State of Connecticut
Department of Public Health

Office of Emergency Medical Services
Data Report

Year 2018 data

Emergency Medical Services Data Report

Year 2018 data

Connecticut Department of Public Health

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The report is based on EMS data collected with NEMSIS v3.4.0 structure in year 2018

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Introduction

The Office of Emergency Medical Services (OEMS) has statutory authority for statewide collection of EMS data[1] and Trauma Registry information.[2]

Data collection for Year 2017 onward was based on the National Emergency Medical Services Information System (NEMSIS) version 3.4.0. The Year 2018 EMS data report is the first one based on prehospital data aggregated with the state's relational database and related applications from Digital Innovation, Inc. It reflects an entirely new data structure, field names, and coding. This report is based on year 2018 data submitted from January 1, 2018 through November 10, 2019.

OEMS interacts within a large network of local, regional, statewide, and national stakeholders and shares data with NEMSIS. We work with federal partners and software vendors to standardize submissions and assure the correct processing of records.

Approximately 750,000 records are submitted to the database annually. Technical difficulties at both the state and local EMS levels resulted in delayed access to NEMSIS version 3.4.0 data and incomplete data collection for year 2017. The 2018 data in this report is at about ninety-two percent (92%) of expected, with diminished data volume in June and July due to technical difficulties with the state server. Year 2019 data volume is on track to be one hundred percent (100%) of expected.

The Trauma Registry data collection is also included as part of the newest Digital Innovation, Inc. Central Site. The upgrade to Trauma Version 5 involves the migration of historical data to the new trauma version, in order to maintain a complete trauma database. Longitudinal data analysis is challenged by the fact that older data used ICD9 codes, while more recent data used ICD10 codes. Unfortunately, there is no sure way to translate ICD9 codes to ICD10 codes, so the data will reflect whichever classification was originally entered.[3]

[1] Connecticut General Statutes Section 19a-177(8)(A) designates the Commissioner of Public Health to collect information on prehospital care rendered by each licensed ambulance service or certified ambulance service that provides emergency medical services.

[2] Section 19a-177-7 of the Regulations of Connecticut State Agencies requires that each licensed Connecticut acute care hospital must submit information to the trauma registry for analysis and evaluation of the quality of care of trauma patients. Records in the trauma registry include all admitted trauma patients, trauma patients who died, trauma patients who were transferred, and all patients with traumatic brain injury.

[3] ICD10 codes follow the International Classification of Diseases and Procedures used to code healthcare diagnoses, symptoms, and procedures https://www.cdc.gov/nchs/icd/icd10cm.htm

Status of Objectives

Although revised data structures and codes for every data field make acquiring finer details possible, the improved level of detail comes with a price. Data fields that now collect ICD10 codes are more complex because the number of options compared with ICD9 is increased (68,000 vs 13,000 codes respectively).

In 2017, the state adopted the data structure to collect EMS data (NEMSIS 3.4.0). The Trauma Registry is implementing a newer version of software that fulfills requirements of the National Trauma Databank.[4] Trauma hospitals are resubmitting their trauma records back to 2009 and migrating all trauma data to a new version of the Digital Innovation repository.[5]

The short, intermediate and longer-term data collection goals are summarized below.

0 = on hold / no progress; IP = in progress; X = completed.

Short term

EMS Software compliance with version 3.4	IP
Begin setup for a new EMS vendor	
Continue movement of trauma to a new version	IP

Intermediate term

Testing of Trauma collector	IP
Query tool for EMS data	0
Query tool for Trauma registries	IP
Import trauma data from 2009 forward	IP
State-specific EMS Data Dictionary requirements	IP
Submit data to NEMSIS	IP
Identify data submission issues in Production V5, Trauma	0

Longer term

EMS data validated by state level schematron[6]	IP
Data sharing projects	IP
Data linkage projects	IP
Examine system costs, advantages, barriers to change	IP

[4] National Trauma Databank https://www.facs.org/quality-programs/trauma/tqp/center-programs/ntdb

[5] Connecticut General Statute Section 19a-177, subdivision (7), subparagraph (E)adopted the most recent version of the National Trauma Bank standards and data dictionary, which allows trauma data collection that follows the national guidelines for field triage of injured patients.

[6] A schematron is rule-based coding language that establishes patterns, rules, and checks for specific data elements that are submitted in EMS records to the data collector. NEMSIS has a schematron that operates at the national level. Some, but not all states create a second schematron that details state-specific requirements. Validation is complex and can be associated with different levels of warnings to data submitters. At the highest level, a record may not be added to the database if criteria are not met. Less stringent levels issue a cautionary statement but accept the submitted data.

EMS Summary Figures, Year 2018

Summary figures are presented as in previous reports with additional details as available. The NEMSIS version 3.4.0 data collection structure allows increased detail in level of care and response mode descriptors. Totals are based on records that contain specific data, e.g., age.

Type of Service Requested	**688,356**
911 Response (Scene)	79%
Medical Transport	18%
Inter-facility Transport	2%
Intercept	1%
Mutual Aid	0.4%
Standby	0.2%
Public Assistance/Other Not Listed	0.1%

total e911=911 response + intercept + mutual aid calls

All Calls by Gender	**616,386**
Female	51%
Male	48%
"Not recorded" entered	1%

* Less than 0.5% entered "Unknown"/"Not Applicable

All Calls by Age Group	**608,109**
Adult (age 18 years and older)	94%
Pediatric (age 0 through 17 years)	6%

Primary Role of Unit	**688,937**
Ground Transport	92%
Non-Transport Assistance	5%
Non-Transport Administrative	2%
Non-Transport Rescue	1%
Air Transport-Helicopter	<0.5%
Air Transport-Fixed Wing	<0.5%

Level of Care of Unit	**688,937**
ALS-Paramedic	77%
BLS-Basic /EMT	23%

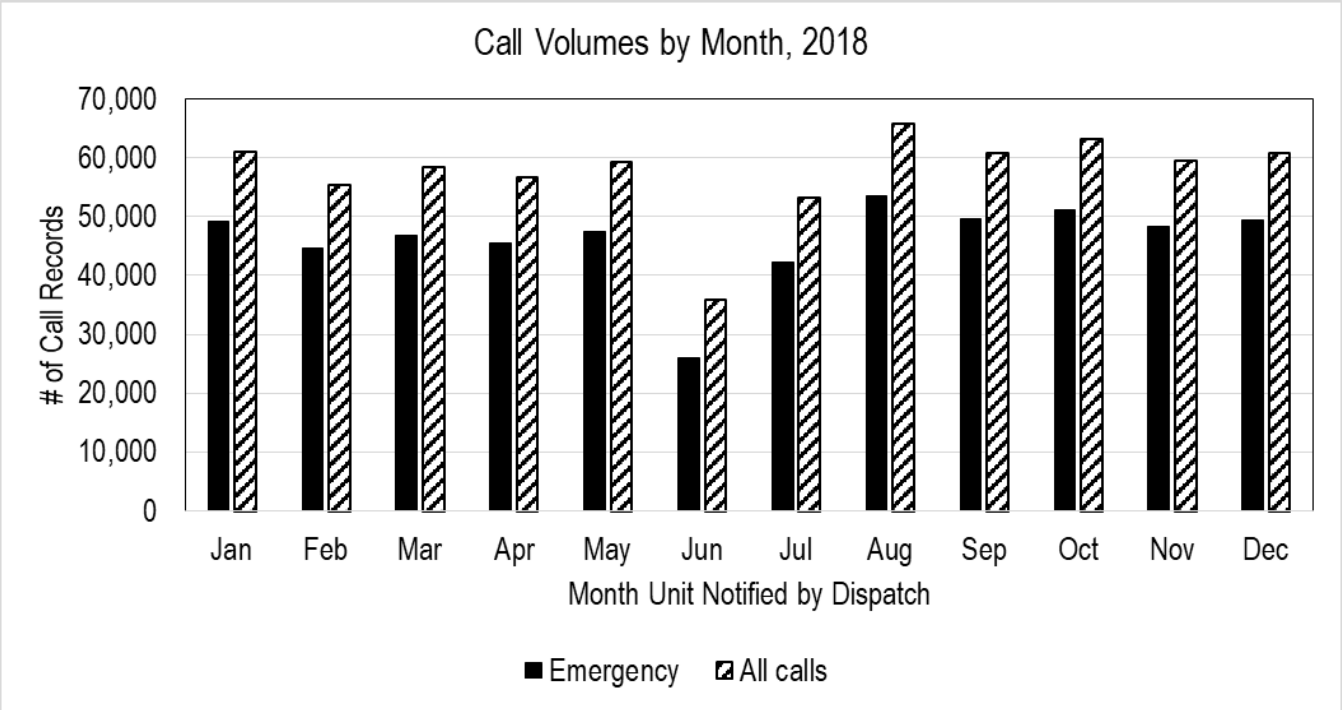
All other choices total less than 0.5%

Response Mode to Scene	**688,937**
Emergent (Immediate Response)	57%
Non-Emergent	39%
Emergent Downgraded to Non-Emergent	4%
Non-Emergent Upgraded to Emergent	<0.5%

Additional Response Mode Descriptors	**613,919**
No Lights or Sirens (L or S)	40%
Lights and Sirens (LS)	38%
Unscheduled	11%
Initial LS, Downgraded to No LS	4%
Speed-Normal Traffic	2%
Scheduled	1%
Speed-Enhanced per Local Policy	1%
Intersection Navigation-Against Normal Light	<0.5%
Intersection Navigation-With Auto Light Changing	<0.5%
Initial No LS, Upgraded to L and S	<0.5%
Intersection Navigation-With Normal Light Patterns	<0.5%
Lights and No Sirens	<0.5%

Record Volume
The chart below reflects the decreased volume of processed records in June and July of 2018.

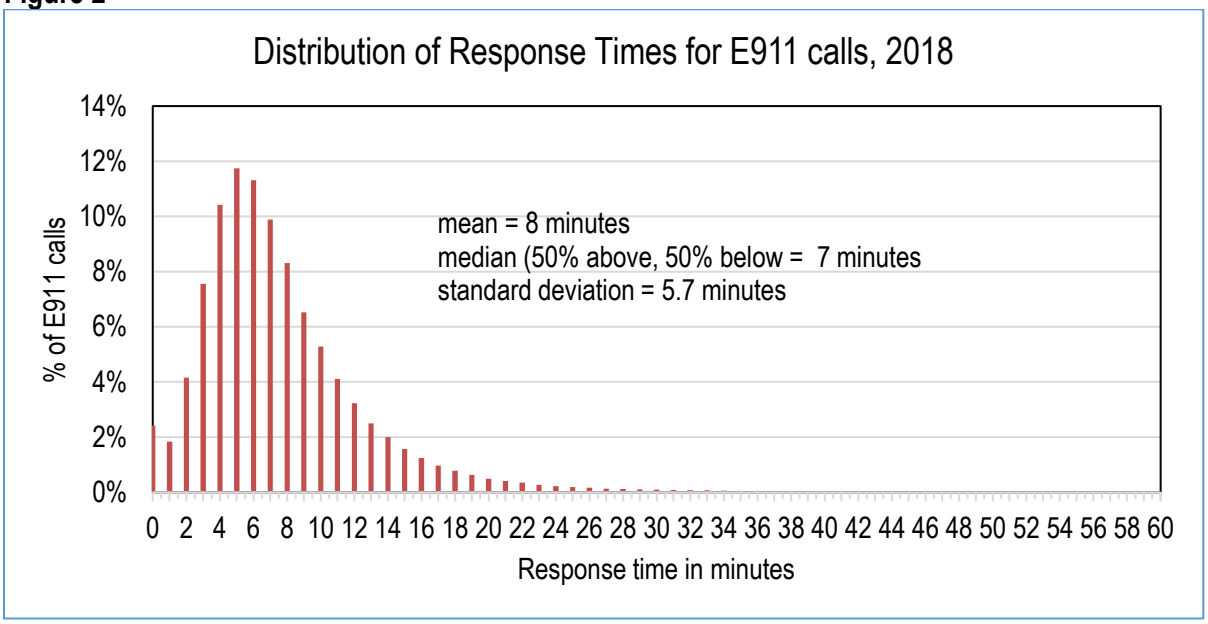
Figure 1



Response Times for Emergency 911 Calls

Response time is calculated as the time when unit arrived at scene minus time when unit was notified by dispatch.
Time of arrival at scene is historically used for the response time calculations instead of time of arrival at the patient. Each municipality has response time standard agreements with the individual agencies and service areas under their jurisdiction.
Ninety-seven percent (97%) of emergency 911 calls (n = 522,338) have a response time of zero to sixty minutes.

Figure 2



Missing time unit notified by dispatch: 0%; Missing time of arrival at scene: 3%
Missing time of arrival at patient: 23%; Missing time patient arrived at destination: 30%.

Incident Location Type

Incident location type is now based on ICD10 codes. For reporting purposes, locations were grouped using the first three characters of the ICD10 code entered to decrease the thirty-one types that ICD10 provides. The ten most frequent incident locations are listed below.

Location type	%
Non-institutional private residence	45%
Hospital	18%
Street/Highway	11%
Trade/service including ambulatory health	10%
Residential institution	8%
Public use building	5%
"Other" unspecified place	2%
Transport vehicle	<1%
Park/recreational area	<0.5%
Industrial/construction area	<0.5%
All other specified places	<0.5%
	625,323

The newest data collection structure affords more specificity of location type for public health inquiry with ICD10 codes. Although dependent on additional programming, ICD10 allows further examination of the characteristics of EMS response to specific locations. For example, nursing home responses (n = 37,490) were examined with regard to the type of call, patient disposition and ultimate destination.

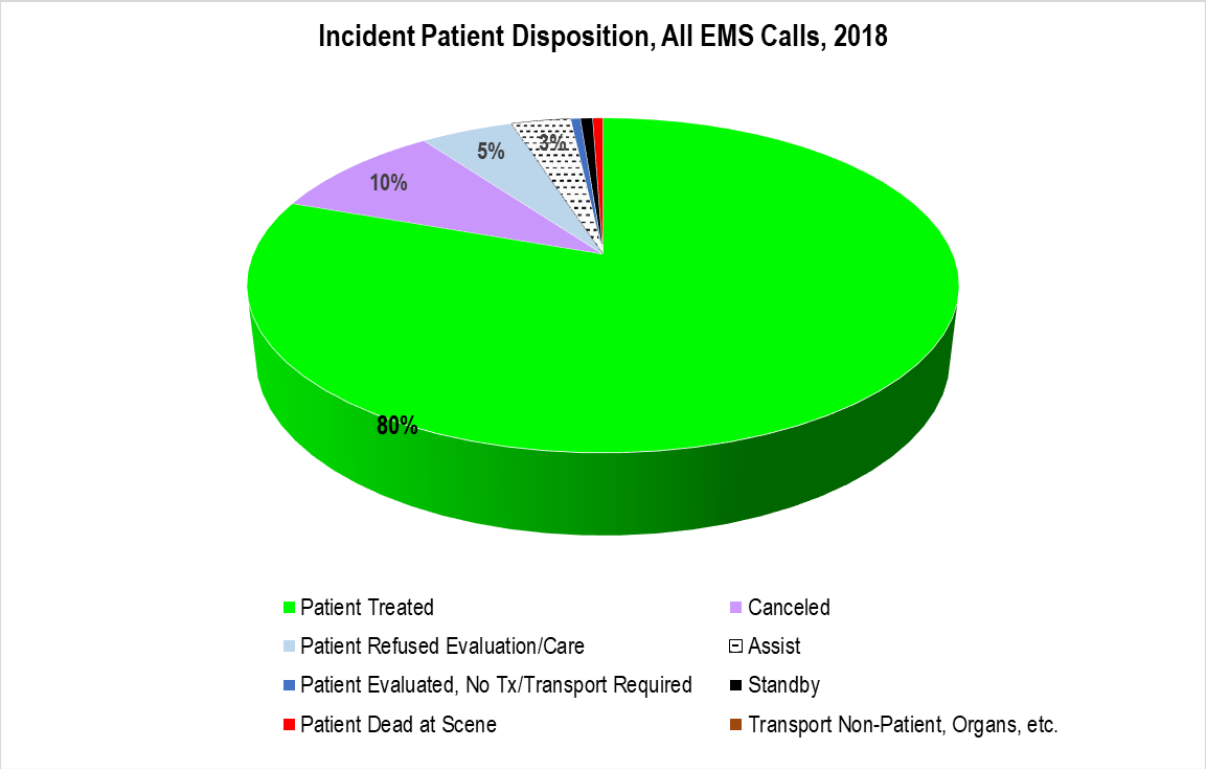
The majority, seventy percent (70%) of nursing home responses were emergency calls. The remaining thirty percent (30%) were coded as inter-facility or medical transport. Seventy (70%) percent of the records had information about patient disposition and type of destination. Ninety percent (90%) of those records showed that the patient was evaluated or treated by EMS. Sixty-nine (69%) percent of patients evaluated or treated by EMS were taken to a hospital, urgent care center or freestanding emergency clinic.

More than 2,400 injuries for which nursing home patients were brought to a hospital ED or urgent care were documented. Although multiple injuries may have been reported for the same patient, the majority of causes of injury were falls (ninety-two percent, 92%). Six percent (6%) of the injuries were from assault, intentional self-harm and/or event of unknown intent.

Incident Patient Disposition

Most records (ninety-nine percent, 99%) contained patient disposition information.

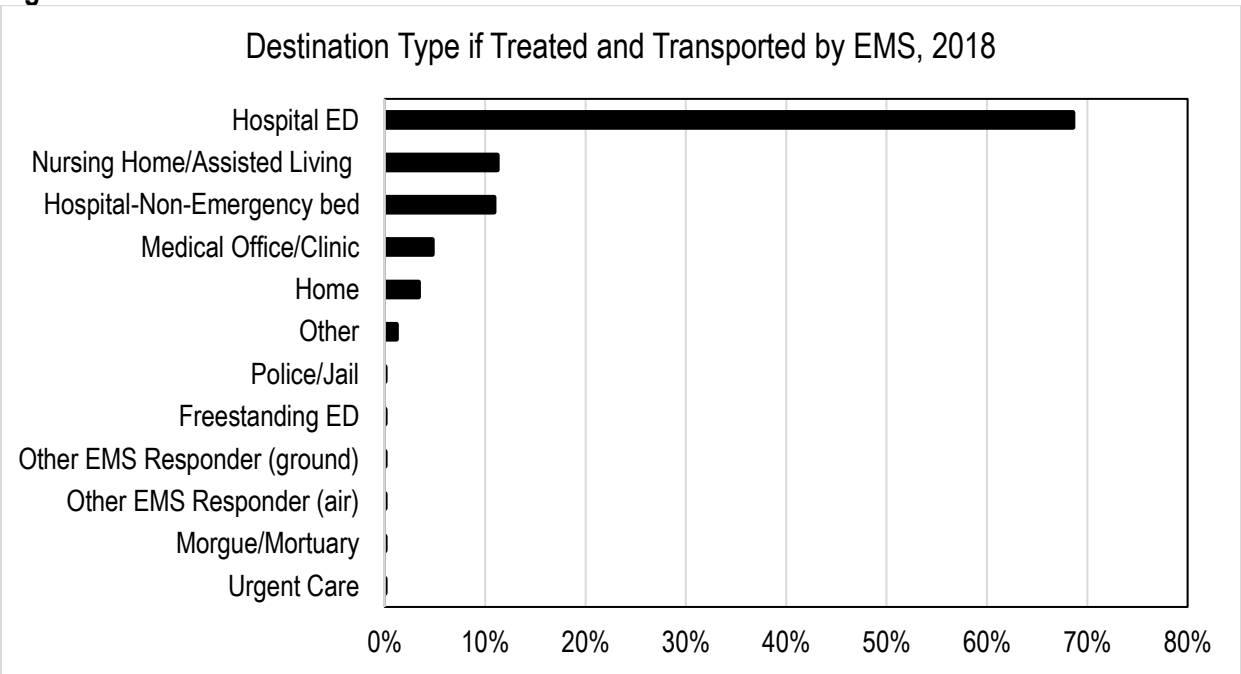
Figure 3



Destination Type

Destination type information was recorded for over five hundred thousand (n = 508,550) records where the disposition code indicated that the patient was treated. This represents approximately ninety-two percent (92%) of "treated" records. It excludes records whose disposition was "treated but no transportation needed".

Figure 4



Delay Data

The source of delays at the incident scene, in transport, and in turn-around to availability for service have not been part of previous annual reports. However, this information may be useful in the analyses of emergency service responses and resource deployment. Multiple delays can be entered in one record.

Scene Delay Types (n = 10,386)

Other	24%
Safety-Crew/Staging	17%
Patient Access	13%
Staff Delay	9%
Safety-Patient	8%
Extrication	7%
Language Barrier	5%
Weather	5%
Awaiting Ground Unit	3%
Distance	2%
Traffic	2%
Triage/Multiple Patients	1%
Crowd	1%
Directions/Unable to Locate	1%
Vehicle Crash Involving this Unit	1%
Mechanical Issue-Unit, Equipment, etc.	<0.5%
Vehicle Failure of this Unit	<0.5%
Haz-Mat	<0.5%
Awaiting Air Unit	<0.5%

Transport Delay Types (n = 2,243)

Other	26%
Weather	20%
Traffic	18%
Safety	9%
Staff Delay	8%
Distance	7%
Route Obstruction	2%
Diversion	2%
Rendezvous Transport Unavailable	2%
Vehicle Failure of this Unit	2%
Patient Condition Change	1%
Vehicle Crash Involving this Unit	1%
Directions/Unable to Locate	1%
Crowd	1%
Haz-Mat	<0.5%

Turn-Around Delay Types (n = 4,112)

ED Overcrowding / Transfer of Care	19%
Other	14%
Clean-up	12%
Staff Delay	12%
Distance	10%
Documentation	9%
Decontamination	7%
Traffic	6%
Weather	4%
Equipment/Supply Replenishment	4%
Equipment Failure	1%
EMS Crew Accompanies Patient for Facility Procedure	1%
Route Obstruction	1%
Rendezvous Transport Unavailable	<0.5%
Vehicle Failure of this Unit	<0.5%
Vehicle Crash of this Unit	<0.5%

Barriers to Patient Care

About ninety eight percent (98%) of records recorded "No barrier" or left it blank. Barriers to patient care listed were: language, culture, patients that were unconscious, uncooperative, psychologically, physically or developmentally impaired, had hearing difficulties, or were speech or sight impaired. Obesity, emotional distress, physical barriers or restraints, and cultural or religious limitations were also noted. More than one barrier could be recorded in a patient record.

Emergency Medical Dispatch (EMD)

Emergency medical dispatch (EMD) is routinely accomplished in a systematic way to handle emergency calls. This requires personnel trained in medical dispatch to determine the nature and priority of calls and then to dispatch the correct EMS resources and give instructions to the caller as needed. EMD also gives EMS the opportunity to alert specialty care receiving hospitals, depending on the situation.

CMS Service Level

Payment service levels were documented as follows:

CMS Service Level	Frequency	%
ALS, Level 1 Emergency	271,563	47%
BLS	153,922	27%
BLS, Emergency	132,082	23%
ALS, Level 1	14,619	3%
ALS, Level 2	2,972	1%
Specialty Care Transport	2,894	1%
Paramedic Intercept	27	0%
	578,079	

Primary Method of Payment

Over 400,000 records of all types contained payment information.

Primary Method of Payment	Frequency	%
Other Payment Option	148,715	34%
Medicare	72,655	17%
Self-Pay	68,090	16%
No Insurance Identified	52,836	12%
Insurance	49,091	11%
Medicaid	42,802	10%
Workers Compensation	329	0.1%
Other Government	310	0.1%
Not Billed (for any reason)	297	0.1%
Payment by Facility	5	0%
Community Network	4	0%
Contracted Payment	3	0%
	435,137	

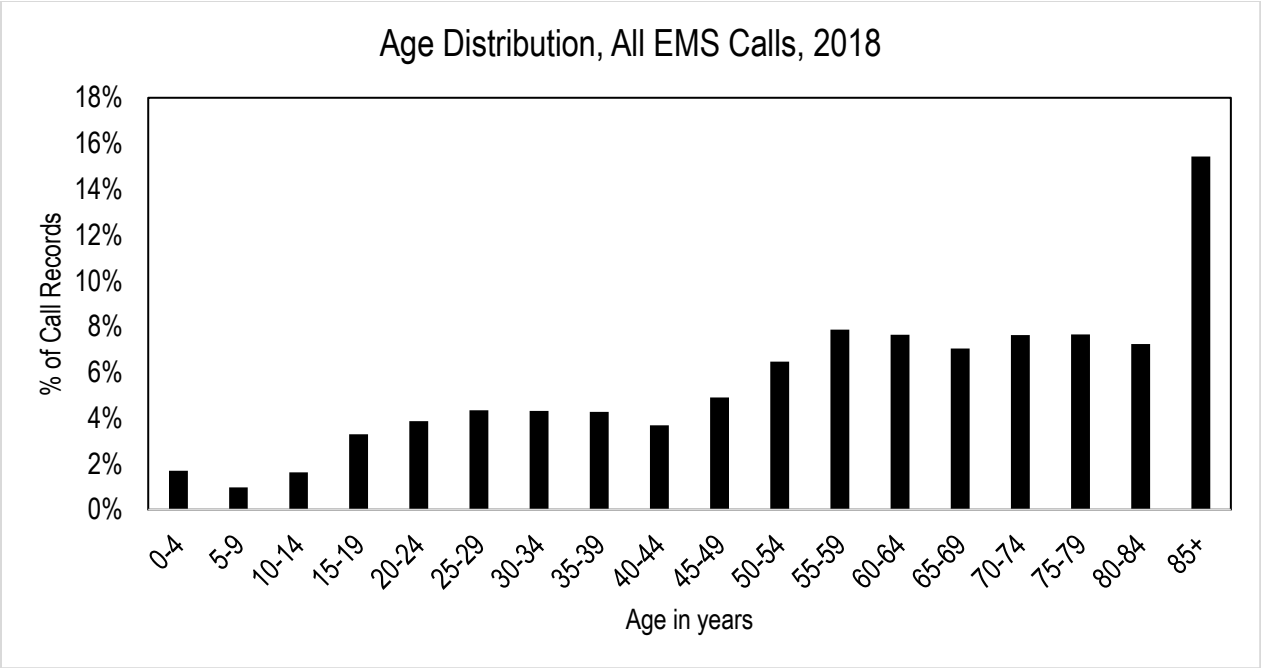
Additional elements being collected allow sorting of records by whether or not an injury was work-related, which is of interest to specific stakeholders. Other such fields include but are not limited to whether or not there is a possible injury, or initial patient acuity, both of which may be useful for helping to identify records in another system such as the trauma registry.

Possible Injury?	Frequency	%
No	463,119	81%
Yes	96,978	17%
Unknown	9,199	2%
	569,296	

Work-related?	Frequency	%
No	260,881	71%
Unknown	74,660	20%
Yes	29,371	8%
	364,912	

Initial Patient Acuity	Frequency	%
Lower Acuity (Green)	405,675	76%
Emergent (Yellow)	115,322	21%
Critical (Red)	13,516	3%
Dead without Resuscitation Efforts (Black)	2,189	<0.5%
	536,702	

Figure 5



n = 608,130 records with age data

Injury Data

The top three sources of injury documentation in year 2018 records were falls, motor vehicle crashes, and assaults.

Codes used to describe injuries have changed significantly between NEMSIS version 2.2.1 and NEMSIS version 3.4.0. NEMSIS codes for cause of injury, primary impression and secondary impressions were previously single entries corresponding to ICD9 (2016 and previous). The current documentation allows for multiple entries of codes corresponding to the ICD10 classification increasing complexity of documentation and analysis.[7]

[7] The higher number and complexity of ICD-10 codes presents practitioners with long code lists which cannot always be searched. The consequences of higher complexity are loss of cause of injury data. One possibility is to request that injury picklists focus on the more general codes, with complexity reserved for hospital data collection. When data entry is prohibitively complex, the default is notation in the patient care narrative text, which cannot be easily searched or reduced to classification (Example, the Falls section).

Figure 6 (based on 66,644 injuries recorded for people age 18 years or older)

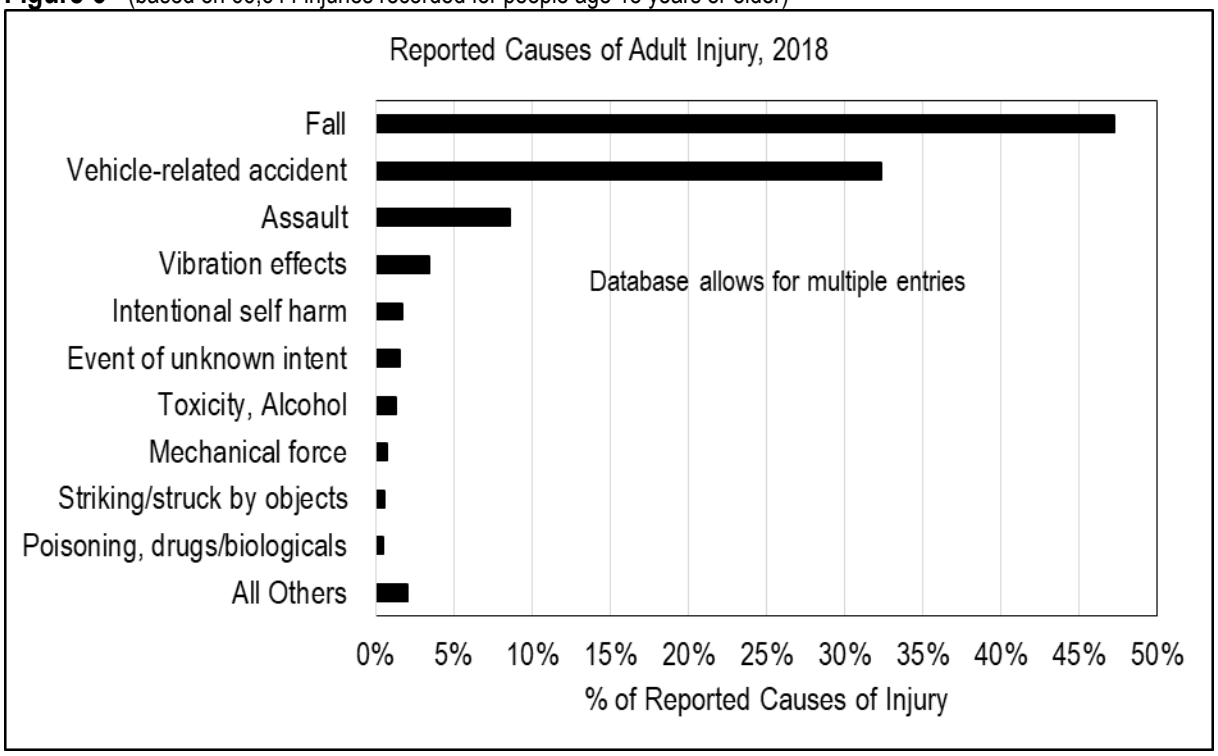
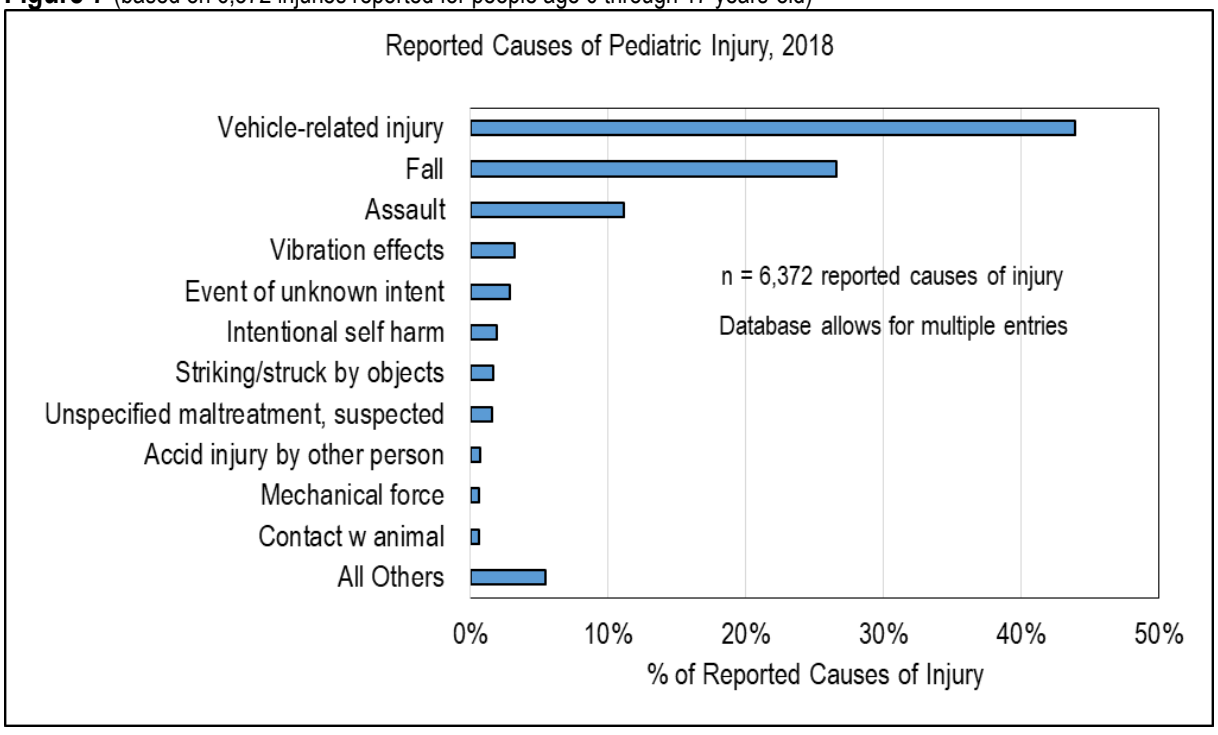


Figure 7 (based on 6,372 injuries reported for people age 0 through 17 years-old)



Other Injury Information: Mechanism of Injury, Trauma Center Criteria and Injury Risk factors

"Mechanism of Injury" is a NEMSIS–recommended field, and although not universally required by the data collection platform being used by the EMS service, more than one injury mechanism can appear in the same record reflecting the extent of the trauma. The selection of "Other" is the most frequent injury mechanism entered (version 3.4.0 choice). Closer examination of records where the "Other" category was chosen would be needed in determining the true nature of the injury.

Mechanism of Injury	Frequency	% of All Mechanisms
Other	52,673	65%
Blunt	25,259	31%
Penetrating	2,416	3%
Burn	443	1%
	80,791	

Trauma Center Criteria are the field triage criteria for transport to a trauma center. Multiple entries are possible. Records which had data in trauma center criteria showed the following distribution of information.

Trauma Center Criteria	Frequency	% of All Criteria
Glasgow Coma Score <= 13	753	35%
All penetrating injuries to head, neck, torso, and extremities proximal to elbow/knee	283	13%
RR <10 or >29 bpm (<20 in infants aged <1 year) or need ventilation	197	9%
Pelvic fractures	169	8%
Two or more proximal long-bone fractures	168	8%
Crushed, de-gloved, mangled, or pulseless extremity	157	7%
Systolic Blood Pressure <90 mmHg	151	7%
Open or depressed skull fracture	107	5%
Chest wall instability or deformity (e.g., flail chest)	75	3%
Paralysis	75	3%
Amputation proximal to wrist or ankle	29	1%
	2,164	

Vehicular, Pedestrian or Other Injury Risk Factors

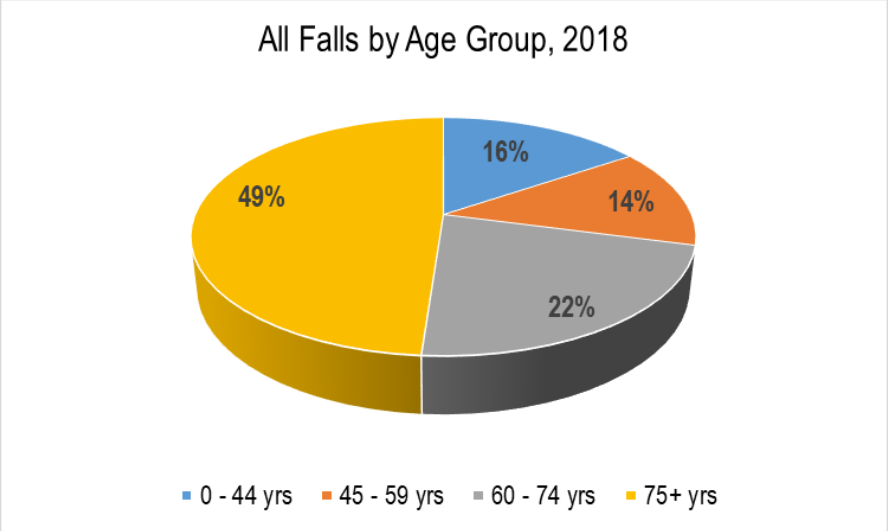
These are additional field triage criteria for transport to trauma center. Multiple entries are possible for each record.

Injury Risk Factors	Frequency	% of Risk Factors
Crash Intrusion, including roof: > 12 in. occupant site; > 18 in. any site	1,575	36%
EMS Provider Judgment	1,193	28%
Anticoagulants and Bleeding Disorders	414	10%
Motorcycle Crash > 20 MPH	235	5%
Auto v. Pedestrian/Bicyclist Thrown, Run Over, or > 20 MPH Impact	223	5%
Crash Ejection (partial or complete) from automobile	206	5%
SBP < 110 for age > 65	91	2%
Crash Vehicle Telemetry Data (AACN) Consistent with High Risk of Injury	89	2%
Crash Death in Same Passenger Compartment	87	2%
Fall Adults: > 20 ft. (one story is equal to 10 ft.)	56	1%
Pregnancy > 20 weeks	53	1%
Burn, with trauma mechanism	43	1%
Burn, without other trauma	39	1%
Fall Children: > 10 ft. or 2-3 times the height of the child	16	0%
	4,320	

Falls

Falls were the leading cause of injury in the adult injury profile for year 2018 (Figure 5). The number and complexity of ICD10 codes for exact circumstances of falls may lead to underreporting. Codes pertaining to falls cover detail such as where the person fell, whether or not the fall was accidental, the circumstances surrounding the fall, whether or not it was a recurring fall in a person with a history of falls, whether a person fell going upstairs, downstairs, fell from a standing position, etc. In order to collect cause of injury data optimally at the pre-hospital point of care, more general lists of codes should be agreed on at the point of data collection, if possible. The first three characters of ICD10 codes used to create falls categories were aggregated for review.

Figure 8



(n = 33,176 records with age data)

Initial Patient Acuity (Falls)

Eighty-seven percent (87%) of fall records also contained data on the initial acuity of the patient and the patient's age. More than one-quarter (28%) of fall records with acuity and age data were judged emergent or critical by EMS responders. The distribution of critical or emergent fall records by age group mirrors the age distribution of the occurrence of falls reported. The percent of all records where the patient condition was judged critical or emergent (n = 8,391) is shown by age group.

Age group (years)	% of All Emergent/Critical
0 - 44	16%
45 - 59	15%
60 - 74	23%
75+	47%

Falls at Age 45 and Older, by Location

Location	45 to 59 y	60 to 74 y	75 y +
Non-institutional private residence	53%	62%	62%
Trade/service incl. ambulatory health	14%	10%	5%
Street/highway	11%	6%	2%
Public use building	8%	5%	2%
Institutional residence	6%	11%	21%
Hospital	3%	5%	6%
Other specified place	2%	1%	<1%
Industrial / construction area	1%	<1%	<1%
Park / recreation area	1%	<1%	<1%
Unspecified place	<1%	<1%	<1%
	4,382	7,090	15,455
Falls missing location	113	227	750
Total	**4,495**	**7,317**	**16,205**

Figure 9 n = 19,196 fall injuries reported for females. Seventy percent (70%) were women age 65 and older.

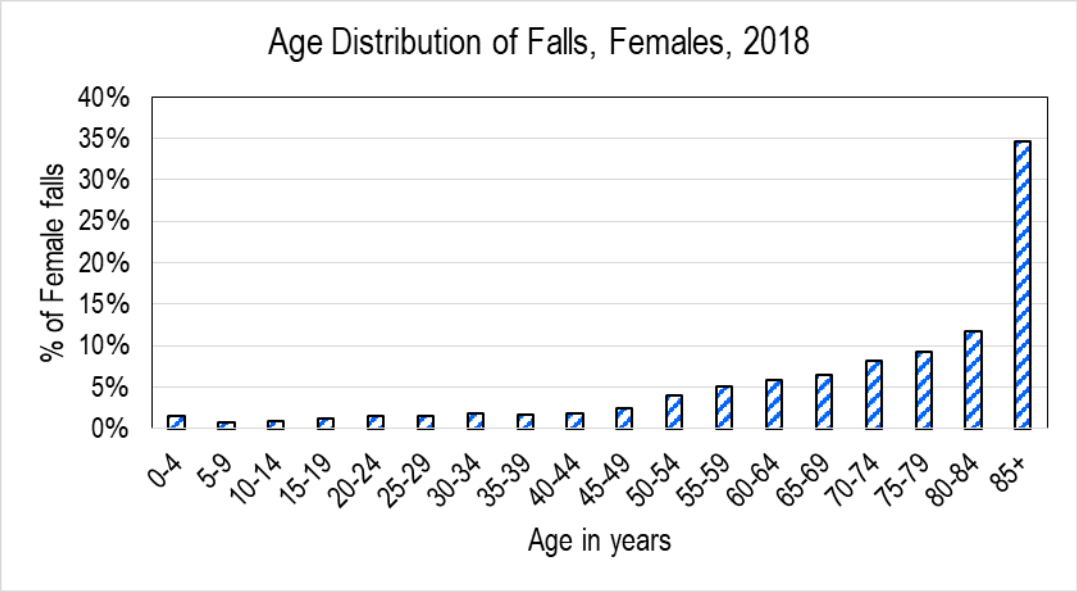
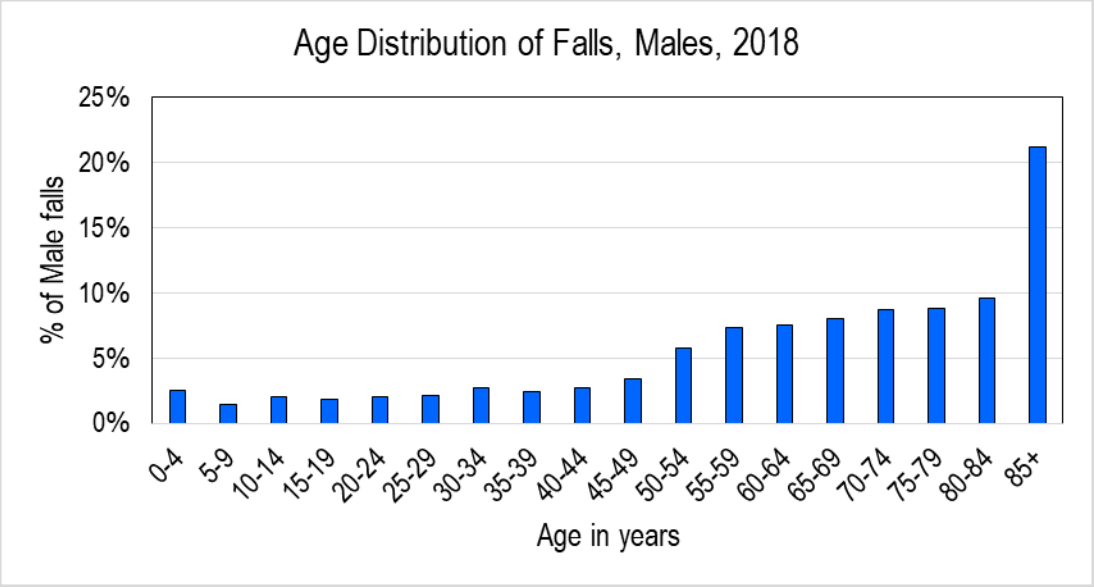


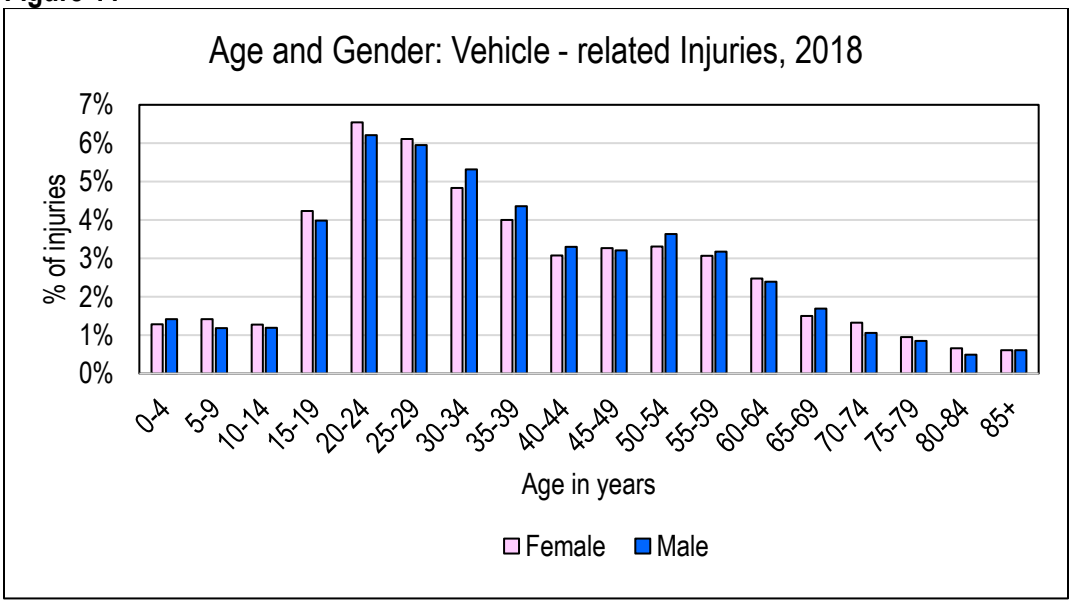
Figure 10 n = 13,853 fall injuries reported for males. Fifty-six (56%) percent were males age 65 and older. However, the number of falls for men started increasing at age 50-54.



Vehicle-Related Injuries

Vehicle-related causes of injury were among the top three documented in 2018 data. The National Highway Traffic Safety Administration (NHTSA) reported a recent (2016 – 2018) decrease in motor vehicle crash fatalities but an increase in fatalities among "non-occupants" (pedestrians, bicyclists and other non-occupants) from fourteen percent (14%) to twenty percent (20%) in the 2009 to 2018 interval.[8] Connecticut EMS records for year 2018 include over twenty-three thousand unique records with age and gender data. Injury categories included were: all vehicle occupant injuries, injuries to motor cyclists, pedal cyclists, pedestrian collisions with vehicles, injuries involving pedestrian conveyances, and unspecified transport accidents.

Figure 11

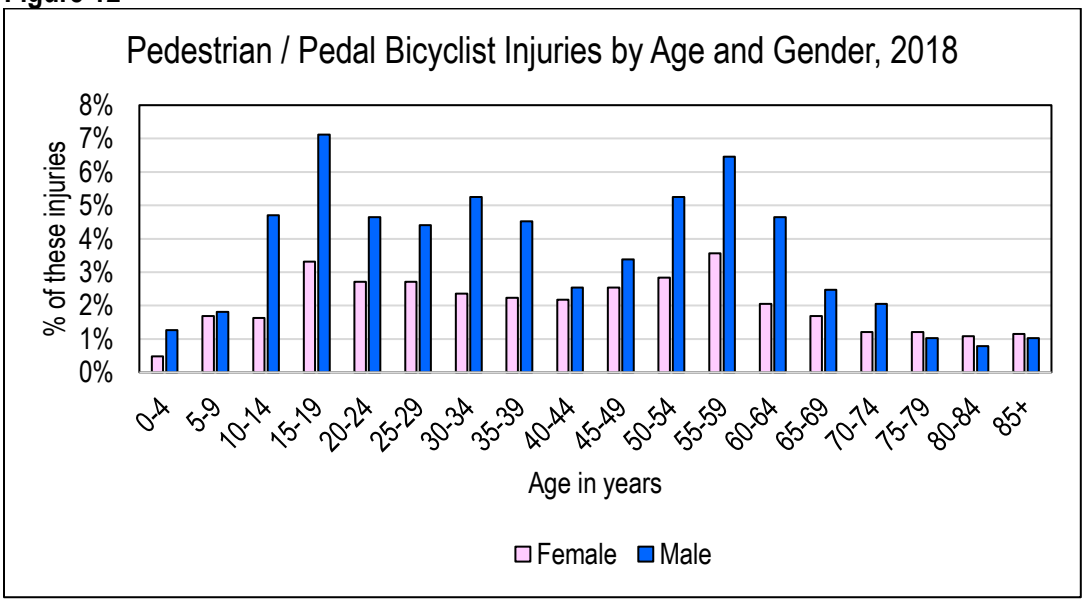


[8] NHTSA Traffic Safety Facts, October 2019 https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812826, Accessed Jan 2020

Pedestrian-Vehicle Collisions, Pedestrian conveyance and Pedal Bicyclist Injuries

The Governors Highway Safety Association projected a four percent (4%) increase in pedestrian fatalities nationwide in 2018.[9,10] An estimated 1,550 pedestrians and 550 bicyclists are hit by cars in Connecticut each year. States across the country are using a variety of methods to reduce pedestrian and bicyclist fatalities (road engineering, law enforcement, and raising awareness in drivers, pedestrians, and bicyclists). In Connecticut, a community outreach program "Watch for Me CT", led by the Connecticut Department of Transportation and the Connecticut Children's Injury Prevention Center is one prevention strategy.[11] The age and gender distribution of injuries from n = 1,657 codes for pedestrian-vehicle collisions, pedal bicyclists, and pedestrian conveyance injuries from year 2018 Connecticut EMS records is shown in Figure 12. Data are incomplete for June and July 2018.

Figure 12



n = 1,706 unique records, 1,657 had age and gender data

[9] The projected increase was based on historical data from the first six months of 2018. The increase is a comparison to figures from 2017 from state highway safety estimates. More state-specific estimates are included: https://portal.ct.gov/-/media/DOT/documents/dhighwaysafety/TRCC/trcc_meeting_11-20-19.pdf?la=en, Accessed Dec 2019.

[10] New Projection: 2018 Pedestrian Fatalities Highest Since 1990: https://www.ghsa.org/resources/news-releases/pedestrians19, Accessed Jan 2020.

[11] Watch For Me CT: https://www.watchformect.org/, Accessed Dec 2019.

Timing of Pedestrian and Bicyclist Injuries

The date and time that the EMS unit was notified by dispatch was used to approximate pedestrian, pedestrian conveyance, and pedal bicyclist injuries (n = 1,706 unique records) in Connecticut data. Data for June and July were not all available.

Information for over six thousand pedestrian fatalities collected through the FARS system[12] for 2018 pinpoints the 6:00 pm to 9:00 pm (26%) and the 9:00 pm to midnight (24%) periods as the deadliest nationwide.[13] Figure 13 shows timing of Connecticut injuries. Figure 14 shows the weekday timing of Connecticut injuries next to FARS weekday timing for fatalities.

Figure 13

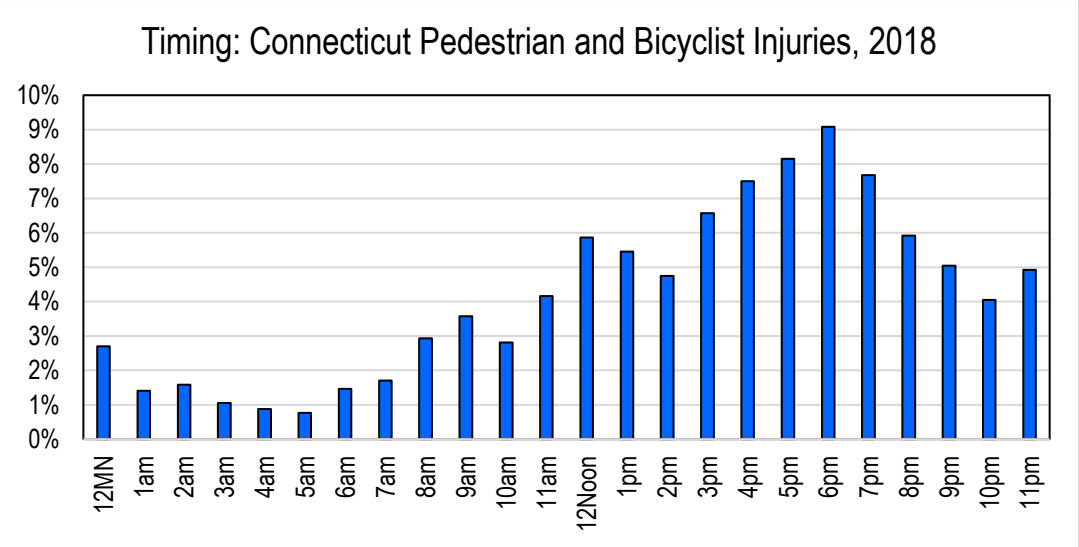
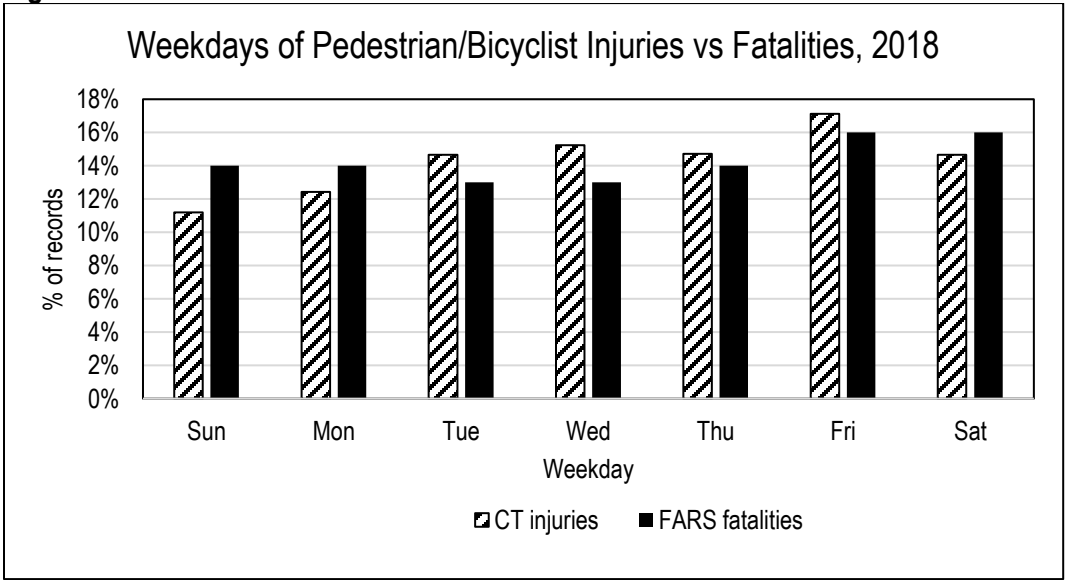


Figure 14



[12] Fatality Analysis Reporting System (FARS): https://www.nhtsa.gov/research-data/fatality-analysis-reporting-system-fars, Accessed January 2020.

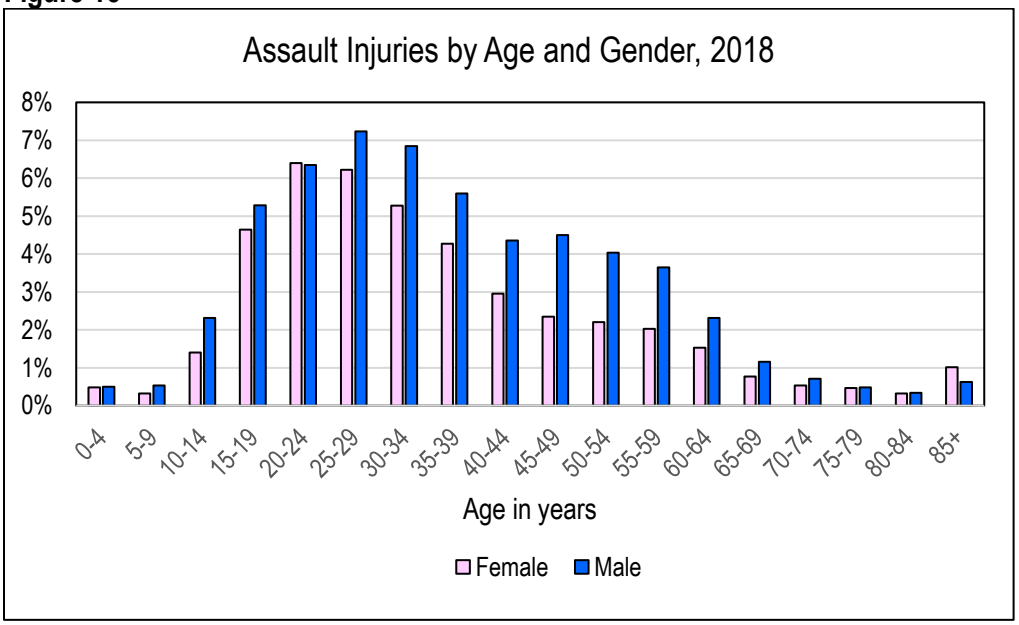
[13] Fatality Facts 2018, Pedestrians: https://www.iihs.org/topics/fatality-statistics/detail/pedestrians. Based on data from the U.S. Department of Transportation Fatality Analysis Reporting System (FARS), Accessed Jan 2020.

Injuries from Assault

Assault is the third most common cause of injury in the year 2018 data. The unique records with cause of injury identified as assault which have age and gender data (n = 6,221) are shown in Figure 15. Assaults can be further coded into sixteen different categories, each with numerous specific sub-classifications. At least sixty percent (60%) of assault cause of injury records indicate that the patient was brought to a hospital, ED or medical clinic.

Given violence prevention has long been a public health priority area,[14] other causes of injury such as intentional self-harm, suspected physical abuse, suspected maltreatment, and suspected sexual abuse can be specifically coded.

Figure 15



[14] Centers for Disease Control, Violence Prevention timeline, https://www.cdc.gov/violenceprevention/publichealthissue/timeline.html accessed Jan 2020.

Cardiac Arrests

Surveillance data from the Cardiac Arrest Registry to Enhance Survival (CARES) show that each year about 300,000 people in the United States have a cardiac arrest.[15] Data that include location type, presumed etiology, the timing of events, resuscitation efforts, destination, and outcome information provide a framework for examining prehospital care with respect to survival and good functional outcomes, especially for arrests that are witnessed. Connecticut data includes outcome at the end of the EMS event but would need to be linked with hospital outcome data for more in depth evaluation.

A number of data fields have been added to the national EMS data collection framework (NEMSIS) in order to collect more specific data about prior treatment, vital signs, and outcomes.

Compare data collection V221 vs V340			**x = collects that information**
	V2.2.1	**V3.4.0**	
Cardiac Arrest No/Yes before/after EMS arrived	x	x	
Etiology	x	x	V3 adds "Drug Overdose"
Resuscitation Attempted by EMS	x	x	
Arrest Witnessed by	x	x	V3 adds "Family member"
First Monitored Rhythm	x	x	
Any Return of Spontaneous Circulation	x	x	V3 adds "Yes, sustained for 20 consecutive minutes", multiple choices allowed
Neurological Outcome at Hospital Discharge	x	x	optional
Prior CPR[16]	No	x	
Who Provided Prior CPR	No	x	
Prior AED[17]	No	x	
Who used Prior AED	No	x	
Type of CPR Used by EMS	No	x	
Estimated time of arrest prior to EMS arrival	x		
Date/time resuscitation d/c	x		
Reason CPR/resuscitation d/c	x	x	
Cardiac Rhythm on Arrival at Destination	x	x	V3 more extensive list
Outcome at End of Cardiac Arrest Event		x	

Arrest Witness Data

Half of the cardiac arrest events (n = 2,394) were documented by emergency responders as having no witness. Of these, 168 were missing location type data. The remaining unwitnessed events (n = 2,226) were distributed by location as follows: The majority of events (75%) took place at a non-institutional private residence. The others were distributed across institutional residence (11%), street or highway (5%), trade/service including ambulatory health (3%), public use building (2%), hospitals (2%) and other places (2%).

[15] McNally B, et. al. Out-of-hospital cardiac arrest surveillance ---Cardiac Arrest Registry to Enhance Survival (CARES), United States, October 1, 2005 – December 31, 2010: https://www.ncbi.nlm.nih.gov/pubmed/21796098.

[16] CPR: cardiopulmonary resuscitation

[17] AED: Automated External Defibrillator

Figure 16 n = 4,210 records of non-institutional cardiac arrests with age and gender

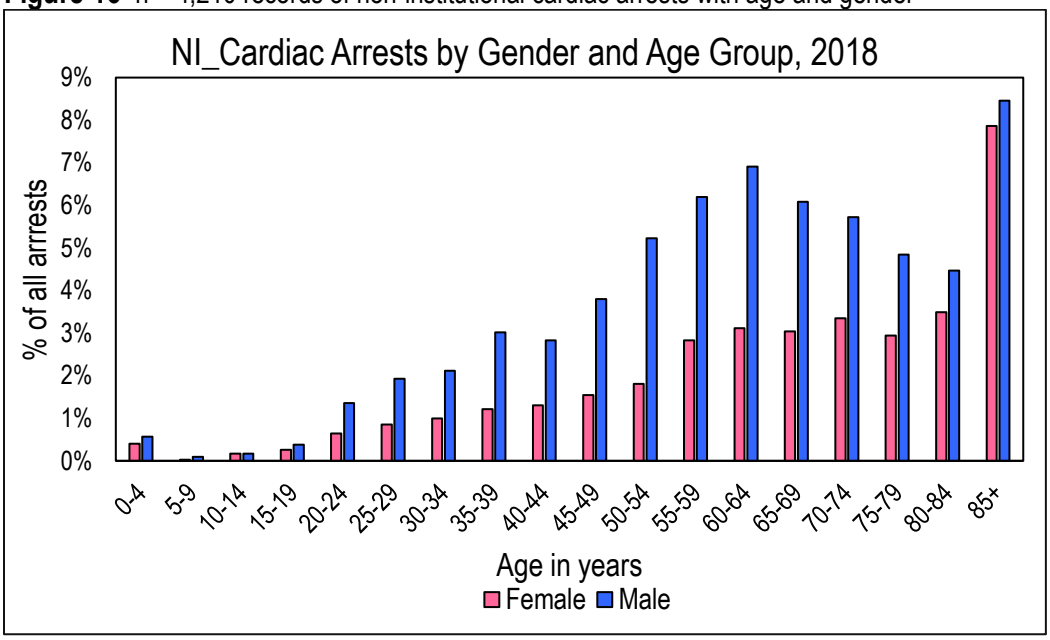


Figure 17 n = 4,052 records with cardiac arrest etiology information

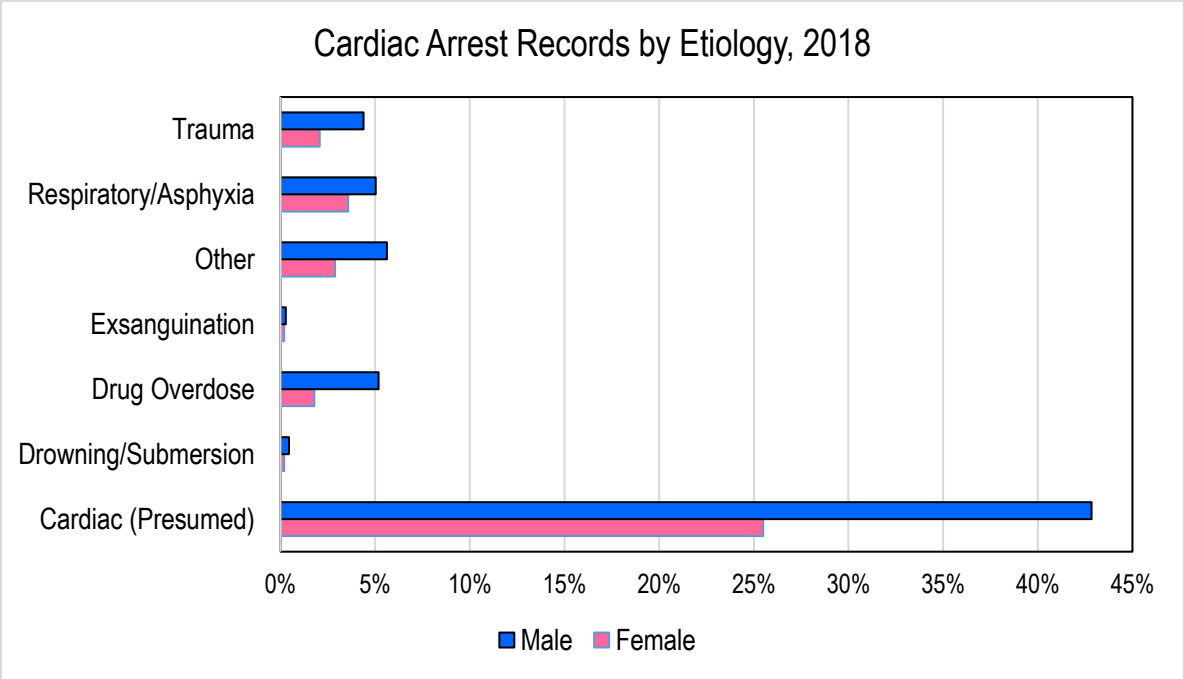
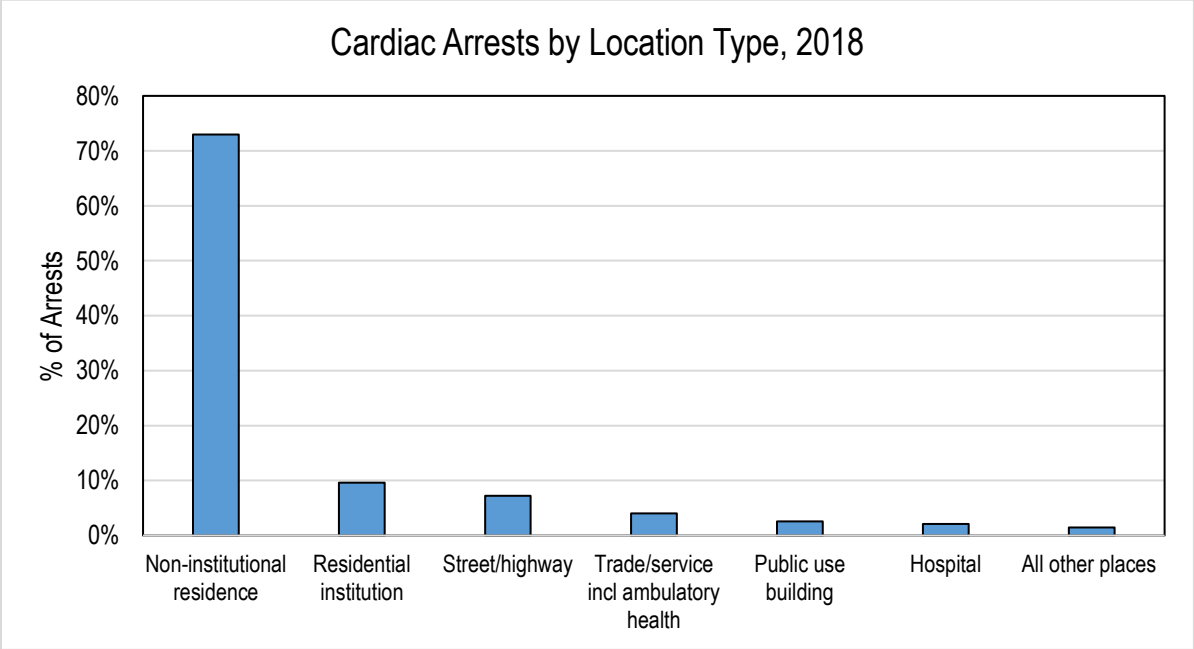


Figure 18 n = 4,220 records with location type data



560 records were missing location type

All of the records that documented occurrence of a cardiac arrest had timing information. Eighty-nine percent (98%) of cardiac arrests occurred prior to the arrival of emergency medical services. Documentation of the first monitored arrest rhythm was as follows for 4,780 events.

First Monitored Arrest Rhythm	% of Arrests
Asystole	52%
PEA[18]	14%
Unknown AED Non-Shockable Rhythm	8%
Unknown AED Shockable Rhythm	3%
Ventricular Fibrillation	7%
Ventricular Tachycardia-Pulseless	1%
Missing Information	14%

Fifty-one percent (51%) of all event records documented reasons for discontinuing resuscitation or CPR:
Obvious signs of death (34%), return of spontaneous circulation (30%), a medical control order (22%), completion of protocol requirements (8%), a Do Not Resuscitate (DNR) order (6%), or physically unable to perform (0.2%).

[18] PEA refers to "pulseless electrical activity".

In 2018 data, 4,780 cardiac arrest records were queried for CPR, AED and outcome information:

CPR Prior to EMS?	No	31%
	Yes	52%
	Missing data	17%
AED Prior to EMS?	No	46%
	Yes, no defibrillation	31%
	Yes, WITH defibrillation	8%
	Missing data	15%
End of EMS Event Patient Outcome	Expired in the Field	36%
	Ongoing Resuscitation in ED	24%
	Expired in ED	20%
	ROSC[19] in the Field	4%
	ROSC in the ED	3%
	Ongoing Resuscitation by Other EMS	1%
	Missing data	12%

Available data for years 2017, 2018, and 2019 was combined to examine the roles of persons who used CPR or AED prior to the arrival of the EMS unit which responded to the call.

Who gave prior CPR? (n = 12,234 records)	**% of prior**
First Responder (Fire, Law, EMS)	54%
Non-EMS Healthcare professional	22%
Family Member	10%
Other EMS, not dispatched responder	8%
Lay Person (non-family)	6%

Who Used AED Prior to EMS? (n = 6,603 records)	**% of prior**
First Responder (Fire, Law, EMS)	85%
Healthcare Professional (Non-EMS)	12%
Lay Person (non-family)	1%
Other EMS Professional (not part of dispatched response)	1%
Family Member	<1%

[19] ROSC is the return of spontaneous circulation after cardiac arrest.

Non-Traumatic Chest Pain

Almost four percent (4%) of all types of calls in 2018 were for a complaint reported by dispatch of "non-traumatic chest pain". Destination types for 27,131 non-traumatic chest pain calls classified as "treated" by EMS showed that the majority (76%) of destination types were to hospital, urgent care center or free-standing emergency departments. Twenty-three percent (23%) of "treated" recorded "no information" of destination type and one percent were transferred to another EMS responder. One problem appears to be in documentation of destination type and use of the actual destination codes for clinical care.

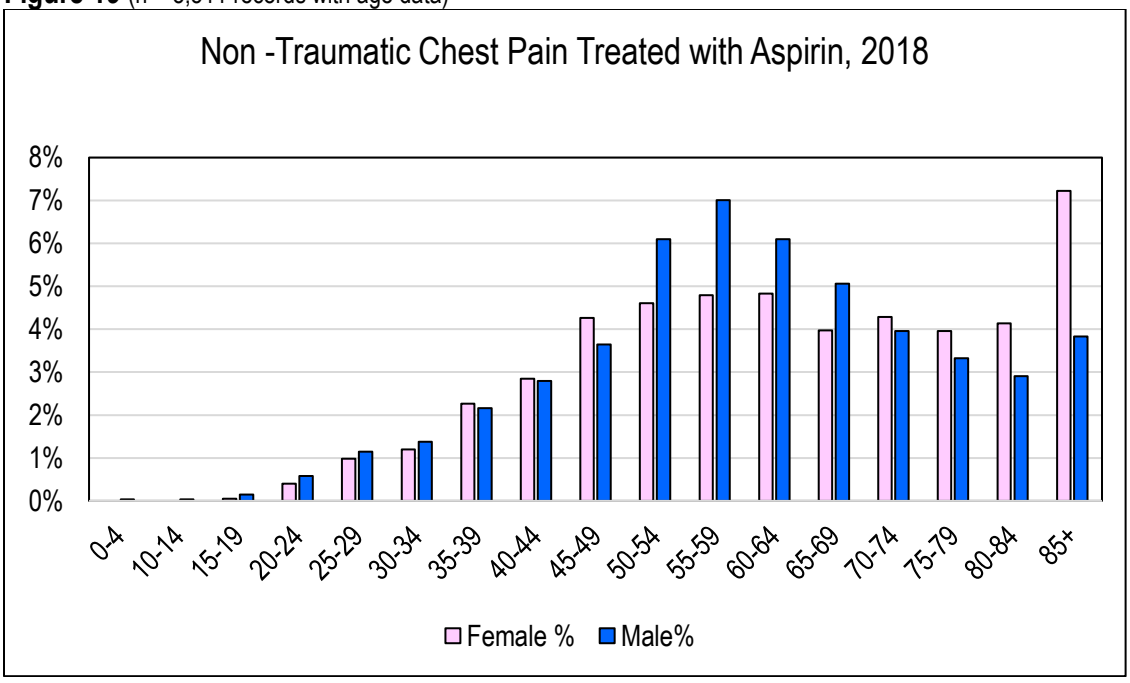
The destination type of almost one-quarter of non-traumatic chest pain records was specifically coded as "no information". However, these records often collected information in the destination name field. Not all of the entries in the destination name field were valid choices. Without validation, the ascertainment of protocol adherence and hospital utilization for specific conditions is difficult to accomplish.

Seventy-nine percent (79%) of the "treated" records contained information about initial patient acuity. Of those records, thirty-eight percent (38%) were judged as "emergent", three percent were judged "critical" and the rest were low acuity (59%), or dead without resuscitation (<1%).

The EMS provider's primary impression is collected once per record, but the secondary impressions can include multiple entries for each record in a separate filed. A detailed analysis of all the provider impressions documented for non-traumatic chest pain is beyond the scope of this report.

There were 5,566 non-traumatic chest pain records documented administration of aspirin by EMS. There were almost equal numbers of males and females with age data. The age distribution by gender appears in Figure 19.

Figure 19 (n = 5,511 records with age data)



Alcohol and Drugs

A patient history field is now used to collect information entered about alcohol and other drug use. More than one indicator can be collected in a patient care record. The indicators found in decreasing order of frequency were: patient admits to alcohol use, smell of alcohol on breath, patient admits to drug use, alcohol containers/paraphernalia at scene, drug paraphernalia at scene, and positive level known from law enforcement or hospital record.

Indicators collected and discussed above are not by themselves reliable estimators of the size of a public health problem. Part of the recognition is in documentation. As in previous reports[20], but using the new data structures, additional fields were examined to ascertain how drug and alcohol documentation was being done.[21] For the 2018 report, if a record reflected the documentation of an alcohol/drug indicator, EMS use of a toxicity protocol or administration of Naloxone were recorded in an associated scoring field.[22]

Below are the patterns of data collection in 2018 for alcohol and drug related information, using a patient history (alcohol/drug indicator), a protocol use field and medications given fields (1 = present, 0 = absent).

INDICATOR	TOXPROTOCOL	NALOXONE	Frequency
1	0	0	26,172
0	0	1	4,158
1	0	1	1,335
0	1	0	157
1	1	0	54
1	1	1	42
0	1	1	30

Over five thousand (n = 5,565) total administrations of Naloxone were documented in medications given for over more than three thousand (n = 3,606) individual calls. The distribution of the number of doses in those calls was as follows:

# Doses	Frequency	Percent
1	2,404	67%
2	846	23%
3	205	6%
4	93	3%
>4	58	2%

Ninety-eight percent (98%) of calls where Naloxone was given were emergency 911 calls. More than half (51%) of incident responses were to non-institutional residences. Eighteen percent (18%) were to a street or highway. Eight percent (8%) of calls were to a trade or service location, eight percent (8%) were to a public use building. Three percent (33%) of responses were to an institutional residence and the remaining locations were not specific. Approximately two-thirds (68%) of these patients were directed to a hospital, urgent care center, or free-standing emergency department. Almost one third of destination types were coded "no information" for destination type. The administration routes for Naloxone were coded as intranasal (50%), intravenous (37%), intramuscular (6%) and intraosseous (5%). Ninety-nine percent (99%) of patient dispositions were treatment/assist calls. About 1% of calls documented death at the scene.

[20] Kloter, et. al, OEMS 2015 Data Report: https://portal.ct.gov/-/media/Departments-and-Agencies/DPH/dph/ems/pdf/CEMSTARS/2015OEMSAnnualDataReportpublicpdf.pdf?la=en, Accessed 12/13/2019.

[21] Kloter, et.al, OEMS 2016 Data Report: https://portal.ct.gov/-/media/Departments-and-Agencies/DPH/dph/ems/pdf/CEMSTARS/2016OEMSAnnualDataReportpublic.pdf?la=en, Accessed 12/13/2019.

[22] Any record containing a Naloxone code in the medications given field (multiple entries possible) was scored 1 for created variable _NARCAN. Records with alcohol/drug use indicators were assigned a 1 for _INDICATOR. Records which contained codes for toxicity protocols were scored a 1 for _TOXPROTOCOL. These could include toxicities from prescribed drugs and other substances, not only illicit drugs.

Protocols Documented

NEMSIS v3.4.0 uses 114 codes for treatment protocols, grouped into Airway, Environmental, General, Injury, Medical, and OB/GYN. The current guidance for Connecticut EMS protocols v2019.5 can be found on the OEMS web site at https://portal.ct.gov/DPH/Emergency-Medical-Services/EMS/Statewide-EMS-Protocols. The protocols are divided into care sections for routine patient care, medical, cardiac, trauma, airway, other procedures, and sections for hazardous materials exposures, mass casualties and radiation injuries.

Almost one hundred different protocols codes were entered for 2018. The top ten protocols codes in year 2018 were:

Protocol Code	Label	Frequency
9914075	General-Universal Patient Care/ Initial Patient Contact	88,890
9914071	General-Pain Control	18,552
9914053	General-Behavioral/Patient Restraint	17,715
9914139	Medical-Respiratory Distress/Asthma/COPD/Reactive Airway	16,761
9914207	Airway-Rapid Sequence Induction (RSI-Paralytic)	14,918
9914165	Other	12,732
9914135	General-Overdose/Poisoning/Toxic Ingestion	12,623
9914117	Medical-Cardiac Chest Pain	9,462
9914113	Medical-Altered Mental Status	7,008
9914055	General-Cardiac Arrest	4,807

Moving Forward

The Office of Emergency Medical Services continues to work with stakeholders to obtain complete and correctly processed data submissions. EMS data collection is being migrated to Image Trend, which is the EMS database vendor for all other New England states. We gratefully acknowledge the sharing of goals and strategies with the Syndromic Surveillance and the Injury Prevention program at the Department of Public Health.

The trauma data collector created by Digital Innovation, Inc. has been acquired by another vendor, ESO. We are working with this vendor and with state trauma registries during this transition.

Missing Data Submissions

The following agencies do not have records in the 2018 dataset:

Campion Ambulance/ now Trinity Health	L151P1
American Ambulance	L059P1
Bethlehem	C010B1
Burlington	C020P1
Canton	C023I1
Coventry	C032B1
Hamilton Sunstrand	C165B2
LifeNet	0767
Morris	C087B1
Mortlake Fire	C019B1
Naugatuck	C088P1
Norfolk Lions	C098I1
Northern Duchess Paramed (NY)	L00RP1
Old Lyme South End	C105B1
Oxford Ambulance	C108B1
Poquetank VFD	C114B2