ImageTrend Collaborate™ Short Report:

Prehospital Incidents in the Geriatric Population from January 2019 to June 2022

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SUMMARY

What is already known about this topic?

In 2019, the geriatric population within the U.S. accounted for 1 in every 7 individuals and is expected to increase by over 48% in the next 20 years.[1] This increase is also expected to increase healthcare and emergency medical services (EMS) utilization.

What does this report add?

From 2019 through the first half of 2022, the proportion of geriatric incidents in the prehospital setting has continued to increase with descriptive variation amongst the geriatric population compared to the other adult age groups.

What is the call to action?

Identify variables associated with increased EMS utilization in the geriatric population, continue to provide geriatric patient competency training for EMS providers, and incorporate alternative resources within communities for non-emergent geriatric incidents to reduce the burden on prehospital services.

Authored by ImageTrend's Clinical & Research Services Team

Overview

Past studies have shown geriatric adults account for approximately 40% of all EMS responses.[2-3] Understanding this aging population and their unique needs for EMS can help strengthen training, quality of care, resource allocation, and alternative healthcare options to ultimately improve patient quality of life.

Methodology

DATA COLLECTION METHOD:

All data is collected and stored within ImageTrend Collaborate. Each organization has given permission to utilize their de-identified data for Collaborate research purposes. Data reported within this report is based on the National Emergency Medical Services Information System (NEMSIS) V3.4 data elements.

DATA DE-IDENTIFICATION:

ImageTrend Collaborate follows federally established HIPAA Safe Harbor Regulations to ensure data anonymity and protection of patient records.

EXTERNAL DATA SOURCES:

United States Department of Agriculture Rural Urban Continuum Codes (USDA RUCC)[4]: This classification scheme distinguishes metropolitan counties by population size of metro area and nonmetropolitan counties by degree of urbanization and adjacency to a metro area. There are nine (9) RUCC codes with three (3) metro, four (4) non-metro and two (2) rural categories.

Social Vulnerability Index (SVI)[5]: Variables included in SVI come from the American Community Survey 2014–2018 dataset and estimates vulnerability by socioeconomic status, household composition & disability, minority status & language, and housing type & transportation. The higher the value (range 0 to 1) indicates a greater level of vulnerability.

American Community Survey (ACS)[6]: The ACS is a nationwide ongoing survey designed to provide communities with insightful information in areas of social, housing, economics and demographics. Data from this survey helps determine how to distribute $675 billion in federal and state funds annually. This survey utilized five-year estimates spanning from 2016 to 2020. We utilized this dataset to identify population level variables such as Medicaid usage, older adults living alone, and poverty.

National Hospital Ambulatory Medical Care Survey (NHAMCS) Hospital Emergency Department[7]: This data is gathered from a national sample of visits to hospital emergency departments. Data collected in this dataset includes patient demographics, payment sources, illness and injury information, vitals, diagnoses, procedures, medications and more.

Centers for Disease Control and Prevention - CDC Wonder[8]: This data is available online for epidemiologic research in public health, decision making, priority setting, program evaluation, and resource allocation. The underlying cause of death database has mortality and population counts for all U.S. counties. Deaths are based on U.S. resident death certificates.

DATA ANALYSIS:

- NEMSIS Version 3.4 fields were utilized.
- Incidents were from January 1, 2019, to June 30, 2022.
- Data was aggregated and analyzed within Microsoft PowerBI Version 2.88.1385.0.
- Incidents were included in the analysis if the type of service request (eResponse.05) was 911 response and incident/patient disposition (eDisposition.12) resulted in patient contact.
- Geriatric patients were identified as 65 years or older. Age groups of 65-74 years, 75-84 years, and 85 and older were created.
- ICD-10-CM-Codes were left in their standard category groupings for the majority, while a few individual groupings were pulled out to highlight their importance.[9]
- U.S. regions were identified utilizing the U.S. Census region groups.
- Social Vulnerability Index (SVI) was grouped into 25th percentiles.
- USDA RUCC Codes were grouped into Metro area (RUCC 1-3), Non-metro area (RUCC 4-7) and Rural (RUCC 8-9).

Assumptions and Limitations

- Data included within this report is retrospective and includes all submissions to ImageTrend Collaborate between January 1, 2019 and June 30, 2022.
- If corrections/edits or changes to the ePCR documentation were made after the date the report was created, the changes are not shown in this report, but all updates will be available within Collaborate for future reporting.
- Data reported and collected into the dataset have varying documentation standards based on agency or state policies.

Financial support for this report was provided by ImageTrend, Inc.

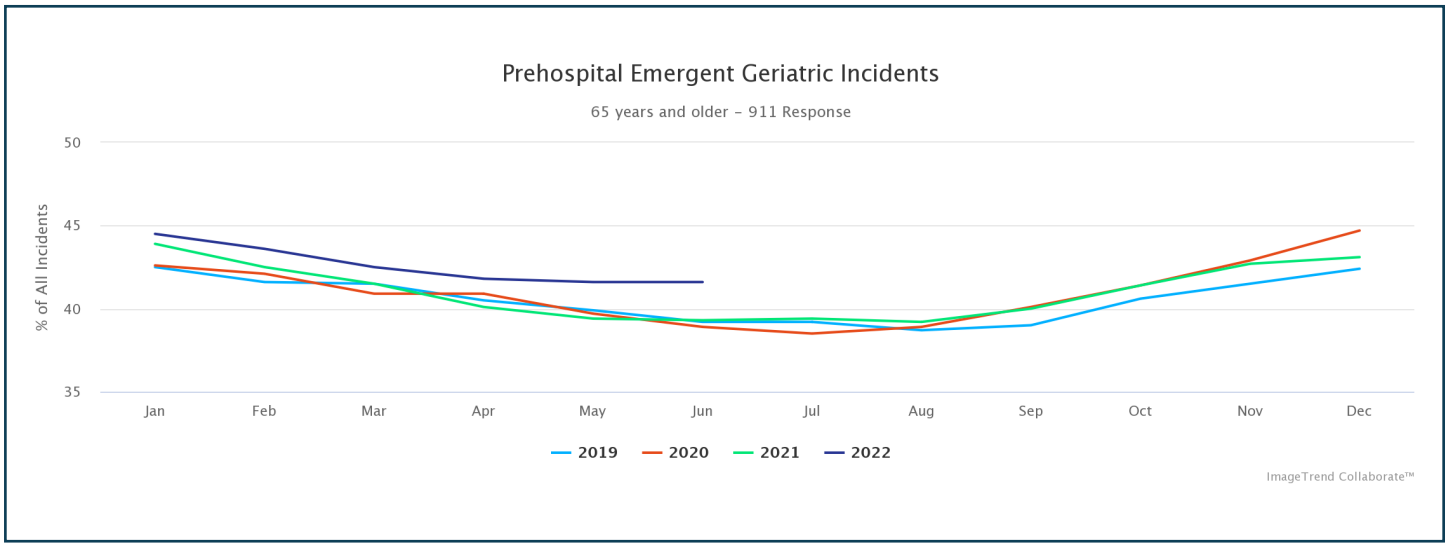
Results

INCIDENT OVERVIEW

From January 2019 to June 2022, there was 7,245,730 (41%) geriatric incidents out of 17,620,542 total incidents with 911 response and patient contact (**Fig. 1 & Table 1**).

- Almost 26% of emergent geriatric incidents include individuals 85 years or older.
- A majority of emergent geriatric incidents were female (56%), white/caucasian (60%), were treated and transported (72%), located at a private residence (67%), and in a metro area (77%).
- Most of these incidents were located in the South (40%), followed by the West (31%).
- The top three (3) dispatch reasons for emergent geriatric incidents involved falls (20%), followed by sick person, and breathing problems. Dispatch for breathing problems increased by 5%, while non-traumatic chest pain decreased by 10% from 2019 to 2021.
- Almost 74% of incidents were treated and transported in 2019 but fell to 70% in 2021. Patient refusals for care increased from 9% in 2019 to 11% in 2021.
- The top three (3) provider primary impression ICD-10 groupings included[9]: Injury and Poisoning (S00-T88) (15%), Malaise and Fatigue (R53) (14%), and Diseases of Circulatory System (I00-I99) (10%).

Fig. 1



41% of 911 response incidents are from the Geriatric Age Group (65+ years)

15% of provider impressions are Injury and Poisoning ICD-10 Codes

56% Female

60% White/ caucasian

72% Treated and transported

67% Private residence location

77% Metro area

2019 vs 2021

Treat and Transports decreased

74%

70%

Geriatric vs Other Adult Incidents

Data comparisons between the geriatric population and the other adult population were done to see how certain variables may be similar or different for emergent prehospital incidents from 2019 to the first half of 2022 (**Table 2**).

- There were more female (56% vs 47%), white (60% vs 45%), treat and transports (72% vs 67%) and dispatch for falls (20% vs 5%) in the geriatric incidents compared to the other adult incidents.
- Malaise and Fatigue (R53) provider primary impressions were higher in the geriatric incidents compared to other adult incidents nationally (14% vs 6%).
- Cognition and perception (R40-R46) provider primary impressions were higher in the geriatric incidents compared to the other adult incidents nationally (8% vs 5%).
- The geriatric population had slightly lower levels of social vulnerability compared to the other adult incidents (10% less in the most vulnerable quartile).
- There was a higher proportion nationally (19% vs 17%) of geriatric incidents living in non-metro or rural areas compared to the other adult population.

Emergent dispatch calls for falls were

20%  **5%**

vs

in geriatric adults compared to other adult incidents

Malaise and fatigue

 **2x** 

higher

in geriatric adults compared to other adult incidents

Cognition and perception incidents were

8%  **5%**

vs

in geriatric adults compared to other adult incidents

19%  **17%**

vs

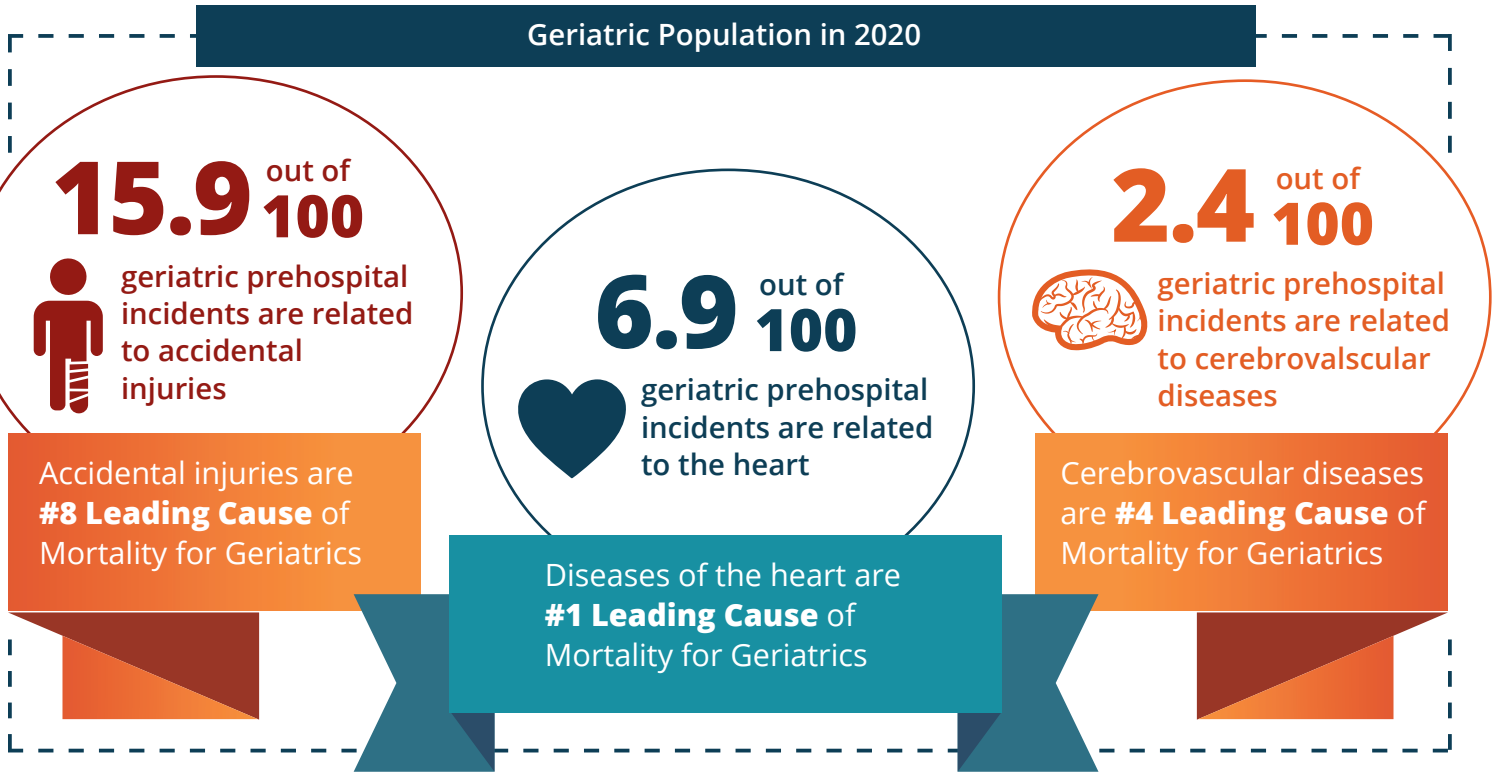
Geriatric incidents occur in non-metro or rural areas compared to other adult incidents

National Health Data Comparison

The need to treat and prevent illnesses or injuries to ultimately reduce morbidity and mortality occurs at the public health, primary care, EMS, and hospital settings. It is important to understand how EMS care contributes to the continuum of health so that further research, resource allocation and quality of care can be addressed. The ability to add additional datasets and integrate with EMS data can help improve quality of care and patient quality of life. While these types of comparisons help gain a full perspective of the burden of illness or injury, it is important to understand that there may be similarities as well as differences across the spectrum of healthcare.

ICD-10 groupings found in the CDC's top leading causes of mortality for 2020 were compared to the Collaborate EMS dataset and the National Ambulatory Medical Care Survey (NAMCS)-Hospital Emergency Department visits (**Table 3**).[7-8]

- Accidental injuries are the top reason that geriatric individuals utilized EMS and emergency departments in 2020 and are the 8th leading cause of mortality for the geriatric population.
- In 2020, diseases of the heart were the number one cause of mortality for the geriatric population and the second leading reason for emergent EMS and emergency department utilization for the same population.
- In 2020, cerebrovascular diseases were the 4th leading cause of mortality in the geriatric population and the third leading reason for emergent EMS utilization.



Social Determinants of Health

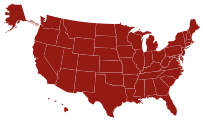
Social determinants of health (SDOH) are defined as the conditions in an environment where people are born, live, learn, work, play, worship, and age that affect health, well-being and quality of life.[10] SDOH's are an integral component of many health-related conditions seen by EMS. Within the aging population, there may be several factors that have influenced their health throughout their life as well as factors currently impacting their health.

For this report, there were four (4) variables integrated with Collaborate data to help assess the impact of SDOH's on emergent prehospital geriatric incidents: Social Vulnerability Index, percentage of the county living in poverty, percentage of the county population on Medicaid, and percentage of the county's geriatric population living alone (**Table 4**). Refer to the method's section (**Page 1**) of this report to learn more about these three (3) variables.

- 60% of geriatric prehospital incidents involved individuals living in the highest 50% most vulnerable U.S. counties.
- Only 15% of geriatric prehospital incidents involved individuals living in the least vulnerable quartile of U.S. counties.
- More than 63% of geriatric prehospital incidents located in counties with poverty levels above the national average (10.5%).[11]
- The U.S. national average for individuals utilizing Medicaid was 17.8% in 2019. Over 40% of emergent geriatric prehospital incidents were above the national average.[12]
- Geriatric individuals living alone can be at risk for utilizing EMS or other health services more frequently than other individuals living in a congregate or family setting.[13-14] This dataset showed 60% of the emergent geriatric incidents live in counties where more than 10% of the geriatric population lives alone.

Emergent Geriatric Incidents

60% occur in counties where more than **10%** of geriatric population live alone



15% live in the least socially vulnerable quartile of the U.S.

63% occur in counties above the national poverty average of **10.5%**[11]

40% occur in counties where Medicaid is used by more individuals than the national average of **17.8%**[12]

Action Items

Provide additional training and resources for EMS providers to properly manage geriatric incidents

Work with community organizations to identify and manage nonemergent geriatric incidents

Further Questions to Consider

1. What percentage of geriatric incidents result in repeat patient encounters? How many of these incidents are nonemergent?
2. What community services are available for geriatric patients that are utilizing EMS for nonemergent services?
3. How are providers trained to manage geriatric patients? Is there continued training throughout a provider's career?
4. What percentage of geriatric fall incidents are preventable with community resource intervention?
5. How often is telemedicine being used to evaluate and treat geriatric patients?

Table 1. Prehospital Emergent Geriatric (≥65 years) Incident Descriptives[a-b]

	2019	2020	2021	2022[c]	Total
All Incidents (All Ages)	4,431,063	4,921,931	5,565,334	2,702,214	17,620,542
Geriatric Incidents	1,796,147 (40.%)	2,016,593 (41.0%)	2,281,059 (41.0%)	1,151,931 (42.6%)	7,245,730 (41.1%)
65-74 years	37.6%	38.9%	39.6%	38.8%	38.8%
75-84 years	35.2%	35.2%	35.3%	36.2%	35.4%
≥85 years	27.2%	26.0%	25.1%	25.1%	25.8%
Gender					
Male	43.1%	44.4%	44.0%	44.2%	43.9%
Female	56.3%	55.1%	55.4%	55.3%	55.5%
Missing	0.6%	0.5%	0.6%	0.5%	0.5%
Race (Top 3 by Counts)					
White	60.8%	60.1%	59.9%	61.2%	60.4%
Black/African American	8.6%	9.9%	9.6%	9.4%	9.4%
Hispanic	3.3%	3.7%	3.9%	4.0%	3.7%
Missing	24.4%	23.4%	23.4%	21.7%	23.4%
Incident Location Type (Top 3 by Counts)					
Private Residence	63.5%	67.4%	67.9%	67.6%	66.6%
Assisted Living/Nursing Home	15.2%	13.8%	13.1%	13.9%	14.0%
Healthcare Facility	5.5%	4.6%	4.7%	4.7%	4.9%
Urbanicity (USDA RUCC)[c]					
Metro	76.5%	76.7%	76.5%	77.2%	76.7%
Non-Metro	15.9%	16.7%	16.9%	16.6%	16.5%
Rural	2.2%	2.2%	2.2%	2.2%	2.2%
Missing	5.4%	4.4%	4.4%	4.0%	4.6%
Region[d]					
Midwest	17.4%	17.6%	17.2%	17.3%	17.4%
South	41.7%	40.6%	39.7%	38.9%	40.3%
West	30.9%	30.4%	31.4%	32.0%	31.1%
Northeast	8.8%	10.3%	10.5%	10.6%	10.1%
Missing	1.2%	1.2%	1.2%	1.1%	1.2%
Dispatch Reasons (Top 5 by Counts)					
Falls	19.9%	19.6%	19.7%	19.7%	19.7%
Sick Person	18.3%	18.0%	18.5%	18.7%	18.3%
Breathing Problem	11.9%	12.6%	12.5%	12.7%	12.4%
Chest Pain (Non-Traumatic)	6.4%	5.8%	5.7%	5.8%	5.9%
Unconscious/Fainting/ Near-Fainting	5.0%	5.0%	4.8%	4.8%	4.9%
Patient Disposition Categories (Top 5 by Counts)					
Treat & Transport	73.9%	71.3%	70.3%	70.8%	71.5%
Patient Refused Care	8.9%	10.4%	11.2%	10.8%	10.4%
Treat, Transferred Care	8.4%	8.0%	8.4%	8.6%	8.3%
Patient Treated & Released (Per Protocol)	4.8%	5.4%	5.1%	4.9%	5.1%
Death Pronouncements	1.5%	1.9%	1.8%	1.8%	1.8%
Provider Primary Impression Groups (ICD-10-CM-Codes)[e] (Top 5 by Counts)					
Injury and Poisoning (S00-T88)	15.6%	15.2%	15.1%	14.7%	15.2%
Malaise and Fatigue (R53)	13.5%	13.8%	14.5%	14.8%	14.1%
Diseases of Circulatory System (I00-I99)	10.2%	10.0%	9.8%	9.4%	9.9%

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Table 1. Prehospital Emergent Geriatric (≥65 years) Incident Descriptives[a-b]

	2019	2020	2021	2022 *(cont.)*	Total
Cognition and Perception (R40-R46)	7.4%	7.9%	7.7%	7.7%	7.7%
Diseases of Respiratory System (J00-J99)	7.4%	6.9%	6.1%	6.2%	6.7%

[a] Incidents were 911 response with patient contact
[b] Includes January 1, 2019, to June 30, 2022
[c] USDA RUCC: Rural Urban Continuum. See report reference #4
[d] Region was grouped by U.S. Census categories
[e] See CDC Wonder Underlying Causes of Death (Reference #8 in report)

Table 2. Prehospital Emergent Geriatric (≥65 years) and Other Adult (18-64 years) Group Incident Descriptives, 2019-2022[a-b]

	Geriatric (≥65 years)	Other Adults (18-64 years)
All 911 Incidents	7,245,730	10,027,052
Gender		
Male	43.9%	51.9%
Female	55.5%	47.4%
Missing	0.5%	0.7%
Race (Top 3 by Counts)		
White	60.4%	44.5%
Black/African American	9.4%	19.6%
Hispanic	3.7%	8.8%
Missing	23.4%	22.0%
Dispatch Reason (Top 5 by Counts)		
Falls	19.7%	5.2%
Sick Person	18.3%	13.8%
Breathing Problem	12.4%	9.6%
Chest Pain (Non-Traumatic)	5.9%	6.9%
Unconscious/Fainting/Near-Fainting	4.9%	4.7%
Patient Disposition (Top 5 by Counts)		
Treat & Transport	71.5%	66.7%
Patient Refused Care	10.4%	14.2%
Treat, Transferred Care	8.3%	9.1%
Patient Treated & Released (Per Protocol)	5.1%	6.9%
Death Pronouncements	1.8%	1.3%
Incident Location Type (Top 3 by Counts)		
Private Residence	66.6%	52.0%
Assisted Living/Nursing Home	14.0%	2.3%
Healthcare Facility	4.9%	4.9%
Urbanicity (USDA RUCC)[c]		
Metro	76.7%	78.3%
Non-Metro	16.5%	14.8%
Rural	2.2%	1.8%
Missing	4.6%	5.1%
Provider Primary Impressions (Top 5 by Counts)		
Injury and Poisoning (S00-T88)	15.2%	15.7%
Malaise and Fatigue (R53)	14.1%	6.0%

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Table 2. Prehospital Emergent Geriatric (≥65 years) and Other Adult (18-64 years) Group Incident Descriptives, 2019-2022[a-b]

	Geriatric (≥65 years)	Other Adults (18-64 years)
Diseases of Circulatory System (I00-I99)	9.9%	6.8%
Cognition and Perception (R40-R46)	7.7%	5.0%
Diseases of Respiratory System (J00-J99)	6.7%	4.9%
Social Vulnerability Index[d] (25% Quartiles)		
Q1 (Least Vulnerable)	14.9%	11.1%
Q2	20.7%	18.7%
Q3	35.1%	37.4%
Q4 (Most Vulnerable)	24.7%	27.7%
Missing	4.6%	5.1%

[a] Incidents were 911 response with patient contact and had a documented primary impression
[b] Includes January 1, 2019 to June 30, 2022
[c] USDA RUCC: Rural Urban Continuum. See report reference #4
[d] See report reference #5
* Total 911 Incidents from 2019-2022: 19,800,540

Table 3. Geriatric (≥65 years) Illness and Injury Dataset Comparisons, 2020

ICD-10 Groupings	Collaborate Crude Prehospital Emergent Incident Rate per 100[a]	National Ambulatory Medical Care Survey (NAMCS) Hospital Emergency Department Visit Rate per 100[b]	CDC Leading Causes of Mortality for Adults ≥65 Years[c]
Diseases of Heart (I00-I09, I11, I13, I20-I51)	6.9	9.8	#1
Cerebrovascular Diseases (I60-I69)	2.4	1.6	#4
COVID-19, Influenza and Pneumonia (U07.1, J09-J18)[d]	1.5	5.6	#3/#10
Septicemia (A40-A41)	0.8	2.3	#13
Chronic Lower Respiratory Diseases (J40-J47)	1.4	3.2	#6
Accidents (Unintentional injuries (V01-X59, Y85-Y86)	15.9	20.3	#8

[a] Not all individual ICD-10 codes are documented within the prehospital setting
[b] See report reference #7
[c] See report reference #8
[d] COVID-19 was combined with the Influenza and Pneumonia ICD-10 groupings as symptoms are similar in the prehospital setting.

Table 4. Prehospital Emergent Geriatric (≥65 years) Incident Variables by Social Determinants of Health[a-b]

	2019 (n=1,796,147)	2020 (n=2,016,593)	2021 (n=2,281,059)	2022c (n=1,151,931)	Total (n=7,245,730)
Percent of County Social Vulnerability Index[c] (25% Quartiles)					
Q1 (Least Vulnerable)	15.1%	15.0%	14.7%	14.7%	14.9%
Q2	19.4%	20.8%	21.2%	21.5%	20.7%
Q3	37.0%	33.9%	34.9%	34.9%	35.1%
Q4 (Most Vulnerable)	23.1%	25.9%	24.8%	24.8%	24.7%
Missing	5.4%	4.4%	4.4%	4.1%	4.6%
Percent of County Population Living in Poverty[d]					
≤10.5%	30.5%	30.8%	31.0%	32.3%	31.0%
10.6-19.5%	58.0%	57.6%	57.7%	57.1%	57.7%
19.6-29.5%	5.6%	6.6%	6.3%	6.0%	6.1%
≥29.6%	0.5%	0.6%	0.6%	0.6%	0.6%
Missing	5.4%	4.4%	4.4%	4.1%	4.6%
Percent of County Population on Medicaid[e]					
≤17.8%	54.8%	52.8%	54.2%	55.1%	54.1%
17.9%-27.8%	31.0%	33.9%	32.7%	32.2%	32.5%
≥27.9%	8.7%	8.9%	8.7%	8.6%	8.7%
Missing	5.4%	4.4%	4.4%	4.1%	4.6%
Percent of County Geriatric Population Living Alone[f]					
≤10.0%	34.8%	34.2%	35.6%	36.0%	35.1%
11.0%-20.0%	59.6%	61.3%	59.9%	59.8%	60.2%
≥21.0%	0.2%	0.2%	0.2%	0.2%	0.2%
Missing	5.4%	4.4%	4.4%	4.1%	4.6%

[a] Incidents were 911 response and patient contact was made
[b] Includes January 1, 2019, to June 30, 2022
[c] See report reference #5
[d] National average for percentage of individuals in poverty was 10.5% in 2019. See report reference #6
[e] National average for percentage of individuals utilizing Medicaid was 18.8% in 2021. See report reference #6
[f] See report reference #6

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To Our Contributors

We want to thank our clients who have opted to provide their data to better the industry. Without you, our efforts to advance prehospital research to improve patient care, agency efficiencies, and industry knowledge would be limited.

About Collaborate

The EMS and healthcare industry is full of underutilized data that can be used to make a lasting, positive impact on the community. The ImageTrend Collaborate™ initiative provides insight into clinical, operational, and public health data that will contribute to healthcare provided by organizations, specific sectors, and the industry at large. Our objective is to dive into research topics relevant to the urgent topics affecting the care provided within your community. Collaborate aggregates, de-identifies and reports on data to empower data-driven decision-making. As of 2022, Collaborate data includes over 30 million incident records representing all regions of the United States. | Visit ***www.ImageTrend.com/Collaborate*** or scan the QR code:

Correspondence:

Morgan K. Anderson, MPH
E-mail: manderson@imagetrend.com
Clinical & Research Services
ImageTrend, Inc. 20855 Kensington Blvd., Lakeville, MN 55044

About ImageTrend

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