ImageTrend

TRANSPORTATION INCIDENT VISUALIZATION COMPANION GUIDE

Introduction

EMS responds to more than 1.5M motor vehicle crash-related injuries annually. Federal and state entities rely on motor vehicle crash incident data to identify problem areas for improvement within their communities and along the roadway systems, which they use to request funding to impact overall transportation safety. Often crash data reporting is delayed, making it challenging to analyze and garner timely insights. The Transportation Incident Visualization will offer a systemic approach with near realtime data, giving users the ability to swiftly identify areas of safety vulnerabilities. Analyzing motor vehicle crashes, understanding why they happen, and what can be done to prevent them from happening is the intelligence gained. Working together, we will help all parties involved use the dashboards to look at transportation insights from a historic and predictive perspective.

Inclusion Criteria

This data set represents patients who were suspected of being involved in a motor vehicle or transportation emergency event attended by an EMS clinician. This dataset includes the following inclusion and exclusion criteria. For details on each data element, its code, and range of values, please see the NEMSIS Version 3.4 and 3.5 Data Dictionary found at: DEM/EMS Data Dictionary. Additional descriptions of these values are available in this NEMSIS v3 Extended Data Definitions document. Please see ICD-10 Data for more information on diagnosis and procedure codes.

The primary criteria below will be used to capture suspected EMS incidents related to transportation and traffic incidents, and motor vehicle crashes involving vehicle occupants, motorcyclists, pedal cyclists, pedestrians, and other road users. Further refined criteria are used to build specific dashboards, topics, and charts.

Patient Care Reports WHERE:

(1 item from blue box) OR (1 item from pink box) OR (1 item from a green box AND 1 item from any of the grey boxes)

eInjury.01 (Cause of injury) is at least one V00-V89

OR

eInjury.01 (Cause of Injury) = V00 (Pedestrian Conveyance Accident) AND eScene.09 (Scene Location Type) =Y92.4 (street, highway and other paved roadways)

OR

eDispatch.01(Dispatch Reason) = 2301069(Traffic/Transportation Incident)

eScene.09(Incident Location Type) = Y92.4(street, highway and other paved roadways)

eDispatch.03(EMD Card number) starts with 29 (Traffic/Transportation Accident)

AND

Primary Provider Impression or Secondary Provider Impression **is at least one** T79 T07-T32, S00-S99

OR

eSituation.02 (Possible Injury) = “Yes”

OR

eProtocols.01(Protocols used) **is at least one**
9914077(Injury-Amputation)
9914083(Injury-Bleeding/Hemorrhage)
9914085(Injury-Burns-Thermal)
9914087(Injury-Cardiac Arrest)
9914089(Injury-Crush Syndrome)
9914093(Injury- Drowning/Near Drowning)
9914095(Injury-Electrical Injuries), 9914097(Injury-Extremity)
9914099(Injury-Eye)
9914101(Injury-Head), 9914103(Injury-Impaled Object)
9914105(Injury-Multisystem),9914107(Injury-Spinal Cord)
9914205(Injury-Facial Trauma)
9914207(Injury-General Trauma Management)
9914213(Injury-Topical Chemical Burn)

OR

eArrest.02 (Cardiac Etiology = “3002015”)

OR

eOther.02 (Potential System of Care/Specialty/Registry Patient) **is at least one**
4501017(Trauma)
4502019(Traumatic Brain Injury)

OR

eVitals.33 (Revised Trauma Score) **is not** NULL

OR

eInjury.04(Trauma Triage Criteria) **is at least one** 2904001(Auto v. Pedestrian/Bicyclist Thrown, Run Over, or > 20 MPH Impact)
2904007(Crash Death in Same Passenger Compartment)
2904009(Crash Ejection (partial or complete) from automobile)
2904011(Crash Intrusion, including roof: > 12 in. occupant site; > 18 in. any site)
2904013(Crash Vehicle Telemetry Data (AACN) Consistent with High Risk of Injury)
2904015(Motorcycle Crash > 20 MPH)
2904029(Auto Crash: Child (age 0-9 years) unrestrained or in unsecured child safety seat
2904035(Rider separated from transport vehicle with significant impact (e.g., motorcycle, ATV, horse, etc.)

OR

eInjury.05(Main Area of the Vehicle Impacted by the Collision) **is not** Null

OR

eInjury.06(Location of Patient in Vehicle) **is not** Null

OR

eInjury.07(Use of Occupant Safety Equipment) **is at least one**
2907001(Child booster seat)
2907007(Infant Car Seat Forward Facing)
2907009(Infant Car Seat Rear Facing)
2907027(Shoulder and Lap Belt Used)
2907029(Lap Belt Only Used)

OR

eInjury.08(Airbag Deployment) **is not** Null

Dashboard Views

- **EMS Activations:** These data represent all EMS activations that may have responded to an motor vehicle incident.

  Example: A unit responded and began treating a patient, a second unit responded and took over care of patient. Both ePCR records will be accounted for in this section of the dashboard.

- **Patient Incidents:** These events are based on a deduplication process that will only show one ePCR per patient (see below for deduplication process).

  Example: One unit responded and began treating a patient, a second unit responded and took over care of patient. Only one complete ePCR record for that patient will be accounted for in this section of the dashboard.

- **Blood Transfusion Report:** These events are based on the overall EMS activation view and features enhanced reporting regarding hemodynamic instability and prehospital care delivery. Additional information includes indicators of normal/abnormal shock index, intravenous access determination, and prehospital blood administration.
- **Pedestrian Involved Events :** These events are based on the NEMSIS case definition “Motor Vehcle Crash – Pedestrian” and represent all EMS activations where the patient was a pedestrian injured in a motor vehicle crash.
- **Pedal Cycle InvovledInvolved Events:** These events are based on the NEMSIS case definition “Motor Vehicle Crash – Pedal Cycle” and represent all EMS activations where the patient was a pedal cycle rider injured in a motor vehicle crash.
- **Motorcycle Involved Events:** These events are based on the NEMSIS case definition “Motor Vehicle Crash – Motorcycle” and represent all EMS activations where the patient was a motorcycle rider injured in a motor vehicle crash.
- **Vehicle Occupants Events:** These events are based on the NEMSIS case definition “Motor Vehicle Crash – Car, Truck, or Bus” and represent all EMS activations where the patient was an occupant of a three-wheeled motor vehicle, car, pick-up truck, van, heavy transport vehicle, or bus injured in a motor vehicle crash.

Deduplication Process

Duplicate records have been removed when possible. The rates represented include individual and unique incidents. Duplicate ePCRs are excluded by including only reports for the following element values. These values were selected to limit motor-vehicle emergency events as closely as possible to "patient events". This is done by identifying elements that allow for the removal of duplicate records where multiple EMS units attended the same patient.

(eResponse.07 (Primary Role of the Unit) = 2207003 (Ground Transport))
AND
((eScene.01 (First EMS Unit on Scene) = 9923003 (Yes) **OR**
(eScene.01 (First EMS Unit on Scene) = 7701003 (Not Recorded) **AND**
eDisposition.12 (Incident/Patient Disposition)= 4212031 (Patient Treated, Transferred Care to Another EMS Unit))

OR

(eDisposition.27 (Unit Disposition)= 4227001 (Patient Contact Made)
AND
(eDisposition.29 (Crew Disposition)= 4229001 (Initiated and Continued Primary Care) **OR**
(eDisposition.29 (Crew Disposition)= 4229003 (Initiated Primary Care and Transferred to Another EMS Crew))

Data Collection and Distribution

Data included in the MVC Transportation Incident Visualization dashboard are collected from the ImageTrend System, which is supported by the National Emergency Medical Services Information System (NEMSIS) and the National Highway Traffic Safety Administration (NHTSA) Office of Emergency Medical Services (OEMS). States across the nation submit EMS data to ImageTrend and is then stored in a repository. More Information about ImageTrend can be found at: https://www.imagetrend.com/

State/Territory Offices of EMS electronically submit to ImageTrend de-identified limited data from patient care reports (PCRs) that have been generated by local EMS agencies. The data visualizations do not contain protected health information (PHI) or personally identifiable information (PII).

Additional Data Definitions

- **Severe Patient Injury** – defined using the NEMSIS TAC provided case definition
    - **Severe injury** – determined for the activation if any of the following conditions have been met:
        - eDisposition.19, which represents 'Final Patient Acuity', in versions 3.4 or 3.5 of the NEMSIS database is 'Critical (Red)'. The NEMSIS for Critical (Red) final patient acuity is 4219001.
        - eDisposition.24, which represents 'Destination Team Pre-Arrival Alert or Activation', in versions 3.4 or 3.5 of the NEMSIS database is one of the following:
            - Yes - Adult Trauma - 4224003
            - Yes - Pediatric Trauma - 4224011
            - Yes - Trauma (General) - 4224017
        - The probability of survival from the algorithm is less than or equal to 0.361.
            - Probability of survival algorithm:

- Calculate the sum of eVitals.19 (Glasgow Coma Score - Eye), eVitals.20 (Glasgow Coma Score - Verbal), eVitals.21 (Glasgow Coma Score - Motor). This is the patient's Glasgow Coma Score. Exclude values of '7701001' (Not Applicable) and '7701003' (Not Recorded)
    - Create Glasgow Coma Score categories:
        - 0 if [0, 3]
        - 1 if [4, 5]
        - 2 if [6, 8]
        - 3 if [9, 12]
        - 4 if [13, 15]
- Create systolic blood pressure categories from eVitals.06, exclude values of '7701001' (Not Applicable), 7701003 (Not Recorded), 8801005 (Exam Finding Not Present), 8801019 (Refused), 8801023 (Unable to Complete):
    - 0 if equal to 0
    - 1 if [1, 49]
    - 2 if [50, 75]
    - 3 if [76, 89]
    - 4 if greater than or equal to 90
- Create respiratory rate categories from eVitals.14, exclude values of '7701001' (Not Applicable), 7701003 (Not Recorded), 8801005 (Exam Finding Not Present), 8801019 (Refused), 8801023 (Unable to Complete):
    - 0 if equal to 0
    - 1 if [1, 5]
    - 2 if [6, 9]
    - 4 if [10, 29]
    - 3 if greater than or equal to 30
- Calculate a variable called 'Rts' that encompasses the glascow coma score, systolic blood pressure, and respiratory rate categories as follows:
    - Rts = 0.9368*(Glasgow Coma Score Category) + 0.7326*(Systolic Blood Pressure Category) + 0.2908*(Respiratory Rate Category)
- Patient is determined to be dead if any of the following conditions are met:
    - eSituation.09, eSituation.10, eSituation.11, or eSituation.12 contains 'R99' (Ill-defined and unknown cause of mortality, Death (unexplained) NOS, or Unspecified cause of mortality)
        - eArrest.16 contains '3016005' (Obvious Signs of Death)

- Finally determine the probability of survival as follows:
    - 0.027 if Rts is [0, 1) OR the patient is dead
    - 0.071 if Rts is [1, 2)
    - 0.172 if Rts is [2, 3)
    - 0.361 if Rts is [3, 4)
    - 0.605 if Rts is [4, 5)
    - 0.807 if Rts is [5, 6)
    - 0.919 if Rts is [6, 7)
    - 0.969 if Rts is [7, 7.84)
    - 0.988 if Rts is greater than 7.84

- **Probability of Survival** – source: NEMSIS TAC provided definition from weighted RTS score
    - **Probability of survival:**
        - 0.027 if Rts is [0, 1) OR the patient is dead
        - 0.071 if Rts is [1, 2)
        - 0.172 if Rts is [2, 3)
        - 0.361 if Rts is [3, 4)
        - 0.605 if Rts is [4, 5)
        - 0.807 if Rts is [5, 6)
        - 0.919 if Rts is [6, 7)
        - 0.969 if Rts is [7, 7.84)
        - 0.988 if Rts is greater than 7.84
- **Urbanicity** – source: NEMSIS TAC provided definition
    - "Urbanicity refers to the degree to which a geographical area is considered urban. It's a measure of how "city-like" a place is, ranging from densely populated, bustling city centers to more sparsely populated, rural areas."
- **Abnormal Shock Index** – defined from consultation with NHTSA/NEMSIS identified subject matter experts in prehospital blood administration, to be continuously reviewed and updated as new evidence emerges by the TIV Technical Expert Panel
    - Calculated from the 1st concurrently documented heart rate and systolic blood pressure
    - Abnormal if ages 0 to 5: >1.2; 6 to 12: > 1.0; 13 to 14: >0.9; 15+: >0.8
- **Blood Transfusion** – defined as any inclusion in eProcedures.03 OR eMedications.03 for any of the following: blood transfusion, not otherwise specified, packed red blood cells, plasma, platelets, cryoprecipitate, or whole blood

Additional Datasets

When exploring the TIV dataset on the map, there are a several additional datasets available to add to the map as additional layers.

- **Trauma Center Levels** – source: The American College of Surgeons | ACS https://www.facs.org/
    - Data is separated into layers for each Trauma Center Level as retrieved in Spring 2025.

- **FARS Data Layers** – source: Fatality Analysis Reporting System (FARS) | NHTSA https://www.nhtsa.gov/research-data/fatality-analysis-reporting-system-fars
    - Data is separated into years 2020, 2021, 2022, and 2023 and contains all records from the accident.csv file from each year.
    - Regardless of the dashboard that the FARS layers appear on, the FARS layers include all person types for that year. The FARS element “Person Type” is defined as “The role of this person or non-motorist at the time they became involved in the crash”.