

Heroin Overdose v5 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 heroin-involved overdoses using syndromic surveillance data.

New or Revised Definition: Revision of CDC Heroin Overdose v4

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Definition Description: The heroin overdose syndrome definition was designed to identify ED visits for suspected nonfatal heroin-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 was queried for terms indicating a heroin-involved overdose, and for relevant exclusion terms (e.g., denial of use, withdrawal without acute intoxication, etc., which would exclude ED visit records from this syndrome definition), and
- (2) the discharge diagnosis parsed field is queried for International Classification of Diseases, Clinical Modification, 9th Revision (ICD-9-CM)¹, 10th Revision (ICD-10-CM)², and Systematized Nomenclature of Medicine – Clinical Terms (SNOMED-CT)³ diagnosis codes indicating an acute heroin 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, Ninth Revision, Clinical Modification. World Health Organization; 1980.

² World Health Organization. International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM). World Health Organization; 2015.

³ National Library of Medicine. SNOMED-CT. Accessed [Dec 5 2023].
<https://www.nlm.nih.gov/healthit/snomedct/index.html>

Justification for Development: Heroin has historically been a driver of drug overdose morbidity and mortality in the United States, although its prevalence and impact has declined over the past decade⁴. This definition was developed to help public health practitioners track and understand trends of nonfatal heroin-involved overdoses treated in EDs in near real-time.

Data Source During Development: ED visits

Development methods: CDC scientists first started developing the definition using lessons learned from jurisdictions funded by CDC's Enhanced State Opioid Overdose Surveillance (ESOOS) program and researching guidance documents from sources including the National Center for Health Statistics, the Council of State and Territorial Epidemiologists, and Substance Abuse and Mental Health Services Administration. First, ICD-10-CM, ICD-9-CM, and SNOMED-CT diagnosis codes indicating an acute heroin poisoning were identified; this was followed by identifying and adding overdose terms that could be presented in the chief complaint free text field. Finally, heroin chief complaint drug terms indicating that heroin was involved in the overdose were added.

Validation Methods: We used three methods to validate this new definition.

- 1) CDC NSSP scientists used R code to convert syntax from (A) the previous Heroin Overdose versions that queried the Chief Complaint Discharge Diagnosis (CCDD) field to (B) syntax that would more effectively query the Chief Complaint Discharge Diagnosis (CCDD) Parsed field. These conversions focused on changes to diagnostic code formatting within the syntax. The CDC DOSE team checked to see whether the syntax converted correctly (i.e., did not eliminate codes or terms that were intended to capture heroin-involved overdose).
- 2) CDC scientists in DOP piloted the draft definition by manually reviewing records that were captured after aforementioned conversion of syntax.
- 3) Overall summary counts over time comparing heroin overdose syndrome definitions v4 and v5 were analyzed to determine whether there were large deviations in trends.

Validation steps 2 and 3 were iterative processes and were repeated until, as a result of the syntax changes, most new ED records that were included and excluded were a result of syntax conversion only. In addition, and the large picture trends during 2021-2022 were similar.

For more information on initial development of the CDC Heroin Overdose version 4, please refer to its accompanying documentation⁵.

Definition Fields and Structure: The CCDD Parsed field is used to query both the diagnosis codes and chief complaint free text with exclusions (as necessary) to develop the syndrome definition.

- Automatic inclusion:
 - If a diagnosis code indicating a heroin poisoning of unintentional or undetermined intent is present, the ED visit is automatically included in the syndrome.
- Conditional inclusion:
 - If the ED visit does not include a diagnosis code for heroin poisoning of unintentional or undetermined intent, then the visit is not automatically

⁴ <https://www.cdc.gov/nchs/nvss/vsrr/drug-overdose-data.htm>

⁵ CDC Heroin Overdose version 4 Brief:

https://cdn.ymaws.com/www.cste.org/resource/resmgr/overdose_surveillance/CDC_Heroin_Definition_v4.pdf

- included.
- The visit is captured only if it includes two components:
 - 1) chief complaint text indicating an overdose or poisoning **AND**
 - 2) chief complaint text indicating heroin involvement.
 - The list of exclusions is applied to the chief complaint text only when a discharge diagnosis code is not present for heroin poisoning of unintentional or undetermined intent.

For Consideration: Overdoses related to illegally manufactured fentanyl may be listed as a heroin-involved overdose in the chief complaint and diagnosis codes. A large increase in heroin-involved overdose ED visits may be attributable to increased supply and use of illegally made fentanyl by persons using heroin. This occurs because illegally manufactured fentanyl is commonly mixed with heroin and injected by people who historically use heroin. Because fentanyl is not commonly included in emergency department toxicology tests⁶, an ED toxicology test may detect only heroin even though the overdose involved a mixture of heroin and illegally made fentanyl.

Limitations: The definition was developed to capture suspected heroin-involved overdoses treated in EDs. However, it is subject to both misclassification, overreporting, and underreporting for several reasons, including limited point-of-care confirmatory testing to identify whether heroin or other drug(s) were 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 heroin-involved overdose visits; the definition may incorrectly capture such encounters that were not for a true heroin-involved overdose and thus result in overreporting. The team attempted to identify all appropriate inclusion and exclusion terms to capture any suspected nonfatal heroin-involved overdoses while avoiding capturing encounters that were not for an acute heroin-involved overdose or poisoning, but it is possible that some of these encounters were erroneously captured, leading to overreporting.

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⁶ Schwartz, BE et al. Emergency Department Drug Surveillance (EDDS) hospital's urinalysis results compared with expanded re-testing by an independent laboratory, a pilot study. *Drug and Alcohol Dependence*. 2022; 230:109-195. Doi: <https://doi.org/10.1016/j.drugalcdep.2021.109195>

Table 1. Descriptions of discharge diagnosis codes, concepts, and chief complaint terms included or excluded in the CDC Heroin Overdose v5 Parsed definition.

Variable Type	Automatic inclusion?	Terms	Description (discharge diagnosis codes only)
Inclusions			
<i>Discharge Diagnosis codes</i>			
ICD-9-CM ¹	Yes	96501	Poisoning by heroin
		E8500	Accidental poisoning by heroin
ICD- 10-CM ¹	Yes	T401X1A	Poisoning by heroin, accidental (unintentional), initial encounter
		T401X4A	Poisoning by heroin, undetermined, initial encounter
SNOMED-CT	Yes	295174006	Heroin overdose (disorder)
		295175007	Accidental heroin overdose (disorder)
		295176008	Heroin overdose of undetermined intent (disorder)
Chief Complaint terms			
Heroin + Naloxone-related terms	Yes	Heroin terms (and misspellings) + naloxone, narcan, or evzio	
Overdose-related term	Conditional, include only if other heroin-related terms are also present AND no exclusion terms	Poison, overdose, nod, snort, ingest, intoxication, unresponsive, loss of consciousness/syncope, shortness/short of breath, altered mental status (and misspellings).	
Heroin-related term	Conditional, include only if other overdose-related terms are also present AND no exclusion terms	Heroin, speedball, dope (and misspellings).	
Exclusions			
Chief complaint	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 heroin use or overdose terms, 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 Heroin Overdose v5 Parsed

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(,^;T401X1A^,OR,^;T401X4A^,OR,^;96501;^,OR,^;E8500^,OR,^;295174006;^,OR,^;295175007;^,OR,^;295176008;^),OR,(,({,^narcan^,OR,^naloxo^,OR,^poison^,OR,^verdo[se][se]^,OR,^overdose^,OR,^overose^,OR,^nodding^,OR,!nod!,OR,^snort^,OR,^in[gj]est^,OR,^intoxic^,OR,(,^unresponsiv^,OR,^loss of consciousness^,OR,^syncop^),ANDNOT,(^no loss of consciousness^,OR,^denie[sd] loss of consciousness^,OR,^negative loss of consciousness^,OR,^denies any loss of consciousness^),OR,(,^shortness of breath^,OR,^short of breath^),ANDNOT,^denies short^),OR,^altered mental status^),AND,(^her[io][oi]n^,OR,!hod!,OR,^speedball^,OR,^speed ball^,OR,^dope^),),ANDNOT,(,^denie[sd] her[io][oi]n^,OR,^deny her[io][oi]n^,OR,^denying her[io][oi]n^,OR,^denie[sd] drug^,OR,^deny drug^,OR,^denying drug^,OR,^denies any drug^,OR,^with dra^,OR,^withdra^,OR,^detoxification^,OR,^detos^,OR,^detoz^,OR,^dtox^),)
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