

CDC Fentanyl Overdose v2 Parsed
Drug Overdose Surveillance and Epidemiology (DOSE) System Guidance
Syndromic Surveillance Definition Factsheet and Technical Brief

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Definition Purpose: To assist state, local, tribal, territorial, and federal public health practitioners in monitoring emergency department (ED) visits for suspected nonfatal fentanyl-involved overdoses using syndromic surveillance.

New or Revised Definition: Revision of CDC Fentanyl Overdose v1

Date Added to ESSENCE: June 18, 2023

Definition Description: The CDC Fentanyl Overdose v2 Parsed syndrome definition was designed to be used to identify ED visits for suspected nonfatal fentanyl-involved overdoses of unintentional or undetermined intent. The query relies on data in two fields from ED visit records to identify encounters that meet the definition criteria:

- (1) the chief complaint free text field, which is a processed version of the reported chief complaint and may include terms indicating a fentanyl-involved overdose or poisoning, as well as relevant exclusion terms (e.g., terms indicating fentanyl administration by medical personnel, withdrawal without acute intoxication, etc., which would exclude ED visit records from this syndrome definition), and
- (2) the discharge diagnosis parsed field which includes International Classification of Diseases, 10th Revision (ICD-10-CM)¹ and/or Systematized Nomenclature of Medicine - Clinical Terms (SNOMED-CT)² diagnosis codes, with descriptive text removed, and which may indicate an acute fentanyl-involved overdose or poisoning of unintentional or undetermined intent.

Within ESSENCE, the syndrome query is applied to the Chief Complaint Discharge Diagnosis (CCDD) Parsed field, which combines these two fields of interest.

Use-Cases for Definition:

- Case-finding
- Trend monitoring
- Early outbreak detection

¹ World Health Organization. International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM). World Health Organization; 2015.

² National Library of Medicine. SNOMED-CT. Accessed [Dec 5 2023].
<https://www.nlm.nih.gov/healthit/snomedct/index.html>

Justification for Development: Synthetic opioids, including illegally made fentanyls, are driving recent increases in drug overdose morbidity and mortality in the United States.³ This definition was developed to help public health practitioners track and understand trends of nonfatal fentanyl-involved overdoses treated in EDs in near real-time.

Data Source During Development: ED visits

Development Methods: This revision was developed to adapt the CDC Fentanyl Overdose v1⁴ definition syntax to query the newly developed CCDD Parsed field which removes extraneous test from the discharge diagnosis portion of the CCDD. CDC NSSP staff used R code to update the syntax to meet CCDD Parsed field requirements. The CDC DOSE team reviewed the revisions and compared total visits captured by CCDD and CCDD Parsed versions of the definition, with a focus on diagnosis codes, to ensure correct restructuring. CDC scientists in the Division of Overdose Prevention (DOP) developed the CDC Fentanyl Overdose v1 definition by building from the CDC Opioid Overdose v3 syndrome definition⁵ to capture only overdoses that indicated fentanyl involvement. First, ICD-10-CM and SNOMED-CT diagnosis codes indicating acute fentanyl poisoning of unintentional or undetermined intent were identified. Next, overdose terms and fentanyl-specific terms that could be presented in the chief complaint free text field were identified. Lastly, exclusion terms were identified (e.g., terms indicating fentanyl administration by medical personnel, withdrawal without acute intoxication, etc.) to avoid incorrectly capturing encounters that were not for a fentanyl-involved overdose.

Validation Methods: Two methods were employed to validate this new definition.

- 1) CDC scientists from the NSSP team used R code to convert the syntax from (A) the CDC Fentanyl Overdose v1 that queried the Chief Complaint Discharge Diagnosis (CCDD) field to (B) syntax that would effectively query the Chief Complaint Discharge Diagnosis (CCDD) Parsed field. These conversions focused on changes to diagnostic code formatting within the syntax. The DOSE team verified that the syntax converted correctly (i.e., did not eliminate codes or terms that were intended to capture stimulant-involved overdose).
- 2) The DOSE team evaluated the draft definition by comparing overdose counts and reviewing records that were captured before and after aforementioned conversion of syntax. Overall aggregate counts over time comparing CDC Fentanyl Overdose v1 and CDC Fentanyl Overdose v2 Parsed showed minimal and expected differences in counts.

For more information on initial development of the CDC Fentanyl Overdose v1, please refer to its accompanying documentation.

Definition Fields and Structure: The CCDD Parsed field is used to query both the Discharge Diagnosis Parsed and Chief Complaint Free Text fields.

- Automatic inclusion:
 - The ED visit is automatically included in the syndrome definition if the ED visit includes:

³ Casillas, S. M., Scholl, L., Mustaquim, D., & Vivolo-Kantor, A. (2022). Analysis of trends and usage of ICD-10-CM discharge diagnosis codes for poisonings by fentanyl, tramadol, and other synthetic narcotics in emergency department data. *Addict Behav Rep*, 16, 100464. <https://doi.org/10.1016/j.abrep.2022.100464>

⁴ CDC Fentanyl Overdose v1 definition: <https://knowledgerepository.syndromicsurveillance.org/cdc-fentanyl-overdose-v1>

⁵ CDC Opioid Overdose v3 definition: <https://knowledgerepository.syndromicsurveillance.org/cdc-opioid-v3>

- If a diagnosis code indicating an acute fentanyl poisoning of unintentional or undetermined intent is present, and/or
 - If the chief complaint includes a fentanyl term and a naloxone term.
- Conditional inclusion:
 - If the ED visit does not include a diagnosis code for fentanyl poisoning of unintentional or undetermined intent, or a fentanyl term and naloxone term within the chief complaint field, then the visit is not automatically included. In these instances, the visit is captured only if it includes the following two components and no exclusion terms:
 - 1) chief complaint text indicating fentanyl involvement **AND**
 - 2) chief complaint text indicating an overdose or poisoning.
 - The exclusion terms are applied to the chief complaint text only when the automatic inclusion criteria are not met.

Limitations: The definition was developed to capture suspected nonfatal fentanyl-involved overdoses treated in EDs. However, it is subject to both misclassification and under/overreporting for several reasons, including limited point-of-care confirmatory testing to identify the drug(s) involved in the overdose, and reliance on self-report, bystander reports, and/or clinical presentations to determine the drug(s) involved in an overdose. The codes provided in the discharge diagnosis field from the ED visit record do not necessarily represent the final diagnosis of a patient and should be considered preliminary. Additionally, some hospitals may enter all diagnosis codes from a patient’s entire medical history, including codes for previous fentanyl-involved overdose visits; the definition may incorrectly capture such encounters that were not for a true fentanyl-involved overdose and thus result in overreporting if codes for historic drug use/abuse/dependence are included. It is not possible in syndromic data to determine the primary reason for a patient’s visit, as syndromic data lack a primary diagnosis field. Therefore, all terms and codes are considered equally (i.e., not in any priority) regardless of what order they are in the record. Finally, fentanyl is often administered by medical personnel in the ED setting or by emergency medical services technicians en route to the ED to treat severe pain, and this information may be included in the chief complaint field. The team attempted to identify all possible exclusion terms to avoid capturing encounters that were not for a fentanyl-involved overdose, but it is possible that some of these encounters were erroneously captured, leading to overreporting.

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Detailed Definition Components

Table 1. Descriptions of discharge diagnosis codes, concepts, and chief complaint terms included or excluded in the CDC Fentanyl Overdose v2 Parsed definition.

Variable Type	Automatic inclusion?	Terms	Description (discharge diagnosis codes only)
<i>Inclusions</i>			
<i>Discharge Diagnosis codes</i>			

ICD-9-CM ¹	–	–	Not applicable: fentanyl-specific codes were implemented for use in October 2020 and thus were not available for ICD-9-CM
ICD-10-CM ¹	Yes	T40411A	Poisoning by fentanyl or fentanyl analogs, accidental (unintentional), initial encounter
	Yes	T40414A	Poisoning by fentanyl or fentanyl analogs, undetermined, initial encounter
SNOMED CT	Yes	290201006	Fentanyl poisoning
	Yes	290202004	Accidental fentanyl poisoning
	Yes	290204003	Fentanyl poisoning of undetermined intent
	Yes	295193008	Fentanyl overdose
	Yes	295194002	Accidental fentanyl overdose
	Yes	295196000	Fentanyl overdose of undetermined intent
Chief Complaint terms			
Fentanyl + naloxone term	Yes		Fentanyl (and misspellings) + naloxone, narcan, or evzio
Fentanyl-related terms	Conditional, include only if other overdose-related term(s) are also present AND no exclusion terms		Fentanyl (and misspellings)
Overdose-related terms	Conditional, include only if other fentanyl-related term(s) are also present AND no exclusion terms		Poison, overdose, nod, snort, ingest, intoxication, unresponsive, loss of consciousness/unconscious/syncope, shortness/short of breath, altered mental status, agonal breath/respirations, stopped breathing, pinpoint (pupils), dilated pupils, slump, cyanosis, blue lips, hypoxia
Exclusions			
Chief complaint terms	Exclude if encounter captured from chief complaint terms only (i.e., exclusion terms are applied to the chief complaint text only when the automatic inclusion criteria are not met)		Commonly identified negations for fentanyl use or overdose terms, terms indicating fentanyl administration by medical personnel and terms indicating withdrawal or detoxification.

¹ICD-9-CM and ICD-10-CM code punctuation is removed when querying the CCDD Parsed field.

Table 2. ESSENCE syntax, CDC Fentanyl Overdose v2 Parsed

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(,^;T40411A^,OR,^;T40414A^,OR,^;290201006;^,OR,^;290202004;^,OR,^;290204003;^,OR,^;295193008;^,OR,^;295194002;^,OR,^;295196000;^),OR,(,^(^f[ea]nt^,OR,^ph[ea]nt^),AND,(^naloxo^,OR,^narcan^,OR,^evzio^),),OR,(,^(^f[ea]nt^,OR,^ph[ea]nt^),AND,(^poison^,OR,^verdo[sez][se]^,OR,^over dose^,OR,^overose^,OR,^nod^,OR,^snort^,OR,^in[gj]est^,OR,^intoxic^,OR,^unresponsive^,OR,^loss of consciousness^,OR,^unconscious^,OR,^syncop^,OR,^shortness of breath^,OR,^short of breath^,OR,^altered mental status^,OR,^agonal breath^,OR,^agonal resp^,OR,^stopped breathing^,OR,^pinpoint^,OR,^dilated pupil^,OR,^slump^,OR,^cyanosis^,OR,^blue lips^,OR,^hypoxia^),),ANDNOT,(^administered f[ea]nt^,OR,^f[ea]nt[aiyn][nly][aioyl][ln] administered^,OR,^f[ea]nt[aiyn][nly][aioyl] administered^,OR,^f[ea]nt[aiyn][nly] administered^,OR,^f[ea]nt[aiyn] administered^,OR,^f[ea]nt administered^,OR,^given f[ea]nt^,OR,^f[ea]nt[aiyn][nly][aioyl][ln] given^,OR,^f[ea]nt[aiyn][nly][aioyl]
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^,OR,^phantom^,OR,^phentermine^,OR,^phentrimine^,OR,^fentermine^,OR,^phenteramine^,OR,^fanting^,OR,^
fanted^,OR,^elephant^,OR,^elphant^,OR,^infant^,OR,^no loss of conscious^,OR,^denie[sd] loss of
consciousness^,OR,^negative loss of consciousness^,OR,^with
dra^,OR,^withdra^,OR,^withdraw^,OR,^detox^,OR,^dtox^,OR,^detos^,OR,^denies
sob^,OR,^nodule^,OR,^node^,OR,^accifent^,OR,^signifantly^,OR,^ibuprofent^,OR,^bonfante^,,))