



ARIZONA DEPARTMENT
OF HEALTH SERVICES

Jennie Cunico, Acting Director

BUREAU OF EMERGENCY MEDICAL SERVICES AND TRAUMA SYSTEM

EMERGENCY MEDICAL SERVICES 2022 ANNUAL REPORT



Bureau of Emergency Medical Services and Trauma System

Rachel Zenuk Garcia, MPH, MCHES, Bureau Chief

Ithan Yanofsky, Deputy Chief

Gail Bradley, MD, FACEP, FAEMS, Medical Director

Anne Vossbrink, MS, EMS Data Administrator

Carissa Wilson, Trauma Data Administrator

Julia Vinton, MPH, CHES, Time Sensitive Illness & Injury Manager

Vatsal Chikani, MPH, BHMS, Biostatistician

ACKNOWLEDGEMENTS

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Special thanks are extended to the members of the Emergency Medical Services Council, Medical Direction Commission, State Trauma Advisory Board, Protocols Medications and Devices Standing Committee, Trauma and EMS Performance Improvement Committee, Education Committee, Pediatric Advisory Council for Emergency Services Committee, participating EMS agencies, medical directors, and EMS professionals across the state who contribute to the system. Their dedication to protecting the health and safety of patients requiring emergency medical services and continuously improving data collection makes it possible to fully evaluate and advance Arizona's EMS system.

2021 SUBMITTING AGENCIES

GROUND AGENCIES

ABC Ambulance
Action Medical Svc. - Ganado
Action Medical Svc. - Winslow
Ajo Ambulance
American Medical Response Maricopa, LLC
AMR Pinal
AMR Tucson
Arivaca Fire Dist.
Arizona Ambulance Transport (AMR Cochise County)
Arizona City Fire Dist.
Arizona State University EMS
Arrowhead Mobile Healthcare
Avondale Fire & Medical Department
Avra Valley Fire District
Beaver Dam-Littlefield Fire District
Bisbee Fire Dept.
Blue Ridge Fire Dept.
Bouse Volunteer Fire Dist.
Buckeye Fire Department
Buckeye Valley Fire District
Buckskin Fire Department
Bullhead City Fire Department
Casa Grande Fire Dept., City of
Central Arizona Fire Medical Authority
Chandler Fire Department
Colorado City Fire Dept.
Colorado River Indian Tribes Fire Department
Congress Fire Dist.
Copper Canyon Fire and Medical District
Corona de Tucson Fire Department
Cottonwood Fire and Medical Dept.
Daisy Mountain Fire District
Desert Hills Fire Dist.
Douglas Fire Department
Drexel Heights Fire District
Ehrenberg Fire
El Mirage Fire Dept.
Elfrida Ambulance Svc.
Eloy Fire District Ambulance Svc.
Flagstaff Fire Dept.
Florence Fire Dept.
Fort Mojave Mesa Fire Dept
Freeport McMoRan EMS - Morenci (Mining)
Fry Fire District
Ganado Fire District
Gila Bend Rescue / Ambulance
Gilbert Fire & Rescue Department

Glendale Fire Dept.
Globe Fire Dept.
Golden Valley Fire Dist.
Golder Ranch Fire District
Goodyear Fire Dept.
Grand Canyon Nat. Park Fire Dept.
Green Valley Fire District
Greenlee County Ambulance Svc.
Greer Fire District
Groom Creek Fire Dist.
Guardian Medical Transport
Healthcare Innovations
Heber-Overgaard Fire District
Hellsgate Fire Dist.
Helmet Peak Fire Department
High Country Fire Rescue
Holbrook EMS
Hualapai Nation Emergency Services
Kingman Fire Dept., City of
Lake Havasu City Fire Rescue & EMS
Lake Mohave Ranchos Fire District
Life Line Ambulance Service
Life Line Central
Life Line Payson
Life Line Pinal
Life Line Safford
Maricopa Ambulance LLC
Maricopa County Sheriff's Office (MCSO)
Maricopa Fire Dept.
Marine Corps Air Station Fire and Emergency Services (Yuma)
Mayer Fire Department
McMullen Valley Fire Dist.
Mesa Fire and Medical Department
Mohave County Airport Authority
Mohave Valley Fire Dept
Mormon Lake Fire Dist.
Navajo Nation EMS - Fort Defiance
Navajo Nation EMS - Inscription House
Navajo Nation EMS - Kayenta
Navajo Nation EMS - Pinon
Navajo Nation EMS - Red Mesa
Navajo Nation EMS - Tuba City
Navajo Nation EMS - Winslow
Navajo Nation EMS - Chinle
Nogales Ambulance Svc. (Nogales Fire)
North County Fire & Medical District

2021 SUBMITTING AGENCIES

Northern Arizona Consolidated Fire Dept (NACFD)
Northwest Fire Rescue Dist.
Page Fire Department
Palo Verde NGS Fire Dept.
Palominas Fire Dist.
Parker Fire Dist.
Pascua Pueblo Fire Dept.
Payson Fire Dept.
Peoria Fire- Medical Department
Phoenix Fire Department (Part of the year)
Picture Rocks Fire & Medical District
Pima Volunteer Fire Department
Pine/Strawberry Fire Dept.
Pinetop Vol. Fire District
Pleasant Valley Fire Dist.
Ponderosa Fire District
Prescott Fire Dept.
Puerco Valley Ambulance Svc.
Quartzsite Fire Dist.
Queen Creek Fire Dept
Regional Fire and Rescue Dept.
Rincon Valley Fire District
Rio Rico Fire District
Rio Verde Fire District
River Medical, INC
Rural Metro Fire Maricopa
Rural Metro Fire Pima
Rural Metro Fire Yuma
Sacred Mountain Medical Svc.
San Luis Fire Department
Scottsdale Fire Department
Sedona Fire District
Sierra Vista Fire & Medical Department
Somerton Fire Dept.
Sonoita-Elgin Fire District
South County Fire and Medical District
St. Johns Emergency Svcs.
Sun City Fire & Medical Department
Sunsites-Pearce Fire District
Superstition Fire/Medical District
Surprise Fire-Medical Department
Taylor-Snowflake Fire Department
Tempe Fire Dept.
Three Points Fire District
Timber Mesa Fire and Medical District
Tohono O'odham Nation EMS
Tolleson Fire Dept.

Tombstone Fire Dept.
Tri - City Fire District
Tri-Valley Ambulance Svc.
Tubac Fire District Ambulance Svc.
Tucson Airport Authority Fire Dept.
Tucson Fire Department
University of Arizona Emergency Medical Services
Verde Valley Ambulance Co.
Verde Valley Fire District
Vernon Fire Dist.
Water Wheel Fire and Medical District
Whetstone Fire District White Mountain Apache Fire & Rescue
White Mountain Ambulance Svc.
White Mountain Apache Tribe EMS
Wickenburg Fire Department
Williamson Valley Fire Dist.
Winslow Indian Health Care Center Medical Transport
Yarnell Fire Dist.
Yucca Fire Dist.
Yuma Fire Department

AIR AGENCIES

Air EMS, Inc.
Air Evac Svcs.
AirMed
Arizona Lifeline
Banner Air
Classic Air Medical
DPS - Department of Public Safety (Air Rescue AZ)
Guardian Air (Flagstaff)
Guardian Flight
LifeNet (Arizona)
Native American Air Ambul. - OMNI Flight
REACH Air Medical Svcs. (California)
Reva, Inc.
Sunrise Air Ambulance LLC
Tri State Care Flight, LLC

ANNUAL REPORT TO THE DIRECTOR

The 2022 Annual Report celebrates over a decade of data collected through the Arizona Prehospital Information and EMS Registry System (AZ-PIERS) database. AZ-PIERS was implemented in November 2011 with 3 EMS agencies originally submitting patient care records, and in recent years over 179 agencies are now submitting data to the registry in close to real-time. Most patient care reports submitted to AZ-PIERS are received within 24-48 hours of the date of service. The vast volume of EMS data reported in AZ-PIERS is linked with data from the Arizona State Trauma Registry (ASTR) and Hospital Discharge Database (HDD) to help provide data and reports that are used to improve outcomes for patients across the state.

AZ-PIERS provides the state with an opportunity to track statewide prehospital trends and use system data to better understand and improve patient care and outcomes. This year, the Arizona Department of Health Services was able to utilize the database to launch a new EMS and Trauma Data Visualization website, including a real-time 911 dashboard at:

<https://www.azdhs.gov/preparedness/emergency-medical-services-trauma-system/data-visualization/index.php#dashboards-911-call-volume>

This report summarizes AZ-PIERS trends from January 1, 2021-December 31, 2021, including the following highlights:

- Arizona saw a significant increase in 911 call volume submitted to AZ-PIERS during 2021, which can largely be attributed to an increase in the number of EMS agencies reporting patient care reports (1,231,143 total EMS incidents were reported in 2021 vs. 1,003,623 reported in 2020)
- Time sensitive emergencies such as Trauma (Injury), Out of Hospital Cardiac Arrest (OHCA), ST Elevation Myocardial Infarction (STEMI), Stroke, and Opioid Overdoses are some of the areas where early identification and treatment by EMS providers improves outcomes and reduces both morbidity and mortality.
 - 158,378 (14.3%) of EMS patients suffered an Injury, with a majority of traumatic injuries related to Falls (43.3%) and Motor Vehicle Traffic (22.7%)
 - 18,892 (1.7%) of EMS patients suffered Cardiac Arrest, with 86% of Cardiac Arrests resulting in death (N=16,245)
 - 8,060 (0.73%) of EMS patients suffered an Overdose, with 13.2% of Opioid Overdoses resulting in death (N=1,062)
- EMS responded to incidents that impacted all ages and demographics statewide, including 67,640 (6.2%) pediatric patients ages 0-17 years who represent an opportunity for more targeted injury prevention and education.
 - 19.1% of pediatric incidents included Injury as a primary or secondary impression
 - The top three mechanisms of injury for pediatric injuries were Falls, Motor Vehicle Trauma, and Struck By/Against.
- The Arizona Surge Line, active from April 2020 until April 2022, played a role in increasing the number of long-distance patient transfers from rural critical access hospitals and IHS/638 facilities to higher levels of care in urban settings to assist with patient load leveling when hospital capacity was limited.

ANNUAL REPORT TO THE DIRECTOR

- 80,912 (7.3%) interfacility transports resulted from a request from a healthcare facility to transfer a patient to another healthcare facility, including 62,559 (77.3%) interfacility ground transports and 18,353 (22.7%) air transports.
- One-third of EMS patients transported to the hospital were admitted while two-thirds were discharged from the emergency department.
- While the majority of 911 calls result in a disposition code of “treated and transported”, it is difficult to assess incident disposition consistently due to a lack of standardization across different electronic patient care record (ePCR) systems. Arizona will be transitioning to NEMSIS version 3.5 this year, which aims to help standardize this metric across all states by 2024.

Furthermore, this report demonstrates the continued growth and resiliency of Arizona’s EMS system as the state has experienced a population boom in recent decades, now exceeding over seven million residents in addition to a steady stream of winter visitors each year. Currently, the Bureau of EMS and Trauma System regulates 97 certificated ground ambulance providers and 19 licensed air ambulance providers, including 980 registered ground ambulance vehicles and 125 aircraft in the state of Arizona. Additionally, the Bureau oversees certification and designation of approximately 21,773 emergency medical care technicians, 47 trauma centers, 52 base hospitals, and 65 ALS/BLS training programs that are currently active in Arizona.

Arizona’s EMS system is comprised of many talented and dedicated professionals, in addition to the multi-disciplinary leadership of the statutory and standing committees, that have remained resilient over the challenges of the last several years. Going forward, the Department encourages all EMS providers to continue to participate in AZ-PIERS to conduct an ongoing assessment of the system and assure the highest level of care in Arizona. Accordingly, the Bureau of EMS and Trauma System remains committed to continuing to engage the community of care to further evaluate trends and outcomes and develop recommendations to improve the EMS and Trauma system.



Gail Bradley, MD FACEP FAEMS ,Medical Director



Rachel Zenuk Garcia, MPH,MCHES Bureau Chief

BACKGROUND

The purpose of this report is to systematically describe EMS calls reported in Arizona Prehospital Information and EMS Registry System (AZ-PIERS) during the year 2021. This report provides descriptive statistics of EMS run volume and rates for 911 incidents and interfacility transfer by various patient demographics, including age, gender, county, etc. Arizona Prehospital Information & EMS Registry System (AZ-PIERS) is a free, electronic Patient Care Records (ePCRs) registry that allows EMS agencies to collect and transmit records to the State. The primary purpose of AZ-PIERS is to optimize prehospital care through a data driven, quality assurance approach. AZ-PIERS captures agency information, patient demographics, response times, incident location, and prehospital treatment. In order to obtain the final hospital outcome for EMS runs a deterministic linkage between AZPIERS and the Hospital Discharge Database (HDD) was performed.

METHODS

In 2021, 179 EMS agencies submitted data to the AZ-PIERS. A total of 1,231,143 EMS incidents were submitted to AZ-PIERS from January 1, 2021 to December 31, 2021. False calls (12), Cancelled (100,659), Assist (21,601), Stand-by (3,829) and Missing/other (647) EMS incidents were excluded from the analysis. EMS run rates per 100,000 Arizona residents were calculated using population estimates from the Arizona Health Status and Vital Statistics database.¹ Data were analyzed using SAS software, version 9.4 (SAS Institute, Cary, NC) and the graphs were created in Tableau, version 2021.3.0.

The primary and secondary impressions from the EMS diagnosis field were categorized using ICD-10 and Clinical Classifications Software (CCS) criteria in Appendix B.² In order to obtain the final hospital outcome for EMS incidents with an incident disposition of Treated and Transported, a deterministic linkage between AZ-PIERS and the Hospital Discharge Database (HDD) was performed. A total of 670,889 Treated and Transported 911 EMS incidents qualified for linkage between AZ-PIERS and the HDD. Incidents not qualifying for linkage consisted of patients who were transported to facilities not reporting to the HDD, facilities outside of Arizona, or had missing data on all linkage variables. For linkages completed successfully, 606,279 (90%) EMS incidents were successfully matched to their respective records in the HDD.

Data Limitations:

- Since submitting data to AZ-PIERS is voluntary, in 2021 not all agencies submitted data to the registry, and while the data provide a snapshot of the EMS system the numbers may not be a true representation of the entire state. Although 179 of the largest EMS agencies in Arizona who comprise a majority of the call volume submitted data to AZ-PIERS, it is important to note that there are over 300 agencies in Arizona that provide EMS services including many small organizations that do not have a budget or personnel to support an ePCR system.
- The analysis in this report does not include data linkages to the public health disease, syndromic, or death surveillance databases from January 1, 2021-December 31, 2021.

1. Arizona Department of Health Services, Population Health and Vital Statistics. Population Denominators: 2020. <http://pub.azdhs.gov/health-stats/menu/info/pop/index.php>

2. https://www.hcup-us.ahrq.gov/toolssoftware/ccsr/ccs_refined.jsp

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2022 Arizona EMS System Snapshot

Total 2021 EMS incidents reported
1,231,143

1,104,395 incidents included in analysis *

21,822 active EMCT certifications

2,579 new EMCT certifications completed

3,026

Average number of EMS incidents reported per day

1,081,706 (97.95%)
Ground Incidents

22,689 (2.05%)
Air Incidents

179

EMS agencies submitted data

164 Ground providers

15 Air providers

906,126 (82.05%) of EMS incidents were **911 Response (Scene) call**

80,912 (7.33%) of EMS incidents were **Interfacility Transport call**

6.2% (67,640) incidents were among patients ages 0-17 years

55.5% (608,630) incidents were among patients ages >= 55 years

Prevalence of Primary and Secondary Impression Categories of Interest among Pediatric Patients

Injury 12,901 (19.1%)

Respiratory Distressed 5,810 (8.6%)

Seizures 4,345 (6.4%)

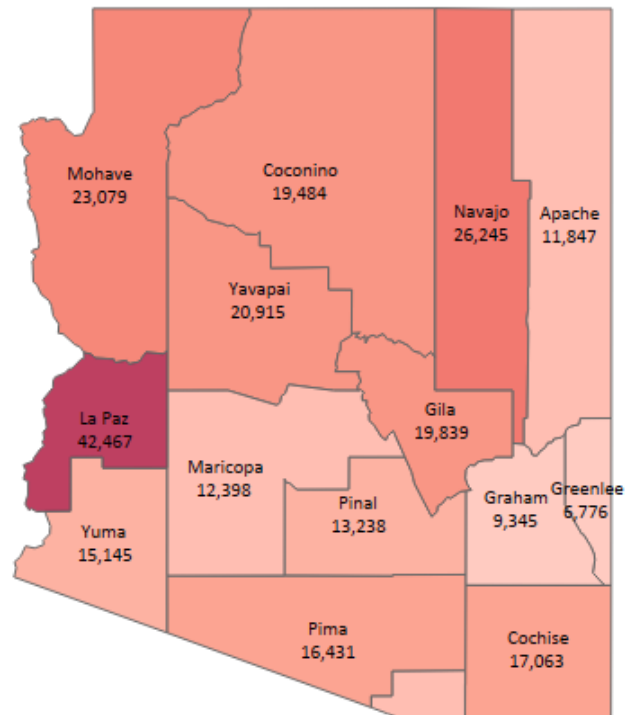
Psychiatric Disorders 2,496 (3.7%)

Suicide/Suicide Attempted 2,450 (3.6%)

Substance use 1,642 (2.4%)



County - specific EMS incident rate per 100,000 Arizona residents



Median Time Intervals for 911 EMS Ground Incidents

8 Minutes
response time

12 Minutes
Scene time

11 Minutes
Transport time

Prevalence of Primary and Secondary Impression Categories of Interest

Injury
158,378 (14.5%)

Substance use
40,927 (3.7%)

Psychiatric Disorders
37,228 (3.4%)

Seizures
23,316 (2.1%)

Cardiac Arrest
18,892 (1.7%)



Mortality by Primary and Secondary Impression Categories

Cardiac Arrest
16,245 (85.99%)

Opioid
1,062 (13.18%)

STEMI
238 (8.03%)

Stroke
337 (5.54%)

Diabetes
402 (2.52%)



*Incident disposition as Canceled, False, Missing, Standby, and other were excluded from the analysis. These data provide a snapshot of EMS incidents based on voluntary reporting submitted to AZ-PIERS, and the numbers do not represent total statewide EMS volume since not all agencies submitted data to the registry during 2021.

EMS 2021 DATA

N = 1,231,143

Table 1: Patient disposition of EMS incidents

Patient Disposition	N	%
Transported to hospital	867,973	70.50%
Refused care and/or transport	200,308	16.27%
Cancelled	100,659	8.18%
Treat/Evaluated and discharged	24,045	1.95%
Assist	21,601	1.75%
On Scene Mortality	12,069	0.98%
Standby	3,829	0.31%
Other	532	0.04%
Missing	115	0.01%
False Call	12	0.00%
Grand Total	1,231,143	100.00%

Data source : AZ-PIERS 2021

N = 1,104,395

Table 2: EMS incidents by response type

Response Type	Grand Total		Air		Ground	
	N	%	N	%	N	%
Grand Total	1,104,395	100.00%	22,689	100.00%	1,081,706	100.00%
911 Response (Scene)	906,126	82.05%	4,213	18.57%	901,913	83.38%
Interfacility Transport	80,912	7.33%	18,353	80.89%	62,559	5.78%
Medical Transport	114,749	10.39%	88	0.39%	114,661	10.60%
Other/Missing	2,608	0.24%	35	0.15%	2,573	0.24%

EMS Incidents with disposition as Cancelled, False, Standby, Missing or Other is excluded from the analysis.

Data Source : AZ-PIERS 2021

Figure 1: Types of EMS Responses (Ground)

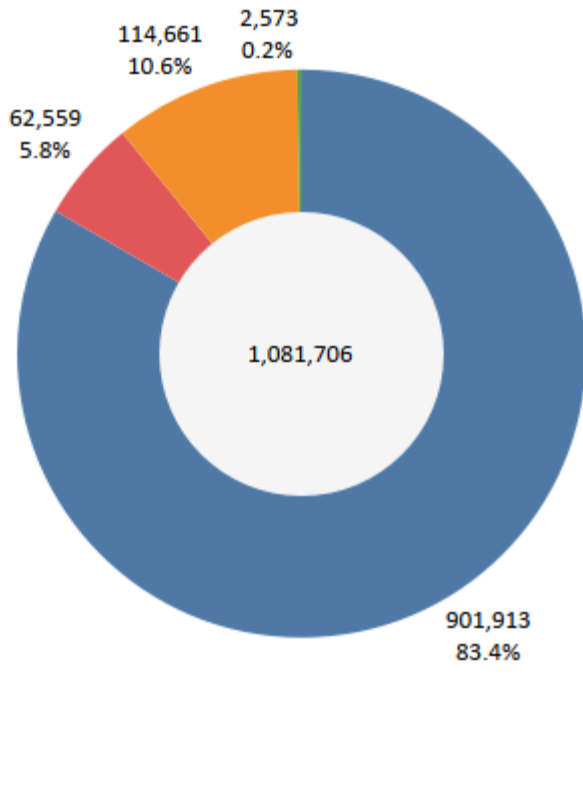


Table 3: EMS Responses (Ground)

Response Type	N	%
911 Response (Scene)	901,913	83.4%
Interfacility Transport	62,559	5.8%
Medical Transport	114,661	10.6%
Other/Missing	2,573	0.2%
Grand Total	1,081,706	100.0%

Data Source: AZ-PIERS 2021

* Refer to Appendix A for Definition

Figure 2: Types of EMS Responses (Air)

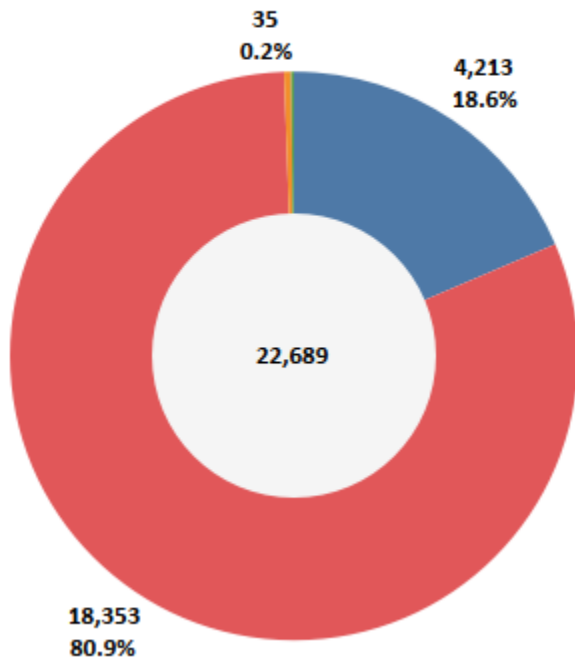


Table 4: EMS Responses (Air)

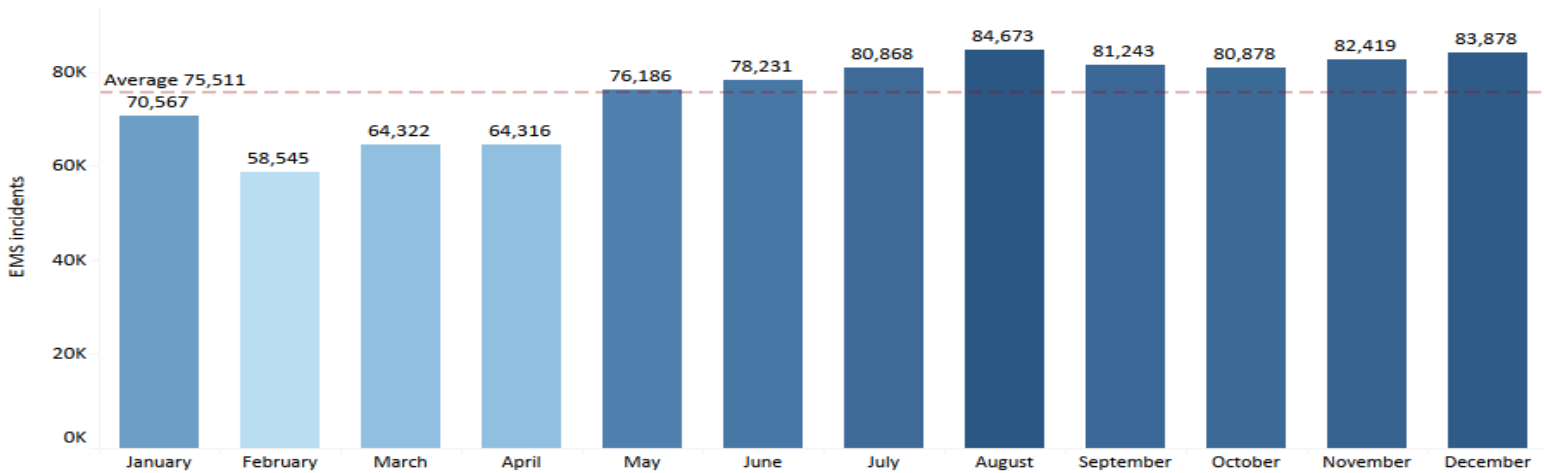
Response Type	N	%
Interfacility Transport	18,353	80.9%
911 Response (Scene)	4,213	18.6%
Medical Transport	88	0.4%
Other/Missing	35	0.2%
Grand Total	22,689	100.0%

Data Source: AZ-PIERS 2021

911 EMS INCIDENTS (N = 710,560) - SUMMARY

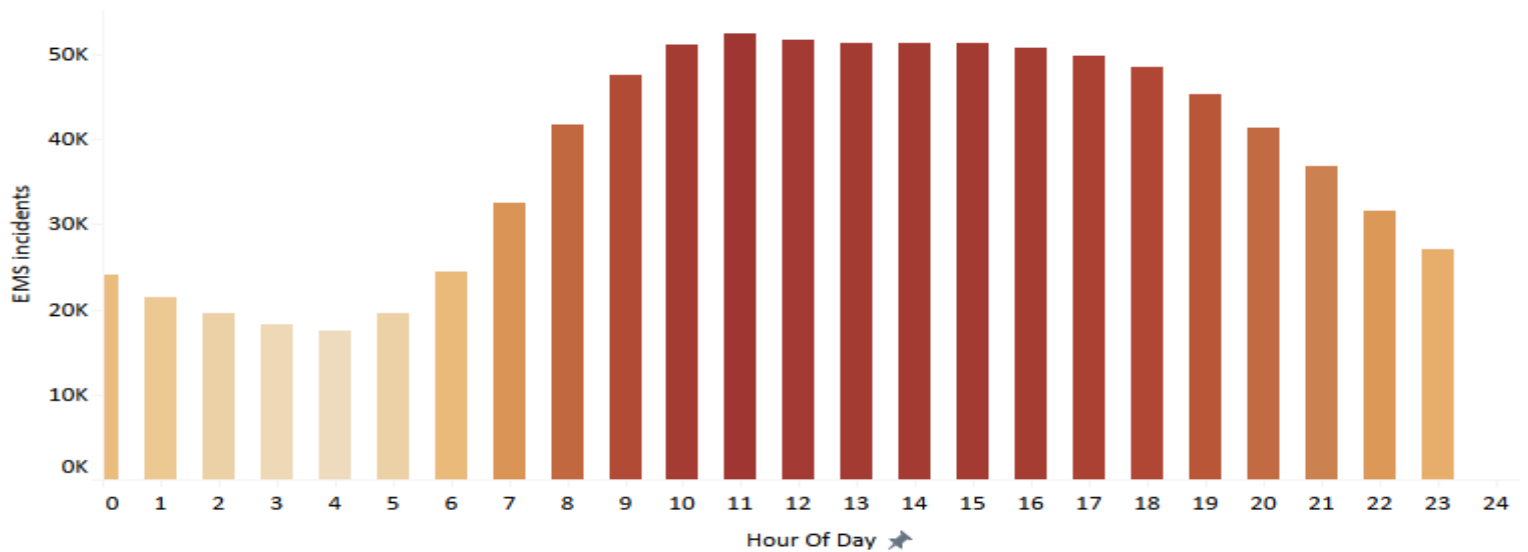
DISTRIBUTION OF 911 EMS INCIDENTS BY MONTH

Figure 3: EMS incidents by month



DISTRIBUTION OF 911 EMS INCIDENTS BY HOUR OF THE DAY

Figure 4: EMS incidents by hour of the day



DISTRIBUTION OF 911 EMS INCIDENTS BY HOUR OF DAY AND DAY OF THE WEEK

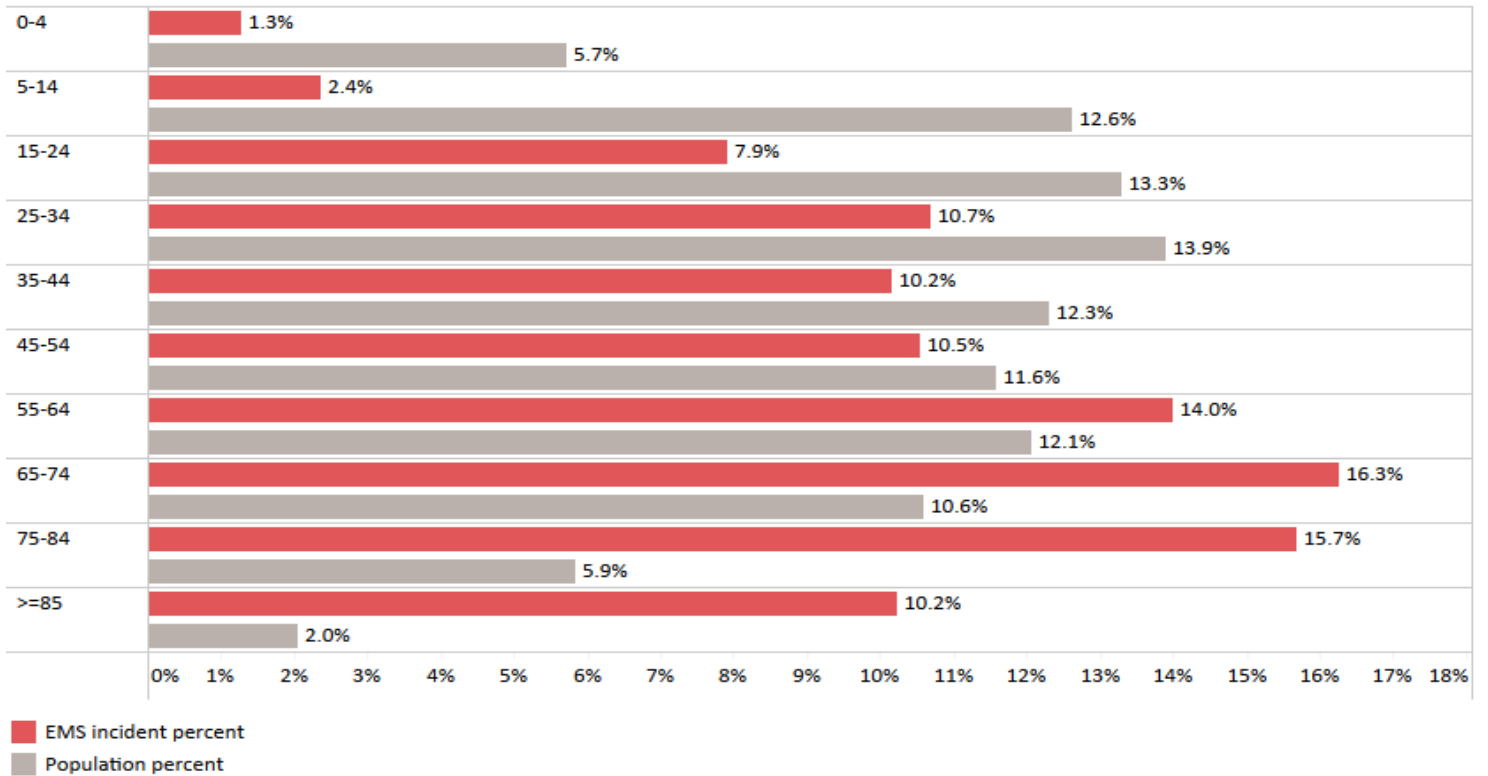
Figure 5: EMS incidents by time and day of the week

Time of Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
12.01am - 4am	14,308	13,192	13,131	13,185	14,146	15,892	16,833
4.01am - 8am	17,895	17,606	17,311	17,402	17,371	15,443	15,092
8.01am - 12pm	30,611	29,957	29,970	29,909	29,975	26,905	25,317
12.01pm - 4pm	30,112	29,913	29,643	29,936	31,215	27,796	25,979
4.01pm - 8pm	26,120	26,061	26,128	26,064	27,931	26,664	25,786
8.01pm - 12am	12,894	12,671	12,967	13,351	14,886	14,963	13,595

911 EMS INCIDENTS - AGE

DISTRIBUTION OF 911 EMS INCIDENTS AND ARIZONA POPULATION

Figure 6: Age - specific distribution of 911 EMS incidents and Arizona population



911 EMS INCIDENT RATE PER 100,000 BY AGE

Figure 7: Age - specific 911 EMS incident rate per 100,000

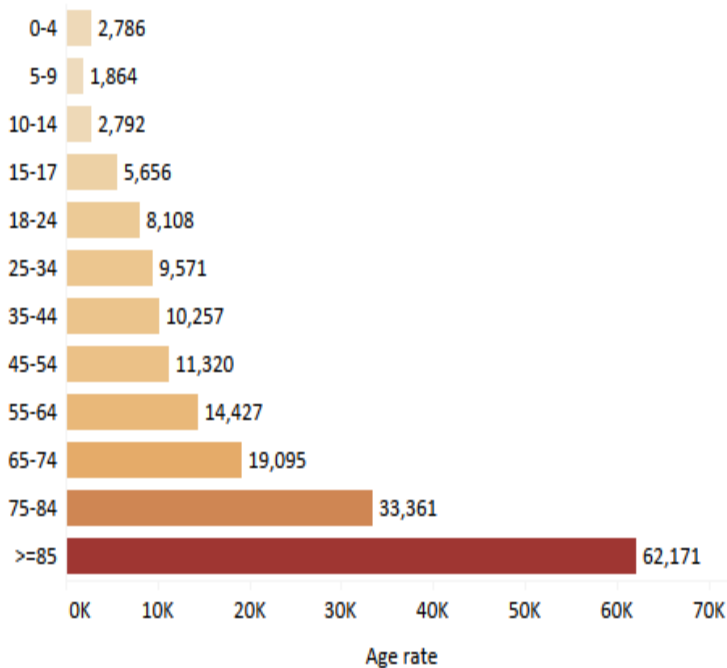


Table 5: Age - specific 911 EMS incidents and EMS incident rate per 100,000

Age	N	Incident %	Age rate
Missing	7,564	0.8%	
0-4	11,614	1.3%	2,786
5-9	8,393	0.9%	1,864
10-14	13,100	1.4%	2,792
15-17	15,795	1.7%	5,656
18-24	55,971	6.2%	8,108
25-34	96,857	10.7%	9,571
35-44	91,994	10.2%	10,257
45-54	95,547	10.5%	11,320
55-64	126,810	14.0%	14,427
65-74	147,455	16.3%	19,095
75-84	142,216	15.7%	33,361
>=85	92,810	10.2%	62,171
Grand Total	906,126		12,438

Data Source : AZ-PIERS 2021

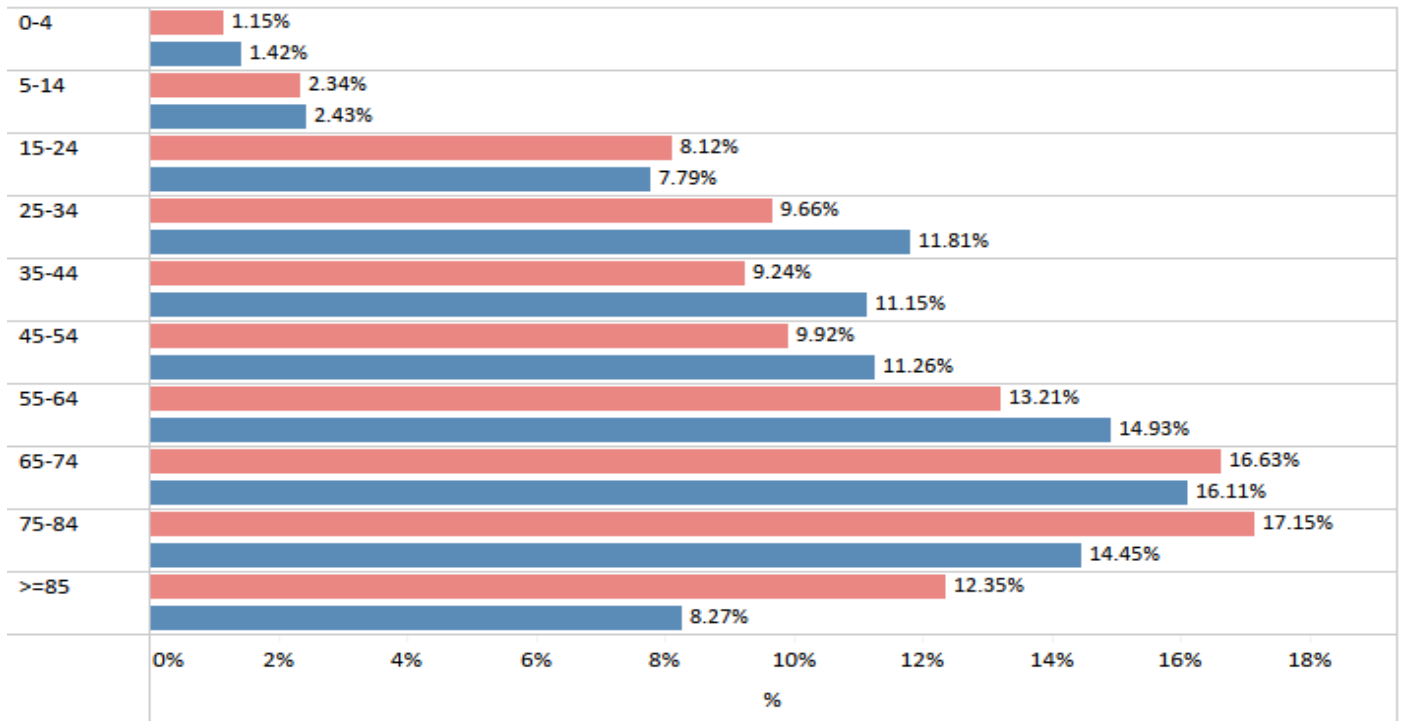
911 EMS INCIDENTS - GENDER

Table 6: Gender - specific 911 EMS incidents and EMS incident rate per 100,000

Gender	N	%	Gender rate
Female	445,778	49.20%	12,153
Male	451,249	49.80%	12,475
Other, neither exclusively male or female	35	0.00%	N/A
Missing/Not Recorded/NA	9,064	1.00%	N/A
Grand Total	906,126	100.00%	12,438

Data Source : AZ-PIERS 2021

Figure 8 : Gender - specific 911 EMS incident percent

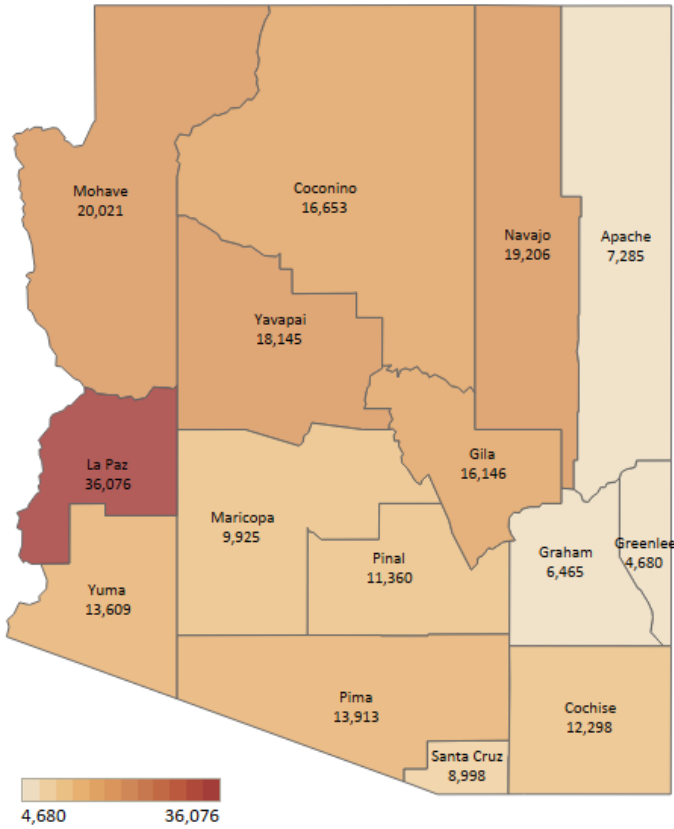


Data Source: AZ-PIERS 2021

Female
Male

911 EMS INCIDENTS - COUNTY

Figure 9: County - specific 911 EMS incident rate per 100,000



Data source: AZ-PIERS 2021

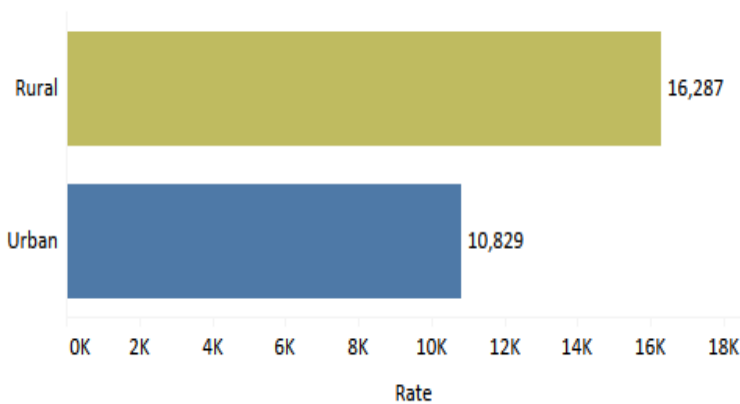
Table 7: County - specific 911 EMS incidents and EMS incident rate per 100,000

County	N	%	County Rate
Apache	4,838	0.53%	7,285
Cochise	15,553	1.72%	12,298
Coconino	24,552	2.71%	16,653
Gila	8,642	0.95%	16,146
Graham	2,523	0.28%	6,465
Greenlee	449	0.05%	4,680
La Paz	6,068	0.67%	36,076
Maricopa	447,378	49.37%	9,925
Mohave	43,350	4.78%	20,021
Navajo	20,694	2.28%	19,206
Pima	147,248	16.25%	13,913
Pinal	49,883	5.51%	11,360
Santa Cruz	4,361	0.48%	8,998
Yavapai	43,761	4.83%	18,145
Yuma	28,213	3.11%	13,609
Out of State	1,831	0.20%	N/A
Missing	56,782	6.27%	N/A
Grand Total	906,126	100.00%	12,438

Data Source : AZ-PIERS 2021

911 EMS INCIDENTS DISTRIBUTION BY URBAN/RURAL COUNTIES

Figure 10: Urban/Rural 911 EMS incident rate per 100,000



Data Source : AZ-PIERS 2021

Table 8: Urban/Rural 911 EMS incidents and EMS incident rate per 100,000

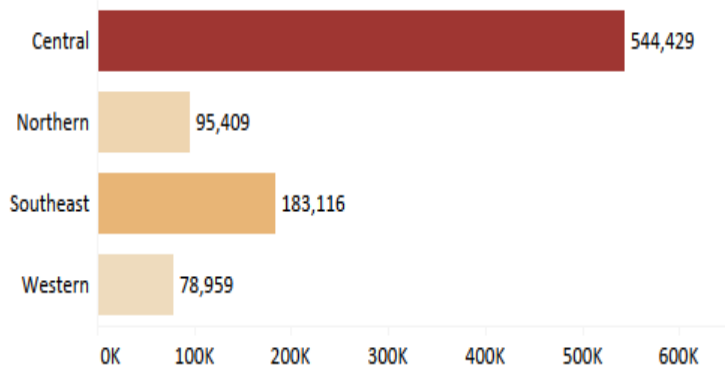
	N	%	Rate
Rural	174,791	19.29%	16,287
Urban	672,722	74.24%	10,829
Out of State	1,831	0.20%	N/A
Missing	56,782	6.27%	N/A
Grand Total	906,126	100.00%	12,438

Data Source : AZ-PIERS 2021

911 EMS INCIDENTS - REGION

911 EMS INCIDENTS DISTRIBUTION BY EMS REGION (AIR AGENCIES EXCLUDED)

Figure 11 : 911 EMS incidents by region



Data Source : AZ-PIERS 2021

Table 9 : 911 EMS incidents by region

Region	N	%
Central	544,429	60.36%
Northern	95,409	10.58%
Southeast	183,116	20.30%
Western	78,959	8.75%
Grand Total	901,913	100.00%

(Air agencies excluded) Data source : AZ-PIERS 2021

Table 10 : Region - specific 911 EMS incidents by Gender

Region	Gender	N	%
Central	Female	273,013	50.15%
	Male	267,100	49.06%
Northern	Female	43,111	45.19%
	Male	51,281	53.75%
Southeast	Female	90,611	49.48%
	Male	89,359	48.80%
Western	Female	37,529	47.53%
	Male	40,960	51.88%

Data Source : AZ-PIERS 2021

The EMS Region assigned for an EMS agency is based on the agency's main office address of record (e.g., the address on their CON application).

Table 11 : Region - specific 911 EMS incidents by age

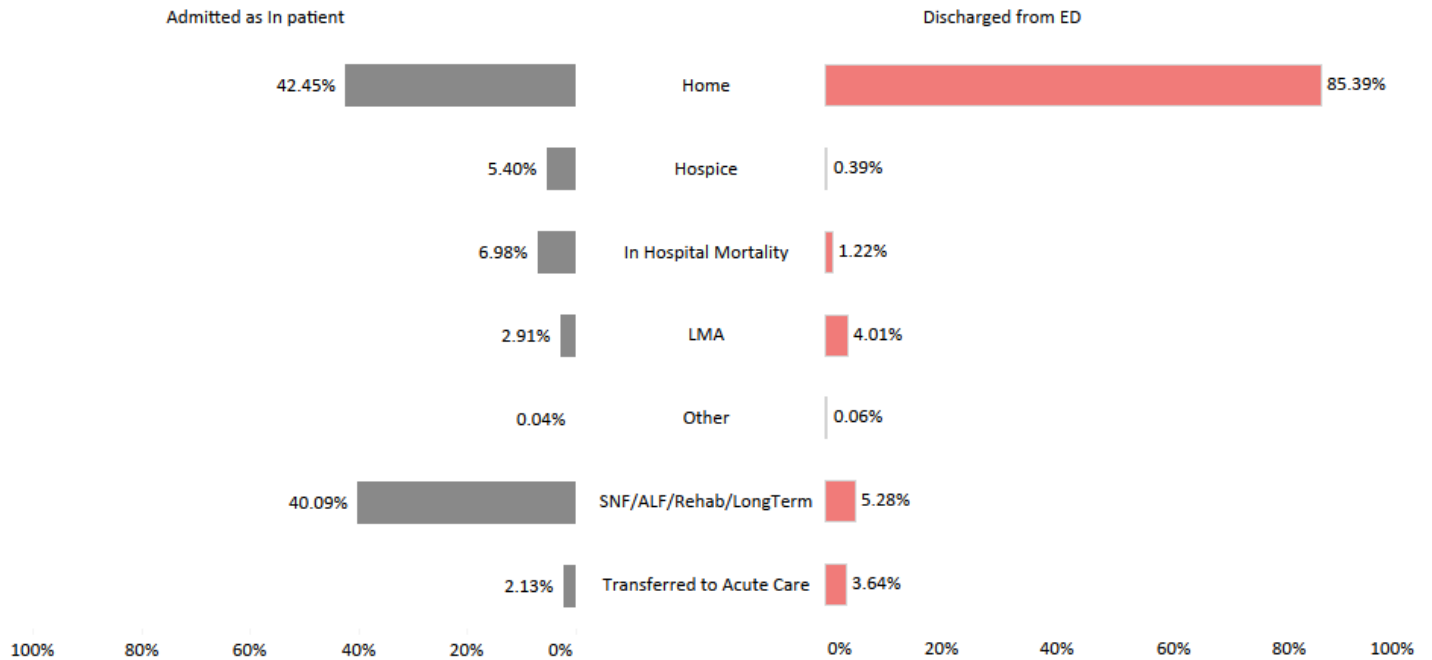
Region	Age2	N	%
Central	0-4	7,881	1.45%
	5-14	14,089	2.59%
	15-24	46,115	8.47%
	25-34	61,306	11.26%
	35-44	56,525	10.38%
	45-54	58,008	10.65%
	55-64	73,086	13.42%
	65-74	84,343	15.49%
	75-84	83,232	15.29%
Northern	>=85	56,452	10.37%
	0-4	878	0.92%
	5-14	2,085	2.19%
	15-24	6,801	7.13%
	25-34	10,538	11.05%
	35-44	10,576	11.08%
	45-54	10,333	10.83%
	55-64	13,544	14.20%
	65-74	15,792	16.55%
Southeast	75-84	14,448	15.14%
	>=85	8,530	8.94%
	0-4	1,901	1.04%
	5-14	3,418	1.87%
	15-24	13,311	7.27%
	25-34	17,966	9.81%
	35-44	17,593	9.61%
	45-54	19,035	10.40%
	55-64	26,818	14.65%
Western	65-74	31,270	17.08%
	75-84	29,218	15.96%
	>=85	20,396	11.14%
	0-4	875	1.11%
	5-14	1,740	2.20%
	15-24	5,124	6.49%
	25-34	6,594	8.35%
	35-44	6,882	8.72%
	45-54	7,710	9.76%
Western	55-64	12,703	16.09%
	65-74	15,303	19.38%
	75-84	14,768	18.70%
	>=85	7,204	9.12%

Data Source : AZ-PIERS 2021

911 EMS INCIDENTS - TREATED AND TRANSPORTED (N= 670,889)

911 EMS INCIDENTS TREATED AND TRANSPORTED - HOSPITAL DISCHARGE STATUS

Figure 12: 911 EMS incidents - Hospital discharge status



Data Source : AZ-PIERS 2021

Table 12: 911 EMS Incidents - Hospital discharge status

	Discharged from ED		Admitted as an Inpatient	
	N	%	N	%
Grand Total	389,583	100.00%	216,696	100.00%
In Hospital Mortality	4,746	1.22%	15,130	6.98%
Home	332,682	85.39%	91,982	42.45%
Hospice	1,523	0.39%	11,711	5.40%
Left against medical advise	15,634	4.01%	6,299	2.91%
SNF/ALF/Rehab/LongTerm	20,584	5.28%	86,869	40.09%
Transferred to Acute Care	14,165	3.64%	4,625	2.13%
Other	249	0.06%	80	0.04%

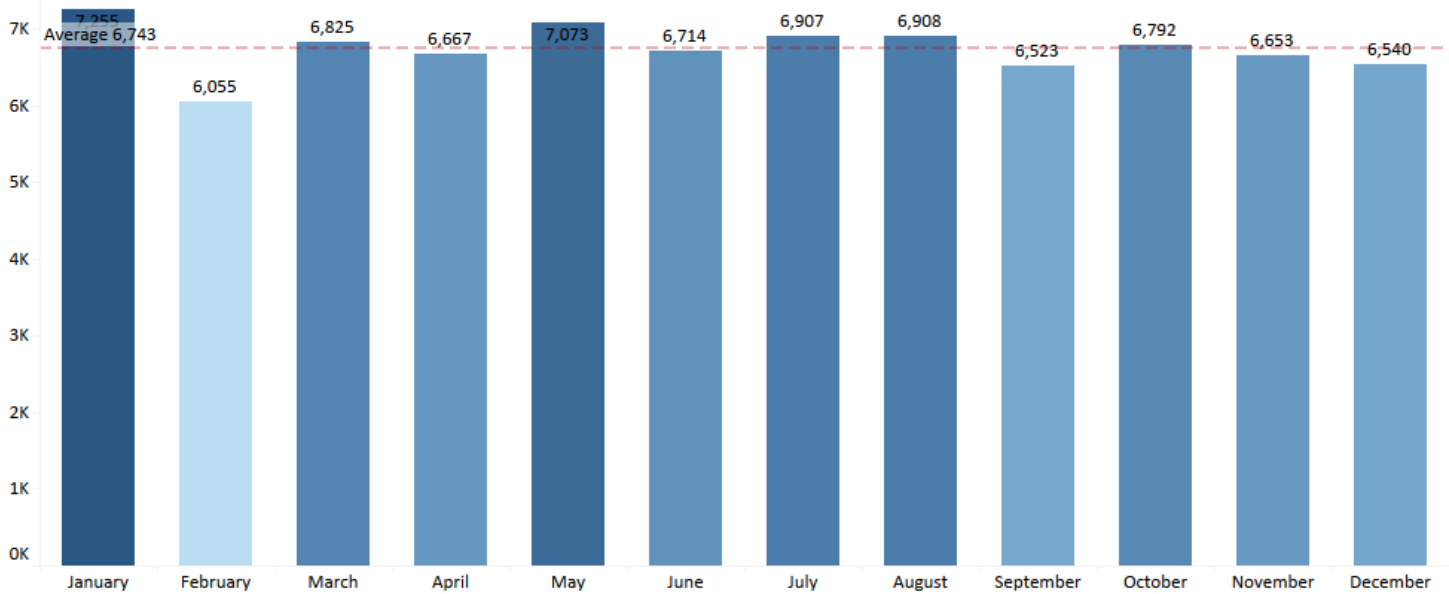
Data Source : AZ-PIERS 2021

Of the 670,889 EMS incidents (911) with disposition as transported to hospital, 606,279 (90%) were successfully matched to their respective records in the Hospital Discharge Database (HDD). **389,583(64%)** of the EMS incidents were discharged from ED while **216,696(36%)** were Admitted as Inpatient in the destination hospital.

INTERFACILITY TRANSPORTS (N = 80,912)

INTERFACILITY TRANSPORTS - DISTRIBUTION BY MONTH

Figure 13: Interfacility transports by month

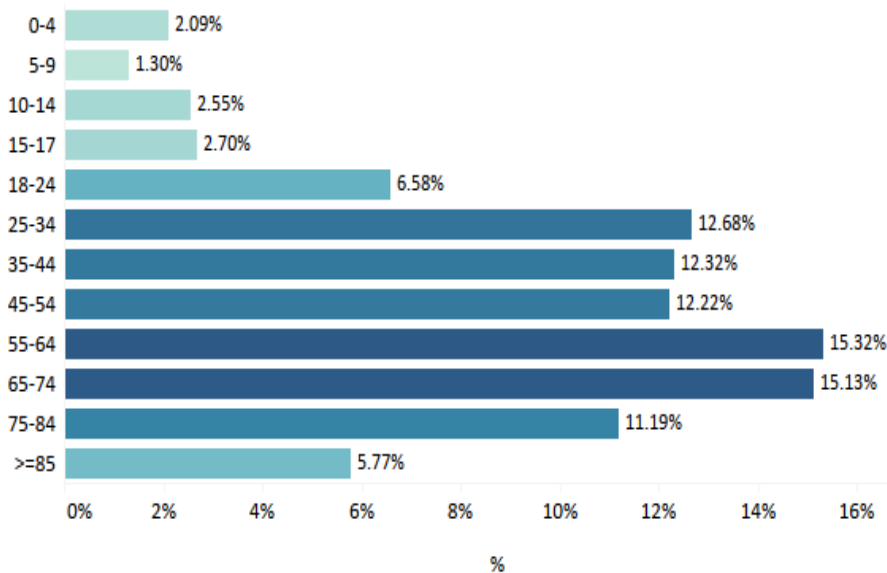


Data Source : AZ-PIERS 2021

INTERFACILITY TRANSPORTS - AGE

Table 13: Age - specific Interfacility Transports

Figure 14: Age - specific interfacility transports



Age	N	%
Grand Total	80,912	100.0%
Missing	117	0.1%
0-4	1,695	2.1%
5-9	1,050	1.3%
10-14	2,066	2.6%
15-17	2,184	2.7%
18-24	5,322	6.6%
25-34	10,258	12.7%
35-44	9,969	12.3%
45-54	9,886	12.2%
55-64	12,396	15.3%
65-74	12,245	15.1%
75-84	9,052	11.2%
>=85	4,672	5.8%

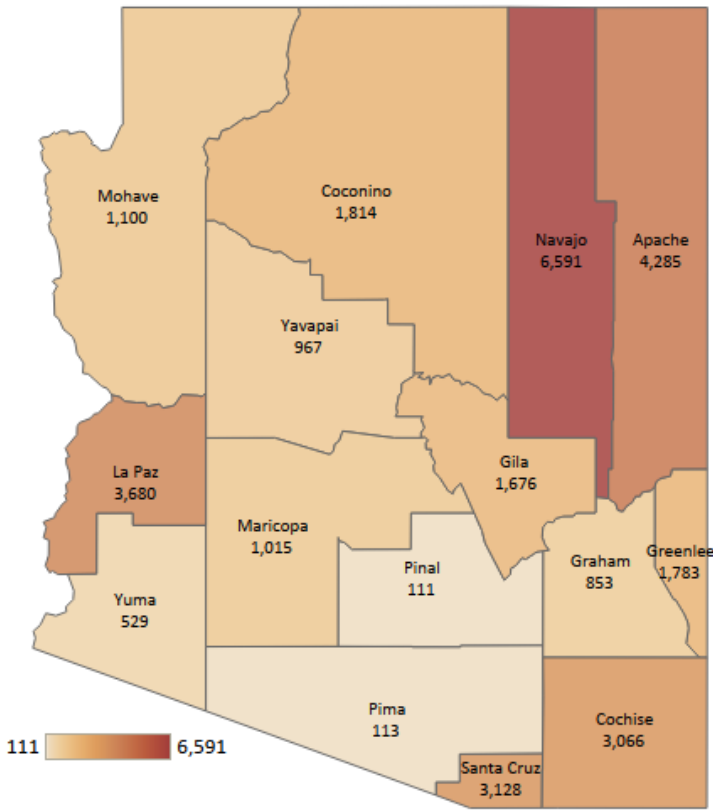
Data Source : AZ-PIERS 2021

Data Source : AZ-PIERS 2021

INTERFACILITY TRANSPORTS (IFT)- COUNTY

INTERFACILITY EMS RUN DISTRIBUTION BY COUNTY

Figure 15: County - specific interfacility transports rate per 100,000



Data Source : AZ-PIERS 2021

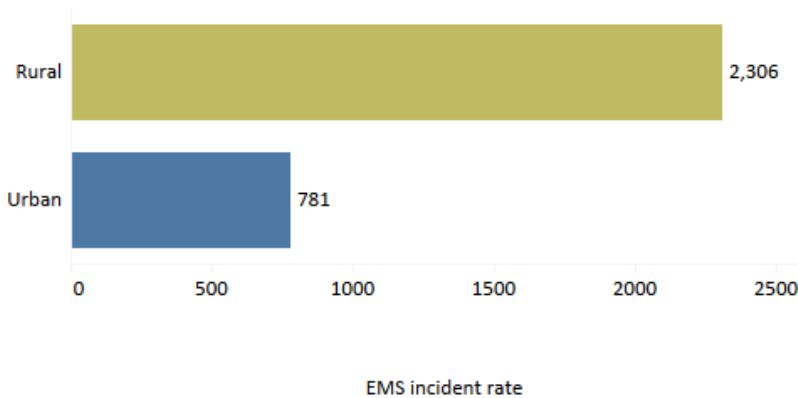
Table 14 : County - specific interfacility transports and transport rate per 100,000

County	N	%	County rate
Apache	2,846	3.52%	4,285
Cochise	3,877	4.79%	3,066
Coconino	2,675	3.31%	1,814
Gila	897	1.11%	1,676
Graham	333	0.41%	853
Greenlee	171	0.21%	1,783
La Paz	619	0.77%	3,680
Maricopa	45,740	56.53%	1,015
Mohave	2,382	2.94%	1,100
Navajo	7,102	8.78%	6,591
Pima	1,195	1.48%	113
Pinal	489	0.60%	111
Santa Cruz	1,516	1.87%	3,128
Yavapai	2,333	2.88%	967
Yuma	1,096	1.35%	529
Out of State	619	0.77%	
Missing	7,022	8.68%	
Grand Total	80,912	100.00%	1,111

Data Source : AZ-PIERS 2021

URBAN/RURAL

Figure 16: Urban/Rural interfacility transports rate per 100,000



Data Source : AZ-PIERS 2021

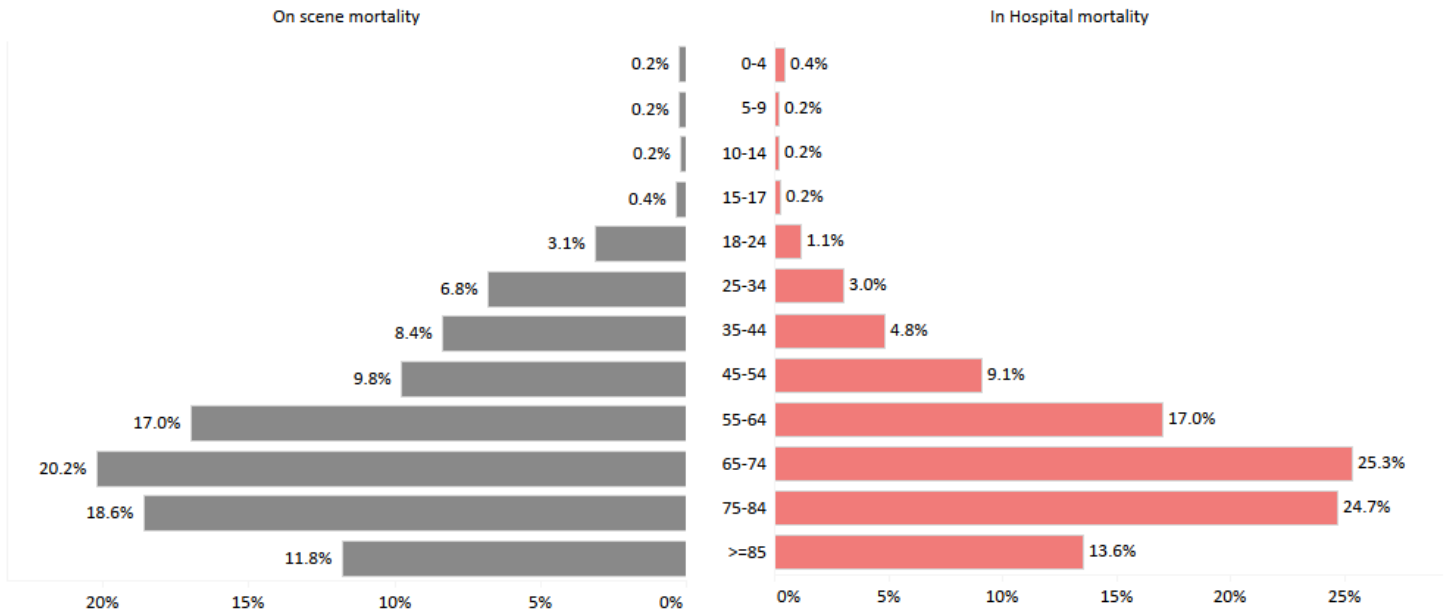
Table 15: Urban/Rural interfacility transports rate per 100,000

	N	%	Incident Rate
Rural	24,751	30.6%	2,306
Urban	48,520	60.0%	781
Out of State	619	0.8%	
Missing	7,022	8.7%	
Grand Total	80,912	100.0%	

Data Source : AZ-PIERS 2021

OVERALL MORTALITY - IN HOSPITAL VS ONSCENE MORTALITY (N = 36,554/1,104,395)

Figure 17: On scene Vs In hospital mortality by age



Data Source : AZ-PIERS 2021

Table 16 : On Scene vs In hospital mortality

	On Scene Mortality		In Hospital Mortality	
	N	%	N	%
Grand Total	12,069	100.00%	24,485	100.00%
Missing	397	3.29%	37	0.15%
0-4	28	0.23%	109	0.45%
5-9	29	0.24%	55	0.22%
10-14	22	0.18%	55	0.22%
15-17	44	0.36%	61	0.25%
18-24	378	3.13%	279	1.14%
25-34	823	6.82%	744	3.04%
35-44	1,008	8.35%	1,180	4.82%
45-54	1,182	9.79%	2,231	9.11%
55-64	2,051	16.99%	4,159	16.99%
65-74	2,439	20.21%	6,206	25.35%
75-84	2,247	18.62%	6,049	24.70%
>=85	1,421	11.77%	3,320	13.56%

Data Source : AZ-PIERS 2021

PROVIDER PRIMARY AND SECONDARY IMPRESSION CATEGORIES OF INTEREST

The impression categories included in the report have been obtained based on ICD-10 codes and CCS category descriptions. Refer to Appendix B for criteria of these impression categories. The categories are not mutually exclusive, i.e., A single patient may have 1 or more impression category as the EMS diagnosis.

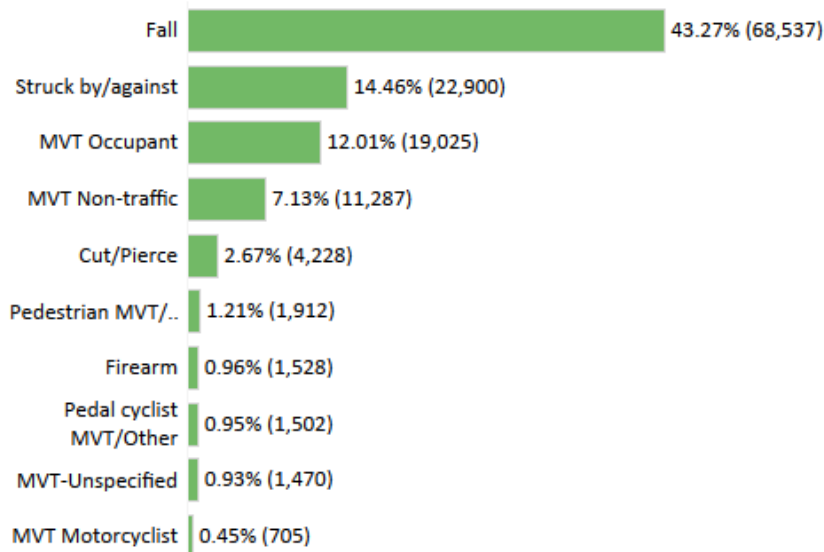
EMS INCIDENTS IMPRESSIONS PREVALENCE (N = 1,104,395)

Table 17: Prevalence of primary and secondary impression categories of interest (N= 1,104,395)

Population Type	N	%
Cardiac Arrest	18,892	1.71%
Diabetes	15,973	1.45%
Injury	158,378	14.34%
Obstetrics	4,240	0.38%
Opioid	8,060	0.73%
Psychiatric Disorders	37,228	3.37%
Respiratory Distressed	95,261	8.63%
Seizures	23,316	2.11%
STEMI	2,965	0.27%
Stroke	6,085	0.55%
Substance use	40,927	3.71%
Suicide/Suicide Attempted	11,118	1.01%

Data Source: AZ-PIERS 2021

Figure 18: Most prevalent injury types



Data Source: AZ-PIERS 2021

DEATHS IN EACH IMPRESSION CATEGORY

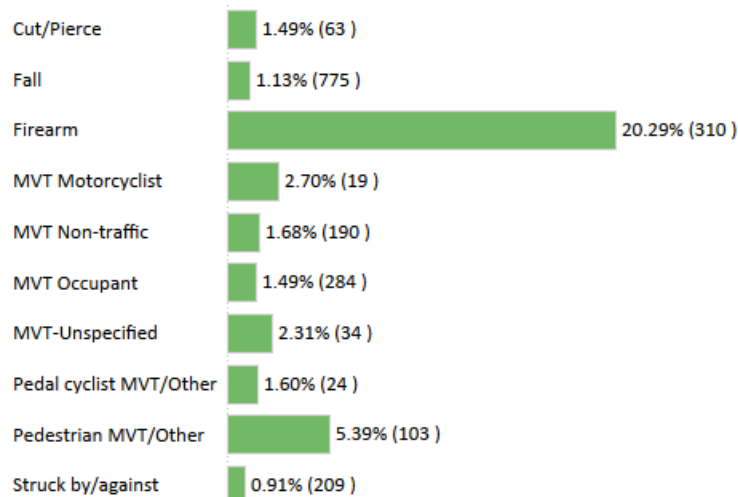
Table 18: Mortality by primary and secondary impression category

Population Type	N	Mortality %
Cardiac Arrest	16,245	85.99%
Diabetes	402	2.52%
Injury	2,609	1.65%
Obstetrics	4	0.09%
Opioid	1,062	13.18%
Psychiatric Disorders	95	0.26%
Respiratory Distressed	7,366	7.73%
Seizures	167	0.72%
STEMI	238	8.03%
Stroke	337	5.54%
Substance use	231	0.56%
Suicide/Suicide Attempted	65	0.58%

Data Source: AZ-PIERS 2021

Includes on scene and hospital mortality

Figure 19: Mortality by injury types



Data Source: AZ-PIERS 2021

KEY TIME INTERVALS

911 GROUND EMS INCIDENTS RESPONSE TIME (N = 901,913)

Table 19: Median response time (in minutes) for 911 EMS incidents (ground)

	Region				
	Grand Total	Central	Northern	Southeast	Western
Number of Records	901,913	544,429	95,409	183,116	78,959
Response time available	899,186	543,164	95,288	181,991	78,743
% Response time missing	0.30%	0.23%	0.13%	0.61%	0.27%
Median Response time	8	8	9	8	8
Percentile (75) of Response time	11	10	13	11	11
Percentile (90) of Response time	16	14	22	16	16

Data Source: AZ-PIERS 2021

911 GROUND EMS INCIDENTS SCENE AND TRANSPORT TIMES WHEN TRANSPORTED TO HOSPITAL (N=666,733)

Table 20: Median scene and transport time (in minutes) for 911 EMS incidents (ground) when transported to hospital

	Region				
	Grand Total	Central	Northern	Southeast	Western
Number of Records	666,733	387,130	79,419	136,404	63,780
Scene time available	569,169	331,537	75,759	104,151	57,722
% Scene time missing	14.63%	14.36%	4.61%	23.65%	9.50%
Median scene time	12	13	12	10	11
Percentile (75) of scene time	17	18	17	15	16
Percentile (90) of scene time	23	24	23	22	22
Transport time available	514,212	301,805	64,266	97,065	51,076
% Transport time missing	22.9%	22.0%	19.1%	28.8%	19.9%
Median Transport time	11	10	12	12	11
Percentile (75) of Transport time	16	15	26	19	20
Percentile (90) of Transport_time	27	21	39	29	30

Data Source: AZ-PIERS 2021

The EMS Region assigned for an EMS agency is based on the agency's main office address of record (e.g., the address on their CON application).

***Response Time** : Calculated as difference between Dispatch Notified Time and Unit Arrived at Patient Time

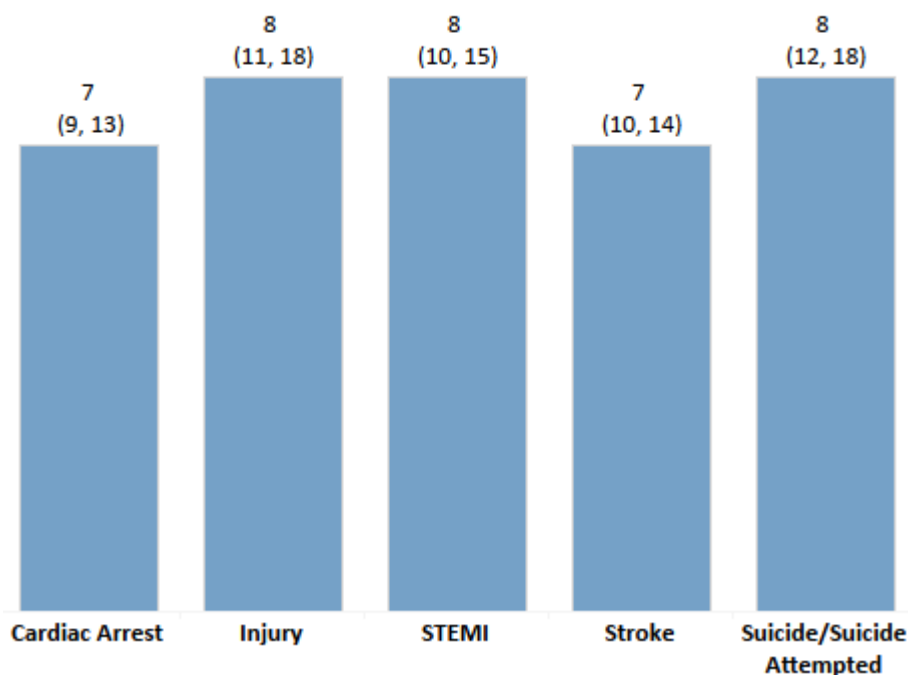
(if Unit Arrived at Patient Time is missing then calculated as difference between Dispatch Notified Time and Patient Arrived Onscene Time)

***Scene time** : Includes only Treated and Transported incidents. Calculated as difference between Scene Left Time or Transferred Care Time and Unit

KEY TIME INTERVALS

911 GROUND EMS INCIDENTS RESPONSE TIME FOR SOME OF THE PRIMARY IMPRESSIONS

Figure 20: Median response time (75th and 90th percentile) (in minutes) for primary impression of interests



Data source: AZPIERS
2021

INTERFACILITY TRANSPORTS: RESPONSE, SCENE, AND TRANSPORT TIME (N = 62,328)

Table 21: Median response, scene and transport time (in minutes) for interfacility transports (Ground)

	Region				
	Grand Total	Central	Northern	Southeast	Western
Number of Records	62,328	50,354	6,621	5,192	161
Response time available	62,030	50,057	6,621	5,191	161
% Response time missing	0.5%	0.6%	0.0%	0.0%	0.0%
Median Response time	26	27	16	27	31
Percentile (75) of Response time	37	37	30	41	43
Percentile (90) of Response time	49	48	51	60	62
Scene time available	61,284	49,462	6,617	5,044	161
% Scene time missing	1.68%	1.77%	0.06%	2.85%	0.00%
Median scene time	16	15	15	18	10
Percentile (75) of scene time	23	23	21	26	13
Percentile (90) of scene time	32	32	30	35	17
Transport time available	60,493	48,747	6,574	5,011	161
% Transport time missing	2.9%	3.2%	0.7%	3.5%	0.0%
Median Transport time	21	20	52	68	77
Percentile (75) of Transport time	34	27	100	81	91
Percentile (90) of Transport_time	66	38	188	108	110

Data Source: AZ-PIERS 2021

EMCT WORKFORCE TRENDS

Table 19 : Arizona EMCT Certification and Training Trends, 2017-2021

Year	Number of active EMCT certifications	Number of new EMCT certifications completed	Number of EMT students	Number of paramedic students	EMT Pass Rate % (% pass at first attempt)		Paramedic Pass Rate % (% pass at first attempt)	
					National	State	National	State
2021	21,012	2,579	2,450	415	80% (67%)	84% (73%)	88% (69%)	93% (76%)
2020	19,921	2,468	1,557	286	79% (70%)	79% (72%)	83% (72%)	89% (82%)
2019	19,339	2,792	2,363	118	79% (69%)	79% (73%)	85% (73%)	96% (79%)
2018	19,253	2,687	2,019	410	80% (71%)	81% (76%)	87% (74%)	93% (82%)
2017	18,702	2,726	1,955	276	80% (71%)	85% (74%)	86% (74%)	93% (82%)

Data Source: National Registry of Emergency Medical Technicians (2023)

Table 20 : Arizona EMCT Workforce Demographics

Total Number of Active EMCTs	Age Range (Years) (Min- Max)	Median Age	Gender (% Male, % Female)
21,822	Min: 18 Max: 82	36 yrs	M: 79.41 F: 20.55

Data Source: Arizona Emergency Medical Care Technicians, 2023

- **EMS Response Types:**

Note: These definitions are from the NEMSIS v3 Extended Data Definitions Dictionary

https://nemsis.org/wp-content/uploads/2018/09/Extended-Data-Definitions_v3_Final.pdf

- ⇒ **Medical (Convalescent) transport:** Transports that are not between hospitals or that do not require an immediate response; these are generally for the purpose of transportation to or from an appointment, performance of a procedure, or long-term care (e.g., hospital to home/hospice/rehabilitation/long-term care facility).
- Convalescent transport is defined as "a scheduled transport other than an interfacility transport" in R9-25-901
- ⇒ **Interfacility transport:** Any transfer, after initial assessment and stabilization, from and to a healthcare facility, to include specialty hospitals, for the purpose of continuation of acute care, this would also include emergent transfer requests (e.g., hospital to hospital, clinic to hospital).
- ⇒ **911 Response on Scene:** Emergent or immediate response to an incident location, regardless of method of notification (e.g., 9-1-1, direct dial, walk-in, flagging down, air ambulance scene flight).
- **Incident Disposition:** Type of disposition treatment and/or transport of the patient by this EMS Unit.
- **Provider's Primary Impression:** The EMS personnel's impression of the patient's primary problem or most significant condition which led to the management given to the patient (treatments, medications, or procedures).
- **Provider's Secondary Impression:** The EMS personnel's impression of the patient's secondary problem or most significant condition which led to the management given to the patient (treatments, medications, or procedures).

- ⇒ **Urban/Rural:**

These Urban/Rural counties were grouped based on the data from the Arizona Health Status and Vital Statistics database

<http://pub.azdhs.gov/health-stats/menu/info/pop/index.php>

- ⇒ **Urban counties:** Maricopa, Pima, Pinal, Yuma
- ⇒ **Rural counties:** Apache, Cochise, Gila, Graham, La Paz, Mohave, Navajo, Santa Cruz, Greenlee, Yavapai, Coconino
- ⇒ **Out of State:** The incident did not occur in Arizona, but the EMS agencies involved where either present on the scene or were involved in the transport.

APPENDIX B. PROVIDER PRIMARY AND SECONDARY IMPRESSION CATEGORIES CRITERIA

Impression Category	Criteria
Obstetrics	CCS Category description of primary or secondary impressions = Spontaneous abortion or Induced abortion or Postabortion complications or Ectopic pregnancy or Other complications of pregnancy or Hemorrhage during pregnancy; abruptio placenta; placenta previa or Hypertension complicating pregnancy; childbirth and the puerperium or Early or threatened labor or Prolonged pregnancy or Malposition; malpresentation or Fetopelvic disproportion; obstruction or Fetal distress and abnormal forces of labor or Polyhydramnios and other problems of amniotic cavity or Umbilical cord complication or OB-related trauma to perineum and vulva or Forceps delivery or Other complications of birth; puerperium affecting management of mother or Other pregnancy and delivery including normal
Psychiatric Disorders	CCS Category description of primary or secondary impressions = Adjustment disorders or Anxiety disorders or Attention-deficit conduct and disruptive behavior disorders or Developmental disorders or Disorders usually diagnosed in infancy childhood or adolescence or Impulse control disorders NEC or Mood disorders or Personality disorders or Schizophrenia and other psychotic disorders
Diabetes	CCS Category description of primary or secondary impressions = Diabetes mellitus without complication or Diabetes mellitus with complications
Substance Abuse	CCS Category description of primary or secondary impressions = Alcohol-related disorders or Substance-related disorders
Seizures	Epilepsy; convulsions
Suicide	Suicide and intentional self-inflicted injury

APPENDIX B. PROVIDER PRIMARY AND SECONDARY IMPRESSION CATEGORIES CRITERIA

Impression Category	Criteria
Stroke	Primary Impression or one of the Secondary Impressions = Non traumatic intracerebral hemorrhage or Non traumatic subarachnoid hemorrhage or Other and unspecified non traumatic intracranial hemorrhage or Cerebral infarction or Transient cerebral ischemic attacks and related syndromes or National Institutes of Health Stroke Scale (NIHSS) score or Persistent migraine aura with cerebral infarction or Cerebral aneurysm, non ruptured or Cerebral atherosclerosis or Non pyogenic thrombosis of intracranial venous system or Acute cerebrovascular insufficiency or Cerebral ischemia or Other cerebrovascular vasospasm and vasoconstriction or Cerebrovascular disease, unspecified Or Destination Stroke Team Prearrival Activation = 1
STEMI	Primary Impression or one of the Secondary Impressions = ST elevation (STEMI) and non-ST elevation (NSTEMI) myocardial infarction or Subsequent ST elevation (STEMI) and non-ST elevation (NSTEMI) myocardial infarction or Subsequent non-ST elevation (NSTEMI) myocardial infarction or Non-ST elevation (NSTEMI) myocardial infarction OR STEMI Probable = 'Yes' OR STEMI Triage Criteria = 'Yes' OR Destination STEMI Team Prearrival Activation = 1 OR Cardiac Rhythm/Electrocardiography (ECG) = STEMI Inferior Ischemia or STEMI Anterior Ischemia or STEMI Posterior Ischemia or STEMI Lateral Ischemia
Cardiac Arrest	Primary Impression or one of the Secondary Impressions = Cardiac arrest or Ventricular fibrillation or Ventricular Flutter OR Cardiac Arrest During EMS Event = ("Yes, After EMS Arrival" or "Yes, Prior to EMS Arrival") Incident Disposition = Cardiac Arrest, Resuscitation Attempted (With Transport) or Cardiac Arrest, Resuscitation Attempted (Without Transport) or Patient Dead at Scene- No Resuscitation Attempted 901H)
Injury	Situation Possible injury = 'Yes'
Opioid	Medication given description = "Naloxone or 'Narcan' or 'Naloxone Hydrochloride" And primary impression = Opioid abuse or Opioid abuse with intoxication or Opioid abuse with unspecified opioid induced disorder or Opioid related disorder or Opioid use, unspecified or Poisoning by other opioids, accidental (unintentional). OR Was naloxone/Narcan administered prior to you/your entity's arrival? Is not missing OR Was naloxone/Narcan administered by you/your entity? Is not missing