

Rapid surveillance of overdose morbidity: Developing case definitions, building queries, and analyzing results

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National Center for Injury Prevention and Control
Division of Unintentional Injury Prevention

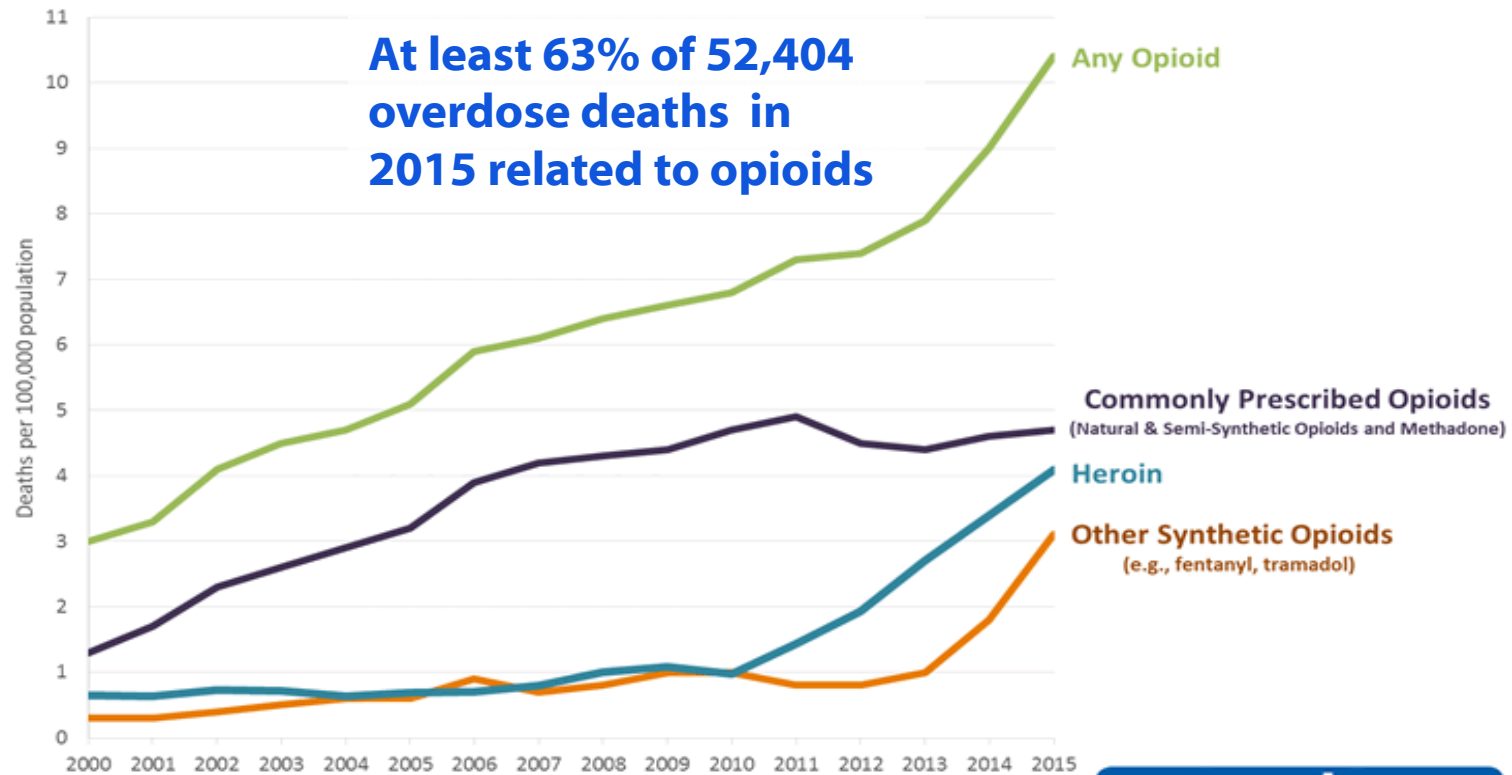


Overview of presentation

- ❑ **The need for rapid surveillance of opioid overdoses**
- ❑ **What is CDC doing to monitor opioid overdose?**
- ❑ **Developing our case definitions for emergency department surveillance**
- ❑ **Preliminary lessons learned**
- ❑ **Future actions**

THE NEED FOR RAPID OPIOID OVERDOSE SURVEILLANCE

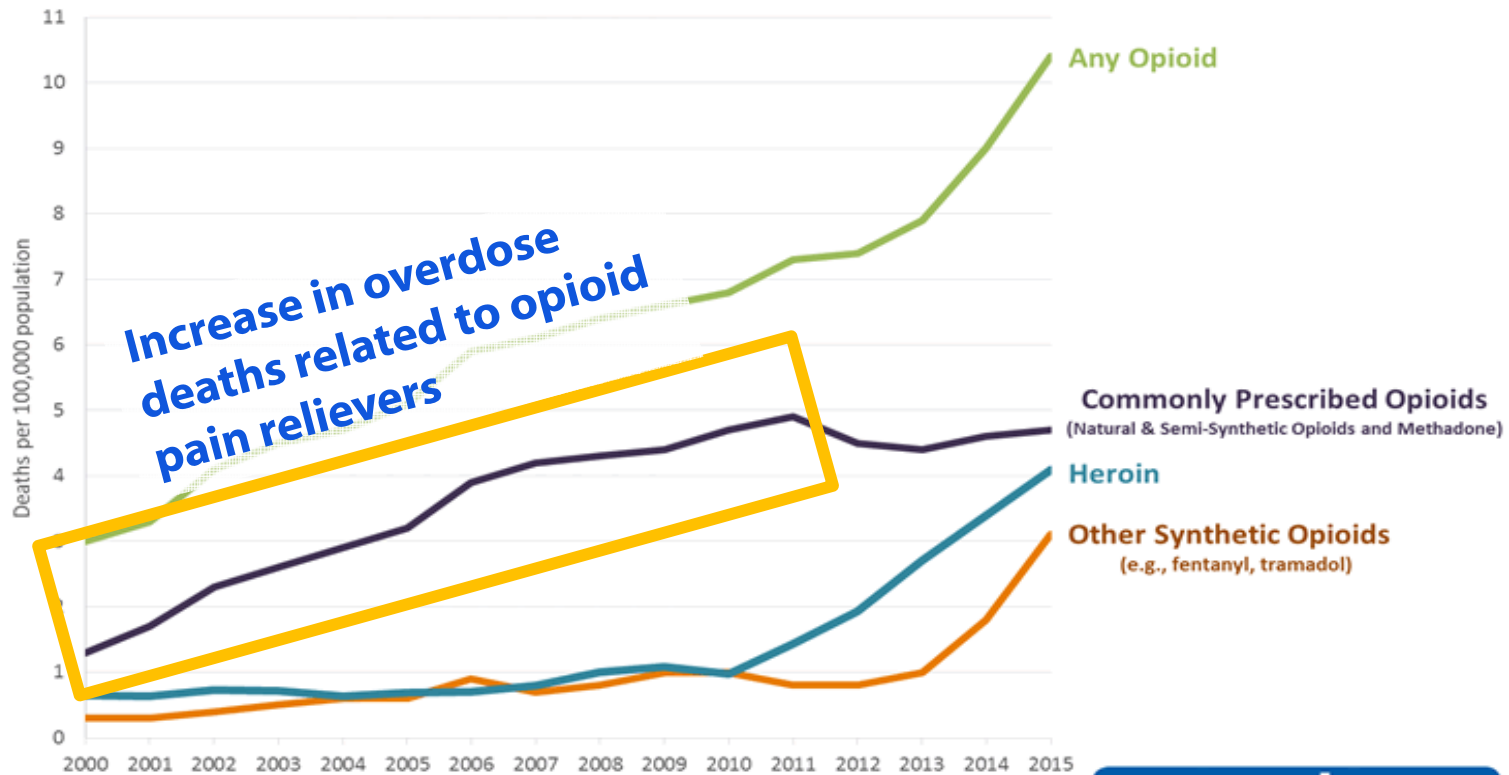
Overdose Deaths Involving Opioids, United States, 2000-2015



SOURCE: CDC/NCHS, National Vital Statistics System, Mortality. CDC WONDER, Atlanta, GA: US Department of Health and Human Services, CDC; 2016. <https://wonder.cdc.gov/>.

www.cdc.gov
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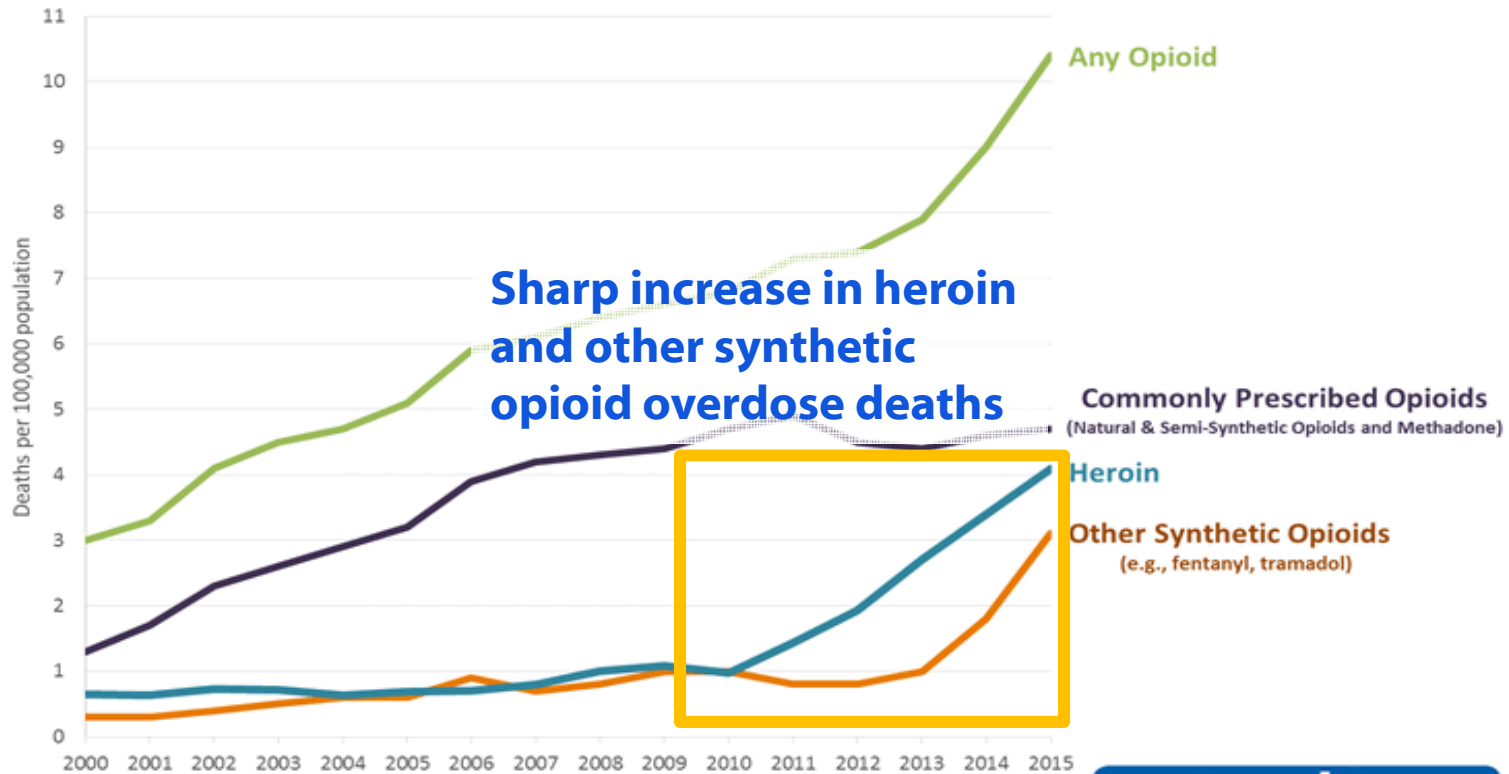
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Overdose Deaths Involving Opioids, United States, 2000-2015



Sharp increase in heroin and other synthetic opioid overdose deaths

SOURCE: CDC/NCHS, National Vital Statistics System, Mortality. CDC WONDER, Atlanta, GA: US Department of Health and Human Services, CDC; 2016. <https://wonder.cdc.gov/>.

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Illicit Opioids - Fentanyl

DEA Issues Nationwide Alert on Fentanyl as Threat to Health and Public Safety - March 18, 2015

DEA Nationwide Alert available at: <http://www.dea.gov/divisions/hq/2015/hq031815.shtml>

Increases in Fentanyl Drug Confiscations and Fentanyl-related Overdose Fatalities



Distributed via the CDC Health Alert Network
October 26, 2015, 0815 EDT (08:15 AM EDT)
CDCHAN-00384

<https://emergency.cdc.gov/han/han00384.asp>



Influx of Fentanyl-laced Counterfeit Pills and Toxic Fentanyl-related Compounds Further Increases Risk of Fentanyl-related Overdose and Fatalities



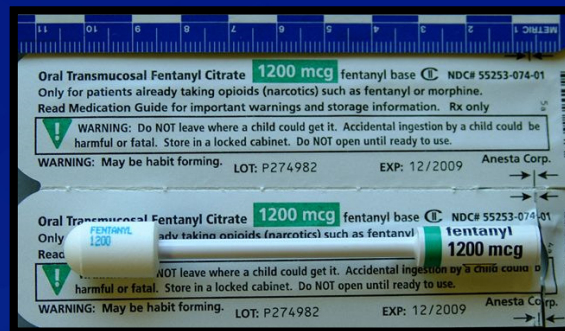
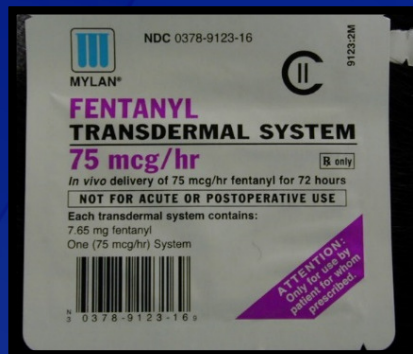
Distributed via the CDC Health Alert Network
August 25, 2016, 15:15 ET (3:15 PM ET)
CDCHAN-00395

<https://emergency.cdc.gov/han/han00395.asp>



Prescription Fentanyl

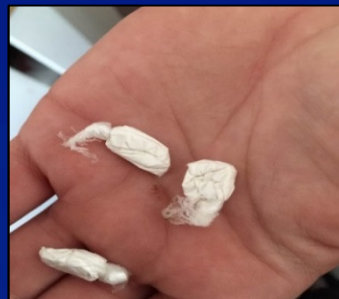
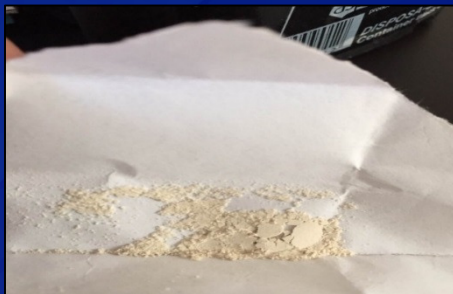
- ❑ Synthetic opioid analgesic, not detected on standard urine screening tests
- ❑ 50X more potent than Heroin
- ❑ Primary use is for managing surgical/postoperative pain, severe chronic pain, and breakthrough cancer pain*



*For more information on approved fentanyl products and their indications, see:
<http://www.accessdata.fda.gov/scripts/cder/drugsatfda/index.cfm?fuseaction=Search.SearchAction&SearchTerm=fentanyl&SearchType=BasicSearch>

Illicitly-Manufactured Fentanyl (IMF)

- ❑ Includes fentanyl *and* fentanyl analogs
- ❑ Drug Enforcement Administration reports large supply of precursor chemicals and fentanyl from China distributed through multiple countries
- ❑ Most recent increases in non-fatal and fatal fentanyl-involved overdoses linked to IMF
- ❑ Often mixed with heroin and/or sold as heroin, or as counterfeit pills



- Algren D, Monteilh C, Rubin C, et al. Fentanyl-associated fatalities among illicit drug users in Wayne County, Michigan (July 2005-May 2006). *Journal Of Medical Toxicology: Official Journal of the American College Of Medical Toxicology* [serial online]. March 2013; 9(1):106-115; U. S. Department of Justice, Drug Enforcement Administration, DEA Investigative Reporting, January 2015

Type of Drug Overdose Outbreaks Increase

❑ Local outbreaks linked to counterfeit prescription pills, adulteration of drugs and introduction of potent opioid products

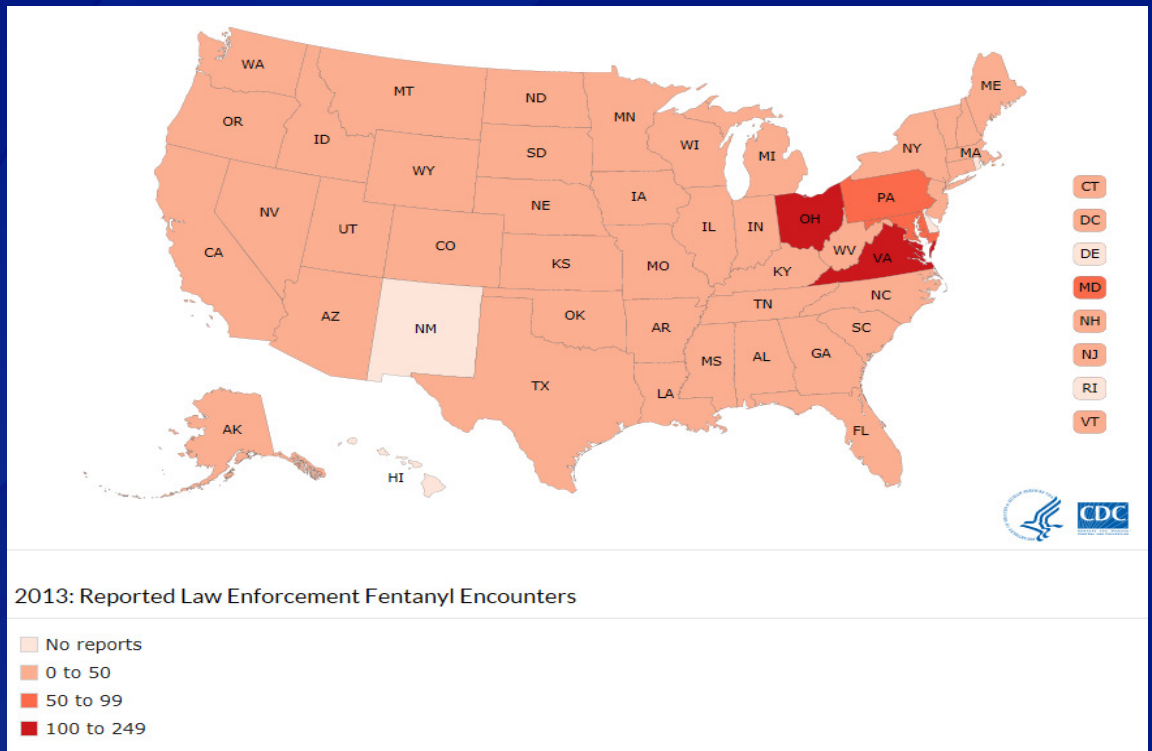
- Counterfeit Norco Poisoning Outbreak — San Francisco Bay Area, California, March 25–April 5, 2016 (<https://www.cdc.gov/mmwr/volumes/65/wr/mm6516e1.htm>)
- Multiple Fentanyl Overdoses — New Haven, Connecticut, June 23, 2016 (<https://www.cdc.gov/mmwr/volumes/66/wr/mm6604a4.htm>)
- Sharp increase related to extremely potent fentanyl analogs such as carfentanil

❑ Widespread increases in the supply and potency of illicit opioids drive sharp increases in deaths

- Illicitly-made fentanyl mixed with heroin and sold in white powder heroin market primarily east of Mississippi (<https://www.cdc.gov/mmwr/volumes/65/wr/mm6533a2.htm>)
- Sharp increases in fentanyl-related overdose deaths in OH, FL, and MA (<https://www.cdc.gov/mmwr/volumes/65/wr/mm6533a3.htm> & <https://www.cdc.gov/mmwr/volumes/66/wr/mm6614a2.htm>)

Rapid Increase in Fentanyl Found in Drug Products Obtained/Tested by Law Enforcement: 2013

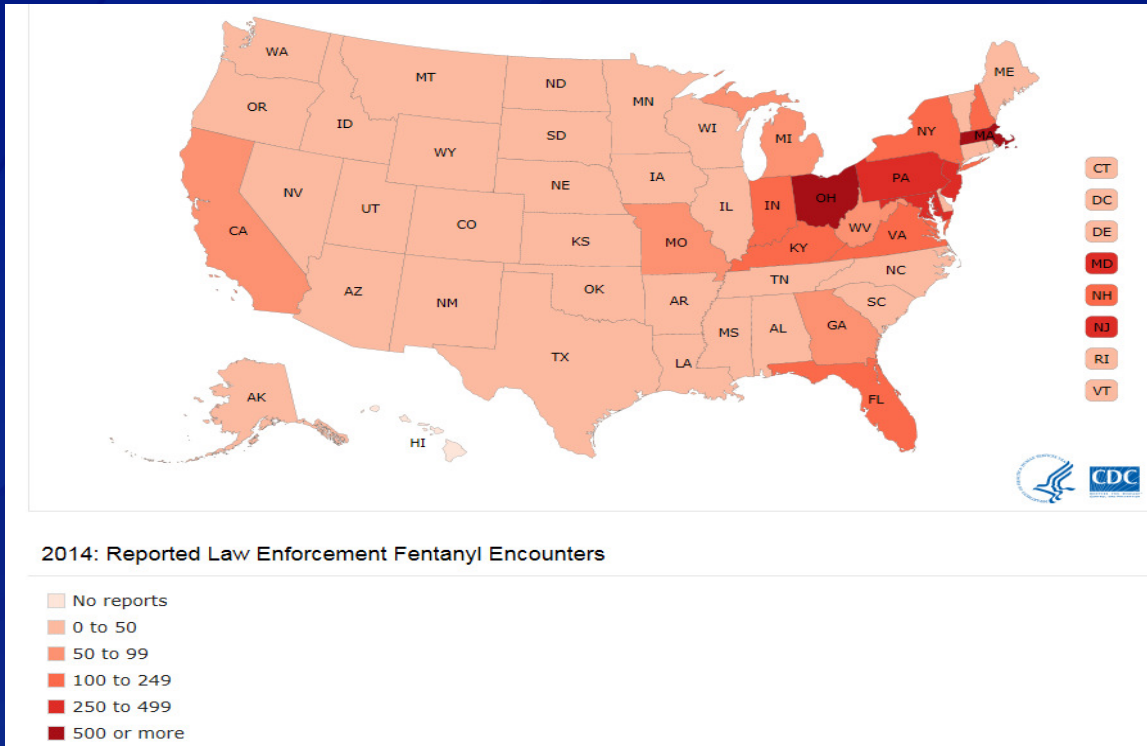
2013



<http://www.cdc.gov/drugoverdose/data/fentanyl-le-reports.html>

Rapid Increase in Fentanyl Found in Drug Products Obtained/Tested by Law Enforcement: 2014

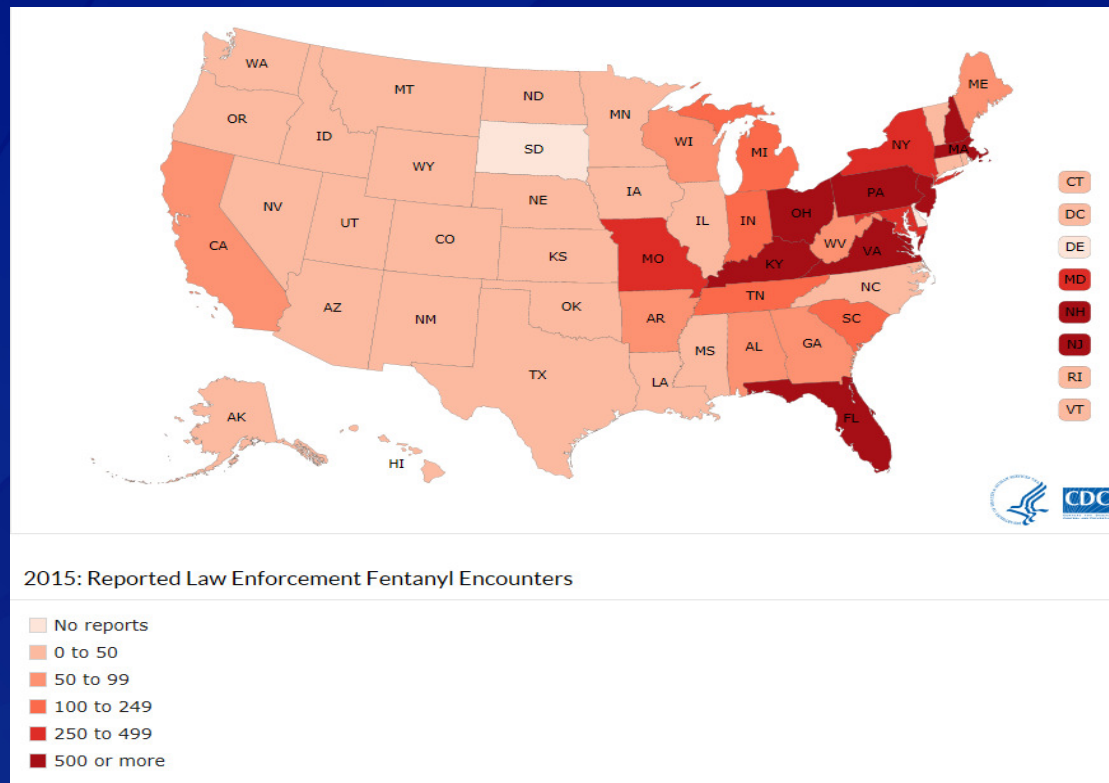
2014



<http://www.cdc.gov/drugoverdose/data/fentanyl-le-reports.html>

Rapid Increase in Fentanyl Found in Drug Products Obtained/Tested by Law Enforcement: 2015

2015

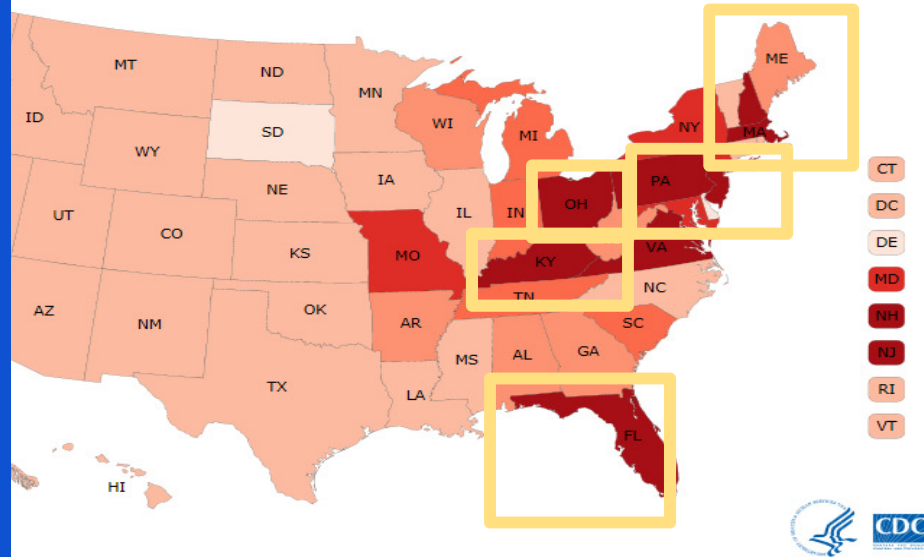


<http://www.cdc.gov/drugoverdose/data/fentanyl-le-reports.html>

2015: Reported Law Enforcement Fentanyl Encounters

**11 States
(2015)**

Florida
Kentucky
Maryland
Maine
Ohio
New Hampshire
West Virginia
Vermont
Rhode Island
Virginia
Connecticut

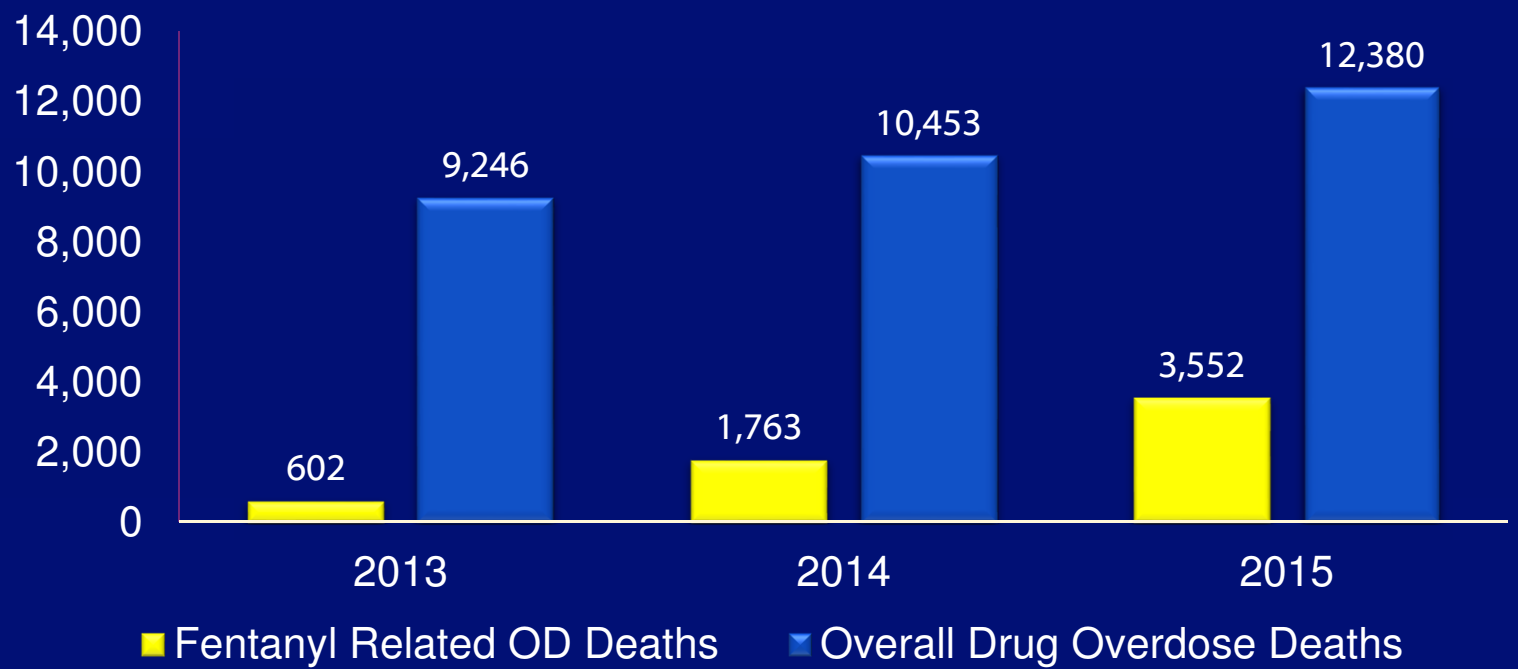


2015: Reported Law Enforcement Fentanyl Encounters

- No reports
- 0 to 50
- 50 to 99
- 100 to 249
- 250 to 499
- 500 or more

<http://www.cdc.gov/drugoverdose/data/fentanyl-le-reports.html>

Preliminary Fentanyl-Related and Overall Drug Overdose Death Counts in 11 States: 2013-2015



CDC RESPONSE: OUR PARTNERS

Three Pillars of CDC's Work

- **Improve data quality and track trends**
- **Strengthen state efforts** by scaling up effective public health interventions
- **Supply healthcare providers with resources** to improve patient safety



Prevention for States (Pfs)*



- Provides states guidance and resources to prevent prescription drug overdoses by addressing problematic opioid prescribing.
- 29 states funded with average award ranging from \$750K to \$1M.
- Funding to states with high burden and readiness to act.
- Focus on high impact, data driven activities and give states flexibility to tailor their work.

* Arizona, California, Colorado, Connecticut, Delaware, Illinois, Indiana, Kentucky, Maine, Maryland, Massachusetts, Nebraska, Nevada, New Mexico, New York, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, Tennessee, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin

1
Enhance
and
Maximize
PDMPs

2
Community
or Health
System
Interventions

3
State Policy
Evaluation

4
Rapid
Response
Projects

Prevention for States Program

Data Driven Prevention Initiative (DDPI)

- **Awarding \$18 million over a 3-year period to 13 states and District of Columbia* to:**
 - Improve data collection and analysis around opioid misuse, abuse, and overdose.
 - Develop strategies that impact behaviors driving prescription opioid dependence and abuse.
 - Work with communities to develop more comprehensive opioid overdose prevention programs.

*Alaska, Alabama, Arkansas, Georgia, Hawaii, Idaho, Kansas, Louisiana, Michigan, Minnesota, Montana, New Jersey, and South Dakota, Washington D.C.

WHAT IS CDC DOING TO MONITOR OPIOID OVERDOSE?

Enhanced State Opioid Overdose Surveillance (ESOOS)

- ❑ **Approximately \$4.3 million per year for 12 states in September 2016 (through September 2019)***
- ❑ **Strategy One: increase timeliness of non-fatal opioid overdose reporting**
 - Emergency department and discharge data (ED)
 - Emergency Medical Services (EMS) data
 - Three indicators: suspected all-drug, opioid, and heroin
- ❑ **Strategy Two: increase timeliness of fatal opioid overdose reporting**
 - Death certificate and Medical Examiner/Coroner (ME/C) report abstraction
- ❑ **Strategy Three: widespread dissemination**

* Kentucky, Maine, Massachusetts, Missouri, New Hampshire, New Mexico, Ohio, Oklahoma, Pennsylvania, Rhode Island, West Virginia, Wisconsin

Enhanced State Opioid Overdose Surveillance (ESOOS)

- ❑ **Over \$3 million per year for 12 states in September 2016 (through September 2019)***
- ❑ **Strategy One: increase timeliness of non-fatal opioid overdose reporting**
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* Kentucky, Maine, Massachusetts, Missouri, New Hampshire, New Mexico, Ohio, Oklahoma, Pennsylvania, Rhode Island, West Virginia, Wisconsin

Why Emergency Department Syndromic Surveillance?

□ Need

- Identify areas experiencing rapid increases in opioid overdoses to inform responses
- Identify more quickly promising practices to reduce opioid overdoses

□ Proven utility to public health and scalable

- Local jurisdictions already using it to track and respond to drug overdoses
- Findings from Epi-Aid investigations and collaborative work with states
- Leverage existing state and national resources (BioSense/ESSENCE)

□ Action at local and national level

- Track quarterly trends across the nation to inform national policy
- Improve more rapid local and state public health response

Why Suspected Drug, Opioid, and Heroin Overdose?

- ❑ **Purpose of funding**
 - Enhance timeliness of opioid-related overdose surveillance with a focus on changes in the illicit opioid market
- ❑ **Heroin identified more often in chief complaint than other drugs**
 - Overdoses related to illicitly-made fentanyl often present/look like heroin overdoses
 - Detected in rapid drug screens and most ED do limited toxicology testing
- ❑ **May only be able to detect “opioid” overdoses due to common treatment with naloxone**
- ❑ **Limited chief complaint and no ICD-10-CM coding may make drug overdose the only feasible syndrome to track**

Why Suspected Drug, Opioid, and Heroin Overdose?

- ❑ **Important to distinguish overdoses from other drug-related ED visits**
 - Withdrawal and detox
 - Abscesses or sores related to drug use
- ❑ **Start small and build to larger set of syndromes**

Philosophy

❑ **Focus on detecting change**

- Pushing system by looking at trend data over quarters
- Some jurisdictions may be able to get and report preliminary burden estimates

❑ **Jurisdiction-driven definitions will outperform national definitions**

- Local flexibility enhances quality and utility by accounting for large variance in text entries and coding

❑ **National guidance**

- National definition will provide a good starting place
- Guidance to encourage common conceptual definition (e.g., no withdrawal/detox) and learn from previous work

Philosophy

- ❑ **Dual local and national use**
- ❑ **Critical to have people in jurisdiction monitoring and improving syndromes**
- ❑ **Good enough to use**
- ❑ **Rapidly learning through collaboration**

ESOOS's ED data sharing

- ❑ **11 of 12 states are sharing ED data**
 - 5 using CDC's NSSP ESSENCE
 - 3 case-level file from state system
 - 3 aggregate file from state system

- ❑ **All 11 capturing all three indicators: all-drug, opioid, and heroin indicators**
 - 1 state also capturing injection drug use

- ❑ **Requesting data on a quarterly basis**

DEVELOPING OUR CASE DEFINITIONS

ESSENCE on the BioSense Platform

- ❑ **Collaborating with the National Syndromic Surveillance Program (NSSP)**
- ❑ **Case definition being driven by work in ESSENCE**
- ❑ **Are working with states that are not using ESSENCE**

Inclusion and exclusion criteria

- ❑ Facilities that are “emergency”; patient visit for “emergency”
- ❑ Individuals ages 11 and older
- ❑ First encounter visits for acute overdose (e.g., 7th character of ICD-10-CM is “A”)
- ❑ Unintentional or undetermined intent (e.g., 5th/6th character of ICD-10-CM is 1 or 4)
 - Tacit exclusion of suicide and assault cases

ED variables for CDC and state case definitions

- ❑ **Discharge Diagnosis (i.e., ICD-10-CM & ICD-9-CM)**
- ❑ **Literal text (e.g., Chief Complaint, Clinical Impression, Triage notes)**

Discharge Diagnosis: *Poisoning codes*

❑ **Heroin:**

- ICD-9: 965.01 and E850.0
- ICD-10-CM: T40.1X

❑ **Opioid:**

- ICD-9: 965.00-965.02, 965.09, E850.0-E850.2
- ICD-10-CM: T40.0X-T40.4X, T40.60, and T40.69

❑ **All drug:**

- ICD-9: 960-979, E850-E858, E950.0-E950.5, E962.0, and E980.0-E980.5
- ICD-10-CM: T36-T50

Chief Complaint

- ❑ **Overdose terms:** overdose, poisoning, nodding off, adverse drug reaction, ingestion, intoxication
- ❑ **Drug terms:**
 - Heroin: heroin, speedball, dope
 - Opioid: (all heroin terms plus) opioid, opiate, opium, methadone, suboxone, oxycodone, percocet, vicodin, fentanyl, hydrocodone, morphine, codeine, oxycodone, dilaudid, hydromorphone, tramadol, buprenorphine
 - All drug: (all opioid terms plus) cocaine, amphetamine, LSD, barbiturate, narcotic, cannabis
- ❑ **Narcan/naloxone/Evzio**
- ❑ **Misspellings and abbreviations**
 - E.g., heroin, opioid, opiate, inject, overdose
 - E.g., "HOD" for heroin overdose or "W/D" for withdrawal

PRELIMINARY LESSONS LEARNED

Overall lessons learned

- ❑ **Missing data**
- ❑ **Misspellings**
- ❑ **Rich data in triage notes (but difficult to query)**

Lessons learned from Triage Notes

<i>Chief Complaint</i>	<i>Discharge Diagnosis</i>	<i>Triage Notes (*original data modified)</i>
OVERDOSE MEDICATION REACTION	T40601A	Patient mainlined heroin. Believes there was fentanyl in it.
OVERDOSE DRUG OVERDOSE	F1190	Found with needle in arm. Pt admitted to heroin and fentanyl use. Narcan not given. Pt denies any SI or attempt to OD.
OVERDOSE	<i>None provided</i>	Pt states that he was drinking a lot today. Pt states that he found a packet of white dope in his bag and shot it up. Pt believes it was fentanyl based heroin.

Lessons learned with Discharge Diagnosis

- ❑ **Don't forget the ICD-9-CM codes**
- ❑ **Querying with and without period for diagnosis codes**
- ❑ **Incorrect discharge diagnosis codes**
- ❑ **For heroin and opioid...dealing with F11s**

F11 misclassification examples

<i>Chief Complaint</i>	<i>Discharge Diagnosis</i>	<i>Triage Notes (*original data modified)</i>
OVERDOSE DRUG OVERDOSE	F11.10	Lethargy and unresponsiveness after taking heroin and lorazepam.
OPIOID ABUSE UNCOMPLICATED	F11.10	Pt reports snorting heroin and become unconscious for 5-10 minutes.
UNRESPONSIVE	F11.90	Heroin and ETOH overdose.
HEROIN	F11.929	Pt found unresponsive. Given narcan by EMS.

Revisions to definition based on Discharge Diagnosis findings

- **For heroin - adding in ICD-9 codes**

- **For opioid - adding in ICD-9 codes and F11s:**
 - F11s in with no negation: F11.22, F11.92, and F11.12 (“with intoxication”)
 - F11s with caveats: F11.10, F11.90, and F11.20 (must include an overdose term + other negations for withdrawal etc).

Revisions to definition based on Chief Complaint findings

❑ Overall lessons learned:

- Amount of text in CC varies by state
- Drug names often not mentioned in CC (e.g., CC only says “drug overdose”)
- Term variation (e.g., opiate, opium, opioid)

❑ Revisions:

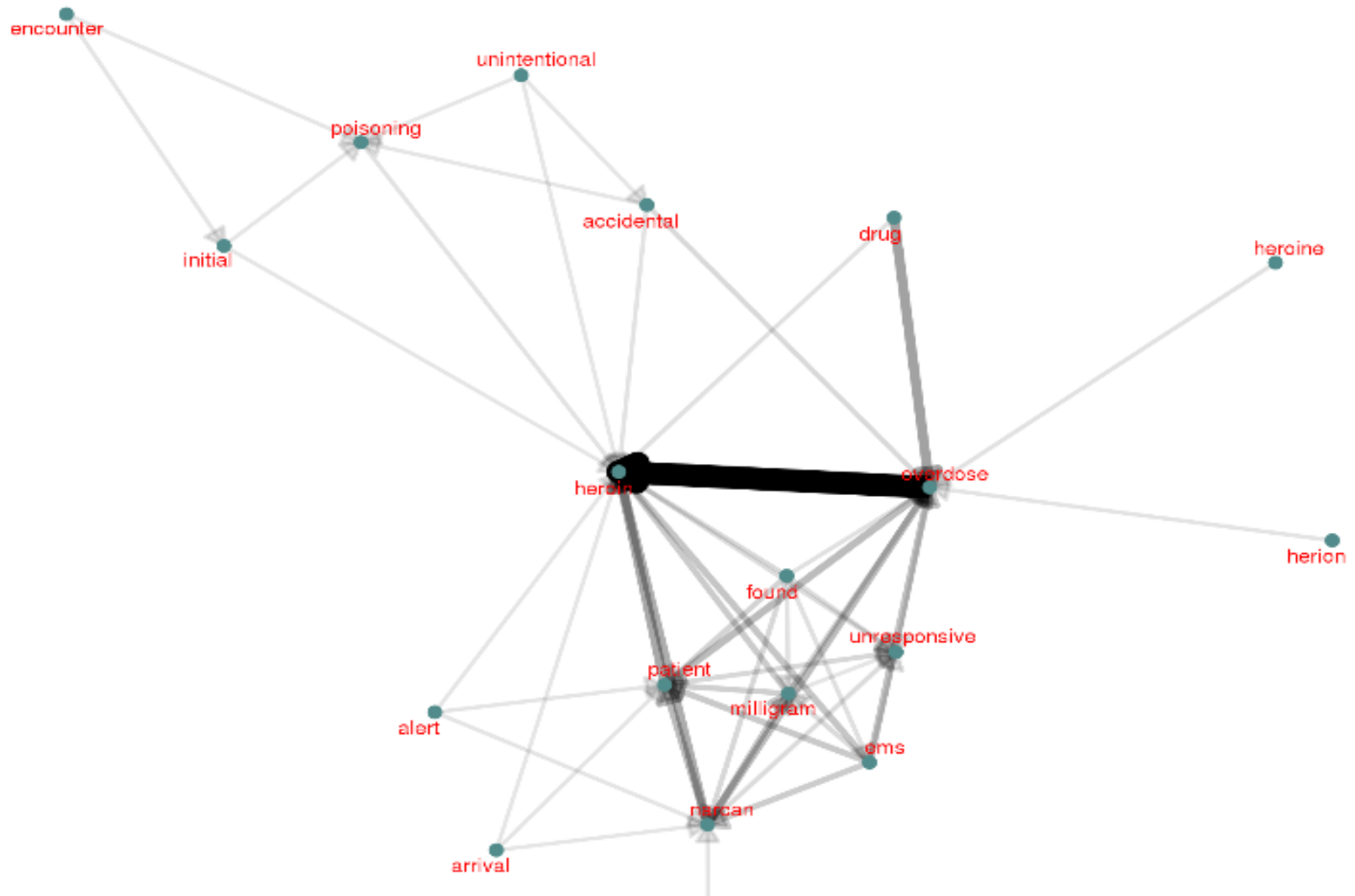
- Additional overdose terms for inclusion: unresponsive, syncope, shortness of breath, altered mental status
- New exclusions for “denying heroin,” adding in “deny/denies/denied/denying drug [use]”, and including exclusions for withdrawal and detox

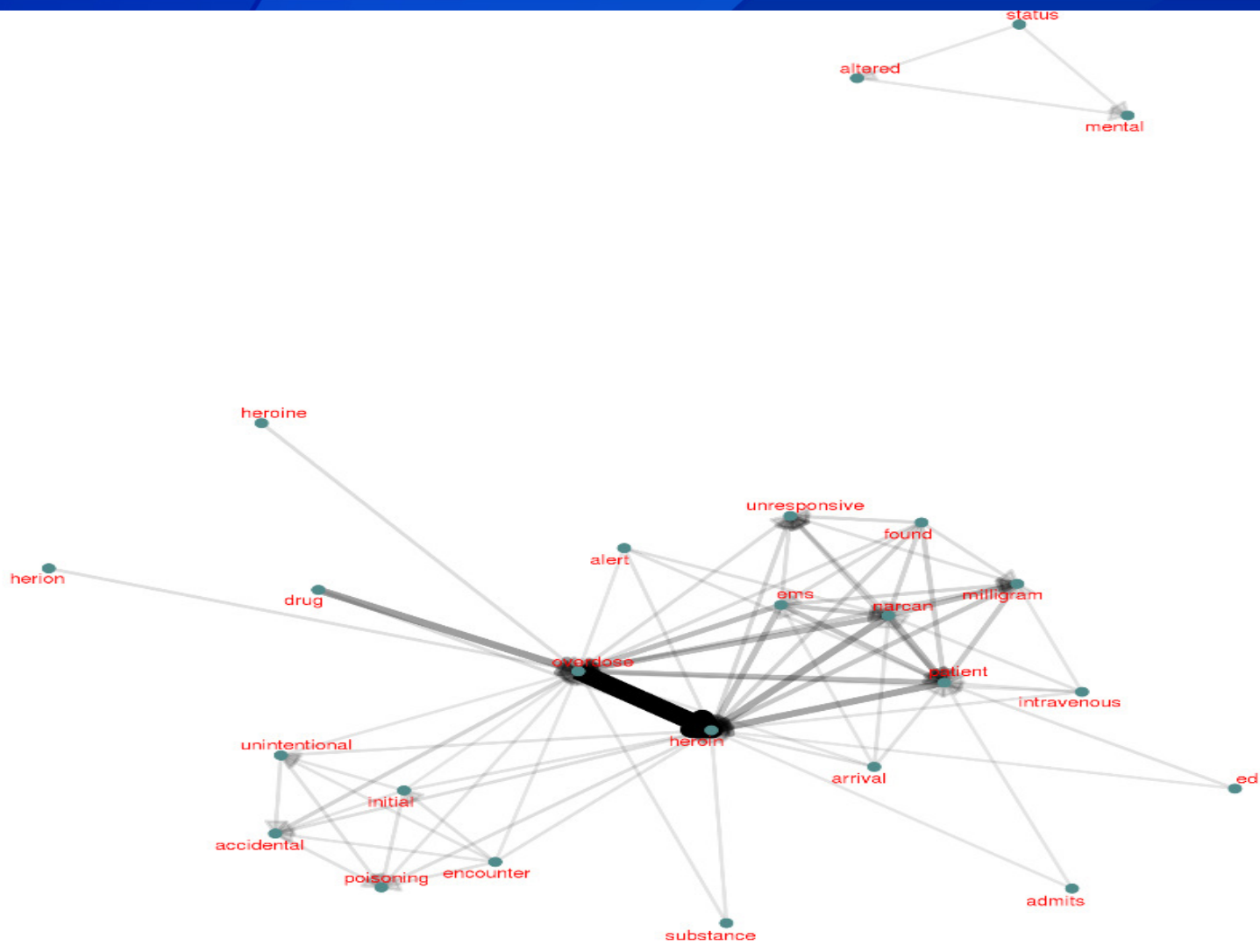
Examples from Chief Complaint

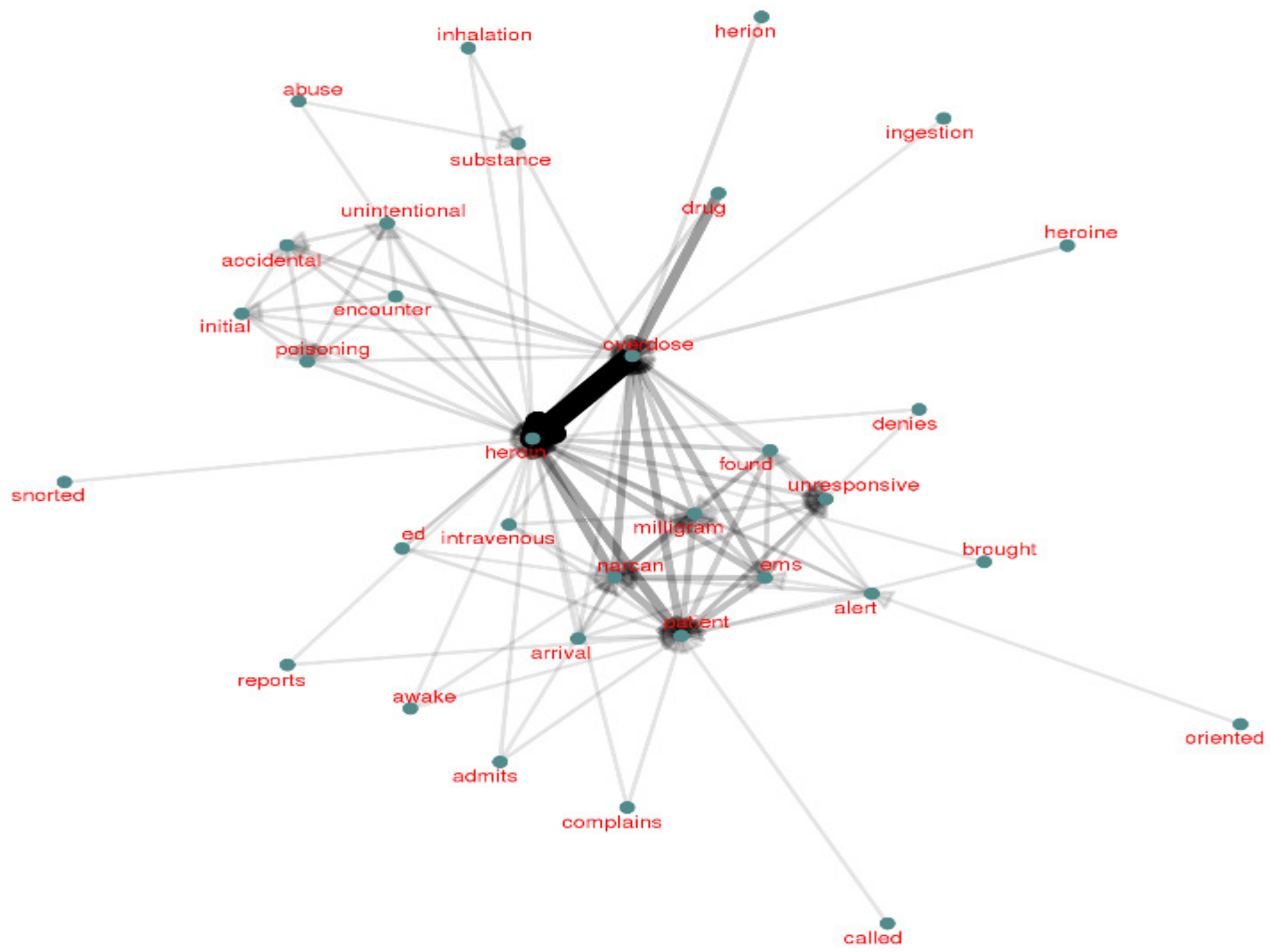
<i>Chief Complaint</i>	<i>Discharge Diagnosis</i>	<i>Triage Notes (*original data modified)</i>
OVERDOSE	T40.1X1A;T40.4X1A; T40.0X1A	Pt arrives in parking lot blue with shallow respirations.
EMS called for pt sitting along car at Speedway unresponsive. 2 Narcan IV administered by EMS. Pt admits to snorting heroin.	T40.1X1A	<i>none</i>
ALTERED MENTAL STATUS	T50.901A	Found unresponsive in car with needles present. EMS admin narcan. Pt admits heroin.
HEROIN OVERDOSE	T40.1X1A;F11.20	Pt. brought to ED by EMS pt given 2mg Narcan for overdose. Pt. says took fentanyl.

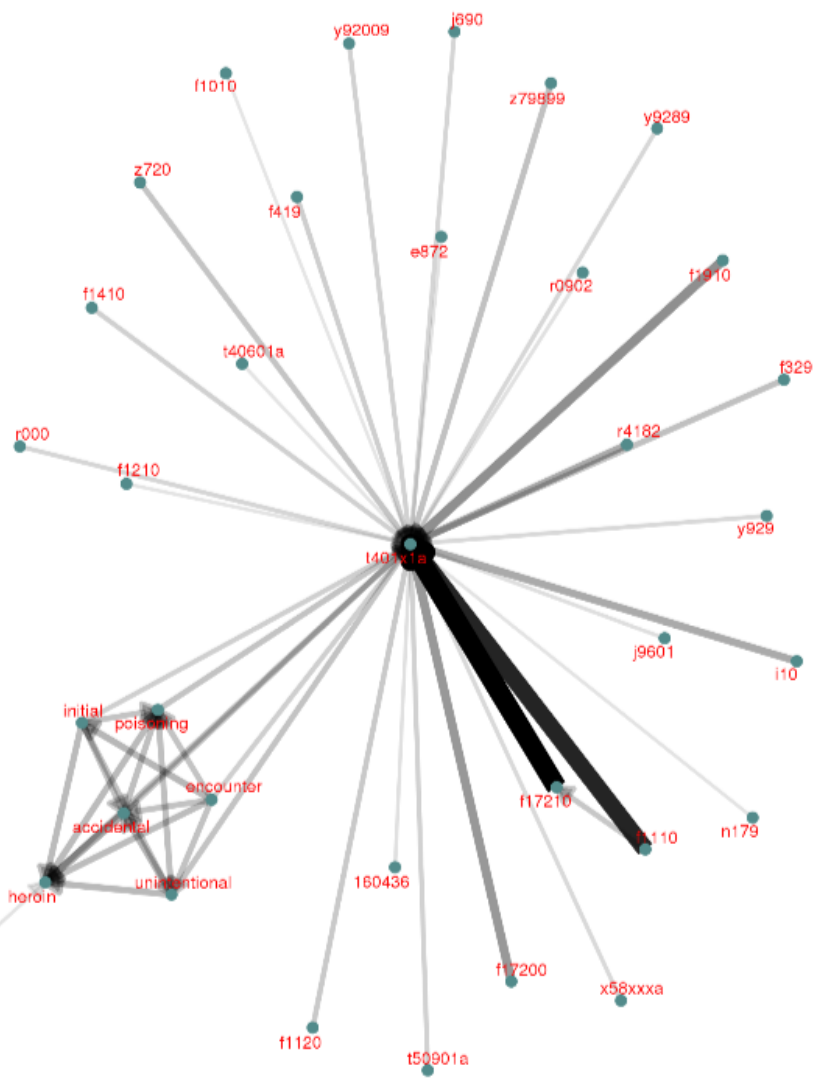
ESSENCE heroin category (Version 2.0 in italics and bold)

Category	Query terms (ESSENCE Syntax)
Chief Complaint and Discharge Diagnosis (CCDD)	(,^narcan^,or,^naloxo^,or,^poison^,or,^[ao]verdose^, or,^over dose^,or,or,^overose^,or,^sobredosis^,or,^nodding^,or,^ nod ^,or,^snort^,or,^adverse rxn^,or,^adverse reaction^,or,^adv effect drug^,or,^adverse effect drug^,or,^drug reaction^,or,^adverse drug^,or,^in[gj]est^,or,^intoxic^,or,^unresponsive^,or,^loss of consciousness^,or,^syncop^,or,^shortness of breath^,or,^altered mental status^,),and,(,^her[io][oi]n^,or,^ hod ^,or,^speedball^,or,^speed ball^,or,^dope^,or,^spheroin^,),or,^[; /]T40.1X1A^,or,^[; /]T401X1A^,or,^[; /]T40.1X4A^,or,^[; /]T401X4A^,or,^[; /]965.01;^,or,^[; /]96501;^,or,^[; /]965.[0][1],or,^[; /]965[0][1],or,^[; /]E850.0;^,or,^[; /]E8500;^,or,^[; /]E850.[0],or,^[; /]E850[0]
Chief Complaint Free Text	^,andnot,^denies her[io][oi]n^,andnot,^deny her[io][oi]n^,andnot,^denied her[io][oi]n^,^andnot,^denying her[io][io]n^,^andnot,^denies drug^,^andnot,^deny drug^,^andnot,^denied drug^,^andnot,^denying drug^









Next steps

- ❑ **Revised guidance on case definitions**
 - Heroin case definition and ESSENCE query 2.0 is forthcoming (1.0 already available)
 - Opioid case definition guidance and ESSENCE query
 - All drug case definition guidance and ESSENCE query – TBD

- ❑ **There is an identified need to search triage notes**

- ❑ **Discharge Diagnosis misclassification (e.g., F11, T50)**

THANKS!

QUESTIONS?

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