of several steps. First, we used the PECOS enrollment data to identify organizations as either non-profit or proprietary. If the

⁹ CMS, *Medicare Enrollment Application: Institutional Providers*, CMS-855A, September 2023.

¹⁰ CMS, *Medicare Enrollment Application: Clinic/Group Practices and Other Suppliers*, CMS-855B, March 2021.

¹¹ The classification was hierarchical and sequential. Critical access hospital enrollment records were assigned first, hospital enrollment records were assigned second, and other providers were assigned third.

¹² For a full list of terms used to classify organizations, see 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*, Task Order No. HHSM-500-T0052, MITRE Corporation, July 30, 2019.

organization did not report being “non-profit” or “proprietary,” we moved on to the next step.¹³ Second, PECOS data contained self-reported fields on organizational structure. This was a text field with a multitude of write-in responses. Using this text-field data, we determined whether an organization was non-profit, for-profit, or government using string searches for specific terms. Third, for organizations without an assigned organization structure after the first two steps, we used targeted internet searches to classify the organization into either non-profit, government, or for-profit. A small number of unclassifiable NPIs were included in the “for-profit” category (hereafter “for-profit”).

Transport Volume

We calculated transport volume for each NPI by counting line-level claims within a year. We classified NPIs into one of four volume categories based on the number of transports: low (200 or fewer transports), medium (201–800 transports), high (801–2,499 transports), and very high (2,500 or more transports). The previous report on industry trends published in November 2022 describes the method for creating these categories.¹⁴

Service Area Population Density

We designated the urbanicity of service areas for suppliers based on their point of ambulance pickup location. We used this location because it provides direct information about where their services are rendered. Ambulance pickup ZIP Codes were either urban, rural, or super rural using a crosswalk maintained by the U.S. Census Bureau.¹⁵ Using the distribution of ambulance pickups for the three service area categories, we assigned one service area population density category to the organization based on the most prevalent service area type. In contrast, for ambulance providers, we used the business location ZIP Code contained in their institutional claims. We chose this location because the point of ambulance pickup location is not available for claims submitted by ambulance providers.

Entrance, Exit, and Persistence

We defined *exiting* NPIs as those that billed Traditional Medicare for transports in the current year but not in the following year. For example, an NPI that billed Traditional Medicare for transports in 2017 but not in 2018 is an exiting NPI in 2017. In contrast, we defined *entering*

¹³ The form specifically asks that non-profits submit their IRS Form 501(c)(3). However, government-owned entities are not required to provide an IRS Form 501(c)(3).

¹⁴ For a full description of the methodology, see Mulcahy et al., 2022.

¹⁵ This classification is used to calculate add-on payments for urban, rural, and super rural services. Super rural is for the lowest 25th percentile of all rural populations arrayed by population density. For more 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.

NPIs as those that did not bill Traditional Medicare for transports in the previous year. For example, an NPI that did not bill Traditional Medicare for transports in 2017 but did so in 2018 is an entering NPI for 2018. Finally, we defined *persisting* NPIs as those that billed Traditional Medicare in a given year and were not classified as entering or exiting in the same year. To determine if organizations entered or remained in 2017, we included 2016 data in the analysis. NPIs can both enter and exit in a single year if they neither billed Traditional Medicare in the prior year nor in the following year. For example, we defined NPIs that billed Traditional Medicare in 2018 but not in 2017 or 2019 as both entering and exiting in 2018.

Analysis

Our analysis had five components. First, we calculated trends in the aggregate for the number of NPIs that billed Traditional Medicare for transports in each year between 2017 and 2022. Second, we reported the share of NPIs that entered, exited, and remained individually for each year between 2017 and 2022. Third, we calculated the share of NPIs that entered and exited between the years 2017 and 2021 by the previously described organizational characteristics.

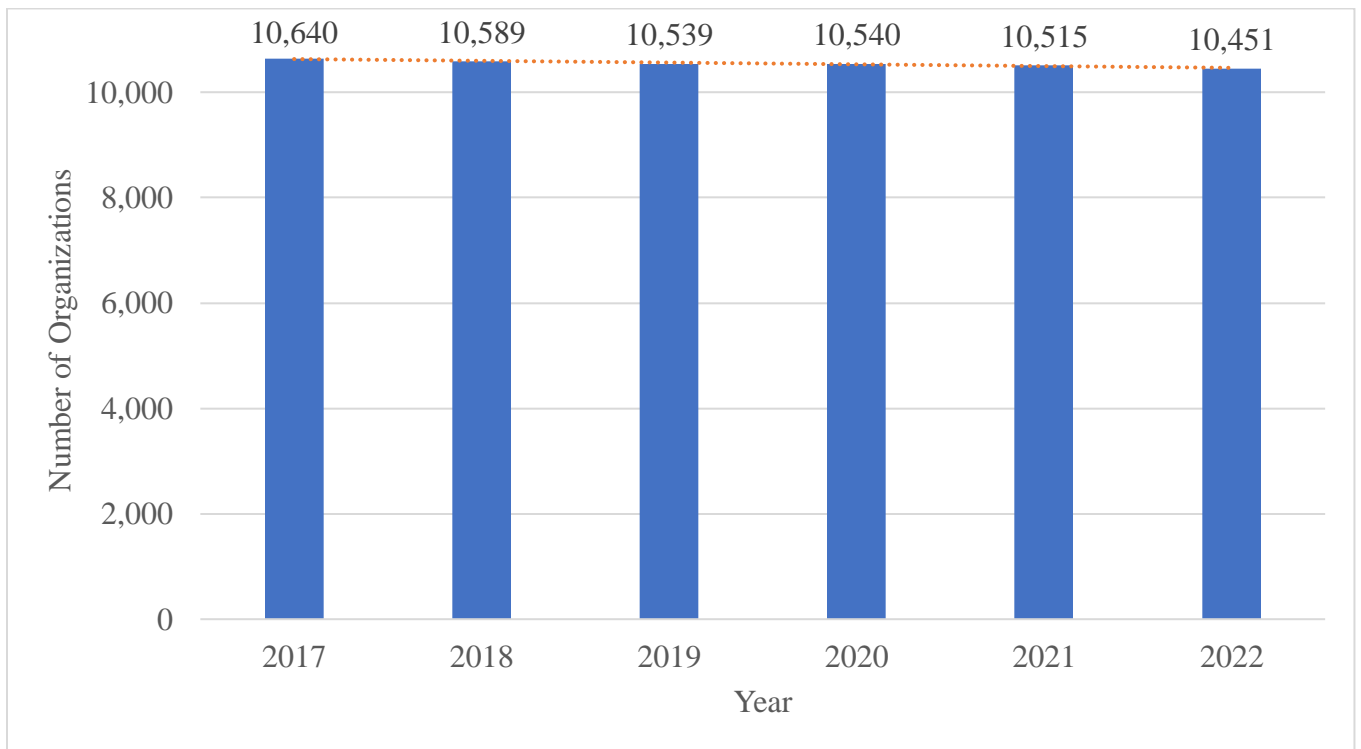
Fourth, we estimated NPI year-level multivariable logistic regression models that predicted the entry and exit of an NPI from Traditional Medicare within a given year as a function of the organizational characteristics of the NPI, including provider or supplier designation, ownership category, service area population density, and transport volume. We used robust standard errors when estimating the model. Finally, we estimated county year-level ordinary least squares regressions that predicted logged-transformed county-level transport volume as a function of entry or exit of an organization from the county between 2017 and 2022 (implemented as indicator variables in separate entry and exit regressions), year fixed effects, and county fixed effects. We clustered robust standard errors at the county level to reflect multiple observations within a county when estimating this model. We estimated this regression separately for three transport volume outcomes: total volume, emergency service volume, and non-emergency service volume. Because the total number of transports is skewed to the right (meaning some organizations performed a disproportionately larger number of transports), we log-transformed each dependent variable (i.e., we used the natural log of the number of transports as our measure of volume plus one to account for observations with zero transports) to reduce skewness. We estimated separate models with an indicator for exit rather than entry.

Results

Counts and Persistence of Organizations

Overall, we found a slight decline in the number of NPIs that billed Traditional Medicare for transports, decreasing from 10,640 in 2017 to 10,451 in 2022 (Figure 1). This constituted a 1.8-percent cumulative decline in the number of NPIs from 2017 to 2022.

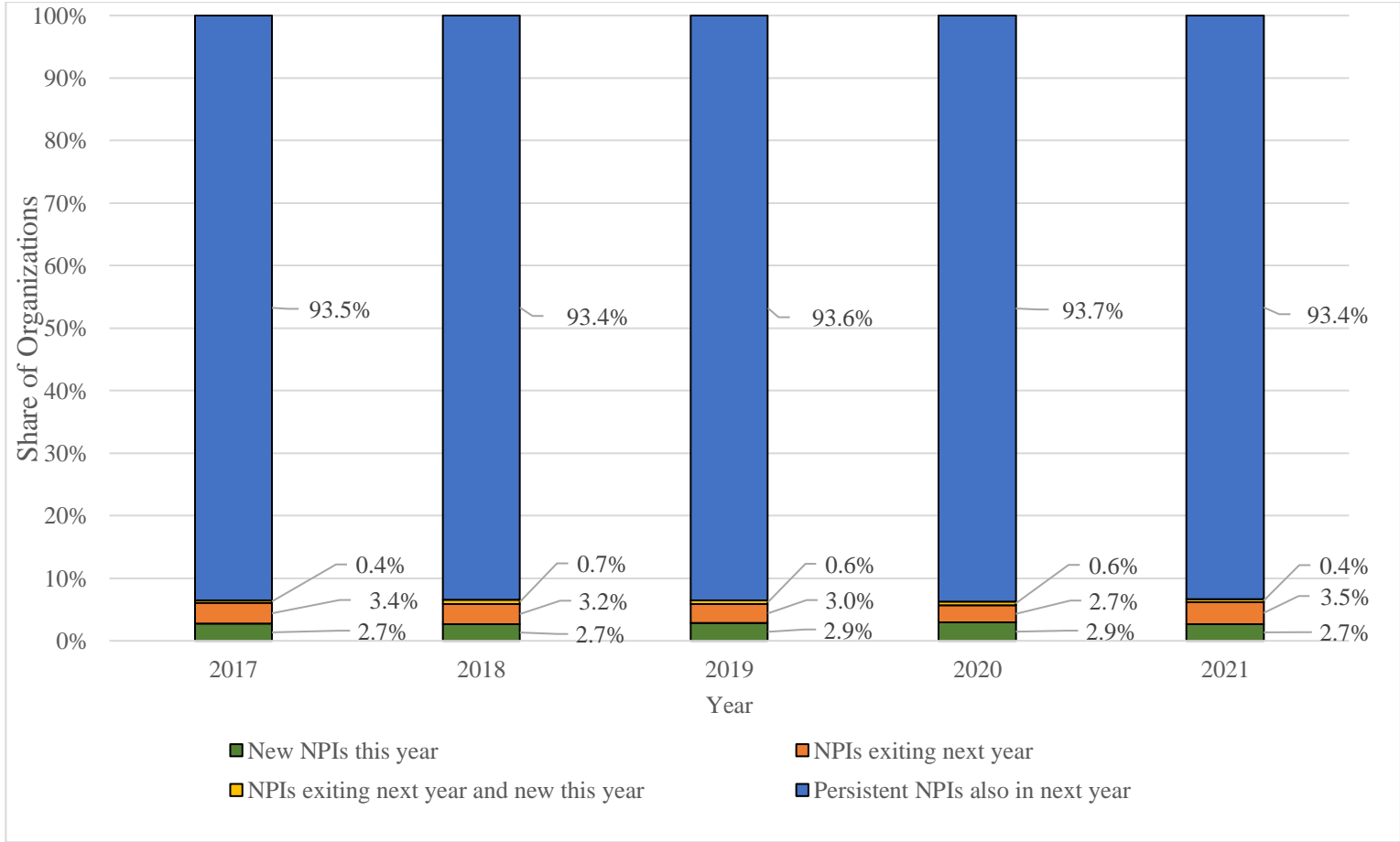
Figure 1. NPIs With Paid Medicare Fee-For-Service Ground Ambulance Claims, 2017–2022



SOURCE: Authors' analysis of Medicare fee-for-service claims accessed via CMS' IDR (run date April 26, 2023, for 2017 data; April 27, 2023, for 2018 and 2019 data; March 21, 2022, for 2020 data; July 19, 2022, for 2021 data; and June 7, 2023, for 2022 data).

Figure 2 shows the annual rates of NPIs that entered and exited based on whether they billed Traditional Medicare for transports in the subsequent year. Between 2017 and 2021, we consistently found that around 93 percent of NPIs that billed in a year also did so in the next year. In a given year between 2017 and 2021, we found that roughly 3 to 4 percent of NPIs stopped billing Traditional Medicare for transports in the next year. We found that around 3 percent of NPIs billed for the first time in each year. Less than 1 percent of NPIs both entered and exited in each year.

Figure 2. NPI Persistence over Time, 2017–2021



SOURCE: Authors’ analysis of Medicare fee-for-service claims accessed via CMS’ IDR (run date April 26, 2023, for 2017 data; April 27, 2023, for 2018 and 2019 data; March 21, 2022, for 2020 data; July 19, 2022, for 2021 data; and June 7, 2023, for 2022 data).

NOTE: We do not include 2022 because 2023 claims data are incomplete. It is also possible for an NPI that enters in a given year to also exit. For example, an NPI that first bills in 2018 and does not bill in 2019 would be classified as both a new and exiting NPI in 2018.

Descriptive Analyses

Exit

In Table 1, we report the organizational characteristics for NPIs that exited between 2017 and 2021. The unit of analysis is an NPI within a year. Most organizations that billed Traditional Medicare for transports are suppliers. Therefore, unsurprisingly, we found that most organizations that exited during the study period were suppliers (88.3 percent). The share of suppliers that exited remained relatively stable over time.

Almost half of all organizations in the 2017–2021 sample were government organizations, yet only 22.3 percent of exiting organizations were government. In contrast, nearly half of all exits were by for-profit organizations (46.7 percent) despite the fact that they represented 21.1 percent of organizations in the 2017–2021 sample.

Table 1. Organizational Characteristics of NPIs That Exited Between 2017 and 2021

	2017–2021 Sample Characteristics	2017–2021 Combined (% of exits)	2017 (% of exits)	2018 (% of exits)	2019 (% of exits)	2020 (% of exits)	2021 (% of exits)
Provider or supplier							
Supplier	94.4	88.3	88.1	86.0	89.0	87.9	90.3
Provider	5.6	11.7	11.9	14.0	11.0	12.2	9.7
Ownership							
For-profit	21.1	46.7	44.1	45.9	42.5	44.4	55.9
Government	50.6	22.3	21.8	23.0	22.7	23.5	20.6
Non-profit	28.3	31.0	34.2	31.2	34.8	32.2	23.5
Service area density							
Rural	28.2	27.1	25.5	30.2	30.5	25.4	24.0
Super rural	19.1	21.3	20.8	20.3	21.4	21.5	22.8
Urban	52.8	51.6	53.7	49.5	48.1	53.1	53.3
Volume							
Low	43.2	71.5	72.3	70.5	71.4	72.6	70.9
Medium	28.4	16.9	15.1	19.3	17.4	16.1	16.5
High	17.2	8.0	8.4	7.3	7.0	7.9	9.2
Very high	11.2	3.6	4.2	2.9	4.3	3.4	3.4
Total number of exits		1,959	404	414	374	354	413

SOURCE: Authors' analysis of Medicare fee-for-service claims accessed via CMS' IDR (run date April 26, 2023, for 2017 data; April 27, 2023, for 2018 and 2019 data; March 21, 2022, for 2020 data; July 19, 2022, for 2021 data; and June 7, 2023, for 2022 data) and PECOS data (run date May 2, 2023).

NOTE: Cells represent column percentages within each panel (i.e., under each heading). Percentages in the table may not add up to 100 because of rounding. Unit of analysis is an NPI within a year.

There were no noticeable differences in the share of organizations that exited and the total 2017–2021 sample by service area density. However, organizations that exited were more likely to be low-volume organizations than were organizations in the overall sample.

Entry

Table 2 displays the characteristics of NPIs that entered between 2017 and 2021. The results for providers, suppliers, service area density, and volume were similar to those for organizations that exited. The largest difference was for ownership category. We found that government organizations were the second most likely to enter. Non-profit organizations were more likely to exit compared with government organizations. The combined results could be because of growth in government organizations as non-profit organizations continued to close between 2017 and 2021.

Table 2. Organizational Characteristics of NPIs That Entered Between 2017 and 2021

	2017–2021 Sample Characteristics	2017–2021 combined (% of entrances)	2017 (% of entrances)	2018 (% of entrances)	2019 (% of entrances)	2020 (% of entrances)	2021 (% of entrances)
Provider or supplier							
Supplier	94.4	90.3	88.6	88.7	91.5	89.9	92.7
Provider	5.6	9.7	11.4	11.3	8.5	10.1	7.3
Ownership							
For-profit	21.1	47.2	37.7	47.0	50.3	50.9	49.5
Government	50.6	31.5	38.3	28.6	31.3	27.2	32.5
Non-profit	28.3	21.3	24.0	24.4	18.4	21.9	17.9
Service area density							
Rural	28.2	26.2	20.7	26.6	30.8	28.5	23.4
Super rural	19.1	20.0	22.5	21.0	18.7	17.6	20.7
Urban	52.8	53.9	56.9	52.4	50.6	53.9	55.9
Volume							
Low	43.2	75.6	77.8	72.5	73.4	75.2	79.6
Medium	28.4	15.8	12.6	16.4	18.1	17.9	13.7
High	17.2	6.4	7.8	7.7	6.9	4.8	5.2
Very high	11.2	2.1	1.8	3.4	1.7	2.1	1.5
Total number of entrances		1,758	333	353	364	379	329

SOURCE: Authors' analysis of Medicare fee-for-service claims accessed via CMS' IDR (run date April 26, 2023, for 2017 data; April 27, 2023, for 2018 and 2019 data; March 21, 2022, for 2020 data; July 19, 2022, for 2021 data; and June 7, 2023, for 2022 data) and PECOS data (run date May 2, 2023).

NOTE: Percentages in the table may not add up to 100 due to rounding. Unit of analysis is an NPI within a year.

Regression Analyses

Next, we estimated multivariable regressions to predict the likelihood of entry and exit by an NPI between 2017 and 2021 as a function of organizational characteristics. In Table 3, we report the results of multivariable logistic regressions. The unit of analysis is an NPI in a year. We report the results of the regressions using odds ratios (ORs), which represent the odds that an outcome occurs given a particular characteristic relative to the odds of the outcome occurring in the absence of the characteristic. An OR greater than one indicates an increased occurrence of an event. In contrast, an OR less than one indicates a decreased occurrence of an event. Providers had greater odds of exiting (OR = 3.99, 95-percent confidence interval [CI] = 3.38, 4.70) and entering (OR = 3.84, 95-percent CI = 3.19, 4.62) compared with suppliers. We found that both government (OR = 0.15, 95-percent CI = 0.13, 0.17) and non-profit (OR = 0.14, 95-percent CI = 0.13, 0.17) organizations were less likely to enter compared with for-profit organizations. We also found that government and non-profit organizations were less likely to exit compared with for-profit organizations. Both rural (OR = 0.85, 95-percent CI = 0.75–0.95) and super rural organizations (OR = 0.61, 95-percent CI = 0.54, 0.70) were less likely to enter compared with urban organizations. Only super rural organizations (OR = 0.77, 95-percent CI = 0.67, 0.87) were less likely to exit compared with urban organizations. There was no difference between rural and urban organizations in the likelihood of exiting. Finally, we found that as volume increased, the likelihood of entering and exiting decreased.

Table 3. Logistic Regression Predicting Entrance and Exit of NPIs Between 2017 and 2021

	NPI entry between 2017 and 2021	NPI exit between 2017 and 2021
Provider or supplier (reference: supplier)		
Provider	3.84*** (3.19–4.62)	3.99*** (3.38–4.70)
Ownership (reference: for-profit)		
Government	0.15*** (0.13–0.17)	0.11*** (0.10 – 0.12)
Non-profit	0.14*** (0.13–0.17)	0.23*** (0.20–0.25)
Volume (reference: low)		
Medium	0.26*** (0.23–0.30)	0.31*** (0.27–0.35)
High	0.11*** (0.09–0.13)	0.15*** (0.13–0.18)
Very high	0.03*** (0.02–0.05)	0.07*** (0.05–0.08)
Service area population density (reference: urban)		
Rural	0.85** (0.75–0.95)	0.95 (0.85–1.06)
Super rural	0.61*** (0.54–0.70)	0.77*** (0.67–0.87)
Constant	0.27*** (0.24–0.31)	0.28*** (0.24–0.32)

SOURCE: Authors' analysis of PECOS and Medicare fee-for-service claims accessed via CMS' IDR (run date April 26, 2023, for 2017 data; April 27, 2023, for 2018 and 2019 data; March 21, 2022, for 2020 data; July 19, 2022, for 2021 data; and June 7, 2023, for 2022 data).

NOTE: Each column is a separate logistic regression model. The unit of analysis is an NPI and year. Additional controls include year fixed effects. Odds ratios are reported. 95-percent CIs are in parentheses. Robust standard errors were used for all calculations. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

Table 4 reports the change in the log-transformed total volume associated with the exit of an organization within that year for a county.¹⁶ The unit of analysis is a county within a year. The main predictor is a dichotomous measure for whether an organization exited within the year for a county. Controlling for county-level time invariant characteristics and year fixed effects, we found that, on average, there were fewer annual transports (about 2 percent less) per county and year once an NPI exited. This is a small decline relative to the mean number of transports within a county each year. There has been a persistent decline in the number of transports in each year compared with 2017. The decline is exhibited by the coefficient of each year fixed effect in

¹⁶ We took the natural log of the number of transports because the total number of transports skewed to the right.

Table 4. The number of transports declined at an increasing rate relative to 2017. We found qualitatively similar results for emergency and non-emergency transports.

Table 4. Regression Predicting Natural Log of the Number of Transports in a County After the Exit of an Organization

	(1)	(2)	(3)
	Total	Emergency Services	Non-Emergency Services
Exit	-0.02* (0.01)	-0.02*** (0.01)	-0.03* (0.01)
Year (reference: 2017)			
2018	-0.02** (0.01)	-0.01** (0.00)	-0.02 (0.01)
2019	-0.04*** (0.01)	-0.03*** (0.01)	-0.05** (0.02)
2020	-0.11*** (0.01)	-0.12*** (0.01)	-0.11*** (0.02)
2021	-0.17*** (0.01)	-0.16*** (0.01)	-0.20*** (0.02)
2022	-0.27*** (0.01)	-0.20*** (0.01)	-0.40*** (0.02)
Constant	7.03*** (0.01)	6.66*** (0.00)	5.58*** (0.01)
Outcome mean	6.92	6.57	5.44
Mean number of transports	4,027	1,670	2,489
Observations	19,255	19,235	17,775

SOURCE: Authors' analysis of Medicare fee-for-service claims accessed via CMS' IDR (run date August 8, 2023).
NOTE: *Exit* is defined as an NPI no longer operating in a county for that specific year but which was operating in the previous year. The unit of analysis is a county in a year. Each column is a different regression model. HCPCS codes A0426 and A0428 are for "non-emergency services." HCPCS codes A0427, A0429, A0432, A0433, A0434, and A0999 are for "emergency services." Robust standard errors are reported in parentheses. Clustering was done at the county level. Additional covariates include county fixed effects. *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

Table 5 reports the same regression model results but replaces the exit measure with an entry measure. Here, we find no association between entry and transport volume within the county in the first year of entry. We found similar results when we examined emergency services and non-emergency services separately. Our results suggest that an entering NPI does not have an impact on total number of transports in their first year of operation in that county. It is important to note that it is possible that, in the long run, the effect of entry can increase or decrease the total volume of services.

Table 5. Regression Predicting Natural Log of the Number of Transports in a County After the Entrance of an Ambulance Organization

	(1)	(2)	(3)
	Total	Emergency services	Non-emergency services
Entrance	-0.01 (0.01)	-0.01 (0.01)	0.03 (0.02)
Year (reference: 2017)			
2018	-0.02*** (0.01)	-0.02*** (0.00)	-0.03* (0.01)
2019	-0.04*** (0.01)	-0.03*** (0.01)	-0.05*** (0.02)
2020	-0.12*** (0.01)	-0.13*** (0.01)	-0.12*** (0.02)
2021	-0.18*** (0.01)	-0.16*** (0.01)	-0.20*** (0.02)
2022	-0.27*** (0.01)	-0.21*** (0.01)	-0.41*** (0.02)
Constant	7.03*** (0.01)	6.66*** (0.00)	5.58*** (0.01)
Outcome mean	6.92	6.57	5.44
Mean number of transports	4,027	1,670	2,489
Observations	19,255	19,235	17,775

SOURCE: Authors' analysis of Medicare fee-for-service claims accessed via CMS' IDR (run date August 8, 2023).
NOTE: The level of analysis is a county in a year. *Entry* is defined as an NPI now operating in a county for that specific year but which was not operating in the previous year. Each column is a different regression model. HCPCS codes A0426 and A0428 are for "non-emergency services." HCPCS codes A0427, A0429, A0432, A0433, A0434, and A0999 are for "emergency services." Robust standard errors are reported in parentheses. Clustering was done at the county level. Additional covariates include county fixed effects. *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

Discussion

Consistent with our previous analysis of data between 2017 and 2020, we continue to find modest declines in the number of organizations billing Traditional Medicare between 2017 and 2022. We found that a relatively stable share of organizations entered and exited the industry each year between 2020 and 2022. It is possible that the COVID-19 pandemic prevented additional exits from occurring, but additional analyses should confirm this hypothesis and identify the exact mechanism.

In the multivariable regression analyses, we also found differences in the organizational characteristics of NPIs that entered and exited between 2017 and 2021. Providers were more likely to both enter and exit between 2017 and 2021 compared with suppliers. For-profit organizations were also more likely to enter or exit between 2017 and 2021 compared with non-profit and government organizations. Organizations that operated with the lowest level of volume also were more likely to enter or exit within a given year compared with organizations that had higher volume. Although we did not find any difference in the likelihood of an NPI exiting between rural and urban areas, we did find that NPIs in super rural areas were less likely to exit compared with urban areas. Furthermore, NPIs had a higher likelihood of entering urban or rural areas compared with super rural organizations over the same period.

Organizational characteristic differences are important to document because they describe how the distribution of organizations may change in future years. Our analysis included years of data both before the COVID-19 PHE (2017–2019) and during the COVID-19 PHE (2020–2022). It will be important to perform similar analyses in the future given that the COVID-19 PHE ended on May 11, 2023. It is possible that the ending of the COVID-19 PHE will impact the likelihood of an NPI to start or stop billing Traditional Medicare for ground ambulance services given that CMS waived certain requirements for ground ambulance services during the emergency.¹⁷

Importantly, we found small declines in county-level total volume, emergency services volume, and non-emergency services volume associated with the exit of an NPI from a county. In contrast, we failed to find any changes in county-level volume associated with an NPI entering a county. However, the current analyses have focused on the impact on volume in a single year. Future analyses should determine whether there are longer-term impacts on transport volume within a county if an NPI starts or stops to bill Traditional Medicare for transports.

¹⁷ For the list of Medicare COVID-19 PHE waivers and flexibilities, see CMS, “Medicare COVID-19 PHE Waivers & Flexibilities (Active),” undated.

Limitations

There are some methodological limitations to our study. First, we did not adjust for changes in Traditional Medicare enrollment or the case mix of Traditional Medicare enrollees between years. The number of beneficiaries is likely correlated to the number of transports. It is also important to note that we did not adjust for the availability of health care providers, such as hospitals, emergency departments, or physician offices. The presence of these types of providers within a county may lead to a decline or increase in the number of transports.

Second, we did not assess the parallel trends assumption for counties that had an NPI enter or exit within the study period. The parallel trends assumption holds that, in the absence of a treatment (in this case, entry or exit), the average outcome for the treated and comparison group would have evolved in parallel. In other words, we cannot rule out the possibility that counties with an entry or exit are dissimilar from other counties. Opportunities for future analyses include an event study to determine whether counties with an entry (exit) are similar to those without an entry (exit) before the event occurs. Therefore, none of our results show causality.

Third, we restricted this analysis to Medicare fee-for-service claims. This is a limitation because the volume categories that we created for sampling purposes solely use Medicare fee-for-service claims. It is possible that some organizations have a disproportionate share of transports of patients without Traditional Medicare coverage, and we may be misclassifying organizations as a result. Fourth, for facility claims, we did not have the pickup ZIP Code. Instead, we used the ZIP Code for the provider's location. This can potentially bias our findings because hospitals may be more likely to be in an urban ZIP Code than would the corresponding pickup locations. In response, we performed a sensitivity analysis in which we estimated the multivariable regression models predicting changes in volume of transports excluding facility claims. Much of the effect of an organization exiting goes away once removing the facility claims. This implies that the effect of exit is concentrated in provider organizations. The results can be found in the appendix. Finally, we did not perform statistical testing to assess if there was a decline in the total number of organizations with ambulance transports in the study period.

Finally, entry and exit can occur in the same county within the same year. Our estimation approach did not take this into account. Therefore, we are likely underestimating or overestimating the effect of an entry or exit within a county.

Conclusions

Our analyses show that the number of organizations, as well as the types of organizations, remained relatively stable between 2017 and 2022. It is notable that, even during the COVID-19 pandemic (2020–2022), the number of organizations remained relatively stable despite significant changes in the health care workforce, payment, and coverage. Furthermore, we found that entry of a new organization was not associated with a change in transport volume within a county in the same year. However, the exit of an organization was associated with a small

decline in total volume of transports, as well as in both emergency and non-emergency services. Future research opportunities include examining the longer-run impacts of entry and exit within a county and continuing this analysis as more years of complete data become available to study the changes in entry and exit following the expiration of the COVID-19 PHE on May 11, 2023.

Appendix

Table A.1. Regression Predicting Natural Log of the Number of Transports in a County After the Exit of an Organization Removing Facility Claims

	(1)	(2)	(3)
	Total	Emergency Services	Non-Emergency Services
Exit	-0.00 (0.01)	-0.01 (0.01)	-0.02 (0.02)
Year (reference: 2017)			
2018	-0.02** (0.01)	-0.02** (0.01)	-0.02 (0.01)
2019	-0.03*** (0.01)	-0.03*** (0.01)	-0.04** (0.02)
2020	-0.11*** (0.01)	-0.12*** (0.01)	-0.10*** (0.02)
2021	-0.16*** (0.01)	-0.15*** (0.01)	-0.18*** (0.02)
2022	-0.26*** (0.01)	-0.19*** (0.01)	-0.39*** (0.02)
Constant	6.81*** (0.01)	6.42*** (0.00)	5.37*** (0.01)
Outcome mean	6.70	6.34	5.24
Mean number of transports	3,803	2,324	1,605
Observations	19,255	19,235	17,775

SOURCE: Authors' analysis of Medicare fee-for-service claims accessed via CMS' IDR (run date August 8, 2023).
 NOTE: The level of analysis is a county. *Exit* is defined as an NPI no longer operating in a county for that specific year but which was operating in the previous year. The unit of analysis is a county in a year. Facility claims were excluded. Each column is a different regression model. HCPCS codes A0426 and A0428 are for "non-emergency services." HCPCS codes A0427, A0429, A0432, A0433, A0434, and A0999 are for "emergency services." Robust standard errors are reported in parentheses. Clustering was done at the county level. Additional covariates include county fixed effects. *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

Table A.2. Regression Predicting Natural Log of the Number of Transports in a County After the Entry of an Organization Removing Facility Claims

	(1)	(2)	(3)
	Total	Emergency Services	Non-Emergency Services
Entrance	0.00 (0.01)	0.00 (0.01)	0.02 (0.02)
Year (reference: 2017)			
2018	-0.02** (0.01)	-0.02*** (0.01)	-0.02 (0.01)
2019	-0.03*** (0.01)	-0.03*** (0.01)	-0.04** (0.02)
2020	-0.11*** (0.01)	-0.12*** (0.01)	-0.10*** (0.02)
2021	-0.16*** (0.01)	-0.15*** (0.01)	-0.18*** (0.02)
2022	-0.26*** (0.01)	-0.19*** (0.01)	-0.39*** (0.02)
Constant	6.81*** (0.01)	6.42*** (0.00)	5.37*** (0.01)
Outcome mean	6.70	6.34	5.24
Mean number of transports	3,803	2,324	1,605
Observations	19,255	19,235	17,775

SOURCE: Authors' analysis of Medicare fee-for-service claims accessed via CMS' IDR (run date August 8, 2023). NOTE: The level of analysis is a county. *Entry* is defined as an NPI now operating in a county for that specific year but which was not operating in the previous year. The unit of analysis is a county in a year. Facility claims were excluded. Each column is a different regression model. HCPCS codes A0426 and A0428 are for "non-emergency services." HCPCS codes A0427, A0429, A0432, A0433, A0434, and A0999 are for "emergency services." Robust standard errors are reported in parentheses. Clustering was done at the county level. Additional covariates include county fixed effects. *** p < 0.001; ** p < 0.01; * p < 0.05.

Abbreviations

CI	confidence interval
CMS	Centers for Medicare & Medicaid Services
COVID-19	coronavirus disease 2019
GADCS	Ground Ambulance Data Collection System
HCPCS	Healthcare Common Procedure Coding System
IDR	Integrated Data Repository
NPI	national provider identifier
OR	odds ratio
PECOS	Provider Enrollment, Chain, and Ownership System
PHE	public health emergency

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