

# EMS by the Numbers

Impact of COVID-19  
November 28, 2022

N. Clay Mann PhD, MS, MBA  
NEMSIS Technical Assistance Center



This document is provided by NHTSA in an effort to help State EMS Officials track particular EMS activations occurring during the COVID-19 pandemic. This document will be updated periodically to provide current information regarding temporal variations in the type and characteristics of EMS activations occurring in the U.S. during the COVID-19 outbreak.

## Identification of ILI

- EMS Primary and Secondary Impression
- B97 codes: SARS and other coronavirus
- J09 codes: Influenza
- J15 codes: Pneumonia
- Patient Primary and Associated Symptoms
- R05 codes: Cough
- R06 codes: Shortness of Breath
- R50 codes: Fever
- J02 codes: Pharyngitis

The definition of Influenza-Like Illness (ILI) is based on the record inclusion criteria provided in the User Guide for the National NEMESIS ILI Surveillance Dashboard. The ILI Surveillance Dashboard User Guide can be found at: <https://wiki.utahdccc.org/confluence/x/BAKXAg>.

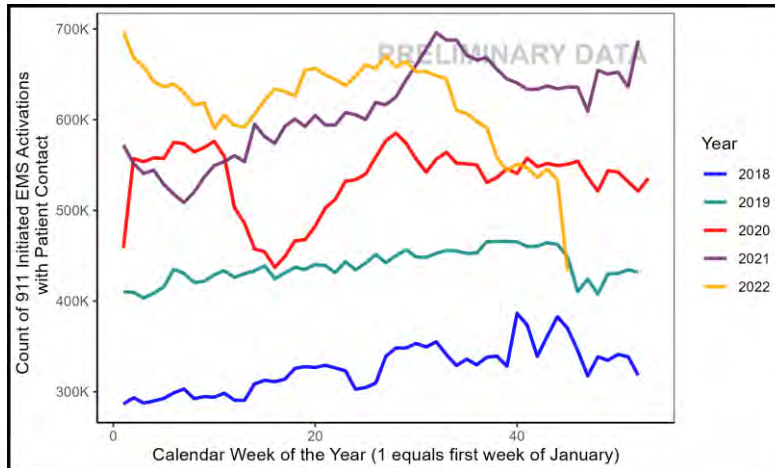
Provided in this slide are examples of the two types of ICD-10-CM codes included in the ILI criteria.

## Research Sample

- Time Period 1 (1<sup>st</sup> week to the 52<sup>nd</sup> week of 2018): **16,919,498**
- Time Period 2 (1<sup>st</sup> week to the 52<sup>nd</sup> week of 2019): **22,800,494**
- Time Period 3 (1<sup>st</sup> week to the 53<sup>rd</sup> week of 2020): **28,291,393**
- Time Period 4 (1<sup>st</sup> week to the 52<sup>nd</sup> week of 2021): **31,738,662**
- Time Period 5 (1<sup>st</sup> week to the 52<sup>nd</sup> week of 2022): **27,759,104**

Four date/time samples of EMS activations are included in this assessment of the COVID-19 pandemic. Three date/time periods (from the 1st week [beginning of January] to the 52nd week [end of December] of the year) are included to provide reference comparison to the fourth time period of interest (the 1st week through the 52nd week of 2021). The total sample includes 127,509,151 9-1-1 initiated EMS activations resulting in patient contact.

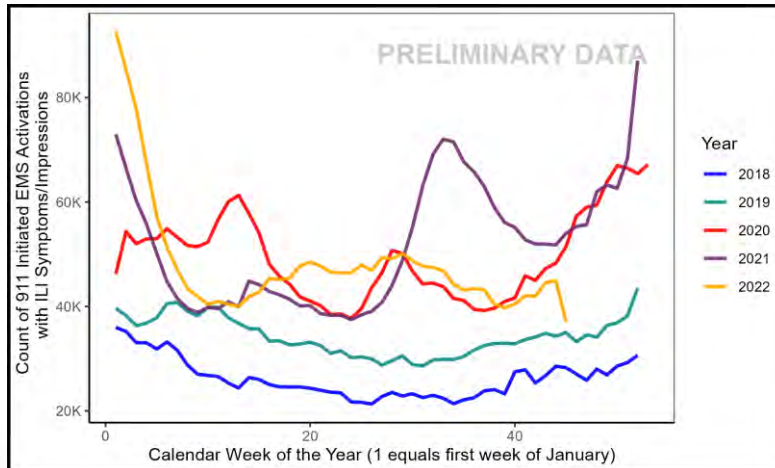
## Count of EMS Activations



The number of States submitting to the National EMS Repository increased over the study period (2017 – 32 States, 2018 – 40 States, 2019 – 44 States, 2020 – 51 States, 2021 to 2022 – 53 States and Territories). The District of Columbia submitted PCRs in each time period. States enrolling in the National EMS Repository commonly begin submitting PCRs at the beginning of the calendar year. No state has stopped submitting PCRs once enrolled.

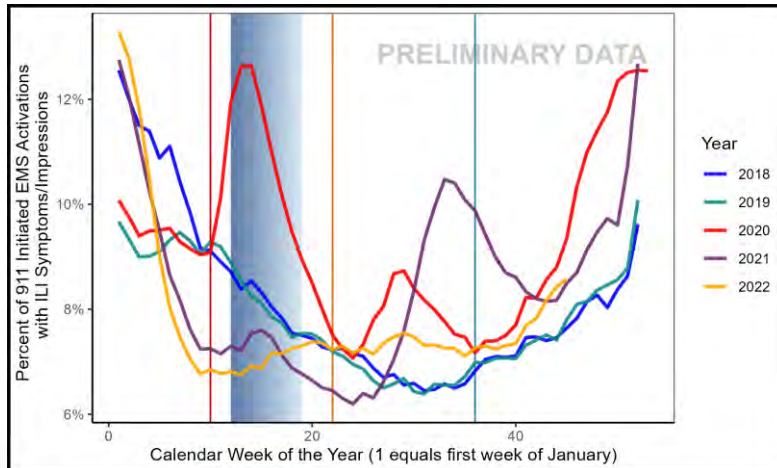
The number of EMS activations decreased by approximately 34% between Week 10 (March 2nd to March 8th) and Week 17 (April 20th through April 26th 2020). The number of EMS activations began a second downward trend in Week 28.

## Count of ILI Activations



The count of EMS activations related to ILI symptoms, greatly increased beginning in Week 10 through Week 14, with a dramatic precipitous drop thereafter through Week 24 of 2020. Because of the variation in the count of EMS activations through time, rates were calculated to remove difference due solely the count of submitted records.

## Rate of ILI Activations



Using the count of 9-1-1 initiated EMS activations with patient contact as the denominator, the rate of ILI activations is presented. This rate will increase with the introduction of the change to the ILI inclusion criteria discussed earlier. The rate of ILI-related EMS activations demonstrates the expected increase during the traditional "flu season", but higher than expected rates beginning in Week 10 and beginning to drop-off dramatically in Week 14. To provide some context to the timing of these rate fluctuations, "headline events" are listed for Week 10 and Week 12 of 2020.

### **2020:**

#### **Week 9-10:**

Feb. 26: CDC reports community spread; Vice President Pence to lead task force

#### **March 3: U.S. surpasses 100 cases**

#### **Week 12:**

March 13: President Trump declares national public health emergency

March 16: 15 days to slow the spread

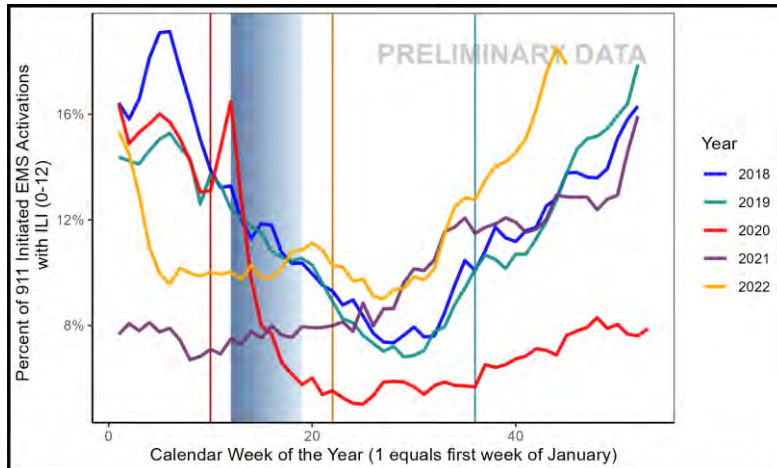
Trump issued guidelines that called for Americans to avoid social gatherings of more than 10 people for the next 15 days and to limit discretionary travel, among other guidelines.

**Many States initiate Stay-at-Home orders with orders beginning to phase-out in Week 19.**

**Week 22** May 25: Memorial Day

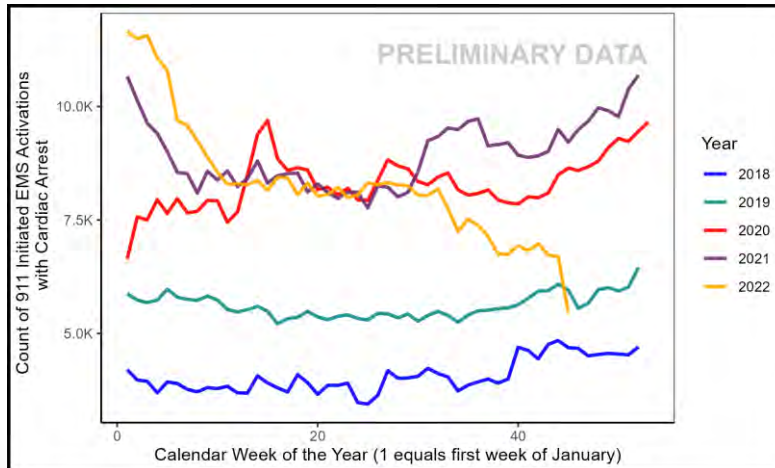
**Week 36:** Start of Labor Day weekend

## Rate of Pediatric ILI Activations



ILI inclusion criteria for patients age 0 – 12 years.

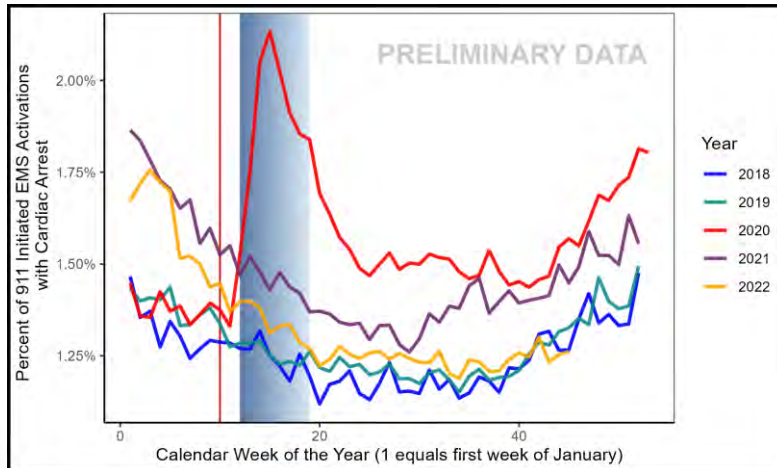
## Count of Cardiac Arrest Activations



The count of cardiac arrest is created by summing the NEMSIS element eArrest.01 - Cardiac Arrest: Yes, Prior to EMS Arrival AND Yes, After EMS Arrival. The increased number of EMS attended cardiac arrests from week 10 through week 15 represent approximately 1,000 additional cardiac arrests.

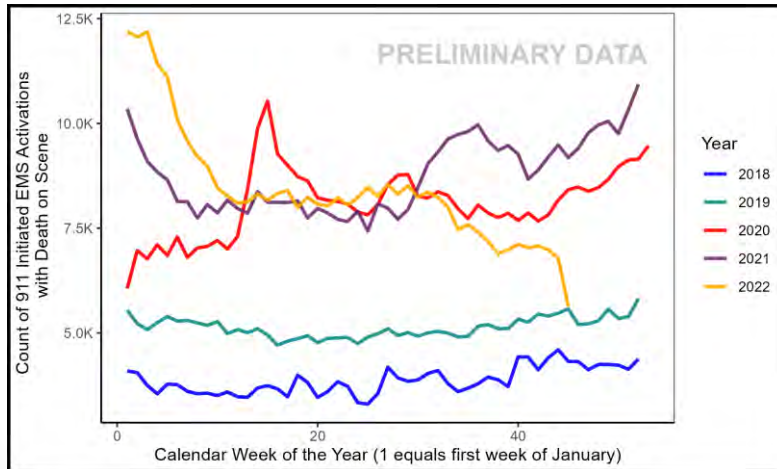


## Rate of Cardiac Arrest Activations



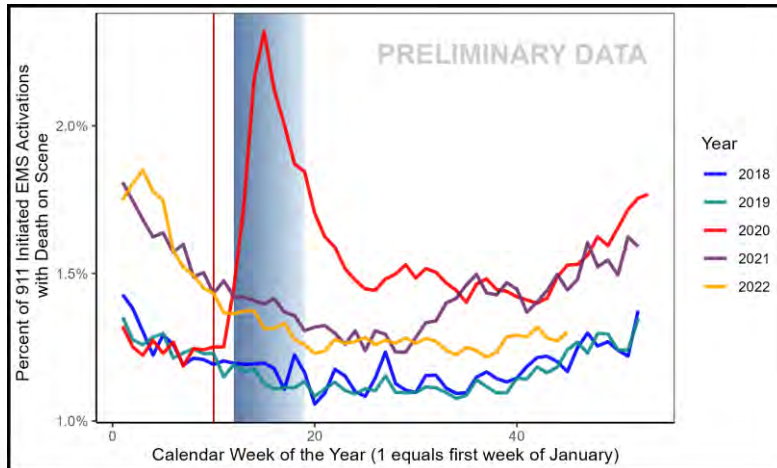
The rate of EMS attended cardiac arrest traditionally increases slightly during the winter months, probably due to additional witnessed arrests. Similar date stamps are superimposed across the dramatic shifts in rate of EMS attended cardiac arrests.

## Count of Scene Death Activations



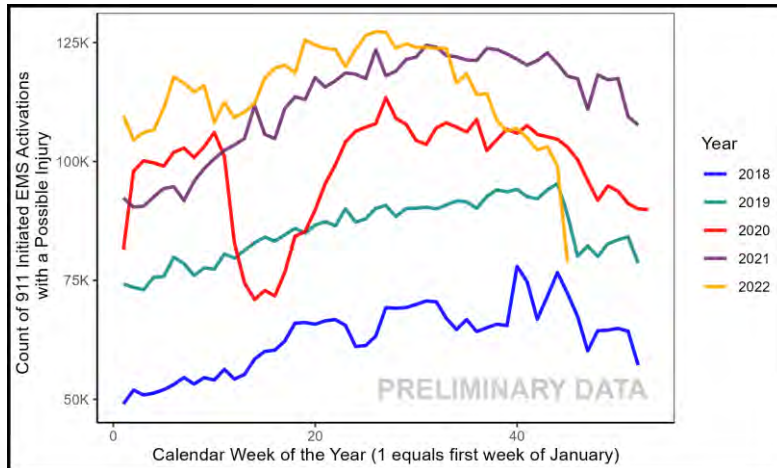
The count of EMS attended scene deaths results from summing the NEMSIS element eDisposition.12 - Incident/Patient Disposition: Patient Dead at Scene - With (or Without) Resuscitation Attempted and With (or Without) Transport.

## Rate of Scene Death Activations



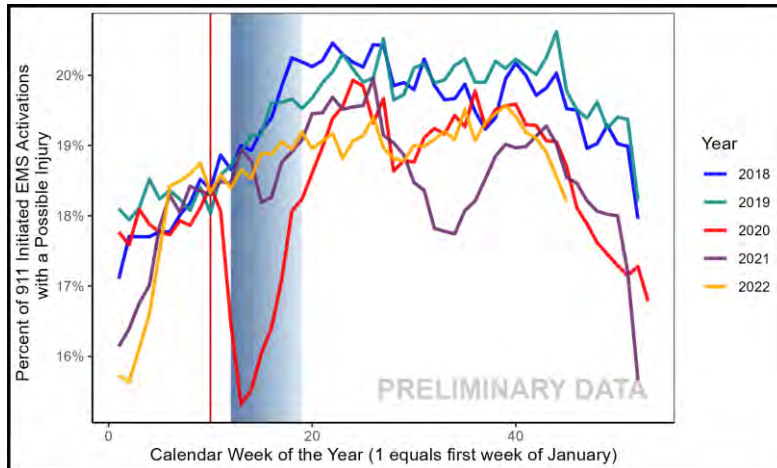
Similar date stamps are superimposed across the dramatic shifts in rate of EMS attended scene deaths.

## Count of Injury-Related Activations



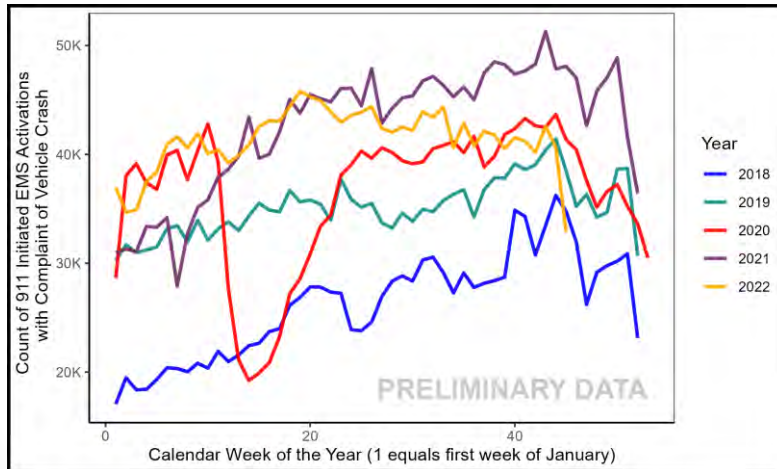
Let's look at an EMS activation trend, one would hypothesize, might decrease with the "Stay-at-Home" orders in place. The count of "injury-related" EMS activations was acquired by summing eSituation.02 - Possible Injury: "Yes."

## Rate of Injury-Related Activations



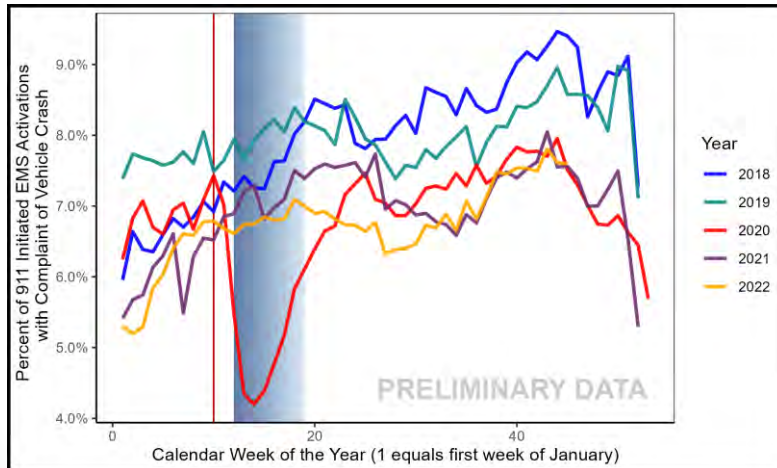
The rate of possible injury-related EMS activations demonstrates the expected increase during warmer months, but lower than expected rates beginning in Week 10 and beginning to increase in Week 13. Similar date stamps are superimposed across the dramatic shifts in rate of EMS activations reporting a possible injury.

## Count of Vehicle Crash Activations



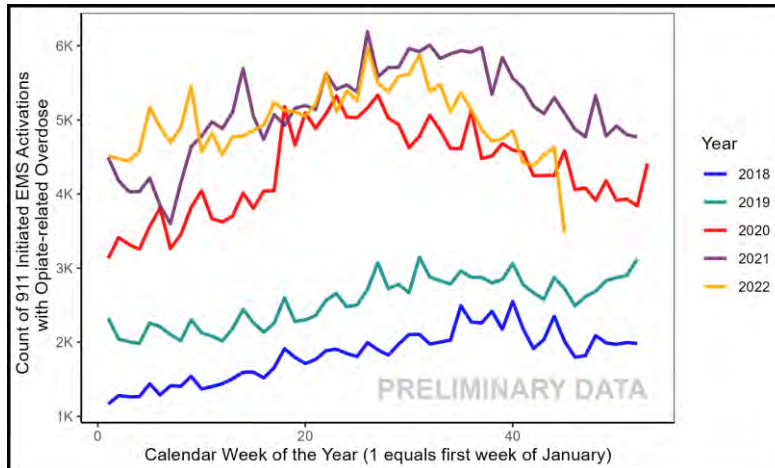
The count of EMS activations related to vehicle crashes results from summing the NEMSIS element eDispatch.01 - Complaint Reported by Dispatch: Traffic/Transportation Incident.

## Rate of Vehicle Crash Activations



Similar date stamps are superimposed across the dramatic shifts in rate of EMS activations associated with a Traffic/Transportation Incident.

## Count of Opioid-Related Activations



The count of opioid-related EMS activations results from summing the NEMESIS elements: eSituation.11 - Provider's Primary Impression, AND eSituation.12 - Provider's Secondary Impressions, AND eSituation.09 - Primary Symptom, AND eSituation.10 - Other Associated Symptoms with any of the following ICD-10-CM codes:

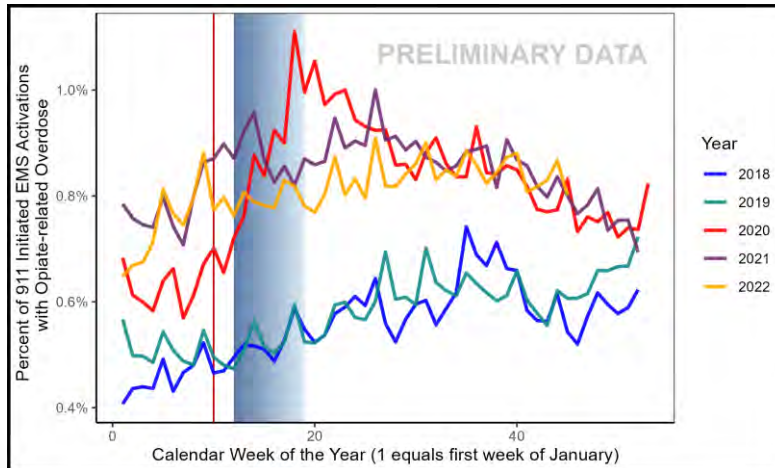
### Codes

F11 codes: Opioid-related disorders

T40 codes: Poisoning by (and adverse effects of) opioid-related drugs

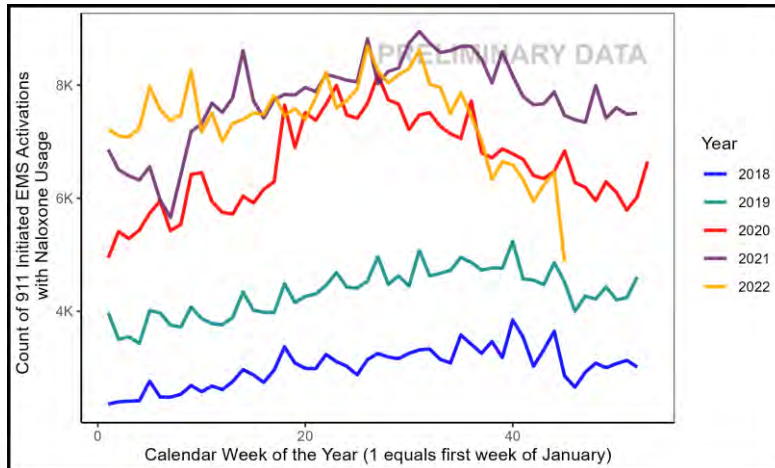


## Rate of Opioid-Related Activations



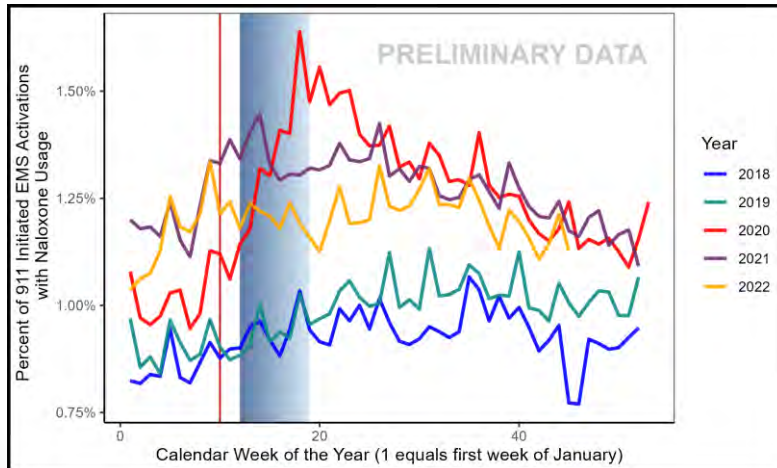
Similar date stamps are superimposed across shifts in the rate of EMS activations documenting opioid-related issues.

## Count of Activations with Naloxone



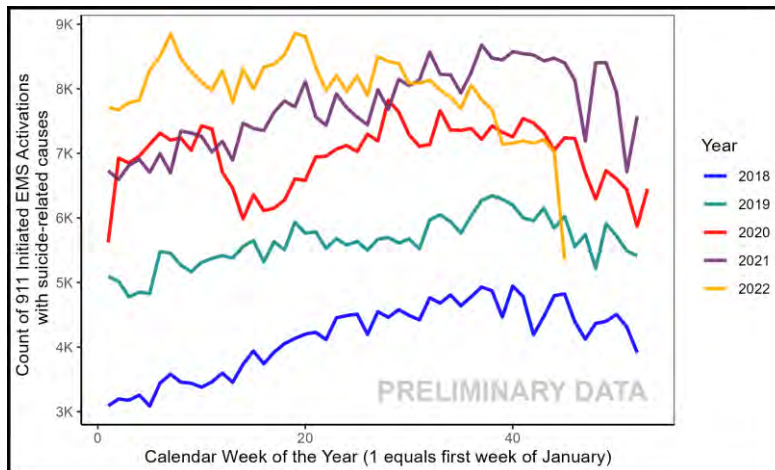
The count of EMS activations with documented use of Naloxone results from summing the NEMSIS element: eMedications.03 – The medication given to the patient. An EMS activation indicating multiple administrations of Naloxone to the same patient is counted only once.

## Rate of Activations with Naloxone



Similar date stamps are superimposed across shifts in the rate of EMS activations with documented Naloxone use.

## Count of Suicide-Related Activations



The count of EMS activations related to suicide/self-harm results from summing the NEMSIS elements: eSituation.11 - Provider's Primary Impression, AND eSituation.12 - Provider's Secondary Impressions, AND eSituation.09 - Primary Symptom, AND eSituation.10 - Other Associated Symptoms with any of the following ICD-10-CM codes:

R45 codes - Suicidal ideations

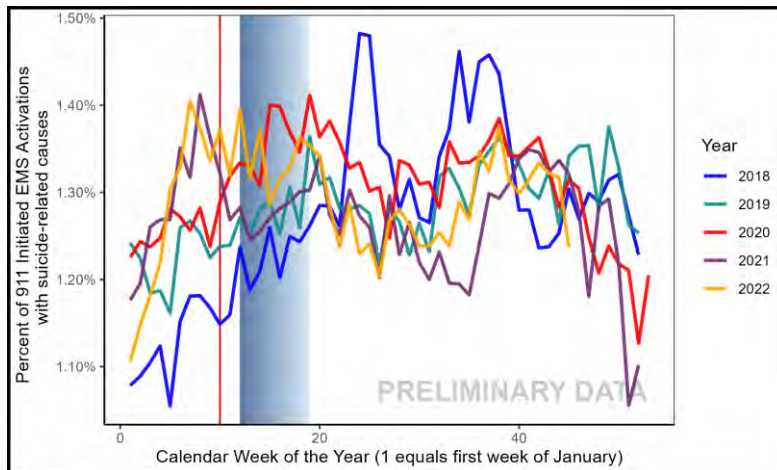
T14.91 - Suicide attempt

T40 codes - Poisoning by medicaments, intentional self-harm T50 codes - Poisoning by unspecified drugs, medicaments and biological substances, intentional self-harm

T65 codes - Toxic effect of specified and unspecified substances, intentional self-harm

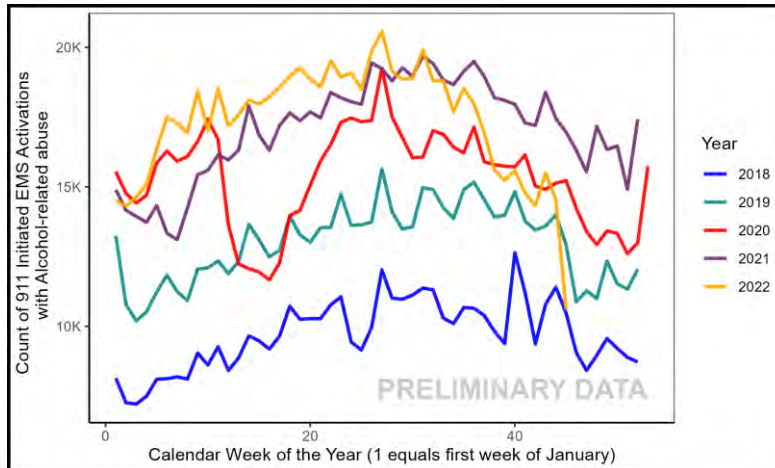
X71 through X83 codes - Intentional self-harm by specified and unspecified means

## Rate of Suicide-Related Activations



Similar date stamps are superimposed across shifts in the rate of EMS activations documenting suicide/self harm issues.

## Count of Alcohol-Related Activations

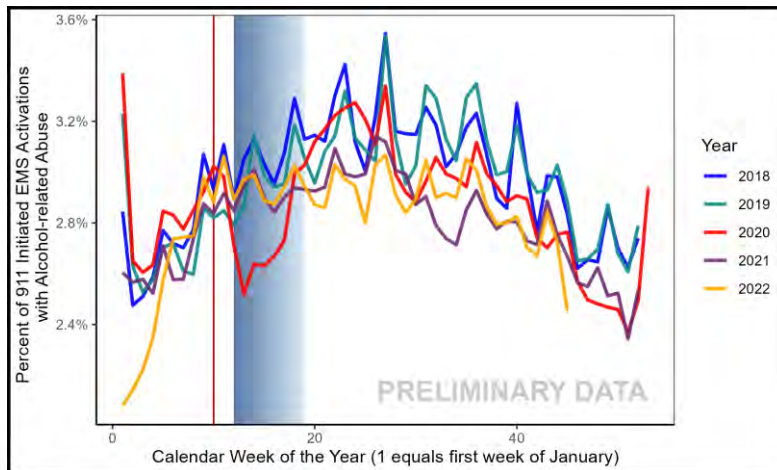


The count of EMS activations documenting alcohol-related issues as an impression or symptom results from summing the NEMIS elements: eSituation.11 - Provider's Primary Impression, AND eSituation.12 - Provider's Secondary Impressions, AND eSituation.09 - Primary Symptom, AND eSituation.10 - Other Associated Symptoms with any of the following ICD-10-CM codes:

F10 codes – Alcohol-related disorders

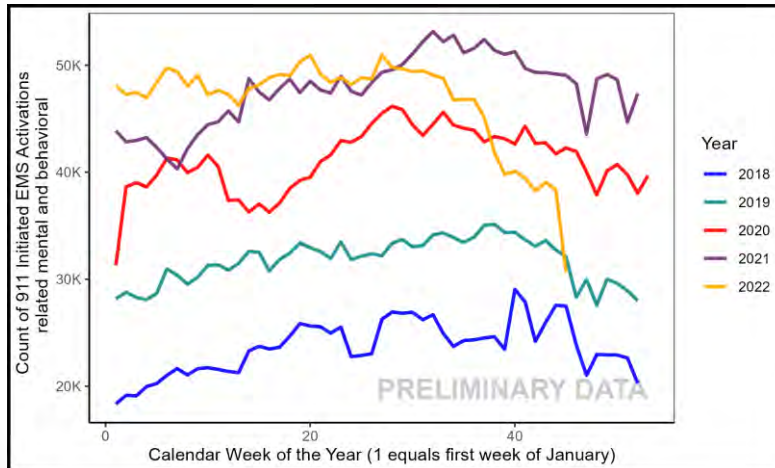
T51 codes – Toxic effect of alcohol (excluding T51.3)

## Rate of Alcohol-Related Activations



Similar date stamps are superimposed across shifts in the rate of EMS activations documenting alcohol-related issues as an impression or symptom.

## Count of Mental/Behavioral Activations



The count of EMS activations related to mental/behavioral health issues results from summing the NEMSIS elements: eSituation.11 - Provider's Primary Impression, AND eSituation.12 - Provider's Secondary Impressions, AND eSituation.09 - Primary Symptom, AND eSituation.10 - Other Associated Symptoms with any of the following ICD-10-CM codes:

F41.9 – Anxiety, NOS

F41.1 - Generalized anxiety disorder

F32.9 - Major depression, NOS

F99 - Mental disorder, NOS

R45.89 - Other symptoms and signs involving emotional state

R45.7 - State of emotional shock and stress, unspecified

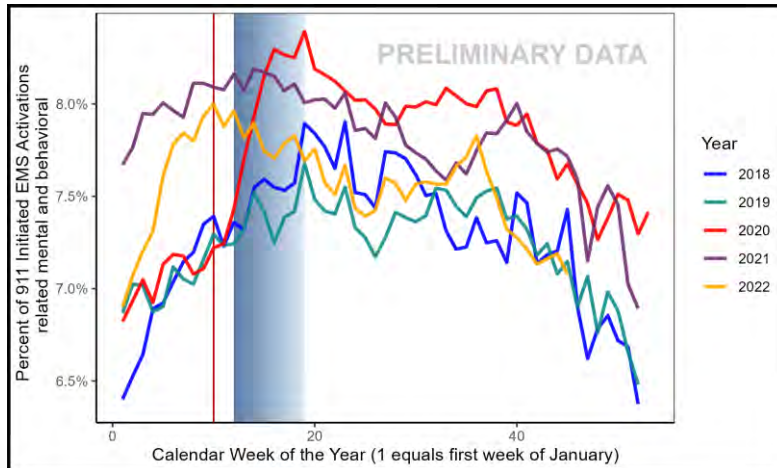
R46.2 - Strange and inexplicable behavior

R46 - Symptoms and signs involving appearance and behavior

R45.82 - Worries

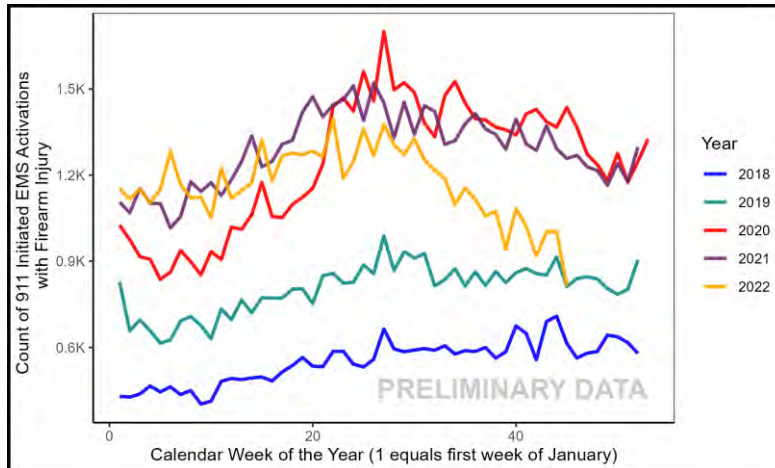


## Rate of Mental/Behavioral Activations



Similar date stamps are superimposed across shifts in the rate of EMS activations associated with mental/behavioral health issues.

## Count of Firearm Injury Activations



The count of EMS activations related to firearm injury from summing the NEMESIS elements: enjury.01 Cause of Injury with any of the following ICD-10-CM codes:

W32 - Handgun discharge and malfunction NOS

W33 - Rifle, shotgun and larger firearm discharge and malfunction NOS

W34 - Accidental discharge and malfunction from other and unspecified firearms and guns

X74.9 - Intentional self-harm by unspecified firearm discharge

X95 - Assault by other and unspecified firearm and gun discharge

X95.9 - Assault by unspecified firearm discharge

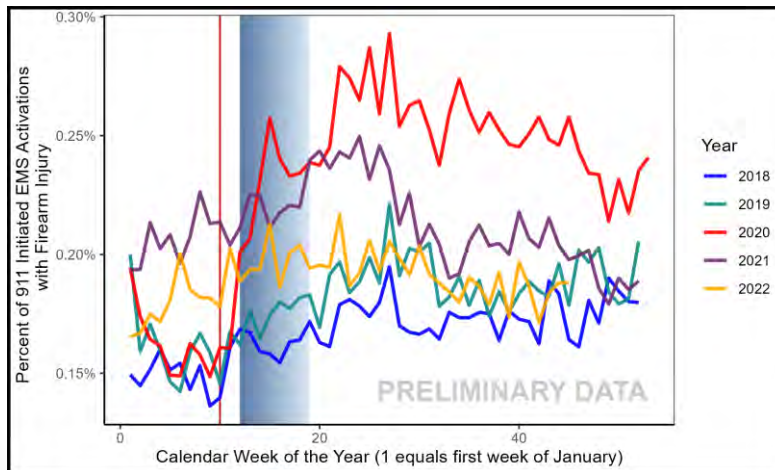
X95.9XXA - Assault by unspecified firearm discharge, initial encounter

Y22 - Discharge of gun for single hand use, undetermined intent

Y23 - Rifle, shotgun and larger firearm discharge, undetermined intent

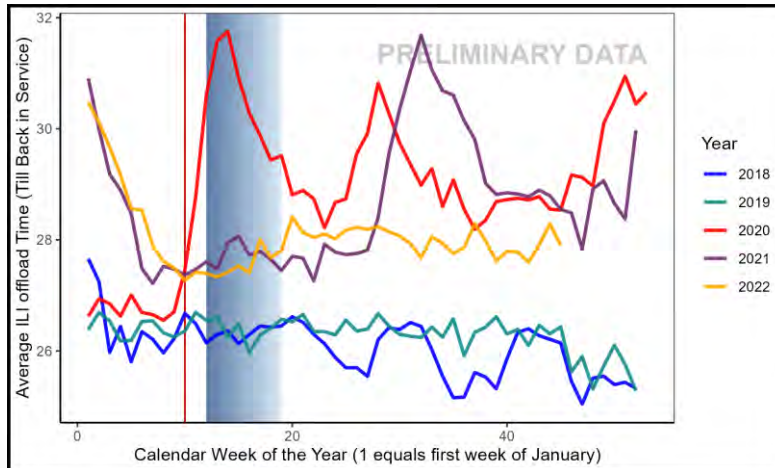
Y24.9 - Unspecified firearm discharge, undetermined intent

## Rate of Firearm Injury Activations



Similar date stamps are superimposed across shifts in the rate of EMS activations associated with firearm injuries.

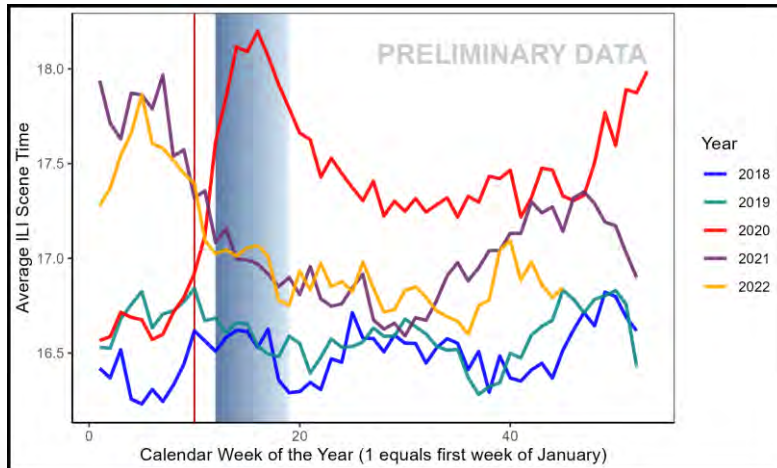
## Average ILI Offload Time



A measure of stress in the emergency care system may be calculated as the elapsed time from the arrival of an ambulance, with a patient, to the Emergency Department of a hospital until the ambulance unit is back in service. This measure is calculated, using NEMESIS elements, as:  $eTimes.13$  (Unit Back in Service Date/Time) -  $eTimes.11$  (Patient Arrived at Destination Date/Time). During the COVID-19 pandemic, this elapsed time will include two important components of stress to the emergency care system:

- a. The elapsed time from ambulance arrival at the hospital until the time the hospital has the available personnel and resources to take responsibility for the care of the patient.
- b. The elapsed time from when the hospital accepts the patient until the ambulance is cleaned, decontaminated, and ready to return to service.

## Average ILI Scene Time



Another potential measure of stress in the emergency care system may be the additional time needed at the scene, when caring for a patient, to ensure proper precautions are taken to protect the patient, bystanders, and EMS clinicians during the COVID-19 pandemic. This measure is calculated, using NEMSIS elements, as:  $eTimes.09$  (Unit Left Scene Date/Time) -  $eTimes.06$  (Unit Arrived on Scene Date/Time).

## Questions?



<https://nemsis.org>

Please contact the NEMESIS Technical Assistance Center for updates to this document. Contact N. Clay Mann at [clay.mann@hsc.utah.edu](mailto:clay.mann@hsc.utah.edu).