ImageTrend

# ImageTrend 2025 EMS Insights Report

## Metrics Shaping Prehospital Care

# Table of Contents


**Executive Summary** ..... 3

**Introduction** ..... 4

**Collaborate** ..... 5

**2025 Metrics** ..... 10

Pain Management in Prehospital Trauma Care ..... 10

Behavioral Health in EMS Response ..... 14

Opioid Crisis EMS Response ..... 18

Insights Into Motor Vehicle Crashes ..... 22

EMS Workforce Dynamics ..... 26

**About ImageTrend** ..... 30

**Citations** ..... 32

# Executive Summary

**Every day, EMS clinicians make quick, complex decisions to deliver the best care possible. At ImageTrend, we know that when lives are on the line or resources are constrained, it matters more than ever that decisions are based on timely and reliable insights.**

This report is built on real-world data collected by EMS clinicians using our all-in-one platform. States and agencies across the country contribute to ImageTrend Collaborate, a large, de-identified and validated national database of EMS activations. This report highlights key trends that leaders can use to benchmark performance, guide planning, and support emerging priorities such as Treatment in Place programs enabled through recent federal initiatives.

Several themes stand out this year. Opioid overdoses continue to strain EMS systems, and low bystander involvement shows a clear opportunity for stronger community partnerships. Behavioral health calls remain a substantial portion of EMS activations and reinforce the need for well-supported clinicians in the field. We also identified gaps in pain assessment and documentation during trauma incidents, pointing to a practical area where improved protocols can immediately support both patient safety and provider performance.

Recognizing the important role states play in EMS care delivery and regulation, we are encouraged by the work underway and the momentum building across the country. Collaborations with NHTSA and NEMSIS have strengthened access to motor vehicle crash data and improved how states visualize street-level incidence. Workforce and licensure data also show that retention and turnover continue to be top concerns, underscoring the need for systems that help leaders see trends clearly and act quickly.

When EMS data is consistent, connected, and easy to use, it becomes a catalyst for better care, smarter decisions, and a stronger, more resilient workforce. Our hope is that this report sparks new ideas, guides informed decisions, and inspires collaborative conversations about the future of EMS.

**Patrick Sheahan**
CEO and President, ImageTrend

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# Introduction

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## Purpose of this Report

**This report provides a national overview of key EMS trends using data from ImageTrend Collaborate™, a large, de-identified dataset contributed by states and EMS agencies across the country. The goal is to offer leaders, clinicians, and researchers a clear view of prehospital care patterns and emerging issues using standardized, nationally representative data. These insights are intended to support benchmarking, operational planning, quality improvement, and evidence-based decision-making at the local, state, and national levels.**

## About the 2024 Dataset

ImageTrend Collaborate aggregates EMS data from agencies across 50 U.S. states and nearly 2,400 EMS organizations. A peer-reviewed study[1] published in Prehospital Emergency Care found the Collaborate dataset closely reflects the characteristics of the NEMSIS research dataset—the national gold standard—across most call, patient, and intervention variables. This validation supports the use of Collaborate as a defensible resource for national EMS trend analysis.

# Collaborate

## Overview of National EMS Activity

**The 2024 ImageTrend Collaborate dataset includes more than 11.3 million EMS activations from across the United States. The sections below highlight who EMS is seeing, where incidents occur, and when systems experience the highest demand.**

### National Activation Summary

These metrics provide a high-level view of EMS activity captured in the 2024 Collaborate dataset.

Total EMS Activations:

**11,327,732**

911 Responses:

**8,892,346**

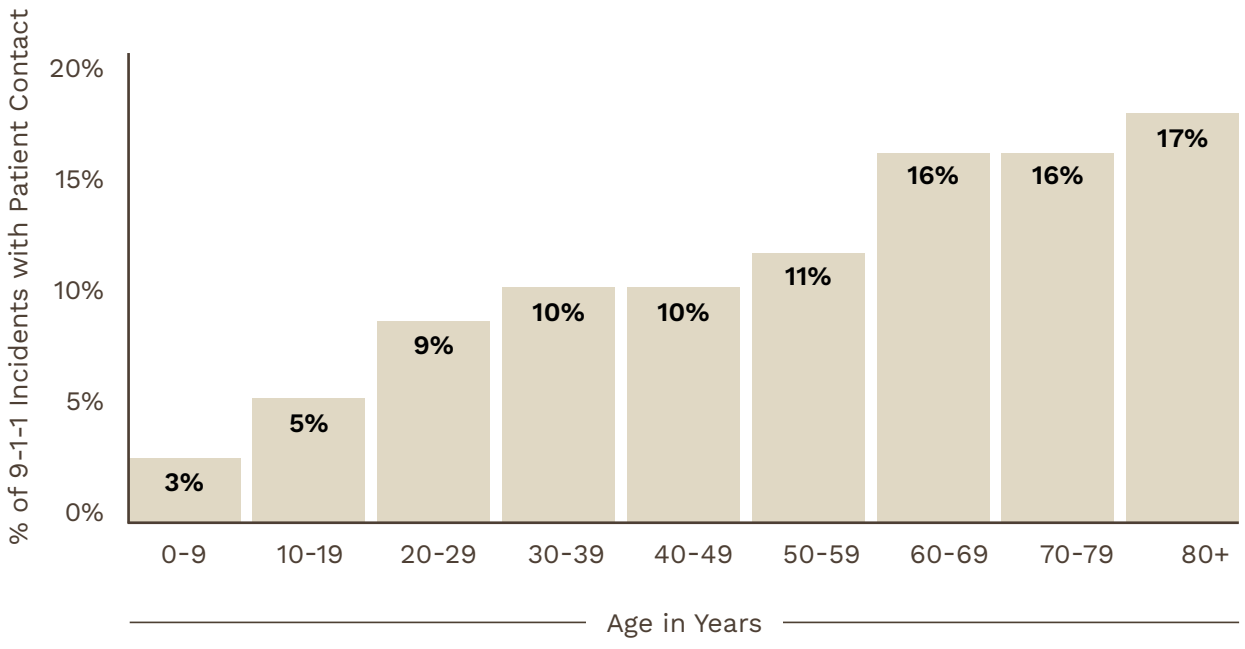
Patient Contacts:

**7,778,410**

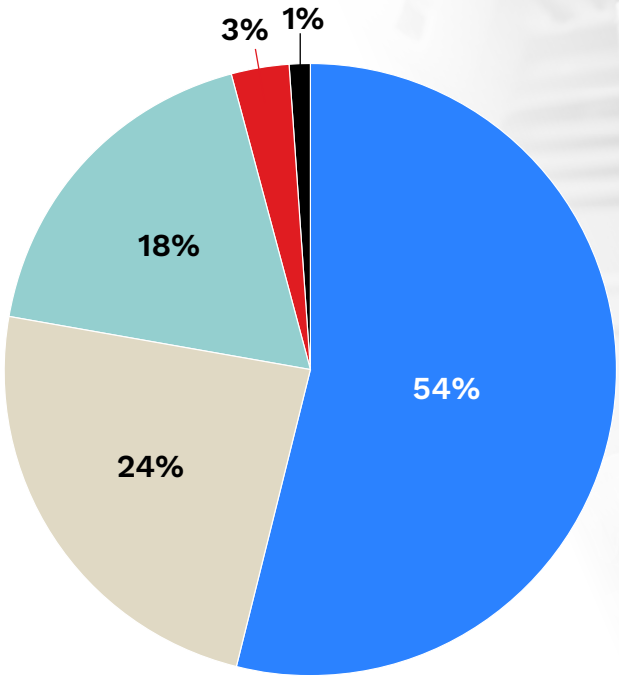
## Who EMS Is Caring For

This section outlines the distribution of patient age, gender, and initial acuity for 911 responses with documented patient contact.

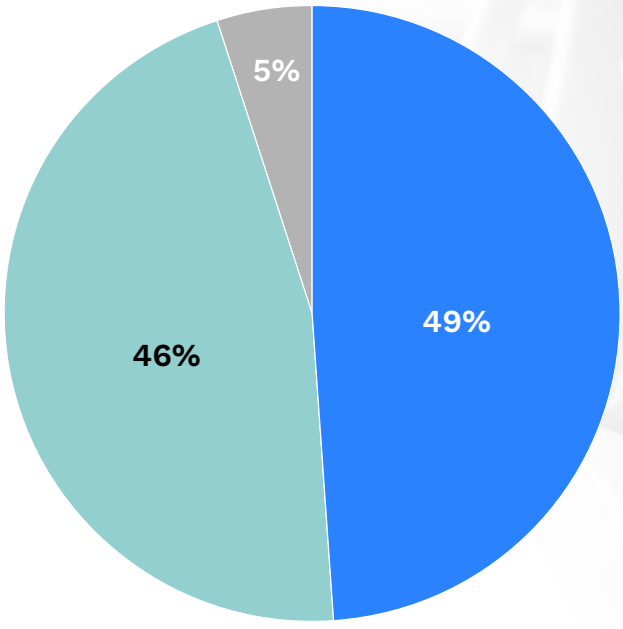
### Patient Age Distribution



## Initial Patient Acuity




## Patient Gender




*Remaining percentage includes unspecified or missing records.

## Where Incidents Occur

Most EMS activations take place in urban communities and within private residences, reflecting national patterns in population density and call type.

### Geographic Setting

- Urban: **85%**
- Rural: **15%**

### Primary Incident Locations*

- Private Residence: **85%**
- Street/Highway: **15%**
- Healthcare Facility: **12%**
- Commercial Location: **6%**

*Additional settings appear in the full dataset.

## When Incidents Occur

Time-of-day and day-of-week patterns help illustrate system demand and resource planning needs. Peak activity occurs during daytime and early evening hours, particularly on weekdays.

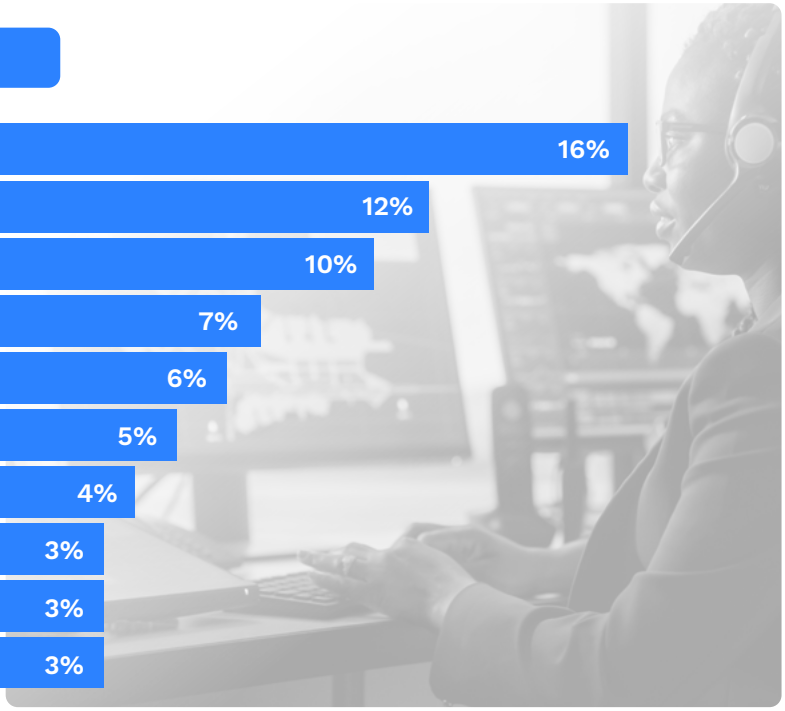
### Incident Volume by Time and Day

| | SUNDAY | MONDAY | TUESDAY | WEDNESDAY | THURSDAY | FRIDAY | SATURDAY | % OF DAILY RESPONSES |
|---|---|---|---|---|---|---|---|---|
| 0:00-2:59 | 95,308 | 78,383 | 73,742 | 71,571 | 72,351 | 75,724 | 88,916 | **7%** |
| 3:00-5:59 | 70,670 | 68,898 | 64,375 | 62,375 | 62,154 | 63,387 | 67,094 | **6%** |
| 6:00-8:59 | 100,273 | 128,445 | 125,068 | 121,966 | 120,272 | 118,791 | 100,535 | **10%** |
| 9:00-11:59 | 154,522 | 201,773 | 197,369 | 192,958 | 191,793 | 191,560 | 162,107 | **17%** |
| 12:00-14:59 | 168,522 | 206,024 | 203,095 | 198,283 | 197,404 | 199,727 | 177,227 | **17%** |
| 15:00-17:59 | 166,052 | 196,913 | 195,020 | 191,425 | 191,600 | 193,507 | 174,715 | **17%** |
| 18:00-20:59 | 159,058 | 165,215 | 164,623 | 163,270 | 163,864 | 171,349 | 169,704 | **15%** |
| 21:00-23:59 | 116,405 | 115,226 | 114,914 | 113,289 | 116,901 | 129,330 | 133,169 | **11%** |
| **% OF WEEKLY RESPONSES** | **13%** | **15%** | **15%** | **14%** | **14%** | **15%** | **14%** | |

# Clinical Patterns in Dispatch and Provider Findings

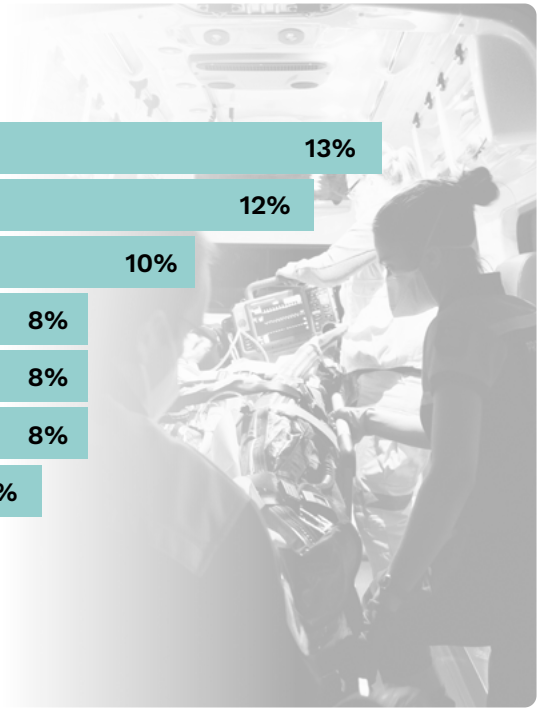
The top dispatch complaints and provider impressions offer insight into the primary reasons EMS is activated, as well as what conditions they encounter when they arrive.

## Top 10 Dispatch Complaints






## Top 10 Provider Impressions



# Pain Management in Prehospital Trauma Care

## Overview

**Unintentional injuries such as falls, motor vehicle crashes, drowning, and poisoning are the leading cause of death among individuals aged 1–44 years.[2] Injuries are also one of the most commonly reported provider impressions in the prehospital setting.[3] Pain relief has been shown not only to reduce discomfort from injuries but also to decrease anxiety and complications associated with acute pain.[4] Unfortunately, evidence indicates that pain is often underrated in the prehospital setting.[5]**

### How Trauma-Related Incidents Were Defined

Trauma-related incidents were defined as 9-1-1 responses where a cause or mechanism of injury was documented. Pain scores were evaluated for transported patients with a normal Glasgow Coma Scale (GCS) score of 15. Pain medication administration was assessed for transported patients with at least one documented pain score.

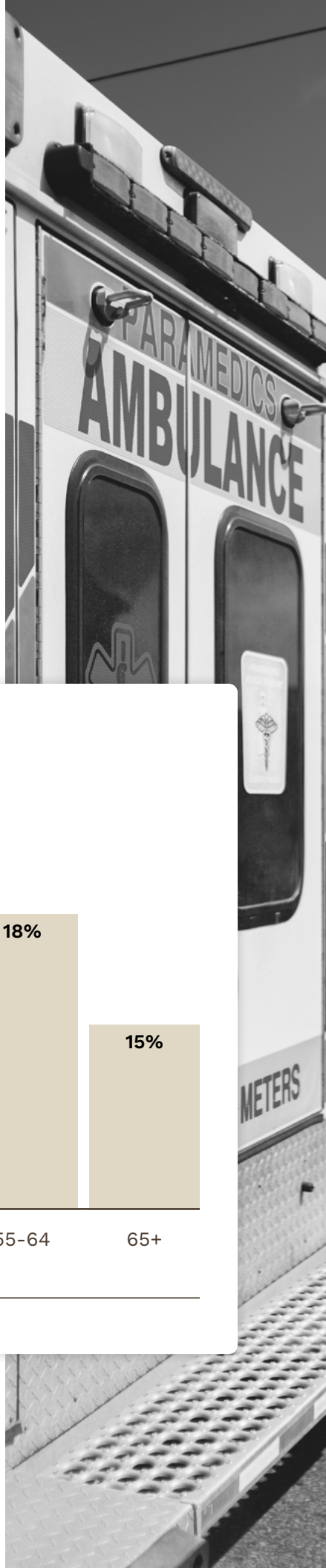
# What We Found

### Injury Overview

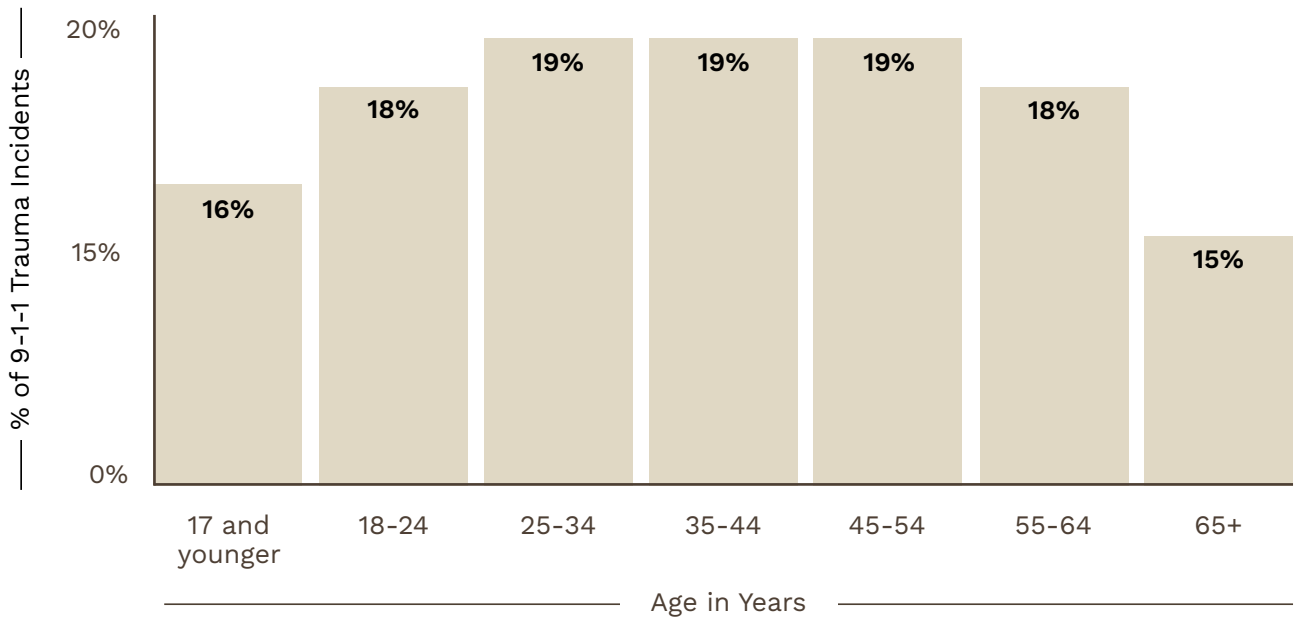
- **1,422,263** (18%) of 9-1-1 incidents were injury-related
- **73%** of injuries were treated and transported
- **68%** had a documented pain score
- **17%** of incidents with a pain score received pain medication

### Pain Scores for Transported Patients

- None: **9%**
- Mild: **11%**
- Moderate: **20%**
- Severe: **28%**
- Missing: **32%**




## Pain Medication Received by Age for Transported Trauma Patients with Documented Pain Score



## Pain Medication Administration

**Administered pain medication by type:**

- **82%** opioid
- **13%** non-opioid
- **5%** both opioid and non-opioid
- **Male and female patients** received medication at similar proportions

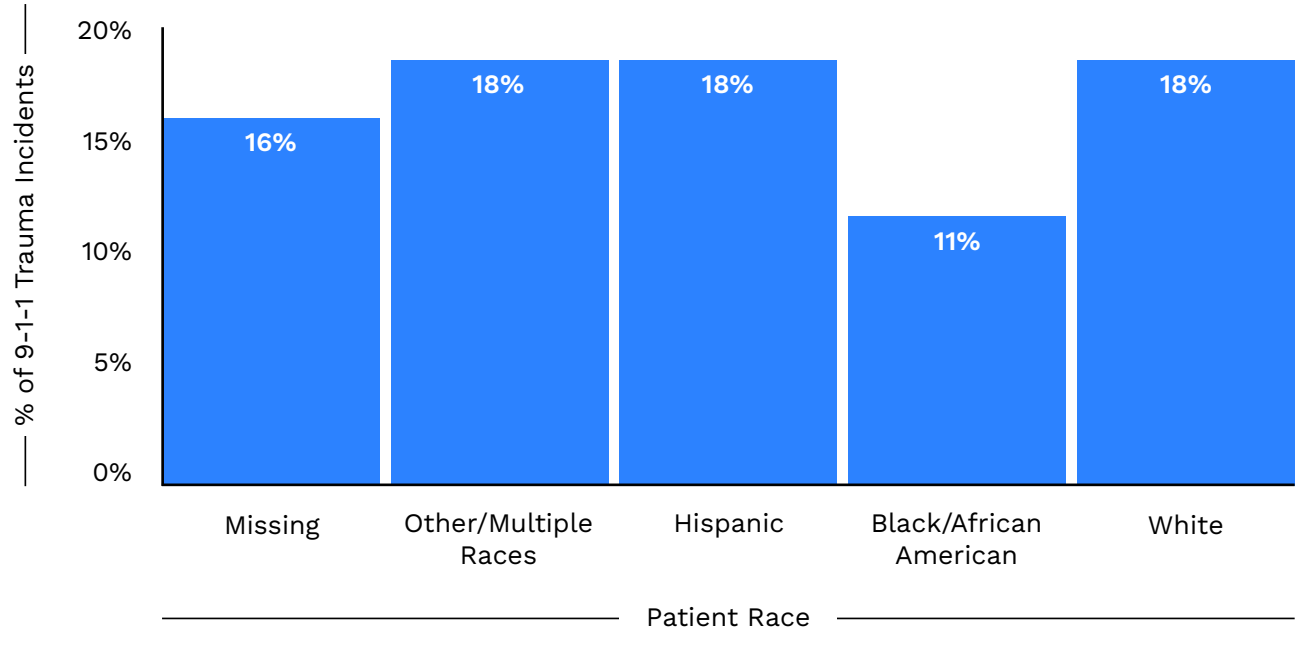
## Equity Considerations in Pain Management

A meaningful disparity emerged in documented pain medication rates:

- **11%** of Black/African American patients with injuries received pain medication
- **18%** of White patients with injuries received pain medication

This variation indicates a **potential inequity in care delivery.** While this report does not identify the underlying causes, this difference warrants further investigation into potential systemic bias, environmental factors, or operational constraints (e.g., intravenous access, time on scene or in transport, clinical judgment) that may influence pain management decisions.

**Pain Medication Administered to Trauma Patients by Race**

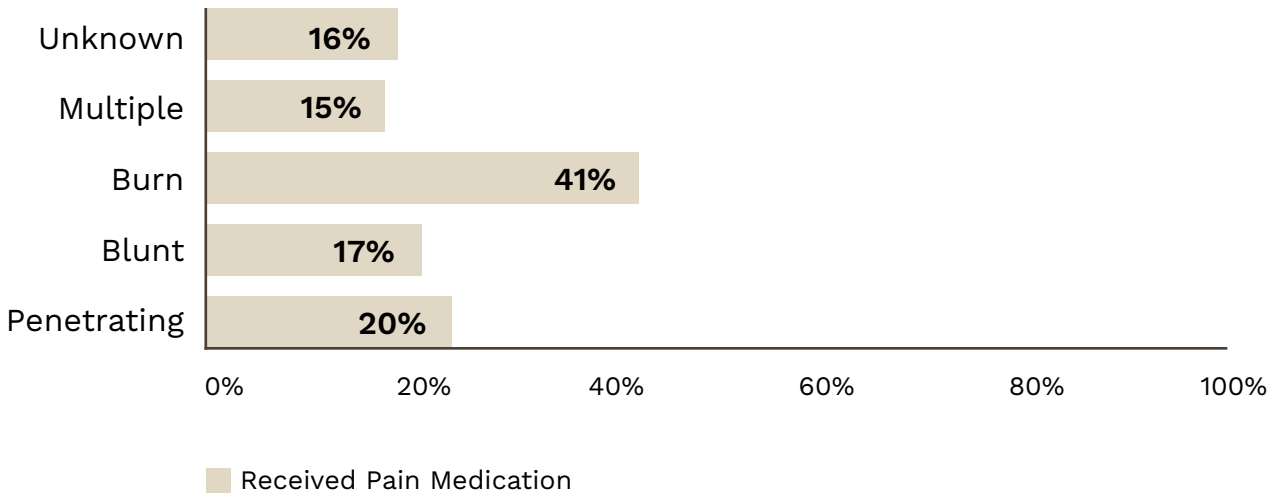


## Injury Context

Among transported injury patients:

- **Slips, trips, and falls** accounted for **55%** of injuries; **16%** received pain medication
- **Car, van, bus, or truck occupants** accounted for **17%; 14%** received pain medication
- **Motorcyclists** accounted for **1.8%; 42%** received pain medication

**Pain Medication Administered by Injury Type**




## Key Takeaways

One-third of patients did not have pain scores documented in injury-related incidents where they were capable of verbal communication, highlighting the importance of consistent assessment and documentation.

Pain medication administration varied significantly by cause and type of injury.

Black/African American patients received pain medication at a lower proportion than White patients (11% vs. 18%), indicating a disparity that deserves further investigation.

Agencies should regularly evaluate their documentation, protocols, and training to align with relevant evidence-based guidelines.

# Behavioral Health in EMS Response

## Overview

**In 2024, an estimated 60 million Americans experienced a mental health illness, and 25% reported an unmet need for mental health treatment.[6] Behavioral health emergencies (BHEs) accounted for approximately 5% of emergency department visits[7] and 10% of EMS responses.[8]**

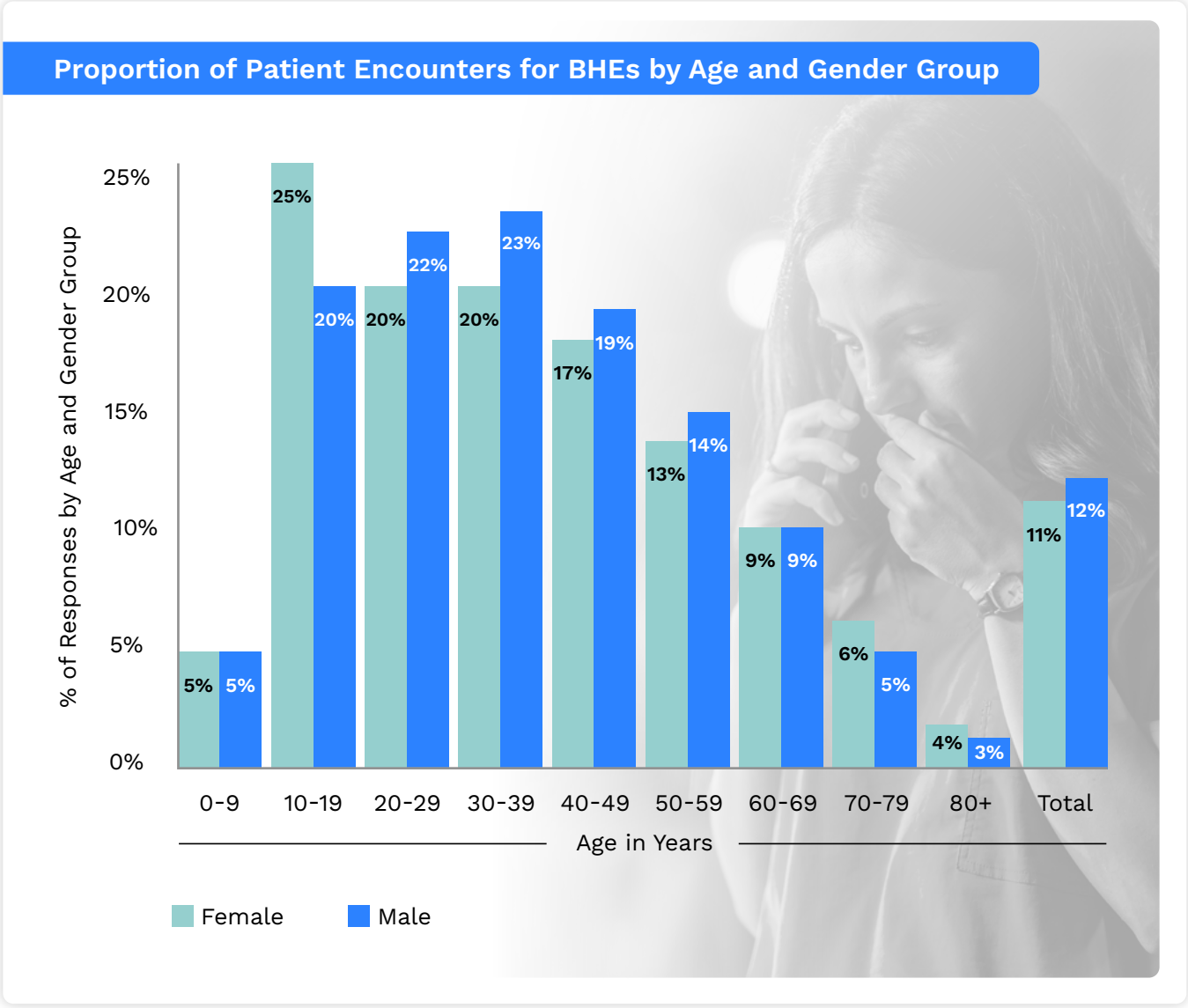
### How Behavioral Health Emergencies Were Defined

BHEs were defined as 9-1-1 responses involving patient encounters with at least one provider-reported impression, symptom, or complaint location consistent with a psychiatric or behavioral disorder. This analysis examined the use of naloxone, chemical sedatives (e.g., benzodiazepines, antipsychotics), and physical restraints by the responding EMS unit.

# What We Found

**BHE Incidence and Patient Characteristics**

- **873,890** (12%) of all 9-1-1 incidents were behavioral health related
- **49%** of BHE patients were female, **51%** male
- **54%** occurred at private residences
- Healthcare facilities were the **second most common location (19%)** for patients aged 70+
- **1 in 10** BHEs involving patients under 20 years old occurred at a school
- **74%** resulted in treatment and transport
- **14%** of patients refused treatment or transport against medical advice

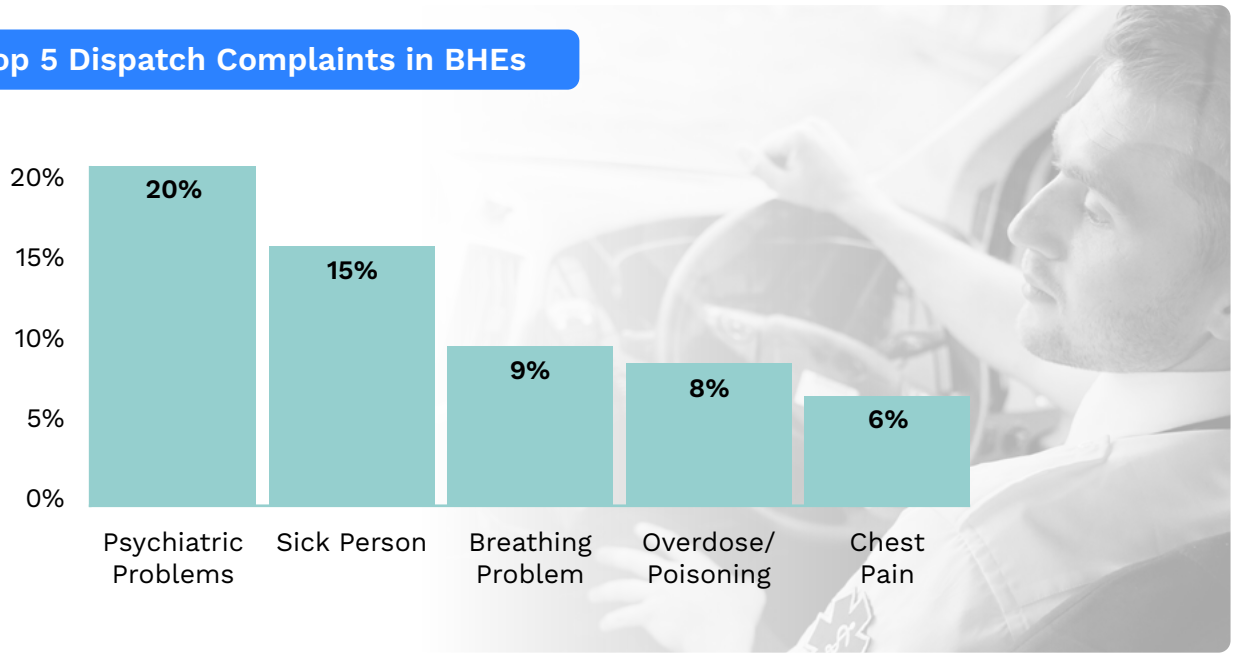



*Each gender-specific age category indicates the proportion of activations within that category classified as BHE.

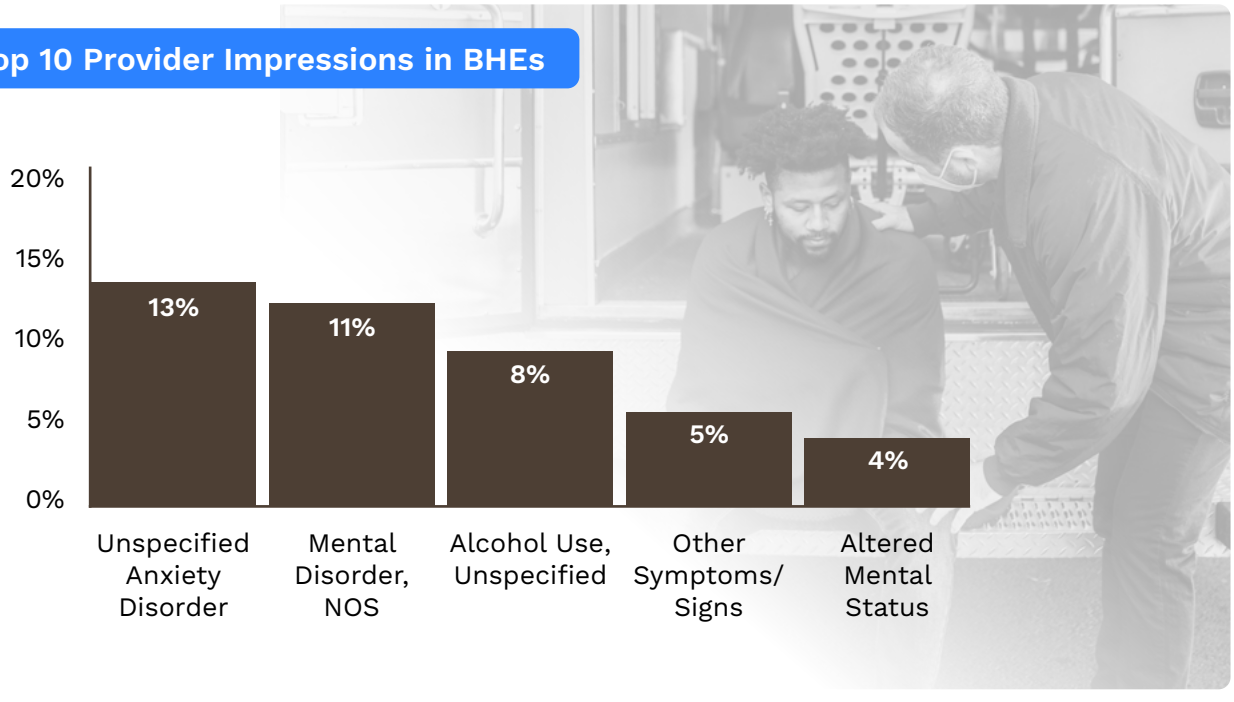
## Top Dispatch Complaints and Provider Impressions

Differences between the top dispatch complaints and provider impressions for BHE responses indicate the important role of clinical judgement in identifying underlying psychological or behavioral disorders in patients and thorough clinical workup of co-occuring physical symptoms.

### Top 5 Dispatch Complaints in BHEs




### Top 10 Provider Impressions in BHEs



## Interventions Used in BHEs

Behavioral health emergencies require informed decision-making, and the use of sedatives, restraints, or naloxone remains limited across encounters. These interventions were applied in a small percentage of BHEs:

- **Chemical sedatives** were used in **2.3%** of BHEs
  - **2.2%** of females, **2.5%** of males
  - Ranged from **1.3%** (<10 years) to **3.0%** (30–39 years)
- **Midazolam** was the most commonly administered sedative, followed by **ketamine**
- **Physical restraints** were used in **1.5%** of BHEs
  - Ranged from **0.9%** (80+ years) to **2.4%** (10–19 years)
- **Naloxone** was used in **1.6%** of BHEs
  - **1.2%** of females, **2.1%** of males
  - Ranged from **0.5%** (<10 years and 80+ years) to **2.2%** (30–49 years)
- De-escalation techniques, shown to be associated with reducing violence experience by EMS clinicians, are not currently captured across the nation[9]

## Key Takeaways

**Behavioral health emergencies account for approximately one in five EMS visits among patients aged 10–49.**

**Only 20% of BHEs are identified as behavioral at dispatch; many present initially with general medical or physical complaints, necessitating EMS clinicians to have a wide index of suspicion that includes BHEs.**

**Chemical sedation (2.3%) and physical restraint (1.5%) were used infrequently, suggesting cautious application of these interventions.**

**Effective response to BHEs requires strong clinical assessment, cultural competence, and de-escalation training.**

**Strengthening partnerships with community behavioral health resources can improve access to follow-up care and reduce repeat EMS utilization.[10]**

# Opioid Crisis EMS Response

## Overview

**Drug overdose remains a leading cause of injury-related death in the United States, with more than 70% involving opioids.[11] Among the estimated 9 million individuals with opioid use disorder, only one-quarter receive necessary treatment,[12] and naloxone dispensing rates vary widely across the country.[13] Prompt identification of opioid overdose events—and timely administration of naloxone by EMS clinicians or bystanders—can save lives and help individuals begin the path toward recovery.**

### How Opioid Overdose Incidents Were Defined

Opioid overdose incidents were defined as 9-1-1 responses with at least one provider-reported impression or symptom consistent with opioid-related disorders or poisoning symptoms. Naloxone administration was evaluated based on who administered the medication and by the documented response following administration.

# What We Found

### Overall Incidence

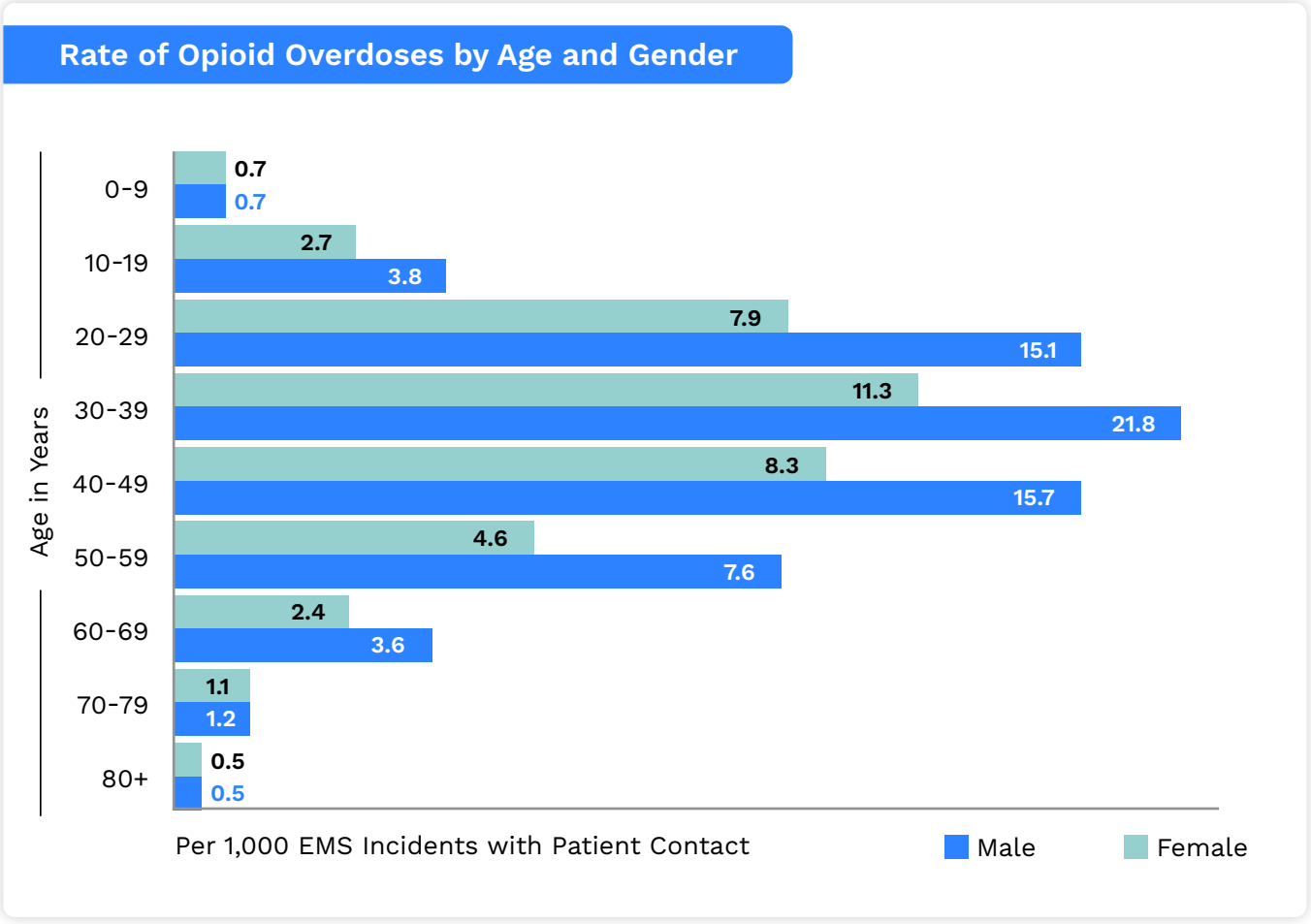
- **42,330** EMS incidents documented a provider-reported impression or symptom of opioid overdose
- **5.4** opioid overdose cases per 1,000 EMS incidents

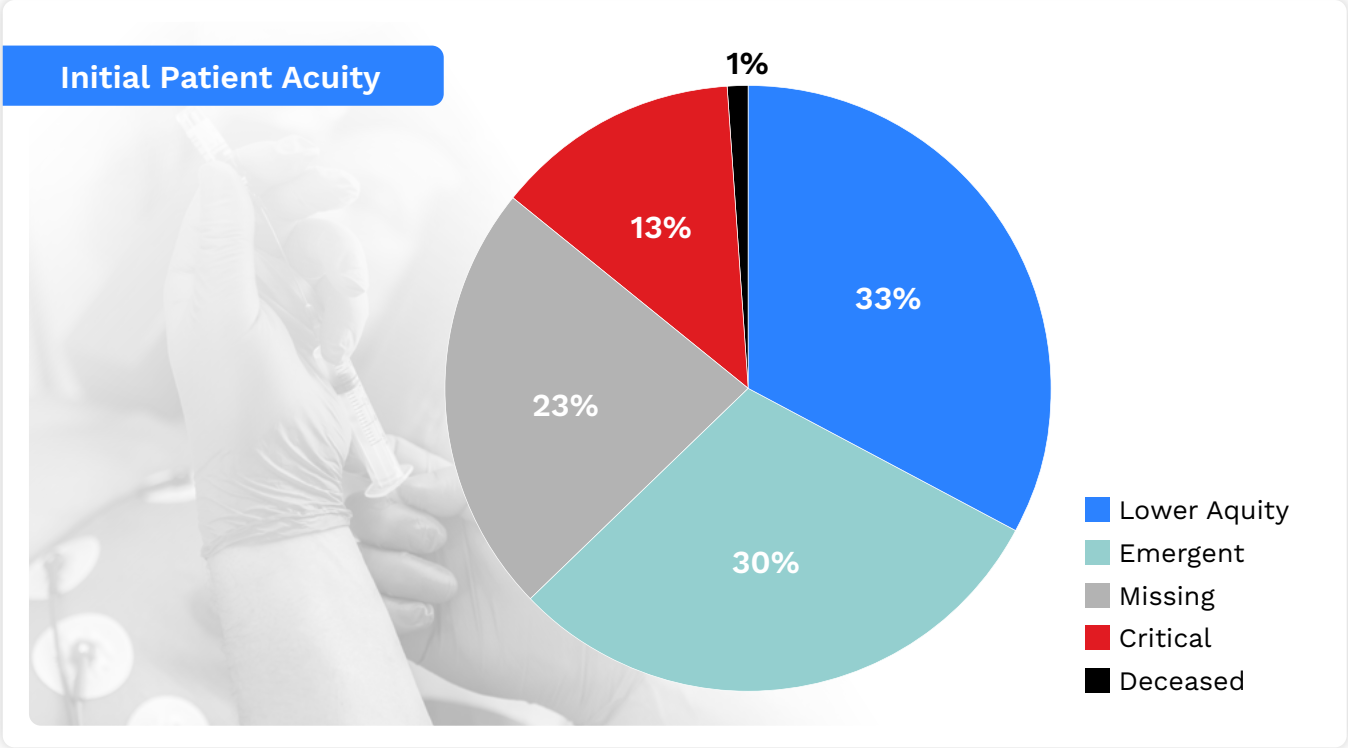
### Where Overdoses Occurred

- **50%** occurred in private residences
- **20%** occurred on streets
- **12%** occurred in commercial settings
- Among patients 80+ years, **25%** of overdoses occurred in healthcare facilities

### Patient Disposition

- **77%** of incidents resulted in treatment and transport
- **11%** of patients refused treatment and/or transport or left against medical advice



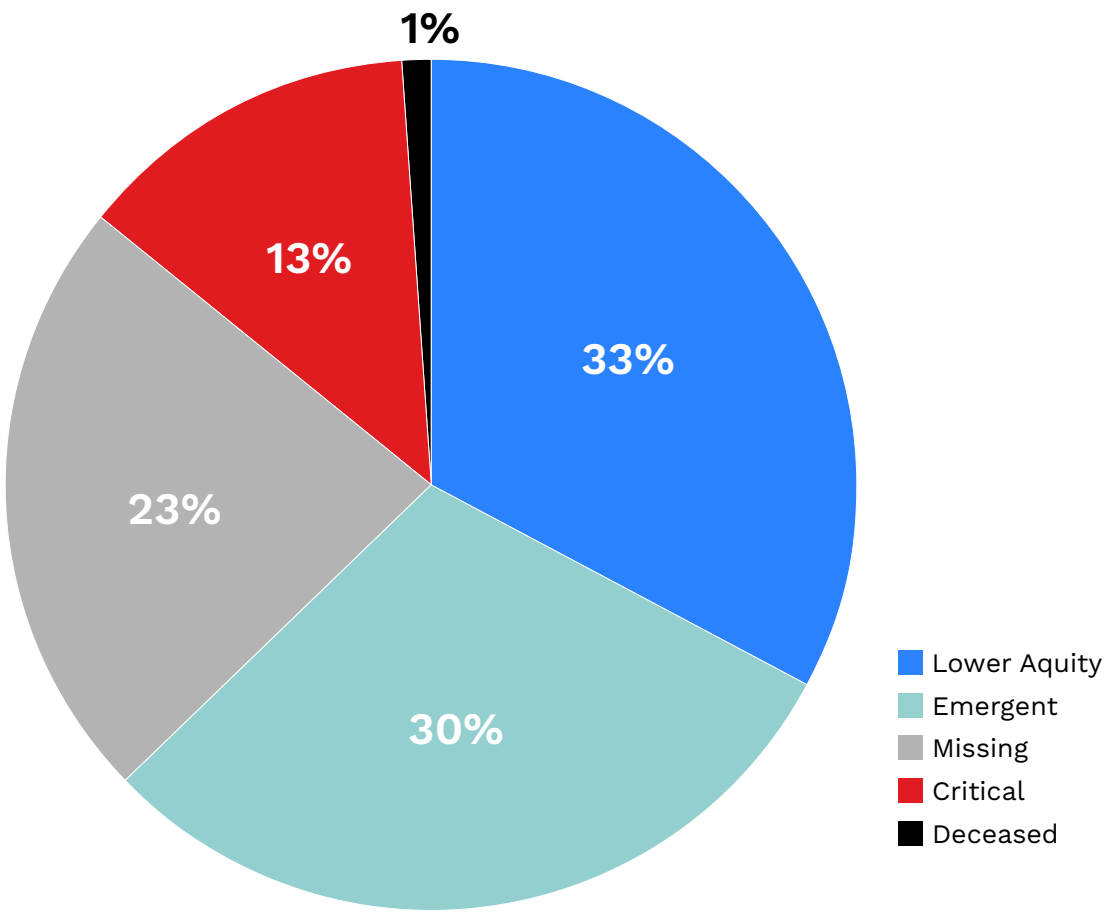



## Naloxone Administration in EMS Response

Most patients with opioid overdose symptoms received naloxone, and the majority showed improvement following administration. Naloxone use also varied somewhat by age and gender.

- **53%** of patients with documented opioid overdose received naloxone
- **51%** of females, **55%** of males
- **52%** of patients aged <50 received naloxone; **59%** of those aged >50
- **87%** of naloxone-treated patients experienced symptom improvement following administration

## Naloxone Administration by Initial Patient Acuity




## Key Takeaways

- Opioid overdoses are most prevalent among men aged 20–59, reinforcing the importance of targeted prevention and community education.
- More than 40% of opioid overdose incidents are classified as critical or emergent, underscoring the urgency of rapid recognition and intervention.
- Naloxone was effective in nearly 90% of critical or emergent cases, significantly improving symptoms; however, bystander administration remains low, highlighting the need for broader public education and access.
- While this analysis reflects national 9-1-1 response data, the impact of opioid overdose varies widely by community. Agencies and states should track local trends, identify high-risk populations, and tailor response strategies accordingly.

# Insights Into Motor Vehicle Crashes

## Overview

**Motor vehicle collisions (MVCs) remain a major public health concern in the United States, contributing to more than 40,000 deaths in 2022.[14, 15] These fatalities are considered unacceptable under the U.S. Department of Transportation's Safe System approach and its Road to Zero initiative, an effort to eliminate roadway deaths through shared responsibility, safer road design, and evidence-based interventions.**

**As part of this broader national emphasis on roadway safety, the National Highway Traffic Safety Administration (NHTSA) and the National Emergency Medical Services Information System (NEMSIS) partnered with ImageTrend to develop the Transportation Incident Visualization (TIV) project. TIV provides cost-free, configurable MVC dashboards to participating state offices.**

**This section summarizes MVCs in ImageTrend's 2024 Collaborate dataset using TIV inclusion criteria, supported by NHTSA, NEMSIS, and ImageTrend subject matter expertise.**

### How MVC Incidents Were Defined

EMS incidents were included if they met the national TIV project criteria, which aim to identify MVCs using standardized NEMSIS data elements. The data element clusters used in this process include eInjury, eDispatch, eScene, eSituation, eProtocols, eArrest, and eVitals. Additional details are available in the TIV Companion Guide.

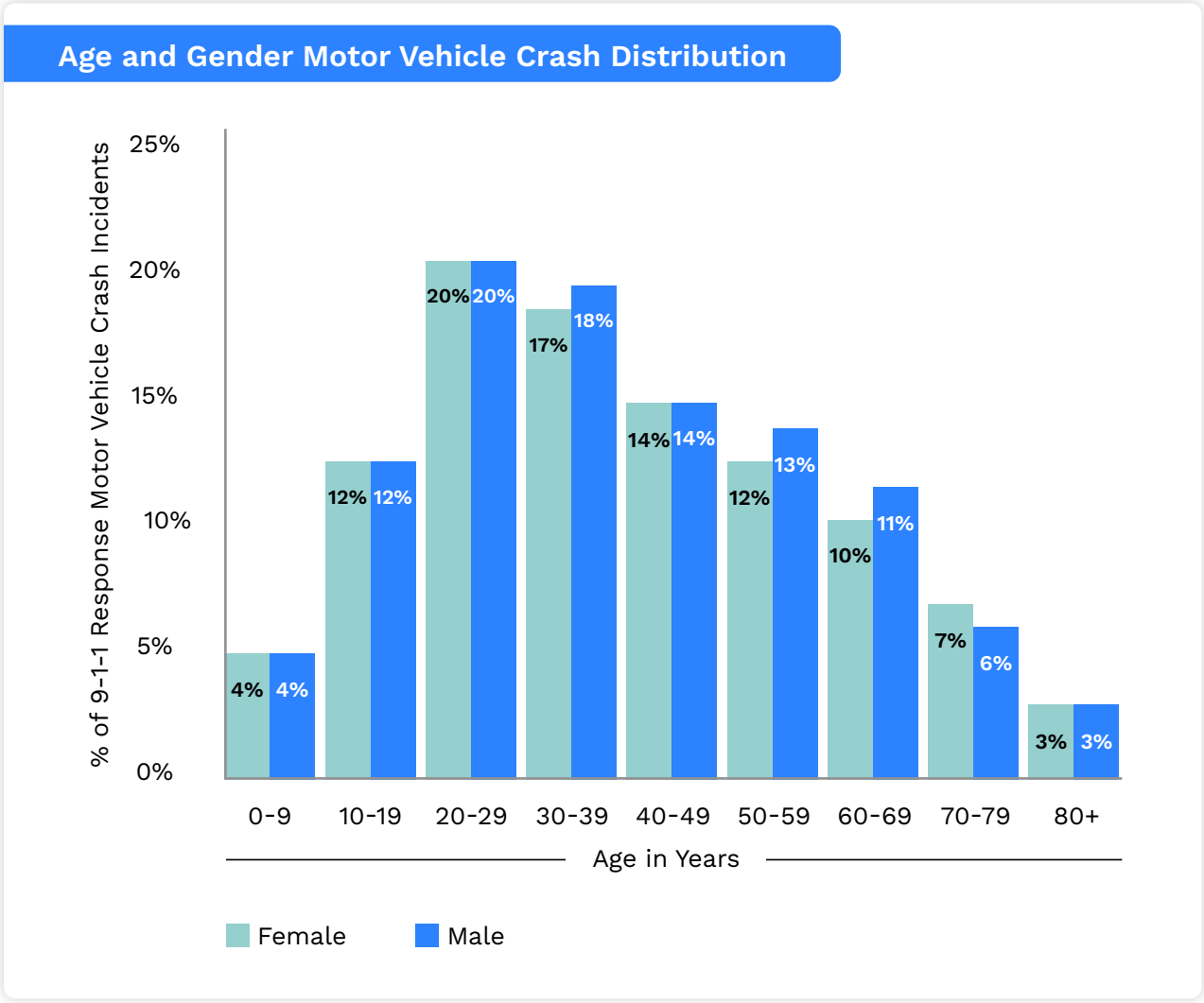
## What We Found

**Overall MVC Incidence**

- **562,331 MVC activations,** representing **7%** of all EMS activations in the dataset

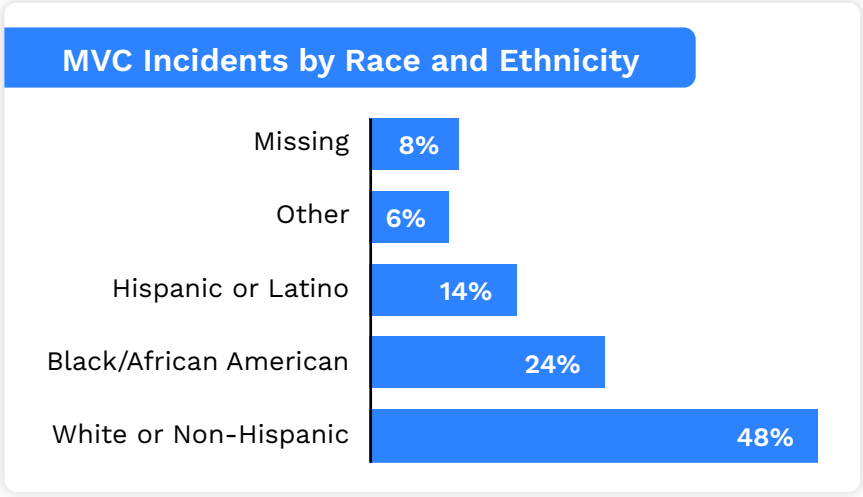
## MVC Incidents by Age and Gender

Younger male drivers accounted for the largest share of MVC-related encounters, with incidence decreasing steadily with age.



## MVC Incidents by Race and Ethnicity

Nearly half of MVC incidents involved White, non-Hispanic patients, with smaller proportions documented among other racial and ethnic groups. Missing data accounted for a small share of encounters.




## Accounting for Multi-Unit Responses (Deduplication Criteria)

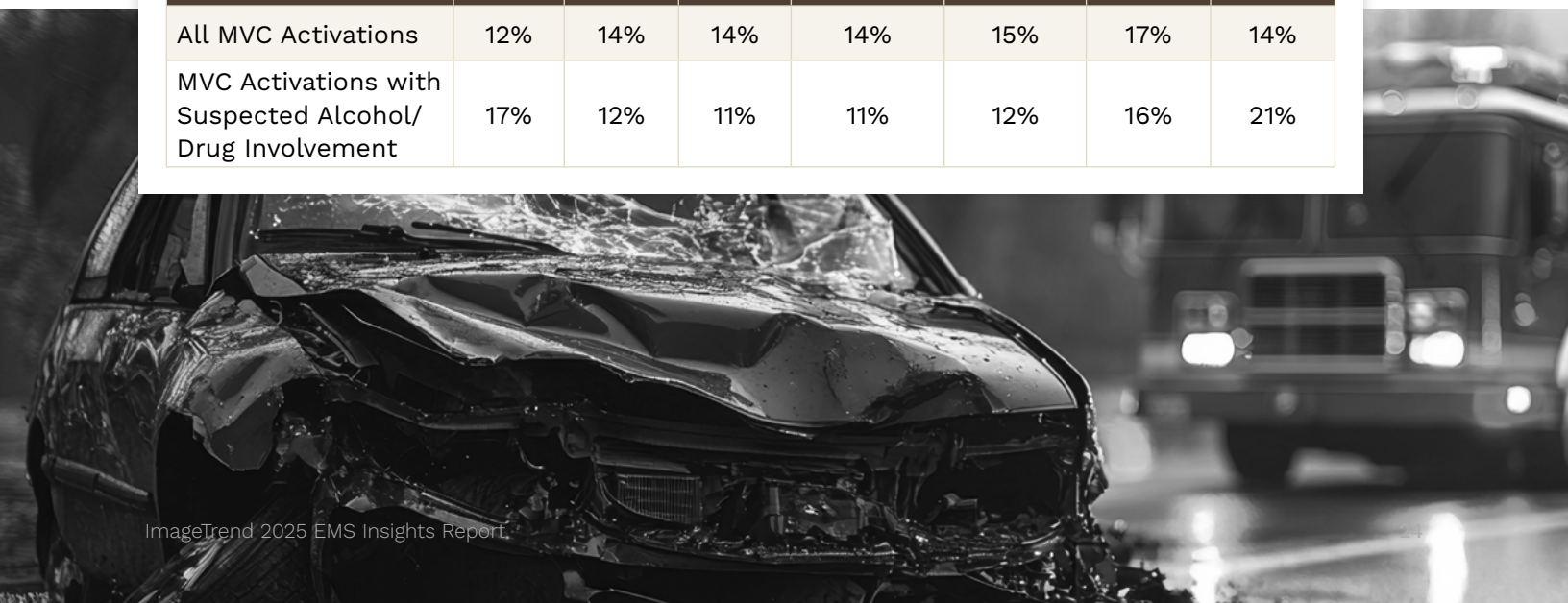
Some MVCs involve responses from multiple EMS units. To avoid counting these incidents more than once, TIV applies a deduplication step based on **eResponse, eScene,** and **eDisposition** clusters.

After deduplication:

- **421,936** unique MVC incidents remained
- **72%** of these incidents resulted in treatment and transport
- **71%** involved an injured driver
- Drug or alcohol indicators were present **1 out of 10 MVCs**

## MVC Incidents and Alcohol/Drug-Related MVCs by Day of the Week

| | SUNDAY | MONDAY | TUESDAY | WEDNESDAY | THURSDAY | FRIDAY | SATURDAY |
|---|---|---|---|---|---|---|---|
| All MVC Activations | 12% | 14% | 14% | 14% | 15% | 17% | 14% |
| MVC Activations with Suspected Alcohol/ Drug Involvement | 17% | 12% | 11% | 11% | 12% | 16% | 21% |



## Geographic Setting

Most MVC incidents occurred in metro areas, reflecting population density and traffic volume patterns.

- **83%** of MVCs occurred in metro areas
- **17%** occurred in rural settings

## First Observed Vital Signs

Initial vital signs indicate that many MVC patients presented within stable physiological ranges at first EMS assessment. Regardless of first observed vital signs, EMS clinicians should maintain a high index of suspicion and reassess frequently to ensure safe clinical judgment.

- Heart Rate: **94**
- Shock Index: **0.73**
- Mean Arterial Pressure: **94**
- Blood Pressure: Systolic **136** / Diastolic **85**

## Key Takeaways

**MVCs continue to represent a major component of EMS workload and roadway injury response, aligning with federal initiatives such as DOT's Road to Zero and the Safe System approach.**

**In 2024, MVC incidents occurred most often on weekends, in urban areas, and among younger male patients.**

**72% of deduplicated MVC incidents resulted in treatment and transport by EMS, and many patients showed relatively stable initial vital signs.**

# EMS Workforce Dynamics

## Overview

**The strength and stability of the EMS workforce are of critical importance. Measuring workforce dynamics has proven challenging, with studies showing annual turnover ranging from 6-30% depending on agency type, certification level, and other job-related characteristics.[16]**

**Workforce patterns can be examined by identifying who enters, stays in, or leaves the profession. Motivations have shifted over time—for example, nationally certified clinicians identified pay as the leading reason for leaving prior to COVID-19, while job satisfaction is now the most common factor. Reliable, repeatable measures for longitudinal workforce evaluation help agencies and states craft effective recruitment and retention strategies.**

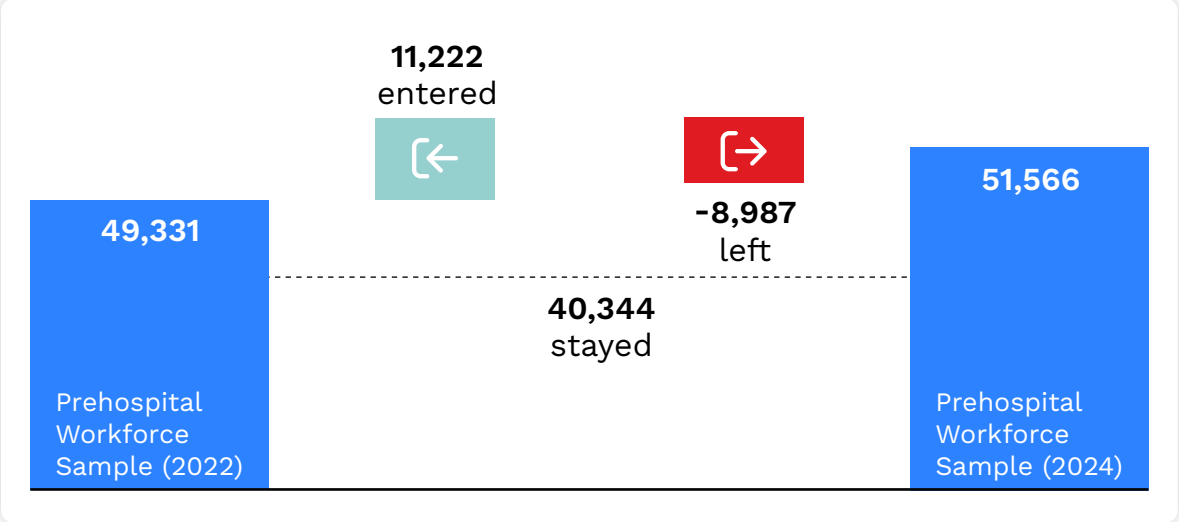
### How Workforce Dynamics Were Defined

Workforce dynamics were evaluated using data across 2022-2024 from four states that use ImageTrend's License Management solution to oversee EMS clinician licensure. Individuals licensed at the EMT, AEMT, and paramedic levels were included and described in relation to their respective populations of interest. Those who left or stayed were calculated as proportions of the 2022 sample, while those who entered were identified from the 2024 sample. Clinicians entering or exiting the workforce were then categorized by gender, as reported by each state.

## Workforce Management: Who Leaves, Stays, and Enters

This analysis provides a combined view of movement into and out of the workforce across four states from 2022 to 2024.

Combined (4 states) workforce dynamics (those who leave, stay, and enter) from 2022 to 2024.




## State-Level Workforce Mobility

Understanding state-specific patterns helps identify where recruitment or retention challenges may be most acute.

**Two-Year EMS Clinician Workforce Leaving & Entering:**

| STATE | LEAVING | ENTERING |
|---|---|---|
| **State 1** | 18% | 23% |
| **State 2** | 17% | 23% |
| **State 3** | 18% | 17% |
| **State 4** | 26% | 24% |

While incoming clinicians generally offset those leaving, **two of the four states showed a net loss.**

**State 3**

- 18% exited
- 17% entered

**State 4**

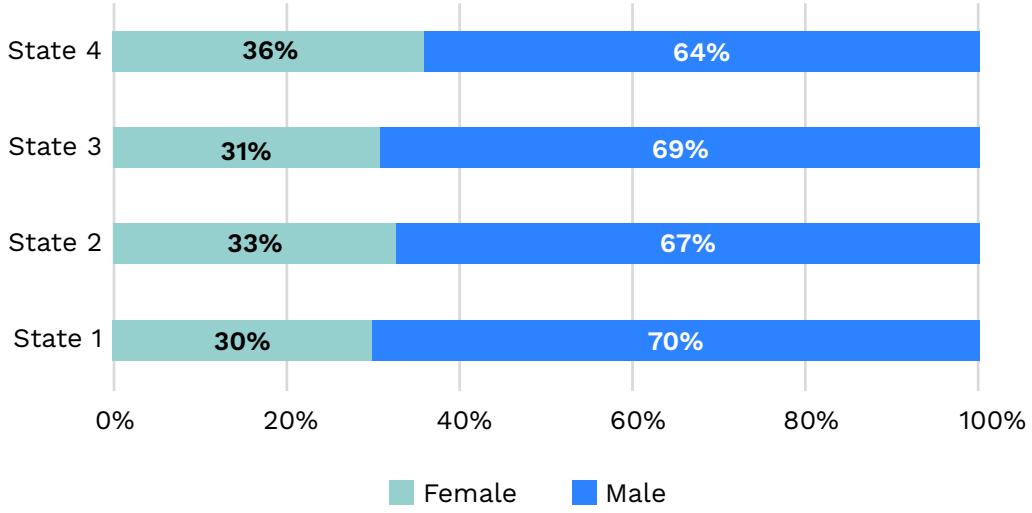
- 26% exited
- 24% entered

These differences highlight where targeted interventions may be needed.

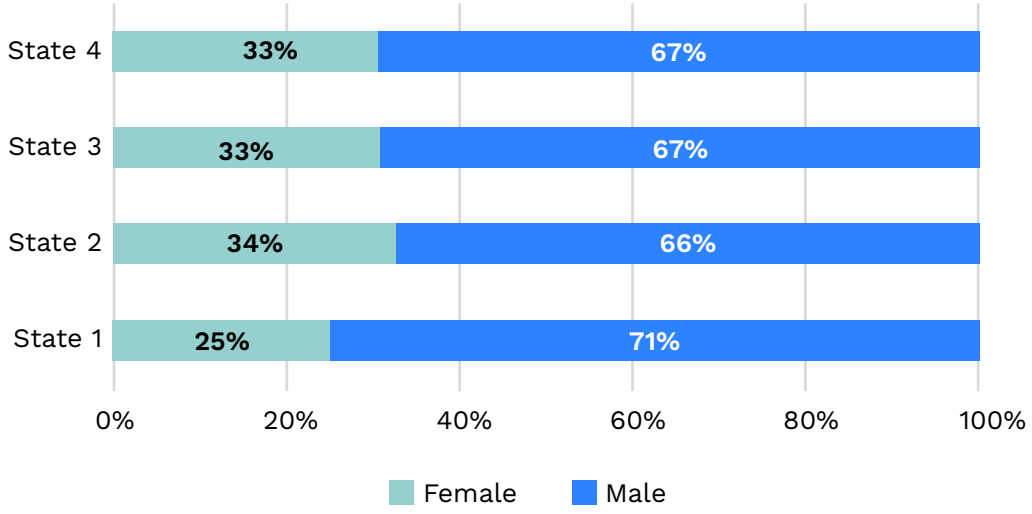
## Gender Patterns in Workforce Turnover

Across all four states, workforces were predominantly male, reflecting the already established large proportion of male EMS clinicians in the workforce. The proportions of female clinicians leaving ranged from 29–36%, similar to reported female workforce representation (24-35%).[17, 18]

### Leaving EMS Clinicians by Gender




### Entering EMS Clinicians by Gender



## Key Takeaways

- Combined workforce metrics (18% leaving, 22% entering) suggest stability at a high level, but state-level patterns reveal where intervention is most needed—particularly in States 3 and 4.
- Agencies and state offices conducting workforce evaluations should view these findings in context with their own data to guide recruitment, training, and retention strategies.
- Peer-reviewed studies show that key factors influencing EMS clinicians' intent to leave include job satisfaction, pay, organizational culture, and burnout.[19] Tools such as the Spector Job Satisfaction Survey, Organizational Culture Assessment Instrument, and Copenhagen Burnout Inventory can help assess these factors.

## Work with ImageTrend

Interested in replicating these analyses using ImageTrend's License Management data?

Curious how advanced analytics can surface the drivers behind your workforce trends?

Want to understand how clinician data connects to patient care patterns?

**Let's connect and start the conversation.**

# About ImageTrend and the Collaborate Dataset

## About ImageTrend

ImageTrend transforms incident data into actionable intelligence, empowering frontline teams to manage rising demands, navigate resource constraints, and drive meaningful change in their communities.

Founded in 1998, ImageTrend serves 3,100+ direct customers and 21,000+ agencies across Fire, EMS, and Hospital markets. With deep industry expertise and advanced data analytics, ImageTrend helps organizations streamline operations, inform long-term strategies, and improve outcomes. Its comprehensive software solutions and dedicated team provide the confidence and insight first responders need to meet today's challenges and prepare for tomorrow's uncertainties.

## About ImageTrend's Clinical & Research Services

The Clinical & Research Services team partners with EMS, fire departments, hospitals, and public health agencies to identify trends, benchmark performance, and uncover meaningful insights. Their work spans national research initiatives, local analyses, and collaborative studies with agencies and academic partners.

**Key areas of focus include:**

- Custom research projects and peer-reviewed publications
- Collaborative studies with agencies and academic institutions
- Data-driven insights that inform funding, policy, and performance

## Why Data Representativeness Matters

Decisions built on incomplete or biased data can lead to inaccurate conclusions—sometimes with real consequences for public health and safety. Representative data ensures findings reflect the full population, not just a narrow subset.

**Examples of non-representative data creating disparities:**

- **Pulse oximetry:** Devices calibrated primarily on lighter skin tones may be less accurate for individuals with darker skin tones.[20]
- **Crash test mannequins:** Injury models based mainly on male bodies can misrepresent risks for women.

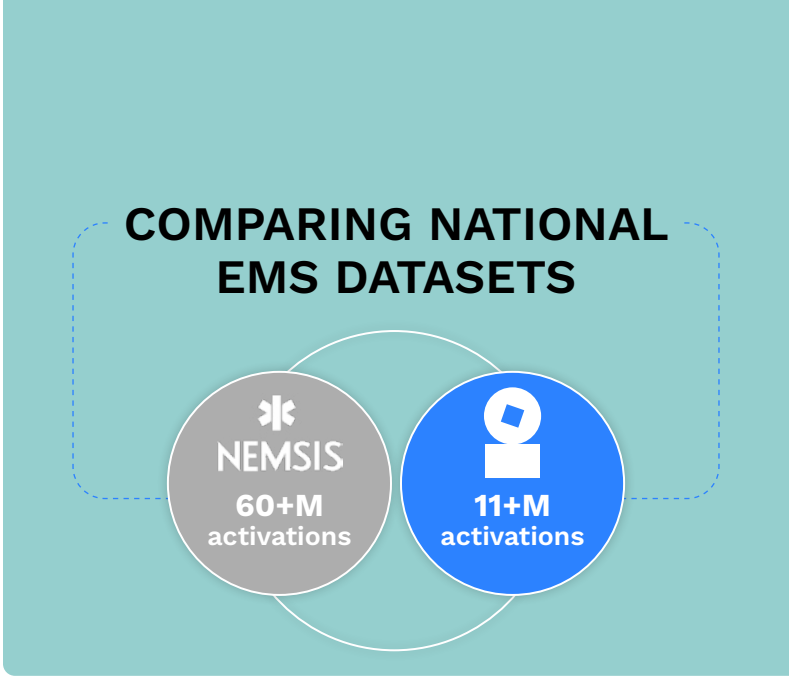
**EMS-specific examples include:**

- Survey data drawn only from membership organizations, which may not reflect the broader EMS workforce.
- Workforce projections that exclude fire-based EMS agencies, limiting insight into national trends.

## Why ImageTrend Collaborate Data Stands Out

ImageTrend Collaborate offers one of the most nationally representative EMS datasets available today, allowing agencies and researchers to trust the validity of their conclusions and make informed decisions.

Because Collaborate captures a broad and diverse set of EMS activations, agencies can "do more with less" while still achieving meaningful national insight. ImageTrend solutions, such as License Management, Scheduling, and Community Health, can further enhance these analyses when integrated.




## Assumptions and Limitations

The 2024 Collaborate dataset represents a cross-sectional snapshot in time. Findings may not generalize to prior or future years. Documentation practices vary by agency, state, and individual clinician, which can result in differences in how similar encounters are recorded. Missing data also presents challenges, as the direction and magnitude of its impact may be difficult to determine.

Collaborate participation is opt-in and may introduce selection bias. However, recent peer-reviewed evidence shows strong national representativeness across most activation, patient, and intervention characteristics when compared to the broader NEMSIS dataset. These considerations are consistent with limitations common to retrospective EMS activation-based analyses.

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