

Querying from Scratch – Cooking Up New Syndromes

1:15PM EST | November 18th, 2020 | 2020 SyS Symposium

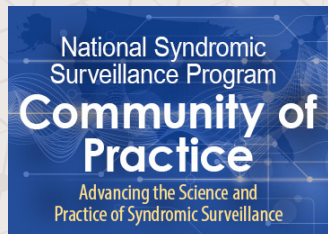
Moderated by Rosa Ergas, MPH – Massachusetts Department of Public Health

Speakers:

Ashley Hawes, MPH – Austin Public Health (Texas)

Gabriel Ann Haas, MPH – Kansas Department of Health and Environment

Catherine Wolff, MS + Danielle Brathwaite, BA – University of North Carolina at Chapel Hill



Council of State and Territorial Epidemiologists



Rosa Ergas, MPH
Massachusetts Department of Public Health



Ashley Hawes, MPH
Austin Public Health (Texas)



Gabriel Ann Haas, MPH
Kansas Department of Health and Environment



Getting More Specific About Suicide Surveillance

Syndromic Surveillance Symposium
November 18, 2020

Gabriel Ann Haas, MPH



Context & Goals

Many pre-defined queries in ESSENCE are broad,
such as for Suicide Related visits...

**Defining a process for digging into that
surveillance data is important to learn more
about factors contributing to these
overarching trends.**



What are the Gaps?

- Efforts thus far have been aimed at query sensitivity
- Much could be learned by increasing syndrome specificity:
 - **Non-fatal suicide attempts**
 - **Types of self-harming behavior**
 - **Mention of triggering events**

Solution = Querying within a Query



Trends in Suicide Related Visits May Have Conflicting Interpretations – Are people seeking help more readily, or are people actually more suicidal?

Looking to Non-Fatal Attempts:



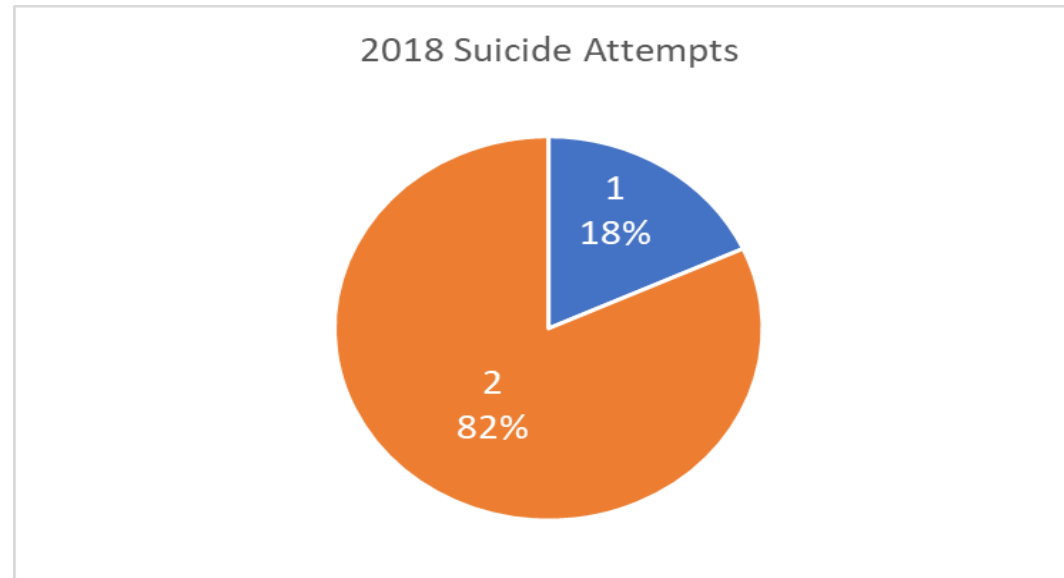
S₁ E₁ T₁
N₁ E₁ W₄
G₂ O₁ A₁ L₁ S₁

- Goal 1 → Separate visits for Ideation vs. Attempts
- Goal 2 → Identify any discordance in trends for Ideation vs. Attempts
- Goal 3 → Within a query for Attempts, identify separate trends based on method

Goal 1 → Separating an Existing Query

- I. **Step 1**: Within CDC's Query for Suicide Related CCDD v1, pull out visits for attempts and self-harm by Querying Discharge Diagnosis Combo
 1. Diagnosis code language:
 1. (,^self-inflicted inju^, OR, ^intentional self^, OR,^intentional coll^,OR,^suicide attempt^,),AND,(,^initial encounter^,OR,^event^,)

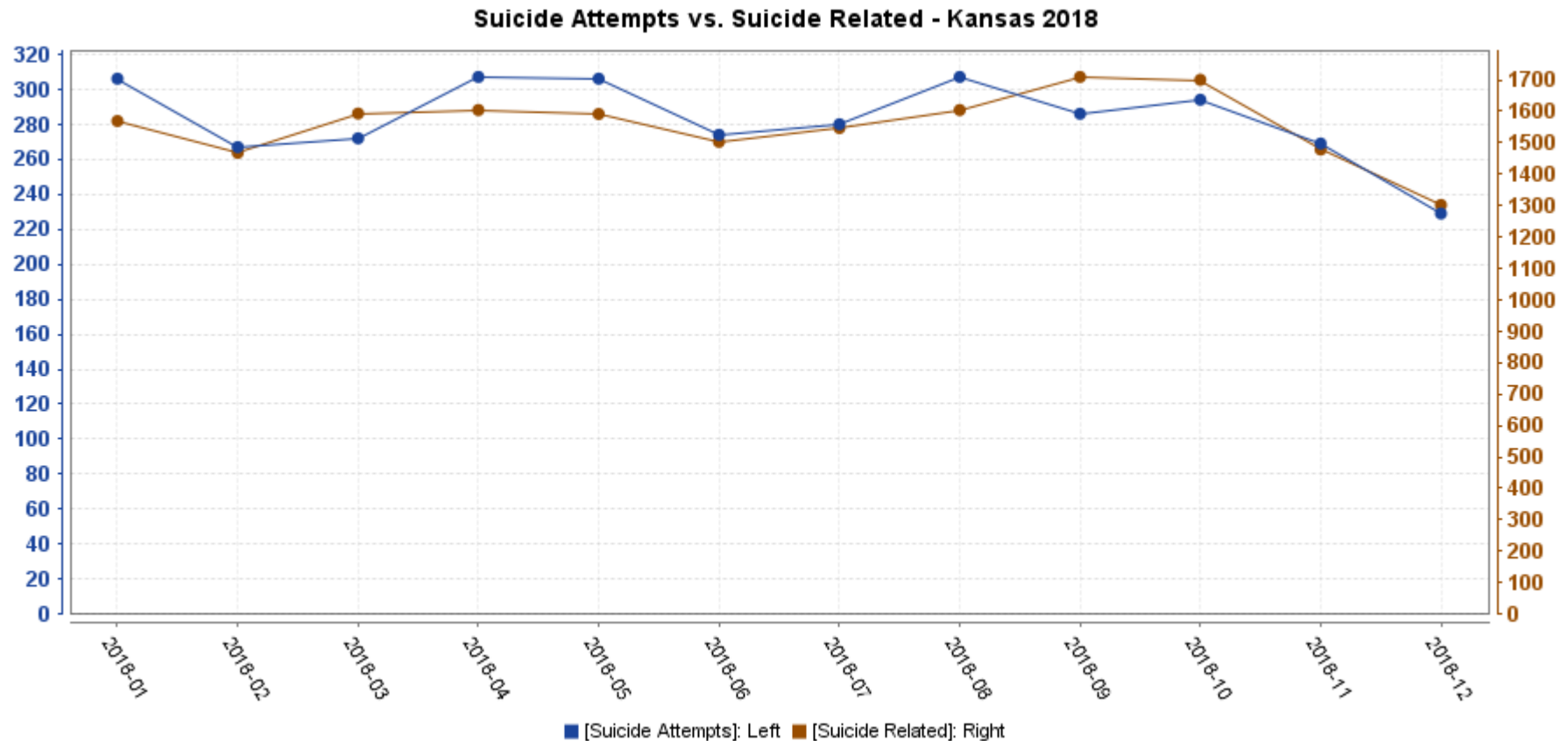
Goal 1 → Results



NSSP Suicide Attempts v1 / Suicide Related CCDD v1: ~25%

Looking at the results compared to the Suicide Attempts CCDD category: More Sensitive, Far Less Specific

Goal 2 → Identifying Discordance in Trends



Goal 3 → Trends by Method - Process

Continuing to Query within a Query...

Apply Free-Text Query to Chief Complaint, Admit Reason For Method

Tip: MyFilter is
super useful for
nesting queries

Selected Query Fields

Geography System	
Region	
Medical Grouping System	
ESSENCE Syndromes	
CC and DD Category	 
SDC Suicide Related v1	
Chief Complaint Combo Free Text	 
(, ^bullet^, OR, ^firearm^, OR, ^gun^, OR, Also Apply To: Admit Reason Combo	
Discharge Diagnosis Combo Free Text	 
(, ^self-inflicted inju^, OR, ^intentional self^, OR, ^intentional coll^, OR, ^suicide attempt^,) AND, (, ^initial encounter^, OR, ^event^,)	
Has Been Emergency	 
Yes	

MyFilter: SuicideFirearm

Goal 3 → Results

Method	Case Count (2018)	Case Count (2019)
Overdose	3,247	3,536
Laceration	662	608
Firearm	22	23
Motor Vehicle	25	23
Hanging/Strangulation	123	99
Carbon Monoxide	8	11
Jumping From Height	29	30
<u>Total</u>	<u>3,397</u>	<u>3,589</u>



The free-text of these smaller data sets can more easily be explored for commonalities.

Note: Many events mentioned more than one Category

Lessons Learned & Future Directions

- ❖ Syndromic Surveillance can provide more detailed information and glean new insight into overarching topics like Suicide. Sometimes more specific trends can tell a completely different story!
- ❖ Find ways to make the querying process more efficient and fail-safe by identifying the appropriate fields to query in a step-wise fashion.
- ❖ By querying within a query, you can make your search terms more generic: the query doesn't need to be as complex or exclude as many things. Smaller data sets can be more easily explored!
- ❖ More can be learned about trends in suicide surveillance using ESSENCE. Further exploration could be done to look into types of overdose, mentions of multiple attempts, or triggering events.

Syndromic Surveillance Symposium 2020



Contact Information: Gabe.Haas@KS.gov, (785)296-8629

Catherine Wolff, MS & Danielle Brathwaite, BA
University of North Carolina at Chapel Hill



A MIXED METHODS
COMPARISON OF A NATIONAL
VS. STATE OPIOID OVERDOSE
SURVEILLANCE DEFINITION

Catherine Wolff and Danielle Brathwaite

CSTE Syndromic Surveillance Symposium

November 18, 2020

DISCLOSURES

- No COI to disclose
- NC DETECT is funded with federal funds from the North Carolina Division of Public Health (NC DPH), Public Health Emergency Preparedness Grant (PHEP), and managed through a collaboration between NC DPH and the University of North Carolina at Chapel Hill Department of Emergency Medicine's Carolina Center for Health Informatics (UNC CCHI). The NC DETECT Data Oversight Committee does not take responsibility for the scientific validity or accuracy of methodology, results, statistical analyses, or conclusions presented.



ESOOS AND OPIOID SURVEILLANCE

- CDC's Enhanced State Opioid Overdose Surveillance (ESOOS) Program funds states to collect timely data on fatal and nonfatal opioid overdoses.
- Provides guidance on identifying nonfatal overdoses nationally, using emergency department (ED) syndromic data.

CDC OPIOID OVERDOSE DEFINITION V.1

Definition Component	Definition
1. Narcan®/Naloxone Keyword	Chief Complaint Keyword: narcan OR naloxone
2. Keyword Combination (Overdose Term + Opioid Term)	Chief Complaint Keyword: ams OR loc OR sob OR shob OR od OR O.D. OR "o/d" OR poison* OR overdose* OR overdoes* OR averdose* OR averdoes* OR "over dose*" OR overose* OR nodding OR nod OR snort* OR ingest* OR inject* OR intoxic* OR unresponsiv* OR "loss of consciousness" OR syncop* OR "shortness of breath" OR "altered mental status" AND Chief Complaint Keyword: heroin OR herion OR hod OR speedball OR "speed ball" OR dope OR opioid OR opiod OR opoid OR opiate OR opate OR opium OR opuim OR opum OR methadone OR suboxone OR oxyco* OR oxyi* OR percoc* OR vicod* OR fentan* OR hydrocod* OR morphin* OR codeine OR codiene OR codene OR oxymor* OR dilaud* OR hydromor* OR tramad* OR suboxin* OR buprenorphine
3. ICD-10-CM Codes	T40.1X1A OR T40.1X4A OR T40.0X1A OR T40.0X4A OR T40.2X1A OR T40.2X4A OR T40.3X1A OR T40.3X4A OR T40.4X1A OR T40.4X4A OR T40.601A OR T40.604A OR T40.691A OR T40.694A OR F11.12 OR F11.120 OR F11.121 OR F11.122 OR F11.129 OR F11.22 OR F11.220 OR F11.221 OR F11.222 OR F11.229 OR F11.92 OR F11.920 OR F11.921 OR F11.922 OR F11.929
4. Keyword (Overdose Term) + ICD-10-CM F11 Code	Chief Complaint Keyword: ams OR loc OR sob OR shob OR od OR "o/d" OR poison* OR overdose* OR overdoes* OR averdose* OR averdoes* OR "over dose*" OR overose* OR nodding OR nod OR snort* OR ingest* OR inject* OR intoxic* OR unresponsiv* OR "loss of consciousness" OR syncop* OR "shortness of breath" OR "altered mental status" AND ICD-10-CM Code: F11.10 OR F11.20 OR F11.90
5. Exclusion terms	Denies/deny/denied heroin/heroin OR denies/deny/denied/denying/denies any drug* OR withdra* OR detoxification OR detos* OR detoz* or dttox*

NC DETECT OPIOID OVERDOSE DEFINITION

- The North Carolina Division of Public Health (NC DPH) historically uses a locally-developed opioid overdose syndrome definition in NC DETECT, NC's syndromic surveillance system
- Includes no keywords, no exclusion terms, and only a subset of the ICD-10-CM codes included in CDC Opioid V.I

Definition Component		Definition
1.	Narcan®/Naloxone Keyword	Chief Complaint Keyword: narcan OR naloxone
2.	Keyword Combination (Overdose Term + Opioid Term)	Chief Complaint Keyword: ams OR loc OR sob OR shob OR od OR O.D. OR "o/d" OR poison* OR overdose* OR overdoes* OR averdose* OR averdoes* OR "over dose*" OR overose* OR nodding OR nod OR snort* OR ingest* OR inject* OR intoxic* OR unresponsiv* OR "loss of consciousness" OR syncop* OR "shortness of breath" OR "altered mental status" AND Chief Complaint Keyword: heroin OR herion OR hod OR speedball OR "speed ball" OR dope OR opioid OR opiod OR opoid OR opiate OR opate OR opium OR opuim OR opum OR methadone OR suboxone OR oxycodone* OR oxycontin* OR percocet* OR vicodin* OR fentanyl* OR hydrocodone* OR morphine* OR codeine OR codiene OR codene OR oxycodone* OR dilaudid* OR hydromorphone* OR tramadol* OR suboxone* OR buprenorphine
3.	ICD-10-CM Codes	T40.1X1A OR T40.1X4A OR T40.0X1A OR T40.0X4A OR T40.2X1A OR T40.2X4A OR T40.3X1A OR T40.3X4A OR T40.4X1A OR T40.4X4A OR T40.601A OR T40.604A OR T40.691A OR T40.694A OR F11.12 OR F11.120 OR F11.121 OR F11.122 OR F11.129 OR F11.22 OR F11.220 OR F11.221 OR F11.222 OR F11.229 OR F11.92 OR F11.920 OR F11.921 OR F11.922 OR F11.929
4.	Keyword (Overdose Term) + ICD-10-CM F11 Code	Chief Complaint Keyword: ams OR loc OR sob OR shob OR od OR "o/d" OR poison* OR overdose* OR overdoes* OR averdose* OR averdoes* OR "over dose*" OR overose* OR nodding OR nod OR snort* OR ingest* OR inject* OR intoxic* OR unresponsiv* OR "loss of consciousness" OR syncop* OR "shortness of breath" OR "altered mental status" AND ICD-10-CM Code: F11.10 OR F11.20 OR F11.90
5.	Exclusion terms	Denies/deny/denied heroin/heroin OR denies/deny/denied/denying/denies any drug* OR withdrawal* OR detoxification OR detox* OR detox* or dtax*

SAMPLE

- Applied the CDC definition to all North Carolina (NC) ED visits that occurred between **January 1, 2018 – July 31, 2018** in NC DETECT data.
- Evaluated suspected opioid overdoses identified by the CDC definition, while **excluding** those captured by the NC DETECT definition.
- **N = 2,296 Visits**

METHODS

- Retrospective review of the 2,296 visits by **two independent, clinically-trained reviewers**.
- Identified false positives generated by components of the CDC definition not currently included in the NC DETECT definition.
- **False positive** = any visit where available evidence supported an alternative explanation for patient presentation that reviewers deemed more likely than an opioid overdose.
- Reviewers **reconciled disagreements**.

EXAMPLE

- **Chief Complaint:** Shortness of breath (SOB)
- **ICD-10-CM Codes:**
 - R06.02 Shortness of Breath
 - J44.9 Chronic Obstructive Pulmonary Disease
 - F11.20 Opioid dependence, uncomplicated
 - F17.200 Nicotine dependence, unspecified, uncomplicated.
- Vitals within normal limits
- Arrived via **ambulance**
- Discharged **home**

RESULTS

- Initial reviewer disagreement on 312 observations (13.6%); reconciliation led to 100% agreement
- False positive rates ranged from **2.6% - 41.4%** for codes/keywords uniquely identifying at least 10 visits
- Based on uniquely identifying 10+ visits and a false positive rate $\leq 10.0\%$, **4 of 16** ICD-10-CM codes evaluated were identified for NC DETECT definition inclusion
- Only **2 of 25** (8%) keywords evaluated, “OD” and “overdose”, met inclusion criteria

RESULTS

False Positives among
Non-Fatal Opioid
Overdose ED Visits
(Jan-July 2018) Identified
by CDC Opioid V.1
Definitional Components

Definition Component	Number (%)	Unique Number (%)
1. Narcan®/Naloxone Keyword	86 (3.8%)	53 (2.5%)
<i>False Positives</i>	11 (12.8%)	11 (20.8%)
2. Keyword Combination	193 (8.4%)	110 (5.1%)
<i>False Positives</i>	14 (7.3%)	13 (11.8%)
3. ICD/10-CM Codes	984 (42.9%)	883 (41.0%)
<i>False Positives</i>	92 (9.4%)	90 (10.2%)
ICD-10-CM T40.6	789 (34.4%)	692 (32.2%)
<i>False Positives</i>	50 (6.3%)	49 (7.1%)
ICD-10-CM F11.1	73 (3.2%)	64 (3.0%)
<i>False Positives</i>	4 (5.5%)	3 (4.7%)
ICD-10-CM F11.2	95 (4.1%)	87 (4.0%)
<i>False Positives</i>	31 (32.6)	29 (33.3%)
ICD-10-CM F11.9	36 (1.6%)	31 (1.4%)
<i>False Positives</i>	8 (22.2%)	8 (25.8%)
4. Keyword + ICD-10-CM F11 Code	1,186 (51.7%)	1,106 (51.4%)
<i>False Positives</i>	282 (23.8%)	279 (25.2%)
Keyword + ICD-10-CM F11.10	564 (47.6%)	500 (45.9%)
<i>False Positives</i>	63 (11.2%)	59 (11.8%)
Keyword + ICD-10-CM F11.20	498 (42.0%)	469 (43.0%)
<i>False Positives</i>	187 (37.6%)	185 (39.5%)
Keyword + ICD-10-CM F11.90	144 (12.1%)	121 (11.1%)
<i>False Positives</i>	35 (24.3%)	33 (27.3%)
Total Visits	2,296 (100.0%)	2,152 (93.7%)
<i>False Positives</i>	396 (17.3%)	393 (18.3%)

RESULTS

False Positives among Non-Fatal Opioid Overdose ED Visits (Jan-July 2018)
Identified by CDC Opioid V.I ICD-10-CM codes
(Component #3)

ICD-10-CM Codes	Number (%)	Unique Number (%)
ICD-10-CM T40.6: Overall	789 (34.4%)	692 (32.2%)
<i>False Positives</i>	50 (6.3%)	49 (7.1%)
ICD-10-CM T40.601A	725 (31.6%)	623 (28.9%)
<i>False Positives</i>	45 (6.2%)	44 (7.1%)
ICD-10-CM T40.604A	70 (3.1%)	54 (2.5%)
<i>False Positives</i>	4 (5.7%)	4 (7.4%)
ICD-10-CM T40.691A	4 (0.2%)	4 (0.2%)
<i>False Positives</i>	1 (25.0%)	1 (25.0%)
ICD-10-CM T40.694A	1 (0.0%)	1 (0.0%)
<i>False Positives</i>	0 (0.0%)	0 (0.0%)
ICD-10-CM F11.1: Overall	73 (3.2%)	64 (3.0%)
<i>False Positives</i>	4 (5.5%)	3 (4.7%)
ICD-10-CM F11.120	5 (0.2%)	4 (0.2%)
<i>False Positives</i>	0 (0.0%)	0 (0.0%)
ICD-10-CM F11.121	6 (0.3%)	4 (0.2%)
<i>False Positives</i>	1 (16.7%)	1 (25.0%)
ICD-10-CM F11.122	2 (0.1%)	2 (0.1%)
<i>False Positives</i>	0 (0.0%)	0 (0.0%)
ICD-10-CM F11.129	60 (2.6%)	54 (2.5%)
<i>False Positives</i>	3 (5.0%)	2 (3.7%)

RESULTS

False Positives among Non-Fatal Opioid Overdose ED Visits (Jan-July 2018)
Identified by CDC Opioid V.I ICD-10-CM codes
(Component #3)

ICD-10-CM Codes	Number (%)	Unique Number (%)
ICD-10-CM F11.2: Overall	95 (4.1%)	87 (4.0%)
<i>False Positives</i>	31 (32.6)	29 (33.3%)
ICD-10-CM F11.220	29 (1.3%)	29 (1.3%)
<i>False Positives</i>	12 (41.4%)	12 (41.4%)
ICD-10-CM F11.221	9 (0.4%)	8 (0.4%)
<i>False Positives</i>	1 (11.1%)	1 (12.5%)
ICD-10-CM F11.222	5 (0.2%)	5 (0.2%)
<i>False Positives</i>	2 (40.0%)	2 (40.0%)
ICD-10-CM F11.229	52 (2.3%)	45 (2.1%)
<i>False Positives</i>	16 (30.8%)	14 (31.1%)
ICD-10-CM F11.9: Overall	36 (1.6%)	31 (1.4%)
<i>False Positives</i>	8 (22.2%)	8 (25.8%)
ICD-10-CM F11.920	5 (0.2%)	5 (0.2%)
<i>False Positives</i>	2 (40.0%)	2 (40.0%)
ICD-10-CM F11.921	19 (0.8%)	16 (0.7%)
<i>False Positives</i>	5 (26.3%)	5 (31.3%)
ICD-10-CM F11.922	0 (0.0%)	0 (0.0%)
<i>False Positives</i>	0 (0.0%)	0 (0.0%)
ICD-10-CM F11.929	12 (0.5%)	10 (0.5%)
<i>False Positives</i>	1 (8.3%)	1 (10.0%)

RESULTS

False Positives among Non-Fatal Opioid Overdose ED Visits (Jan-July 2018)
Identified by CDC Opioid V.I Keywords
(Component #2)

Keyword	Number (%)	Keyword Combination Only Number (%)	Unique Number (%)
AMS	8 (4.2%)	7 (6.4%)	2 (2.6%)
False Positives	1 (12.5%)	1 (14.3%)	0 (0.0%)
LOC	4 (2.1%)	4 (3.6%)	0 (0.0%)
False Positives	3 (75.0%)	3 (75.0%)	0 (0.0%)
SOB	7 (3.6%)	7 (6.4%)	4 (5.2%)
False Positives	5 (71.4%)	5 (71.4%)	2 (50.0%)
OD	61 (31.6%)	41 (37.3%)	14 (18.2%)
False Positives	9 (14.8%)	9 (22.0%)	1 (7.1%)
Poison	3 (1.6%)	1 (0.9%)	1 (1.3%)
False Positives	0 (0.0%)	0 (0.0%)	0 (0.0%)
Overdose	117 (60.6%)	60 (54.5%)	39 (50.6%)
False Positives	2 (1.7%)	2 (3.3%)	1 (2.6%)
Over dose	1 (0.5%)	1 (0.0%)	1 (0.0%)
False Positives	0 (0.0%)	0 (0.0%)	0 (0.0%)
Snort	2 (1.0%)	1 (0.0%)	1 (0.0%)
False Positives	0 (0.0%)	0 (0.0%)	0 (0.0%)
Ingest	8 (4.2%)	7 (6.4%)	7 (9.1%)
False Positives	0 (0.0%)	0 (0.0%)	0 (0.0%)

RESULTS

False Positives among Non-Fatal Opioid Overdose ED Visits (Jan-July 2018)
Identified by CDC Opioid V.I Keywords
(Component #2)

Keyword	Number (%)	Keyword Combination Only Number (%)	Unique Number (%)
Intoxic	4 (2.1%)	3 (2.7%)	2 (2.6%)
False Positives	0 (0.0%)	0 (0.0%)	0 (0.0%)
Unresponsive	10 (5.2%)	6 (5.5%)	4 (5.2%)
False Positives	1 (10.0%)	1 (16.7%)	0 (0.0%)
Loss of Consciousness	1 (0.5%)	0 (0.0%)	0 (0.0%)
False Positives	0 (0.0%)	0 (0.0%)	0 (0.0%)
Syncope	3 (1.6%)	2 (1.8%)	1 (1.3%)
False Positives	1 (33.3%)	0 (0.0%)	0 (0.0%)
Shortness of Breath	2 (1.0%)	2 (1.8%)	0 (0.0%)
False Positives	1 (50.0%)	1 (50.0%)	0 (0.0%)
Altered Mental Status	3 (1.6%)	3 (2.7%)	1 (1.3%)
False Positives	0 (0.0%)	0 (0.0%)	0 (0.0%)
Total Visits	193 (8.4%)	110 (57.0%)	77 (39.9%)
False Positives	14 (7.3%)	13 (11.8%)	4 (5.2%)
Absent Keywords (0% frequency count)	SHOB, O.D, O/D, Overdoes, Averdose, Averdoes, Overose, Nodding, Nod, Injest		

RESULTS

Summary of Qualitative Findings from Clinician Review of Identified ED Visits (Jan-July 2018)

Predominant False Positive Patterns

- Patients with Chronic Obstructive Pulmonary Disease (COPD) and/or Shortness of Breath (SOB) with clear medical etiology, or symptoms that developed over days/weeks (e.g. pneumonia, asthma, heart failure).
- Patients with altered mental status as a result of sepsis/infection.
- Hypoglycemia in patients with a clinically low glucose level.
- Patients with suicidal ideation and a history of drug use but no evidence of overdose.
- Patients presenting for a mental health evaluation with no evidence of drug intoxication.
- Patient's presenting symptoms aligned with another drug such as stimulants or alcohol, but not opioids.

RESULTS

Summary of Qualitative Findings from Clinician Review of Identified ED Visits (Jan-July 2018)

Predominant Opioid Overdose Patterns

- ED visits with a clear opioid overdose ICD-10-CM code, keyword of “OD” or “Overdose,” or named opioid drug/medication in triage/nursing notes.
- COPD or SOB patients with no evidence of active pulmonary illness.
- COPD patients with altered mental status and on chronic opioid medications.
- Patients with reduced levels of consciousness without a neurological explanation.
- Patients with altered mental status and evidence of regular opioid use.
- Patients with low blood pressure without evidence of the cause.
- Patients with a cardiac arrhythmia and evidence of substance use.
- Patients with a complex list of chronic conditions including opioid use.

RECOMMENDATIONS

- 4 ICD-10-CM Codes
 - T40.601A: Poisoning by unspec. narcotics, accidental
 - T40.604A: Poisoning by unspec. narcotics, undetermined
 - F11.129: Opioid abuse with intoxication, unspec.
 - F11.929: Opioid use, unspec. with intoxication
- 2 Keywords
 - “OD”
 - “Overdose”

LIMITATIONS

- Syndromic surveillance data
- Single-state (NC)
- Limited patient information
- Small visit counts

CONCLUSIONS

- Comparison of the CDC Opioid V.I and NC DETECT definitions identified keywords and diagnosis codes to add to the state definition.
- Comparison also identified keywords and diagnosis codes that increased false positives when applied to NC data.
- Quantitative and qualitative trends in coding and keyword use identified in this analysis may prove helpful for further state or national evaluations of opioid surveillance definitions.

ACKNOWLEDGEMENTS

NC DPH IVPB –
Scott Proescholdbell

NC DETECT –
Anna Waller and
Amy Ising

National Syndromic Surveillance Program

Community of Practice

Advancing the Science and Practice of Syndromic Surveillance



Block Schedule

Training

Methods

Innovation

1-1:15PM EST	Daily Opening, Logistics, Overview		
1:15-2PM EST	Training: Call Up Your Data Using APIs	Breakout: Querying from Scratch - Cooking Up New Syndromes	Training: Data Sharing Step-by-Step Using the AMC
	...BREAK...		
2:15-3PM EST	Training: Telling Your Story - Insights and Tips to Promote Syndromic Surveillance	Breakout: The Art of Surveillance - Data Visualizations	Lightning: New Tactics for Old Problems
	...BREAK...		
3:15-4PM EST	Training: Dashboard Creation in NSSP ESSENCE	Breakout: Making the Best of a Sys Situation - Data Quality for Sys	Roundtable: COVID, Current Events, and More - Discussing Syndromic Surveillance Practices in 2020
	...BREAK...		
4:15-5PM EST	Virtual Happy Hour		