2018 Year End EMS Data Report

Bureau of Emergency Medical Services

March 2019

pennsylvania
DEPARTMENT OF HEALTH

Executive Summary

Annually, the Pennsylvania Department of Health (Department) Bureau of Emergency Medical Services (Bureau) publishes a statewide data report. In mid-2018, the Department released a comprehensive data report covering the first six months of 2018. This end of year report is a continuation of that effort to provide detailed clinical, operational and workforce data to the public and the EMS community pertaining to the Commonwealth of Pennsylvania's EMS system.

It is important to note that previous data reports released by the Bureau have been limited to very limited datasets, but the advancements within the various statewide data collection systems, as well as the transition to the National Emergency Medical Services Information System (NEMSIS) version 3.4, have allowed the Bureau to create a more comprehensive report demonstrating the commonwealth's EMS system capabilities. The Bureau will continue to issue this comprehensive report annually to showcase the EMS system.

In 2018, the EMS system in Pennsylvania comprised of 1,258 agencies responded to 2,101,641 calls for service, the overwhelming majority of which constituted emergency responses to incident scenes.

As a part of the Department's role in combating the opioid crisis, the Bureau has provided the Opioid Command Center various reports related to EMS utilization of naloxone. To highlight the EMS role in combating the opioid crisis, in 2018, a total of 16,329 administrations of naloxone in the emergency setting were reported to the state EMS data bridge. Of these administrations, the Bureau can identify that there were 12,457 unique patient encounters in which EMS providers administered naloxone.

Recruitment and retention are topics that continue to generate a significant amount of discussion. Building on the successes of the mid-year data report, the Bureau is continuing to provide information on the aggregate characteristics of individuals who are leaving the EMS profession. To demonstrate the ongoing discussion of recruitment and retention, in 2018, a total of 4,142 EMS certifications were not renewed.

To demonstrate this, the highest number of provider certifications to expire by level were those certified as emergency medical technicians (EMTs), totaling 2,827 individuals. Of these 2,827 expired EMT certifications, 40.64 percent are under the age of 30. Retaining younger individuals in the EMS system must be a priority for EMS leaders within the commonwealth. While the number of individuals seeking initial certification as an EMT remains steady statewide, the rate of newly certified providers does not balance the rate of attrition.

The accuracy of certain data elements and datasets contained within this report are only as accurate as the information provided by field providers through electronic Patient Care Records (ePCR) systems. For example, if an EMS provider only documents the administration of a medication in the narrative portion of the ePCR, this will not be reflected in datasets reported. The Bureau is aware that the datasets are not perfect but demonstrates a reasonable account of the efficacy of the commonwealth's EMS system. Compliance with reporting data varied widely in the first half of the year as the commonwealth finalized the transition to NEMSIS

3.4 standard. It is the belief of the Bureau that, once EMS providers within the system see their data being utilized to advance patient care, the accuracy of reporting within the ePCR systems will continue to improve.

Commonwealth EMS system leaders at all levels should continue to utilize data for a variety of different decision-making processes, which include policy development and recommendations to regional and state MACs for protocol development. Additionally, this data can be used to address operational and staffing concerns throughout the commonwealth. It is the Bureau's intent that this report serves as a benchmark to help individual agencies and municipalities to assess their EMS system performance against statewide datasets.

If there are questions regarding any of the information contained in this report, please contact the Bureau of Emergency Medical Services.

Dylan J Ferguson, Director
Bureau of Emergency Medical Services

Methods

The Bureau of Emergency Medical Services utilized a variety of sources to obtain the datasets to construct this comprehensive report. Most of the raw data is obtained from the state EMS data bridge. Pursuant to 28 Pa. Code § 1021.8 and § 1021.41, all EMS agencies are required to submit electronic patient care records to this state data bridge. In 2017, the commonwealth's EMS system began the transition from NEMSIS version 2.2 to version 3.4.

For this report, the Bureau utilized data that has been uploaded to the state data bridge as of Jan. 12, 2019, with an incident date identified between Jan. 1, 2018, to Dec. 31, 2018. Unless otherwise specified with the notation of "emergency records," the data in this report includes all types of EMS requests for service.

Other sources of data in this report include the National Registry of EMTs, and the Bureau's EMS certification registry, as reported between Jan. 1, 2018 and Dec. 31, 2018.

QRS (Quick Response Service) agencies are currently exempt from submitting data to the state EMS data bridge and are only required to complete paper PCRs. As a result, information related to calls, interventions, medications, etc., provided by a QRS may not be reflected in this report. This is particularly important to note regarding the naloxone data contained within this report. Naloxone administration from QRSs, the public or law enforcement may not be reflected in this report, unless an EMS transport provider documented the medication as given prior to EMS arrival.

Findings

Summary Figures

Table 1 below provides a high level overview of details relating to the overall characteristics and number of EMS responses by Pennsylvania EMS agencies in 2018. The majority of EMS calls for service are related to 911 and emergency responses.

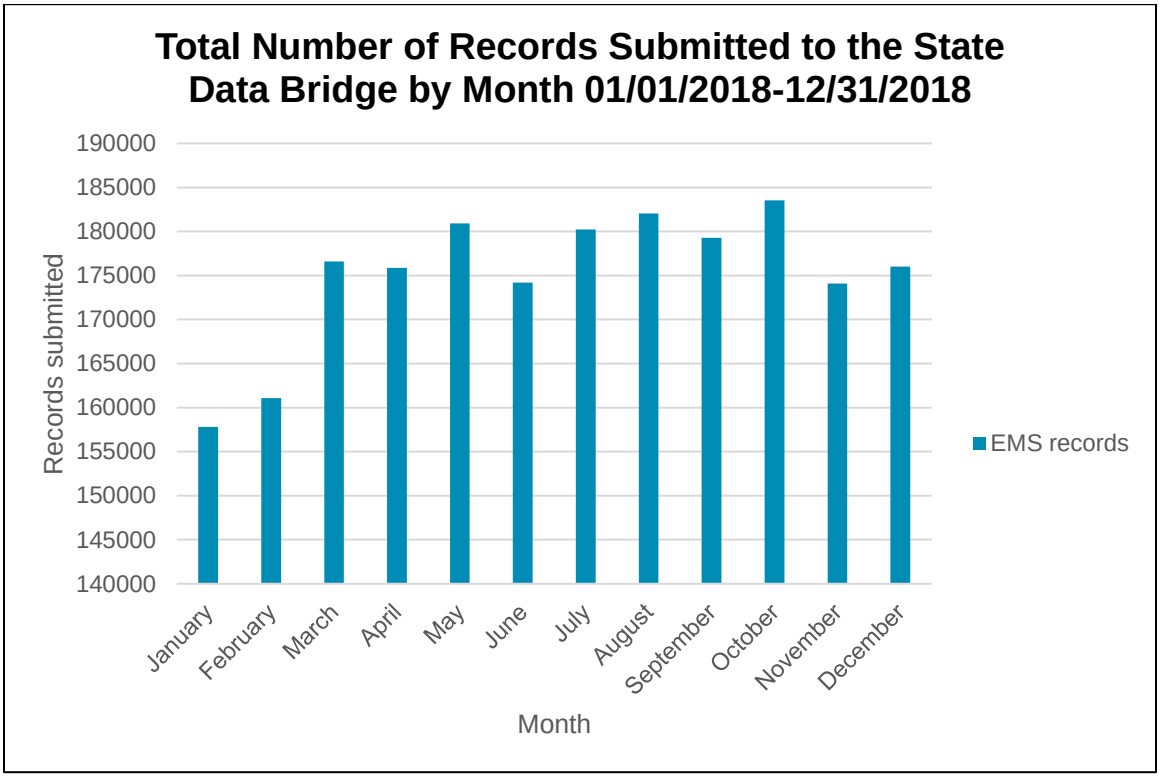
Table 1. EMS Data Summary Figures, 01/01/2018 – 12/31/2018

Metric	Count	% of Total
Type of Service Requested	2,101,641	
*911 Response (scene)	1,606,540	76%
*Intercept	16,157	<1%
Interfacility transport	220,120	10%
Medical transport	234,912	11%
*Mutual aid	3,149	<1%
*Public assistance	3,477	<1%
Standby	17,286	<1%
Total Emergency Records	1,629,323	
EMS Patients by Gender		
Female	903,729	53%
Male	811,041	47%
EMS Patients by Age		
0 to 17 years	102,360	6%
18 years and older	1,598,327	94%
Cardiac Arrests By primary impression "cardiac arrest"	14,687	<1%
Naloxone Administration		
Number of naloxone doses administered (911)	16,329	
Number of 911 encounters with at least one dose of naloxone	12,457	

Source: Pennsylvania State EMS Data Bridge, 2019

Note: For the purposes of this report, all types of service requested that have an * notated above are considered as an emergency record, regardless of how a call was received.

Figure 1. Total Number of Records Submitted to the State Data Bridge by Month of EMS Response, 01/01/2018 – 12/31/2018



Source: Pennsylvania State EMS Data Bridge, 2019

Figure 1 displays the number of records submitted to the state EMS data bridge by month for 2018. Overall the rate of submission is consistent. There was a noticeable increase in records submitted towards the end of quarter 1. This is attributable to transitioning the last large group of agencies to NEMSIS 3.4.

Patient Disposition

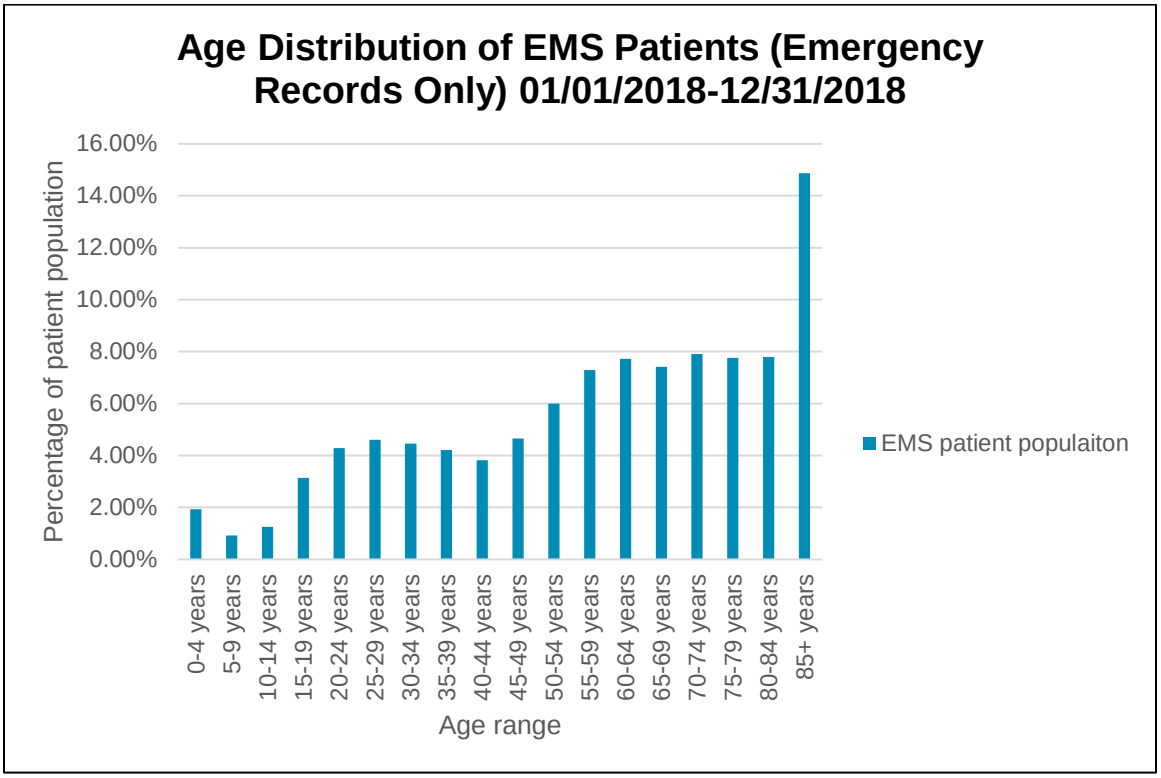
Table 2. EMS Incident Disposition Figures, 01/01/2018 – 12/31/2018

Incident/Patient Disposition	Count of Incident Disposition	% of Incident Dispositions
Assist, agency	9629	0.46%
Assist, public	5990	0.29%
Assist, unit	9696	0.46%
Canceled (prior to arrival at scene)	162736	7.74%
Canceled on scene (no patient contact)	42482	2.02%
Canceled on scene (no patient found)	97532	4.64%
Patient dead at scene -- no resuscitation attempted (with transport)	177	0.01%
Patient dead at scene -- no resuscitation attempted (without transport)	10194	0.49%
Patient dead at scene -- resuscitation attempted (with transport)	54	0.00%
Patient dead at scene -- resuscitation attempted (without transport)	7058	0.34%
Patient evaluated, no treatment/transport required	24075	1.15%
Patient refused evaluation/care (with transport)	706	0.03%
Patient refused evaluation/care (without transport)	85290	4.06%
Patient treated, released (AMA)	9373	0.45%
Patient treated, released (per protocol)	29424	1.40%
Patient treated, transferred care to another EMS unit	31173	1.48%
Patient treated, transported by law enforcement	1112	0.05%
Patient treated, transported by private vehicle	1082	0.05%
Patient treated, transported by this EMS unit	1521166	72.38%
Standby -- no services or support provided	40466	1.93%
Standby -- public safety, fire or EMS operational support provided	12058	0.57%
Transport non-patient, organs, etc.	168	0.01%
	N= 2,101,641	

Source: Pennsylvania State EMS Data Bridge, 2019

Table 2 displays the incident/patient disposition category for all types of EMS calls for service. Nearly 75% of EMS responses result in a patient being transported by EMS. EMS agencies can utilize this number to assist in benchmarking refusal rates of patients against the state average and can utilize it along with locally available information for budgetary and revenue projections.

Figure 2. Age Distribution of all EMS Patient Contacts, 01/01/2018 – 12/31/2018

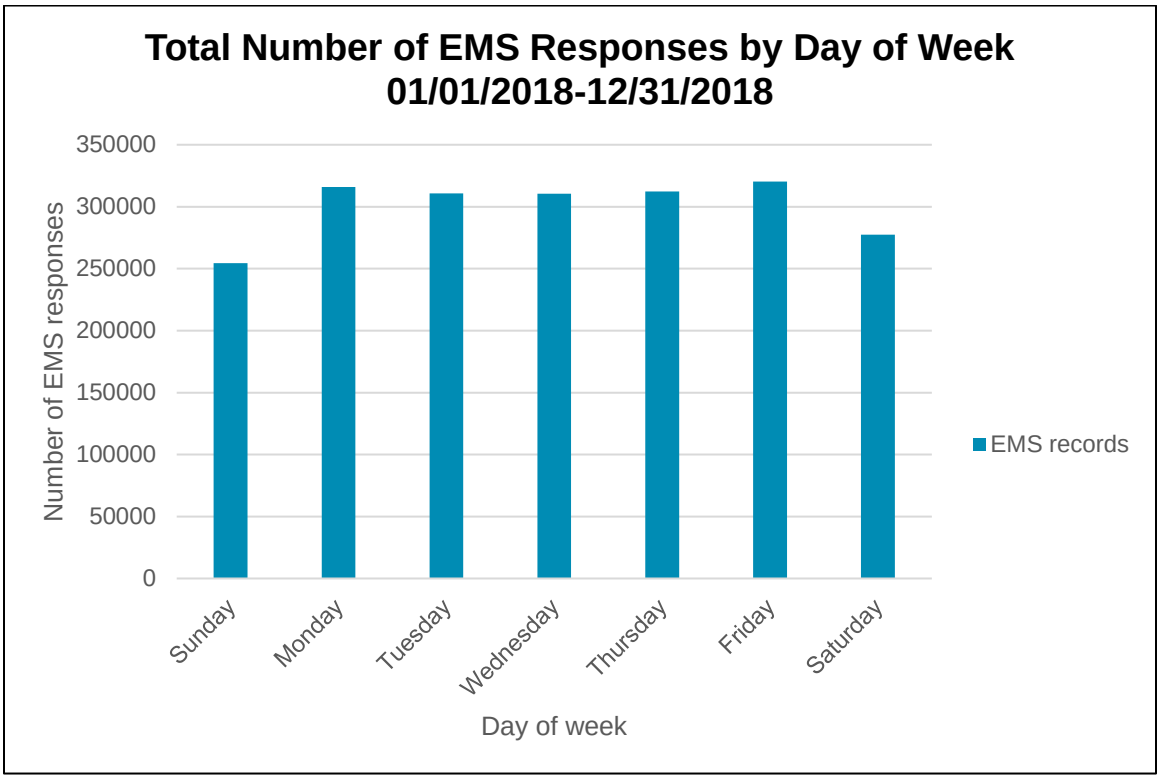


Source: Pennsylvania State EMS Data Bridge, 2019

Figure 2 displays the age demographic by percentage that presents to the EMS system for emergency records. The age group with the highest percentage utilization is 85 years of age and older. The 5 to 9 year demographic presented to the EMS system the least. A significant portion of the EMS patient population, 45 % have reached the medicare eligibility age of 65.

Operational Deployment

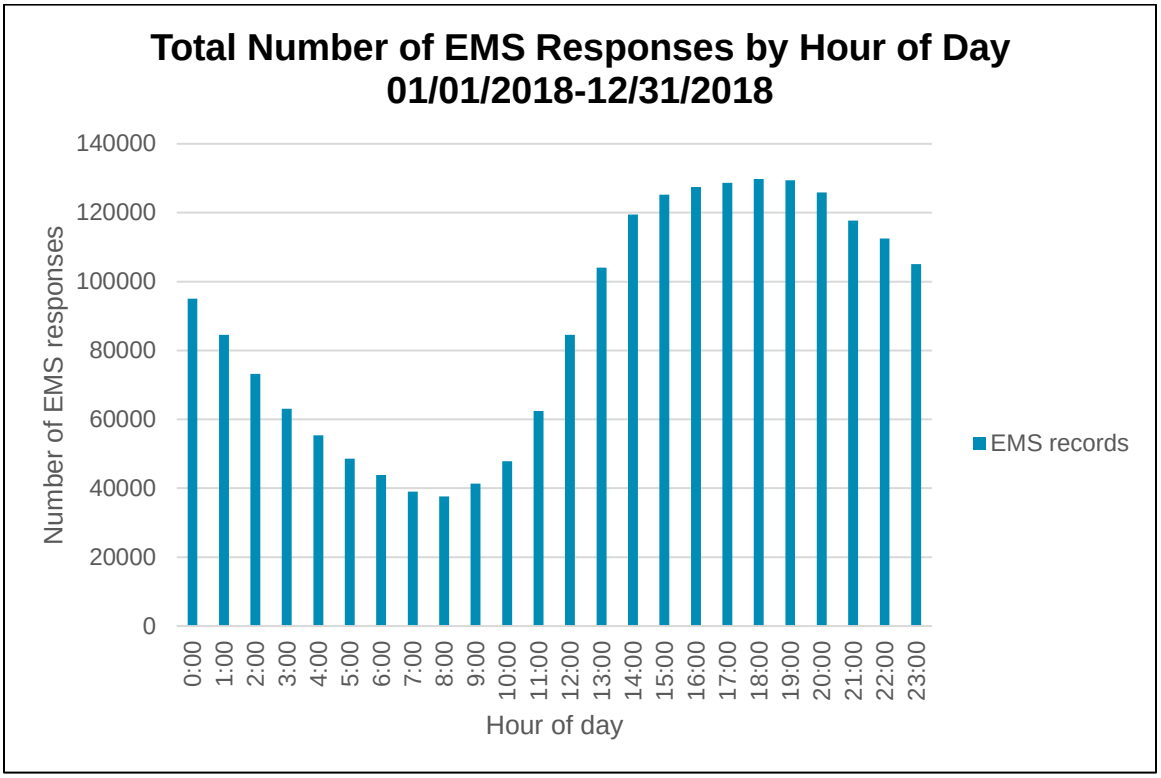
Figure 3. Total Number of EMS Responses by Day of Week, 01/01/2018 – 12/31/2018



Source: Pennsylvania State EMS Data Bridge, 2019

Figure 3 shows that the number of calls for service by day is consistent from day-to-day. Sunday has the lowest number of requests for service. EMS leaders can utilize this data and local versions of this data to assist with resource deployment decisions.

Figure 4. Total Number of EMS Responses by Hour of Day, 01/01/2018 – 12/31/2018



Source: Pennsylvania State EMS Data Bridge, 2019

Figure 4 shows the number of EMS responses by hour of day. The hour of day is displayed along with how many EMS calls for service were received during that time frame. There is a peak of requested responses in the early evening hours, before beginning to decrease after the midnight hour, and ultimately picking up again in the noon hour.

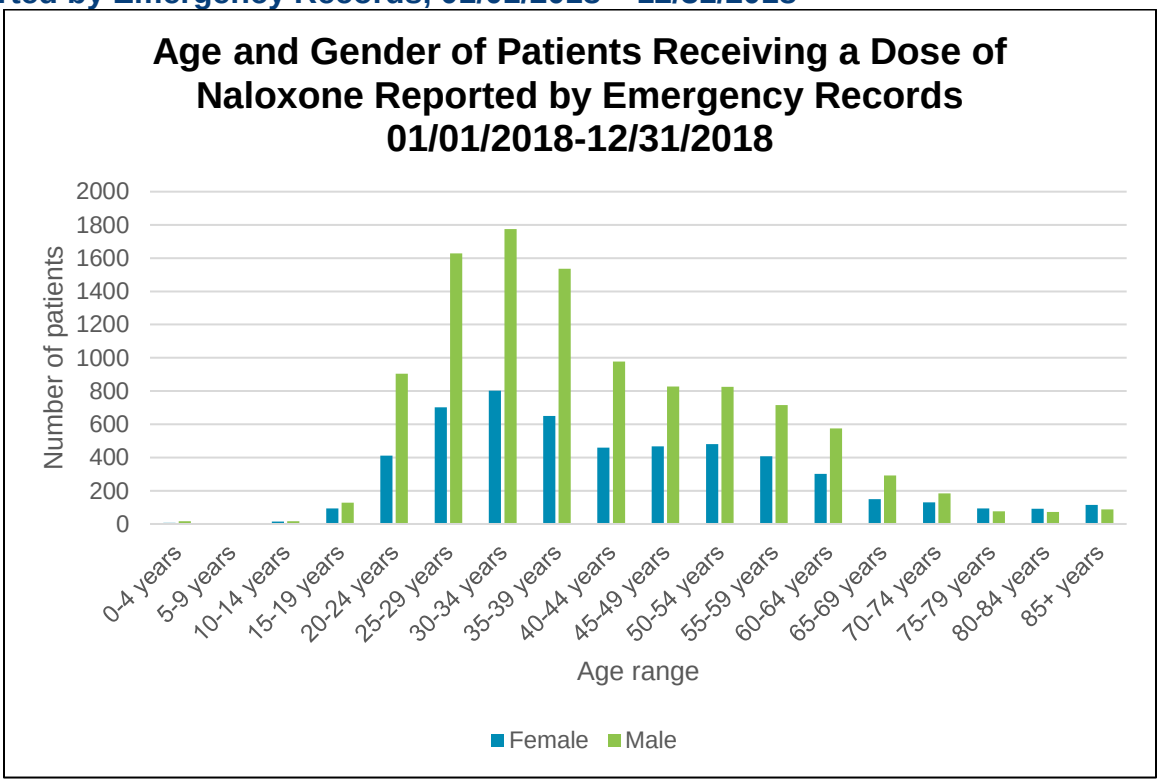
Table 3. EMS Responses by Day/Month, 01/01/2018 – 12/31/2018

Day	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3640	6138	5860	4704	6305	6360	5258	5724	5710	6200	6445	5378
2	4187	6157	**6685**	6088	6532	5486	6495	5794	5522	6422	**6662**	4942
3	4455	5172	5412	5955	6630	4864	6579	5759	5303	6316	5533	6156
4	4247	5065	4855	6355	6572	5857	5481	5332	6360	6471	5098	6160
5	4379	6606	6161	6358	5438	5876	6456	5228	6467	6294	6088	5893
6	3878	6218	5970	6380	4941	5802	6282	6108	6244	5748	6170	6029
7	3648	6071	5357	5422	5944	5887	5233	6009	6400	5390	6074	6129
8	4681	6191	6088	4866	5901	6163	4968	6152	5421	6286	6175	5096
9	4903	6314	6158	6213	5993	5475	6142	6195	4885	6243	6094	4704
10	4715	5331	5181	5977	5939	4778	6332	5991	6091	6244	5295	6200
11	4830	4794	4731	6265	5972	5851	6198	5256	6194	6318	4852	6058
12	5230	6158	6011	6232	5116	6090	6104	4848	6232	6223	5906	6058
13	4653	5968	6033	**6901**	4575	6056	6312	6067	6180	5384	5927	6153
14	4188	5818	6022	6168	6011	6212	5581	5949	6627	4935	5858	6087
15	5663	5799	6033	5097	6523	6149	4828	6113	5700	6165	6388	5287
16	6100	6317	6115	6384	6129	5645	6244	6287	5392	5927	6322	4914
17	5841	5163	5149	6075	5910	5029	5726	6297	6311	6010	5394	6029
18	6051	4600	4917	6263	6059	6484	5763	5499	6279	5964	5137	6102
19	6060	5732	5992	6018	4974	5997	5897	4977	6442	6165	6119	6129
20	5290	5994	6034	5972	4999	6167	5918	5888	6419	5397	5934	6081
21	4757	6324	5425	5061	6280	6024	5140	6078	6551	4821	5788	6445
22	6197	5807	5855	4953	5923	5903	4961	5917	5756	5912	4517	5200
23	5706	5928	6244	6194	6040	5029	5972	5929	5194	6214	5520	4919
24	5609	5055	5051	5933	6269	4969	6059	6367	6002	5859	5349	5281
25	5585	4640	4451	6130	6259	6027	6039	5521	5997	5846	4937	4311
26	5920	5954	5856	6006	5673	6078	6080	5080	6509	6271	6256	5904
27	5104	5784	5727	6065	4841	5821	6048	6416	5907	5551	6039	6053
28	4706	5980	5965	5363	4967	5933	5197	6441	6360	4893	5943	6268
29	5886		6067	4573	6116	6379	5320	6350	5772	6064	6176	5345
30	5927		5987	5894	6105	5815	5756	6218	5068	6002	6094	4950
31	5774		5188		5991		5849	6244		5984		5758

Source: Pennsylvania State EMS Data Bridge, 2019

Table 3 displays the total number of EMS responses by day and month based on values provided in the date/time unit dispatched field. The number of records, which are bolded, represent the three busiest days for EMS in 2018.

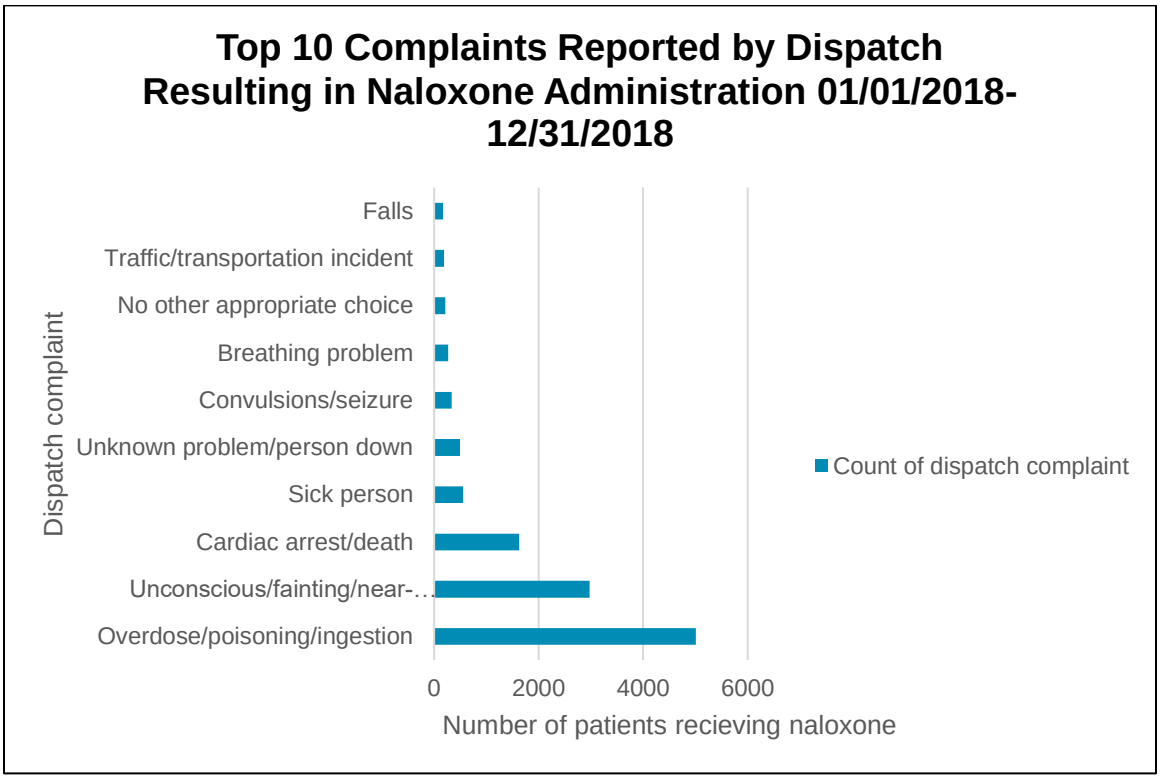
Figure 5. Age and Gender Distribution of Patients Receiving a Dose of Naloxone Reported by Emergency Records, 01/01/2018 – 12/31/2018



Source: Pennsylvania State EMS Data Bridge, 2019

Figure 5 shows that males in the 30-34 year age group are the most likely to be administered a dose of naloxone, compared to all other groups. This information is of particular importance to EMS and public health leaders alike in further refining the response to the opioid crisis.

Figure 6. Top 10 Complaints Reported by 911 Dispatch Resulting in Naloxone Administration Emergency Records Only, 01/01/2018 – 12/31/2018



Source: Pennsylvania State EMS Data Bridge, 2019

Figure 6 below displays the top 10 complaints reported by dispatch that resulted in naloxone administration by EMS.

Table 4. Reported Incident Location Type of Emergency Records Resulting in Naloxone Administration, 01/01/2018 – 12/31/2018

Incident Location Type	% of Incident Location
Agricultural site/farm	0.03%
Ambulatory surgery center	0.01%
Apartment	2.19%
Blank	19.33%
Cultural building	0.14%
Health care provider office	0.59%
Hospital	0.16%
Industrial or construction site	0.08%
Military installation or base	0.02%
Not applicable	0.54%
Not recorded	15.84%
Nursing home	0.63%
Other ambulatory health services establishments	0.06%
Other institutional residence	0.19%
Other place	4.62%
Other private residence	5.38%
Prison	0.19%
Private residence	42.92%
Public administrative building	1.16%
Recreation area	0.56%
Religious institution	0.11%
Retail building	3.15%
School	0.12%
Sidewalk	0.51%
Sports area	0.06%
Urgent care center	0.02%
Vehicle (transport)	1.29%
Wilderness area	0.10%

Source: Pennsylvania State EMS Data Bridge, 2019

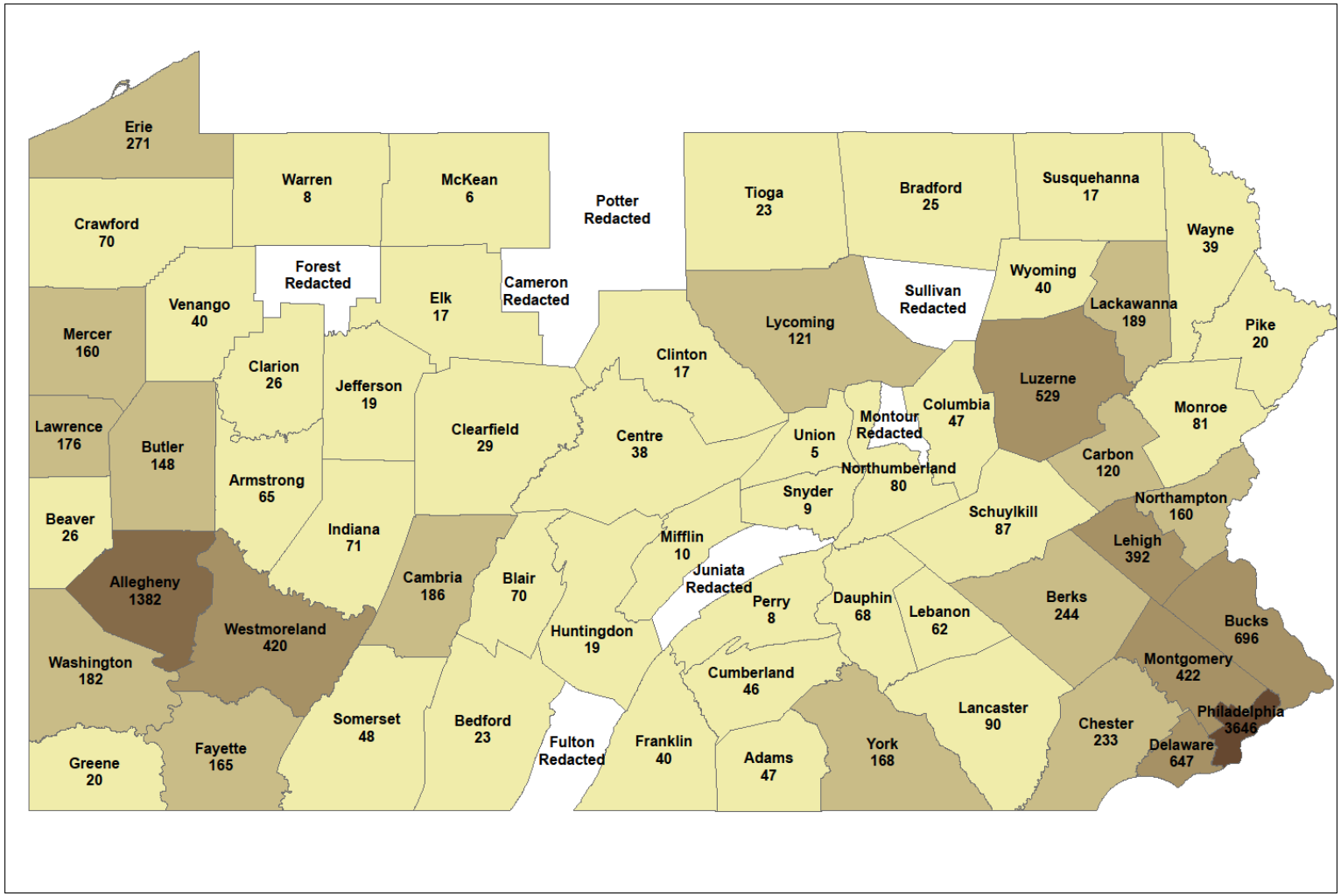
Table 4 displays the reported incident location where a patient received a dose of naloxone administered by EMS providers. Approximetely 50% of patient encounters of this type occurred in a private residence. Unfortunetly, nearly 35% of the submitted records were reported as blank or not recorded, which limits the applicability of this data. By increasing the accuracy of this measurement and active tracking of this metric, EMS can assist in the improvement of public health during the opioid crisis. This will allow public health partners and the Department to better focus local and regional needs for public access naloxone deployment.

Map 1 on the following page displays the count of unique emergency patient records by the incident county, which contained at least one administration of naloxone. Counties in white had less than 5 reported records. In accordance with Bureau reporting policies the information for these counties has been redacted to protect patient privacy.

Map 2 on page 18 displays the count of unique emergency patient records by the patients county of residence (when the state of residence was documented as Pennsylvania), which contained at least one administration of naloxone. Counties in white had less than 5 reported records. In accordance with Bureau reporting policies, the information for these counties has been redacted to protect patient privacy. This map does not account for individuals who had a documented residence outside of Pennsylvania.

It is important to note that significant differences between the county of incident compared to the county of residence may show travel patterns, which ultimately could be a helpful tool for EMS and other health care partners to focus on long term treatment.

Map 1: 2018 Count of Emergency Patients with an Administration of Naloxone by County

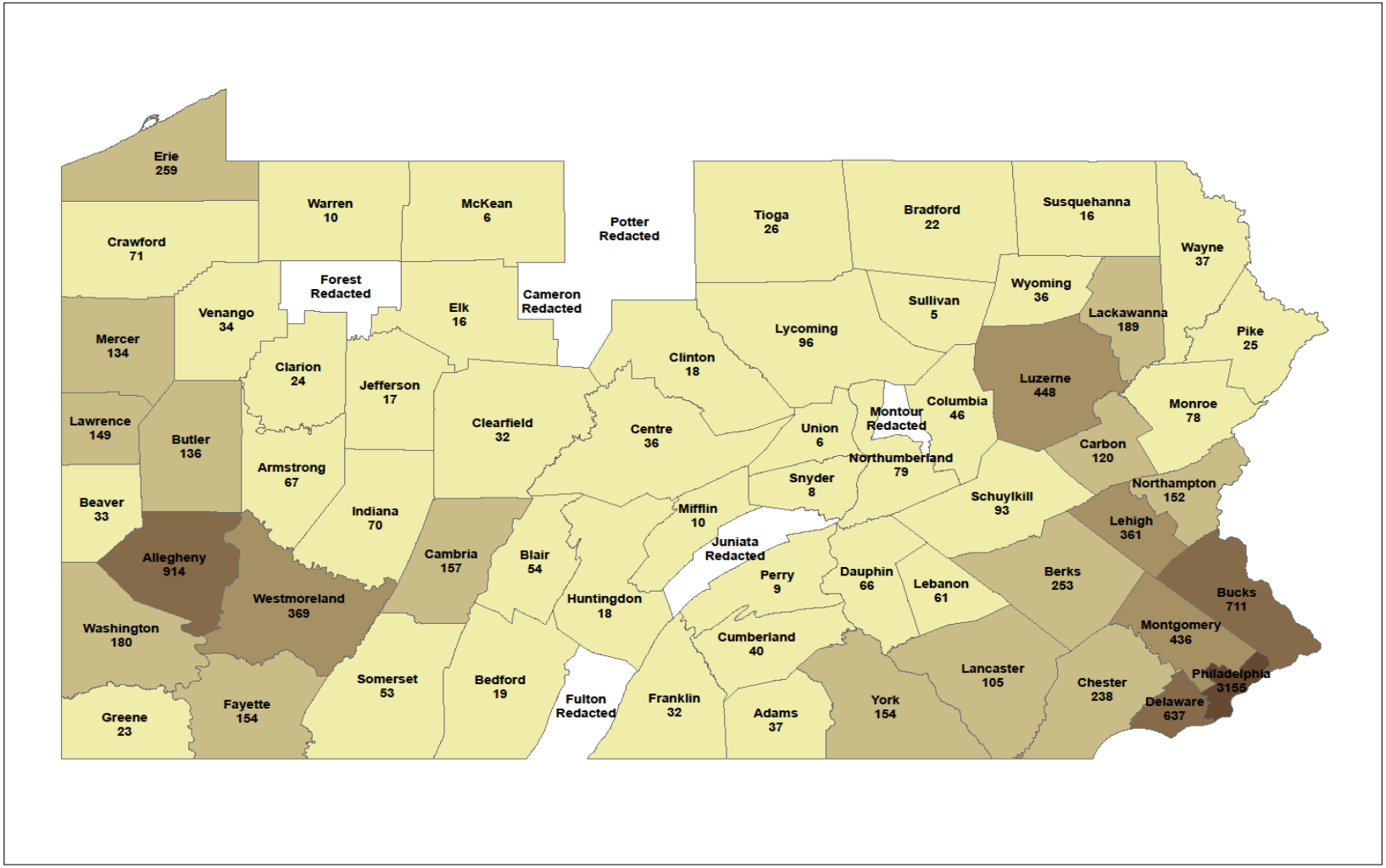


Legend

Patient count: 5 - 90 | 91 - 271 | 272 - 696 | 697 - 1382 | 1383 - 3646

Prepared by DJF 01/115/2019
Source: State EMS Data Bridge, 2019

Map 2: 2018 Count of Emergency Patients with an Administration of Naloxone by County of Residence

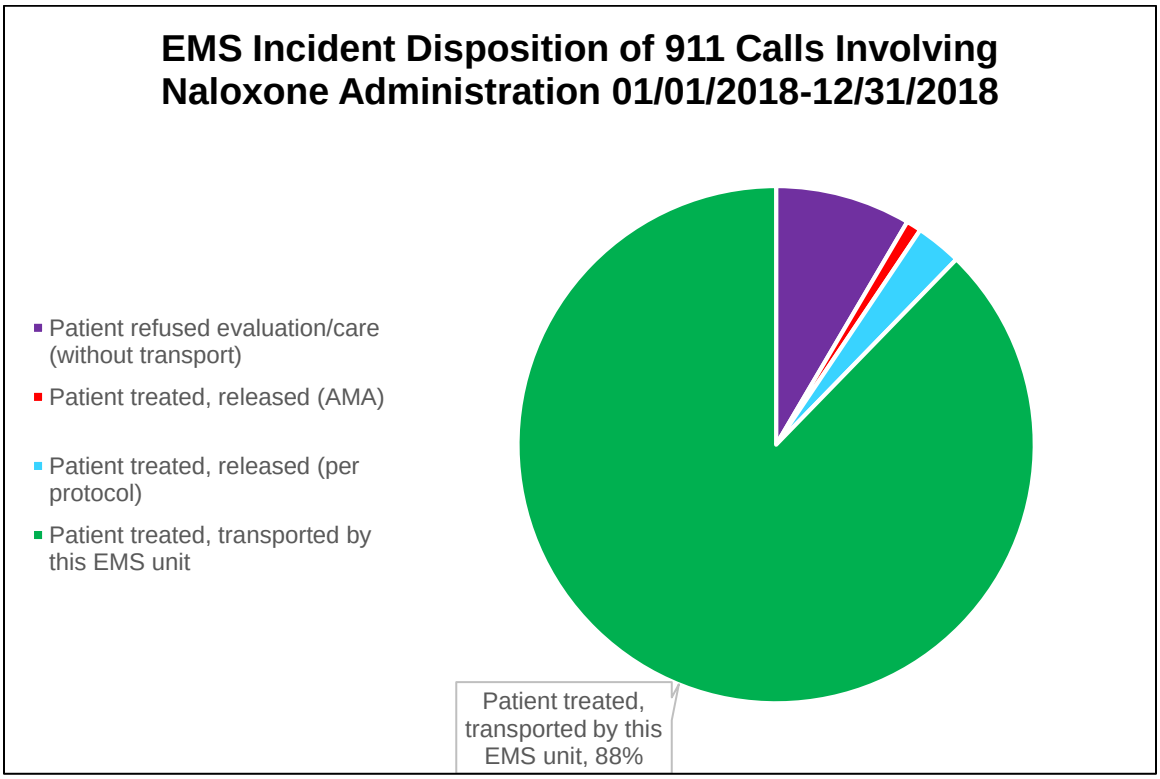


Legend

Patient count: 5 - 96 | 97 - 259 | 260 - 448 | 449 - 914 | 915 - 3155

Prepared by DJF 01/15/2019
Source: EMS State Data Bridge, 2019

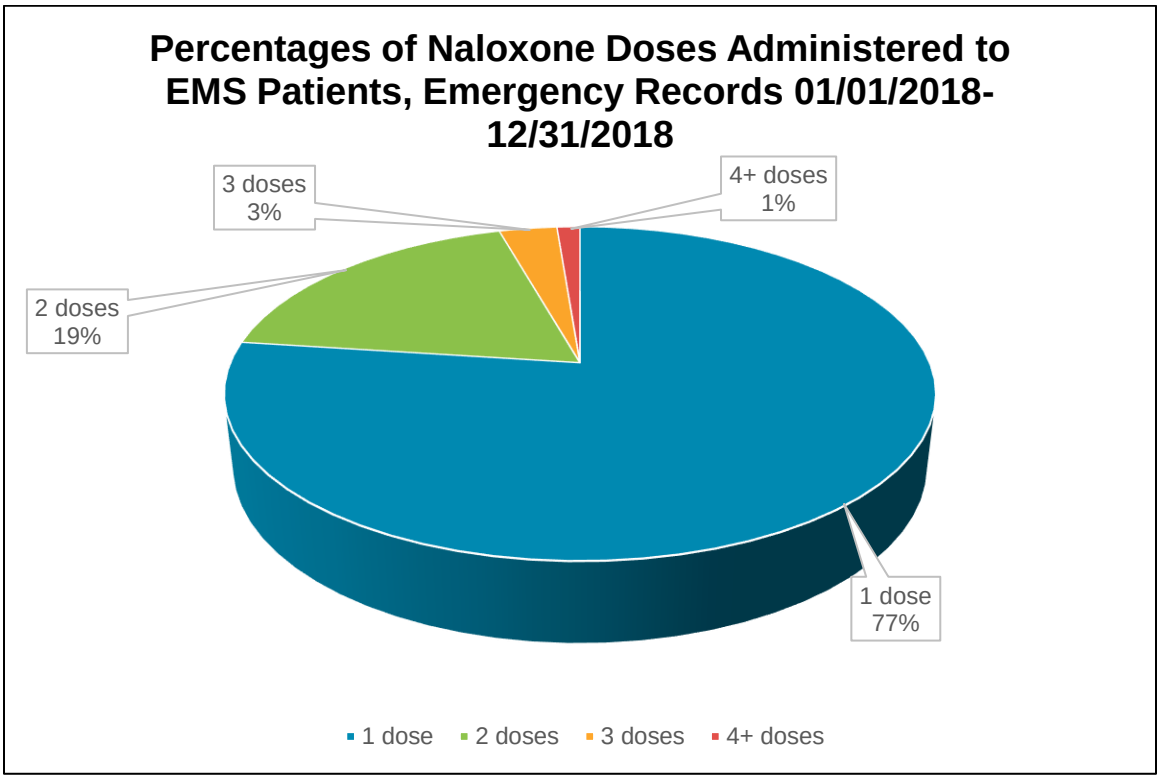
Figure 7. EMS Incident Disposition of Emergency Records Involving Naloxone Administration, 01/01/2018 – 12/31/2018



Source: Pennsylvania State EMS Data Bridge, 2019

Figure 7 above displays the transport vs. refusal dispositions for patients who received at least one dose of naloxone in the emergency out of hospital setting. Eighty-eight % of patients who have a documented dose of naloxone are ultimately transported to a health care facility for further evaluation and treatment. Tracking of this metric can assist state, regional and local leaders in identifying oppurtunities for participation in the EMS naloxone leave-behind program endorsed by the Department and the Bureau. The increase in effectiveness of data reporting in NEMSIS 3.4 not only allows stakeholers to better respond to the opioid crisis, but also to greatly improve other aspects of public health as well.

Figure 8. Percentages of Naloxone Doses Administered to EMS Patients, Emergency Records, 01/01/2018 – 12/31/2018



Source: Pennsylvania State EMS Data Bridge, 2019

Figure 8 provides a visual representation of the number of naloxone doses given to a single patient, as well as the frequency of that dosage number. In total, 77% of patients are given only one dose of naloxone, 19% required a follow-up dose, and only 1% required four or more doses of naloxone.

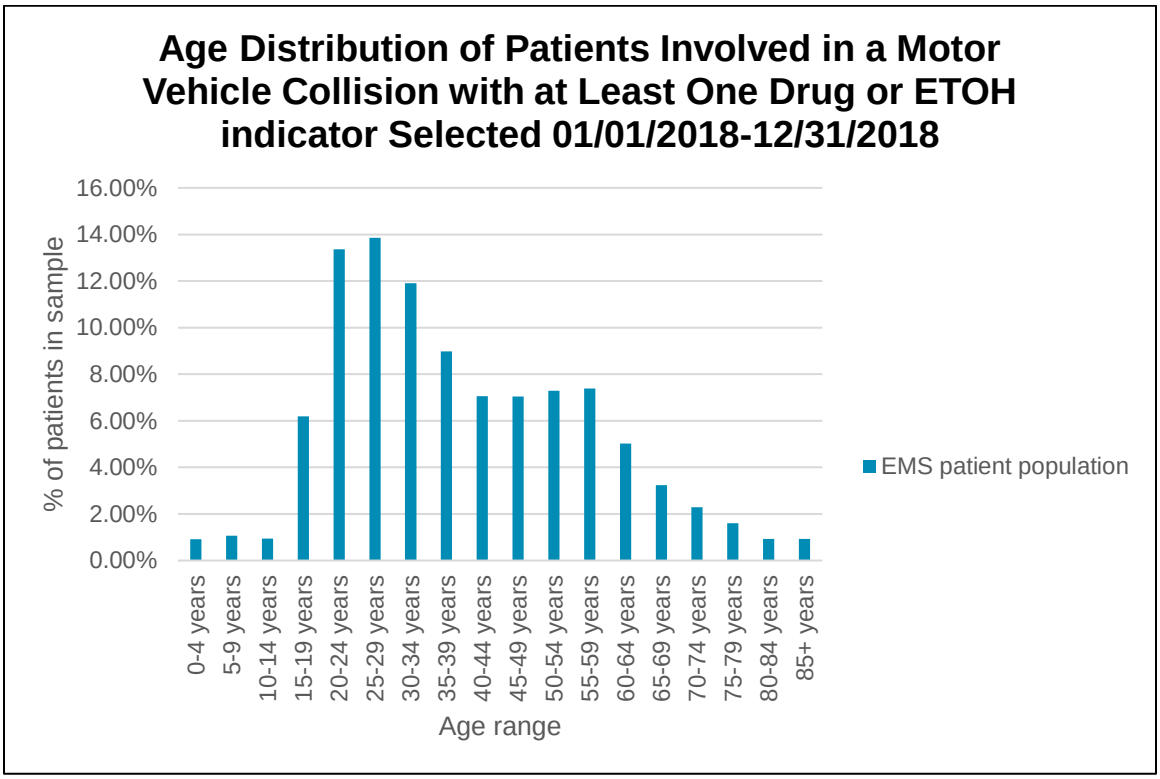
Table 5. Heat Map of total Naloxone Administrations by Day of Week and Hour, Emergency Records, 01/01/2018 – 12/31/2018

Hour	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
0:00	103	89	87	115	105	121	162
1:00	121	88	104	87	107	122	135
2:00	82	105	93	77	99	97	131
3:00	98	74	73	61	80	76	89
4:00	76	63	58	62	67	73	91
5:00	70	42	51	43	51	53	86
6:00	49	43	34	35	35	40	55
7:00	53	36	23	34	30	32	43
8:00	30	37	30	25	33	35	42
9:00	28	20	30	26	26	29	24
10:00	27	28	32	30	44	32	36
11:00	42	31	49	47	47	57	51
12:00	77	40	37	54	48	57	48
13:00	56	41	49	57	71	57	80
14:00	60	62	69	85	61	66	72
15:00	71	64	71	70	76	85	84
16:00	86	65	96	68	81	76	94
17:00	84	70	84	85	106	108	92
18:00	110	88	87	88	73	98	88
19:00	101	87	94	85	100	107	112
20:00	101	87	100	92	108	118	105
21:00	98	114	84	114	103	126	104
22:00	115	100	110	98	107	119	109
23:00	114	104	116	102	123	135	93

Source: Pennsylvania State EMS Data Bridge, 2019

Table 5 displays, via the heatmap method, naloxone administrations by EMS providers on emergency response calls. The day of week and time were extracted from the date/time that the EMS unit was dispatched. Shades of red and orange represent the highest number of doses, whereas shades of yellow and green represent lower numbers. The number of occurrences is included within the table for reference. Saturday mornings in the midnight hour had the highest number of doses.

Figure 9. Age Distribution of Patients Involved in a Motor Vehicle Collision with at Least One Drug or ETOH Indicator Selected Emergency Records, 01/01/2018 – 12/31/2018

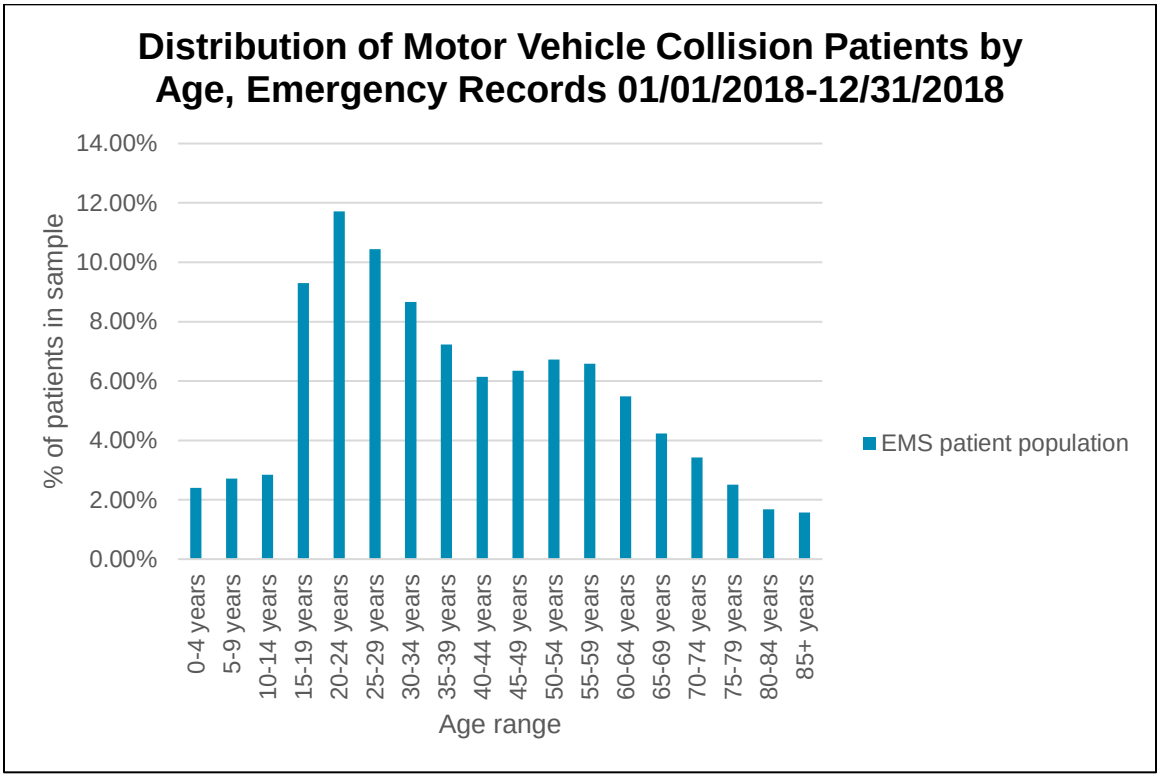


Source: Pennsylvania State EMS Data Bridge, 2019

Figure 9 displays the percentage of patients by age range that make up the population of patients that were involved in a motor vehicle collision for which there was at least one drug or alcohol factor documented. The greatest number of patients involved in all documented motor vehicle collisions with a drug or alcohol indicator was the 25- to 29-year-old age group.

Trauma Indicators

Figure 10. Distribution of Motor Vehicle Collision Patients by Age, Emergency Records, 01/01/2018 – 12/31/2018



Source: Pennsylvania State EMS Data Bridge, 2019

Figure 10 displays the percentage of patients by age range that make up the population of patients that were involved in a motor vehicle collision. The greatest number of patients involved in all documented motor vehicle collisions was the 20- to 24-year-old age group.

Table 6. Traumatic Mechanisim of Injury Type Emergency Records, 01/01/2018 – 12/31/2018

Trauma Type	% of Trauma Reports That Type Appears
Blunt	90%
Penetrating	6%
Burn	1%

Source: Pennsylvania State EMS Data Bridge, 2019

Table 6 summarizes the type of injury sustained in trauma records. In cases where multiple trauma types were documented in the same call, they were counted in each category. Percentages in the above table do not total 100, due to elimination of trauma types categorized as “other,” per patient care records.

Clinical Markers

Table 7. Top 25 EMS Provider Primary Impression, All Records, 01/01/2018 – 12/31/2018

Providers Primary Impression	Count of Providers Primary Impression
Acute pain not elsewhere classified	37948
Alcohol use, with intoxication	11051
Altered mental status	91559
Angina	9413
Back pain	14771
Cardiac arrest	14687
Cardiac arrhythmia/dysrhythmia	26604
Chest pain, other [non-cardiac]	57997
Death	9169
Encounter, adult, no findings or complaints	47258
Fever	8008
Generalized abdominal pain	136773
Headache	8188
Hypoglycemia	17409
Injury of head	13986
Injury, unspecified	138664
Malaise	19719
Reduced mobility	17802
Respiratory disorder	29381
Respiratory distress, acute	68413
Seizures with status epilepticus	19041
Seizures without status epilepticus	10894
Syncope and collapse	33980
TIA	18182
Weakness	78315

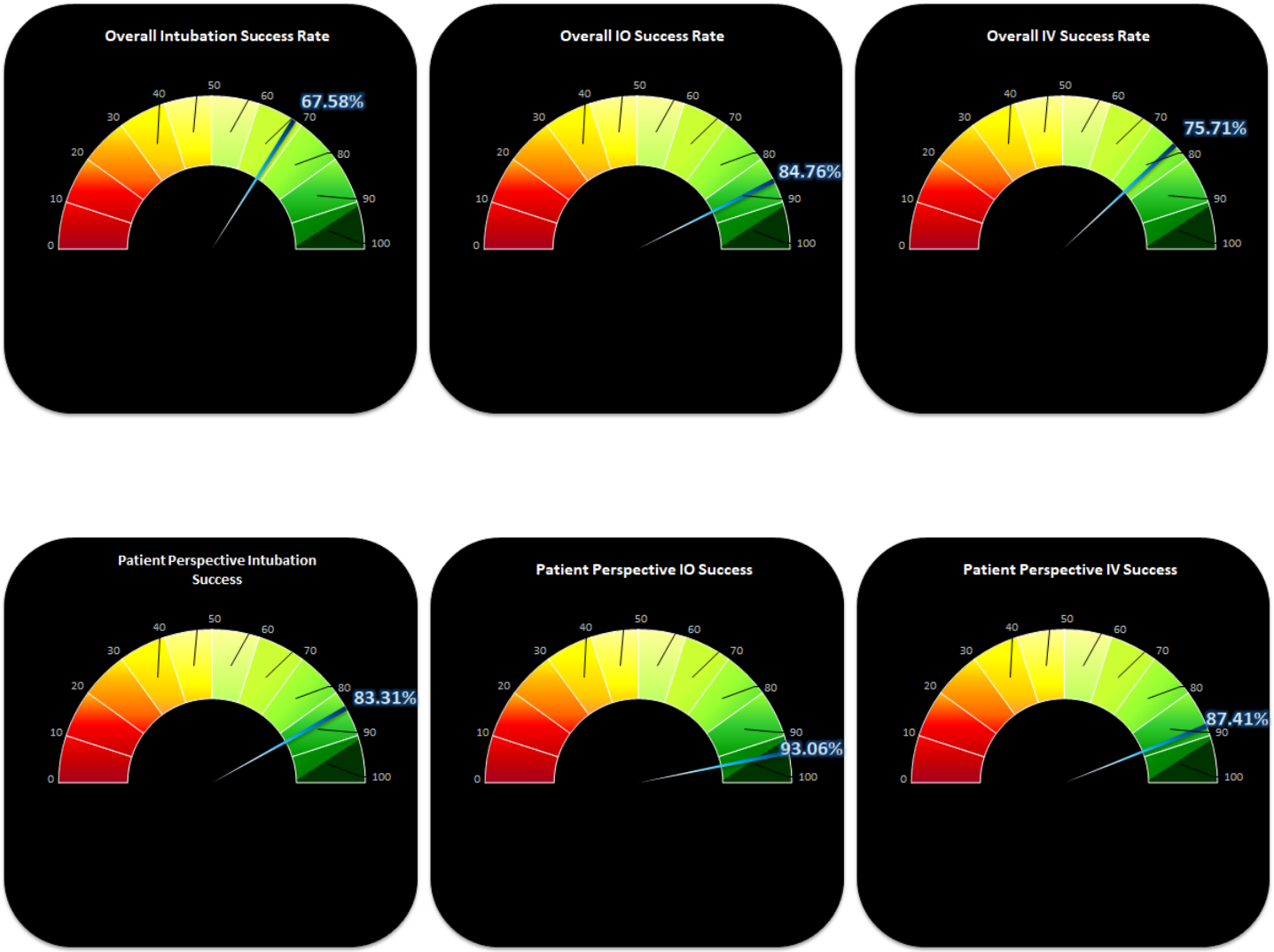
Source: Pennsylvania State EMS Data Bridge, 2019

Table 7 displays the top 25 provider primary impressions for all EMS calls for service between Jan. 1, 2018 and Dec. 31, 2018. Accurate reporting of primary impression creates an accurate picture as to the clinical severity and demographic of the patient population. Information such as this can help drive protocol development in the future.

Figure 11 on the following page displays the success rates for various Advanced Life Support (ALS) procedures. These statistics were compiled from all record types. ALS services are encouraged to utilize this data to benchmark their agencies performance against the commonwealth. Proficiency in these procedures is indicative of safe and quality pre-hospital care.

Statistics reported in row 1 of Figure 11 represent overall totals. This number is calculated by taking the total number of successes and dividing by the total number of attempts. Additionally, statistics reported in row 2 in Figure 11 come from the patient perspective. This number is calculated by taking the number of patients for whom the procedure was successful (regardless of number of attempts) and dividing it by the total number of patients who had the procedure performed.

Figure 11. Statewide Skill Percentages, 01/01/2018 – 12/31/2018



Source: Pennsylvania State EMS Data Bridge, 2019

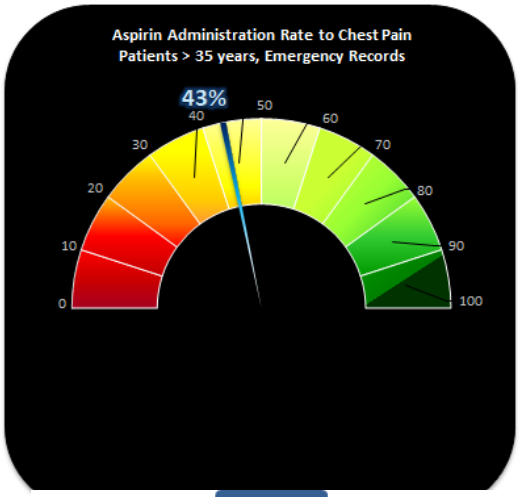
Figure 12 on the following page displays various clinical performance benchmarks. These statistics were calculated using only emergency records. EMS agencies can utilize these statewide averages as a way to benchmark their performance. The administration rate for aspirin in cases of chest pain is a metric utilized by the American Heart Association and is also part of the EMS Compass performance metric project.

Completion of a 12 lead electrocardiogram in the pre-hospital enviroment is one of many interventions that EMS can complete in the pre-hospital enviroment and, ultimately, influence the definitive care of the patient. This metric was further filtered to only count transports completed by an Advanced Life Support Ambulance.

Evidence based standards state that EMS scene times should be kept to a minimum and that timely transport to definitive care is the most effective treatment. Industry goals for stroke and ST segment elevated myocardial infarction (STEMI) scene times are 15 minutes or less.

Figure 12. Statewide Clinical Performance Metrics, 01/01/2018 – 12/31/2018

Average STEMI Scene Time, Emergency Records



Average Stroke Scene Time, Emergency Records

Source: Pennsylvania State EMS Data Bridge, 2019

Table 8. Medication Administration County, Emergency Records Only, 01/01/2018 – 12/31/2018

Medication Given	Total Count of Administrations
Acetaminophen (e.g., Tylenol, Anacin)	921
Adenosine (e.g., Adenocard)	2257
Albuterol (e.g., Proventil, Ventolin, AccuNeb)	39559
Albuterol/ipratropium (e.g., Combivent, Duoneb)	6850
Amiodarone (e.g., Cordarone)	1155
Aspirin	36787
Atropine	1919
Calcium chloride	287
Captopril (e.g., Capoten)	7
D10 (dextrose 10% per 250 ml)	1269
D10 (dextrose 10% per 500 ml	8
D25 (dextrose 25%)	90
D5 Injectable Solution (dextrose 5%)	352
D50 (dextrose 50% solution)	4236
Dexamethasone (e.g., Decadron)	206
Diazepam (e.g., Valium)	484
Diltiazem (e.g., Cardizem)	1349
Diphenhydramine (e.g., Bendadryl)	3039
Dopamine	98
Enalapril (e.g., Vasotec)	22
Epi 1:1,000 (epinephrine 1 mg/ml)	2597
Epi 1:10,000 (epinephrine 0.1 mg/ml)	33294
Epinephrine auto-injector, adult (0.3 ml of epi 1.0 mg/ml)	69
Epinephrine auto-injector, junior (0.3 ml of epi 0.5 mg/ml)	23
Epinephrine, Racemic HCl	24
Etomidate (e.g., Amidate)	487
Fentanyl	23494
Furosemide (e.g., Lasix)	83
Glucagon	1765
Glucose oral gel (e.g., Glutose, Insta-Glucose)	3692
Heparin	115
Hydrocortisone (e.g., Solu-Cortef)	9
Ipratropium (e.g., Atrovent)	2004
Ketamine (e.g., Ketalar)	773
Ketorolac (e.g., Toradol)	295
Labetalol (e.g., Normodyne)	16

Medication Given	Total Count of Administrations
Lactated Ringers (e.g., LR, RL)	170
Lidocaine	976
Lorazepam (e.g., Ativan)	2337
Magnesium sulfate	591
Mannitol (e.g., Osmitrol)	8
Methylprednisolone (e.g., Solu-Medrol)	11198
Midazolam	6411
Morphine	3416
Naloxone (e.g., Narcan)	16329
Nicardipine (e.g., Cardene)	29
Nitroglycerin	40916
Nitrous oxide	94
Norepinephrine (e.g., Levophed)	76
Ondansetron (e.g., Zofran)	32566
Oxytocin (e.g., Pitocin)	9
Phenytoin (e.g., Dilantin)	5
Propofol (e.g., Diprivan)	17
Rocuronium (e.g., Zemuron)	433
Sodium bicarbonate	979
Sodium chloride 3% injectable solution (NaCl 3%)	16
Succinylcholine (e.g., Anectine)	187
Tetracaine (e.g., Altacaine)	9
Vasopressin	9
Vecuronium (e.g., Norcuron)	56
Verapamil	119

Source: Pennsylvania State EMS Data Bridge, 2019

Table 8 displays the number of medication administrations by EMS providers during an emergency record type call. Normal saline and oxygen were excluded. In addition, any medication that had less than 5 administrations was excluded from publishing. This table also reflects any medications administered and documented by an air ambulance on a scene flight.

Table 9 on pages 32-33 display the frequency with which an EMS procedure was performed on an emergency record type EMS call. These procedures are unduplicated counts, which means that, even if a procedure was performed on a single patient multiple times, it was only counted once. Finally, it is not indicative of a successful completion of the procedure; it only captures the number of patients on which a procedure was attempted. Any procedure that had less than 5 attempts was excluded from publishing. This table also reflects any procedures performed and documented by an air ambulance on a scene flight.

Table 9. Procedure Counts, Emergency Records Only, 01/01/2018 – 12/31/2018

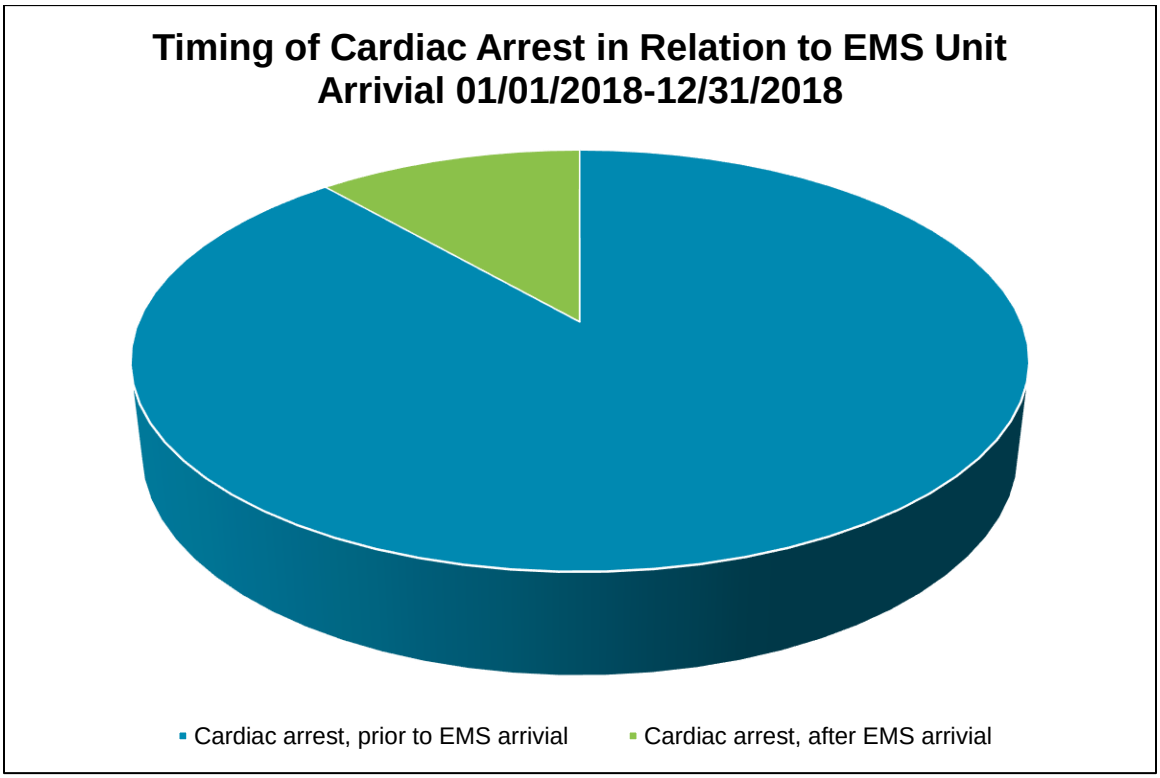
Procedure	Number of Patients
12 Lead ECG Obtained	153443
15 Lead ECG Obtained	373
18 Lead ECG Obtained	29
3 Lead ECG Obtained	68539
Airway device removal	82
Airway opened	606
Artery, blood draw	9
Artery, insertion of catheter (unspecified)	960
Assisted ventilations (via mask)	7810
Assisted ventilations (via tube)	1210
BiPAP	34
Blood product, unspecified	526
Burn care	880
Cardioversion	236
Central line care	28
Central venous pressure monitoring	40
Cervical collar applied	21424
Chest compressions (mechanical device)	2028
Childbirth	173
Contact medical control	376168
CPAP	7500
CPR, manual	5792
Cricothyrotomy, surgical	9
C-spine stabilization, manual	1303
decontamination	13
Defibrillation, AED	119
Defibrillation, manual	1800
ETCO2 colorimetric detection	8
ETCO2 digital capnography	1356
Eye irrigation	19
Fetal heart monitor surveillance	12
Foreign body removal	84
General wound care	7282
Heimlich maneuver	36
Hemostatic agent	920
Immobilization using long board	5563
Immobilization using short extrication Splint	524
Impedance threshold device	106
Induction, rapid sequence	345
Intracranial pressure monitoring	189
Intubation, existing tracheostomy stoma	12
Intubation, nasal	103

Procedure	Number of Patients
Intubation, oral	5380
Intubation, retrograde	8
IO cannulation	9594
Laryngeal mask airway insertion	22
Laryngoscopy, direct	483
Laryngoscopy, indirect (e.g., video laryngoscopy)	79
Left ventricular assist device care	11
Mouth-to-mask/mouth ventilation	8
Nasal airway insertion	3553
Nasogastric tube insertion	28
Needle decompression	329
Occlusive dressing	290
Oral airway insertion	2278
Orogastric tube insertion	77
Orthostatic vital signs	3255
Pacing, cardiac	938
Patient cooling (cold pack or general)	1791
Patient warming (warm pack or general)	220
PEEP applied	9
Physical assessment	55358
Precordial thump	17
Pressure dressing	3084
Restraint applied, chemical	31
Restraint applied, physical	1279
Spinal immobilization, cervical	10427
Spinal immobilization, full	2873
Splinting, general	5489
Splinting, pelvic binder/sling	306
Splinting, traction	230
Suction airway	4190
Supraglottic airway insertion (double lumen)	515
Supraglottic airway, single lumen (i.e., King)	125
Tourniquet	308
Vagal maneuver	430
Vascular access via existing port (i.e., Portacath)	1127
Vein, blood draw	10939
Vein, catheter removal	315
Vein, external jugular	1855
Vein, extremity	316146
Vein, femoral	647
Ventilator care and adjustment	488

Source: Pennsylvania State EMS Data Bridge, 2019

Cardiac Arrest

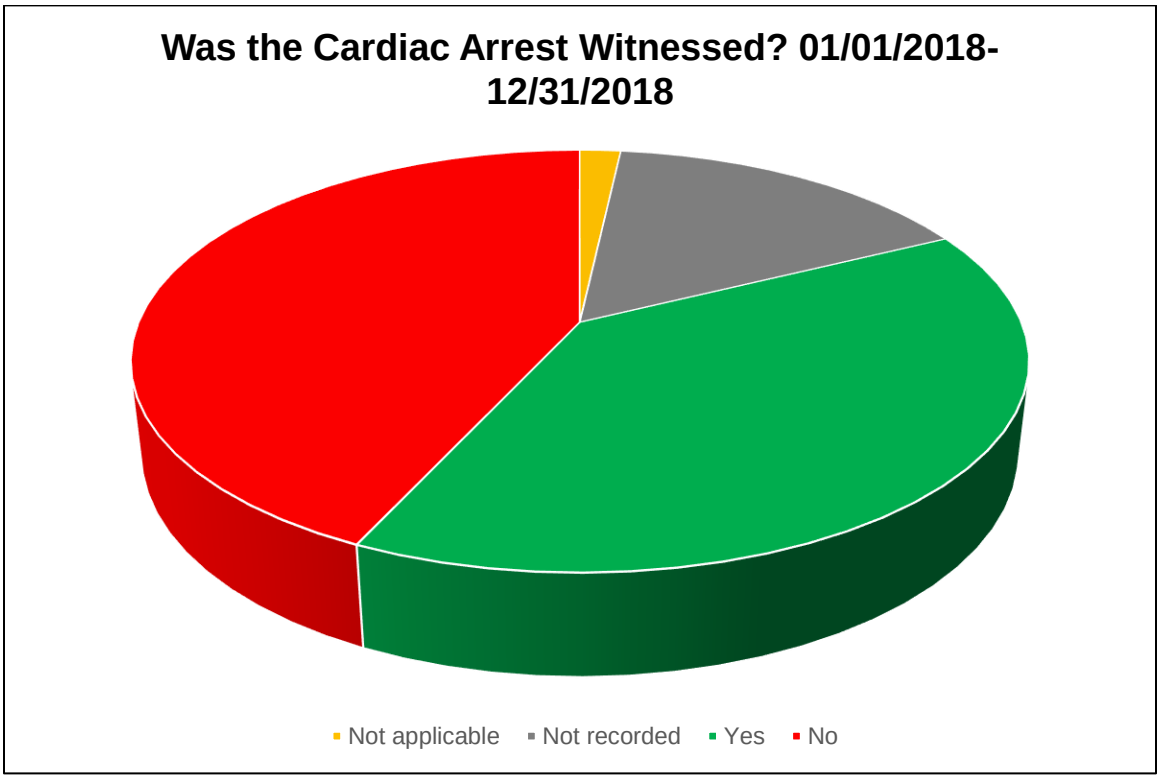
Figure 13. Timing of Cardiac Arrest in Relation to EMS Unit Arrivial, 01/01/2018 – 12/31/2018



Source: Pennsylvania State EMS Data Bridge, 2019

Figure 13 shows that approximately 90% of the cardiac arrests documented by EMS providers occurred prior to the arrival of an EMS unit.

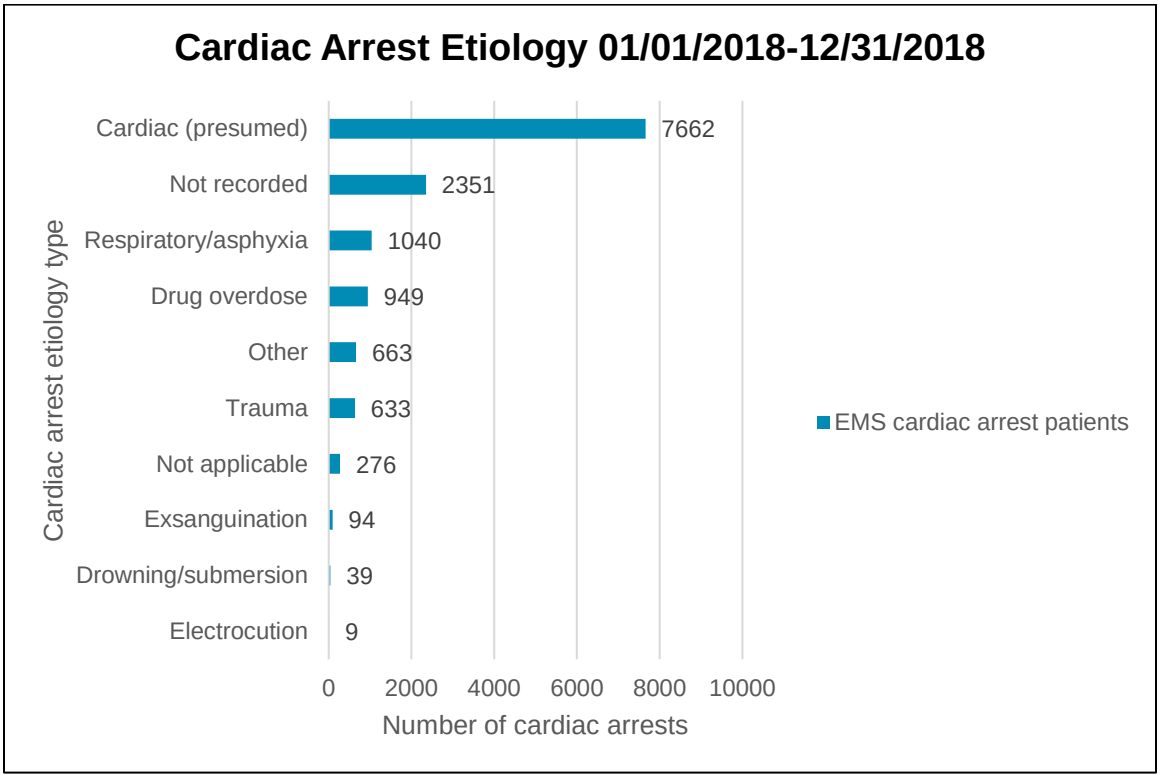
Figure 14. Was the Cardiac Arrest Witnessed?, 01/01/2018 – 12/31/2018



Source: Pennsylvania State EMS Data Bridge, 2019

Activation of the EMS system is the first step in the cardiac arrest chain of survival. When a cardiac arrest is witnessed by a family member or bystander, that activation can occur sooner and ultimately give the patient a greater chance of survival. Even more so when it is combined with bystander CPR. Figure 14 shows that only 39% of reported cardiac arrests were witnessed. Eighteen percent of reported cardiac arrests did not have this value recorded, so there exists the possibility that this metric is higher than reported.

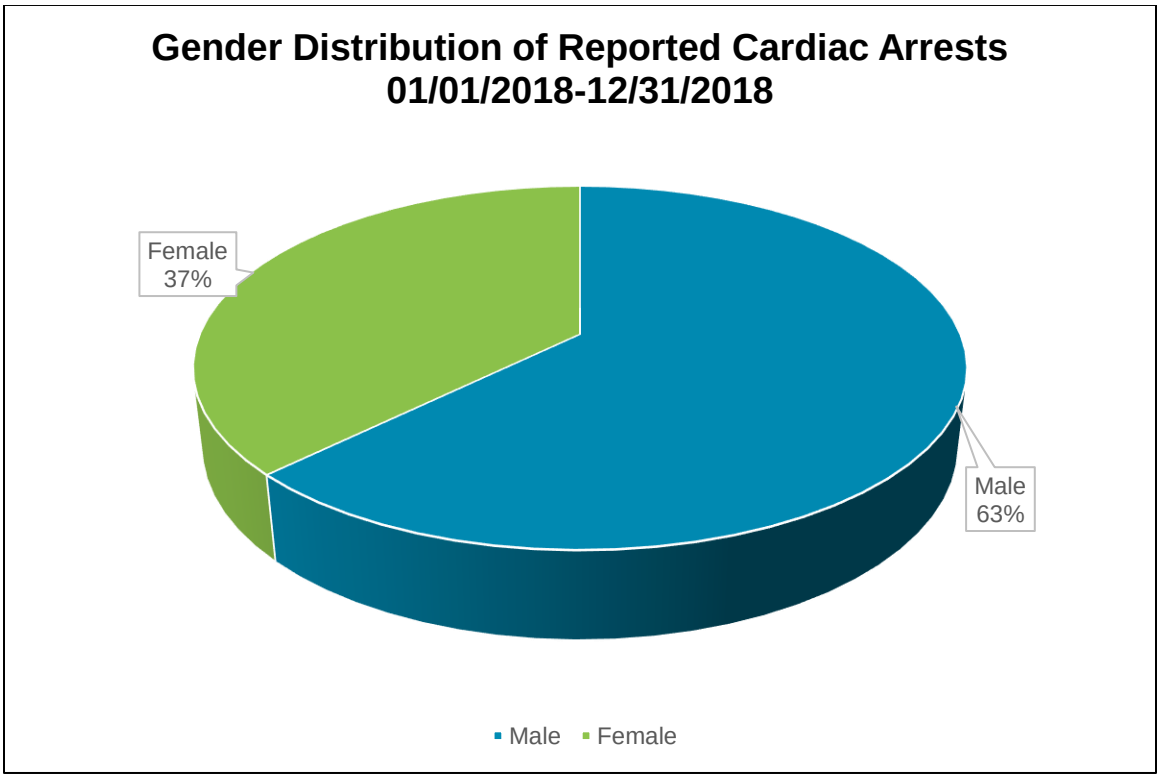
Figure 15. Statewide Cardiac Arrest Etiology, 01/01/2018 – 12/31/2018



Source: Pennsylvania State EMS Data Bridge, 2019

Figure 15 displays the etiology of cardiac arrests reported to the Department. The overwhelming number of these arrests were categorized Cardiac (presumed). Based upon this information, Pennsylvania's cardiac arrest etiology breakdown is consistent with national statistics based on previous CARES reports.

Figure 16. Gender Distribution of Reported Cardiac Arrests, 01/01/2018 – 12/31/2018



Source: Pennsylvania State EMS Data Bridge, 2019

Figure 16 summarizes the gender distribution of reported cardiac arrests. In the cardiac arrests that were reported to the data bridge, males had nearly two times the number of out-of-hospital cardiac arrests compared to females.

Table 10. Reason CPR or Resucitation Discontinued by EMS, 01/01/2018 – 12/31/2018

Reason CPR/Resuscitation Discontinued	Count of Reason CPR/Resuscitation Discontinued
DNR	300
Medical control order	2510
Not applicable	795
Not recorded	6429
Obvious signs of death	1258
Physically unable to perform	10
Protocol/policy requirements completed	364
Return of spontaneous circulation (pulse or BP noted)	2050

Source: Pennsylvania State EMS Data Bridge, 2019

Table 10 displays the breakdown of reason for discontinuing CPR and/or other resuscitative efforts. Other than for medical control order and values not being reported, return of spontaneous circulation was a top reason for discontinuation of efforts

Table 11. End of EMS Cardiac Arrest Event, 01/01/2018 – 12/31/2018

End of EMS Cardiac Arrest Event	Count of End of EMS Cardiac Arrest Event	Percentage of End of EMS Cardiac Arrest Event
Expired in ED	2661	19.40%
Expired in the field	5114	37.28%
Not applicable	584	4.26%
Not recorded	1386	10.10%
Ongoing resuscitation by other EMS	78	0.57%
Ongoing resuscitation in ED	1527	11.13%
ROSC in the ED	685	4.99%
ROSC in the field	1681	12.26%

Source: Pennsylvania State EMS Data Bridge, 2019

Table 11 summarizes the final EMS status of all patients whom were reported in cardiac arrest. The best metric for evaluating cardiac arrest performance is neurologically intact survival. However, currently, there is no mechanism to collect ultimate outcome information in the state data bridge.

The Bureau recommends that all EMS agencies participate in the CARES (Cardiac Arrest Registry to Enhance Survival) project. CARES is a registry that tracks cardiac arrest survival and includes a mechanism for collecting the final hospital outcomes; it is the current gold

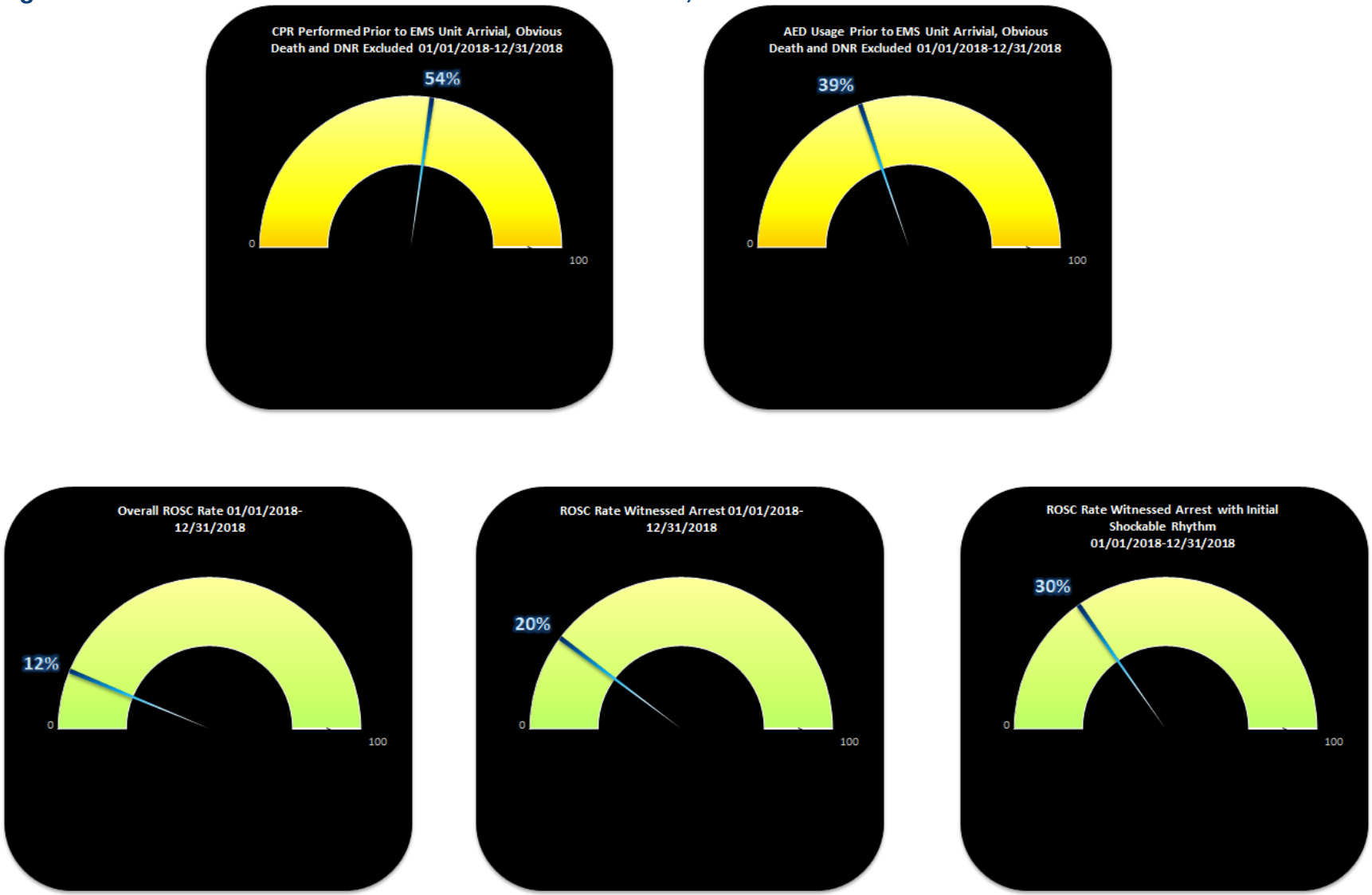
standard in tracking cardiac arrest statistics in the nation. Currently, only 151 of EMS agencies in the commonwealth participate in the CARES project.

The statistics included in figure 17 on page 40 focus largely on return of spontaneous circulation (ROSC). For the purposes of this report, ROSC was counted if it was documented as sustained for at least 20 minutes, and/or was documented as ROSC on arrival to the emergency department.

There are three separate ROSC rates. The first looks at all cardiac arrests that were presumed cardiac in nature, excluding those with a do-not-resuscitate (DNR) order, and cases where obvious death was documented. The second looks at the same sample but with an additional filter that the cardiac arrest was witnessed. The third incorporates the characteristics of the first two but has an additional filter of the initial rhythm for EMS being a shockable rhythm.

Rates of CPR and AED usage prior to EMS arrival are also included to gauge the success of bystander education programs.

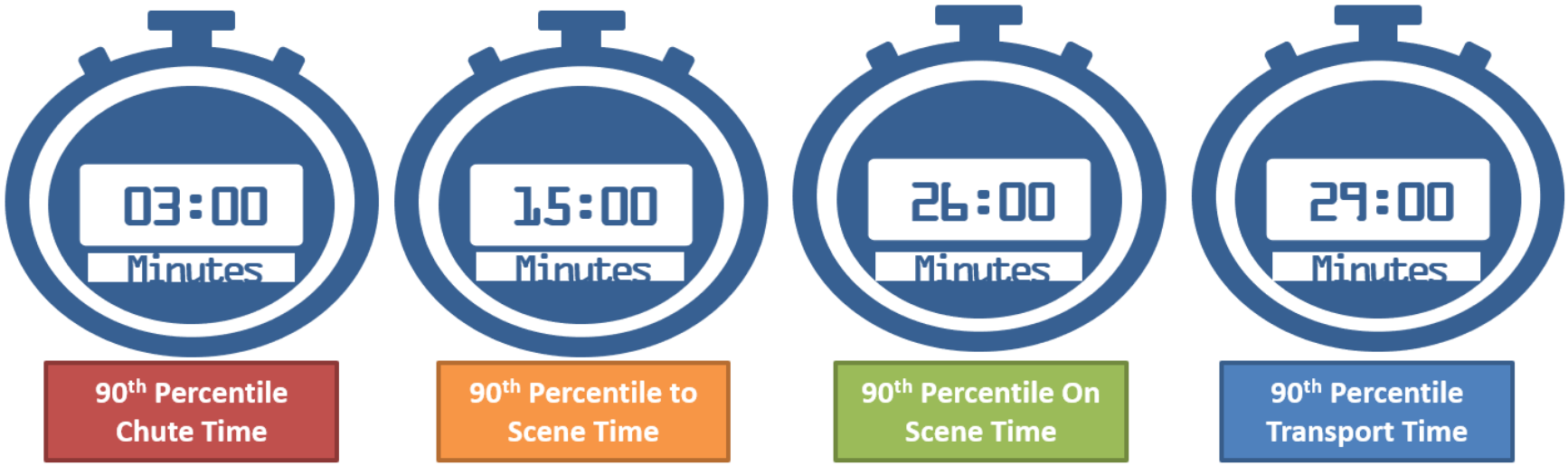
Figure 17. Statewide Cardiac Arrest Performance Metrics, 01/01/2018 – 12/31/2018



Source: Pennsylvania State EMS Data Bridge, 2019

Response Time

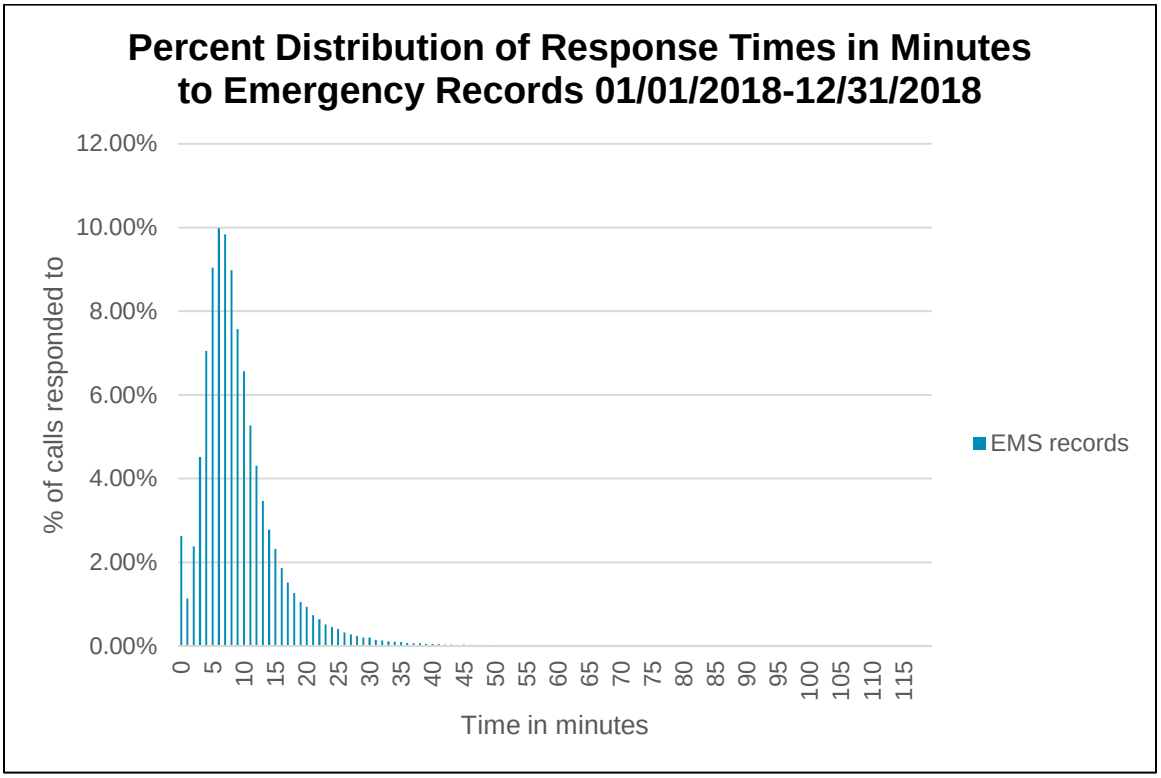
Figure 18. Statewide 90th Percentile Interval Times, Emergency Records Only 01/01/2018 – 12/31/2018



Source: Pennsylvania State EMS Data Bridge, 2019

Figure 18 displays the statewide 90th percentile times for emergency calls for service for various intervals. Response time is a commonly requested metric. To calculate the 90th percentile response time, we can add the 90th percentile chute time and the 90th percentile to scene time. The commonwealth's 90th percentile response time is 18 minutes. This means that 90 percent of emergency calls in the commonwealth are responded to and an EMS agency is on scene in 18 minutes. Chute time is the interval between a unit being notified by dispatch of a call for service and the unit being en route to the call.

Figure 19. Percent Distribution of Response Times in Minutes, Emergency Records, 01/01/2018 – 12/31/2018



Source: Pennsylvania State EMS Data Bridge, 2019.

Figure 19 displays the percentage of emergency record type calls that are responded to in each minute of elapsed time. Nearly 70% of emergency calls for service received a response time of 10 minutes or less. Response time is measured from the time that the unit was notified by dispatch to the time that the unit arrived on scene. Both data points had to be present to be calculated. Ninety percent of records submitted had both points present for analysis. Table 12 on pages 43 through 45 provides detailed county level information related to response time.

Table 12. Response Time Information by County, Emergency Records Only, 01/01/2018 – 12/31/2018

County	Number of Valid Records	90th Percentile Response Time (Minutes)	Average Response Time (Minutes)	Median of Response Time (Minutes)
Adams	7520	16.00	9.73	9.00
Allegheny	180423	16.00	9.37	8.00
Armstrong	8799	21.00	12.02	10.00
Beaver	3890	18.00	11.32	10.00
Bedford	5018	24.00	13.32	11.00
Berks	37203	15.00	9.00	8.00
Blair	19784	13.48	7.65	6.22
Bradford	7986	23.00	11.17	8.00
Bucks	47348	13.00	8.77	8.00
Butler	21424	16.00	9.16	8.00
Cambria	22882	14.00	8.71	8.00
Cameron	1137	30.00	14.54	9.00
Carbon	8627	21.00	11.35	10.00
Centre	12777	20.00	11.46	10.00
Chester	47055	13.00	8.28	8.00
Clarion	4631	18.00	9.51	8.00
Clearfield	11014	21.00	11.02	9.00
Clinton	3859	21.00	12.09	10.00
Columbia	7891	21.00	11.80	10.00
Crawford	9124	20.00	10.37	8.00
Cumberland	13219	13.62	8.42	7.98
Dauphin	19533	15.00	9.02	8.00
Delaware	66356	10.00	6.71	6.00
Elk	3482	19.00	9.98	8.00
Erie	32259	16.00	9.14	8.00
Fayette	20957	18.00	9.53	8.00
Forest	774	28.00	13.63	11.00
Franklin	11943	14.00	8.50	7.58

County	Number of Valid Records	90th Percentile Response Time (Minutes)	Average Response Time (Minutes)	Median of Response Time (Minutes)
Fulton	787	26.00	16.40	15.00
Greene	4963	26.00	13.84	11.00
Huntingdon	3692	27.00	14.28	12.00
Indiana	8053	21.00	12.43	11.00
Jefferson	4890	20.00	10.87	10.00
Juniata	3586	18.00	10.81	10.00
Lackawanna	30468	15.00	7.99	6.62
Lancaster	26257	15.13	9.12	8.25
Lawrence	12651	20.00	10.51	9.00
Lebanon	11912	15.50	8.65	7.52
Lehigh	36807	13.67	8.26	7.00
Luzerne	36375	15.00	8.75	7.00
Lycoming	17038	17.00	9.77	8.00
McKean	2952	19.00	9.07	7.00
Mercer	13947	17.00	9.08	7.00
Mifflin	4227	18.00	10.06	9.00
Monroe	8627	21.00	12.28	11.00
Montgomery	51096	12.00	7.74	7.00
Montour	1661	33.00	14.59	9.52
Northampton	27365	14.00	8.34	8.00
Northumberland	15258	18.00	9.24	7.00
Perry	3217	24.00	13.84	12.80
Philadelphia	265034	16.00	8.92	8.00
Pike	4738	25.00	14.33	13.00
Potter	1724	33.00	17.02	14.00
Schuylkill	13599	20.00	11.36	10.00
Snyder	3120	22.00	12.66	11.00
Somerset	8683	20.00	10.90	10.00
Sullivan	1045	42.00	24.06	24.00
Susquehanna	4271	27.31	16.04	15.00
Tioga	6370	30.00	14.30	11.99

County	Number of Valid Records	90th Percentile Response Time (Minutes)	Average Response Time (Minutes)	Median of Response Time (Minutes)
Union	7430	15.00	8.22	7.00
Venango	6477	19.00	9.68	8.00
Warren	3608	19.65	9.77	7.56
Washington	29438	19.00	10.32	9.00
Wayne	6340	27.00	14.60	13.00
Westmoreland	106180	20.00	10.09	9.00
Wyoming	4374	23.73	13.56	12.00
York	28315	14.37	8.69	8.00

Source: Pennsylvania State EMS Data Bridge, 2019

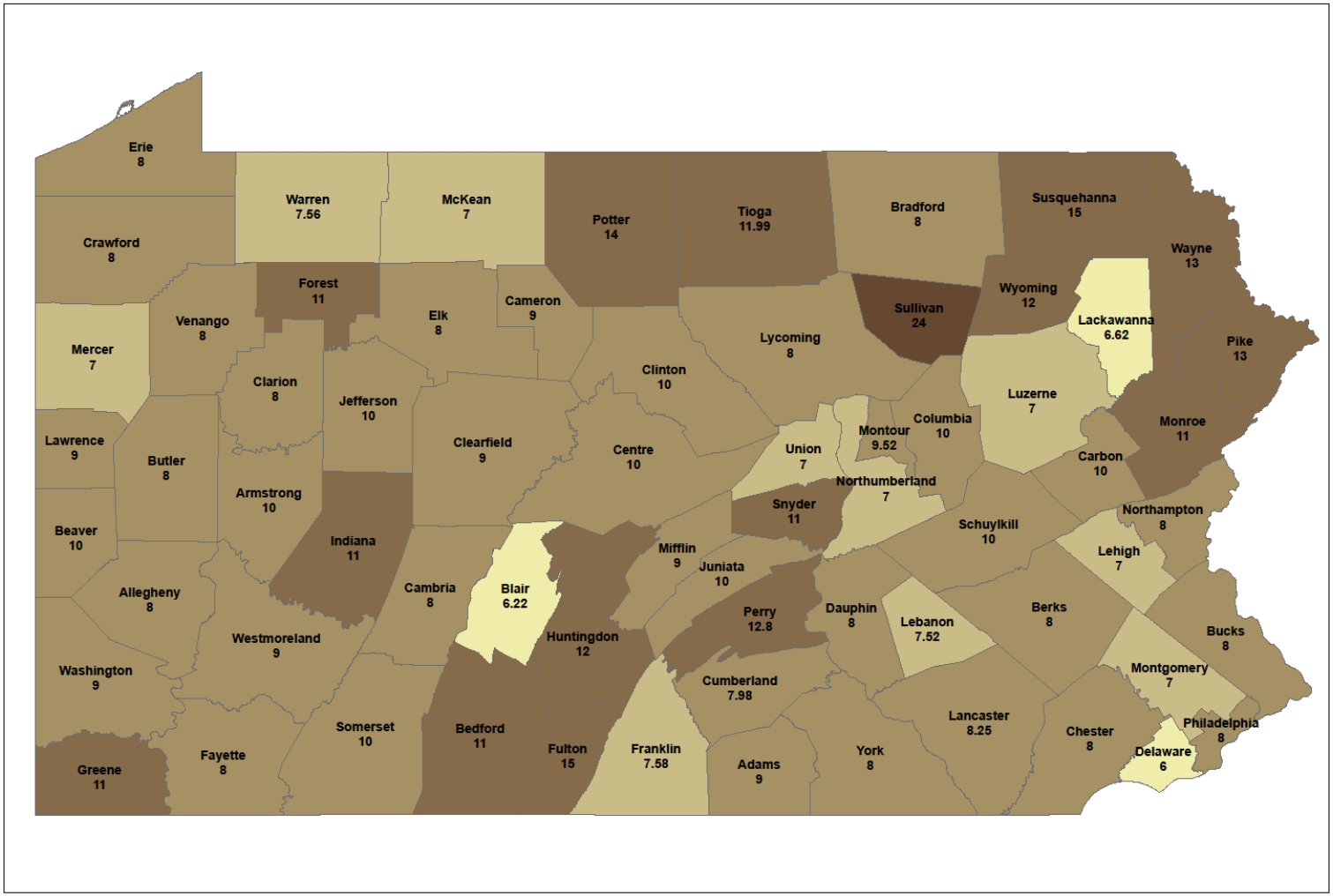
Response time is defined as the difference between the EMS unit's arrival on scene and the time notified by dispatch. Both data points had to be present to be calculated. Most of the records rejected in data analysis to create this calculation did not have a dispatch time present. This lack of data is attributed to the accuracy of the information provided by field providers

Included in the table are the number of valid records as defined above, the 90th percentile response time, the average response time and the median response time. The 90th percentile indicates that 90% of emergency calls for service in the selected county are answered in that time frame. The average response time is calculated by adding all the response times together and dividing by the total number of records. Finally, the median response time is also included; the median is calculated by listing the response time of all the applicable records and selecting the one that is in the middle. The median can also be referred to as the 50th percentile, meaning 50 percent of calls are answered in less time and 50 percent are answered in more time.

These figures are provided as a benchmark and are provided for a high-level overview. Because of variations in data reporting and validity, the Bureau encourages anyone who has specific questions regarding response times in their jurisdiction to contact their local 911 center, particularly if the number of valid records is not consistent with what is expected for the county.

Map 3 on the following page provides a visual representation of the median response time by incident county**.**

Map 3: 2018 Median Response Time for Emergency Records by County in Minutes



Legend

Median of response time in minutes: 6.00 - 6.62 | 6.63 - 7.58 | 7.59 - 10.00 | 10.01 - 15.00 | 15.01 - 24.00

Prepared by DJF 01/15/2019
Source: EMS State Data Bridge, 2019

EMS Workforce

Table 13. Number of Pennsylvania EMS Certifications Expiring, by Certification Type, 01/01/2018 – 12/31/2018

Primary Certification	Number of Certifications Expiring
EMSVO	16
EMR	602
EMT	2827
AEMT	9
Paramedic	531
PHRN	157

Source: Pennsylvania State EMS Certification Registry, 2019

Table 13 summarizes the number of individuals by certification type that allowed their certification to expire in 2018. The EMT certification level had the most expirations. The number of paramedic expirations may be artificially low, due to the process of transitioning all paramedic certifications to expire on the last day of December in odd numbered years, pursuant to regulation.

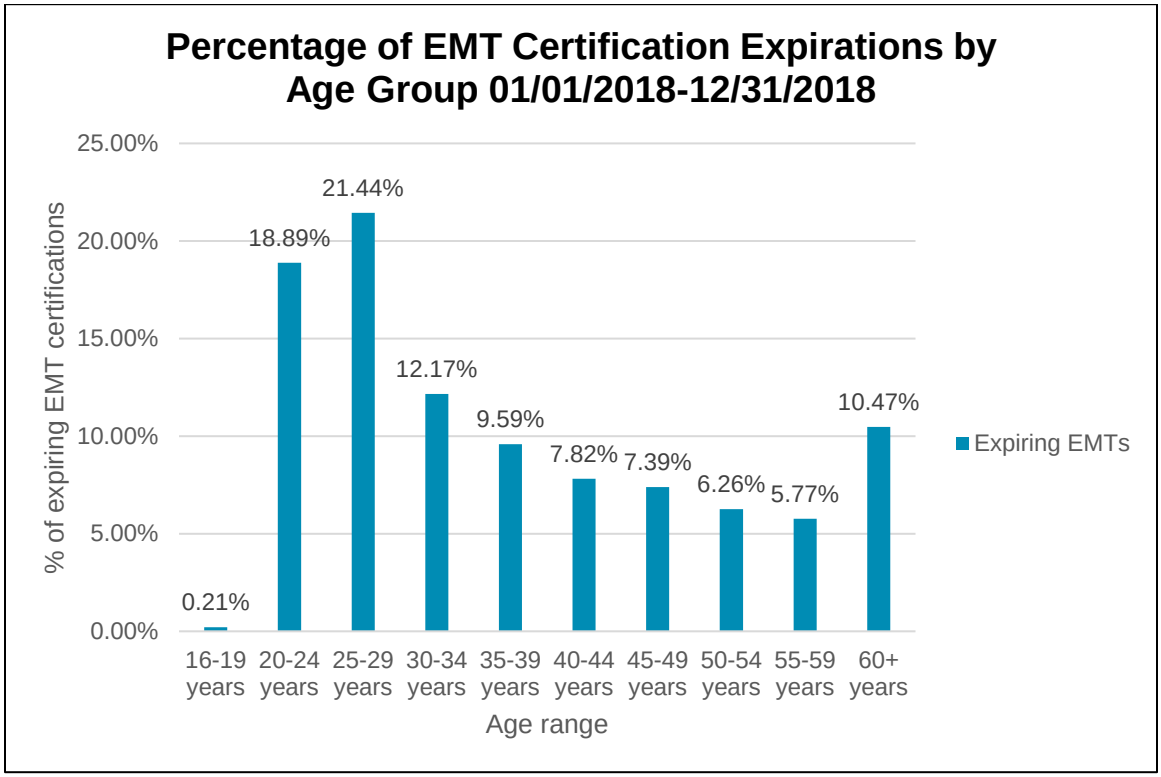
Table 14. Number of Pennsylvania Licensed EMS Agencies as of 12/31/2018

Highest Level on Agency License	Count of Agencies
QRS	431
BLS	444
ALS	366
Air ambulance services	17
Total number of agencies	**1,258**

Source: Pennsylvania State EMS Certification Registry, 2019

Table 14 summarizes the number of licesed EMS agencies by the highest level of their EMS agency license.

Figure 20. Percentage of EMT Certification Expirations by Age Group, 01/01/2018 – 12/31/2018

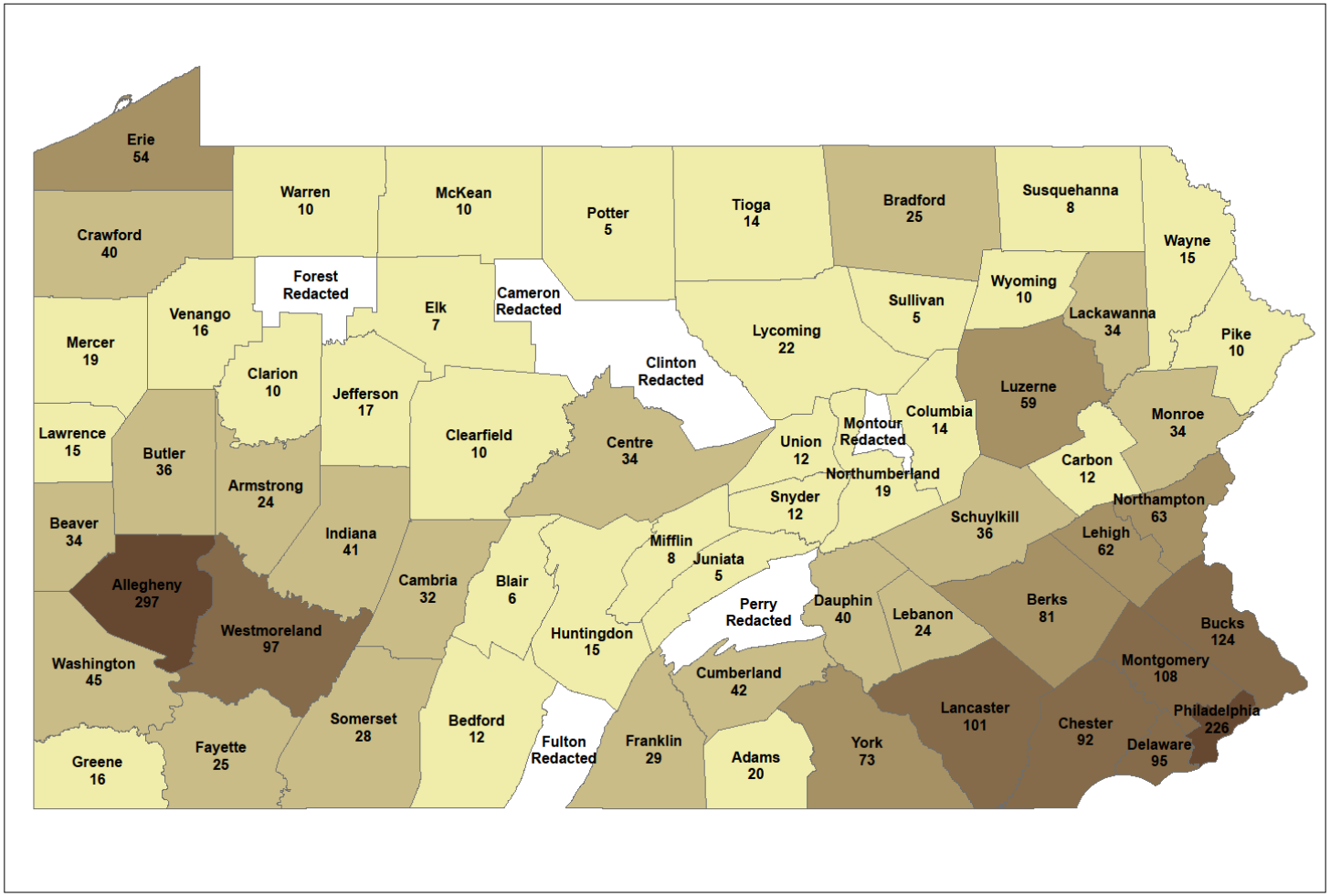


Source: Pennsylvania State EMS Certification Registry, 2019

Figure 20 shows that over 60% of individuals with an expiring certification were under the age of 40. Forty percent of expiring EMTs are under the age of 30. The rate at which younger EMT's are leaving the system is concerning. This information is important to monitor and trend to allow for targeted retention strategies to be implemented at the state, regional and local levels. Those who hold EMT certification are the pipeline for paramedics. Continued inabilities to retain EMTs will exacerbate the challenge to recruit paramedics.

Map 4 on the following page displays geographically the number of EMT certifications by county of residence. Counties in white had less than 5 individuals' EMT certifications expire. In accordance with Bureau reporting policies, the information for these counties has been redacted to protect provider privacy. This map does not account for individuals who held a Pennsylvania EMS certification but who reside outside of Pennsylvania.

Map 4: Count of 2018 EMT Expirations by County

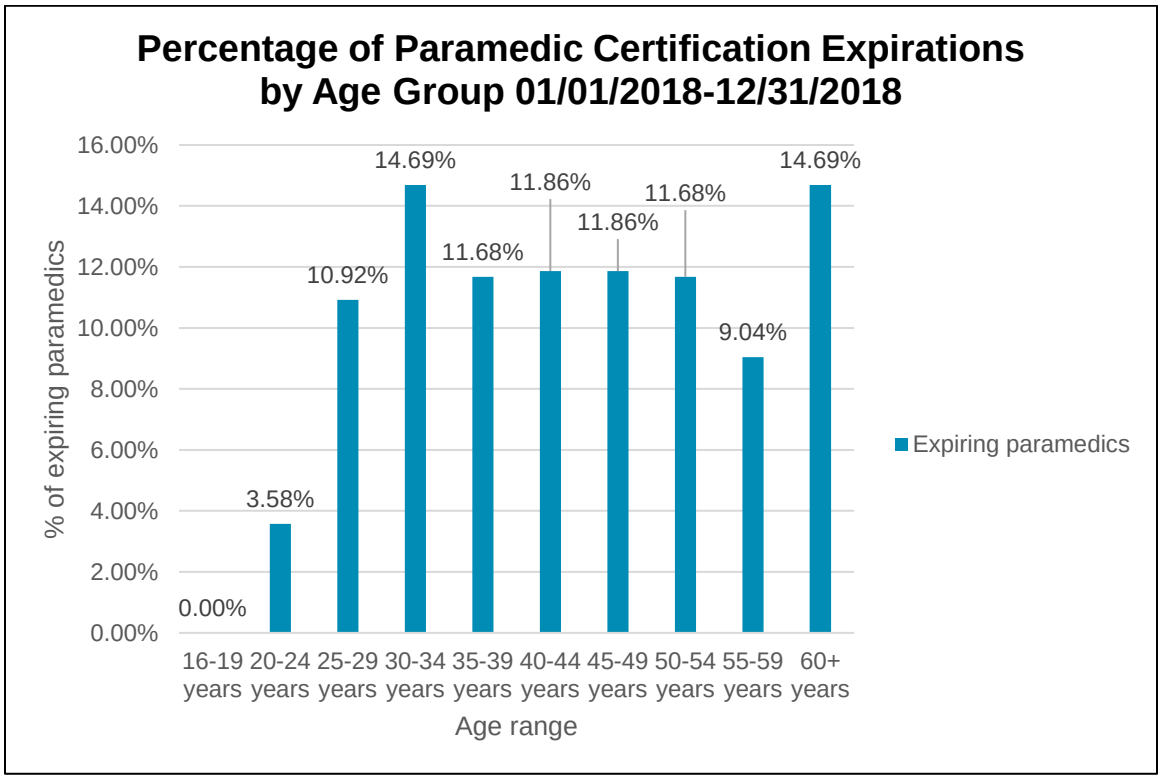


Legend

Number of EMT expirations: 5 - 22 | 23 - 45 | 46 - 81 | 82 - 124 | 125 - 297

Prepared by DJF 01/15/2019
Source: EMS Certification Registry, 2019

Figure 21. Percentage of Paramedic Certification Expirations by Age Group, 01/01/2018 – 12/31/2018

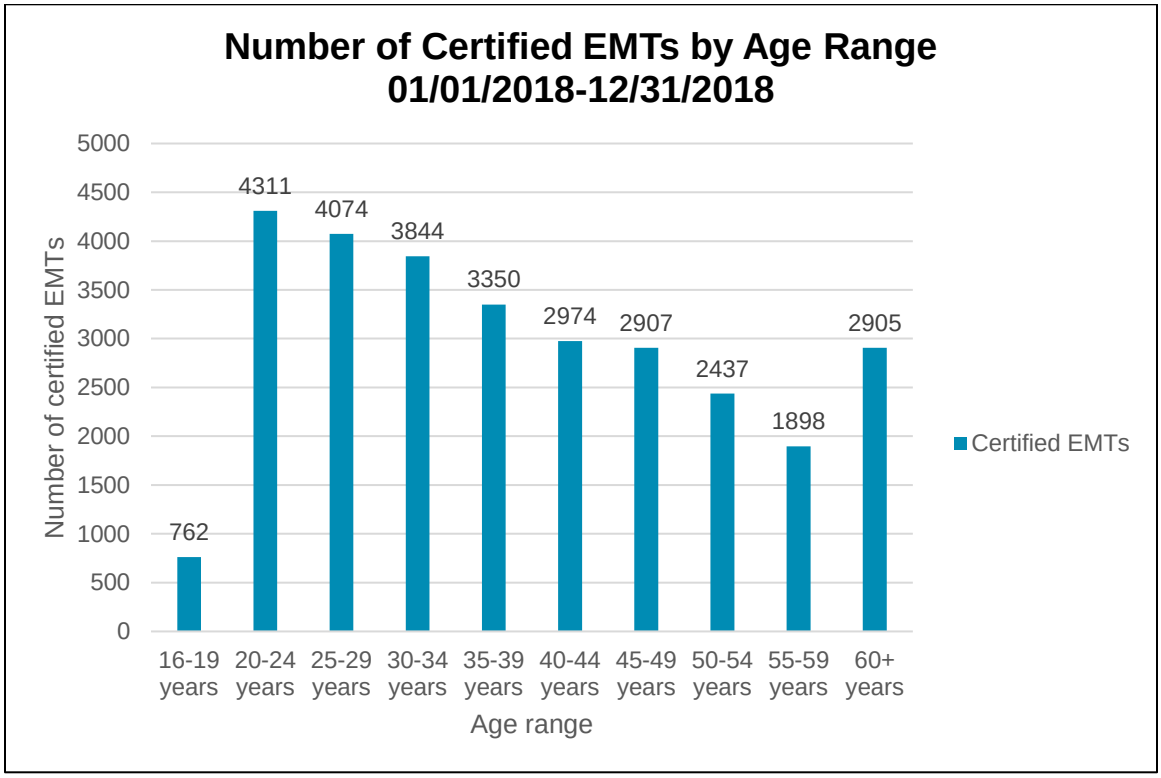


Source: Pennsylvania State EMS Certification Registry, 2019

Figure 21 shows that nearly 41 % of individuals with an expiring paramedic certification were under the age of 40. Approximately 15 % of expiring paramedics are under the age of 30. The rate at which younger paramedics are leaving the system is still concerning, but not to the extent of the EMT level. This information is important to monitor and trend to allow for targeted retention strategies to be implemented at the state, regional and local levels.

The number of paramedic expirations may be artificially low, due to the process of transitioning all paramedic certifications to expire on the last day of December in odd numbered years, pursuant to regulation.

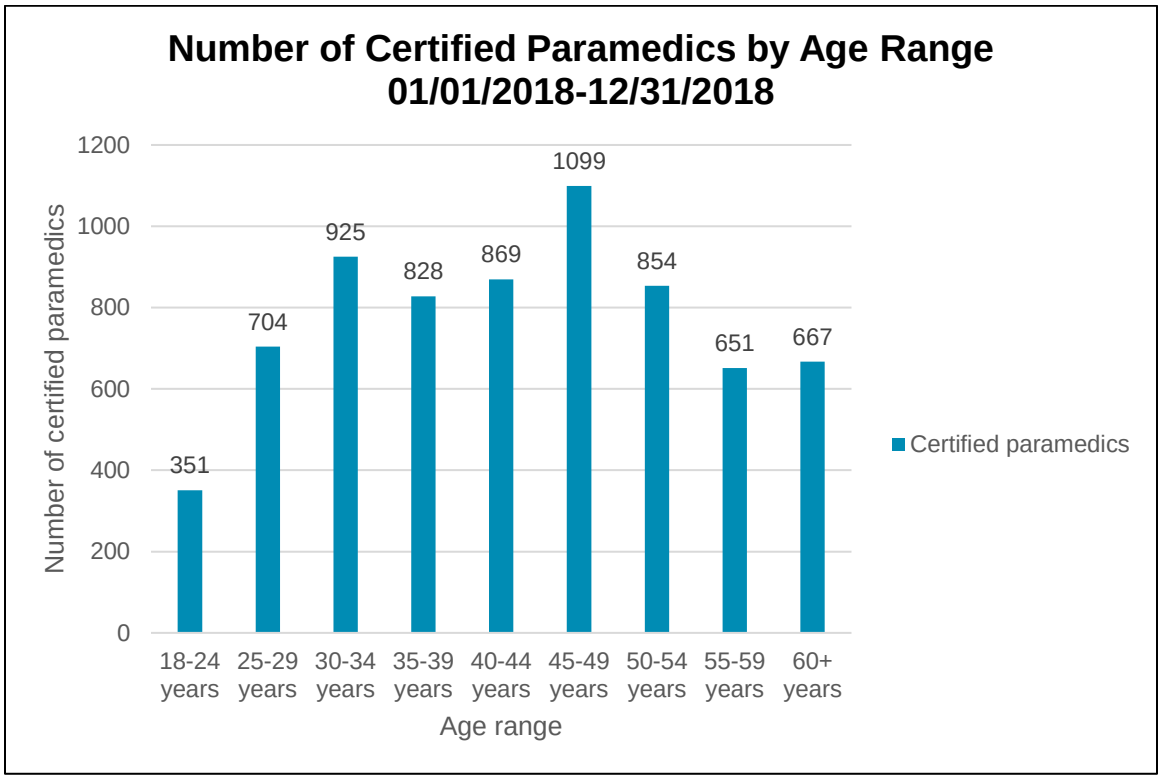
Figure 22. Number of Certified EMTs by Age Range, 01/01/2018 – 12/31/2018



Source: Pennsylvania State EMS Certification Registry, 2019

Figure 22 displays the age range distribution of certified EMTs within Pennsylvania's EMS system. It is important to note that this is the available workforce, not necessarily the "active" workforce.

Figure 23. Number of Certified Paramedics by Age Range, 01/01/2018 – 12/31/2018



Source: Pennsylvania State EMS Certification Registry, 2019

Figure 23 displays the age range distribution of certified paramedics within Pennsylvania's EMS system. It is important to note that this is the available workforce, not necessarily the "active" workforce.

Table 15. Pennsylvania Certified EMS Workforce as of 01/15/2019

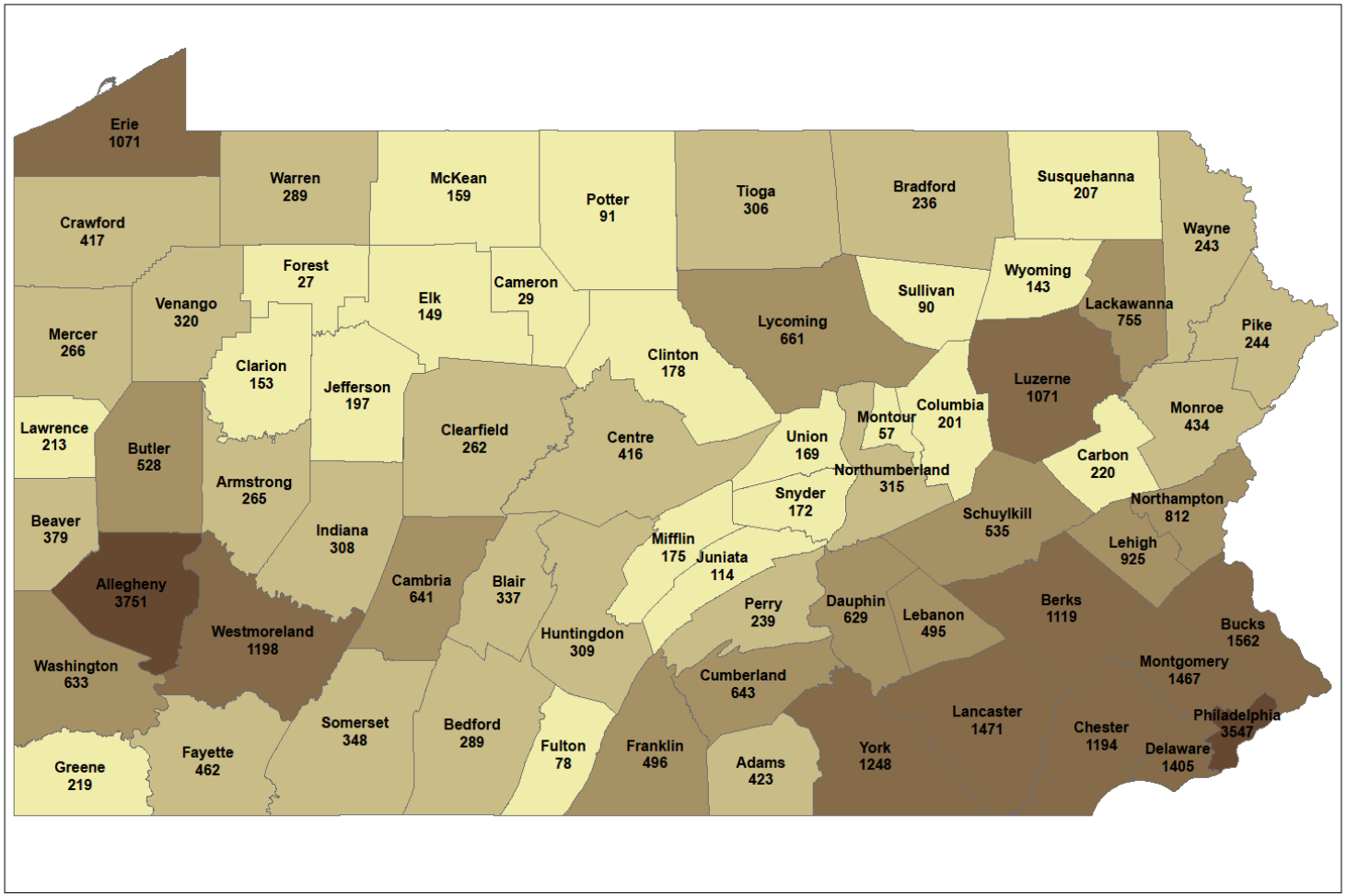
Primary Certification	Number of Certification Holders	Net Change from 2017
EMSVO	947	47
EMR	3256	(342)
EMT	29462	(1,167)
AEMT	245	64
Paramedic	6948	(169)
PHRN	1210	(20)

Source: Pennsylvania State EMS Certification Registry, 2019

The above numbers in table 15 are all individuals who hold a certification at that level and, as such, are considered part of the available workforce. Also included is the net change from 2017. This value was calculated by compairing the values for year ending 2018, to the values previously reported in the 2017 year end report. It is important to note that this is the available workforce, not necessarily the “active” workforce.

Map 5 on the following page displays the total number of certified field providers through the level of PHRN by county of residence. This map does not account for individuals who hold a Pennsylvania EMS certification but who reside outside of Pennsylvania.

Map 5: Number of EMS Field Providers through the Level of PHRN by County



Legend

Number of field providers through the level of PHRN: 27 - 220 | 221 - 462 | 463 - 925 | 926 - 1562 | 1563 - 3751

Prepared by DJF 01/15/2019
Source: EMS Certification Registry, 2019

Table 16. National Registry of Emergency Medical Technician Exam Statistics, by Year of Course Completion 2015-2018 [1]

Testing Metric	2015	2016	2017	2018
PA EMT Overall Pass Rate	**75%**	**78%**	**76%**	**76%**
National EMT overall pass rate	80%	82%	81%	80%
EMT successful completion	1,813	2,084	1944	1,860
PA paramedic overall pass rate	**85%**	**83%**	**90%**	**87%**
National paramedic overall pass rate	88%	89%	90%	87%
Paramedic successful completion	245	227	214	269

Source: National Registry of Emergency Medical Technicians, 2019

Table 16 above shows the number of students successfully passing the NREMT, EMT and paramedic cognitive exams, by year of course completion. Pennsylvania overall pass rates are also included. National overall pass rates are also included for benchmarking purposes. The values for 2015 and 2016 are now static, as the two-year window for exam completion has passed. The numbers for 2017 and 2018 are dynamic, as students are still testing.

Citations

1. National Registry of Emergency Medical Technicians. (2019). Pennsylvania state pass/fail reports. Retrieved from www.nremt.org.