

Approaches to Syndromic Case Definitions for Drug Overdose Surveillance

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Agenda

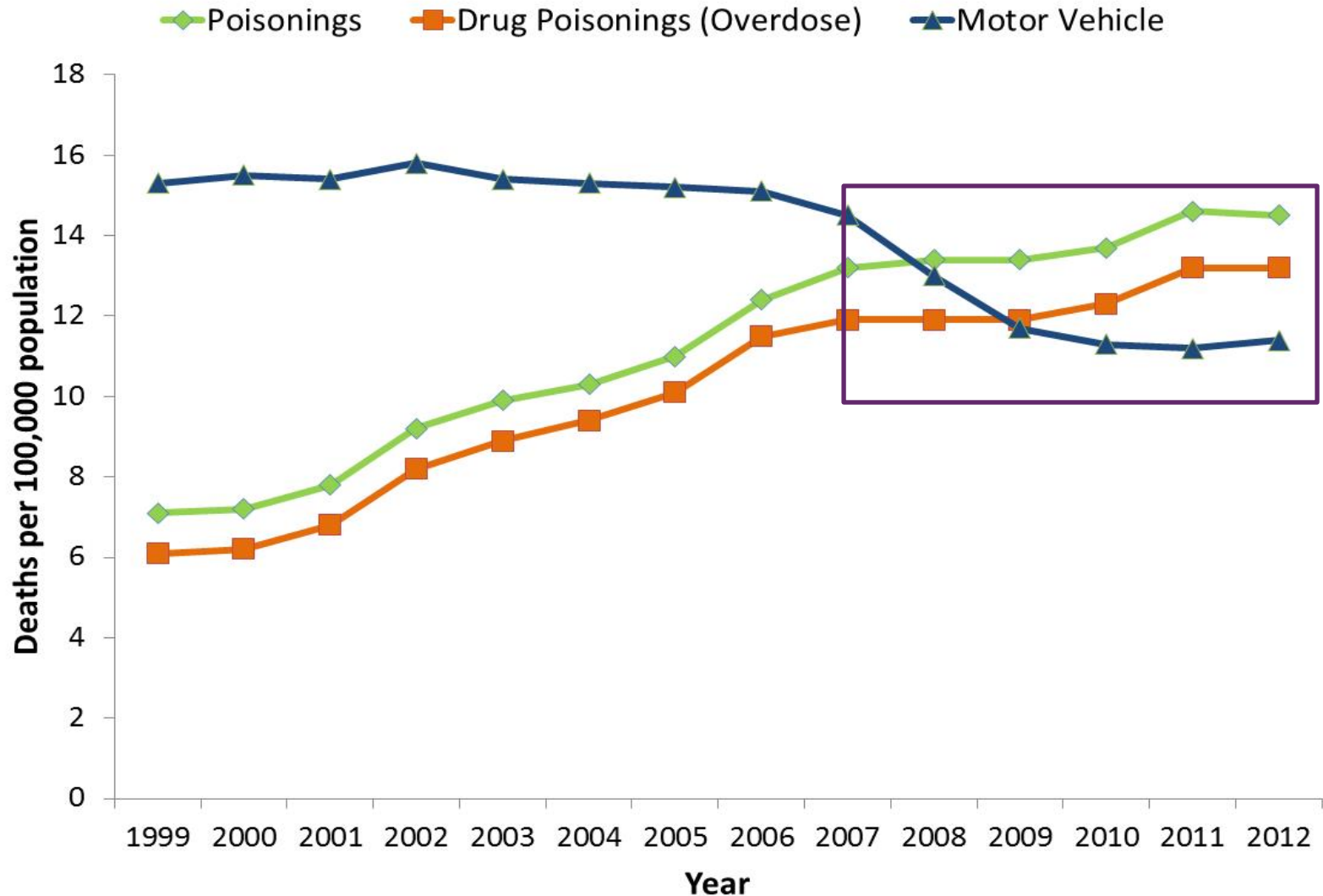
- ❑ Background
 - Drug overdoses and opioid pain reliever (OPR) overdoses
 - State/CDC need for emergency department syndromic definitions

- ❑ Tool
 - Description and lessons learned
 - Case definitions

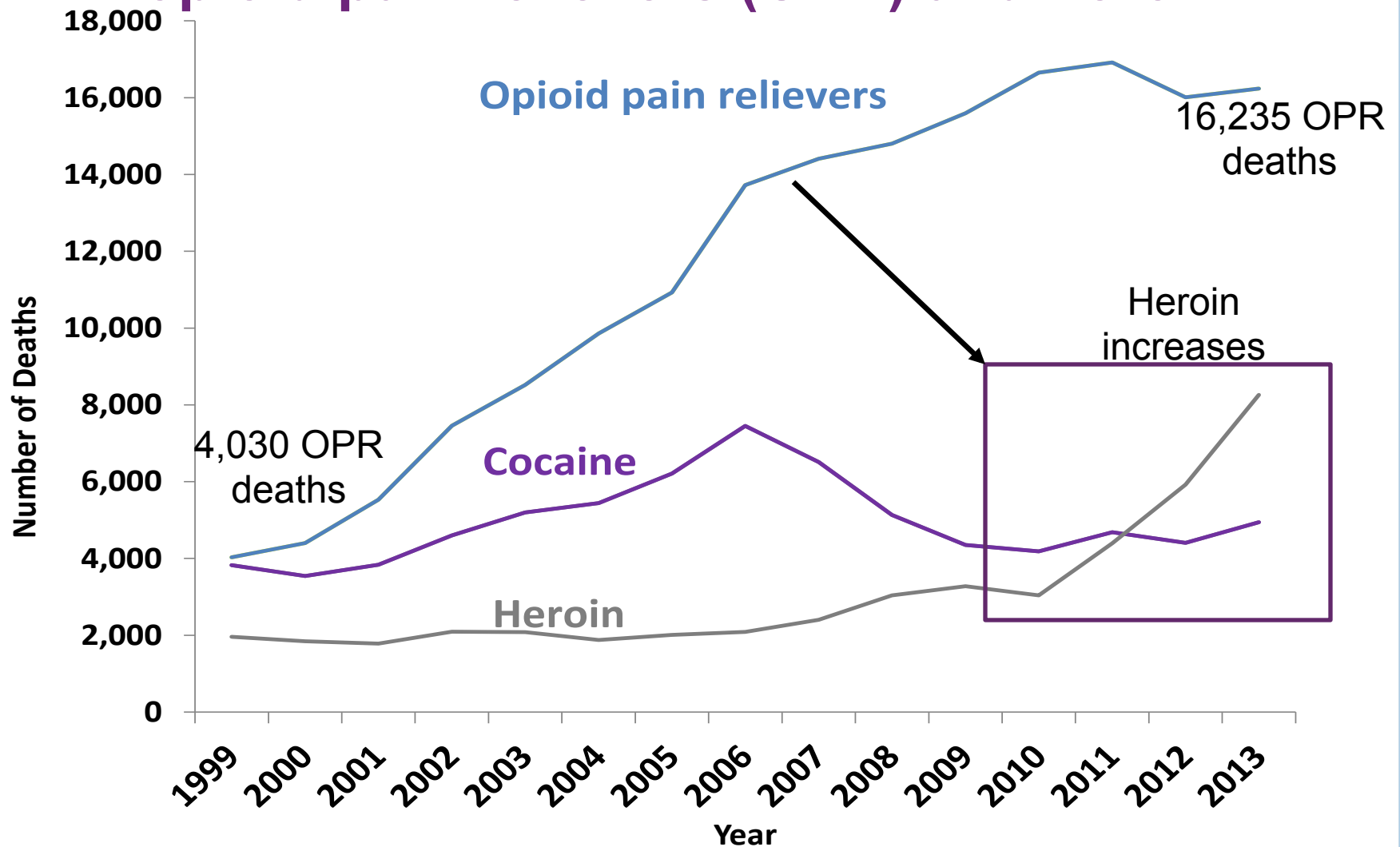
- ❑ Validation
 - Pilot
 - Draft findings

- ❑ Next steps

Drug overdoses have surpassed motor vehicle crashes as the leading cause of injury death



Dramatic increase in overdose deaths related to opioid pain relievers (OPR) and heroin



Need for Timely Data

- Timely monitoring of drug overdoses
 - Current time delays of ≥ 1 year on mortality/morbidity
 - ED syndromic rapid data collection
 - 26 ED visits for every one OPR death
- Identify drug poisoning/overdose outbreaks
 - Lacing of heroin/cocaine with other drugs (e.g., fentanyl)
 - Interest in marijuana and synthetic marijuana (e.g., spice)



Increase in Fentanyl-Related Overdose Deaths
— Rhode Island, November 2013–March 2014

Nonpharmaceutical Fentanyl-Related Deaths --- Multiple States, April 2005--March 2007

- More rapid assessment of promising prevention and response practices
 - CDC funding 14-16 states to establish OPR overdose prevention
 - Naloxone administered by EMS

Background on Project

- ❑ State request to HHS Region 1 coordinator to enhance surveillance drug overdose morbidity
 - Region 1 states (CT, MA, ME, NH, RI, VT) and New Jersey
 - Enhanced timeliness of data to inform/evaluate prevention efforts focus for 4 states
 - 2-3 states interested in ED syndromic surveillance

- ❑ One other state made a TA request related to syndromic surveillance

- ❑ CDC need
 - Enhanced timeliness to track epidemic and evaluate prevention efforts
 - Support state and local data collection and response

Approach

□ Background

- General poisoning/drug overdose definitions available (e.g., BioSense and Rx Stat)
- Localities using comprehensive definitions (NYC & Boston)
- Previous CDC Epi-Aids to states

□ Goal of project

- Respond to state requests
- Build a word search tool that could be shared broadly and facilitate sharing of aggregate data
 - Search drug overdose
 - Search opioid and heroin-related overdoses
- Build diagnostic tools to assess and adapt case definitions

Approach

- ❑ Collaborators and acknowledgements
 - CDC Center for Surveillance, Epidemiology, and Laboratory Services (CSELS)
 - Vermont Public Health Department
 - Advice from Boston and NYC Health Departments
 - Division of Unintentional Injury and Prevention, CDC

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Draft SAS Tool

- ❑ Facilitate use
 - Word search of chief complaint
 - Output key syndromes to SAS datasets
 - Macros to handle different input datasets and variable names

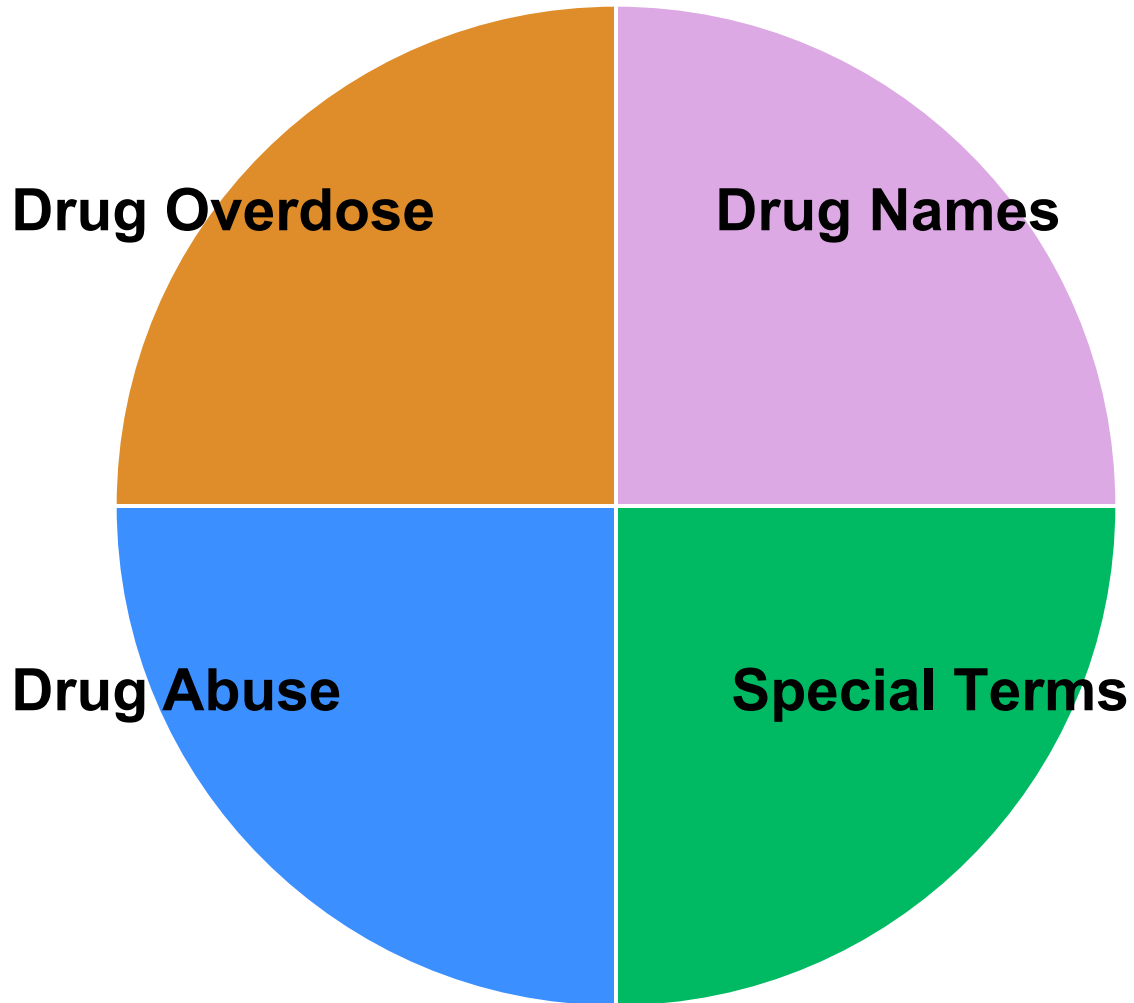
- ❑ Flexibility
 - ICD-9-CM search on drug overdose cases

- ❑ Local adaptation and quality improvement
 - Count the frequency of words appearing in drug overdose ED visits
 - ED visits identified and uniquely identified by search terms
 - Provide access to all search drug search terms

SAS Macros to Customize to Data

```
*****;  
*STEP 1: ENTER IN KEY MACRO VARIABLES THAT ARE USED IN THE PROGRAM;  
*****;  
  
*-----;  
*A. SPECIFY DIRECTORIES WHERE THE ED FILE IS STORED AND WHERE YOU WANT RESULTS EXPORTED;  
  
    *THIS IS THE DIRECTORY THAT CONTAINS THE RAW FILE WITH THE CHIEF COMPLAINT INFORMATION;  
  
    %LET INDIRX=<INSERT DIRECTORY FOR IMPORT FILES>;  
  
*Example: \\example\a_PDO\State_technical\State_specific\  
  
    *THIS IS WHERE THE SAS DATASETS CREATED BY THE PROGRAM WILL BE SAVED;  
  
    %LET OUTDIRX=<INSERT DIRECTORY FOR EXPORT FILES>;  
  
*Example: \\example\a_PDO\State_technical\State_specific\  
  
*-----;  
*B. SPECIFY THE NAME OF THE INPUT DATASET;  
  
%LET INDATZ= <INSERT NAME OF SAS IMPORT FILE (DO NOT INCLUDE EXTENTIONS)>;  
  
*Example: overdose_edit ;
```

Components of Word Search



Drug Overdose Terms



- ❑ Search for words and phrases (SAS)
 - Word search helpful for abbreviations (e.g. OD, O.D.) and reduce exclusion terms
 - Phrases more inclusive

- ❑ Key target terms
 - *Overdose*: Abbreviation used commonly such as OD
 - *Poisoning*: Exclusion critical (e.g., alcohol, food, bite, etc.)
 - *Adverse reaction*: Broad definition of overdose/poisoning

- ❑ Terms only used if a drug name (e.g., Vicodin) or “drug”/”toxic” present AND “alcohol” absent
 - Intoxication
 - Ingestion

Drug Overdose Terms: SAS and Excel

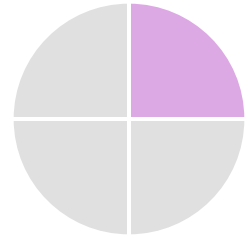


```
*****;
*****OVERDOSE AND ACUTE TERMS***;

*look for overdose;
if findw(&chiefx,'OD','! $ % & ( ) * + , - . / ; < ^ | : ?','i')>0 or
findw(&chiefx,'OD/SI','! $ % & ( ) * + , - . / ; < ^ | : ?','i')>0 or
findw(&chiefx,'SI/OD','! $ % & ( ) * + , - . / ; < ^ | : ?','i')>0 or
findw(&chiefx,'O D','! $ % & ( ) * + , - . / ; < ^ | : ?','i')>0 or
findw(&chiefx,'O.D.','! $ % & ( ) * + , - . / ; < ^ | : ?','i')>0 or
findw(&chiefx,'O.D.','! $ % & ( ) * + , - . / ; < ^ | : ?','i')>0 or
findw(&chiefx,'OD.','! $ % & ( ) * + , - . / ; < ^ | : ?','i')>0 or
findw(&chiefx,'O/D','! $ % & ( ) * + , - . / ; < ^ | : ?','i')>0 or
findw(&chiefx,'O\D','! $ % & ( ) * + , - . / ; < ^ | : ?','i')>0 or
find(&chiefx,'overdo','i')>0 or find(&chiefx,'averdose','i')>0 or find(&chiefx,'operdose','i')>0
or find(&chiefx,'over dose','i')>0 or find(&chiefx,'overose','i')>0 or find(&chiefx,'sobredosis','i')>0 then oflag1=1;
```

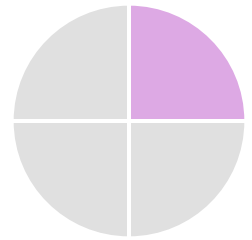
SAS Name	Type of search	Target Word	Search Word or Phrase	Search String	Do not flag if the following phrase/word appears in the chief complaint	Other required key word
intox	a_overdose	Intoxication	Phrase	Intoxic	Alcohol, tobacco	Drug or other drug term
oflag1	a_overdose	Overdose	Phrase	Overdo, averdose, operdose, over dose, overose, sobredosis		
oflag1	a_overdose	OD	Word	OD, O D, SI/OD, OD/SI, O.D., O.D, OD., O/D, O\D		
oflag106	a_overdose	snort	Phrase	snort	drug term or drug	
oflag2	a_overdose	Poison	Phrase	pois	food, alcohol pois, etoh pois, sting, bite, ivy, plant, oak monoxide co co?	

Drug Names



- ❑ Specific drug names appear in ED visits related to overdose and abuse
 - Class of drug not reported in many overdose ED visits
- ❑ Limited number of drugs searched
 - Lists of names/slang can exceed 20,000 terms
- ❑ Drug terms included
 - Likely to be reported at chief complaint stage by patient, EMS, or physician
 - Entered by hospital staff
 - Special area of interest (e.g., opioid / heroin)

Type of Drugs: SAS and Excel



```
*****;
*****DRUG SPECIFIC SEARCH TERMS*****;

*look for amphetamine;

if find(&chiefx,'ampheta','i')>0 then oflag101=1;

*look for methamphetamine;
if findw(&chiefx,'crystal','! $ % & ( ) * + , - . / ; < ^ | : ?','i')>0 then oflag102=1;
if find(&chiefx,'metham','i')>0 or findw(&chiefx,'meth','! $ % & ( ) * + , - . / ; < ^ | : ?','i')>0 then oflag103=1;

*look for ecstasy;

if find(&chiefx,'ecstasy','i')>0 or find(&chiefx,'extasy','i')>0 or find(&chiefx,'ectacy','i')>0 or find(&chiefx,'extacy','i')>0
or find(&chiefx,'ecstasy','i')>0 or find(&chiefx,'ecstasy','i')>0 then oflag104=1;
```

SAS Name	Type of search	Target Word	Search Word or Phrase	Search String	Do not flag if the following phrase/word appears in the chief complaint	Other required key word
oflag160	d_Benzodiazepines	Oxazepam	Phrase	Oxazep		
oflag161	d_Benzodiazepines	Diazepam	Phrase	Diazep		
oflag201	e_Rx_opioids	Opioid	Phrase	opiod, opoid, opiat		
oflag202	e_Rx_opioids	OxyContin, Oxycodone	Phrase	oxyco,oxyi		
oflag203	e_Rx_opioids	Percocet	Phrase	Percoc		
oflag204	e_Rx_opioids	Vicodin	Phrase	Vicod		
oflag205	e_Rx_opioids	Fentanyl	Phrase	Fentan		

Substance Abuse

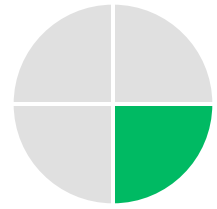


- ❑ Number of ED visits related to extended abuse and not overdose
 - Withdrawal
 - Detox
 - Abuse

- ❑ Classification strategy
 - Only used if no indication of drug overdose
 - No indication or acute of substance abuse, also grouped in this category

- ❑ Track “withdrawal” and “detox”
 - “Detox” is a request for service
 - “Withdrawal” symptoms of addiction

Special Terms



- ❑ Exclusion terms
 - “Alcohol” and “tobacco” critical when identifying drug overdose and substance abuse terms
 - “No” or “Denies”
 - If no evidence of acute overdose or repeat prescriptions:
 - “History of allergic reaction”
 - “Refill”
- ❑ Drugs not related to substance abuse
 - Insulin and anticoagulants
 - Grouped separately because have different public health implications
- ❑ Alcohol and drug ED visits
 - Broaden parameters to classify as overdose vs. substance abuse

Case Definitions

- ❑ Any drug-related ED visit
 - Drug overdose
 - Substance abuse
 - Drug not related to substance abuse

- ❑ Opioid analgesics
 - Any mention
 - Drug overdose
 - Substance abuse

- ❑ Heroin
 - Any mention
 - Drug overdose
 - Substance abuse

Case Definitions

- ❑ Narcotic: Cocaine, opioid analgesics, heroin, and “narcotic”
 - Drug overdose
 - Substance abuse
 - Drug not related to substance abuse

- ❑ Additional information available on:
 - Over 50 types of drugs
 - Over 20 types of opioid pain relievers
 - Limited to no information on some drugs

Limitations and Opportunities

- ❑ Many ED visits will not list a specific drug
- ❑ Consider including triage notes to capture more drug-related ED visits (e.g., symptom caused by drug overdose or substance abuse)
- ❑ Identification of opioid-related overdoses supported by two factors
 - EMS/community administration of naloxone
 - Scene evidence of heroin overdose, especially when injection
- ❑ Version 1.0
 - Multiple states
 - New drugs

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Pilot in Vermont

□ Goal

- Test feasibility and utility of using syndromic ED data to monitor drug overdoses

□ Methods

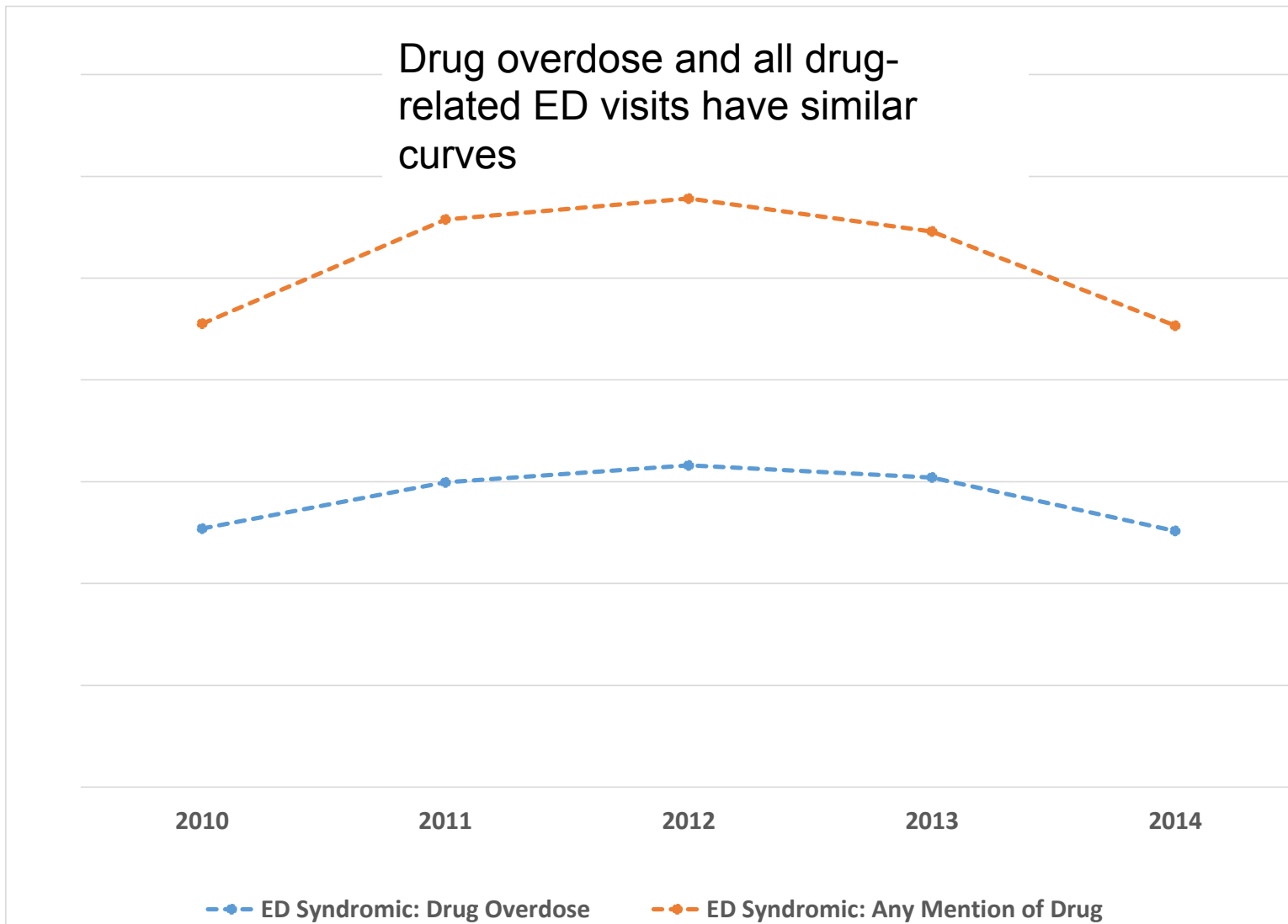
- Develop SAS code
- Run and revise SAS code on ED chief complaint & triage notes
- ***Compare word search findings against ICD-9-CM codes for internal consistency***
- ***Compare word search findings against ED drug overdose counts from finalized ED/hospital discharge files***
- Create a SAS program that can be shared with other jurisdictions

Internal Consistency

- ❑ Compare primary diagnosis ICD-9-CM against word search findings to revise coding
 - Possible for 1/3 of ED visits

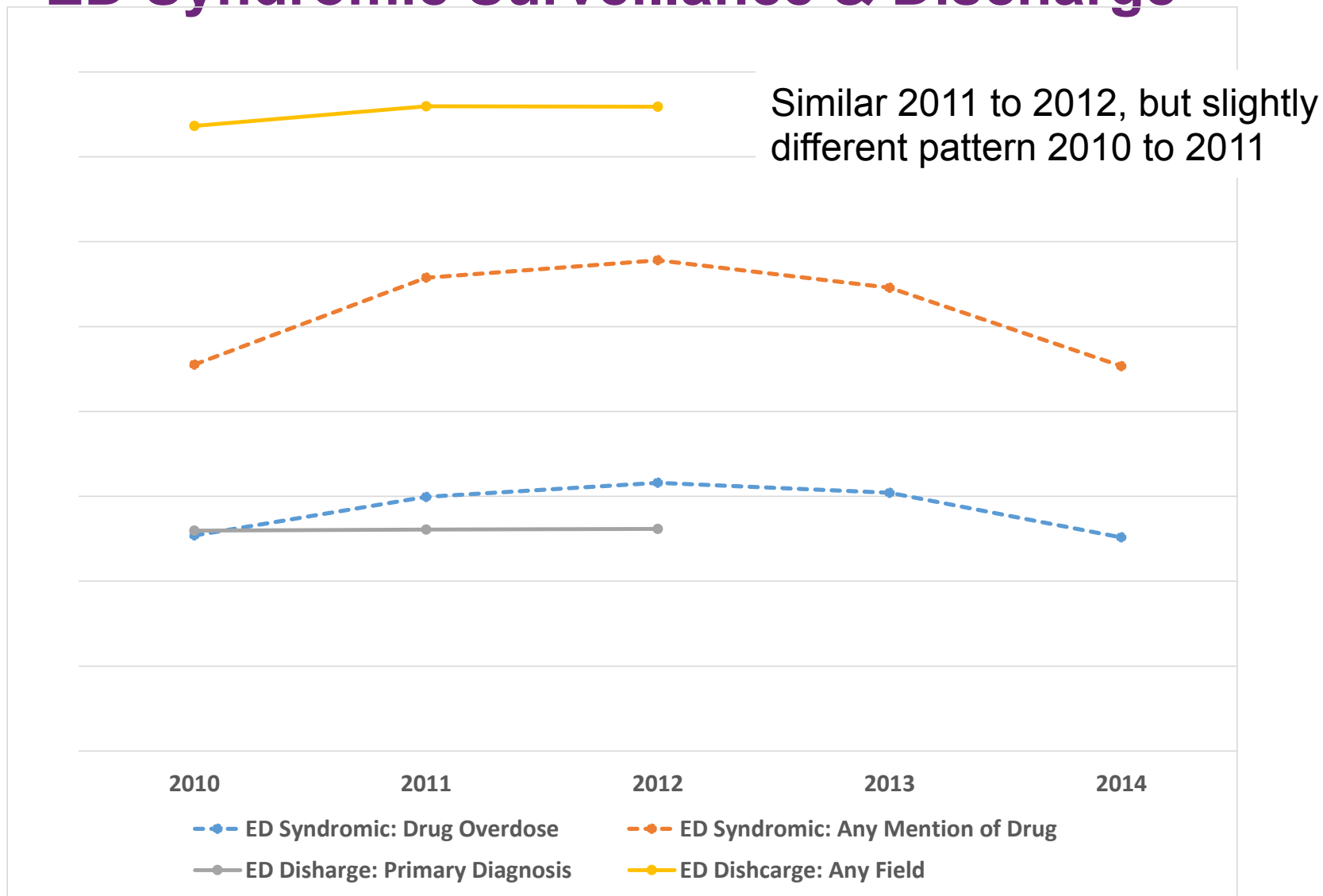
- ❑ Findings
 - Identify 95% or greater of ICD-9-CM cases for drug overdoses, overdoses related to OPR and heroin
 - Word search is identifying significantly more cases than just primary diagnosis ICD-9-CM
 - Review suggests word search is working properly
 - ICD-9-CM analysis ongoing, but discrepancy partially explained by primary ICD-9-CM code capturing symptoms

Preliminary Number of Drug Overdose ED Visits: ED Syndromic Surveillance*



*Y-axis not reported because data are preliminary and may change

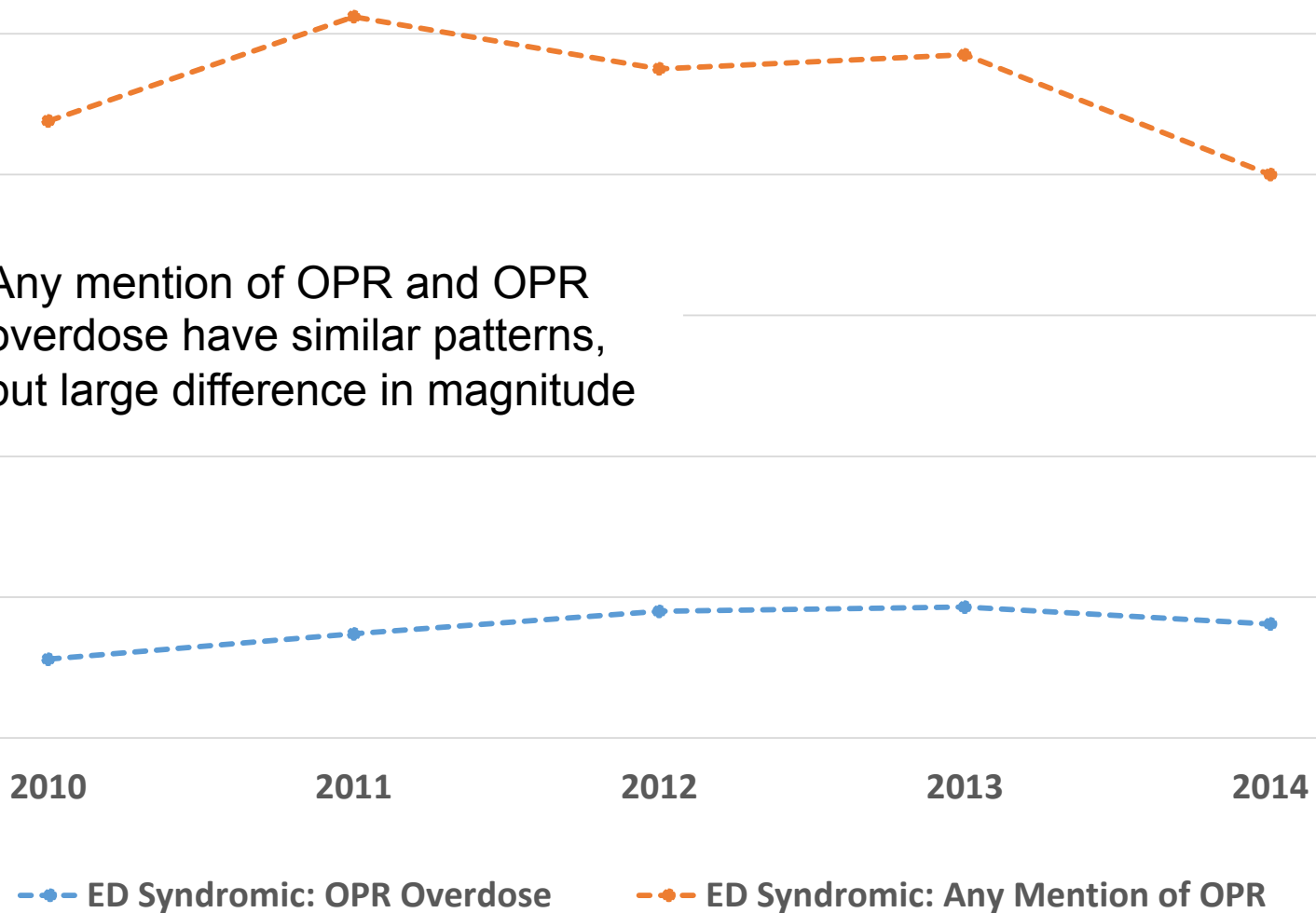
Preliminary Number of Drug Overdose ED Visits: ED Syndromic Surveillance & Discharge*



*Y-axis not reported because data are preliminary and may change

Preliminary Number of OPR-Related Overdose ED Visits: ED Syndromic Surveillance*

Any mention of OPR and OPR overdose have similar patterns, but large difference in magnitude

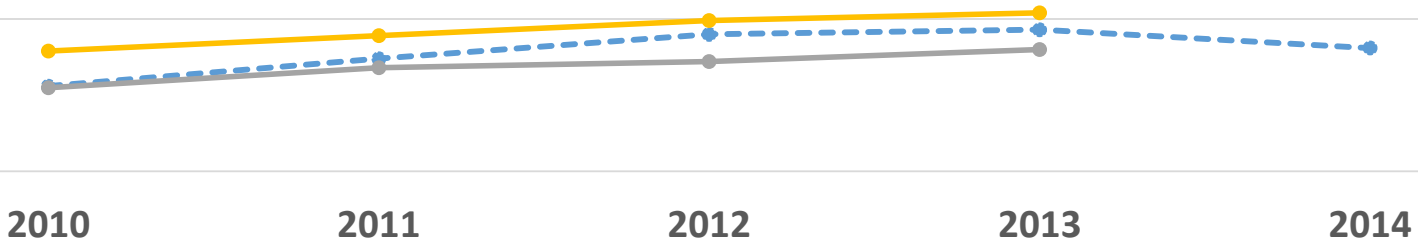


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Preliminary Number of OPR-Related Overdose ED Visits: ED Syndromic Surveillance & Discharge*



OPR syndromic and ED discharge file display similar trends and magnitude



ED Syndromic: OPR Overdose

ED Syndromic: Any Mention of OPR

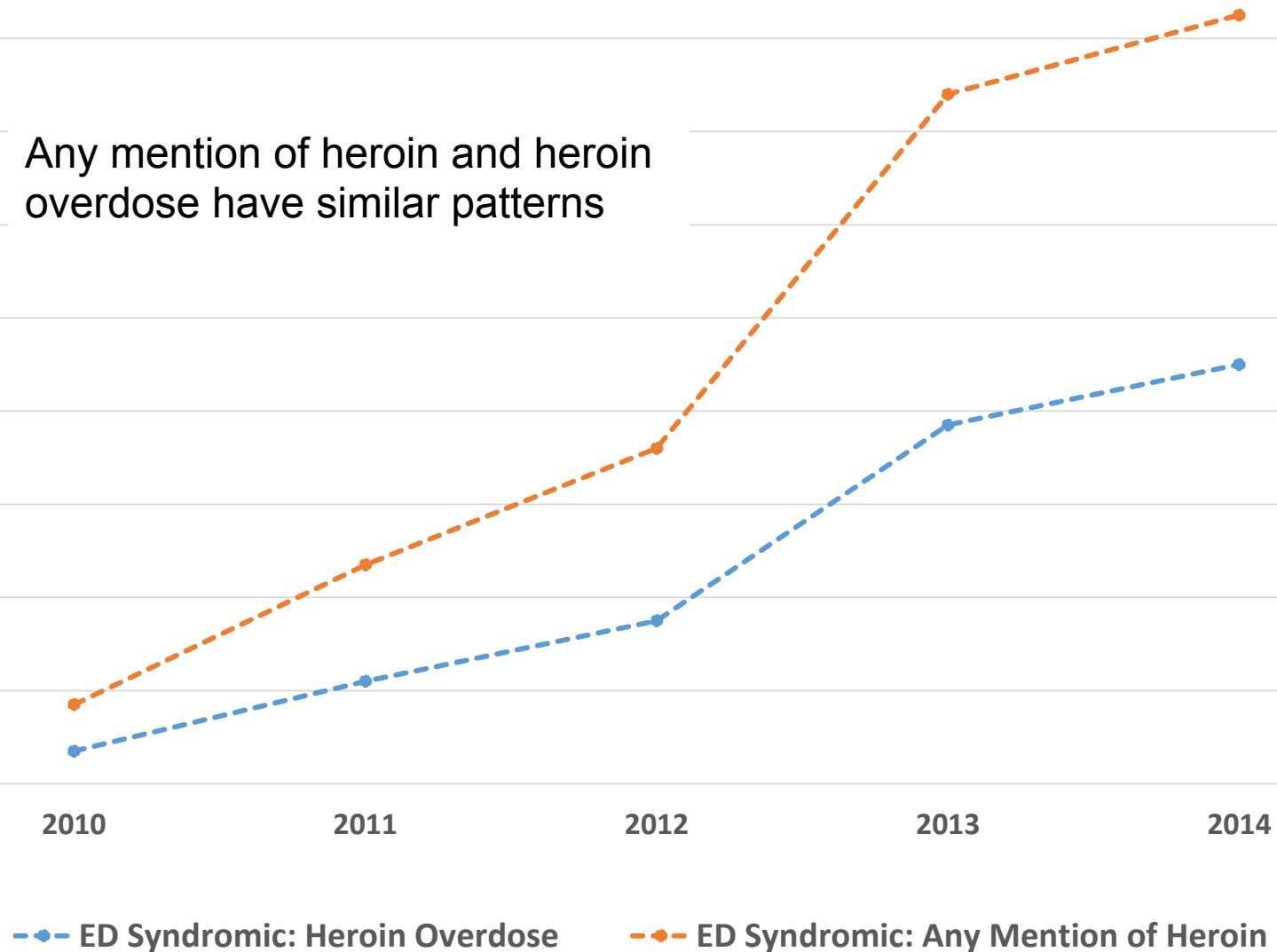
ED Discharge: Primary Diagnosis

ED Discharge: Primary Diagnosis or Any E-code

*Y-axis not reported because data are preliminary and may change

Preliminary Number of Heroin-Related Overdose ED Visits: ED Syndromic Surveillance*

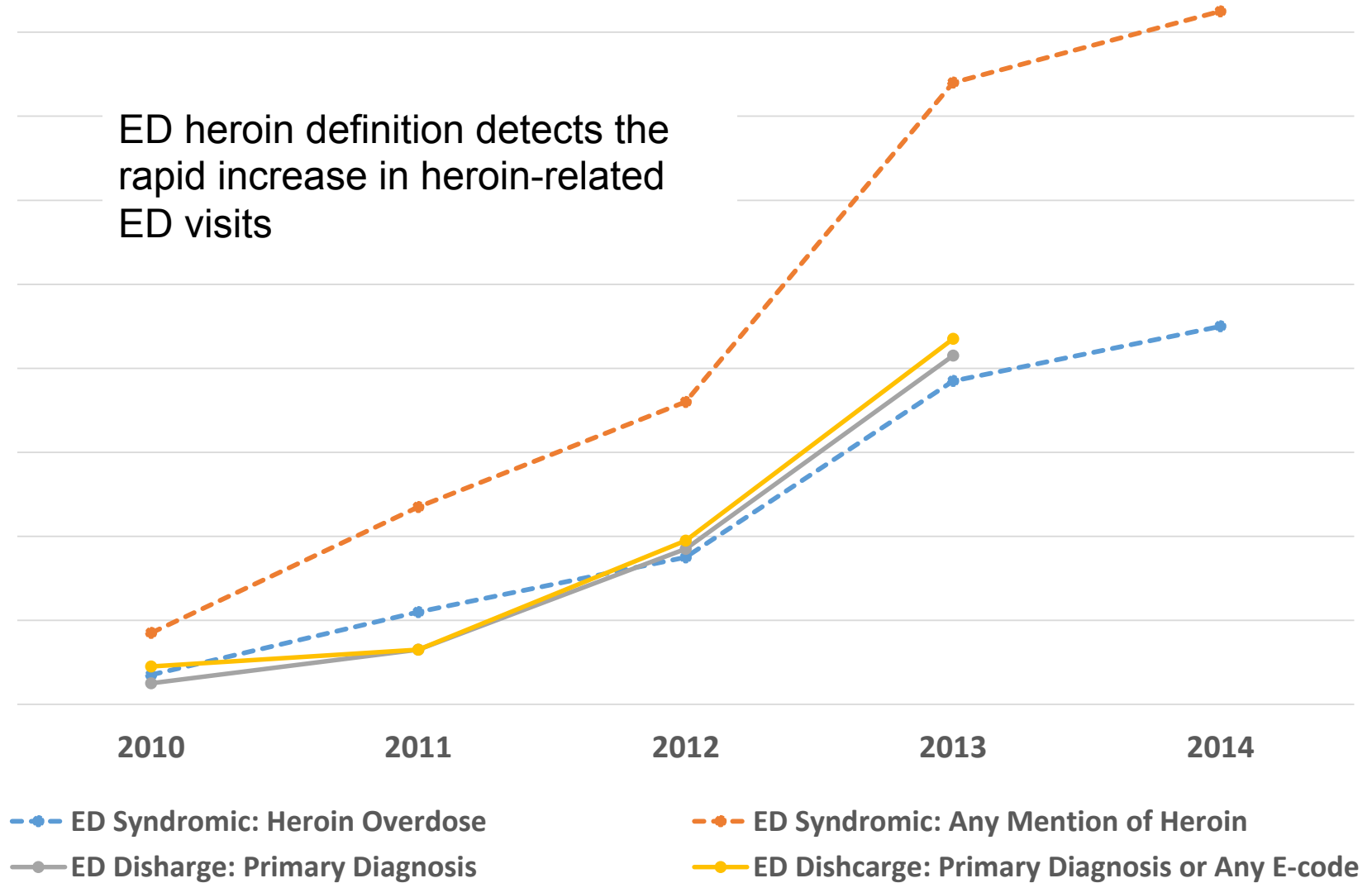
Any mention of heroin and heroin overdose have similar patterns



*Y-axis not reported because data are preliminary and may change

Preliminary Number of Heroin-Related Overdose ED Visits: ED Syndromic Surveillance & Discharge*

ED heroin definition detects the rapid increase in heroin-related ED visits



*Y-axis not reported because data are preliminary and may change

Lessons Learned & Next Steps

- ❑ Lessons learned so far
 - ED syndromic data looks like a promising surveillance source
 - Heroin and opioid-related ED visits sufficient data to track trends
 - Importance of distinguishing substance abuse and drug overdose ED visits

- ❑ Current status
 - Expand testing to two more sites

- ❑ Next steps
 - More broadly release to interested states for use/revision within a few months
 - Identify ways to distribute and improve use
 - Share aggregate data with CDC and across state
 - CDC internal approval process

Thank You



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The findings and conclusions in this report are those of the author and do not necessarily represent the views of the Centers for Disease Control and Prevention.