Council of State and Territorial Epidemiologists Emergency Medical Services
Nonfatal Opioid Overdose Standard Guidance

Using this Standard Guidance

This guidance will assist public health practitioners in state, tribal, local, and territorial (STLT) jurisdictions utilize Emergency Medical Services (EMS) data to identify suspected nonfatal opioid overdose (NFOO).

EMS Data Collection Overview

The data elements for this standardized guidance for nonfatal opioid overdose are derived from a core set of elements that most states submit to a national data repository, the National Emergency Medical Services Information System (NEMSIS). The National Highway Traffic Safety Administration (NHTSA) developed the NEMSIS to provide a national standard for the documentation of patient care reports in the prehospital setting. EMS incidents are documented as patient care reports (PCRs) using software compliant with documentation and data exchange standards. In 2019, NEMSIS received 34,203,087 EMS activations submitted by 10,062 EMS agencies in 47 states and territories.

The flow of EMS data from an EMS incident to inclusion in the national database is illustrated in Figure 1. EMS personnel generate a PCR for each patient at an EMS incident, which incorporates information from the 911 dispatch, medical devices utilized in patient care, and any information logged by EMS personnel. When the incident is complete, the PCR is submitted to the EMS agency, transferred to the state data repository, and finally transmitted to NEMSIS. The time this process takes varies by state, with NEMSIS receiving about 40% of records within 24 hours of the EMS incident.

Definitions for the elements in this standard guidance are adapted from the NEMSIS v3.5.0 Data Dictionary. Differences between NEMSIS v3.4.0 and v3.5.0 that may affect this guidance are discussed in Supplemental Material 4.

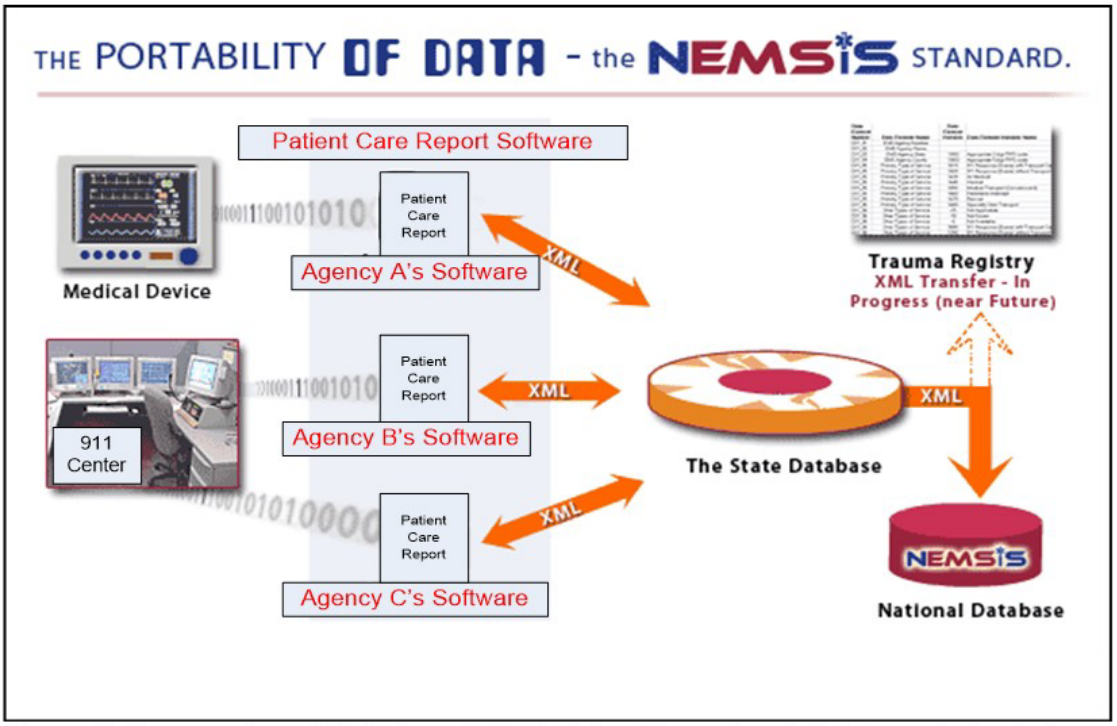

Figure 1. Progression of data from EMS incident to national database (adapted from NEMSIS TAC resources)

Understanding the Data Elements Used in This Standard Guidance

This standard guidance directs practitioners to utilize key EMS data elements to define a nonfatal opioid overdose including six coded elements and one text field, the *Patient Care Report Narrative*. Coded elements are populated when EMS personnel complete their reports of incidents. In the reports EMS personnel select set terms of medical conditions from text descriptions (in drop down menu selections).

Coded Elements. The coded elements are elements containing selections from a drop-down menu.

- *Provider's Primary Impression*
- *Provider's Secondary Impression*
- *Primary Symptom*
- *Other Associated Symptoms*
- *Medication Administered*
- *Response to Medication Administered*

The data selections made by EMS personnel in the field (the frontend) may differ from data obtained on the backend by public health professionals because text descriptions of conditions and symptoms included in drop-down menu selections are typically mapped to correspond on the backend to diagnosis or medication codes not seen by EMS personnel. Algorithms determined by EMS software vendors dictate how frontend data are mapped to the backend. Specifically, data selections for *Provider's Primary Impression* and *Provider's Secondary Impression* and selections for *Primary Symptom* and *Other Associated Symptoms* are often mapped on the backend to codes from the International Classification of Diseases, Tenth Revision Clinical Modification (ICD-10-CM). These would include "T-codes" which indicate injury, poisoning, and certain other consequences of external causes, and/or "F-codes" which indicate mental and behavioral disorders.

For example, EMS personnel may select "Narcotic use" as a *Primary Symptom* during an encounter. The EMS software vendor algorithm might map the encounter on the backend to "T40.6: poisoning by, adverse effect of, and underdosing of other and unspecified narcotics". Staff in public health departments conducting overdose surveillance typically have access only to the backend coded values, not the initial frontend drop-down menu categories selected by EMS personnel in the field. In this example, public health staff cannot reasonably be expected to determine NFOO from the presence of this ICD-10-CM code alone since numerous ICD-10-CM codes may indicate a suspected NFOO. This variation in codes indicating suspected NFOO can be attributed to the customization of data selections available to EMS personnel on the frontend, and variation in the way these customized data selections map to backend diagnosis codes. For example, an EMS agency may wish to include "opioid overdose symptoms" as a choice for *Primary Symptom* or *Other Associated Symptoms.* This selection may map on the backend as "F11: Opioid related disorders", or "F11.1: Opioid abuse", or "F11.15: Opioid abuse with opioid-induced psychotic disorder". A list of all ICD-10-CM codes which may indicate a suspected NFOO are available in Table 1a, along with a detailed description of each coded element, their definition (per NEMSIS v3.5.0), and "values of interest" which may indicate a suspected NFOO.

Text Element: Patient Care Report Narrative.

The *Patient Care Report Narrative* may be used to validate suspected NFOO identified using the coded elements, or to detect a NFOO that may have been missed by the coded elements. In contrast to the coded elements the national EMS database does not collect the *Patient Care Report Narrative,* limiting the ability to utilize this element to identify NFOO using national NEMSIS data. In addition, although most states require submission of the *Patient Care Report Narrative* to the state data repository, confidentiality and privacy laws may limit the ability of state and local jurisdictions to access this element, as the *Patient Care Report Narrative* may contain unredacted protected health information. Thus, availability of this element may vary by state.

CSTE Emergency Medical Services Nonfatal Opioid Overdose Standard Guidance

This standard guidance details how to use the EMS coded elements and text element, *Patient Care Report Narrative* to identify suspected NFOO. EMS incidents (also referred to as EMS runs or EMS transports) are considered eligible for consideration if the *Type of Service Requested (*eResponse.05) indicates an emergency response (e.g., primary response area, intercept, or mutual aid). EMS incidents should be excluded from consideration if a) the *Type of Service Requested* (eResponse.05) is a non-emergency response (e.g., hospital-to-hospital transfer, public assistance, standby, mobile integrated health care encounter, etc.), OR b) *Initial Patient Acuity* (eSituation.13*)* is "Dead Without Resuscitation Efforts (Black)" OR c) *Final Patient Acuity* (eDisposition.19) is "Dead Without Resuscitation Efforts (Black)". The standard guidance is summarized in Box 1 and explained in further detail below.

In rare instances, death may result from rebound opioid toxicity following an opioid overdose. It is possible that an individual may die following interaction with EMS personnel. Therefore, this definition aims to identify suspected NFOO to the extent they can be identified while the individual is still alive.

Box 1: CSTE Emergency Medical Services Nonfatal Opioid Overdose Standard Guidance

Eligibility: EMS incidents are *eligible* if *Type of Service Requested* indicates an emergency response. EMS incidents should be *excluded* if *Type of Service Requested* is a non-emergency response or *Initial Patient Acuity/Final Patient Acuity* is "Dead Without Resuscitation Efforts (Black)".

A nonfatal opioid overdose is defined as any eligible EMS incident where:

1. **The *Provider's Primary Impression* OR *Provider's Secondary Impression* is opioid overdose related**

OR

2. **The *Primary Symptom* OR *Other Associated Symptoms* is opioid overdose related**

OR

3. ***Medication Administered* is naloxone or Narcan AND *Response to Medication Administered* is improved**

OR

4. ***Patient Care Report Narrative* contains:**
   a) At least ONE (1) opioid- related keywords, see Table 1b
   AND
   b) At least TWO (2) overdose-related keywords, see Table 1b

CSTE Emergency Medical Services Nonfatal Opioid Overdose Standard Guidance

1: *Provider's Primary Impression OR Provider's Secondary Impression* are opioid overdose related.
In these fields, EMS personnel indicate their "differential diagnosis", which should identify the patient as the victim of an opioid overdose. A suspected NFOO can be identified by ICD-10-CM T and F codes to which text descriptions are mapped and which indicate an opioid overdose related incident. A suspected NFOO may also be indicated by values for *Provider's Primary Impression* or *Provider's Secondary Impression* that contain the word "opioid" or "overdose". Values for *Provider's Primary Impression* or *Provider's Secondary Impression* that may indicate a suspected NFOO can be found in Table 1a and in Supplemental Materials 2 and 3.

2: The *Primary Symptom* OR *Other Associated Symptoms* are opioid overdose related.
Similar to the *Provider's Primary Impression* and the *Provider's Secondary Impression*, the *Primary Symptom* and *Other Associated Symptoms* also identify suspected NFOO through opioid overdose related T and F codes (Table 1a). This would include any incidents which contained opioid overdose related T or F codes based on symptoms but were not identified as a suspected NFOO using either the *Provider's Primary Impression* or the *Provider's Secondary Impression.* For example, an opioid overdose would be excluded if EMS personnel selected "R41.82: Change in mental status NOS" as the *Provider's Primary Impression* and "R40.20: Unconsciousness NOS" as the *Provider's Secondary Impression*. However, this incident may still be identified if EMS personnel selected a *Primary Symptom* that translated on the backend to "F11: Opioid related disorders.

3: *Medication Administered* is naloxone or Narcan AND *Response to Medication Administered* is improved.
Nonfatal opioid overdoses may be identified by searching for any EMS incidents which reported the administration of Narcan or naloxone with an improved response. In contrast to the other coded elements, *Medication Administered* may allow EMS personnel to enter the medication as a free-text response, which may result in a variety of eligible responses (e.g., Naloxone Hydrochloride 1 MG/ML Injectable Solution (Narcan), Naloxone Injectable Solution [Narcan], Naloxone Prefilled Syringe, Naloxone 0.5mg, Naloxone 2 mg, Naloxone/Pentazocine, EVZIO, etc.). Thus, possible values of *Medication Administered* may need to be evaluated to capture all responses that indicate a naloxone administration. Although naloxone administrations have often been used as a proxy variable for identifying NFOO using EMS data[2,3], counting naloxone administrations only (without documentation of response to Naloxone) might overestimate NFOO. For example, counting all naloxone administrations might include instances when naloxone was administered to rule out NFOO as a cause of respiratory depression[4]. However, counting naloxone administrations where the *Response to Medication Administered* was improved should decrease the likelihood of including any non-NFOO events.

4: *Patient Care Report Narrative* contains at least ONE(1) opioid AND at least TWO(2) overdose-related keywords.
The *Patient Care Report Narrative* is an unstructured free-text response written by EMS personnel. Rather than focusing on standardized values that indicate a NFOO, the *Patient Care Report Narrative* can be queried for opioid- and overdose-related keywords that may indicate a suspected NFOO. This may be advantageous for incidents where the coded elements were missing or left blank, such as incidents where the patient was not transported to the hospital, refused treatment, or was administered naloxone prior to EMS personnel arrival at the scene.

Information provided in the *Patient Care Report Narrative* may also be used to determine which EMS incidents identified as NFOO may actually be "false positives" provided the incident does not meet the criteria for any coded elements(1-3). For example, an individual with an altered mental status due to alcohol intoxication may be administered naloxone with an "improved" response, albeit due to the reaction resulting from the discomfort of an intranasal naloxone administration. Further information in the *Patient Care Report Narrative* may be useful for identifying this as a "false positive" and excluding it from NFOO counts.

When using coded elements (1-3) to identify a suspected NFOO only one relevant selection is required. Identifying a suspected NFOO using the *Patient Care Report Narrative* requires the combination of one(1) opioid-related keyword and two(2) overdose-related keywords. The field tests conducted to examine this standard guidance demonstrated that use of only one overdose-related keyword had a higher likelihood of identifying a "false positive". For example, identification of all cases where the word "pinpoint" is used in the *Patient Care Report Narrative* may also select incidents involving stroke or head injuries, whereas the combination of "pinpoint" with "opioid" and "agonal" may limit selection to incidents of suspected NFOO.

Specific opioid- and overdose-related keywords within the *Patient Care Report Narrative* which may indicate a suspected NFOO are listed in Table 1b. These keyword lists were developed using commonly occurring keywords in existing state definitions for NFOO, then evaluated in a field test that applied the NFOO guidance to EMS data from six state/local jurisdictions. Keywords identified as frequently occurring in the first field test were further examined in a second field test where two states utilized EMS incidents to examine the frequency of each keyword in a "true" nonfatal opioid overdose, as identified through manual review of the *Patient Care Report Narrative*. The keyword lists included in Table 1.b feature the words determined most likely to identify a "true positive" nonfatal opioid overdose. This determination was resulted from two separate field tests of this guidance by six distinct jurisdictions including state and local agencies.

Classification of Nonfatal Opioid Overdose Cases

The CSTE Standardized Surveillance Case Definition (CSTE NFOO PS or PS:19-CC-01) identifies a three-tiered hierarchy of NFOO case classifications based upon the evidence used to identify cases as confirmed, probable, or suspected in section VII- Case Definition for Case Classification.

Confirmed Cases are unlikely due to the very low proportion of EMS incidents that use confirmatory laboratory evidence, which is a required element to classify a case as confirmed as outlined in PS:19-CC-01.

Probable Cases PS:19-CC-01 outlines criteria to use when determining probable NFOO cases. However, EMS data are unlikely to meet the stated criteria demonstrating successful naloxone administration with reversal or improvement. Most EMS incidents will not contain enough information to reasonably determine successful naloxone administration with reversal or improvement. When developing this standard guidance, two field tests were conducted to understand such concerns. Field test results indicate that the coded elements *Medication Administered* and *Response to Medication Administration* with Narcan or naloxone and improved, respectively are not fields consistently made available to public health jurisdictions or the fields are frequently incomplete. Inconsistent data quality of the coded elements requires that the *Patient Care Report Narrative* must be searched manually for indication of naloxone administration and if improvement resulted. The free text field is not consistently documented. Primary and secondary impressions alone are not sufficient to determine probable cases. Similar to Emergency Department syndromic data which identify suspected overdoses, the ICD-10-CM codes assigned in EMS data for coded elements are not final diagnosis codes based on medical confirmation. Rather, the assigned ICD-10-CM codes in EMS data are typically assigned based on algorithms pre-set by EMS vendors to coincide with descriptions of the patient state and main medical ailment selected by EMS personnel during the encounter.

Suspected Cases The majority of EMS incidents will meet the suspect case classification. EMS incidents that indicate a NFOO by any opioid overdose related entries from the drop-down elements (i.e., *Provider's Primary Impression, Provider's Secondary Impression, Primary Symptom,* or *Other Associated Symptoms)* or include any cases that are identified with at least one opioid-related keyword and at least two overdose-related keywords should be classified as suspected cases.

For example, a suspected NFOO case would include any of the following:

- EMS incident where the *Provider's Primary Impression OR Provider's Secondary Impression* was opioid overdose related
- EMS incident where the *Primary Symptom* OR *Other Associated Symptoms* were opioid overdose related
- EMS incident where the *Patient Care Report Narrative* contains
    - at least ONE(1) opioid-related keyword, See Table 1b
      AND
    - at least TWO(2) overdose-related keywords, See Table 1b

Table 1a: NEMSIS v3.5.0 Definitions and Values for Coded Elements Which May be Used to Identify a Nonfatal Opioid Overdose

Element[a]	Element Description	Values of Interest[b]

Provider's Primary Impression eSituation.11	The EMS personnel's impression of the patient's primary problem or most significant condition which led to the management given to the patient (treatments, medications, or procedures)	**T-Codes likely containing the words "overdose" or "opioid"**
		• **Poisoning by opium** (T40.0,T40.0X,T40.0X1,T40.0X1A,T40.0X2,T40.0X2A,T40.0X3,T40.0X3A,T40.0X4, T40.0X4A)
		• **Poisoning by heroin** (T40.1, T40.1X, T40.1X1, T40.1X1A, T40.1X2, T40.1X2A, T40.1X3, T40.1X3A, T40.1X4, T40.1X4A)
		• **Poisoning by other opioids** (T40.2, T40.2X, T40.2X1, T40.2X1A, T40.2X2, T40.2X2A, T40.2X3, T40.2X3A, T40.2X4, T40.2X4A)[c]
		• **Poisoning by methadone** (T40.3, T40.3X, T40.3X1, T40.3X1A, T40.3X2, T40.3X2A, T40.3X3, T40.3X3A, T40.3X4, T40.3X4A)
		• **Poisoning by other synthetic narcotics** (T40.4, T40.4X, T40.4X1, T40.4X1A, T40.4X2, T40.4X2A, T40.4X3, T40.4X3A, T40.4X4, T40.4X4A)
		  ○ **Poisoning by fentanyl** (T40.41, T40.411, T40.411A, T40.412, T40.412A, T40.413, T40.413A, T40.414, T40.414A)[c]
		  ○ **Poisoning by tramadol** (T40.42, T40.421, T40.421A, T40.422, T40.422A, T40.423, T40.423A, T40.424, T40.424A)[c]
		  ○ **Poisoning by other synthetic narcotics** (T40.49, T40.491, T40.491A, T40.492, T40.492A, T40.493, T40.493A, T40.494, T40.494A)[c]
		• **Poisoning by other and unspecified narcotics** (T40.6)
		  ○ **Poisoning by unspecified narcotics** (T40.60, T40.601, T40.601A, T40.602, T40.602A, T40.603, T40.603A, T40.604, T40.604A)
		  ○ **Poisoning by other narcotics** (T40.69, T40.691, T40.694, T40.691A, T40.692, T40.692A, T40.693, T40.693A, T40.694, T40.694A)
		F-Codes likely containing the words "overdose" or "opioid"
		• **Opioid related disorders** (F11)
		• **Opioid abuse** (F11.1, F11.10, F11.11, F11.12, F11.120, F11.121, F11.122, F11.129, F11.13, F11.14, F11.15, F11.150, F11.151, F11.159, F11.18, F11.181, F11.182, F11.188, F11.19)
		• **Opioid dependence** (F11.2, F11.20, F11.21, F11.22, F11.220, F11.221, F11.222, F11.229, F11.23, F11.24, F11.25, F11.250, F11.251, F11.259, F11.28, F11.281, F11.282, F11.288, F11.29)
		• **Opioid use, unspecified** (F11.9, F11.90, F11.92, F11.920, F11.921, F11.922, F11.929, F11.93, F11.94, F11.95, F11.950, F11.951, F11.959, F11.98, F11.981, F11.982, F11.988, F11.99)

Provider's Secondary Impression eSituation.12	The EMS personnel's impression of the patient's secondary problem or most significant condition which led to the management given to the patient (treatments, medications, or procedures)	
Primary Symptom eSituation.09	The primary sign and symptom present in the patient or observed by EMS personnel	
Other Associated Symptoms eSituation.10	Other symptoms identified by the patient or observed by EMS personnel	
Medication Administered eMedications.03	The medication administered to the patient (by EMS personnel)	• Naloxone[d] • Naloxone Hydrochloride[d] • Narcan[d]
Response to Medication Administered eMedications.07	The patient's response to the medication	• "Improved"

[a] Element definitions based on the NEMSIS Data Dictionary for NEMSIS v3.5.0.

[b] Values for Primary Impression, Secondary Impression, Primary Symptoms, and Other Associated Symptoms are from the 10th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10-CM)

[c] Denotes ICD-10-CM T codes introduced on October 1, 2020 that identify injuries due to poisoning by fentanyl, tramadol, or other synthetic narcotics. These codes may start to be included by NEMSIS v3.5.0.

[d] These three entries for naloxone are the most common, however there may be additional choices that contain "naloxone" or "Narcan" that could also be included (e.g., Naloxone Hydrochloride 1 MG/ML Injectable Solution (Narcan), Naloxone Injectable Solution [Narcan], Naloxone Prefilled Syringe, Naloxone 0.5mg, Naloxone 2 mg, Naloxone/Pentazocine, EVZIO, and RXNorm RXCUI code Naloxone 0.5mg = 343216).

Table 1b: NEMSIS v3.5.0 Definitions and Values for the Patient Care Report Narrative (eNarrative.01) Which May be Used to Identify a Nonfatal Opioid Overdose

Values of Interest	
Analysis of PCRN should include at least 1 opioid-related keyword AND at least 2 overdose-related keywords in order to be identified as a suspected nonfatal opioid overdose	
Opioid-Related Keywords	**Overdose-Related Keywords**
• Buprenorphine • Carfentanyl • Codeine, codiene, codene, • Dilaudid, dilaud • Dope • Evzio • Fentanyl, fent • Heroin, herion, heroine, HOD, spheroin • Hydrocodone, hydrocod • Hydromorphone, hydromor • Methadone • Morphine, morphin • Narcan, naloxone, nalox[d] • Opiate(s), opate(s) • Opioid(s), opiod(s), opoid(s) • Opium, opium, opum • Oxymorphone, oxymor • Oxycodone (oxyco, oxy, oxyi) • Percocet, percoc • Speed ball, speedball • Suboxin • Suboxone • Tramadol, tramad • Vicodin, vicodine, vicod	• Agonal • Altered mental status (AMS) • Apnea • Constricted pupil • Decreased resp • Decreased rr • Decreasing resp • Depressed resp • Dyspnea • Ingestion (ingest, injest) • Intoxication (intoxic) • Loss of conscious (syncopy, syncope) • Miosis (Miotic) • Nodding off • Overdose (overdosed, overdosing, overdose, overdoes, averdose, averdoes, over does, over dose) • Pinpoint (pin point, pin-point) • Poisoning (poison) • Pupil*constricted[e] • Resp*decreased[e] • Resp*depression[e] • Snort, snorted • Unresponsive (unresponsiv)

AMS= altered mental status, HOD=heroin overdose, LOC=loss of consciousness, NEMSIS=National Emergency Medical Services Information System, PCR=patient care report, RR=respiratory rate

[d] These three entries for naloxone are the most common, however there may be additional choices that contain "naloxone" or "Narcan" that could also be included (e.g., Naloxone Hydrochloride 1 MG/ML Injectable Solution (Narcan), Naloxone Injectable Solution [Narcan], Naloxone Prefilled Syringe, Naloxone 0.5mg, Naloxone 2 mg, Naloxone/Pentazocine, EVZIO).

[e] In these instances, an asterisk(*) is included as a "wildcard", which is intended to match any amount of text in the place of the asterisk. For example, "Pupil*constricted" will match "pupil constricted" as well as "pupils are severely constricted".

ADDITIONAL CONTEXT FOR SUSPECTED NONFATAL OPIOID OVERDOSES

The estimates of suspected NFOO determined by this standard guidance prove useful for public health surveillance and examining trends over time. EMS data may also be utilized to contextualize NFOO incidents, providing knowledge that could be used to inform the initiation of community-based opioid-related drug overdose prevention interventions and harm reduction programs. For example, public health jurisdictions may wish to assess bystander/layperson naloxone administrations following community initiation of a naloxone distribution program (NDP). A subpopulation of bystander naloxone administrations may be found by evaluating incidents where *Medication Administered Prior to the Arrival of EMS* was 'yes' and assessing the *Incident ZIP Code* within that subpopulation may help jurisdictions assess the distribution of bystander naloxone within the community. Suggested variables for providing further context are summarized in Supplemental Material 1, along with their definitions (per NEMSIS v 3.5.0), values of interest, and their potential use for contextualizing an analysis of suspected NFOO.

LIMITATIONS

EMS incidents involving a suspected NFOO identified using this standard guidance are subject to several limitations.

- *Cannot confirm NFOO.* It is important to remember that NFOO identified using EMS data are "suspected" or "probable", as they are based on key signs and symptoms or naloxone administration coupled with a response, but these lack confirmation that would come from the toxicological analysis of biological specimens. This would also limit the ability to use EMS data to determine the type of opioid ingested. Although this information may be self-reported by the patient, the accuracy of any self-reported information would be difficult to determine without biological specimen analysis.

- *Underestimation or Overestimation of true NFOO.* Similar to emergency department syndromic data, NFOO identified from EMS data should not be used to estimate overall burden. However, NFOO identified from EMS data should be useful in monitoring potential overdose spikes and monitoring trends over time (e.g., examining change over time in rates of suspected or probable NFOO per number of EMS incidents) and with the understanding that a given individual might be represented in multiple incidents. Suspected and probable NFOO can be analyzed separately or combined to meet surveillance objectives (e.g., when examining trends in rates of NFOO per number of EMS incidents).

- *Polysubstance use.* This standard guidance may also underestimate NFOO in instances where opioids were combined with other substances (polysubstance use). Consider an example in which the patient mixes opioids with alcohol. The obvious intoxication and inability to determine the presence of additional substances may lead EMS personnel to document the *Provider's Primary Impression* as "T50.904: Poisoning by unspecified drugs, medicaments and biological substances, undetermined". Further, administration of naloxone to the patient may elicit no response; while naloxone may reverse the respiratory depression due to the opioid(s), it would have no effect on the persisting central nervous system depression related to the alcohol consumption. This may lead EMS personnel to document the *Medication* as "naloxone (Narcan)" and the *Response to Medication Administered* as "Unchanged" or "Worse". Thus, the potential inability to capture cases of polysubstance use using the coded elements may contribute to an underestimation of NFOO.

- *Decrease in EMS Responses to NFOO.* The increase in programs to distribute naloxone may decrease the perceived necessity of individuals to call 911 after an opioid overdose or cancel an initiated call. Several studies have shown that individuals who are trained to provide naloxone no longer feel the need to call 911 because they believe they can "handle the overdose themselves" [5–7]. Additionally, many individuals remain afraid to call 911 due to negative interactions with law enforcement[7]. There

are also individuals who are transported to emergency departments without involvement of EMS personnel. Therefore, the inability to account for suspected NFOO where EMS is not summoned (or is cancelled) may contribute to an overall underestimation of suspected NFOO.

- *Accuracy in Documentation of NFOO.* Data submission rules may allow incidents to be submitted without the information necessary for identifying a NFOO. For example, the associated validation rules for *Provider's Primary Impression* and *Primary Symptom* in the NEMSIS Data Dictionary V3.5.0 show that both are required to be submitted when the *Type of Service Requested* (eResponse.05) is "Emergency Response" (Primary Response Area), AND the *Patient Evaluation/Care* (eDisposition.28) is "Patient Evaluated and Care Provided". It is therefore possible that in instances where *Patient Evaluation/Care* is not "Patient Evaluated and Care Provided" (e.g., "Patient Evaluated and Refused Care" or "Patient Evaluated, No Care Required", or "Patient Refused Evaluation/Care") that information for the coded elements may not be documented, and thus result in underreporting of NFOO. While information necessary to identify these cases as a NFOO may be found in the *Patient Care Report Narrative,* not all jurisdictions may have access to or the capacity to analyze the *Patient Care Report Narrative,* which may lead to an overall underestimation of NFOO.

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SUPPLEMENTAL MATERIALS

1. **Supplemental Material 1:** NEMSIS v3.5.0 Definitions for Data Elements that can provide context when assessing nonfatal opioid overdoses

2. **Supplemental Material 2.** List of Opioid Overdose Related ICD-10-CM F codes

3. **Supplemental Material 3.** List of Opioid Overdose Related ICD-10-CM T codes

4. **Supplemental Material 4:** Crossover from NEMSIS v3.4.0 to NEMSIS v3.5.0

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Supplemental Material 1: NEMSIS v3.5.0 Definitions for Data Elements that Can Provide Context When Assessing Nonfatal Opioid Overdoses[a]

Element[b]	Element Description	Potential Values of Interest [c,d,e]	Use/Context
Patient Evaluation/Care **eDisposition.28**	The patient disposition for an EMS event identifying whether a patient was evaluated, and care or services were provided	• "Patient Evaluated and Care Provided" • "Patient Evaluated and Refused Care" • "Patient Evaluated, No Care Required" • "Patient Refused Evaluation/Care"	• Describe prevalence of NFOO who were transported to the hospital, or who refused transport to the hospital
Unit Disposition **eDisposition.27**	The patient disposition for an EMS event identifying whether patient contact was made	• "Patient Contact Made" • "Cancelled on Scene" • "Cancelled Prior to Arrival at Scene" • "No patient contact" • "No patient found" • "Non-Patient Incident"	• Describe prevalence of NFOO that cancelled EMS or where EMS made no contact • Provide additional context/validation for NFOO involving bystander naloxone administration
Medication Administered Prior to the Arrival of EMS **eMedications.02**	Indicates that the medication administration which is documented was administered prior to this EMS units care.	• "Yes" • "No"	• Describe prevalence of NFOO involving bystander naloxone administration
Medication Administered Route **eMedications.04**	The route medication was administered to the patient	• "Intranasal" • "Intramuscular (IM)" • "Intravenous (IV)"	• Provide additional context/validation for NFOO involving bystander naloxone administration
Medication Dosage **eMedications.05**	The dose or amount of the medication administered to the patient	*Variety of Numbers*	• Provide additional context/validation for overall severity of NFOO • Additional context/validation for NFOO involving bystander naloxone administration
Medication Dosage Units **eMedications.06**	The unit of medication dosage administered to patient	• "mg"	• Provide additional context/validation for NFOO involving bystander naloxone administration
Role/Type of Person Administering Medication **eMedications.10**	The type (level) of EMS or Healthcare Professional Administering the Medication. For medications administered prior to the EMS arrival, this may be a non-EMS healthcare professional	• "Lay person" • "Law enforcement" • "Family member"	• Provide additional context/validation for NFOO involving bystander naloxone administration
Medical/Surgical History **eHistory.08**	The patient's pre-existing medical and surgery history of the patient	*Variety of Medical Codes*	• Describe pre-existing conditions common among patients sustaining NFOO
Destination/Transferred To, Name[†] **eDisposition.01**	The destination the patient was delivered or transferred to	*Variety of Hospital Codes*	• Describe healthcare resources utilized by NFOO
Emergency Department Diagnosis **eOutcome.10**	The practitioner's description of the condition or problem for which Emergency Department services were provided	• "Discharged to home of self-care" • "Left against medical advice" • "Admitted as an inpatient to this hospital"	• Provide validation for EMS differential diagnosis of NFOO
Patient's Home ZIP Code **ePatient.09**	The patient's ZIP code of residence	*Variety of ZIP codes*	• Enable geographic coding
Incident ZIP Code **eScene.19**	The ZIP code of the incident location	*Variety of ZIP codes*	• Enable geographic coding
Procedure **eProcedures.03**	The procedure performed on the patient	• "Oxygen therapy" • "Manual establishment of airway" • "Cardiopulmonary resuscitation"	• Provide additional context/validation for overall severity of NFOO

[a] Element definitions based on the NEMSIS Data Dictionary for NEMSIS v3.5.0 (NEMSIS, 2019).
[b] Code assigned to elements in the NEMSIS v3.5.0
[c] Suggested List for Medical/Surgical History given by ICD-10-CM Description. Available at https://stash.utahdcc.org/stash/projects/NEP/repos/nemsis_public/browse/SuggestedLists/NEMSIS_V3_Suggested_List_eHistory.08.pdf
[d] NEMSIS suggested List for Procedures. Available at https://stash.utahdcc.org/stash/projects/NEP/repos/nemsis_public/browse/SuggestedLists/eProcedures.03%2C%20dConfiguration.03%2C%20dConfiguration.07%20-%20Procedures.xlsx
[e] Example values for procedure are based on SNOMED values
[†] State required element, may not be provided to NEMSIS

NOTES: Abbreviations: EMS=Emergency Medical Services, NFOO=Nonfatal Opioid Overdose, NEMSIS=National Emergency Medical Services Information System.

Supplemental Material 2. List of Opioid Overdose Related ICD-10-CM F Codes

Code	Code Description
F11	Opioid related disorders
F11.1	Opioid abuse
F11.10	Opioid abuse, uncomplicated
F11.11	Opioid abuse, in remission
F11.12	Opioid abuse with intoxication
F11.120	Opioid abuse with intoxication, uncomplicated
F11.121	Opioid abuse with intoxication delirium
F11.122	Opioid abuse with intoxication with perceptual disturbance
F11.129	Opioid abuse with intoxication, unspecified
F11.13	Opioid abuse with withdrawal
F11.14	Opioid abuse with opioid-induced mood disorder
F11.15	Opioid abuse with opioid-induced psychotic disorder
F11.150	Opioid abuse with opioid-induced psychotic disorder with delusions
F11.151	Opioid abuse with opioid-induced psychotic disorder with hallucinations
F11.159	Opioid abuse with opioid-induced psychotic disorder, unspecified
F11.18	Opioid abuse with other opioid-induced disorder
F11.181	Opioid abuse with opioid-induced sexual dysfunction
F11.182	Opioid abuse with opioid-induced sleep disorder
F11.188	Opioid abuse with other opioid-induced disorder
F11.19	Opioid abuse with unspecified opioid-induced disorder
F11.2	Opioid dependence
F11.20	Opioid dependence, uncomplicated
F11.21	Opioid dependence, in remission
F11.22	Opioid dependence with intoxication
F11.220	Opioid dependence with intoxication, uncomplicated
F11.221	Opioid dependence with intoxication delirium
F11.222	Opioid dependence with intoxication with perceptual disturbance
F11.229	Opioid dependence with intoxication, unspecified
F11.23	Opioid dependence with withdrawal
F11.24	Opioid dependence with opioid-induced mood disorder
F11.25	Opioid dependence with opioid-induced psychotic disorder
F11.250	Opioid dependence with opioid-induced psychotic disorder with delusions
F11.251	Opioid dependence with opioid-induced psychotic disorder with hallucinations
F11.259	Opioid dependence with opioid-induced psychotic disorder, unspecified
F11.28	Opioid dependence with other opioid-induced disorder
F11.281	Opioid dependence with opioid-induced sexual dysfunction
F11.282	Opioid dependence with opioid-induced sleep disorder
F11.288	Opioid dependence with other opioid-induced disorder
F11.29	Opioid dependence with unspecified opioid-induced disorder
F11.9	Opioid use, unspecified
F11.90	Opioid use, unspecified, uncomplicated
F11.92	Opioid use, unspecified with intoxication
F11.920	Opioid use, unspecified with intoxication, uncomplicated
F11.921	Opioid use, unspecified with intoxication delirium
F11.922	Opioid use, unspecified with intoxication with perceptual disturbance
F11.929	Opioid use, unspecified with intoxication, unspecified
F11.93	Opioid use, unspecified with withdrawal
F11.94	Opioid use, unspecified with opioid-induced mood disorder
F11.95	Opioid use, unspecified with opioid-induced psychotic disorder
F11.950	Opioid use, unspecified with opioid-induced psychotic disorder with delusions

F11.951	Opioid use, unspecified with opioid-induced psychotic disorder with hallucinations
F11.959	Opioid use, unspecified with opioid-induced psychotic disorder, unspecified
F11.98	Opioid use, unspecified with other specified opioid-induced disorder
F11.981	Opioid use, unspecified with opioid-induced sexual dysfunction
F11.982	Opioid use, unspecified with opioid-induced sleep disorder
F11.988	Opioid use, unspecified with other opioid-induced disorder
F11.99	Opioid use, unspecified with unspecified opioid-induced disorder

Supplemental Material 3. List of Opioid Overdose Related ICD-10-CM T Codes

Code	Description
T40.0	Poisoning by, adverse effect of and underdosing of opium
T40.0X	Poisoning by, adverse effect of and underdosing of opium
T40.0X1	Poisoning by opium, accidental (unintentional)
T40.0X1A	Poisoning by opium, accidental (unintentional), initial encounter
T40.0X2	Poisoning by opium, intentional self-harm
T40.0X2A	Poisoning by opium, intentional self-harm, initial encounter
T40.0X3	Poisoning by opium, assault
T40.0X3A	Poisoning by opium, assault, initial encounter
T40.0X4	Poisoning by opium, undetermined
T40.0X4A	Poisoning by opium, undetermined, initial encounter
T40.1	Poisoning by and adverse effect of heroin
T40.1X	Poisoning by and adverse effect of heroin
T40.1X1	Poisoning by heroin, accidental (unintentional)
T40.1X1A	Poisoning by heroin, accidental (unintentional), initial encounter
T40.1X2	Poisoning by heroin, intentional self-harm
T40.1X2A	Poisoning by heroin, intentional self-harm, initial encounter
T40.1X3	Poisoning by heroin, assault
T40.1X3A	Poisoning by heroin, assault, initial encounter
T40.1X4	Poisoning by heroin, undetermined
T40.1X4A	Poisoning by heroin, undetermined, initial encounter
T40.2	Poisoning by, adverse effect of and underdosing of other opioids
T40.2X	Poisoning by, adverse effect of and underdosing of other opioids
T40.2X1	Poisoning by other opioids, accidental (unintentional)
T40.2X1A	Poisoning by other opioids, accidental (unintentional), initial encounter
T40.2X2	Poisoning by other opioids, intentional self-harm
T40.2X2A	Poisoning by other opioids, intentional self-harm, initial encounter
T40.2X3	Poisoning by other opioids, assault
T40.2X3A	Poisoning by other opioids, assault, initial encounter
T40.2X4	Poisoning by other opioids, undetermined
T40.2X4A	Poisoning by other opioids, undetermined, initial encounter
T40.3	Poisoning by, adverse effect of and underdosing of methadone
T40.3X	Poisoning by, adverse effect of and underdosing of methadone
T40.3X1	Poisoning by methadone, accidental (unintentional)
T40.3X1A	Poisoning by methadone, accidental (unintentional), initial encounter
T40.3X2	Poisoning by methadone, intentional self-harm
T40.3X2A	Poisoning by methadone, intentional self-harm, initial encounter
T40.3X3	Poisoning by methadone, assault
T40.3X3A	Poisoning by methadone, assault, initial encounter
T40.3X4	Poisoning by methadone, undetermined
T40.3X4A	Poisoning by methadone, undetermined, initial encounter
T40.4	Poisoning by, adverse effect of and underdosing of other synthetic narcotics
T40.41[c]	Poisoning by, adverse effect of and underdosing of fentanyl or fentanyl analogs
T40.411[c]	Poisoning by fentanyl or fentanyl analogs, accidental (unintentional)
T40.411A[c]	Poisoning by fentanyl or fentanyl analogs, accidental (unintentional), initial encounter
T40.412[c]	Poisoning by fentanyl or fentanyl analogs, intentional self-harm
T40.412A[c]	Poisoning by fentanyl or fentanyl analogs, intentional self-harm, initial encounter
T40.413[c]	Poisoning by fentanyl or fentanyl analogs, assault
T40.413A[c]	Poisoning by fentanyl or fentanyl analogs, assault, initial encounter
T40.414[c]	Poisoning by fentanyl or fentanyl analogs, undetermined

Code	Description
T40.414A[c]	Poisoning by fentanyl or fentanyl analogs, undetermined, initial encounter
T40.42[c]	Poisoning by, adverse effect of and underdosing of tramadol
T40.421[c]	Poisoning by tramadol, accidental (unintentional)
T40.421A[c]	Poisoning by tramadol, accidental (unintentional), initial encounter
T40.422[c]	Poisoning by tramadol, intentional self-harm
T40.422A[c]	Poisoning by tramadol, intentional self-harm, initial encounter
T40.423[c]	Poisoning by tramadol, assault
T40.423A[c]	Poisoning by tramadol, assault, initial encounter
T40.424[c]	Poisoning by tramadol, undetermined
T40.424A[c]	Poisoning by tramadol, undetermined, initial encounter
T40.49[c]	Poisoning by, adverse effect of and underdosing of other synthetic narcotics
T40.491[c]	Poisoning by other synthetic narcotics, accidental (unintentional)
T40.491A[c]	Poisoning by other synthetic narcotics, accidental (unintentional), initial encounter
T40.492[c]	Poisoning by other synthetic narcotics, intentional self-harm
T40.492A[c]	Poisoning by other synthetic narcotics, intentional self-harm, initial encounter
T40.493[c]	Poisoning by other synthetic narcotics, assault
T40.493A[c]	Poisoning by other synthetic narcotics, assault, initial encounter
T40.494[c]	Poisoning by other synthetic narcotics, undetermined
T40.494A[c]	Poisoning by other synthetic narcotics, undetermined, initial encounter
T40.4X[b]	Poisoning by, adverse effect of and underdosing of other synthetic narcotics
T40.4X1[b]	Poisoning by other synthetic narcotics, accidental (unintentional)
T40.4X1A[b]	Poisoning by other synthetic narcotics, accidental (unintentional), initial encounter
T40.4X2[b]	Poisoning by other synthetic narcotics, intentional self-harm
T40.4X2A[b]	Poisoning by other synthetic narcotics, intentional self-harm, initial encounter
T40.4X3[b]	Poisoning by other synthetic narcotics, assault
T40.4X3A[b]	Poisoning by other synthetic narcotics, assault, initial encounter
T40.4X4[b]	Poisoning by other synthetic narcotics, undetermined
T40.4X4A[b]	Poisoning by other synthetic narcotics, undetermined, initial encounter
T40.6	Poisoning by, adverse effect of and underdosing of other and unspecified narcotics
T40.60	Poisoning by, adverse effect of and underdosing of unspecified narcotics
T40.601	Poisoning by unspecified narcotics, accidental (unintentional)
T40.601A	Poisoning by unspecified narcotics, accidental (unintentional), initial encounter
T40.602	Poisoning by unspecified narcotics, intentional self-harm
T40.602A	Poisoning by unspecified narcotics, intentional self-harm, initial encounter
T40.603	Poisoning by unspecified narcotics, assault
T40.603A	Poisoning by unspecified narcotics, assault, initial encounter
T40.604	Poisoning by unspecified narcotics, undetermined
T40.604A	Poisoning by unspecified narcotics, undetermined, initial encounter
T40.69	Poisoning by, adverse effect of and underdosing of other narcotics
T40.691	Poisoning by other narcotics NOS
T40.691A	Poisoning by other narcotics, accidental (unintentional), initial encounter
T40.692	Poisoning by other narcotics, intentional self-harm
T40.692A	Poisoning by other narcotics, intentional self-harm, initial encounter
T40.693	Poisoning by other narcotics, assault
T40.693A	Poisoning by other narcotics, assault, initial encounter
T40.694	Poisoning by other narcotics, undetermined
T40.694A	Poisoning by other narcotics, undetermined, initial encounter

[a] All codes based on the definitions for the International Classification of Diseases version 10-CM.

[b] Denotes ICD-10-CM T code retired after October 1, 2020.

[c] Denotes ICD-10-CM T codes introduced on October 1, 2020 that identify injuries due to poisoning by fentanyl, tramadol, or other synthetic narcotics. These codes may start to be included by NEMSIS v3.5.0.

Supplemental Material 4: Crossover from NEMSIS v3.4.0 to NEMSIS v3.5.0

Not all EMS jurisdictions may be submitting data compliant with NEMSIS v3.5.0, and may instead be working with data elements from NEMSIS v3.4.0. Although the data elements in the CSTE EMS Standard Guidance did not substantially change from v3.4.0 to v3.5.0, there are several instances where the data element name or data element number may have been updated. These changes have been highlighted and illustrated in the table below.

Individuals using data from NEMSIS v3.4.0 instead of NEMSIS v3.5.0 should note the following differences:

- Changes to enumerated list for eResponse.05 *Type of Service Requested* (intent can still be met)
- Addition to enumerated list for *Initial Patient Acuity*
- The data element name for "*Medication Administered*" is "*Medication Given*"
- *Unit Disposition* and *Patient Evaluation/Care* are combined into one data element in NEMSIS v3.4.0, the data element name is *Incident/Patient Disposition* and element number (eDisposition.12).

Table SM4.1: Potential Changes in Data Elements from NEMSIS v.3.4.0 to v3.5.0

Element Name NEMSIS v3.4.0	Element Name NEMSIS v3.5.0	Element Number NEMSIS v3.4.0	Element Number NEMSIS v3.5.0
Type of Service Requested	*Type of Service Requested*	eResponse.05	eResponse.05
Initial Patient Acuity	*Initial Patient Acuity*	eSituation.13	eSituation.13
Medication Given	*Medication Administered*	eMedications.03	eMedications.03
Incident/Patient Disposition	*Unit Disposition*	eDisposition.12	eDisposition.27
Incident/Patient Disposition	*Patient Evaluation/Care*	eDisposition.12	eDisposition.28
Final Patient Acuity	*Final Patient Acuity*	eDisposition.19	eDisposition.19