

Creating a Buzz Around SyS Data

2:00 PM EST | December 7th, 2022 | 2022 SyS Symposium

Moderator:

- Nimi Idaikkadar, MPH – CDC/DDNID/NCIPC/DIP/DAB

Presenters:

- Tyler Bonnell, MPH – Washington State Department of Health Rapid Health Information Network (RHINO)
- Daniel Cornforth, PhD – Centers for Disease Control and Prevention
- Adan Oviedo, MPH – Georgia Department of Health



Council of State and Territorial Epidemiologists



Tyler Bonnell. MPH
Washington State Department of Health
Rapid Health Information Network (RHINO)





Evaluating The Lethal Means Of Non-Fatal Suicide Attempts Presenting To Washington State Emergency Departments Before And During The Covid-19 Pandemic

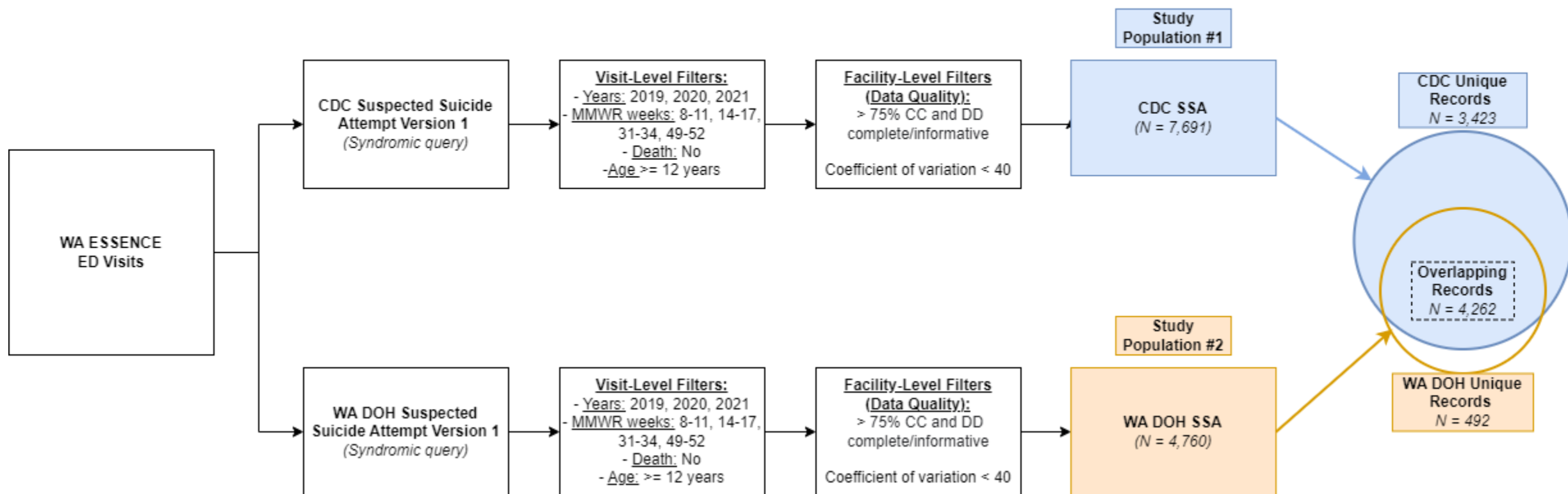
Tyler Jarvis Bonnell (*he/him/his*), MPH
Washington State Department of Health

Research Aims

- 1) Describe the lethal means utilized for non-fatal suicide attempts presenting to Washington State Emergency Departments.
- 2) Compare if utilization of lethal means has changed before versus during the COVID-19 pandemic.

Study Populations

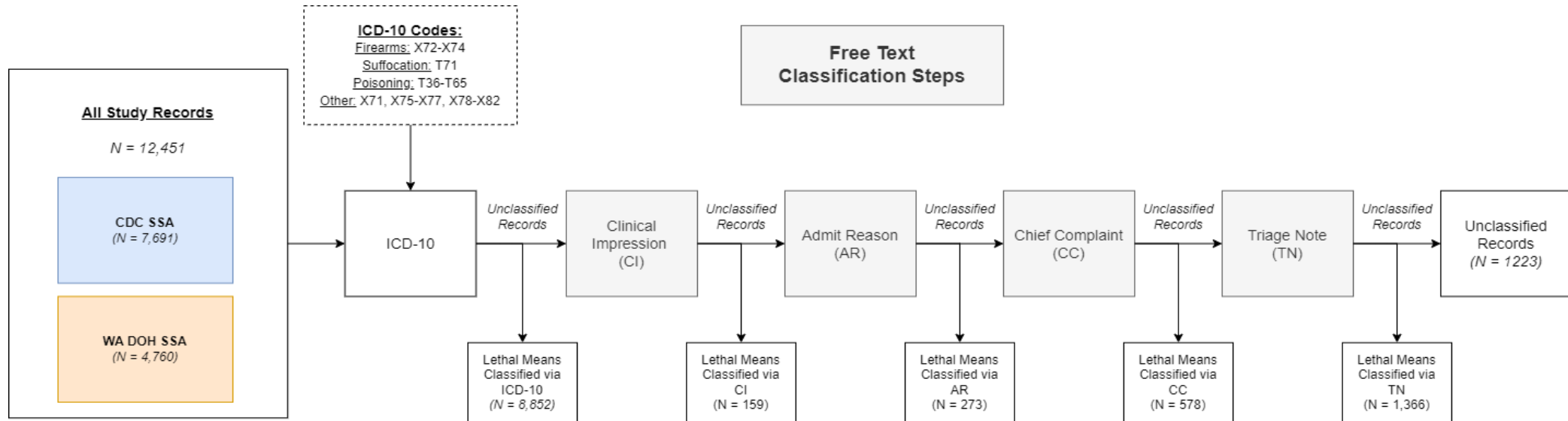
Study Population Flow Diagram



Lethal Means Examined

	Firearms	Suffocation	Other	Poisoning
Description	Includes handguns, shotguns, rifles, and pellet guns	Includes hanging and strangulation	Includes drowning, explosives/fire/hot objects, cutting or piercing, jumping from a high place, and lying-in front of a moving vehicle	Includes underdosing and toxic effects from a large range of substances and exposure routes
ICD-10 Codes (Subcategories included)	X72, X73, X74	T71	X71, X75-X82	T36 – T65
Free-Text	Unigrams and Bigrams unique to each lethal mean <i>(obtained through text mining of visits records already classified via ICD-10).</i>			

Lethal Mean Classification Approach



- **Ordered, hierarchical process**
 - ICD-10 codes utilized for ~75% of classification
 - Free-text fields (CI, AR, CC, TN) used for ~25% of classification
- **~90%** of all visit records had ≥ 1 lethal mean classified

Lethal Mean Classification Results

CDC Suspected Suicide Attempt V1 (CDC SSA)						Total ED Visit Records (N=7691)
	Firearms (N=69)	Suffocation (N=358)	Other (N=1014)	Poisoning (N=5848)	No Lethal Means Detected (N=601)	
Age Groups						
12-17	12 (17.3%)	96 (26.8%)	246 (24.3%)	1717 (29.4%)	130 (21.6%)	2143 (27.9%)
18-44	32 (46.4%)	194 (54.2%)	589 (58.1%)	3013 (51.5%)	331 (55.1%)	4056 (52.7%)
45+	25 (36.2%)	68 (19.0%)	179 (17.7%)	1118 (19.1%)	141 (23.5%)	1492 (19.4%)
Biological Sex						
Female	24 (34.8%)	169 (47.2%)	569 (56.1%)	4000 (68.4%)	310 (51.6%)	4948 (64.3%)
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Urbanicity						
Rural	<10	29 (8.1%)	141 (13.9%)	477 (8.2%)	77 (12.8%)	708 (9.2%)
Urban	50 (75.2%)	290 (81.0%)	758 (74.8%)	4629 (79.1%)	426 (70.9%)	5998 (78.0%)

Cell values represent the number of visit records where a lethal mean was indicated. Total cell count may exceed the number of total ED visits as a record may indicate multiple lethal means.

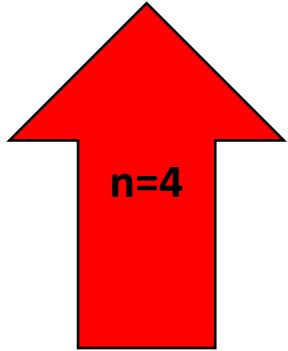
Pandemic Comparison

	Winter MMWR Weeks 8-11	Spring MMWR Weeks 14-17	Summer MMWR Weeks 31-34	Fall MMWR Weeks 49-52
2019 (Reference)	2/17 – 3/16	3/31 – 4/27	7/28 – 8/24	12/1 – 12/28
2020	-	3/29 – 4/25	7/26 – 8/22	11/29 – 12/26
2021	2/21 – 3/20	4/4 – 5/1	8/1 – 8/28	12/5 – 1/1/2022

Metrics:

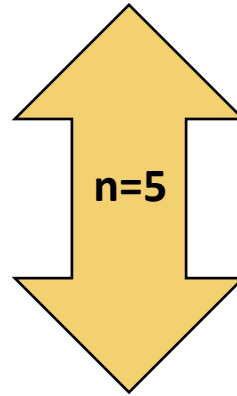
- 1) Counts of Visits
- 2) Visit Rates (*per 10,000 ED visits*)
- 3) **Percent Change in Visits**
- 4) **Visit Ratios w/ 95% Confidence Intervals**

CDC SSA: All Visits (n = 7,961)



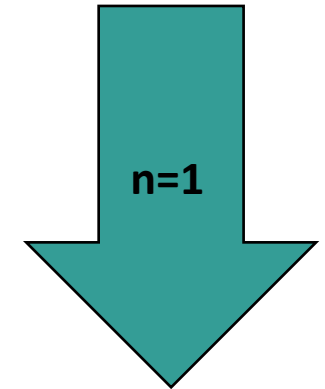
Increasing Visit Rates & Visit Counts:

- Poisoning: Winter 2021
- Other: Winter 2021
- Total Suicide Attempts: Winter 2021, Spring 2021



Increasing Visit Rates (only):

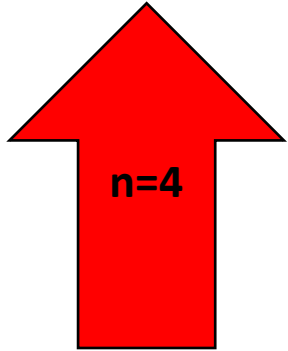
- Poisoning: Spring 2020, Fall 2020
- Other: Spring 2020
- Total Suicide Attempts: Spring 2020, Fall 2020



Decreasing Visit Rates & Visit Counts:

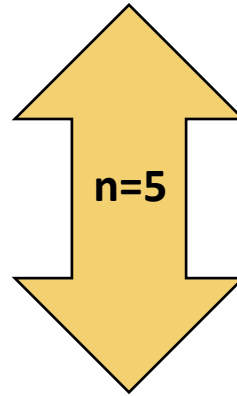
- Suffocation: Summer 2020

CDC SSA: All Visits (n = 7,961)



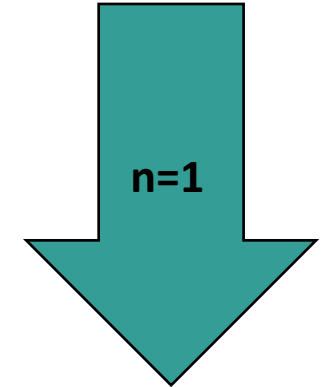
Increasing Visit Rates & Visit Counts:

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- Other: Spring 2020
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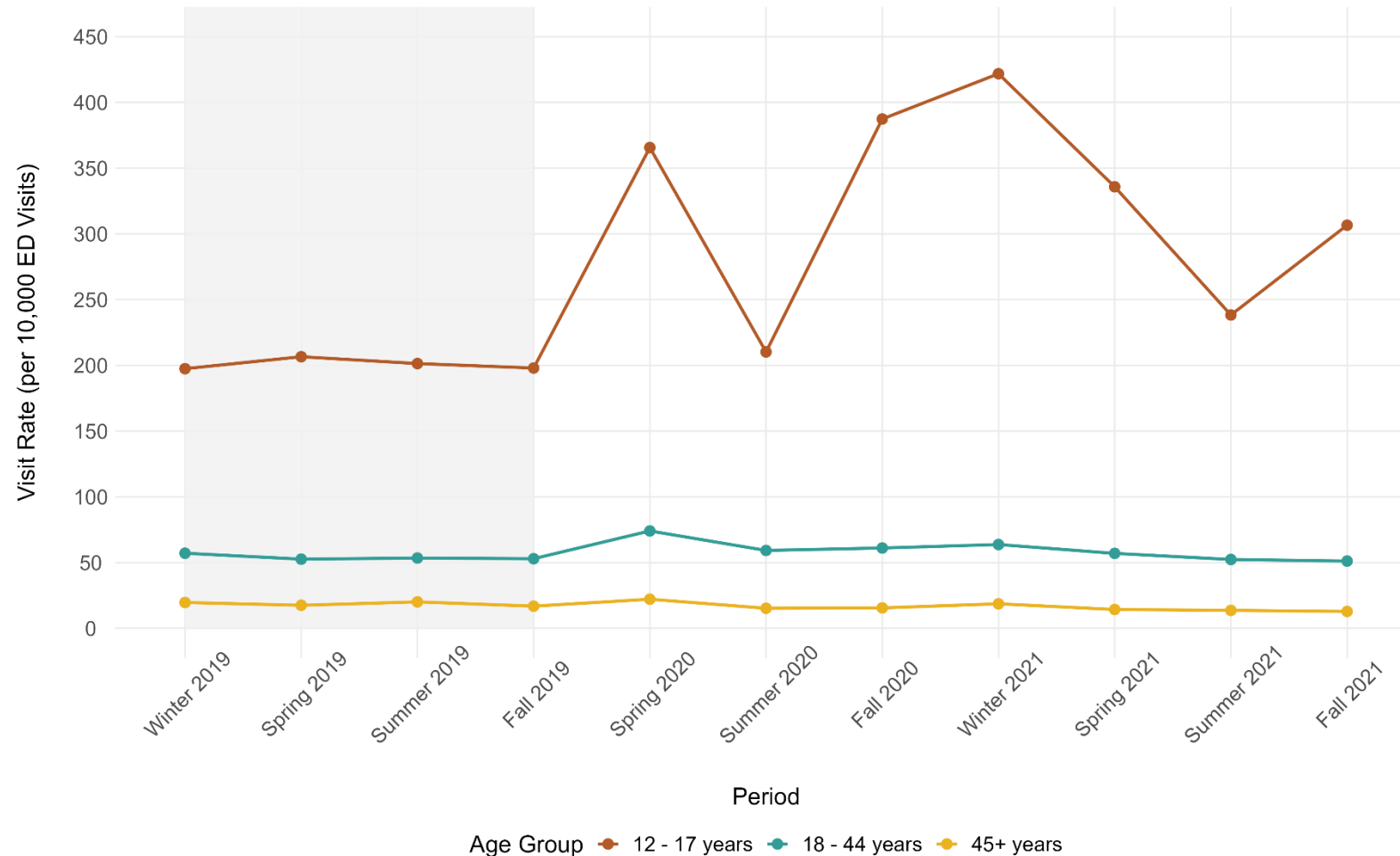
Decreasing Visit Rates & Visit Counts:

- Suffocation: Summer 2020

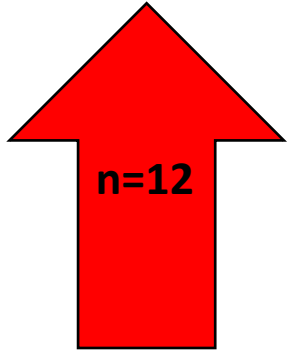
Highlighted values represent statistical findings that were replicated in the (secondary) WA DOH SSA study population.

School Age Youth (12-17)

CDC Suspected Suicide Attempt Visit Rate (per 10,000 visits) by Age Group

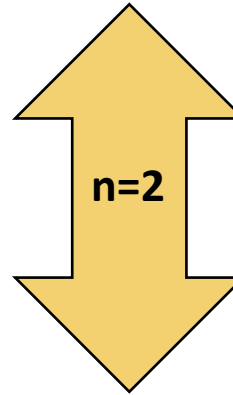


CDC SSA: School Age Youth (12-17 years)



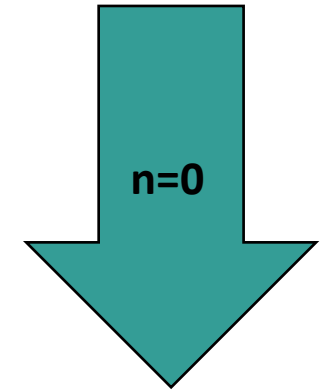
Increasing Visit Rates & Visit Counts:

- Suffocation: Fall 2020
- Poisoning: Fall 2020, Winter 2021, Spring 2021, Fall 2021
- Other: Spring 2020, Fall 2020, Fall 2021
- Total Suicide Attempts: Fall 2020, Fall 2021, Winter 2021, Spring 2021



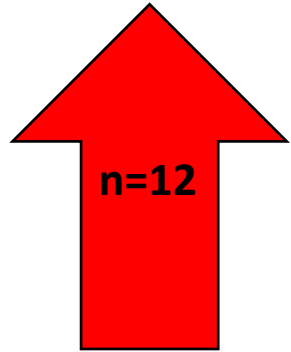
Increasing Visit Rates (only):

- Poisoning: Spring 2020
- Total Suicide Attempts: Spring 2020



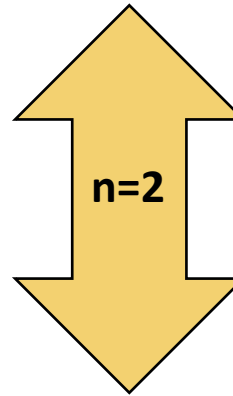
Decreasing Visit Rates & Visit Counts:

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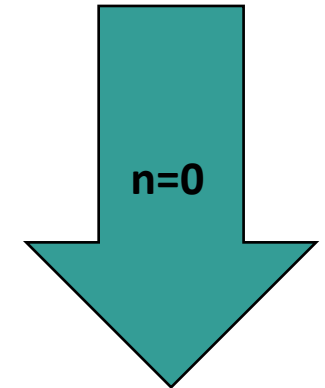
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- Other: Spring 2020, Fall 2020, Fall 2021
- Total Suicide Attempts: Fall 2020, Fall 2021, Winter 2021, Spring 2021



Increasing Visit Rates (only):

- Poisoning: Spring 2020
- Total Suicide Attempts: Spring 2020



Decreasing Visit Rates & Visit Counts:

Highlighted values represent statistical findings that were replicated in the (secondary) WA DOH SSA study population.

Future Directions

- **Improve classification method:**
 - Better distinguish 1) historical mentions of lethal mean use and 2) plans to access lethal means from actual utilization.
 - Increase capture of firearm-related suicide attempts using ICD-10 codes for accidental and unintentional firearm injuries.
- **Promote data to action:**
 - Extend lethal means analysis to **include intersectional patient identities**.
 - **Disaggregate lethal mean categories** (i.e.; Poisoning) into narrower classes such as OTC Medications (acetaminophen, ibuprofen, aspirin, antihistamines).

Special thanks to the following individuals
for their support with this project:

- Lareina LaFlair
- Cody Carmichael
- Skyler Elmstrom (WA DOH)
 - Natasha Close
 - Lea Hamner
- Sara Chronister (WA DOH)
- Cynthia Karlsson (WA DOH)

- Ali Rowhani Rahbar (UW)
 - Isaac Rhew (UW)

- Lakshmi Radhakrishnan (CDC)
 - Abigail Gates (CDC)



Any Questions?



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Syndromic Query Definitions



CDC Suspected Suicide Attempt V1

Fields utilized to identify records: Discharge Diagnosis, Admit Reason Combo, and Chief Complaint History.

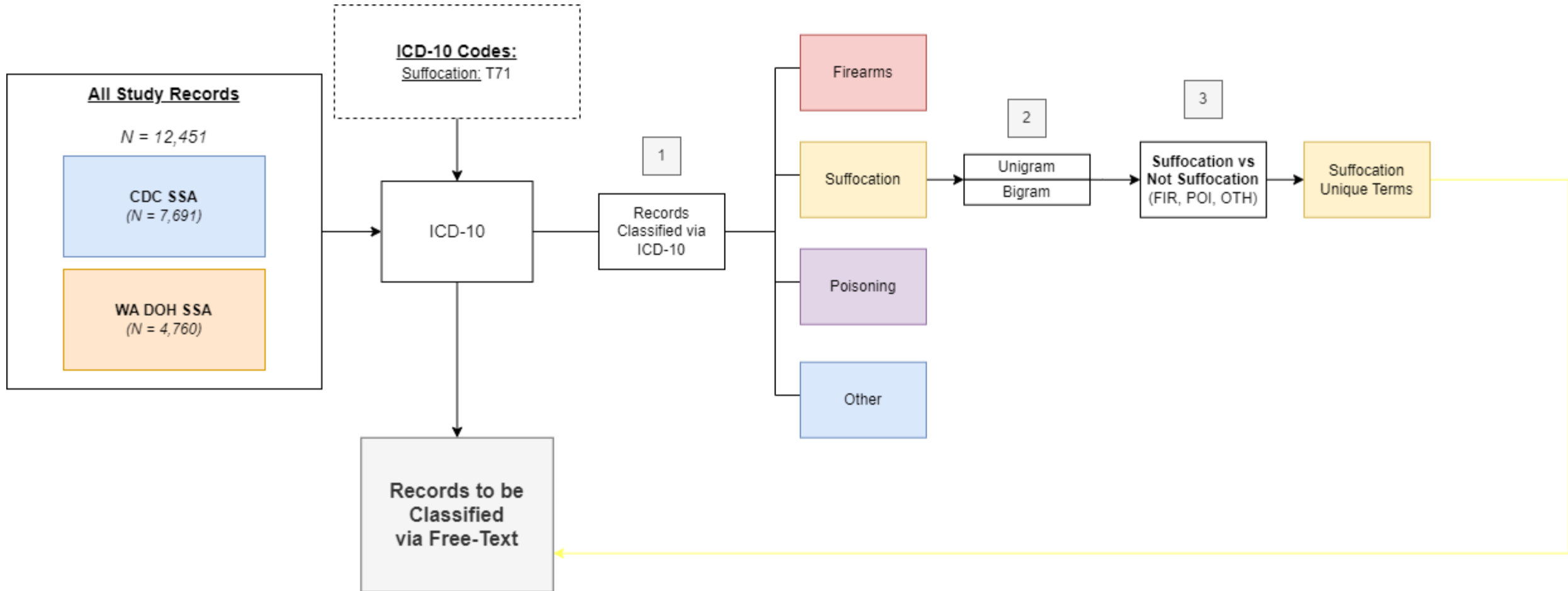
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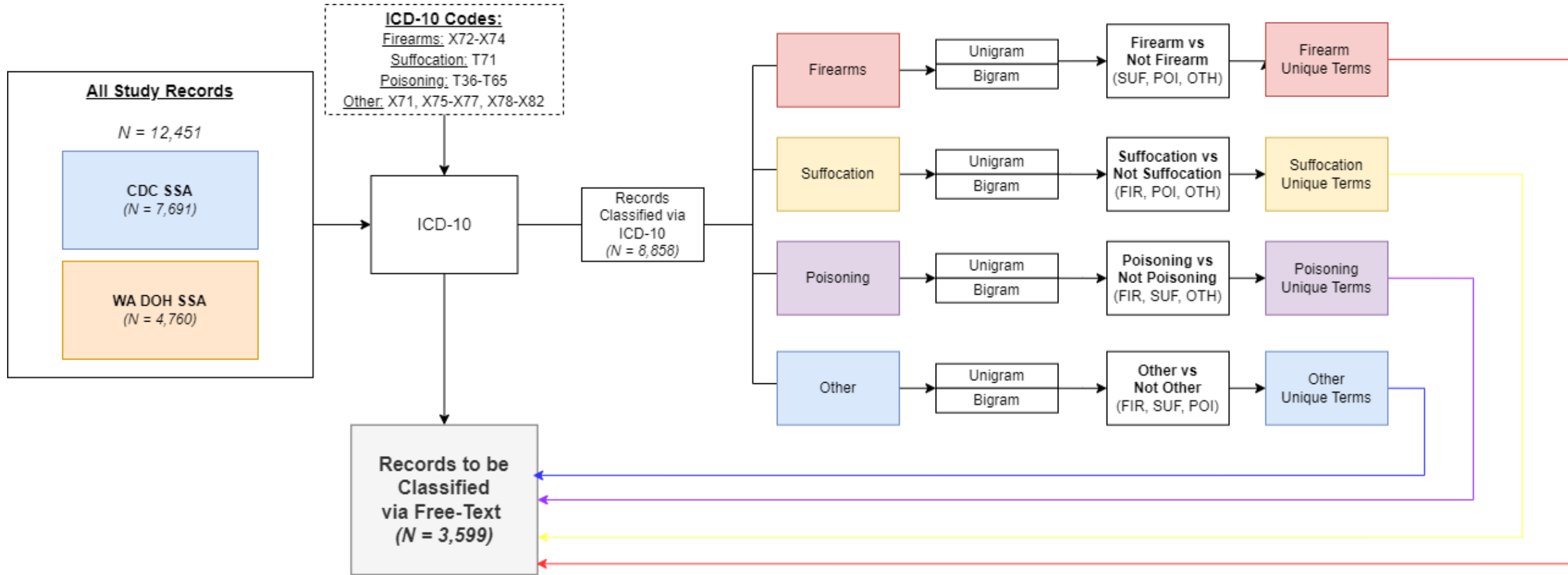
WA DOH Suspected Suicide Attempt V1

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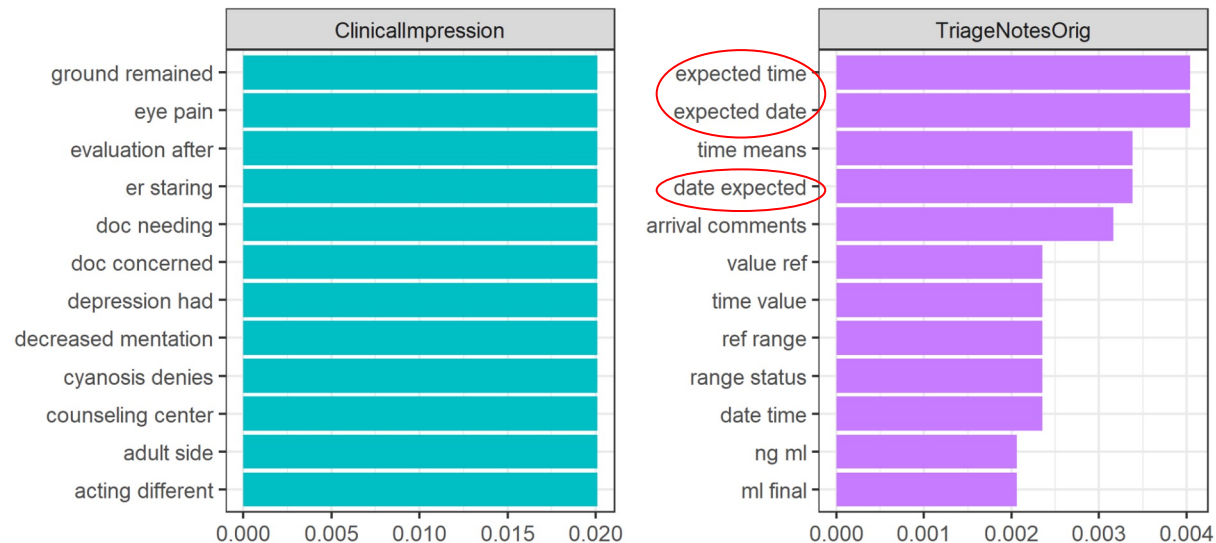
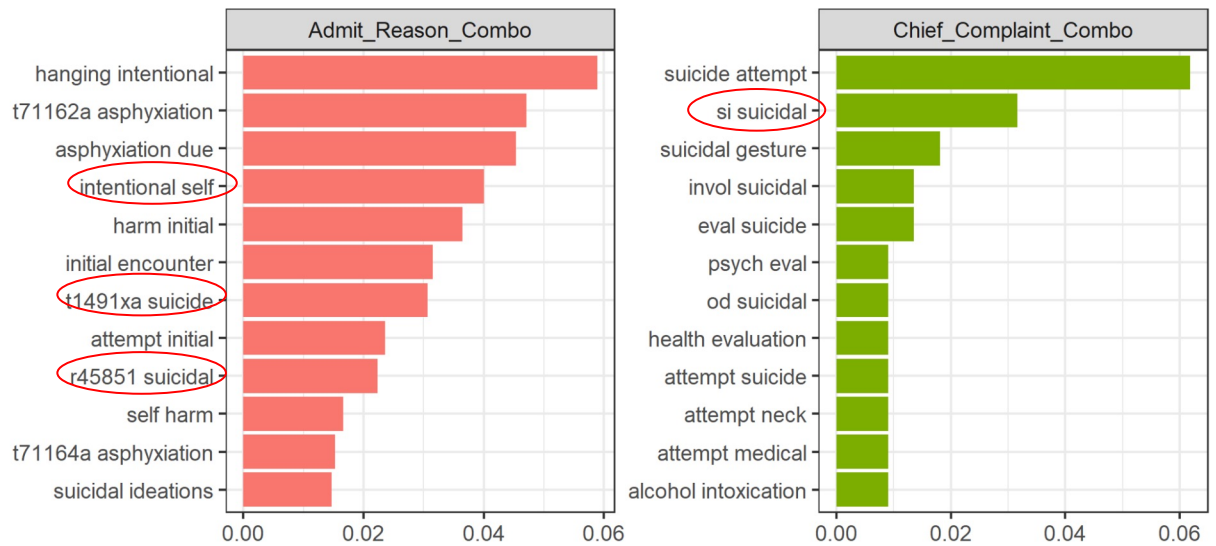
Methods – Development of Free Text Classification



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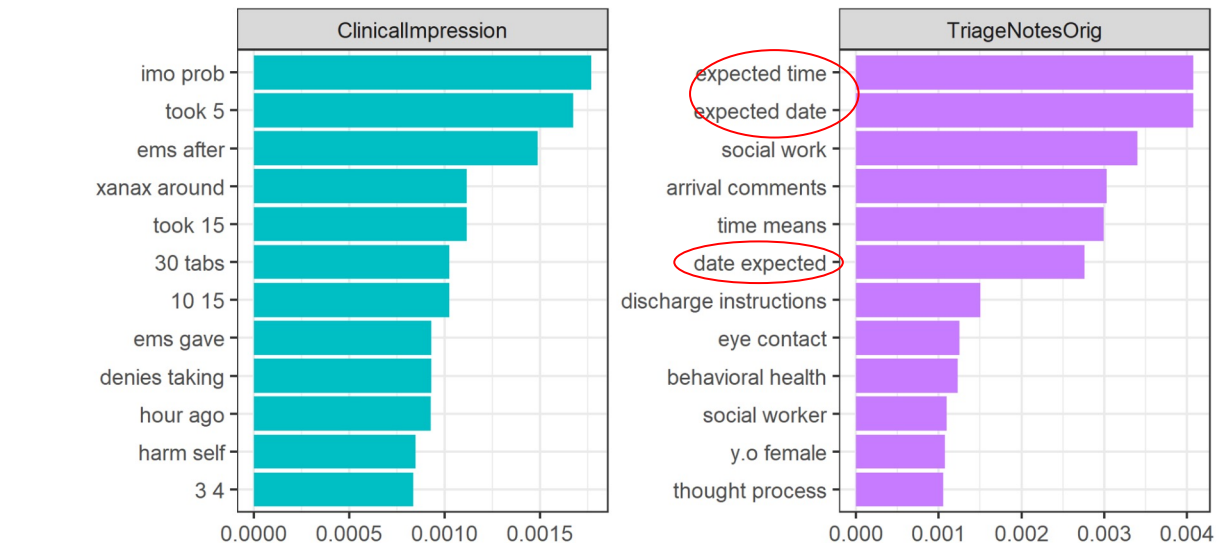
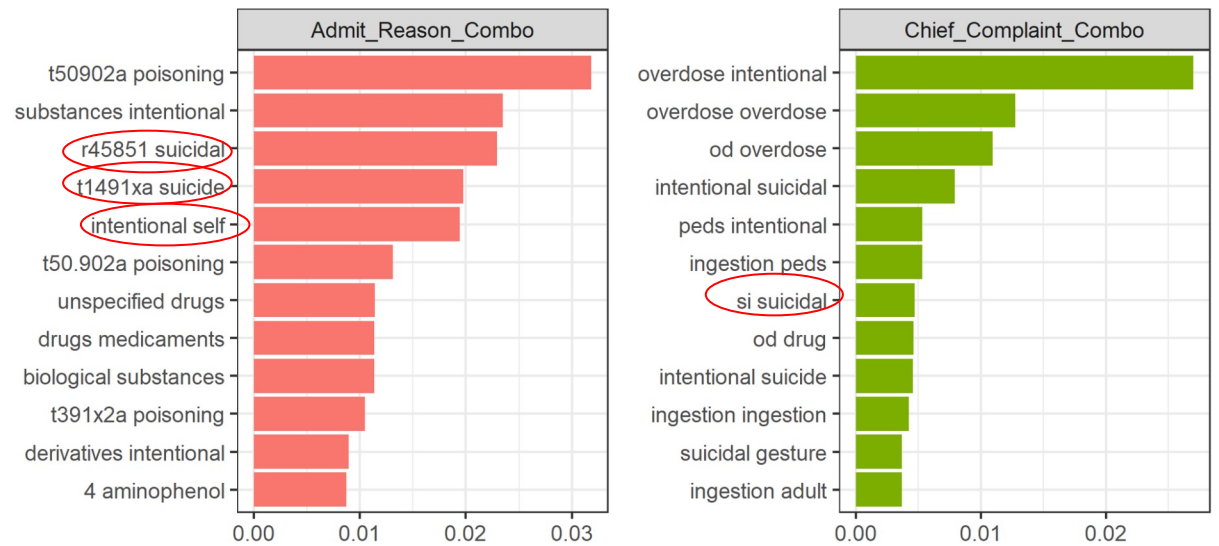


Suffocation Bigram Frequency-Inverse Document Frequency (tf-idf) by EMR Free-Text Field



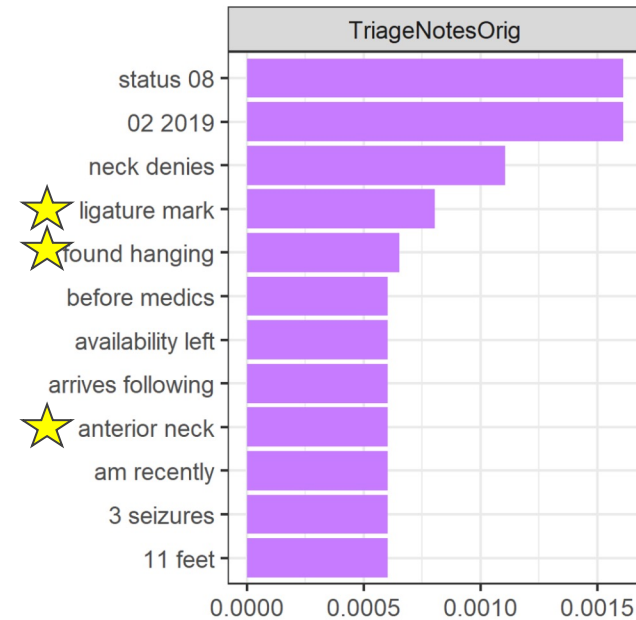
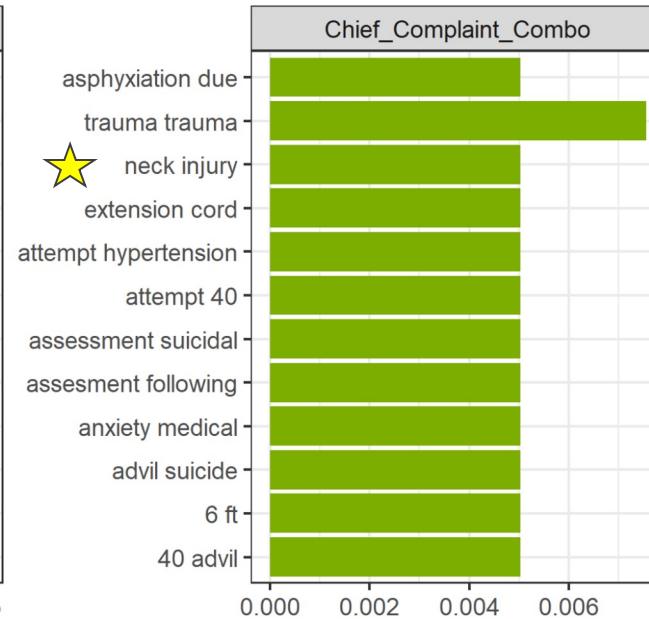
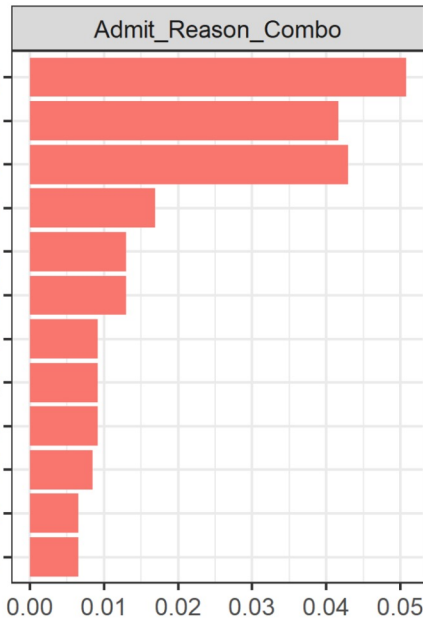
tf-idf

Non Suffocation Bigram Frequency-Inverse Document Frequency (tf-idf) by EMR Free-Text Field



tf-idf

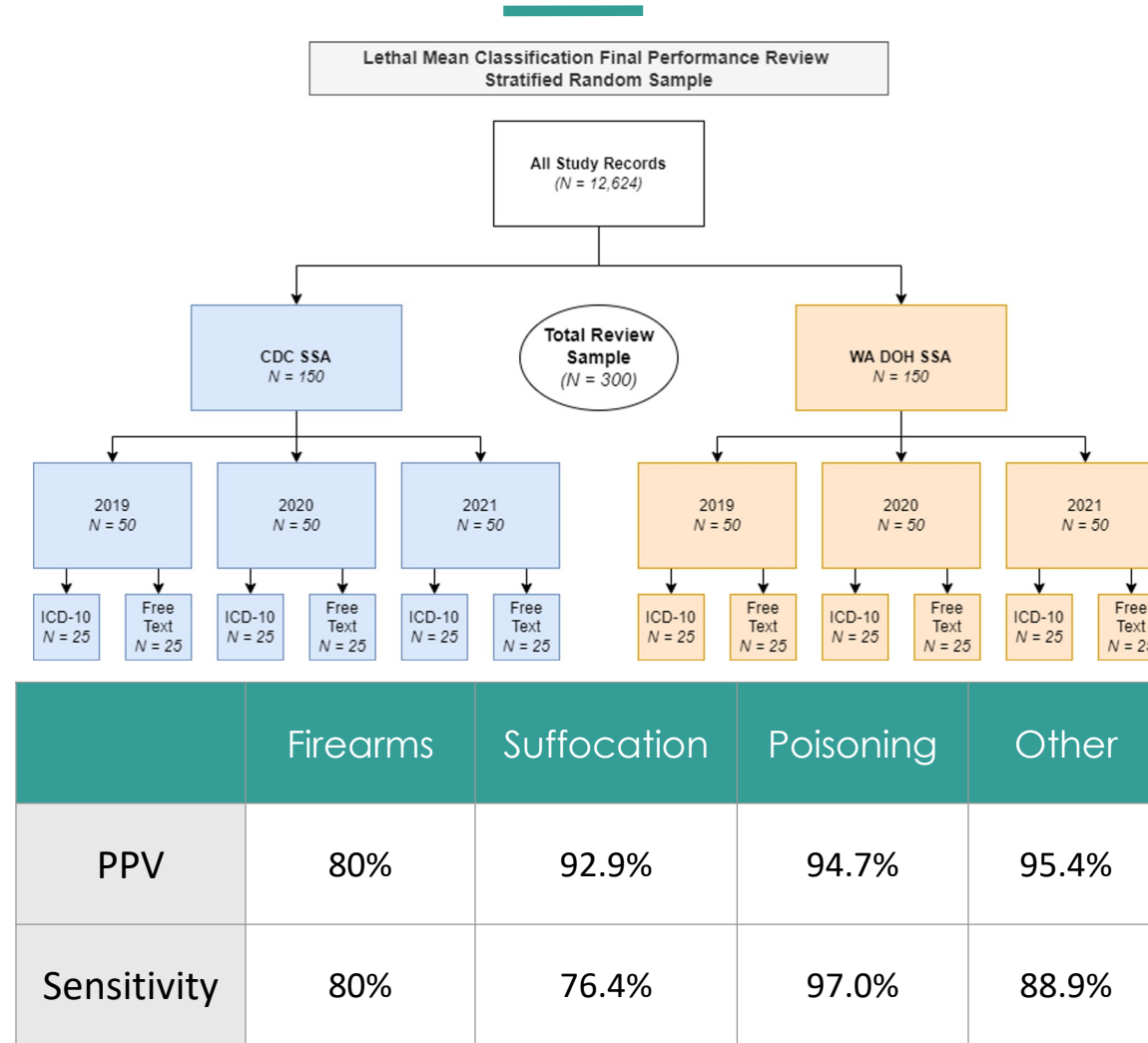
Unique Suffocation Phrases (tf-idf) by EMR Free-Text Field



tf-idf

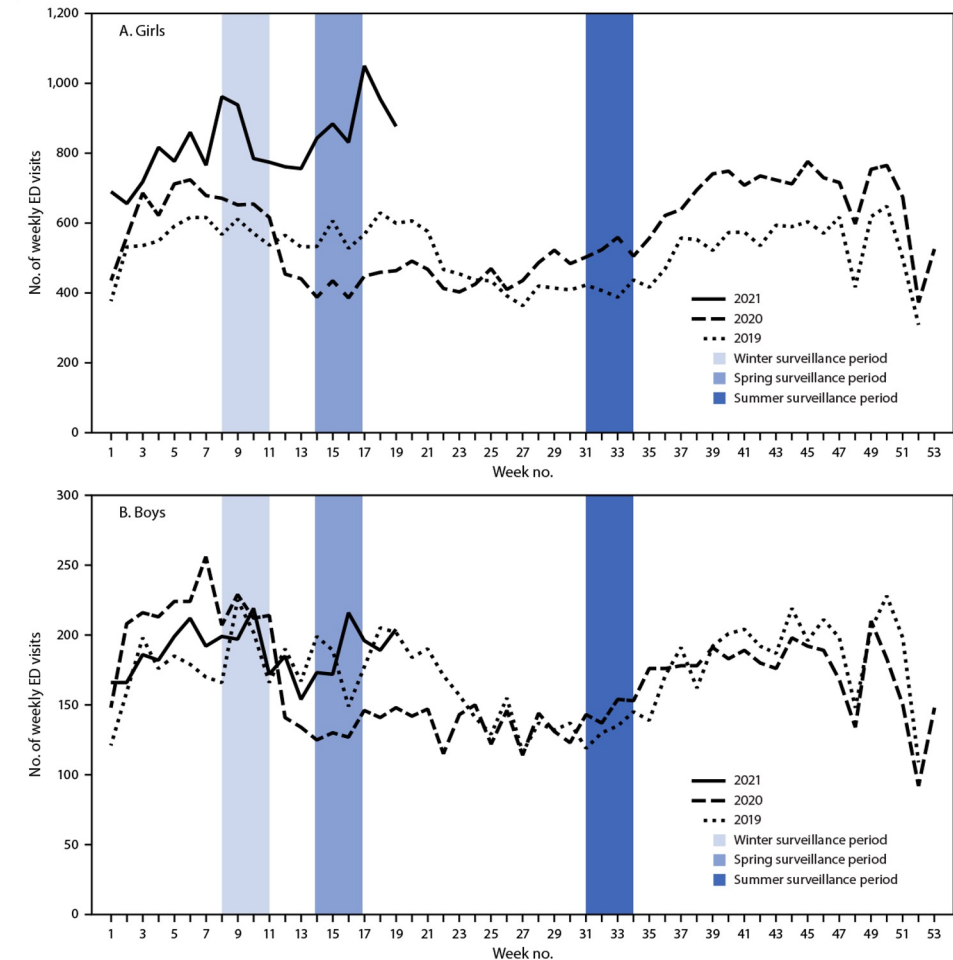
- While still imperfect, the resulting list of “unique” terms appear to be much closer to the concept we are interested in classifying.
- This comparison approach results in indicators that co-occur with different lethal means (i.e.; alcohol) being filtered out.

Methods – Manual Review & Classification Performance



Background

- During the COVID-19 pandemic, there have been elevated concerns regarding mental health and suicide-related behaviors, ***in particular among school age youth.***
- Understanding trends in the use of lethal means is important for informing lethal means restriction interventions – ***a key pillar of suicide prevention efforts.***
- Lethal mean utilization data have historically been monitored using death certificates and hospital administrative databases which have ***significant processing delays.***



Emergency Department Visits for Suspected Suicide Attempts Among Persons Aged 12–25 Years Before and During the COVID-19 Pandemic — United States, January 2019–May 2021

Study Dates

	Winter <i>MMWR Weeks 8-11</i>	Spring <i>MMWR Weeks 14-17</i>	Summer <i>MMWR Weeks 31-34</i>	Fall <i>MMWR Weeks 49-52</i>
2019 (Reference)	MMWR	MMWR	MMWR	MMWR
2020	X	MMWR	MMWR	WA Holiday 2020 Surge 11/29 – 12/16
2021	MMWR	COVID-19 Vaccines Become Widely Available to WA Residents 4/4 – 5/1	Delta Surge 8/7 – 8/28	Introduction of Omicron 12/5 – 1/1/2022

MMWR refers to time period(s) present within the national NSSP MMWR analysis.

Lethal Mean Classification Findings

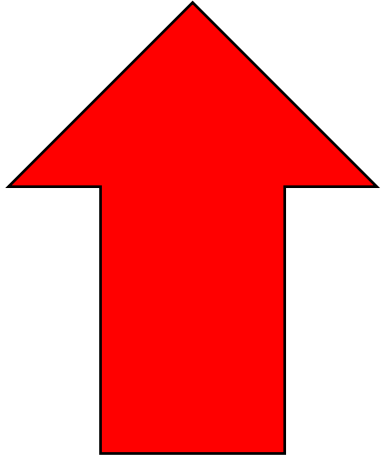
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Lethal Mean Co-Occurrence

CDC SSA	
Number of Visits	Lethal Means
75	Poisoning & Other
44	Suffocation & Other
26	Suffocation & Poisoning
13	Firearms & Other
<10	Firearms, Poisoning, & Other
<10	Suffocation, Poisoning, & Other
<10	All
<10	Firearms & Suffocation
<10	Firearms & Poisoning
<10	Firearms, Suffocation, & Poisoning

WA DOH SSA	
Number of Visits	Lethal Means
72	Poisoning & Other
46	Suffocation & Other
26	Suffocation & Poisoning
21	Firearms & Other
<10	Firearms, Poisoning, & Other
<10	Suffocation, Poisoning, & Other
<10	All
<10	Firearms & Suffocation
<10	Firearms & Poisoning
<10	Firearms, Suffocation, & Poisoning

CDC SSA: All Visits



Winter 2021 (vs Winter 2019):

- **Poisoning:** 640 visits (+13.3%), VR = 1.27 [1.13, 1.42]
- **Other:** 103 visits (+28.8%), VR = 1.45 [1.08, 1.94]
- **Total Suspected Suicides:** 845 (+16.4%), VR = 1.31 [1.19, 1.45]

CDC SSA: All Visits

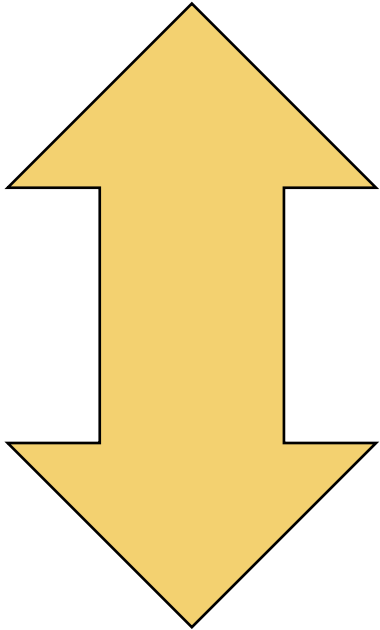
Spring 2020 (vs Spring 2019):

- **Poisoning**:** 450 visits (**-14.3%**), VR = 1.35 [1.19, 1.53]
- **Other:** 82 visits (**+0%**), VR = 1.58 [1.16, 2.15]
- **Total Suspected Suicides**:** 606 visits (**-10.4%**), VR = 1.41 [1.26, 1.57]

Fall 2020 (vs Fall 2019):

- **Poisoning**:** 506 visits (**-3.1%**), VR = 1.26 [1.12, 1.42]
- **Total Suspected Suicides:** 697 visits (**-3.9%**), VR = 1.25 [1.13, 1.39]

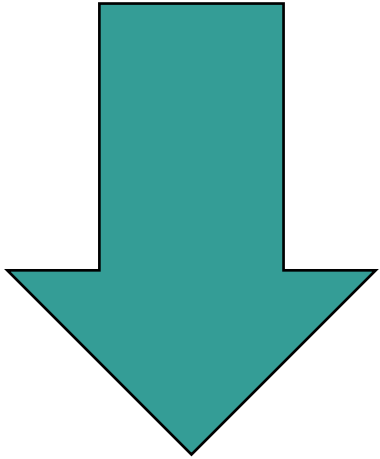
***Results were replicated in a Sensitivity Analysis using WA DOH SSA data.*



CDC SSA: All Visits

Summer 2020 (vs Summer 2019):

- **Suffocation****: 19 visits (-48.7%), VR = 0.56 [0.32, 0.97]



***Results were replicated in a Sensitivity Analysis using WA DOH SSA data.*

CDC SSA: School Age Youth (12-17 Years)

Spring 2020 (vs. Spring 2019):

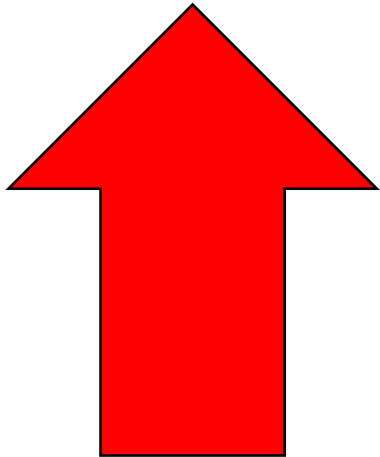
- **Other:** 25 visits (+31.6%), VR = 2.96 [1.63, 5.37]

Fall 2020 (vs. Fall 2019):

- **Suffocation:** 16 visits (+33.3%), VR = 2.41 [1.14, 5.09]
- **Poisoning:** 159 visits (+5.3%), VR = 1.9 [1.52, 2.38]
- **Other:** 28 visits (+47.4%), VR = 2.66 [1.49, 4.76]
- **Total Suicide Attempts:** 207 visits (+8.4%), VR = 1.96 [1.61, 2.38]

Winter 2021 (vs. Winter 2019):

- **Poisoning:** 243 visits (+65.3%), VR = 2.2 [1.8, 2.69]
- **Total Suicide Attempts:** 289 visits (+60.6%), VR = 2.14 [1.78, 2.57]



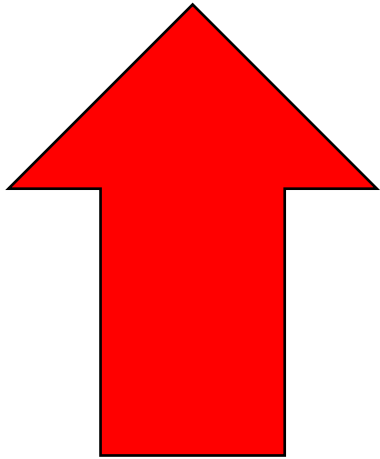
CDC SSA: School Age Youth (12-17 Years)

Spring 2021 (vs. Spring 2019):

- **Poisoning:** 203 visits (+41%), VR = 1.53 [1.24, 1.89]
- **Total Suicide Attempts:** 260 visits (+49.4%), VR = 1.63 [1.35, 1.97]

Fall 2021 (vs. Fall 2019):

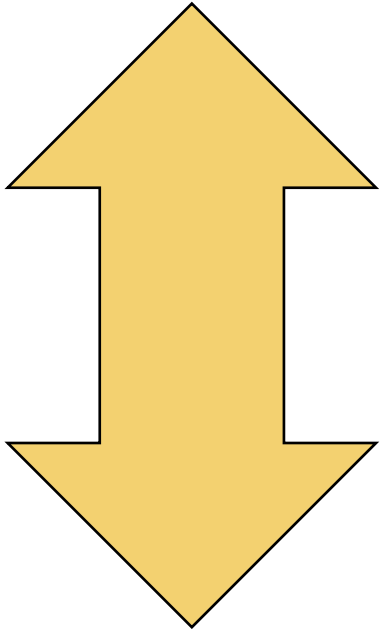
- **Poisoning:** 185 visits (+22.5%), VR = 1.56 [1.26, 1.93]
- **Other:** 31 visits (+63.2%), VR = 2.08 [1.18, 3.68]
- **Total Suicide Attempts:** 232 visits (+21.5%), VR = 1.55 [1.28, 1.87]



CDC SSA: School Age Youth (12-17 Years)

Spring 2020 (vs Spring 2019):

- **Poisoning:** 100 visits **(-30.6%%)**, VR = 1.56 [1.21, 2.01]
- **Total Suspected Suicides:** 137 visits **(-21.3%)**, VR = 1.77 [1.42 2.21]





Daniel Cornforth, PhD
Centers for Disease Control and
Prevention



Factors Other Than Disease Severity Shape Hospitalization Rates During COVID-19 Surges

Dan Cornforth, PhD (CDC NSSP)

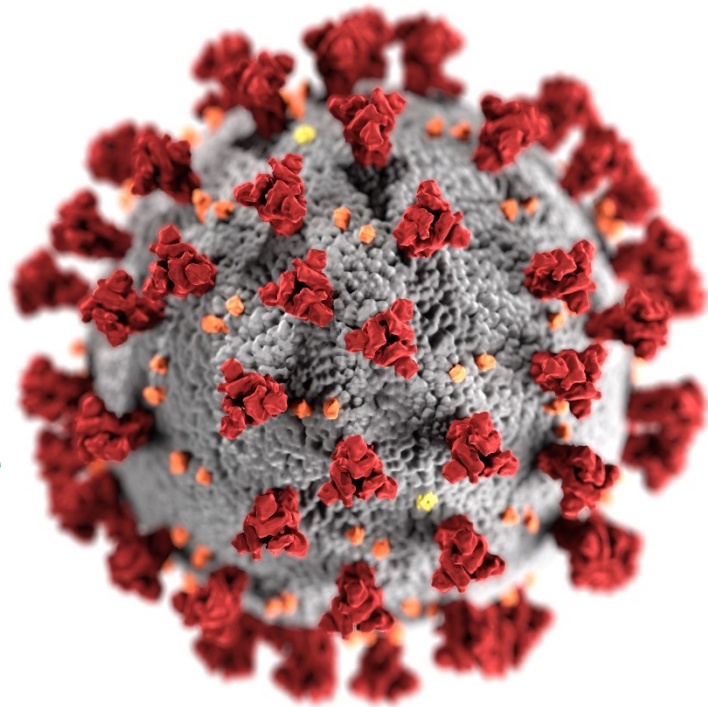
Adewole Oyalowo, MS (Booz Allen Hamilton)

Lara Bull, PhD, MPH (CDC DataHub)

Aaron Kite-Powell, MS (CDC NSSP)

CDC, Division of Health Informatics and Surveillance

December 7, 2022



cdc.gov/coronavirus

Outline

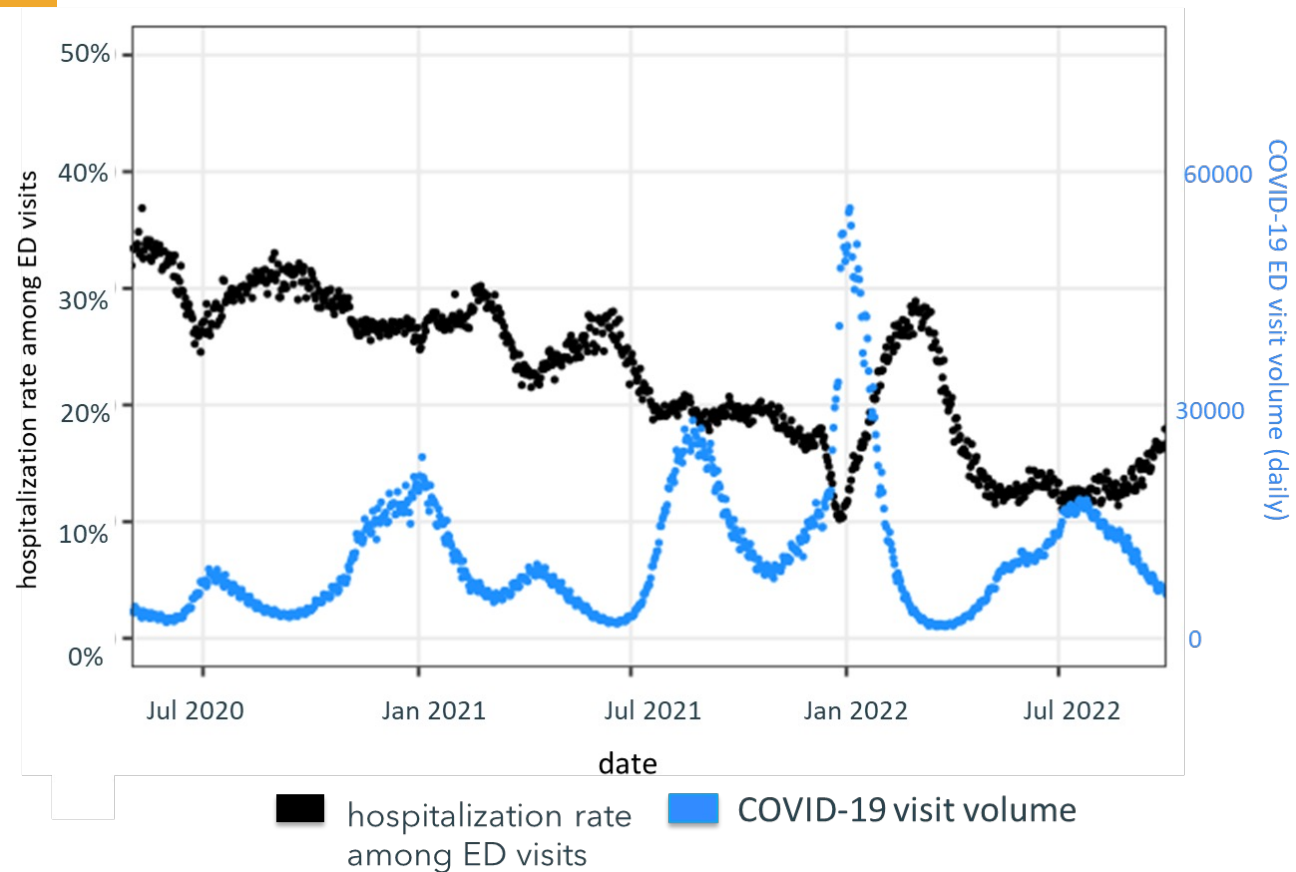
- Overview of hospitalization information in National Syndromic Surveillance Program (NSSP) data
- Decrease in hospitalization rates during COVID-19 surges
- Possible causes of these dynamics

Admission Information in NSSP Data (the HasBeenAdmitted field)

Developed in 2020 by partners in Florida to combine information from two other fields

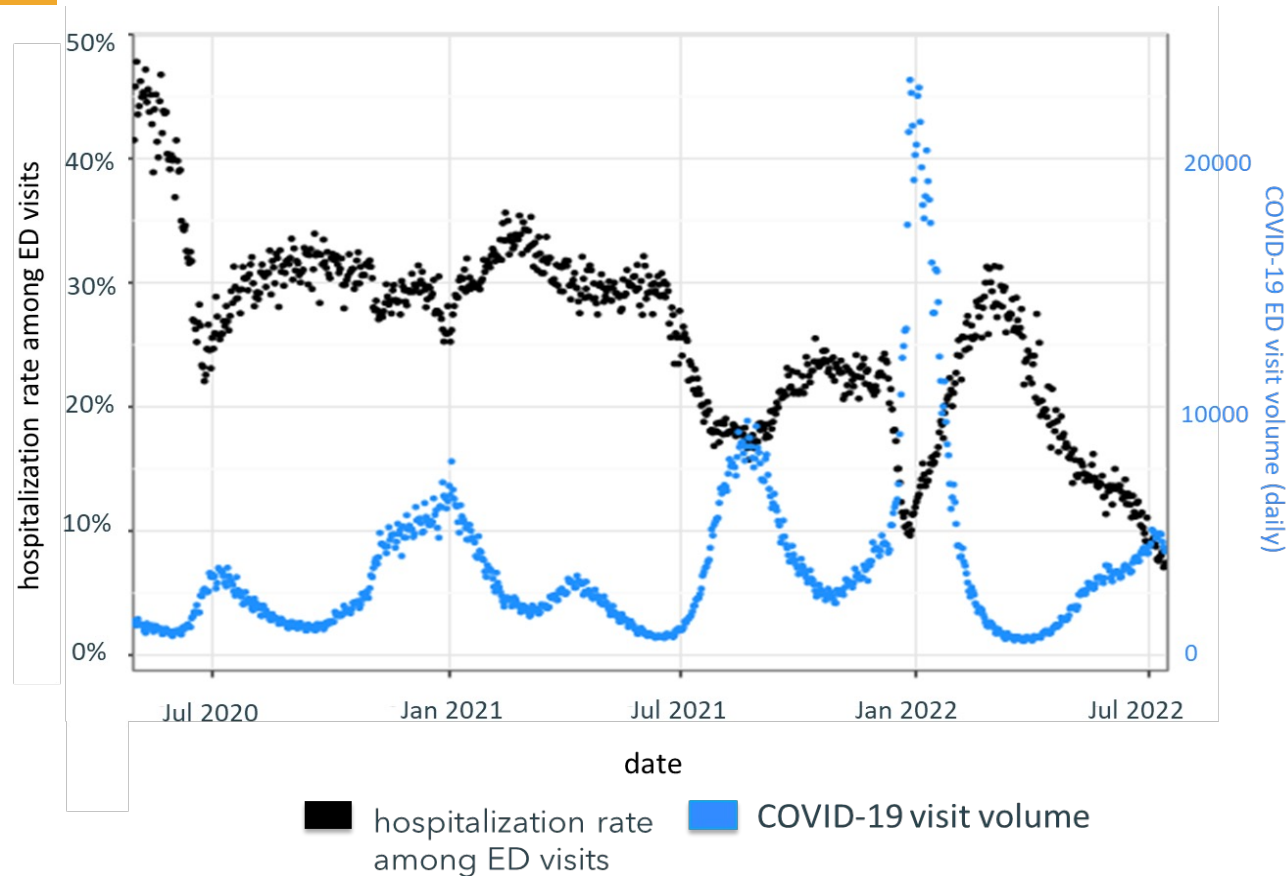
- HasBeenInpatient—TRUE if the patient class is ever Inpatient
- DischargeDispositionUpdates—TRUE if “ADMIT” disposition code is ever sent during visit

COVID-19 Hospitalizations in NSSP Data



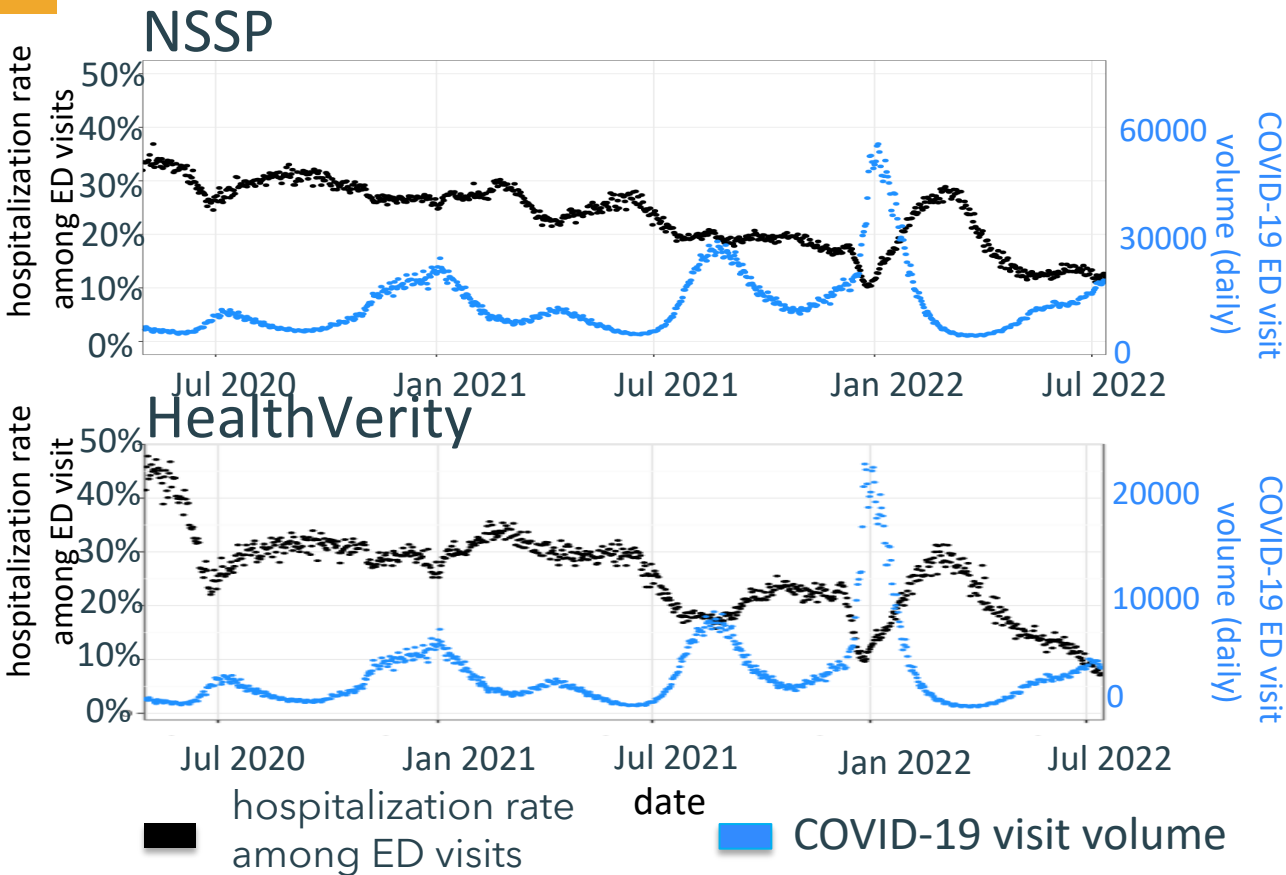
1. Hospitalization rate decreases as visit volume increases
2. Overall correlation coefficient of -0.51
3. During Omicron, sharp decrease in hospitalization rate, then increase, then decreased again

COVID-19 Hospitalizations in HealthVerity Insurance Claims Data



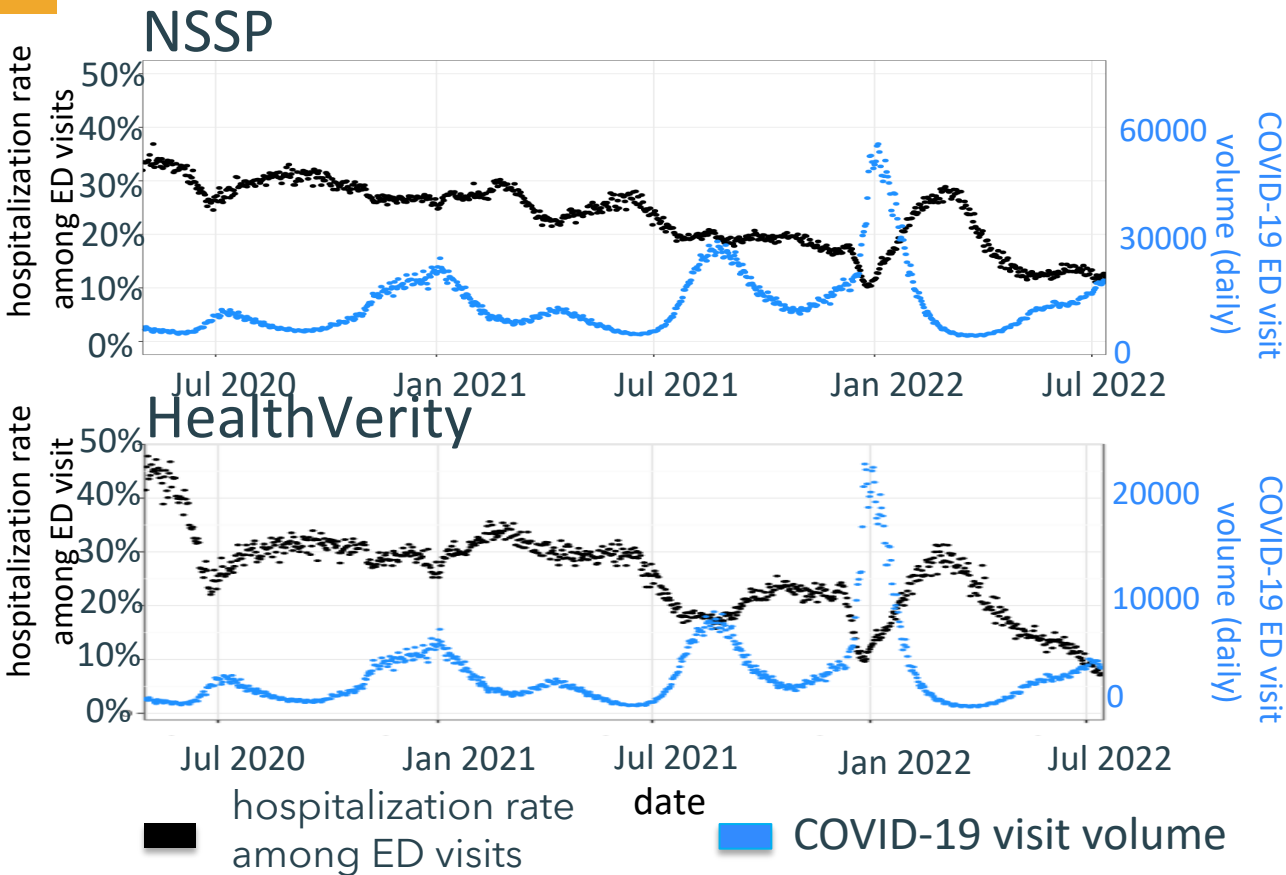
1. Based on closed insurance claims of 2.5 million emergency department (ED) visits
2. Counted individuals hospitalized within 3 days of an emergency department visit with COVID-19 diagnosis codes
3. Similar dynamics to those in NSSP data

NSSP vs HealthVerity Data



- Differences
 - More ED visits in NSSP dataset than in HealthVerity
 - Early dates in pandemic have higher % of hospitalization in NSSP
 - Increase in hospitalization rate in insurance claim data after Delta peak

NSSP vs HealthVerity Data



- Differences
 - More ED visits in NSSP dataset than in HealthVerity
 - Early dates in pandemic have higher % of hospitalization in NSSP
 - Increase in hospitalization rate in insurance claim data after Delta peak
- Possible causes of differences
 - Differences in coverage
 - Potential Data Quality questions in NSSP data in some jurisdictions
 - Different definition for 'hospitalization' from ED

Possible Explanations for Changes in Hospitalization Rates During Surges

1. Hospital resource limitations

Possible Explanations for Changes in Hospitalization Rates During Surges

1. Hospital resource limitations
2. Change of healthcare seeking behavior

Possible Explanations for Changes in Hospitalization Rates During Surges

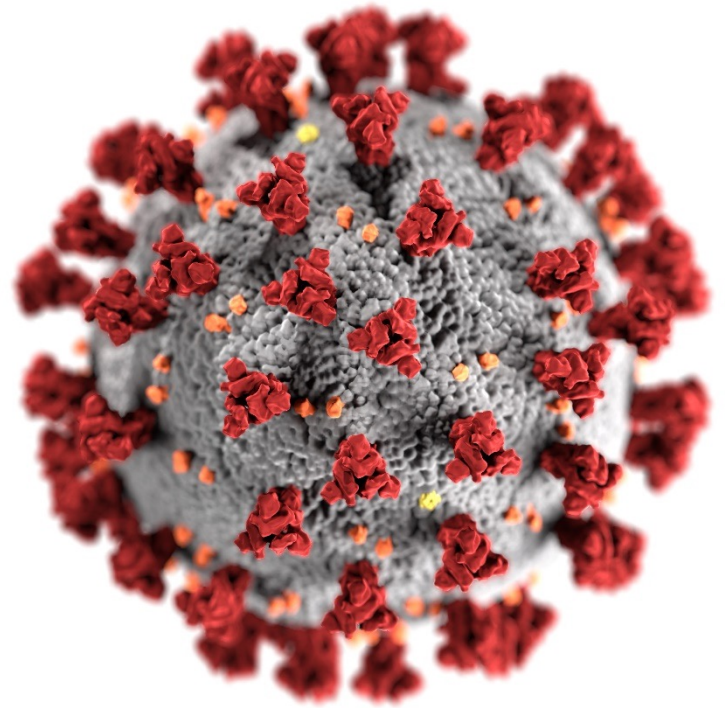
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Possible Explanations for Changes in Hospitalization Rates During Surges

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Possible Explanations for Changes in Hospitalization Rates During Surges

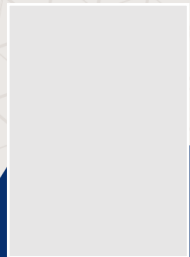
1. Hospital resource limitations
2. Change of healthcare seeking behavior
3. SARS-CoV2 infection in individuals visiting ED for other conditions which typically do not require hospitalization
4. Patients visiting ED to be tested when testing sites have long wait times
5. Other possibilities?



For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

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





Adan Oviedo, MPH
Georgia Department of Health



Leveraging Syndromic Surveillance to Identify and Communicate Firearm Related Injuries in Georgia

A SyS practice to improve knowledge-sharing and understanding of firearm-related injuries in Georgia

Syndromic Surveillance Symposium Breakout Session
Creating a Buzz around SyS Data
December 07, 2022

Adan Oviedo, MPH

FASTER Project Overview

- 3-Year CDC funding opportunity for 10 States and jurisdictions around the country with the goal of:
 1. Improve timeliness of aggregated reporting of ED visits for nonfatal firearm injuries
 2. Disseminate finding to key stakeholders working to prevent or respond to firearm injuries

Methods – Data Sources

- SENDSS
 - Patient chief complaint data are electronically collected from 145 hospital Emergency Departments across Georgia and transmitted to our State Electronic Notifiable Disease System (SENDSS) daily
- ESSENCE
 - 110 Georgia facilities also report to the National Syndromic Surveillance Program (NSSP) for inclusion into the Early Notification of Community-based Epidemics (ESSENCE) system

Methods - Applying the Syndrome Definition

- Firearm Injury Syndrome
 - Based on CDC's CCDD Firearm Injury (Version 2)
 - Text mining of chief complaint in conjunction with discharge diagnosis codes
 - Includes unintentional, intentional self-directed, assault, undetermined intent, legal intervention, and terrorism
 - Retroactively integrated into SENDSS going back to January 1st 2020 and forward

Methods – Dashboard

- Tableau as a platform
 - Server and desktop versions
 - Cost depends on users and permissions
 - Plenty of communities and resources
- Webpage
 - <https://dph.georgia.gov/faster-ga>
 - Additional information about SyS
 - Data usage and limitations
 - Embedding versus link

The screenshot displays the Georgia Department of Public Health (DPH) website. The header includes the DPH logo and navigation links: About DPH, Health Topics, Clinical Services, Vital Records, Women and Children, Immunization, Environmental Health, and Epidemiology. The breadcrumb trail indicates the path: Epidemiology > Health Behaviors and Policies > FASTER-GA. A left sidebar menu lists various epidemiology topics, with 'FASTER-GA' highlighted. The main content area is titled 'FASTER-GA' and features a section for 'Firearm Injury Surveillance Through Emergency Room Visit: FASTER'. This section includes an overview paragraph, a link to CDC data, and a list of objectives. A 'DASHBOARD' button is visible in the bottom right corner of the content area.

FASTER-GA

Firearm Injury Surveillance Through Emergency Room Visit: FASTER

Overview

Firearm-related injuries and death are a serious public health problem in the United States (U.S.), and particularly so in Georgia. In 2019 and according to the National Vital Statistics, 39,707 U.S. residents died due to firearm injuries, an age-adjusted rate of 11.83/100,000. Of these deaths, 1,695 were Georgians (age-adjusted rate of 15.78/100,000), a rate 33% higher than the U.S., ranking **Georgia 15th in firearm-related deaths in the U.S.** and the 10th for the south region of the U.S. (<https://www.cdc.gov/injury/wisqars/index.html>)

The Firearm Injury Surveillance Through Emergency Rooms: Georgia Approach (FASTER-GA) is a CDC-funded program awarded to the Georgia Department of Public Health to improve the timeliness of surveillance for Emergency Department (ED) visits of nonfatal firearm injuries.

Objectives

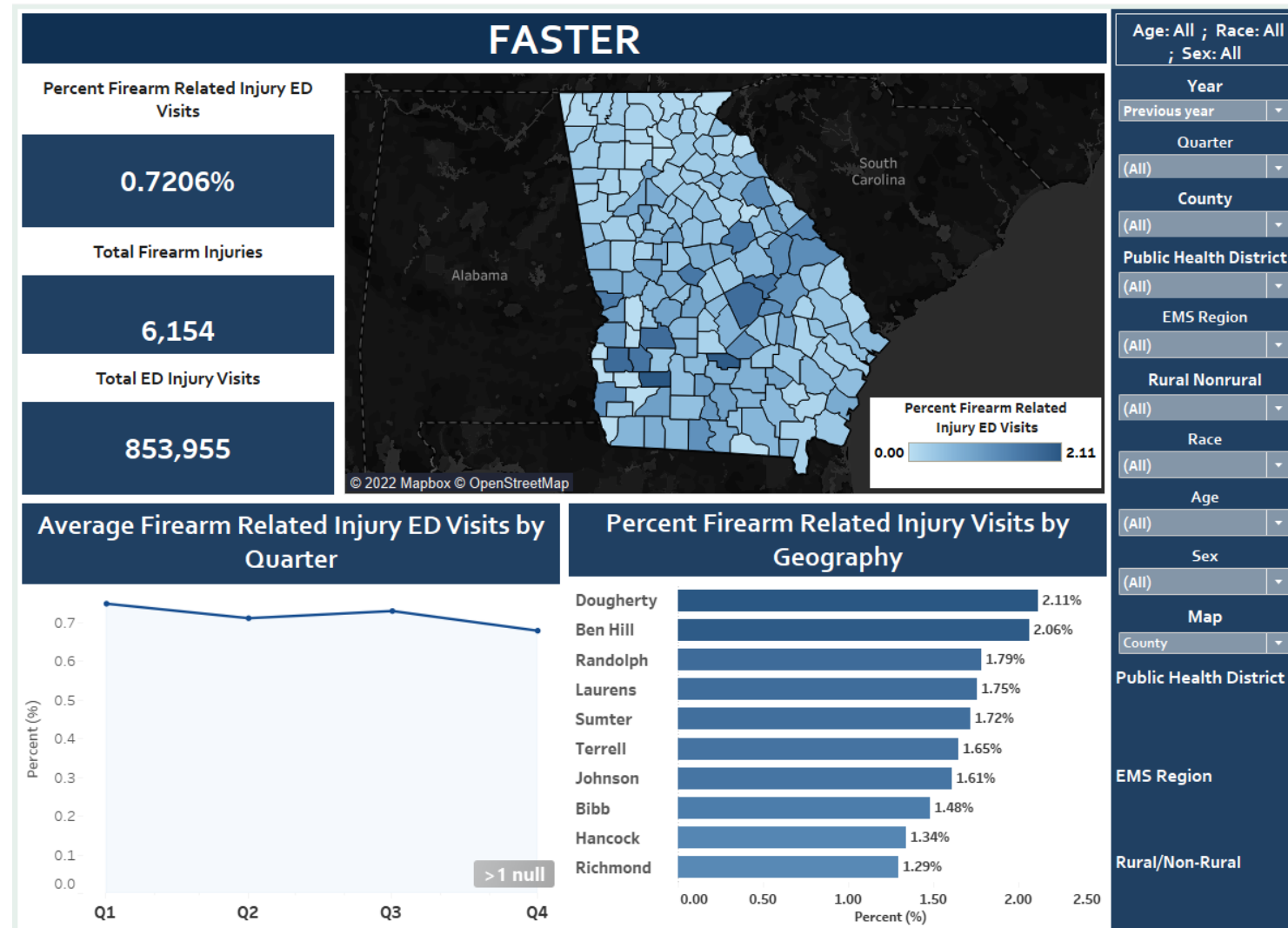
- Conduct surveillance of nonfatal firearm injuries to assess changes and trends in firearm-related injuries.
- Improve the accuracy, timeliness, and completeness of reporting of ED visits for nonfatal firearm injuries.
- Provide surveillance data to partners to facilitate the implementation of evidence-based strategies targeting Georgians at greatest risk of nonfatal firearm injuries.
- Respond to rapid increases or clusters of firearm-related injuries.

[Data Limitation](#)

Firearm Surveillance

DASHBOARD

Results - Demonstration



Acknowledgements

- The FASTER/GVDRS team
 - Rana Bayakly, Ashley Rayals, and Elizabeth Blankenship
- Informatics Team
 - Nathan Hunter, Kim Dial, and Praneetha Gatta
- SENDSS Developer
 - Bill Williamson

Thank you!

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National Syndromic Surveillance Program

Community of Practice

Resources that Advance the Science and
Practice of Syndromic Surveillance



2022

Syndromic Surveillance Symposium

December 6–8, 2022



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