Evaluating the Lethal Means of Non-Fatal Suicide Attempts Presenting to Washington State Emergency Departments Before and During the COVID-19 Pandemic

Tyler Bonnell

A thesis

submitted in partial fulfillment of the

requirements for the degree of

Master of Public Health

University of Washington

2022

Reading Committee:

Ali Rowhani-Rahbar, Chair

Lareina Laflair

Isaac Rhew

Program Authorized to Offer Degree:

Epidemiology

© Copyright 2022

Tyler Bonnell

University of Washington

Abstract

Evaluating the Lethal Means of Non-Fatal Suicide Attempts Presenting to Washington State Emergency Departments Before and During the COVID-19 Pandemic

Tyler Bonnell

Chair of the Supervisory Committee:
Ali Rowhani-Rahbar
Department of Epidemiology

Introduction: During the COVID-19 pandemic, concerns about increasing mental health conditions have emerged due to intersecting stressors associated with COVID-19 morbidity and mortality as well as disease mitigation efforts such as stay-at-home orders, school closures, and social distancing. However, little is known regarding the COVID-19 pandemic's impact on suicidal behavior in Washington.

Methods: This observational longitudinal study utilized 7,765 Washington Emergency Department (ED) visit records from 2019 to 2021 to describe the lethal means utilized for non-fatal suicide attempts and investigate if the utilization of lethal means for suicide attempts has

changed during the COVID-19 pandemic. Data on lethal mean utilization were collected from visit records using a novel, automated classification approach leveraging ICD-10 diagnostic codes and clinical free-text fields.

Results: Poisoning was the most identified lethal mean among non-fatal suicide attempt visit records during the study period (n = 5833), followed by Other (n = 1010), No Lethal Mean detected (n = 601), Suffocation (n = 356), and Firearms (n = 68). There were a few instances where non-fatal suicide attempt visit counts and proportion of all ED visits increased relative to before the COVID-19 pandemic such as for poisoning (+13.7%, Visit Ratio = 1.23 [1.1, 1.37]), other (+28.8%, Visit Ratio = 1.39 [1.04, 1.86]), and total suicide attempts (+16.3%, 1.26 [1.14, 1.39]) during Winter 2021 (2/21 – 3/20/2021). School age youth (12 – 17 years) appeared to be most impacted as non-fatal suicide attempts accounted for the largest share of ED visits (across all subgroups examined), and they experienced the greatest number of statistically significant elevated visit ratios for suicide attempts during the COVID-19 pandemic (n = 12).

Conclusions: This study developed a novel approach to identify the utilization of lethal means for non-fatal suicide attempts using population-based ED data. This approach could be valuable in monitoring real-time changes in population-level suicidal behaviors and evaluating the impact of lethal mean restriction policies.

TABLE OF CONTENTS

Chapter 1. Introduction 1

Chapter 2. Methods 2

2.1 Study Design 2

2.2 Study Setting & Participants 2

2.3 Data Collection 5

2.4 Analysis 8

Chapter 3. Results 11

3.1 Subgroup Analyses 15

3.2 Sensitivity Analysis 23

Chapter 4. Discussion 25

4.1 Limitations 28

4.2 Conclusion 30

Chapter 5. Tables & Figures 31

5.1 Primary & Sensitivity Analysis Tables 31

5.2 Figures 35

5.3 Supplementary Tables 38

Chapter 6. References 51

Chapter 7. Supplementary Appendix 55

LIST OF FIGURES

Figure 1. Study Population Flow Diagram 35
Figure 2. Lethal Mean Classification Flow Diagram 36
Figure 3. Stratified Random Sample of Records for Final Lethal Mean Classification Performance Review 37
Figure 4. Data Analysis Estimate Defintions 10
Figure 5. Intra-seasonal Comparison of Weekly Poisoning Suicide Attempt Visit Proportions 13
Figure 6. Intra-seasonal Comparison of Weekly Other Suicide Attempt Visit Proportions 14
Figure 7. Intra-seasonal Comparison of Weekly Suffocation Suicide Attempt Visit Proportions 14
Figure 8. Weekly Total Suicide Attempt Visit Proportion by Age Group 15
Figure 9. Intra-seasonal Comparison of Weekly Poisoning Suicide Attempt Visit Proportions (School Age Youth; 12-17 Years) 16
Figure 10. Intra-seasonal Comparison of Weekly Other Suicide Attempt Visit Proportions (Young Adults; 18-44 Years) 17
Figure 11. Intra-seasonal Comparison of Weekly Poisoning Suicide Attempt Visit Proportions (Older Adults; 45+ Years) 18
Figure 12. Weekly Total Suicide Attempt Visit Proportion by Biological Sex 19
Figure 13. Intra-seasonal Comparison of Weekly Poisoning Suicide Attempt Visit Proportions (Females)........ 20
Figure 14. Weekly Total Suicide Attempt Visit Proportion by Urbanicity of Patient's Resident County 21
Figure 15. Intra-seasonal Comparison of Weekly Poisoning Suicide Attempt Visit Proportions (Patients Residing in Urban Counties) 22
Figure 16. Intra-seasonal Comparison of Weekly Poisoning Suicide Attempt Visit Proportions (Patients Residing in Rural Counties) 23

LIST OF TABLES

Table 1. Performance Evaluation of Lethal Mean Classification Approach 8
Table 2. Study Analysis Periods 8
Table 3. CDC Suspected Suicide Attempt Sample Demographics 11-12
Table 4. WA DOH Suspected Suicide Attempt Sample Demographics 23-24
Table 5. CDC SSA Results 31-32
Table 6. WA DOH SSA Results 32-33
Supplementary Table 1. Suspected Suicide Attempt Syndromic Query Definitions . 38-39
Supplementary Table 2. (CDC SSA) 12-17 Years Results 39-40
Supplementary Table 3. (CDC SSA) 18-44 Years Results 41-42
Supplementary Table 4. (CDC SSA) 45+ Years Results 43-44
Supplementary Table 5. (CDC SSA) Females Results 44-45
Supplementary Table 6. (CDC SSA) Males Results 46-47
Supplementary Table 7. (CDC SSA) Urban Results 47-48
Supplementary Table 8. (CDC SSA) Rural Results 49-50

ACKNOWLEDGEMENTS

I would like to thank my Thesis Committee Chair Ali Rowhani-Rahbar for helping develop the core analytic aims of this work. Additionally, I would like to thank my Thesis Committee Member Lareina Laflair for helping me navigate the intricacies of working with syndromic surveillance data and providing continuous guidance and professional development throughout this project. Lastly, I express gratitude to my final Thesis Committee Member Isaac Rhew for introducing me to the field of Psychiatric Epidemiology and his support in contextualizing this work among the emerging findings of mental health impacts of the COVID-19 pandemic.

DEDICATION

This research project is dedicated to Anthony Newsome-Moffa a beloved friend and colleague in Public Health. Although he is no longer with us, his memory provides meaning, purpose, and urgency to this work.

Chapter 1. INTRODUCTION

In 2019, 1,263 individuals died by suicide in Washington, making it the 8th leading cause of death for the entire state population.[1,2] Concerningly, the suicide mortality rate in Washington has also increased by 16% over the past decade from 13.8 suicide deaths per 100,000 residents in 2010 to 16.1 suicide deaths per 100,000 residents in 2019.[2] Understanding the causes of this rising suicide mortality rate requires critically examining the incidence of suicidal attempts (suicidal attempts per total population) and the case fatality ratio (CFR; fatal suicides deaths per all suicidal acts).[3]

Nationally, total suicidal acts among US adults have been estimated to have increased by 10% from 2006 to 2015.[4] Recently, behavioral health and suicide-related concerns have emerged during the COVID-19 pandemic due to multiple factors, including disease mitigation efforts (e.g. lockdowns, school closures, and social distancing) and COVID-19 related morbidity and mortality that have disrupted daily life and significantly impacted mental health.[5] Pandemic-related changes to suicide trends have already been observed nationally among school age youth (ages 12 – 17 years) whose mean number of weekly ED visits for suspected suicide attempts (SSA) increased by 22.3% and 39.1% during summer 2020 and winter 2021, respectively, compared to the same time periods in 2019.[6]

The case fatality ratio of suicide attempts is largely determined by the lethality of the mean(s) utilized.[7] While the rates of suicide death by firearms and suffocation (which are commonly recognized as the most lethal suicide means[4,7]) have been increasing from 2010 to 2019, little is known about lethal means accessed for non-fatal suicide attempts. Identifying the lethal means used for non-fatal attempts is critical to understanding the overall distribution of methods

utilized for all suicide attempts (both fatal and non-fatal). Estimating this distribution using real-time, syndromic surveillance data could be a valuable tool for suicide prevention stakeholders to proactively respond to changes in suicide-related behaviors and evaluate the population impacts of lethal mean restriction interventions.

The primary aim of this study was to describe the lethal means utilized by individuals for non-fatal suicide attempts who received care at a Washington emergency department (ED) and investigate if the utilization of specific lethal means has changed significantly during the COVID-19 pandemic.

Chapter 2. METHODS

2.1 Study Design

We used a longitudinal observational study design to compare the lethal means utilized by individuals who received care from Washington EDs for non-fatal suicide attempts during the COVID pandemic (2020 and 2021) to a pre-pandemic reference period (2019).

2.2 Study Setting & Participants

The study was conducted in coordination with the Washington State Department of Health (WA DOH) Rapid Health Information Network (RHINO) team and utilized electronic medical record (EMR) data from the Electronic Surveillance System for Early Notification of Community-Based Epidemics (ESSENCE), which has been described at length elsewhere.[8] Briefly, ESSENCE receives real-time EMR data from hospital inpatient and ED visits including patient demographics, facility information, visit information, and clinical information (including diagnoses, chief complaints, and death and hospital admission indicators).[9] This project has been reviewed by the

Washington State Institutional Reviewed Board and has been granted Human Subject Exempt status.

Key visit-level eligibility criteria for this study included presenting to a Washington ED for medical care, the patient was 12 years or older, information within the EMR indicating a suspected suicide attempt, and the patient did not die while receiving care within the hospital. Related to the first criterion, ESSENCE had a high level of reporting from non-federal EDs in Washington during the study period ranging from approximately 62% during Winter 2019 to 100% in Fall 2021..[9] The robust capture of Washington EDs within ESSENCE highlights its strength in identifying population-level ED utilization trends, especially over recent years.[9] However, ESSENCE has limited ability to identify primary healthcare visits, visits to federal medical facilities (such as military hospitals), and individuals that attempt suicide but do not receive formal medical care. Therefore, the findings of this study only generalize to individuals receiving medical care for a non-fatal suicide attempt at Washington civilian EDs. The exclusion of patients under the age of 12 was implemented as accurately determining intent to die among young children remains a considerable challenge.[10] Related to the third criterion, ED visits for suspected suicide attempts were sampled from all Washington ED visits using the CDC Suspected Suicide Attempt Version 1 and WA DOH Suspected Suicide Attempt Version 1 syndromic surveillance queries.[11] These queries use a unique combination of ICD-10 diagnostic codes and EMR free-text elements to identify suspected suicide attempt ED visits and have been previously validated by the CDC and other public health stakeholders.[11,12] These queries were applied separately to generate two distinct (yet overlapping) study populations referred to as CDC SSA and WA DOH SSA (Figure 1). For this study, the CDC SSA data set was used for the primary analysis whereas the WA DOH SSA data set was used for sensitivity analyses. The rationale for utilizing multiple queries is due

to their differential performance in distinguishing suicide attempts from non-suicidal, self-injury (NSSI).[12] This differential performance and capture of ED visit records reflect the different terms included within these respective syndromic surveillance query definitions (Supplementary Table 1). The most notable changes implemented in WA DOH SSA (as compared to CDC SSA) are additional exclusion criteria that exclude subsequent and sequelae-related ED visits as well as those related to NSSI. The former was implemented through the exclusion of ICD-10 codes with the 7th character suffixes of "D" (subsequent visit) or "S" (visits to treat sequelae). The latter was implemented through the additional exclusion of records with EMR free-text phrases such as: "not trying to kill himself" and "not wanting to end their life". While there are many similarities between these two syndromic query definitions, these differences result in the WA DOH SSA population being a narrower subset of the overall CDC SSA population.

These mechanisms to distinguish and exclude NSSI-related visits from our samples were imperfect, and it is likely that some number of NSSI-related visits remained. Unfortunately, additional exclusion of NSSI-related visits from the samples was not feasible given the limited ability to adjudicate intent to die using EMR data.[6] To address this limitation, we conducted a sensitivity analysis wherein study findings from the CDC SSA were compared with those from the WA DOH SSA to help triangulate the true utilization of lethal means for non-fatal suicide attempts.

Key hospital-level eligibility criteria included meeting a priori reporting standards of 75% EMR data field completeness and a coefficient of variation less than 40.[6,13] These data quality criteria have been recommended as minimum thresholds for analyses using syndromic surveillance data, and they ensure that observed trends are not due to variations in reporting by hospital stakeholders.[6]

2.3 DATA COLLECTION

Although data on the utilization of lethal means were present within ED visit records, this information was neither collated nor readily accessible for analysis at the start of this study. Therefore, lethal means had to be identified using a novel, multi-step classification approach designed by the research team which leveraged visit record ICD-10 diagnostic codes and free-text EMR narratives (Figure 2). The specific lethal means examined in this study were firearms, suffocation (including hanging and strangulation), poisoning (by drug overdose or other substances), and other methods (including cutting, drowning, and jumping).

First, lethal means were classified using relevant ICD-10 codes for firearms (X72-X74), suffocation (T71), poisoning (T36-T65), and other (drowning; X71, explosives, fire, and hot objects; X75-X77, cutting or piercing; X78, X79, jumping from a high place; X80, lying-in front of a moving object or crashing a motor vehicle; X81, X82) respectively. Visit records that had multiple classified lethal means contributed to each category as they represent a unique occasion where each lethal mean was accessed. If no applicable ICD-10 codes were present, then free-text information within the EMR's Clinical Impression (CI), Admit Reason (AR), Chief Complaint (CC), and Triage Note (TN) fields were matched to a list of keywords and phrases to classify the lethal mean(s) indicated within the visit record. This list was generated through unigram and bigram analyses of the free-text fields (CI, AR, CC, and TN) of visit records with previously classified lethal mean(s) (using R's "tidytext" package[14]). The goal of these analyses was to extract the 100 most common one and two-word free text phrases (measured by term-frequency inverse document frequency[14]) for each lethal mean. Next, free-text phrases for a lethal mean (i.e., Firearms) were compared to the phrases for all other lethal means (i.e., Not Firearms which consisted of Suffocation, Poisoning, and Other) to isolate and extract a list of keywords and phrases

that were unique to a specific lethal mean. This was implemented to address the significant overlap of certain terms across various lethal means and to subsequently increase the specificity of our classification approach. Each list of lethal-mean specific terms was then manually reviewed and supplemented with additional terms from relevant parsed ICD-10 code definitions (i.e., X72 – Intentional self-harm by handgun discharge) and pre-existing syndromic surveillance queries (i.e., CDC Firearm Injury Version 2 and CDC All Drug Version 2).[11] Lastly, our free-text lethal mean classification method underwent a six-stage iterative design approach (described in detail in the Supplementary Appendix) to implement minor tweaks and ensure appropriate performance.

Our final lethal mean classification method was manually evaluated by two study team members (TB and LL). The manual review consisted of a stratified random sample of approximately 300 classified visit records stratified by data source (CDC SSA and WA DOH SSA), year (2019, 2020, and 2021), and whether ICD-10 or EMR free text fields were used to classify the visit record (Figure 3). This sampling approach was utilized to promote adequate capture of diverse records and ensure assessment of the various components of our classification approach (such as ICD-10 vs EMR free-text classification).

Reviewers separately reviewed all records and assigned a rating (1: Very unlikely, 2: Unlikely, 3: Somewhat likely, 4: Likely, or 5: Very likely) indicating the likelihood that each lethal mean was present in the visit record. Ratings of four or five (Likely or Very Likely) were considered "True Positives" and ratings of one, two, or three (Very Unlikely, Unlikely, or Somewhat likely) were considered "True Negatives" for the presence of a lethal mean. Reviewers compared their individual ratings and decided upon final ratings through consensus.

The results of our automated lethal mean classification method were then compared against the consensus manual review ratings to estimate the method's Positive Predictive Value (PPV),

Negative Predictive Value (NPV), Sensitivity, and Specificity (using R's caret package) (Table 1). For this project, we set an a priori goal of developing a classification method that could reach 90% or higher PPV. Suffocation, Poisoning, and Other suicide attempts all surpassed this threshold indicating that records automatically classified as having one of these lethal means were extremely likely to have the corresponding lethal mean indicated upon manual review. The PPV of the Firearms category did not reach the pre-specified threshold, which was likely influenced by a few classification errors occurring within a relatively small population. NPV estimates for all lethal mean categories were extremely high indicating that when our automated classification approach did not detect the lethal means this was often validated upon manual review. Sensitivity estimates for Firearms and Suffocation were noticeably lower compared to the other lethal mean categories as well as their own respective PPV estimates. This indicates that refinement of the Firearms and Suffocation automated classification approach may be needed to promote greater capture and identification of the records. Like NPV, specificity estimates were extremely high across all lethal mean categories indicating that when records did not contain references to these lethal means they were also not detected by the automated classification approach. Lastly, Accuracy is an aggregated performance estimate of our classification approach which is calculated by summing the number of records designated as "True Positives" and "True Negatives" divided by all records (represented by the sum of records designated as "True Positives", "True Negatives", "False Positives", or "False Negatives"). In summary, the Accuracy estimates were extremely high across all categories, indicating that our automated classification approach was successfully classifying the lethal mean(s) present in most ED records.

Table 1: Performance Evaluation of Lethal Mean Classification Approach *(N = 293)*				
	Firearms* (n = 10)	**Suffocation* (n = 34)**	**Poisoning (n = 167)**	**Other* (n = 117)**
PPV	80.0%	92.9%	94.7%	95.4%
NPV	99.3%	97.0%	95.9%	92.9%
Sensitivity	80.0%	76.4%	97.0%	88.9%
Specificity	99.3%	99.2%	92.9%	97.2%
Accuracy [95% CI]	98.6% [96.5%, 99.6%]	96.6% [93.8%, 98.4%]	95.2% [92.1%, 97.4%]	93.9% [90.5%, 96.3%]

**Column values represent the number of visit records indicating a lethal mean (i.e., a unique occasion where a lethal mean was accessed). Given visit records can indicate multiple lethal means, the total column count may be greater than the total number of visit records manually reviewed (n = 293).*

2.4 Analysis

The study's primary outcome of interest was the lethal mean(s) indicated within the patient's visit record. This was chosen to serve as a proxy measure for the lethal mean(s) utilized for the patient's non-fatal suicide attempt. Time was this study's exposure of interest which was measured by the CDC MMWR week of the start of the patient's ED visit. To facilitate comparisons across years, ED visits were aggregated into select four-week analysis periods with the 2019 periods serving as pre-pandemic reference periods (Table 2).

Table 2: Study Analysis Periods				
	Winter *Weeks 8-11*	Spring *Weeks 14-17*	Summer *Weeks 31-34*	Fall *Weeks 49-52*
Pre-Pandemic Reference Periods **(2019)**	Ref. (2/17 – 3/16)	Ref. (4/7 – 4/27)	Ref. (8/4 – 8/24)	Ref. (12/1 – 12/28)
Pandemic Surveillance Periods **(2020)**	X	(3/29 – 4/25)	(7/26 – 8/22)	(11/29 – 12/26)[1]
Pandemic Surveillance Periods **(2021)**	(2/21 – 3/20)	(4/4 – 5/1)[1]	(8/7 – 8/28)[1]	(12/5 –1/1/2022)[1]

[1] Represent additional time periods not analyzed previously in national SSA MMWR Report: https://www.cdc.gov/mmwr/volumes/70/wr/mm7024e1.htm

Additional time periods were selected to represent distinct periods during the COVID-19 Pandemic in Washington:

Fall 2020 period captures the 2020 Holiday surge as well as the first COVID-19 vaccinations among healthcare providers, first responders, and other Phase 1A priority groups. https://www.doh.wa.gov/Portals/1/Documents/1600/coronavirus/348-862-VaccineTimeline.pdf

Spring 2021 period captures the period when COVID-19 vaccinations become widely available to WA residents on 4/15/2021.

Summer 2021 period captures period when the Delta variant accounted for almost all WA sequenced SARS-CoV2 infections.

Fall 2021 period captures the period when the Omicron variant was initially detected in the United States to when it reached dominance in WA (among sequenced samples).

These periods were chosen to encompass distinct moments of the COVID-19 pandemic in Washington and to extend a previous national ESSENCE study on suspected suicide attempt ED visits.[6] Distinct moments represented within these periods include but are not limited to the 2020 COVID-19 Holiday surge (Fall 2020)[15], the initial widespread availability of COVID-19 vaccines (Spring 2021)[16], the emergence of the Delta variant (Summer 2021)[17], and the introduction of the Omicron variant in Washington (Fall 2021)[17].

For each four-week period, the number of SSA visits was identified (referred to as "Total SSA") and stratified by lethal mean (referred to as "Lethal Mean Count") (Figure 4-1). The percent change in visits was estimated by comparing the Lethal Mean Counts observed during the pandemic surveillance period to those during the pre-pandemic reference period (Figure 4-2). These two measures were used to assess the absolute burden of SSA visits to Washington EDs during the study period. To account for fluctuations in total ED utilization observed during the COVID-19 pandemic,[18] we also calculated proportional measures to understand if SSA-related visits were accounting for a larger share of all ED visits during the study period. The visit proportion of SSA ED visits was calculated by dividing the Lethal Mean Count by the total number of ED visits observed during each four-week period. For ease of interpretation, these estimates were then multiplied by 100,000 and interpreted as "#X SSA ED visits per 100,000 ED visits" (Figure 4-3). Lastly, visit ratios were calculated by comparing SSA visit proportion estimates during the pandemic surveillance period to those during the pre-pandemic reference period (Figure 4-4). 95% confidence intervals were manually calculated with alpha set at 0.05 using z-scores. Visit ratios that did not include 1 within their confidence intervals were considered statistically

significant. In addition to statistical significance, these measures provided additional information regarding the magnitude and precision of potential differences observed in lethal mean utilization during the COVID-19 pandemic.

Figure 4: Data Analysis Estimate Definitions
Absolute Measures: **1. Lethal Mean Count (LMC) =** Lethal-mean specific non-fatal suspected suicide attempt ED visit count for the four-week period **2. Percent Change in Visits =** [Four-week LMC *during Pandemic surveillance period* – Four-week LMC *during Pre-Pandemic reference period*] / Four-week LMC *during Pre-Pandemic reference period* * 100% **Proportional Measures:** **3. Visit Proportions of SSA ED Visits per 100,000 ED visits =** Four-week LMC/Four-week total ED visits * 100,000 ED visits **4. Visit Ratios of SSA ED Visits (VR) =** Four-week SSA visit proportion *during Pandemic surveillance period* / Four-week SSA visit proportion *during Pre-Pandemic reference period*

Subgroup analyses were conducted using the covariates age, biological sex, and urbanicity of the patient's resident county. These analyses investigated if there were changes among specific subpopulations in the utilization of lethal means for non-fatal suicide attempts during the COVID-19 pandemic. These analyses produced similar metrics to those previously described except stratified by the key covariates. Age groups were defined as school age youth (12-17 years), younger adults (18-44 years), and older adults (45+ years). Biological sex was defined as male or female. The urbanicity of a patient's resident county was defined using the 2013 NCHS Urban-Rural Classification Scheme where "urban" referred to counties designated as large central metro, large fringe metro, medium metro, and small metro, and "rural" referred to counties designated as

micropolitan and noncore.[19] Estimates derived from small cell sizes (10 > n > 0) were suppressed in accordance with the WA DOH Small Number Reporting Policy (Table 5).[20]

Chapter 3. RESULTS

The CDC SSA data set used for this study consisted of 7,675 Washington ED visit records from 2019 to 2021. Of the 7,675 total visit records, 7,074 records had at least one lethal mean classified (92.2%). Additionally, there was a total of 178 visit records with multiple lethal means indicated.

Poisoning represented a vast majority of the lethal means utilized for non-fatal suicide attempts followed by other, suffocation, and firearms (Table 3). This distribution of lethal means for non-fatal suicide attempts was expected given the high lethality of firearms and suffocation.[4,7] As a result of poisoning's majority within the study population, findings related to changes in total suicide attempts often mirrored those of poisoning suicide attempts (and vice versa). Our study population was predominantly composed of younger adults (18-44 years), females, and residents of urban Washington counties. However, school age youth were also highly represented within this study population despite their limited age range (Table 3).

Table 3: CDC Suspected Suicide Attempt Sample Demographics

	Firearms (n=68)	Suffocation (n=356)	Poisoning (n=5833)	Other (n=1010)	No Lethal Mean(s) Detected (n=601)	Total Visit Records (N = 7675)
Age Group (years)						
12-17	11 (16.2%)	95 (26.7%)	1715 (29.4%)	245 (24.3%)	130 (21.6%)	2139 (27.9%)
18-44	32 (47.1%)	193 (54.2%)	3000 (51.4%)	586 (58.0%)	330 (54.9%)	4044 (52.7%)
45+	25 (36.8%)	68 (19.1%)	1118 (19.2%)	179 (17.7%)	141 (23.5%)	1492 (19.4%)
Sex						

Female	23 (33.8%)	169 (47.5%)	3993 (68.5%)	568 (56.2%)	309 (51.4%)	4938 (64.3%)
Male	45 (66.2%)	187 (52.5%)	1840 (31.5%)	442 (43.8%)	292 (48.6%)	2732 (35.6%)
Urbanicity						
Rural	9 (13.2%)	33 (9.3%)	561 (9.6%)	156 (15.4%)	85 (14.1%)	821 (10.7%)
Urban	59 (86.8%)	323 (90.7%)	5272 (90.4%)	854 (84.6%)	516 (85.9%)	6854 (89.3%)

Cell values represent the number of visit records indicating a lethal mean (i.e., a unique occasion where a lethal mean was accessed). Given visit records can indicate multiple lethal means, the total cell count may be greater than the total number of visit records (indicated in the right column).

Upon comparing ED visits before and during the COVID-19 pandemic, we found multiple instances of elevated and decreased visit proportions for total and lethal mean-specific suicide attempts. Among all lethal means, poisoning suicide attempts had the highest number of periods with statistically significant visit ratios (4 of 7 periods) followed by other (2 of 7 periods), and suffocation (1 of 7 periods). Numerous increases and decreases in firearm suspected suicide attempts were observed during the COVID-19 pandemic, however, none of these changes were statistically significant. The statistical significance of these changes was influenced by the varying sample sizes and estimate precision observed across lethal mean categories (Tables 5-6).

When looking more specifically at each lethal mean, poisoning suicide attempts were the most indicated lethal mean category with visit counts ranging from 450 to 650 per four-week analytical period. Poisoning suicide attempts had significantly increased visit proportions during Spring 2020 (VR = 1.35 [95% CI: 1.19, 1.54]), Fall 2020 (1.19 [1.05, 1.34]), Winter 2021 (1.23 [1.1, 1.37]), indicating that poisoning suicide attempts represented a larger share of overall ED visits during the COVID-19 pandemic than beforehand (Figure 5, Table 5). However, the visit count of poisoning suicide attempts decreased during Spring 2020 (-13.8%) and Fall 2020 (-3.5%) (Table 5). These discordant findings represent instances where the absolute number of poisoning suicide attempts decreased by a smaller amount than all other types of ED visits, thus resulting in a greater proportion of overall ED visits. Poisoning suicide attempt visit proportion decreased

during Summer 2021 (0.87 [0.77, 0.98]), despite an absolute increase in poisoning suicide attempts of approximately three percent (Figure 5, Table 5).

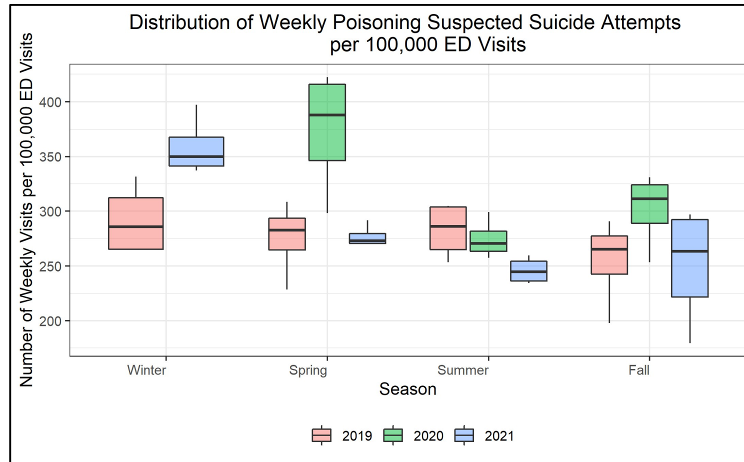


Figure 5: Intra-seasonal Comparison of Weekly Poisoning Suicide Attempt Visit Proportions

Other suicide attempts were the second most common lethal mean category with visit counts ranging from 80 to 110 per four-week analytical period. Other suicide attempts had elevated visit proportions relative to pre-pandemic during Spring 2020 (1.57 [1.04, 1.86]) and Winter 2021 (1.39 [1.04, 1.86]) (Figure 6, Table 5). There was no change in visit counts for Spring 2020 and a 28.8% increase in visit counts for Winter 2021 (Table 5). Additional increases in other suicide attempt visit proportions relative to pre-pandemic were observed during Fall 2020 Summer 2020, Spring 2021, and Fall 2021, however, these increases were not significant (Figure 6, Table 5). No statistically significant decreases in other suicide attempt visit ratios were observed.

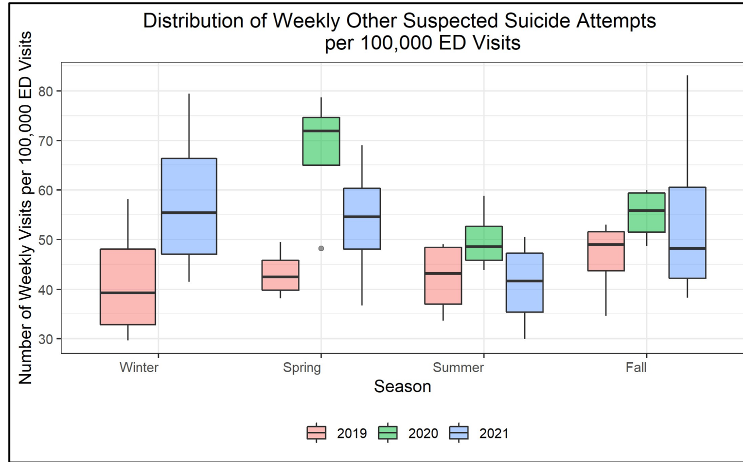


Figure 6: Intra-seasonal Comparison of Weekly Other Suicide Attempt Visit Proportions

Suffocation suicide attempts were the third most common lethal mean category with visit counts ranging from 18 to 40 per four-week analytic period. Suffocation suicide attempts had elevated visit proportions relative to pre-pandemic during Spring 2020 (1.69 [0.99, 2.88]) and Fall 2020 (1.33 [0.85, 2.08]), however, neither of these increases were significant (Figure 7, Table 5). Suffocation visit counts increased by 7.7% and 8.1% for Spring 2020 and Fall 2020 respectively (Table 5). There was one statistically significant decrease in visit proportions relative to pre-pandemic during Summer 2020 (0.52 [0.30, 0.92]), which corresponded with a 51 percent decrease in suffocation suicide attempt visit counts (Figure 7, Table 5).

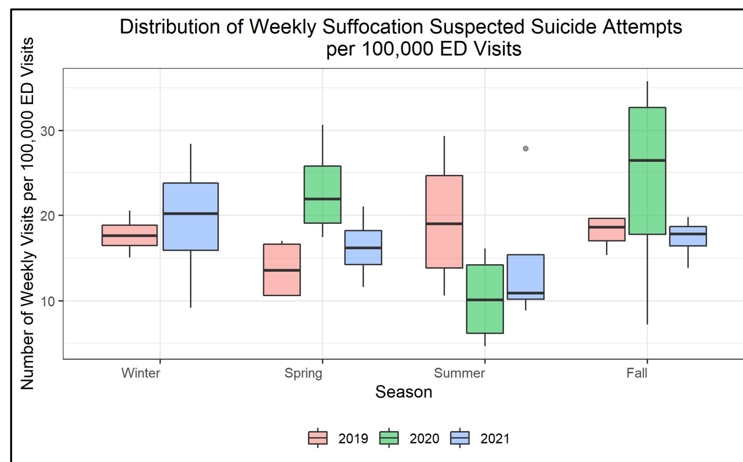


Figure 7: Intra-seasonal Comparison of Weekly Suffocation Suicide Attempt Visit Proportions

Firearm suicide attempts were the least common lethal mean category with visit counts typically less than 10 per four-week analytic period. Before suppression due to small numbers, there were no statistically significant increases or decreases in visit proportions of firearm suicide attempts, which was influenced by low estimate precision.20 Caution should be taken when interpreting presented firearm-related findings as any error of the lethal mean classification method is likely to have a sizeable effect on our comparisons due to the rarity of these events. One example of this is an unexpected spike in firearm-related visits observed during Spring 2021 (n=16) which upon further investigation was determined to be influenced by a few visits related to self-harm by paintball guns (Table 5).

3.1 Subgroup Analyses

Upon further investigation of our results, there appeared to be notable differences in lethal mean utilization based on a patient's age, biological sex, and urbanicity of resident county. School age youth (12-17 years old) were one of the most impacted subpopulations within our study with total and lethal mean-specific suicide attempt visit proportions far exceeding those for other age groups (Figure 8, Supplementary Tables 2-4).

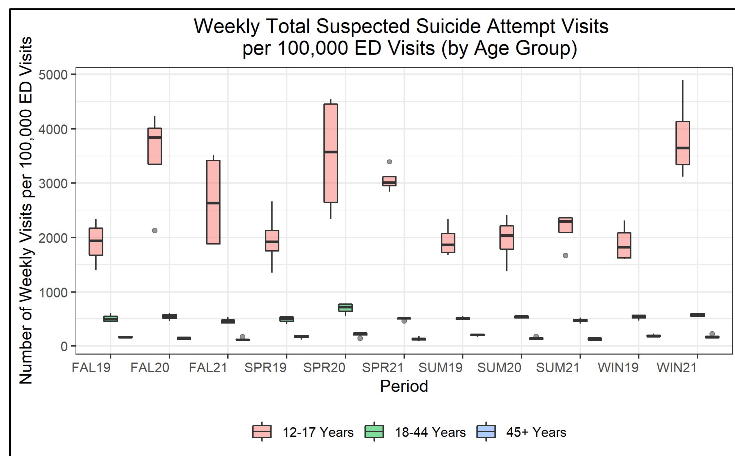


Figure 8: Weekly Total Suicide Attempt Visit Proportion by Age Group

Additionally, school age youth experienced elevated visit proportions during the COVID-19 pandemic relative to pre-pandemic for total suicide attempts in Spring 2020 (1.72 [1.38, 2.15]), Fall 2020 (1.84 [1.52, 2.24]), Winter 2021 (2.02 [1.68, 2.43]), Spring 2021 (1.54 [1.27, 1.86]), and Fall 2021 (1.45 [1.2, 1.75]) (Supplementary Table 2). The absolute changes in total suicide attempt visit counts during these periods are as follows: -23% (Spring 2020), +8.9% (Fall 2020), +59.8% (Winter 2021), +50% (Spring 2021), and +21.5% (Fall 2021) (Supplementary Table 2). Apart from Spring 2020, these results highlight that the relative proportion and absolute count of youth SSA-related ED visits have remained elevated well over a year into the COVID-19 pandemic.

This subpopulation also experienced multiple elevated visit ratios including one for suffocation (Fall 2020), five for poisoning (Spring 2020, Fall 2020, Winter 2021, Spring 2021, Fall 2021), and three for other (Spring 2020, Fall 2020, Fall 2021) (Supplementary Table 2, Figure 9).

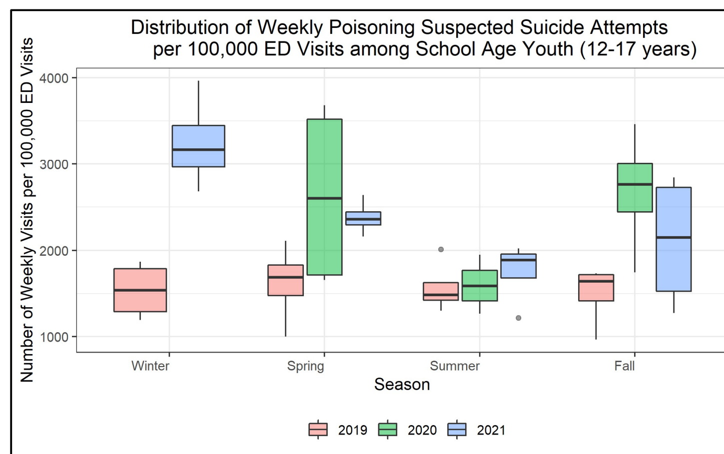


Figure 9: Intra-seasonal Comparison of Weekly Poisoning Suicide Attempt Visit Proportions (School Age Youth; 12-17 Years)

A few of the indicated periods had lethal mean visit ratio point estimates that exceeded a value of two signaling a strong and potentially meaningful shift in lethal mean utilization among

school age youth. These periods include Spring 2020 (Other: 2.94 [1.62, 5.34]), Fall 2020 (Suffocation: 2.26 [1.07, 4.77], Other: 2.5 [1.4, 4.47]), and Winter 2021 (Poisoning: 2.11 [1.72, 2.58]) (Supplementary Table 2). The absolute changes in visit counts during these periods were as follows: +31.6% (Other, Spring 2020), +33.3% (Suffocation, Fall 2020), +47.4% (Other, Fall 2020), and +66.4% (Poisoning, Winter 2021). Instances like these are concerning as they represent a simultaneous increase in the relative proportion and absolute count of suspected suicide attempt visits even during periods of lower overall ED utilization.

Younger adults (18-44 years) had a few shifts in total and lethal mean-specific suicide attempt visit proportions, particularly during the beginning phases of the COVID-19 pandemic. Elevated visit ratios were observed for total (1.44 [1.24, 1.67]), suffocation (2.16 [1.04, 4.49]), poisoning (1.33 [1.12, 1.58]), and other suicide attempts (1.55 [1.01, 2.37]) during Spring 2020, followed by other suicide attempts in Winter 2021 (1.73 [1.15, 2.59]) and Spring 2021 (1.56 [1.06, 2.29]) respectively (Supplementary Table 3, Figure 10). Increases in absolute visit counts were only observed for suffocation suicide attempts during Spring 2020 (+50%) and other suicide attempts during Spring 2020 (+7.3%), Winter 2021 (+73%), and Spring 2021 (+73%) (Supplementary Table 3).

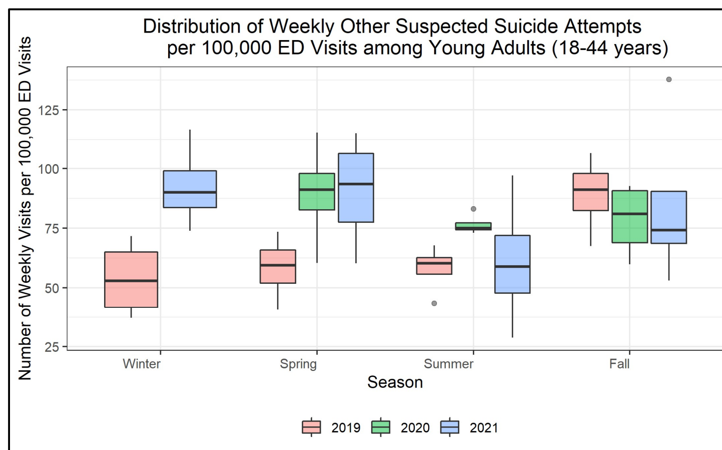


Figure 10: Intra-seasonal Comparison of Weekly Other Suicide Attempt Visit Proportions (Young Adults; 18-44 Years)

Older adults (45+ years) had markedly different trends from the other age groups as they experienced multiple reductions in total and lethal mean specific suicide attempt visit proportions during the COVID-19 pandemic. Visit proportions for total suicide attempts were lower relative to pre-pandemic for Summer 2020 (0.73 [0.58, 0.92]), Summer 2021 (0.64 [0.51, 0.80]), and Fall 2021 (0.73 [0.57, 0.94]) for this subpopulation (Supplementary Table 4). During these periods, total suicide attempt visit counts decreased by 31.6%, 25.9%, and 22.1% respectively (Supplementary Table 4). Poisoning suicide attempts had elevated visit ratios relative to pre-pandemic during Spring 2020 (1.36 [1.03, 1.79]), which subsequently decreased during Summer 2020 (0.67 [0.61, 0.88]), Fall 2020 (0.73 [0.55, 0.97]), Summer 2021 (0.59 [0.46, 0.77]), and Fall 2021 (0.67 [0.51, 0.89]) (Figure 11). During these periods, poisoning suicide attempt visit counts decreased by 6.7%, 37.2%, 30.5%, 31.4%, and 28.8% respectively (Supplementary Table 4).

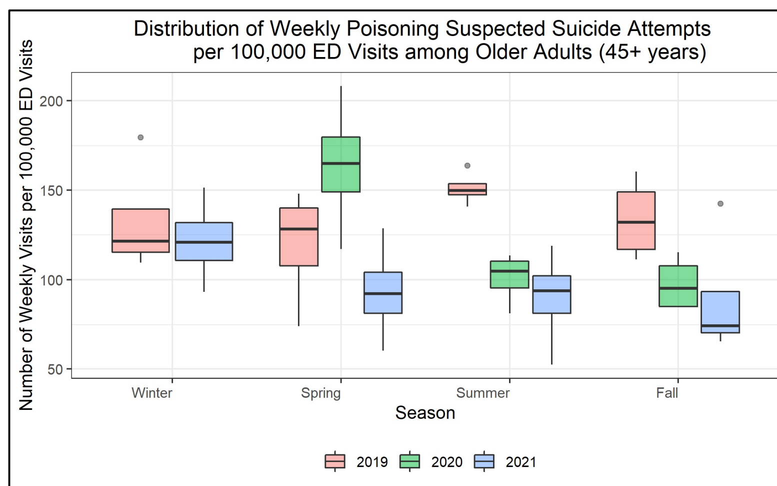


Figure 11: Intra-seasonal Comparison of Weekly Poisoning Suicide Attempt Visit Proportions (Older Adults; 45+ Years)

Other suicide attempts had decreased visit ratios relative to pre-pandemic during Spring 2021 (0.45 [0.22, 0.93]) and Summer 2021 (0.43 [0.21, 0.89]) (Supplementary Table 4). Visit

counts for other suicide attempts decreased by 50% during both periods (Supplementary Table 3). These decreases often co-occurred with increases in total ED visit counts, highlighting a simultaneous decrease in the proportion and absolute count of lethal mean of total and lethal mean specific suicide attempts observed among older adults (Supplementary Table 4).

Females had greater visit proportions for total and lethal mean suicide attempts compared to males, with the largest differences observed for total suicide attempts (Supplementary Table 5, Figure 12).

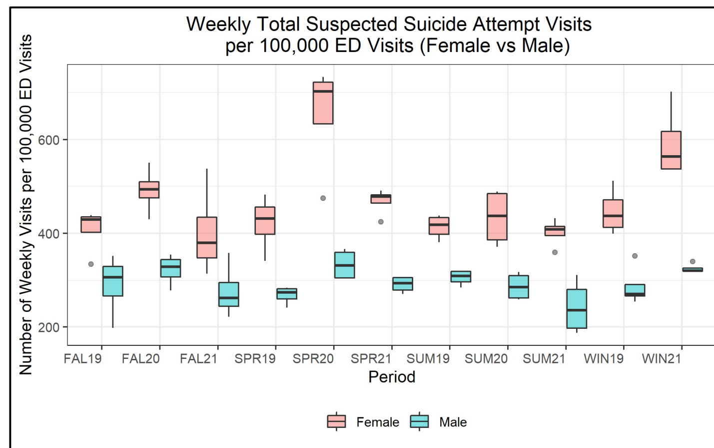


Figure 12: Weekly Total Suicide Attempt Visit Proportion by Biological Sex

Females experienced significantly elevated visit ratios relative to pre-pandemic during Spring 2020 (Poisoning: 1.39 [1.19, 1.61], Other: 2.06 [1.42, 2.99]), Fall 2020 (Suffocation: 2.01 [1.08, 3.75], Poisoning: 1.22 [1.05, 1.41]), and Winter 2021 (Poisoning: 1.23 [1.08, 1.41], Other: 1.77 [1.2, 2.6]) (Supplementary Table 5, Figure 13). The changes in visit counts during these periods were as follows: -16.7% (Poisoning, Spring 2020), +24% (Other, Spring 2020), +62.5% (Suffocation, Fall 2020), -1.4% (Poisoning, Fall 2020), +13.9% (Poisoning, Winter 2021), +63.4% (Other, Winter 2021) (Supplementary Table 5).

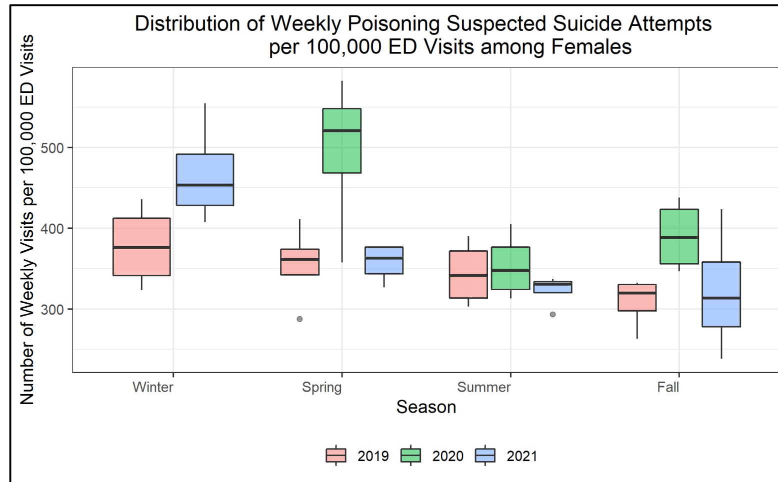


Figure 13: Intra-seasonal Comparison of Weekly Poisoning Suicide Attempt Visit Proportions (Females)

For males, there were few significant visit ratios observed during the COVID-19 pandemic. The most notable finding was a sharp increase in firearm-related suicide attempts (N = 15) observed during Spring 2021 relative to the pre-pandemic reference period (Supplementary Table 6). However, this finding was subsequently investigated and determined to be heavily influenced by visit records that indicated self-harm by paintball guns (as indicated by the X7402XA ICD-10 code). Males also experienced significant decreases in lethal mean visit proportions relative to pre-pandemic during Summer 2020 (Suffocation: >10 [suppressed])[20] and Summer 2021 (Poisoning: 0.74 [0.6, 0.91]) (Supplementary Table 6).

Residents of urban counties had slightly higher total, firearm, suffocation, and poisoning-related suicide attempt visit proportion estimates than residents of rural counties; however, the differences between these two groups were modest (Supplementary Table 7, Figure 14).

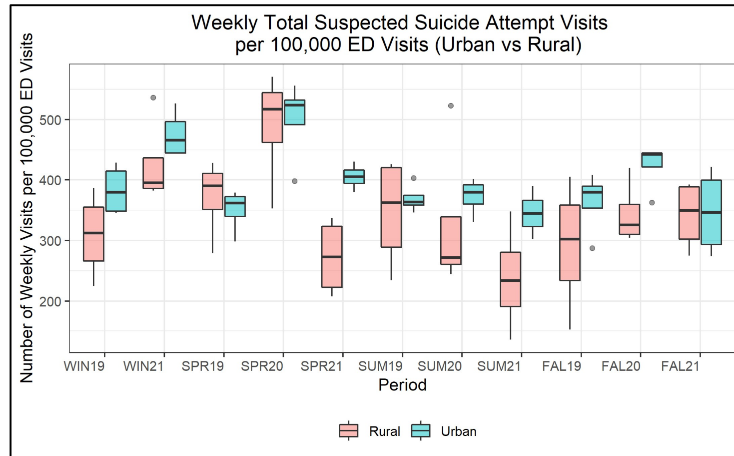


Figure 14: Weekly Total Suicide Attempt Visit Proportion by Urbanicity of Patient's Resident County

Urban residents had statistically significantly elevated visit ratios relative to pre-pandemic for total suicide attempts during Spring 2020 (1.43 [1.27, 1.61]), Fall 2020 (1.17 [1.05, 1.30]), Winter 2021 (1.24 [1.12, 1.38]), and Spring 2021 (1.16 [1.04, 1.29] (Supplementary Table 7). The changes in total suicide attempt visit counts during these periods were -9.4%, -5.5%, +13.7%, and +47.0% respectively (Supplementary Table 7). Additionally, there were elevated lethal mean specific visit ratios during Spring 2020 (Poisoning: 1.38 [1.21, 1.58], Other: 1.58 [1.2, 2.22]), Fall 2020 (Poisoning: 1.15 [1.01, 1.3]), and Spring 2021 (Other: 1.4 [1.03, 1.92]) (Supplementary Table 7, Figure 15). The absolute changes in visit counts during these periods were as follows: -12.2% (Poisoning, Spring 2020), 0% (Other, Spring 2020), -7.2% (Poisoning, Fall 2020), +47% (Other, Spring 2021) (Supplementary Table 7). There was only one significantly decreased visit ratio relative to pre-pandemic which was observed for suffocation suicide attempts during Summer 2020 (0.5 [0.28, 0.91]) (Supplementary Table 7). Additionally, a 54.3% decrease in suffocation suicide attempt visits was observed during this period (Supplementary Table 7).

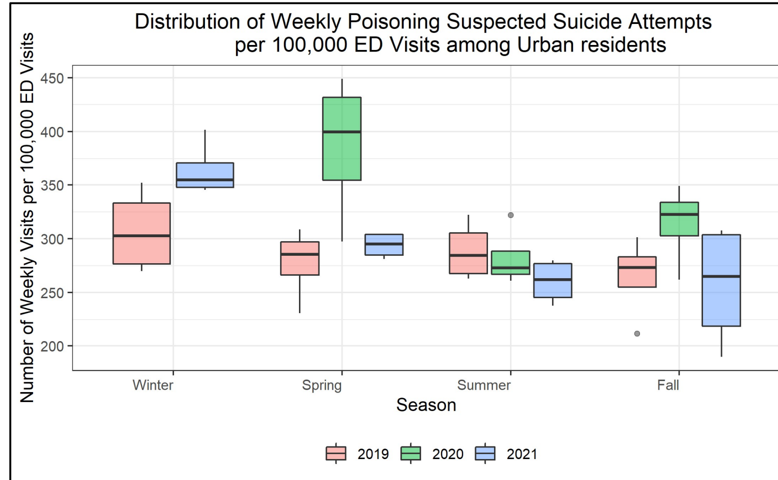


Figure 15: Intra-seasonal Comparison of Weekly Poisoning Suicide Attempt Visit Proportions (Patients Residing in Urban Counties)

Rural residents experienced few significant changes in visit proportions relative to pre-pandemic for total and lethal mean-specific suicide attempts. Significantly elevated visit ratios were observed during Winter 2021 for total (1.39 [1.02, 1.89]) and poisoning suicide attempts (1.72 [1.18, 2.5]) (Supplementary Table 8). Significant decreases were observed during Spring 2021 for poisoning suicide attempts (0.65 [0.44, 0.96]) as well as Summer 2021 for total (0.69 [0.49, 0.95]) and poisoning suicide attempts (0.66 [0.45, 0.97]) (Supplementary Table 8, Figure 16). The changes in visit counts during these periods were as follows: +40.6% (Total SSA, Winter 2021), +74.4% (Poisoning, Winter 2021), -20.7% (Poisoning, Spring 2021), 0% (Total SSA, Summer 2021), and -3.9% (Poisoning, Summer 2021) (Supplementary Table 8).

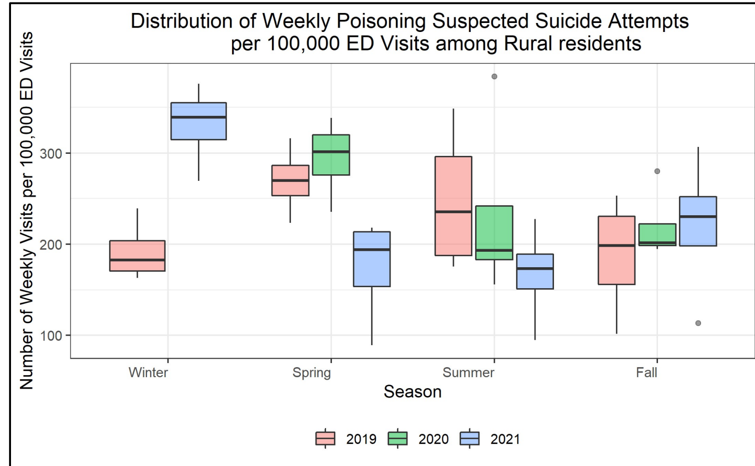


Figure 16: Intra-seasonal Comparison of Weekly Poisoning Suicide Attempt Visit Proportions (Patients Residing in Rural Counties)

3.2 Sensitivity Analysis

To investigate the validity of our findings from the CDC Suspected Suicide Attempt data, we re-ran this set of analyses on the WA DOH SSA data. This data set was utilized due to its definition of suspected suicide attempt ED visits that was developed for the Washington context and its more rigorous exclusion of NSSI. Despite containing fewer ED visit records (N = 4,752) than the CDC SSA (N = 7,675), the age, sex, and urbanicity distributions did not appear to differ meaningfully between these two data sets (Tables 3 & 4).

Table 4: WA DOH Suspected Suicide Attempt Study Sample Demographics

	Firearms (n=91)	**Suffocation (n=376)**	**Poisoning (n=2946)**	**Other (n=920)**	**No Lethal Mean(s) Detected (n=619)**	**Total Visit Records (N = 4752)**
Age Group (years)						
12-17	13 (14.3%)	104 (27.7%)	828 (28.1%)	219 (23.8%)	141 (22.8%)	1251 (26.3%)
18-44	42 (46.2%)	200 (53.2%)	1515 (51.4%)	527 (57.3%)	323 (52.2%)	2497 (52.5%)
45+	36 (39.6%)	72 (19.1%)	603 (20.5%)	174 (18.9%)	155 (25.0%)	1004 (21.1%)

Sex						
Female	25 (27.5%)	181 (48.1%)	2091 (71.0%)	498 (54.1%)	319 (51.5%)	2998 (63.1%)
Male	66 (72.5%)	195 (51.9%)	855 (29.0%)	422 (45.9%)	300 (48.5%)	1751 (36.8%)
Urbanicity						
Rural	13 (14.3%)	37 (9.8%)	302 (10.3%)	119 (12.9%)	82 (13.2%)	531 (11.2%)
Urban	78 (85.7%)	339 (90.2%)	2644 (89.7%)	801 (87.1%)	537 (86.8%)	4221 (88.8%)

Cell values represent the number of visit records indicating a lethal mean (i.e., a unique occasion where a lethal mean was accessed). Given visit records can indicate multiple lethal means, the total cell count may be greater than the total number of visit records. ***To compare the demographics between CDC SSA and WA DOH SSA see Table 3.***

Of the 10 statistically significant visit ratios observed in the primary analysis of the CDC SSA population, only four were also significant within the WA DOH SSA data set. These include for total suicide attempts during Spring 2020 (CDC SSA: 1.42 [1.27, 1.58] vs WA DOH SSA: 1.41 [1.22, 1.63]) and Winter 2021 (CDC SSA: 1.26 [1.14, 1.39] vs WA DOH SSA: 1.36 [1.2, 1.55]) as well as poisoning suicide attempts during Spring 2020 (CDC SSA: 1.35 [1.19, 1.53] vs WA DOH SSA: 1.41 [1.17, 1.69]) and Winter 2021 (CDC SSA: 1.23 [1.10, 1.37] vs WA DOH SSA: 1.43 [1.22, 1.68]). Of the seven remaining results, three WA DOH SSA findings had visit ratios that mirrored the corresponding CDC SSA finding but were not statistically significant. These included visit ratios for total suicide attempts during Fall 2020 (CDC SSA: 1.17 [1.05, 1.3] vs WA DOH SSA: 1.25 [0.92, 1.71]), and other suicide attempts during Spring 2020 (CDC SSA: 1.57 [1.16, 2.13] vs WA DOH SSA: 1.32 [0.96, 1.82]) and Winter 2021 (CDC SSA: 1.36 [1.01, 1.81] vs WA DOH SSA: 1.25 [0.92, 1.71]). For these periods, the changes in absolute visit counts between both data sets were similar, however, the WA DOH SSA data set often experienced changes that were greater in magnitude (Tables 5-6). In summary, most of this study's estimates were replicated upon analyzing the WA DOH SSA data set. For the findings not replicated using the WA DOH SSA data, it is uncertain whether these reflect discordant interpretations of

population level trends in suicide-related behavior during the COVID-19 pandemic or are an artifact of a smaller sample size and reduced estimate precision within the WA DOH SSA data set.

Chapter 4. DISCUSSION

Surprisingly, suicide deaths in Washington dropped from 16.6 deaths in 2019 to 15.8 deaths per 100,000 residents in 2020.[1] Notable drops in suicide deaths were observed during the first phase of the COVID-19 pandemic (April 2019: 111 suicide deaths, 4.5% of total deaths, April 2020: 91 suicide deaths, 3.7% of total deaths).[1] While this declining trend in suicide fatalities is encouraging, it may not be reflective of population-level trends in suicidal behaviors during the COVID-19 pandemic as suicide deaths represent only a fraction of all suicide attempts.[21] This study sought to address this gap in understanding in the Washington context by examining non-fatal suicide attempts observed before and during the COVID-19 pandemic. To our knowledge, this study is one of the first to examine lethal mean utilization for non-fatal suicide attempts using syndromic surveillance data. Understanding the lethal means utilized for non-fatal suicide attempts (in addition to those routinely monitored for fatal suicide deaths) is essential for informing public health interventions that seek to reduce elevated suicide rates and respond to changing suicide-related behaviors.

Compared with the respective pre-pandemic reference periods in 2019, total suicide attempt prevalence significantly increased during Spring 2020, Fall 2020, and Winter 2021 despite declines in total suicide attempt visit counts during Spring and Fall 2020. This discordance between increasing prevalence (a proportional measure) and decreasing suicide attempt ED visit counts (an absolute measure) was a commonly observed phenomenon among study findings which reflects population-level changes in ED utilization and medical care-seeking behaviors during the

COVID-19 pandemic.[18] It is possible that these findings may be influenced by greater decreases in ED visits for conditions such as hypertension, myocardial infarction, and injuries than for suicidal behavior during acute phases of the COVID-19 pandemic.[18]

Upon examining potential changes in lethal mean utilization, we discovered four statistically significant increases that occurred throughout the study period. Poisoning suicide prevalence significantly increased during Spring 2020, Fall 2020, and Winter 2021 despite declines in poisoning suicide attempt visit counts during Spring and Fall 2020. These findings mirror overdose trends observed in Washington's syndromic surveillance data[22] (using the CDC's All Drug Version 1 query[11]), as well as a multi-center research study utilizing medical records from healthcare systems in 6 US states.[23] Trends in overall overdoses offer an imperfect yet valuable comparison of these findings given the difficulties of distinguishing between unintentional and intentional overdoses[24] (which have been estimated to represent as much as 26.5% of all reported overdoses).[25]

Of all the subgroups examined, school age youth (12 to 17 years old) had the highest prevalence of non-fatal suicide attempts. This finding has also been replicated in other population-level mental health surveys such as the 2020 National Survey on Drug Use and Health (NSDUH), which highlighted that school-age youth had higher levels of suicidal ideation, formation of plans, and attempts than adults.[21] Additionally, school-age youth experienced the highest number of significant increases in the visit proportions for total and lethal mean-specific suicide attempts across all subgroups. Specifically, the visit proportions for total suicide attempts increased during Spring 2020, Fall 2020, Winter 2021, and Spring 2021; however, total suicide attempt visit counts only increased during Winter 2021. These results are consistent with the findings from a national analysis that examined ED visits for non-fatal suicide attempts by school age youth during the

COVID-19 pandemic.[6] While there are many different factors influencing this trend, one potential explanation could be the increasing prevalence of suicide risk factors such as depression, anxiety, and other psychological distress among youth during the COVID-19 pandemic. A review of youth mental health longitudinal studies published during the COVID-19 pandemic found increased prevalence of depression (in 16 of 20 studies), anxiety (in 16 of 21 studies), psychological distress (in 6 of 9 studies), and decreased wellbeing and life satisfaction (in 6 of studies), all of which are considered relevant risk factors for suicidal behaviors.[26] In Washington, the 2021 Health Youth Survey (HYS) found that among 8th, 10th, and 12th grade students 35%, 38.1%, and 44.7% reported experiencing elevated depressive symptoms, and 27.1%, 31.5%, and 35.8% reported persistent anxiety symptoms during the past 12 months.[27] Additionally, 24.6% and 7.8% of all school age youth reported seriously thinking about and having ever tried to kill themselves.[27] These estimates represent increases in depressive and anxiety symptoms as well as suicidal behavior compared to 2018 HYS findings, however, these differences should be interpreted cautiously due to methodological changes deployed in the HYS during the COVID-19 pandemic.[27,28] Another factor influencing the increased prevalence of suicide attempts among school-age youth could be the disruption of pre-existing mental health services and protective factors. It is possible that with the implementation of stay-at-home orders and school closures students may have been barred from engaging with school-based mental health services. This particularly concerning given that the education system has been identified as a primary and often only entry point for many youth accessing mental health services.[29] For students already engaged in mental health services before the COVID-19 pandemic, disruptions to the availability and quality of mental health care may have exacerbated pre-existing conditions and suicide risk factors.[30] Lastly, transitions to and from

distance learning modalities may have negatively affected youth peer support networks and overall social connectedness, thereby increasing their risk for suicidal behaviors.[31,32]

Related to lethal mean utilization, school-age youth had significant increases in the prevalence of poisoning suicide attempts during Spring 2020, Fall 2020, and Winter 2021 as well as visit counts for poisoning suicide attempts during Fall 2020 and Winter 2021. These findings align with long-term increases in youth self-poisonings observed over the last two decades[33] as well as increases in overdose-related ED visits observed during the pandemic in syndromic surveillance data (using the CDC All Drug Version 1 query[11]).[34] While the causal mechanisms of these increases are uncertain, one potential explanation is that substances used for poisoning suicide attempts (including acetaminophen, antidepressants[35], and Non-Steroidal Anti-Inflammatory Drugs) are commonplace and could be readily accessible for youth contemplating suicide during the COVID-19 pandemic.[36] These findings suggest the need for further lethal means restriction interventions that limit the availability of substances commonly used by youth for suicidal behaviors (such as acetaminophen), which have been shown to reduce poisoning-related morbidity and mortality in the United Kingdom.[37]

4.1 LIMITATIONS

This study is subject to five principal limitations. First, it does not include non-fatal suicide attempts that did not end up receiving medical care at an ED. Individuals that attempted suicide and did not end up receiving medical care or only received care at a primary, urgent care, or telehealth clinic are not included in the analysis. Thus, this study is likely to underestimate the incidence of non-fatal suicide attempts and potentially bias our estimates toward suicide methods that are more lethal or have higher morbidity. Second, we utilized the indication of a lethal mean within the ED visit record as a proxy measure for lethal mean utilization. At best, this served as a

rough proxy for actual utilization considering that our lethal mean classification method was unable to distinguish between active utilization, planned utilization, and the availability of the lethal mean in the patient's environment. We sought to limit this heterogeneity in classification accuracy by including negation clauses that ignored clinical assessment question templates typically present within clinical free-text fields during the classification process. Although this negation was imperfect, it helped focus our free-text classification on patient answers and exclude the language of clinical assessment tools which could have caused the misclassification of lethal mean(s). Another limitation of this proxy measure is that it was unable to distinguish between present and historical lethal mean use which was present in a minority of records during our manual review. While this error was present across our entire data (and likely represented a form of non-differential misclassification); it could have attenuated the temporal findings of this study. Operating under these limitations, our classification method had high PPV and overall accuracy for most lethal mean categories. In summary, more advanced natural language processing algorithms may be more suited to isolating actual, recent lethal mean utilization from the scenarios described above.[38] A third limitation of the study is the inability to isolate the effects of short-term pandemic-related changes from pre-existing long-term trends in suicidal behaviors. This is especially relevant considering the well-documented youth mental health crisis that existed before the COVID-19 pandemic wherein suicidal ideation and attempts among school age youth increased from 2009 to 2019.[39,40] While we were unable to account for long-term temporal trends within our analysis, we sought to control for possible short-term variability and seasonality in suicidal behavior through intra-seasonal comparisons. A fourth limitation was the use of visit level information which cannot be inferred to represent individuals as patients may have received medical care multiple times or from multiple facilities during the study period. A fifth limitation

is the potential misclassification of NSSI as a non-fatal suicide attempt within the study. Although there is some overlap between NSSI and suicide attempts, they are believed to differ in terms of their intent, repetition (with NSSI typically occurring more frequently), and lethality (with NSSI typically involving less lethal methods).[41] Therefore, our study findings may be biased towards lethal means typically indicated for NSSI such as cutting, burning, or biting.[41]

4.2 Conclusion

Data on lethal mean utilization is routinely collected and monitored by examining the death records of fatal suicides. Unfortunately, there is a dearth of information available on lethal mean utilization for non-fatal suicide attempts. While previous studies[4,7] have sought to address this need by leveraging hospital administrative databases such as the Healthcare Cost and Utilization Project, their findings do not specifically address the Washington context and are not well suited to evaluating rapidly changing mental health outcomes during the COVID-19 pandemic. This study sought to take a different approach and leverage near real-time, population-based ED data available within the ESSENCE platform to provide recent estimates of lethal mean utilization in Washington state. These estimates could be useful in informing proactive suicide prevention efforts and evaluating the impact of lethal mean restriction policies and programs on all suicide attempts, not just deaths. To maximize the utility of these estimates for suicide prevention, future investigations should seek to further disaggregate lethal mean categories and investigate trends in lethal mean utilization by discrete geographic units (such as counties) and the race and ethnicity of patients as well as other intersectional identities.

Chapter 5. TABLES & FIGURES

5.1 PRIMARY & SENSITIVITY ANALYSIS TABLES

Table 5: CDC SSA Results						
	Firearms	**Suffocation**	**Poisoning**	**Other**	**Total SSA**	**Total Visits**
Winter (4 weeks; 8-11)						
Winter 2019 (ref; 2/17 – 3/16)						
Lethal Mean Count*	>10	34	562	80	717	192479
Visit Proportion***	-	17.66	291.98	41.56	372.51	
Winter 2021 (2/21 – 3/20)						
Lethal Mean Count*	>10	35	639	103	834	178314
Percent Change in Visits**	-	2.94%	13.70%	28.75%	16.32%	-7.36%
Visit Proportion***	-	19.63	358.36	57.76	467.71	
Visit Ratio [95% CI]****	-	1.11 [0.69 1.78]	1.23 [1.1 1.37]	1.39 [1.04 1.86]	1.26 [1.14 1.39]	
Spring (4 weeks; 14-17)						
Spring 2019 (ref; 3/31 – 4/27)						
Lethal Mean Count*	>10	26	522	82	665	189608
Visit Proportion***	-	13.71	275.30	43.25	350.72	
Spring 2020 (3/29 – 4/25)						
Lethal Mean Count*	>10	28	450	82	600	120743
Percent Change in Visits**	-	7.69%	-13.79%	0.00%	-9.77%	-36.32%
Visit Proportion***	-	23.19	372.69	67.91	496.92	
Visit Ratio [95% CI]****	-	1.69 [0.99 2.88]	1.35 [1.19 1.54]	1.57 [1.16 2.13]	1.42 [1.27 1.58]	
Spring 2021 (4/4 – 5/1)						
Lethal Mean Count*	16	33	560	109	781	202375
Percent Change in Visits**	-	26.92%	7.28%	32.93%	17.44%	6.73%
Visit Proportion***	7.91	16.31	276.71	53.86	385.92	
Visit Ratio [95% CI]****	-	1.19 [0.71 1.99]	1.01 [0.89 1.13]	1.25 [0.94 1.66]	1.1 [0.99 1.22]	
Summer (4 weeks; 31-34)						
Summer 2019 (ref; 7/28 – 8/24)						
Lethal Mean Count*	>10	37	535	80	690	189281
Visit Proportion***	-	19.55	282.65	42.27	364.54	
Summer 2020 (7/26 – 8/22)						
Lethal Mean Count*	>10	18	484	88	645	176147
Percent Change in Visits**	-	-51.35%	-9.53%	10.00%	-6.52%	-6.94%
Visit Proportion***	-	10.22	274.77	49.96	366.17	
Visit Ratio [95% CI]****	-	0.52 [0.3 0.92]	0.97 [0.86 1.1]	1.18 [0.87 1.6]	1 [0.9 1.12]	
Summer 2021 (8/7 – 8/28)						
Lethal Mean Count*	>10	33	550	92	734	223539
Percent Change in Visits**	-	-10.81%	2.80%	15.00%	6.38%	18.1%
Visit Proportion***	-	14.76	246.04	41.16	328.35	

Visit Ratio [95% CI]****	-	0.76 [0.47 1.21]	0.87 [0.77 0.98]	0.97 [0.72 1.31]	0.9 [0.81 1]	
Fall (4 weeks; 49-52)						
Fall 2019 (ref; 12/1 – 12/28)						
Lethal Mean Count*	>10	37	522	95	724	205066
Visit Proportion***	-	18.04	254.55	46.33	353.06	
Fall 2020 (11/29 – 12/26)						
Lethal Mean Count*	>10	40	504	92	689	166917
Percent Change in Visits**	-	8.11%	-3.45%	-3.16%	-4.83%	-18.6%
Visit Proportion***	-	23.96	301.95	55.12	412.78	
Visit Ratio [95% CI]****	-	1.33 [0.85 2.08]	1.19 [1.05 1.34]	1.19 [0.89 1.58]	1.17 [1.05 1.3]	
Fall 2021 (11/29 – 12/26)						
Lethal Mean Count*	>10	35	508	110	697	202204
Percent Change in Visits**	-	-5.41%	-2.68%	15.79%	-3.73%	-1.4%
Visit Proportion***	-	17.31	251.23	54.40	344.70	
Visit Ratio [95% CI]****	-	0.96 [0.6 1.52]	0.99 [0.87 1.12]	1.17 [0.89 1.55]	0.98 [0.88 1.08]	

Colors were used in this table to identify statistically significant results. Please note that non-significant results may be reflective of low estimate precision and still be meaningful. The colors utilized in this table refer to the following:

Red – significantly elevated prevalence ratios and elevated percent change in visits.
Orange – significantly elevated prevalence ratios and no increase in percent change in visits.
Yellow – significantly decreased prevalence ratios and no decrease in percent change in visits.
Green – significantly decreased prevalence ratios and decreased percent change in visits.

*Lethal Mean Count (LMC) refers to the count of suspected suicide attempt ED visits wherein the lethal mean was identified (either via ICD-10 diagnostic codes or clinical free-text narratives).
**Percent Change in Visits refers to the percentage difference in four-week LMCs between the pandemic surveillance period of interest (2020, 2021) and its corresponding pre-pandemic reference period (2019).
***Visit Proportion refers to the proportion of all ED visits that suspected suicide attempt visits account for during each four-week period. This value is presented as per 100,000 ED visits for ease of interpretation.
****Visit Ratio [95% CI] is the comparison of suspected suicide attempt prevalence between the four-week pandemic surveillance period of interest (2020, 2021) and its corresponding pre-pandemic reference period (2019). Confidence intervals that do not include 1 are considered statistically significant.
"-" Refers to estimates or counts derived from cells that contained 10 > n > 0 visits and were subsequently suppressed in accordance with the Washington State Department of Health guidelines for reporting small numbers.[20]

Table 6: WA DOH SSA Results

	Firearms	Suffocation	Poisoning	Other	Total SSA	Total Visits
Winter (4 weeks; 8-11)						
Winter 2019 (ref; 2/17 – 3/16)						
Lethal Mean Count*	10	36	251	75	407	192479
Visit Proportion***	5.20	18.70	130.40	38.97	211.45	
Winter 2021 (2/21 – 3/20)						
Lethal Mean Count*	>10	36	335	87	514	178314
Percent Change in Visits**	-	0.00%	33.47%	16.00%	26.29%	-7.36%
Visit Proportion***	-	20.19	187.87	48.79	288.26	
Visit Ratio [95% CI]****	-	1.08 [0.68 1.71]	1.44 [1.22 1.7]	1.25 [0.92 1.71]	1.36 [1.2 1.55]	
Spring (4 weeks; 14-17)						

Spring 2019 (ref; 3/31 – 4/27)						
Lethal Mean Count*	12	26	238	82	388	189608
Visit Proportion***	6.33	13.71	125.52	43.25	204.63	
Spring 2020 (3/29 – 4/25)						
Lethal Mean Count*	>10	32	212	69	348	120743
Percent Change in Visits**	-	23.08%	-10.92%	-15.85%	-10.31%	-36.32%
Visit Proportion***	-	26.50	175.58	57.15	288.22	
Visit Ratio [95% CI]****	-	1.93 [1.15 3.24]	1.4 [1.16 1.68]	1.32 [0.96 1.82]	1.41 [1.22 1.63]	
Spring 2021 (4/4 – 5/1)						
Lethal Mean Count*	15	37	303	92	514	202375
Percent Change in Visits**	25.00%	42.31%	27.31%	12.20%	32.47%	6.73%
Visit Proportion***	7.41	18.28	149.72	45.46	253.98	
Visit Ratio [95% CI]****	1.17 [0.55 2.5]	1.33 [0.81 2.2]	1.19 [1.01 1.41]	1.05 [0.78 1.42]	1.24 [1.09 1.42]	
Summer (4 weeks; 31-34)						
Summer 2019 (ref; 7/28 – 8/24)						
Lethal Mean Count*	>10	39	268	94	447	189281
Visit Proportion***	-	20.60	141.59	49.66	236.16	
Summer 2020 (7/26 – 8/22)						
Lethal Mean Count*	>10	19	269	82	442	176147
Percent Change in Visits**	-	-51.28%	0.37%	-12.77%	-1.12%	-6.94%
Visit Proportion***	-	10.79	152.71	46.55	250.93	
Visit Ratio [95% CI]****	-	0.52 [0.3 0.91]	1.08 [0.91 1.28]	0.94 [0.7 1.26]	1.06 [0.93 1.21]	
Summer 2021 (8/7 – 8/28)						
Lethal Mean Count*	>10	34	287	77	457	223539
Percent Change in Visits**	-	-12.82%	7.09%	-18.09%	2.24%	18.1%
Visit Proportion***	-	15.21	128.39	34.45	204.44	
Visit Ratio [95% CI]****	-	0.74 [0.47 1.17]	0.91 [0.77 1.07]	0.69 [0.51 0.94]	0.87 [0.76 0.99]	
Fall (4 weeks; 49-52)						
Fall 2019 (ref; 12/1 – 12/28)						
Lethal Mean Count*	>10	43	269	86	461	205066
Visit Proportion***	-	20.97	131.18	41.94	224.81	
Fall 2020 (11/29 – 12/26)						
Lethal Mean Count*	>10	41	261	77	427	166917
Percent Change in Visits**	-	-4.65%	-2.97%	-10.47%	-7.38%	-18.6%
Visit Proportion***	-	24.56	156.37	46.13	255.82	
Visit Ratio [95% CI]****	-	1.17 [0.76 1.8]	1.19 [1.01 1.41]	1.1 [0.81 1.5]	1.14 [1 1.3]	
Fall 2021 (11/29 – 12/26)						
Lethal Mean Count*	>10	33	255	101	433	202204
Percent Change in Visits**	-	-23.26%	-5.20%	17.44%	-6.07%	-1.4%
Visit Proportion***	-	16.32	126.11	49.95	214.14	
Visit Ratio [95% CI]****	-	0.78 [0.49 1.22]	0.96 [0.81 1.14]	1.19 [0.89 1.59]	0.95 [0.84 1.09]	

Colors were used in this table to identify statistically significant results. Please note that non-significant results may be reflective of low estimate precision and still be meaningful. The colors utilized in this table refer to the following:

Red – significantly elevated prevalence ratios and elevated percent change in visits.
Orange – significantly elevated prevalence ratios and no increase in percent change in visits.
Yellow – significantly decreased prevalence ratios and no decrease in percent change in visits.
Green – significantly decreased prevalence ratios and decreased percent change in visits.

*Lethal Mean Count (LMC) refers to the count of suspected suicide attempt ED visits wherein the lethal mean was identified (either via ICD-10 diagnostic codes or clinical free-text narratives).

**Percent Change in Visits refers to the percentage difference in four-week LMCs between the pandemic surveillance period of interest (2020, 2021) and its corresponding pre-pandemic reference period (2019).

***Visit Proportion refers to the proportion of all ED visits that suspected suicide attempt visits account for during each four-week period. This value is presented as per 100,000 ED visits for ease of interpretation.

****Visit Ratio [95% CI] is the comparison of suspected suicide attempt prevalence between the four-week pandemic surveillance period of interest (2020, 2021) and its corresponding pre-pandemic reference period (2019). Confidence intervals that do not include 1 are considered statistically significant.

"-" Refers to estimates or counts derived from cells that contained 10 > n > 0 visits and were subsequently suppressed in accordance with the Washington State Department of Health guidelines for reporting small numbers.[20]

5.2 Figures

Figure 1: Study Population Flow Diagram

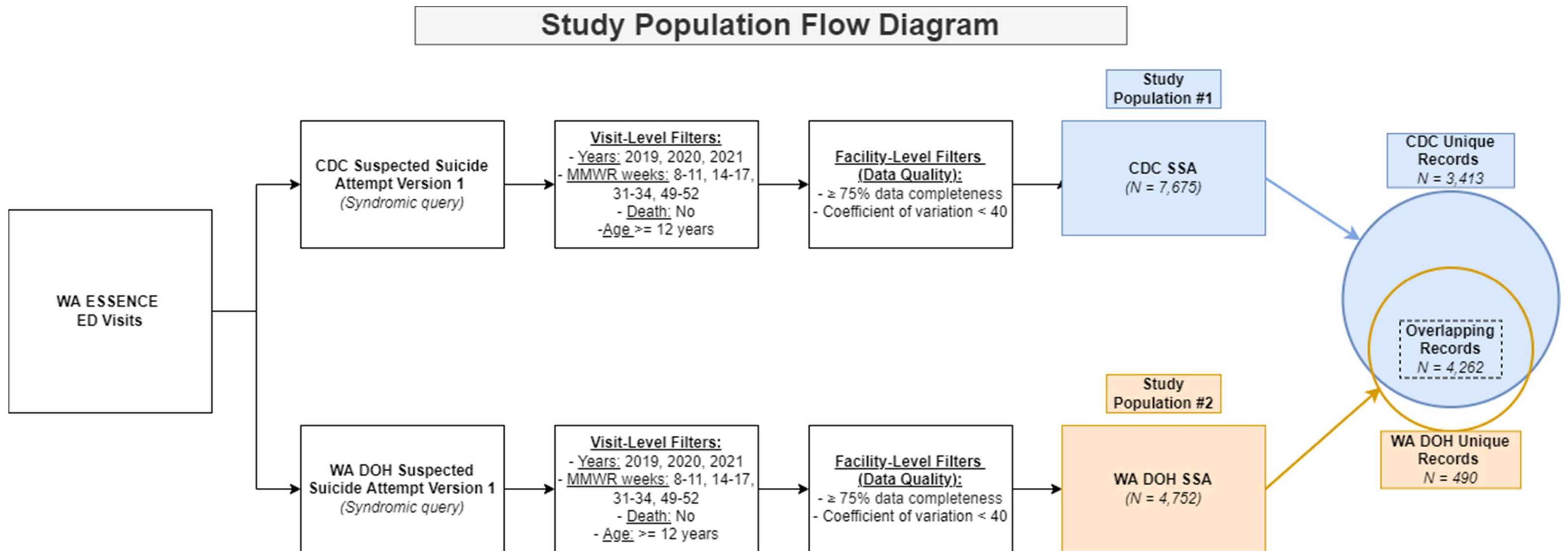


Figure 2: Lethal Mean Classification Flow Diagram

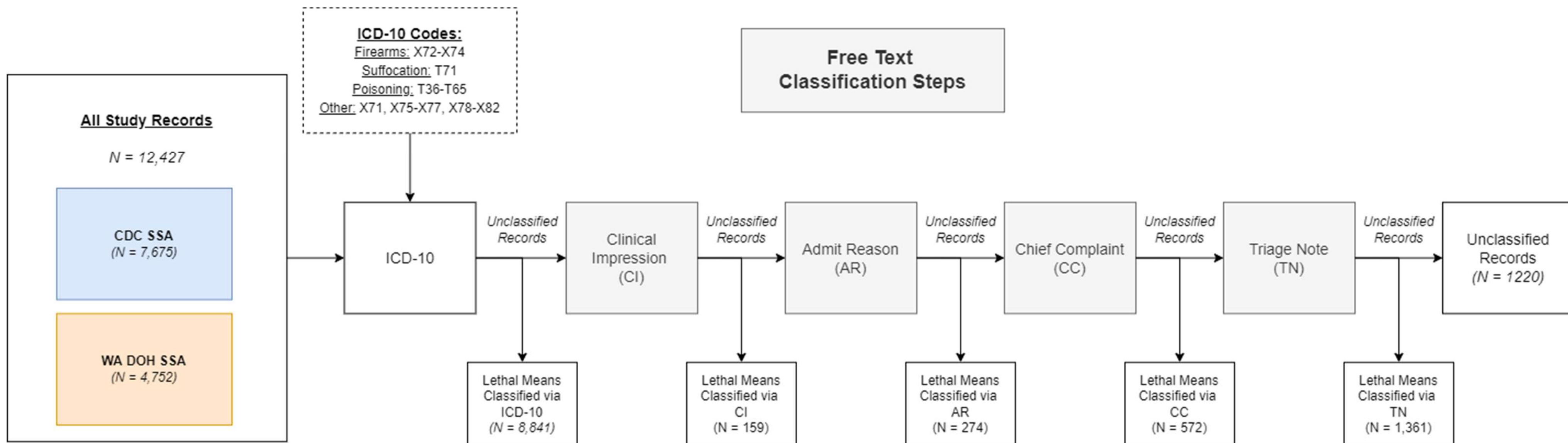
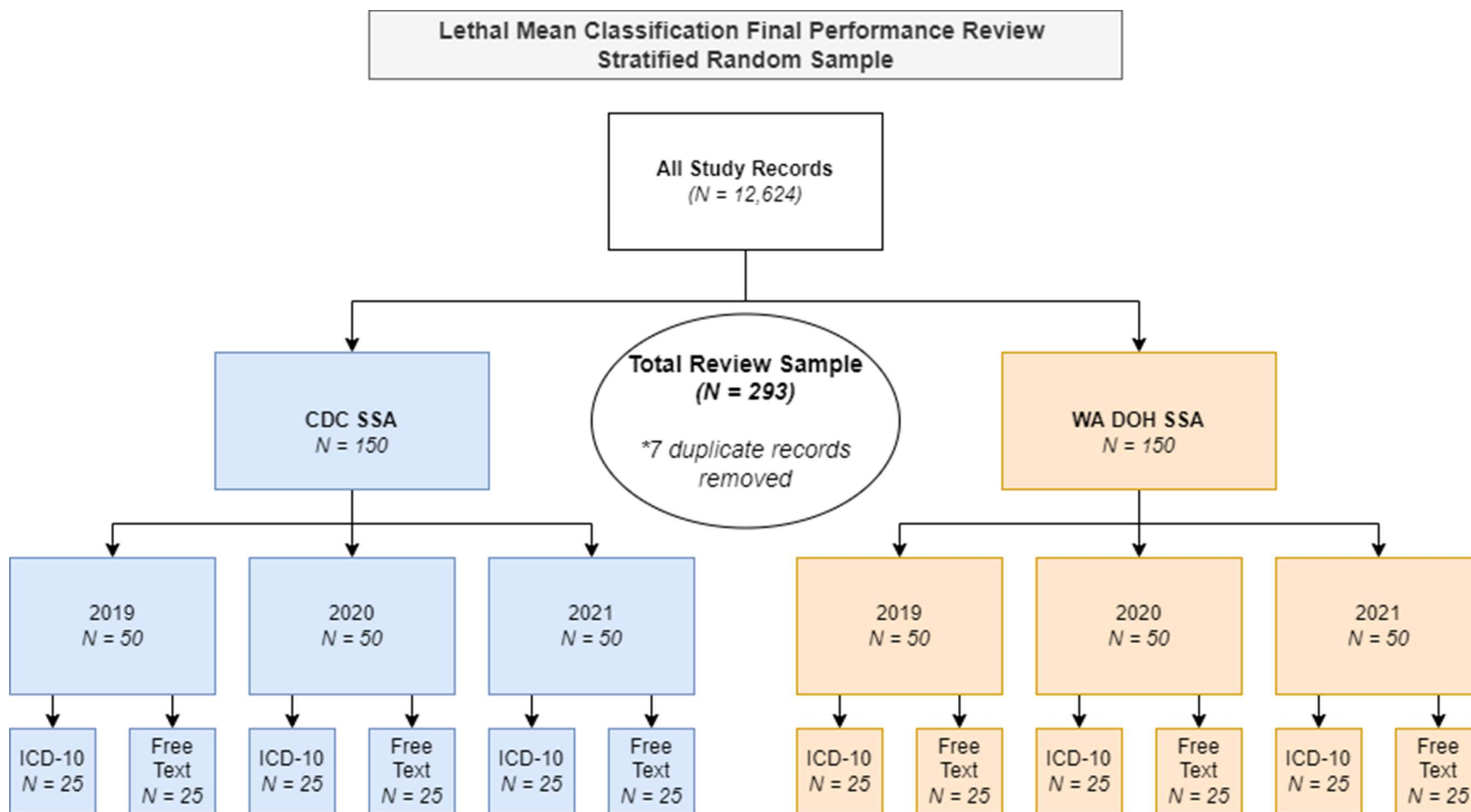


Figure 3: Stratified Random Sample of Records for Final Lethal Mean Classification Performance Review



5.3 Supplementary Tables

Supplementary Table 1: Suspected Suicide Attempt

Syndromic Query Definitions

CDC SSA

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

Syntax:

(,^[;/]T14.91^,or,^[;/]T1491^,or,^[;/]X7[1-9]^,or,^[;/]X8[0-3]^,or,^[;/]T3[6-9].[X0-9][X0-9]2^,or,^[;/]T3[6-9][X0-9][X0-9]2^,or,^[;/]T[4-5][0-9].[X0-9][X0-9]2^,or,^[;/]T[4-5][0-9][X0-9][X0-9]2^,or,^[;/]T6[0-5].[X0-9][X0-9]2^,or,^[;/]T6[0-5][X0-9][X0-9]2^,or,^[;/]T71.[X0-9][X0-9]2^,or,^[;/]T71[X0-9][X0-9]2^,or,^[;/]T3[6-9].[X0-9]2X[ADS]^,or,^[;/]T3[6-9][X0-9]2X[ADS]^,or,^[;/]T[4-5][0-9].[X0-9]2X[ADS]^,or,^[;/]T[4-5][0-9][X0-9]2X[ADS]^,or,^[;/]T6[0-5].[X0-9]2X[ADS]^,or,^[;/]T6[0-5][X0-9]2X[ADS]^,or,^[;/]T71.[X0-9]2X[ADS]^,or,^[;/]T71[X0-9]2X[ADS]^,or,^ [;/]T50.[ABZ][129]2^, or,^ [;/]T50[ABZ][129]2^,or,^[;/]E95[0-9]^,or,^82313006^,or,^55554002^,or,^287181000^,or,^891003^,or,^44301001^,or,^53846008^,or^274228002^,or,^86849004^,or,^287182007^,or,^287190007^,or,^269725004^,or,^287181000^,or,^460991000124106^,or,^59274003^,),or,(,(,(,^ATTEMPT^,ANDNOT,^NO ATTEMPT^,),OR,^[;/]TRY^,OR,TRY^,OR,^TRIED TO^,OR,(,^INTENTIONAL^,ANDNOT,(,^UNINTENTIONAL^,OR,^ACCIDENTAL^,),),), AND,(,^KILL^,OR,(,^HANG^,ANDNOT,^CHANG^,),OR,^SHOOT^,OR,^OVERDOSE^,OR,^[/ ;.]OD[/ ;.]^,OR,OD,OR,OD[/ ;.]^,OR,^[/ ;.]OD,OR,^ END^LIFE^,OR,^SUICIDE^,OR,^SUIC^,OR,^SUCI^,OR,(,^SUSCI^,ANDNOT,^RESUSCI^,),OR,^SUISID^,),or,SUICIDE,),ANDNOT,(,^END OF LIFE^,OR,^END OF BATTERY LIFE^,OR,^DENIE[SD] SELF HARM^,OR,^NO SELF HARM^,OR,^ACCIDENT^,OR,^HOMICI^,OR,^DENIE[SD] SI[\/;.]^,OR,^DENIE[SD] SI,OR,^DENIE[SD] ANY SI[\/;.]^,OR,^DENIE[SD] ANY SI,OR,^DENIE[SD] CURRENT SI[\/;.]^,OR,^DENIE[SD] CURRENT SI,OR ^NO SI[\/;.]^,OR,^NO SI,OR,^NOT SI[\/;.]^,OR,^NOT SI,OR,^DENIE[SD] SUIC^,OR,^DENIE[SD] CURRENT SUIC^,OR,^DENIE[SD] ANY SUIC^,OR,^DENIE[SD] S/H^,OR,^RT SI[\/;.]^,OR,^RT SI,OR,^RIGHT SI[\ /;.]^,OR,^RIGHT SI,OR,^NOT SUIC^,)

WA DOH SSA

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

Syntax:

```
^;T14.91^,or,^;T1491^,or,
^;T42.4X2A^,or,^;T424X2A^,or,
^;T43.592A^,or,^;T43592A^,or,
^;T39.1X2A^,or,^;T391X2A^,or,
^;T45.0X2A^,or,^;T450X2A^,or,
^;T40.3X2A^,or,^;T403x2A^,or,
(,(,^;T71.[X0-9][X0-9]2^,or,^;T71[X0-9][X0-9]2^,),andnot,(,^;T71.[X0-9][X0-
9]2__[DS]^,or,^;T71.[X0-9][X0-9]2__[DS]^,),),or,
(,(,^;X71.[0-9]^,or,^;X71[0-9]^,),andnot,(,^;X71.[0-9]__[DS]^,or,^;X71[0-9]__[DS]^,),),or,
(,(,^;X73.[0-9]^,or,^;X73[0-9]^,),andnot,(,^;X73.[0-9]__[DS]^,or,^;X73[0-9]__[DS]^,),),or,
(,(,^;X74.[0-9]^,or,^;X74[0-9]^,),andnot,(,^;X74.[0-9]__[DS]^,or,^;X74[0-9]__[DS]^,),),or,
(,(,^;X75.[0-9]^,or,^;X75[0-9]^,),andnot,(,^;X75.[0-9]__[DS]^,or,^;X75[0-9]__[DS]^,),),or,
(,(,^;X8[0-2]^,),andnot,(,^;X8[0-2]__[DS]^,),),or,
(,(,^;X83.[0-2]^,or,^;X83[0-2]^,),andnot,(,^;X83.[0-2]__[DS]^,or,^;X83[0-2]__[DS]^,),),or,
^82313006^,or,^55554002^,or,^287181000^,or,^891003^,or,^44301001^,or,^53846008^,or,^
274228002^,or,^86849004^,or,^287182007^,or,^269725004^,or,^460991000124106^,or,^592
74003^,or,
(,(,^suicide attempt^,or,^suicidal attempt^,or,^ideation and attempt^,or,^SI
attempt^,or,^attempted suicide^,or,^suicidal gesture^,or,^attempted SI^,or,^commit
suicide^,or,^commit SI^,or,^attempted strangulation^,or,^to kill himself^,or,^to kill
herself^,or,^attempt suicide^,or,^attempt at suicide^,or,^end her life^,or,^end his
life^,or,^attempt SI^,or,^attempt at SI^,or,^attempts at si^,or,^attempt to SI^,or,^attempted
hanging^,or,^attempt of suicide^,or,^attempts of suicide^,or,^ideation with attempt^,or,^wants
to be dead^,or,^wanted to be dead^,),
andnot,(,^DENIE[SD] SI[ /;.]^,or,^DENIE[SD] SI,or,^DENIE[SD] attempt[ /;.]^,OR,^not
trying to kill herself^,or,^not trying to kill himself^,or,^not trying to kill
themselves^,or,^DENIE[SD] SUIC^,OR,^DENIE[SD] CURRENT SUIC^,OR,^DENIE[SD]
ANY SUIC^,or,^denie[sd] wanting to kill himself^,or,^denie[sd] wanting to kill
herself^,or,^denie[sd] wanting to kill themselves^,or,^denie[sd] wanting to end her
life^,or,^denie[sd] wanting to end his life^,or,^denie[sd] wanting to end their life ^,),)
```

Supplementary Table 2: (CDC SSA) 12-17 Years Results						
	Firearms	**Suffocation**	**Poisoning**	**Other**	**Total SSA**	**Total Visits**
Winter (4 weeks; 8-11)						
Winter 2019 (ref; 2/17 – 3/16)						
Lethal Mean Count*	0	10	146	18	179	9504
Visit Proportion***	0.00	105.22	1536.20	189.39	1883.42	
Winter 2021 (2/21 – 3/20)						
Lethal Mean Count*	0	14	243	22	286	7501
Percent Change in Visits**	0.00%	40.00%	66.44%	22.22%	59.78%	-21.08%
Visit Proportion***	0.00	186.64	3239.57	293.29	3812.82	
Visit Ratio [95% CI]****	-	1.77 [0.79 3.99]	2.11 [1.72 2.58]	1.55 [0.83 2.89]	2.02 [1.68 2.43]	

Spring (4 weeks; 14-17)						
Spring 2019 (ref; 3/31 – 4/27)						
Lethal Mean Count*	>10	>10	144	19	174	8735
Visit Proportion***	-	-	1648.54	217.52	1991.99	
Spring 2020 (3/29 – 4/25)						
Lethal Mean Count*	0	>10	100	25	134	3907
Percent Change in Visits**	-	-	-30.56%	31.58%	-22.99%	-55.27%
Visit Proportion***	0.00	-	2559.51	639.88	3429.74	
Visit Ratio [95% CI]****	-	-	1.55 [1.21 2]	2.94 [1.62 5.34]	1.72 [1.38 2.15]	
Spring 2021 (4/4 – 5/1)						
Lethal Mean Count*	>10	>10	203	27	261	8531
Percent Change in Visits**	-	-	40.97%	42.11%	50.00%	-2.34%
Visit Proportion***	-	-	2379.56	316.49	3059.43	
Visit Ratio [95% CI]****	-	-	1.44 [1.17 1.78]	1.46 [0.81 2.61]	1.54 [1.27 1.86]	
Summer (4 weeks; 31-34)						
Summer 2019 (ref; 7/28 – 8/24)						
Lethal Mean Count*	>10	>10	116	16	143	7395
Visit Proportion***	-	-	1568.63	216.36	1933.74	
Summer 2020 (7/26 – 8/22)						
Lethal Mean Count*	>10	>10	113	14	139	7071
Percent Change in Visits**	-	-	-2.59%	-12.50%	-2.80%	-4.38%
Visit Proportion***	-	-	1598.08	197.99	1965.78	
Visit Ratio [95% CI]****	-	-	1.02 [0.79 1.32]	0.92 [0.45 1.87]	1.02 [0.81 1.28]	
Summer 2021 (8/7 – 8/28)						
Lethal Mean Count*	>10	>10	156	27	192	8900
Percent Change in Visits**	-	-	34.48%	68.75%	34.27%	20.35%
Visit Proportion***	-	-	1752.81	303.37	2157.30	
Visit Ratio [95% CI]****	-	-	1.12 [0.88 1.42]	1.4 [0.76 2.6]	1.12 [0.9 1.38]	
Fall (4 weeks; 49-52)						
Fall 2019 (ref; 12/1 – 12/28)						
Lethal Mean Count*	>10	12	151	19	191	9901
Visit Proportion***	-	121.2	1525.1	191.9	1929.1	
Fall 2020 (11/29 – 12/26)						
Lethal Mean Count*	0	16	159	28	208	5845
Percent Change in Visits**	-	33.33%	5.30%	47.37%	8.90%	-40.97%
Visit Proportion***	0.00	273.74	2720.27	479.04	3558.60	
Visit Ratio [95% CI]****	-	2.26 [1.07 4.77]	1.78 [1.43 2.22]	2.5 [1.4 4.47]	1.84 [1.52 2.24]	
Fall 2021 (12/5 – 1/1/2022)						
Lethal Mean Count*	>10	>10	184	31	232	8322
Percent Change in Visits**	-	-	21.85%	63.16%	21.47%	-15.95%
Visit Proportion***	-	-	2211.01	372.51	2787.79	
Visit Ratio [95% CI]****	-	-	1.45 [1.17 1.79]	1.94 [1.1 3.43]	1.45 [1.2 1.75]	

Colors were used in this table to identify statistically significant results. Please note that non-significant results may be reflective of low estimate precision and still be meaningful. The colors utilized in this table refer to the following:

Red – significantly elevated prevalence ratios and elevated percent change in visits.

Orange – significantly elevated prevalence ratios and no increase in percent change in visits.

Yellow – significantly decreased prevalence ratios and no decrease in percent change in visits.

Green – significantly decreased prevalence ratios and decreased percent change in visits.

*Lethal Mean Count (LMC) refers to the count of suspected suicide attempt ED visits wherein the lethal mean was identified (either via ICD-10 diagnostic codes or clinical free-text narratives).

**Percent Change in Visits refers to the percentage difference in four-week LMCs between the pandemic surveillance period of interest (2020, 2021) and its corresponding pre-pandemic reference period (2019).

***Visit Proportion refers to the proportion of all ED visits that suspected suicide attempt visits account for during each four-week period. This value is presented as per 100,000 ED visits for ease of interpretation.

****Visit Ratio [95% CI] is the comparison of suspected suicide attempt prevalence between the four-week pandemic surveillance period of interest (2020, 2021) and its corresponding pre-pandemic reference period (2019). Confidence intervals that do not include 1 are considered statistically significant.

"-" Refers to estimates or counts derived from cells that contained 10 > n > 0 visits and were subsequently suppressed in accordance with the Washington State Department of Health guidelines for reporting small numbers.[20]

Supplementary Table 3: (CDC SSA) 18-44 Years Results

	Firearms	Suffocation	Poisoning	Other	Total SSA	Total Visits
Winter (4 weeks; 8-11)						
Winter 2019 (ref; 2/17 – 3/16)						
Lethal Mean Count*	>10	12	299	37	365	68990
Visit Proportion***	-	17.39	433.40	53.63	529.06	
Winter 2021 (2/21 – 3/20)						
Lethal Mean Count*	>10	14	289	64	391	69135
Percent Change in Visits**	-	16.67%	-3.34%	72.97%	7.12%	0.21%
Visit Proportion***	-	20.25	418.02	92.57	565.56	
Visit Ratio [95% CI]****	-	1.16 [0.54 2.52]	0.96 [0.82 1.13]	1.73 [1.15 2.59]	1.07 [0.93 1.23]	
Spring (4 weeks; 14-17)						
Spring 2019 (ref; 3/31 – 4/27)						
Lethal Mean Count*	>10	12	273	41	338	70229
Visit Proportion***	-	17.09	388.73	58.38	481.28	
Spring 2020 (3/29 – 4/25)						
Lethal Mean Count*	0	18	252	44	338	48750
Percent Change in Visits**	-	50.00%	-7.69%	7.32%	0.00%	-30.58%
Visit Proportion***	0.00	36.92	516.92	90.26	693.33	
Visit Ratio [95% CI]****	-	2.16 [1.04 4.49]	1.33 [1.12 1.58]	1.55 [1.01 2.37]	1.44 [1.24 1.67]	
Spring 2021 (4/4 – 5/1)						
Lethal Mean Count*	>10	22	267	71	391	78144
Percent Change in Visits**	-	83.33%	-2.20%	73.17%	15.68%	11.27%
Visit Proportion***	-	28.15	341.68	90.86	500.36	
Visit Ratio [95% CI]****	-	1.65 [0.82 3.33]	0.88 [0.74 1.04]	1.56 [1.06 2.29]	1.04 [0.9 1.2]	
Summer (4 weeks; 31-34)						
Summer 2019 (ref; 7/28 – 8/24)						
Lethal Mean Count*	>10	21	282	42	365	72591
Visit Proportion***	-	28.93	388.48	57.86	502.82	

Summer 2020 (7/26 – 8/22)						
Lethal Mean Count*	>10	12	284	47	375	70496
Percent Change in Visits**	-	-42.86%	0.71%	11.90%	2.74%	-2.89%
Visit Proportion***	-	17.02	402.86	66.67	531.95	
Visit Ratio [95% CI]****	-	0.59 [0.29 1.2]	1.04 [0.88 1.22]	1.15 [0.76 1.75]	1.06 [0.92 1.22]	
Summer 2021 (8/7 – 8/28)						
Lethal Mean Count*	>10	18	300	54	406	87729
Percent Change in Visits**	-	-14.29%	6.38%	28.57%	11.23%	20.85%
Visit Proportion***	-	20.52	341.96	61.55	462.79	
Visit Ratio [95% CI]****	-	0.71 [0.38 1.33]	0.88 [0.75 1.04]	1.06 [0.71 1.59]	0.92 [0.8 1.06]	
Fall (4 weeks; 49-52)						
Fall 2019 (ref; 12/1 – 12/28)						
Lethal Mean Count*	>10	21	253	64	361	71776
Visit Proportion***	-	29.26	352.49	89.17	502.95	
Fall 2020 (11/29 – 12/26)						
Lethal Mean Count*	>10	17	263	52	356	66237
Percent Change in Visits**	-	-19.05%	3.95%	-18.75%	-1.39%	-7.72%
Visit Proportion***	-	25.67	397.06	78.51	537.46	
Visit Ratio [95% CI]****	-	0.88 [0.46 1.66]	1.13 [0.95 1.34]	0.88 [0.61 1.27]	1.07 [0.92 1.24]	
Fall 2021 (12/5 – 1/1/2022)						
Lethal Mean Count*	>10	25	240	65	350	76788
Percent Change in Visits**	-	19.05%	-5.14%	1.56%	-3.05%	6.98%
Visit Proportion***	-	32.56	312.55	84.65	455.80	
Visit Ratio [95% CI]****	-	1.11 [0.62 1.99]	0.89 [0.74 1.06]	0.95 [0.67 1.34]	0.91 [0.78 1.05]	

Colors were used in this table to identify statistically significant results. Please note that non-significant results may be reflective of low estimate precision and still be meaningful. The colors utilized in this table refer to the following:

Red – significantly elevated prevalence ratios and elevated percent change in visits.
Orange – significantly elevated prevalence ratios and no increase in percent change in visits.
Yellow – significantly decreased prevalence ratios and no decrease in percent change in visits.
Green – significantly decreased prevalence ratios and decreased percent change in visits.

*Lethal Mean Count (LMC) refers to the count of suspected suicide attempt ED visits wherein the lethal mean was identified (either via ICD-10 diagnostic codes or clinical free-text narratives).
**Percent Change in Visits refers to the percentage difference in four-week LMCs between the pandemic surveillance period of interest (2020, 2021) and its corresponding pre-pandemic reference period (2019).
***Visit Proportion refers to the proportion of all ED visits that suspected suicide attempt visits account for during each four-week period. This value is presented as per 100,000 ED visits for ease of interpretation.
****Visit Ratio [95% CI] is the comparison of suspected suicide attempt prevalence between the four-week pandemic surveillance period of interest (2020, 2021) and its corresponding pre-pandemic reference period (2019). Confidence intervals that do not include 1 are considered statistically significant.
"-" Refers to estimates or counts derived from cells that contained 10 > n > 0 visits and were subsequently suppressed in accordance with the Washington State Department of Health guidelines for reporting small numbers.[20]

Supplementary Table 4: (CDC SSA) 45+ Years Results						
	Firearms	**Suffocation**	**Poisoning**	**Other**	**Total SSA**	**Total Visits**
Winter (4 weeks; 8-11)						
Winter 2019 (ref; 2/17 – 3/16)						
Lethal Mean Count*	>10	12	117	25	161	87499
Visit Proportion***	-	13.71	133.72	28.57	184.00	
Winter 2021 (2/21 – 3/20)						
Lethal Mean Count*	>10	>10	107	17	148	88235
Percent Change in Visits**	-	-	-8.55%	-32.00%	-8.07%	0.84%
Visit Proportion***	-	-	121.27	19.27	167.73	
Visit Ratio [95% CI]****	-	-	0.91 [0.7 1.18]	0.67 [0.36 1.25]	0.91 [0.73 1.14]	
Spring (4 weeks; 14-17)						
Spring 2019 (ref; 3/31 – 4/27)						
Lethal Mean Count*	>10	>10	105	22	144	87585
Visit Proportion***	-	-	119.88	25.12	164.41	
Spring 2020 (3/29 – 4/25)						
Lethal Mean Count*	>10	>10	98	13	125	60003
Percent Change in Visits**	-	-	-6.67%	-40.91%	-13.19%	-31.49%
Visit Proportion***	-	-	163.33	21.67	208.32	
Visit Ratio [95% CI]****	-	-	1.36 [1.03 1.79]	0.86 [0.43 1.71]	1.27 [1 1.61]	
Spring 2021 (4/4 – 5/1)						
Lethal Mean Count*	>10	>10	90	11	123	97323
Percent Change in Visits**	-	-	-14.29%	-50.00%	-14.58%	11.12%
Visit Proportion***	-	-	92.48	11.30	126.38	
Visit Ratio [95% CI]****	-	-	0.77 [0.58 1.02]	0.45 [0.22 0.93]	0.77 [0.6 0.98]	
Summer (4 weeks; 31-34)						
Summer 2019 (ref; 7/28 – 8/24)						
Lethal Mean Count*	>10	>10	137	22	174	90736
Visit Proportion***	-	-	150.99	24.25	191.77	
Summer 2020 (7/26 – 8/22)						
Lethal Mean Count*	0	>10	86	18	119	85011
Percent Change in Visits**	-	-	-37.23%	-18.18%	-31.61%	-6.31%
Visit Proportion***	0.00	-	101.16	21.17	139.98	
Visit Ratio [95% CI]****	-	-	0.67 [0.51 0.88]	0.87 [0.47 1.63]	0.73 [0.58 0.92]	
Summer 2021 (8/7 – 8/28)						
Lethal Mean Count*	>10	>10	94	11	129	105252
Percent Change in Visits**	-	-	-31.39%	-50.00%	-25.86%	16%
Visit Proportion***	-	-	89.31	10.45	122.56	
Visit Ratio [95% CI]****	-	-	0.59 [0.46 0.77]	0.43 [0.21 0.89]	0.64 [0.51 0.8]	
Fall (4 weeks; 49-52)						
Fall 2019 (ref; 12/1 – 12/28)						
Lethal Mean Count*	>10	>10	118	12	140	88226
Visit Proportion***	-	-	133.75	13.60	158.68	

Fall 2020 (11/29 – 12/26)						
Lethal Mean Count*	>10	>10	82	12	117	84083
Percent Change in Visits**	-	-	-30.51%	0.00%	-16.43%	-4.7%
Visit Proportion***	-	-	97.52	14.27	139.15	
Visit Ratio [95% CI]****	-	-	0.73 [0.55 0.97]	1.05 [0.47 2.34]	0.88 [0.69 1.12]	
Fall 2021 (12/5 – 1/1/2022)						
Lethal Mean Count*	>10	>10	84	14	109	93856
Percent Change in Visits**	-	-	-28.81%	16.67%	-22.14%	6.38%
Visit Proportion***	-	-	89.50	14.92	116.14	
Visit Ratio [95% CI]****	-	-	0.67 [0.51 0.89]	1.1 [0.51 2.37]	0.73 [0.57 0.94]	

Colors were used in this table to identify statistically significant results. Please note that non-significant results may be reflective of low estimate precision and still be meaningful. The colors utilized in this table refer to the following:

Red – significantly elevated prevalence ratios and elevated percent change in visits.
Orange – significantly elevated prevalence ratios and no increase in percent change in visits.
Yellow – significantly decreased prevalence ratios and no decrease in percent change in visits.
Green – significantly decreased prevalence ratios and decreased percent change in visits.

*Lethal Mean Count (LMC) refers to the count of suspected suicide attempt ED visits wherein the lethal mean was identified (either via ICD-10 diagnostic codes or clinical free-text narratives).
**Percent Change in Visits refers to the percentage difference in four-week LMCs between the pandemic surveillance period of interest (2020, 2021) and its corresponding pre-pandemic reference period (2019).
***Visit Proportion refers to the proportion of all ED visits that suspected suicide attempt visits account for during each four-week period. This value is presented as per 100,000 ED visits for ease of interpretation.
****Visit Ratio [95% CI] is the comparison of suspected suicide attempt prevalence between the four-week pandemic surveillance period of interest (2020, 2021) and its corresponding pre-pandemic reference period (2019). Confidence intervals that do not include 1 are considered statistically significant.
"-" Refers to estimates or counts derived from cells that contained 10 > n > 0 visits and were subsequently suppressed in accordance with the Washington State Department of Health guidelines for reporting small numbers.[20]

Supplementary Table 5: (CDC SSA) Females Results

	Firearms	**Suffocation**	**Poisoning**	**Other**	**Total SSA**	**Total Visits**
Winter (4 weeks; 8-11)						
Winter 2019 (ref; 2/17 – 3/16)						
Lethal Mean Count*	>10	17	397	41	462	103775
Visit Proportion***	-	16.38	382.56	39.51	445.19	
Winter 2021 (2/21 – 3/20)						
Lethal Mean Count*	>10	22	452	67	567	96028
Percent Change in Visits**	-	29.41%	13.85%	63.41%	22.73%	-7.47%
Visit Proportion***	-	22.91	470.70	69.77	590.45	
Visit Ratio [95% CI]****	-	1.4 [0.74 2.63]	1.23 [1.08 1.41]	1.77 [1.2 2.6]	1.33 [1.17 1.5]	
Spring (4 weeks; 14-17)						
Spring 2019 (ref; 3/31 – 4/27)						
Lethal Mean Count*	>10	10	366	50	431	102355
Visit Proportion***	-	9.77	357.58	48.85	421.08	
Spring 2020 (3/29 – 4/25)						
Lethal Mean Count*	>10	13	305	62	402	61541
Percent Change in Visits**	-	30.00%	-16.67%	24.00%	-6.73%	-39.87%

Visit Proportion***	-	21.12	495.60	100.75	653.22	
Visit Ratio [95% CI]****	-	2.16 [0.95 4.93]	1.39 [1.19 1.61]	2.06 [1.42 2.99]	1.55 [1.35 1.78]	
Spring 2021 (4/4 – 5/1)						
Lethal Mean Count*	>10	18	391	59	507	108417
Percent Change in Visits**	-	80.00%	6.83%	18.00%	17.63%	5.92%
Visit Proportion***	-	16.60	360.64	54.42	467.64	
Visit Ratio [95% CI]****	-	1.7 [0.78 3.68]	1.01 [0.87 1.16]	1.11 [0.76 1.62]	1.11 [0.98 1.26]	
Summer (4 weeks; 31-34)						
Summer 2019 (ref; 7/28 – 8/24)						
Lethal Mean Count*	>10	13	350	47	420	101466
Visit Proportion***	-	12.81	344.94	46.32	413.93	
Summer 2020 (7/26 – 8/22)						
Lethal Mean Count*	>10	>10	330	45	405	93244
Percent Change in Visits**	-	-	-5.71%	-4.26%	-3.57%	-8.1%
Visit Proportion***	-	-	353.91	48.26	434.34	
Visit Ratio [95% CI]****	-	-	1.03 [0.88 1.19]	1.04 [0.69 1.57]	1.05 [0.92 1.2]	
Summer 2021 (8/7 – 8/28)						
Lethal Mean Count*	>10	11	389	49	480	119526
Percent Change in Visits**	-	-15.38%	11.14%	4.26%	14.29%	17.8%
Visit Proportion***	-	9.20	325.45	41.00	401.59	
Visit Ratio [95% CI]****	-	0.72 [0.32 1.6]	0.94 [0.82 1.09]	0.89 [0.59 1.32]	0.97 [0.85 1.11]	
Fall (4 weeks; 49-52)						
Fall 2019 (ref; 12/1 – 12/28)						
Lethal Mean Count*	>10	16	355	57	448	109892
Visit Proportion***	-	14.56	323.04	51.87	407.67	
Fall 2020 (11/29 – 12/26)						
Lethal Mean Count*	0	26	350	46	437	88829
Percent Change in Visits**	-	62.50%	-1.41%	-19.30%	-2.46%	-19.17%
Visit Proportion***	0.00	29.27	394.02	51.78	491.96	
Visit Ratio [95% CI]****	-	2.01 [1.08 3.75]	1.22 [1.05 1.41]	1 [0.68 1.47]	1.21 [1.06 1.38]	
Fall 2021 (12/5 – 1/1/2022)						
Lethal Mean Count*	>10	17	351	53	435	107835
Percent Change in Visits**	-	6.25%	-1.13%	-7.02%	-2.90%	-1.87%
Visit Proportion***	-	15.76	325.50	49.15	403.39	
Visit Ratio [95% CI]****	-	1.08 [0.55 2.14]	1.01 [0.87 1.17]	0.95 [0.65 1.38]	0.99 [0.87 1.13]	

Colors were used in this table to identify statistically significant results. Please note that non-significant results may be reflective of low estimate precision and still be meaningful. The colors utilized in this table refer to the following:

Red – significantly elevated prevalence ratios and elevated percent change in visits.
Orange – significantly elevated prevalence ratios and no increase in percent change in visits.
Yellow – significantly decreased prevalence ratios and no decrease in percent change in visits.
Green – significantly decreased prevalence ratios and decreased percent change in visits.

*Lethal Mean Count (LMC) refers to the count of suspected suicide attempt ED visits wherein the lethal mean was identified (either via ICD-10 diagnostic codes or clinical free-text narratives).

**Percent Change in Visits refers to the percentage difference in four-week LMCs between the pandemic surveillance period of interest (2020, 2021) and its corresponding pre-pandemic reference period (2019).
***Visit Proportion refers to the proportion of all ED visits that suspected suicide attempt visits account for during each four-week period. This value is presented as per 100,000 ED visits for ease of interpretation.
****Visit Ratio [95% CI] is the comparison of suspected suicide attempt prevalence between the four-week pandemic surveillance period of interest (2020, 2021) and its corresponding pre-pandemic reference period (2019). Confidence intervals that do not include 1 are considered statistically significant.
"-" Refers to estimates or counts derived from cells that contained 10 > n > 0 visits and were subsequently suppressed in accordance with the Washington State Department of Health guidelines for reporting small numbers.[20]

Supplementary Table 6: (CDC) Males Results

	Firearms	Suffocation	Poisoning	Other	Total SSA	Total Visits
Winter (4 weeks; 8-11)						
Winter 2019 (ref; 2/17 – 3/16)						
Lethal Mean Count*	>10	18	171	41	255	88689
Visit Proportion***	-	20.30	192.81	46.23	287.52	
Winter 2021 (2/21 – 3/20)						
Lethal Mean Count*	>10	14	193	36	267	82220
Percent Change in Visits**	-	-22.22%	12.87%	-12.20%	4.71%	-7.29%
Visit Proportion***	-	17.03	234.74	43.78	324.74	
Visit Ratio [95% CI]****	-	0.84 [0.42 1.69]	1.22 [0.99 1.5]	0.95 [0.61 1.48]	1.13 [0.95 1.34]	
Spring (4 weeks; 14-17)						
Spring 2019 (ref; 3/31 – 4/27)						
Lethal Mean Count*	>10	18	159	33	234	87232
Visit Proportion***	-	20.63	182.27	37.83	268.25	
Spring 2020 (3/29 – 4/25)						
Lethal Mean Count*	>10	16	146	21	197	59168
Percent Change in Visits**	-	-11.11%	-8.18%	-36.36%	-15.81%	-32.17%
Visit Proportion***	-	27.04	246.76	35.49	332.95	
Visit Ratio [95% CI]****	-	1.31 [0.67 2.57]	1.35 [1.08 1.69]	0.94 [0.54 1.62]	1.24 [1.03 1.5]	
Spring 2021 (4/4 – 5/1)						
Lethal Mean Count*	15	15	173	51	273	93864
Percent Change in Visits**	400.00%	-16.67%	8.81%	54.55%	16.67%	7.6%
Visit Proportion***	15.98	15.98	184.31	54.33	290.85	
Visit Ratio [95% CI]****	4.65 [1.35 16.05]	0.77 [0.39 1.54]	1.01 [0.82 1.25]	1.44 [0.93 2.23]	1.08 [0.91 1.29]	
Summer (4 weeks; 31-34)						
Summer 2019 (ref; 7/28 – 8/24)						
Lethal Mean Count*	>10	24	187	38	269	87776
Visit Proportion***	-	27.34	213.04	43.29	306.46	
Summer 2020 (7/26 – 8/22)						
Lethal Mean Count*	>10	>10	158	36	238	82846
Percent Change in Visits**	-	-	-15.51%	-5.26%	-11.52%	-5.62%
Visit Proportion***	-	-	190.72	43.45	287.28	
Visit Ratio [95% CI]****	-	-	0.9 [0.72 1.11]	1 [0.64 1.58]	0.94 [0.79 1.12]	
Summer 2021 (8/7 – 8/28)						
Lethal Mean Count*	>10	24	163	45	253	103917

Percent Change in Visits**	-	0.00%	-12.83%	18.42%	-5.95%	18.39%
Visit Proportion***	-	23.10	156.86	43.30	243.46	
Visit Ratio [95% CI]****	-	0.84 [0.48 1.49]	0.74 [0.6 0.91]	1 [0.65 1.54]	0.79 [0.67 0.94]	
Fall (4 weeks; 49-52)						
Fall 2019 (ref; 12/1 – 12/28)						
Lethal Mean Count*	>10	23	191	41	276	95141
Visit Proportion***	-	24.17	200.75	43.09	290.10	
Fall 2020 (11/29 – 12/26)						
Lethal Mean Count*	>10	14	160	47	252	78020
Percent Change in Visits**	-	-39.13%	-16.23%	14.63%	-8.70%	-18%
Visit Proportion***	-	17.94	205.08	60.24	322.99	
Visit Ratio [95% CI]****	-	0.74 [0.38 1.44]	1.02 [0.83 1.26]	1.4 [0.92 2.12]	1.11 [0.94 1.32]	
Fall 2021 (12/5 – 1/1/2022)						
Lethal Mean Count*	>10	19	161	57	261	94265
Percent Change in Visits**	-	-17.39%	-15.71%	39.02%	-5.43%	-0.92%
Visit Proportion***	-	20.16	170.80	60.47	276.88	
Visit Ratio [95% CI]****	-	0.83 [0.45 1.53]	0.85 [0.69 1.05]	1.4 [0.94 2.1]	0.95 [0.81 1.13]	

Colors were used in this table to identify statistically significant results. Please note that non-significant results may be reflective of low estimate precision and still be meaningful. The colors utilized in this table refer to the following:

Red – significantly elevated prevalence ratios and elevated percent change in visits.
Orange – significantly elevated prevalence ratios and no increase in percent change in visits.
Yellow – significantly decreased prevalence ratios and no decrease in percent change in visits.
Green – significantly decreased prevalence ratios and decreased percent change in visits.

*Lethal Mean Count (LMC) refers to the count of suspected suicide attempt ED visits wherein the lethal mean was identified (either via ICD-10 diagnostic codes or clinical free-text narratives).
**Percent Change in Visits refers to the percentage difference in four-week LMCs between the pandemic surveillance period of interest (2020, 2021) and its corresponding pre-pandemic reference period (2019).
***Visit Proportion refers to the proportion of all ED visits that suspected suicide attempt visits account for during each four-week period. This value is presented as per 100,000 ED visits for ease of interpretation.
****Visit Ratio [95% CI] is the comparison of suspected suicide attempt prevalence between the four-week pandemic surveillance period of interest (2020, 2021) and its corresponding pre-pandemic reference period (2019). Confidence intervals that do not include 1 are considered statistically significant.
"-" Refers to estimates or counts derived from cells that contained 10 > n > 0 visits and were subsequently suppressed in accordance with the Washington State Department of Health guidelines for reporting small numbers.[20]

Supplementary Table 7: (CDC SSA) Urban Results

	Firearms	Suffocation	Poisoning	Other	Total SSA	Total Visits
Winter (4 weeks; 8-11)						
Winter 2019 (ref; 2/17 – 3/16)						
Lethal Mean Count*	>10	33	525	69	648	169046
Visit Proportion***	-	19.52	310.57	40.82	383.33	
Winter 2021 (2/21 – 3/20)						
Lethal Mean Count*	>10	31	570	90	737	155015
Percent Change in Visits**	-	-6.06%	8.57%	30.43%	13.73%	-8.3%
Visit Proportion***	-	20.00	367.71	58.06	475.44	
Visit Ratio [95% CI]****	-	1.02 [0.63 1.67]	1.18 [1.05 1.33]	1.42 [1.04 1.95]	1.24 [1.12 1.38]	

Spring (4 weeks; 14-17)						
Spring 2019 (ref; 3/31 – 4/27)						
Lethal Mean Count*	>10	27	467	66	585	167341
Visit Proportion***	-	16.13	279.07	39.44	349.59	
Spring 2020 (3/29 – 4/25)						
Lethal Mean Count*	>10	26	410	66	530	106086
Percent Change in Visits**	-	-3.70%	-12.21%	0.00%	-9.40%	-36.6%
Visit Proportion***	-	24.51	386.48	62.21	499.59	
Visit Ratio [95% CI]****	-	1.52 [0.89 2.6]	1.38 [1.21 1.58]	1.58 [1.12 2.22]	1.43 [1.27 1.61]	
Spring 2021 (4/4 – 5/1)						
Lethal Mean Count*	14	31	519	97	710	175363
Percent Change in Visits**	-	14.81%	11.13%	46.97%	21.37%	4.79%
Visit Proportion***	7.98	17.68	295.96	55.31	404.87	
Visit Ratio [95% CI]****	-	1.1 [0.65 1.84]	1.06 [0.94 1.2]	1.4 [1.03 1.92]	1.16 [1.04 1.29]	
Summer (4 weeks; 31-34)						
Summer 2019 (ref; 7/28 – 8/24)						
Lethal Mean Count*	>10	35	486	74	619	167683
Visit Proportion***	-	20.87	289.83	44.13	369.15	
Summer 2020 (7/26 – 8/22)						
Lethal Mean Count*	>10	16	435	69	569	152551
Percent Change in Visits**	-	-54.29%	-10.49%	-6.76%	-8.08%	-9.02%
Visit Proportion***	-	10.49	285.15	45.23	372.99	
Visit Ratio [95% CI]****	-	0.5 [0.28 0.91]	0.98 [0.86 1.12]	1.02 [0.74 1.42]	1.01 [0.9 1.13]	
Summer 2021 (8/7 – 8/28)						
Lethal Mean Count*	>10	31	503	84	663	192145
Percent Change in Visits**	-	-11.43%	3.50%	13.51%	7.11%	14.59%
Visit Proportion***	-	16.13	261.78	43.72	345.05	
Visit Ratio [95% CI]****	-	0.77 [0.48 1.25]	0.9 [0.8 1.02]	0.99 [0.72 1.35]	0.93 [0.84 1.04]	
Fall (4 weeks; 49-52)						
Fall 2019 (ref; 12/1 – 12/28)						
Lethal Mean Count*	>10	36	501	82	656	180716
Visit Proportion***	-	19.92	277.23	45.38	363.00	
Fall 2020 (11/29 – 12/26)						
Lethal Mean Count*	>10	33	465	79	620	146316
Percent Change in Visits**	-	-8.33%	-7.19%	-3.66%	-5.49%	-19.04%
Visit Proportion***	-	22.55	317.81	53.99	423.74	
Visit Ratio [95% CI]****	-	1.13 [0.71 1.82]	1.15 [1.01 1.3]	1.19 [0.87 1.62]	1.17 [1.05 1.3]	
Fall 2021 (12/5 – 1/1/2022)						
Lethal Mean Count*	>10	33	456	91	610	175906
Percent Change in Visits**	-	-8.33%	-8.98%	10.98%	-7.01%	-2.66%
Visit Proportion***	-	18.76	259.23	51.73	346.78	
Visit Ratio [95% CI]****	-	0.94 [0.59 1.51]	0.94 [0.82 1.06]	1.14 [0.85 1.54]	0.96 [0.86 1.07]	

Colors were used in this table to identify statistically significant results. Please note that non-significant results may be reflective of low estimate precision and still be meaningful. The colors utilized in this table refer to the following:

- Red – significantly elevated prevalence ratios and elevated percent change in visits.
- Orange – significantly elevated prevalence ratios and no increase in percent change in visits.
- Yellow – significantly decreased prevalence ratios and no decrease in percent change in visits.
- Green – significantly decreased prevalence ratios and decreased percent change in visits.

*Lethal Mean Count (LMC) refers to the count of suspected suicide attempt ED visits wherein the lethal mean was identified (either via ICD-10 diagnostic codes or clinical free-text narratives).
**Percent Change in Visits refers to the percentage difference in four-week LMCs between the pandemic surveillance period of interest (2020, 2021) and its corresponding pre-pandemic reference period (2019).
***Visit Proportion refers to the proportion of all ED visits that suspected suicide attempt visits account for during each four-week period. This value is presented as per 100,000 ED visits for ease of interpretation.
****Visit Ratio [95% CI] is the comparison of suspected suicide attempt prevalence between the four-week pandemic surveillance period of interest (2020, 2021) and its corresponding pre-pandemic reference period (2019). Confidence intervals that do not include 1 are considered statistically significant.
"-" Refers to estimates or counts derived from cells that contained 10 > n > 0 visits and were subsequently suppressed in accordance with the Washington State Department of Health guidelines for reporting small numbers.[20]

Supplementary Table 8: (CDC SSA) Rural Results						
	Firearms	**Suffocation**	**Poisoning**	**Other**	**Total SSA**	**Total Visits**
Winter (4 weeks; 8-11)						
Winter 2019 (ref; 2/17 – 3/16)						
Lethal Mean Count*	>10	>10	43	13	69	22454
Visit Proportion***	-	-	191.50	57.90	307.29	
Winter 2021 (2/21 – 3/20)						
Lethal Mean Count*	0	>10	75	13	97	22753
Percent Change in Visits**	-	-	74.42%	0.00%	40.58%	1.33%
Visit Proportion***	0.00	-	329.63	57.14	426.32	
Visit Ratio [95% CI]****	-	-	1.72 [1.18 2.5]	0.99 [0.46 2.13]	1.39 [1.02 1.89]	
Spring (4 weeks; 14-17)						
Spring 2019 (ref; 3/31 – 4/27)						
Lethal Mean Count*	>10	>10	58	17	80	21513
Visit Proportion***	-	-	269.60	79.02	371.87	
Spring 2020 (3/29 – 4/25)						
Lethal Mean Count*	0	>10	42	17	70	14261
Percent Change in Visits**	-	-	-27.59%	0.00%	-12.50%	-33.71%
Visit Proportion***	0.00	-	294.51	119.21	490.85	
Visit Ratio [95% CI]****	-	-	1.09 [0.73 1.62]	1.51 [0.77 2.95]	1.32 [0.96 1.82]	
Spring 2021 (4/4 – 5/1)						
Lethal Mean Count*	>10	>10	46	14	71	26125
Percent Change in Visits**	-	-	-20.69%	-17.65%	-11.25%	21.44%
Visit Proportion***	-	-	176.08	53.59	271.77	
Visit Ratio [95% CI]****	-	-	0.65 [0.44 0.96]	0.68 [0.33 1.38]	0.73 [0.53 1.01]	
Summer (4 weeks; 31-34)						
Summer 2019 (ref; 7/28 – 8/24)						
Lethal Mean Count*	>10	>10	52	11	71	20522

Visit Proportion***	-	-	253.39	53.60	345.97	
Summer 2020 (7/26 – 8/22)						
Lethal Mean Count*	0	>10	53	13	75	22877
Percent Change in Visits**	-	-	1.92%	18.18%	5.63%	11.48%
Visit Proportion***	0.00	-	231.67	56.83	327.84	
Visit Ratio [95% CI]****	-	-	0.91 [0.62 1.34]	1.06 [0.48 2.37]	0.95 [0.69 1.31]	
Summer 2021 (8/7 – 8/28)						
Lethal Mean Count*	0	>10	50	10	71	29870
Percent Change in Visits**	-	-	-3.85%	-9.09%	0.00%	45.55%
Visit Proportion***	0.00	-	167.39	33.48	237.70	
Visit Ratio [95% CI]****	-	-	0.66 [0.45 0.97]	0.62 [0.27 1.47]	0.69 [0.49 0.95]	
Fall (4 weeks; 49-52)						
Fall 2019 (ref; 12/1 – 12/28)						
Lethal Mean Count*	>10	>10	45	16	68	23409
Visit Proportion***	-	-	192.23	68.35	290.49	
Fall 2020 (11/29 – 12/26)						
Lethal Mean Count*	0	>10	45	14	69	20071
Percent Change in Visits**	-	-	0.00%	-12.50%	1.47%	-14.26%
Visit Proportion***	0.00	-	224.20	69.75	343.78	
Visit Ratio [95% CI]****	-	-	1.17 [0.77 1.76]	1.02 [0.5 2.09]	1.18 [0.85 1.65]	
Fall 2021 (12/5 – 1/1/2022)						
Lethal Mean Count*	>10	>10	56	20	87	25430
Percent Change in Visits**	-	-	24.44%	25.00%	27.94%	8.63%
Visit Proportion***	-	-	220.21	78.65	342.12	
Visit Ratio [95% CI]****	-	-	1.15 [0.77 1.7]	1.15 [0.6 2.22]	1.18 [0.86 1.62]	

Colors were used in this table to identify statistically significant results. Please note that non-significant results may be reflective of low estimate precision and still be meaningful. The colors utilized in this table refer to the following:

Red – significantly elevated prevalence ratios and elevated percent change in visits.
Orange – significantly elevated prevalence ratios and no increase in percent change in visits.
Yellow – significantly decreased prevalence ratios and no decrease in percent change in visits.
Green – significantly decreased prevalence ratios and decreased percent change in visits.

*Lethal Mean Count (LMC) refers to the count of suspected suicide attempt ED visits wherein the lethal mean was identified (either via ICD-10 diagnostic codes or clinical free-text narratives).
**Percent Change in Visits refers to the percentage difference in four-week LMCs between the pandemic surveillance period of interest (2020, 2021) and its corresponding pre-pandemic reference period (2019).
***Visit Proportion refers to the proportion of all ED visits that suspected suicide attempt visits account for during each four-week period. This value is presented as per 100,000 ED visits for ease of interpretation.
****Visit Ratio [95% CI] is the comparison of suspected suicide attempt prevalence between the four-week pandemic surveillance period of interest (2020, 2021) and its corresponding pre-pandemic reference period (2019). Confidence intervals that do not include 1 are considered statistically significant.
"-" Refers to estimates or counts derived from cells that contained 10 > n > 0 visits and were subsequently suppressed in accordance with the Washington State Department of Health guidelines for reporting small numbers.[20]

Chapter 6. REFERENCES

1. Centers for Disease Control and Prevention. WISQARS (Web-based Injury Statistics Query and Reporting System)|Injury Center|CDC. Centers for Disease Control and Prevention. Published 2019. https://www.cdc.gov/injury/wisqars/

2. Degrauw X. SUICIDE in WA. Washington State Department of Health; 2021. https://doh.wa.gov/sites/default/files/legacy/Documents/Pubs//140-254-SuicideInWA.pdf

3. Miller M, Azrael D, Barber C. Suicide Mortality in the United States: The Importance of Attending to Method in Understanding Population-Level Disparities in the Burden of Suicide. Annual Review of Public Health. 2012;33(1):393-408. doi:10.1146/annurev-publhealth-031811-124636

4. Wang J, Sumner SA, Simon TR, et al. Trends in the Incidence and Lethality of Suicidal Acts in the United States, 2006 to 2015. JAMA Psychiatry. 2020;77(7):684. doi:10.1001/jamapsychiatry.2020.0596

5. Czeisler MÉ. Mental Health, Substance Use, and Suicidal Ideation during the COVID-19 Pandemic. MMWR Morbidity and Mortality Weekly Report. 2020;69(32). doi:10.15585/mmwr.mm6932a1

6. Yard E. 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. MMWR Morbidity and Mortality Weekly Report. 2021;70(70(24);888–894). doi:10.15585/mmwr.mm7024e1

7. Conner A, Azrael D, Miller M. Suicide Case-Fatality Rates in the United States, 2007 to 2014. Annals of Internal Medicine. 2019;171(12):885. doi:10.7326/m19-1324

8. Burkom H, Loschen W, Wojcik R, et al. Electronic Surveillance System for the Early Notification of Community-Based Epidemics (ESSENCE): Overview, Components, and Public Health Applications. JMIR Public Health and Surveillance. 2021;7(6):e26303. doi:10.2196/26303

9. Washington State Department of Health. RHINO Data Description | Washington State Department of Health. doh.wa.gov. Accessed May 14, 2022. https://doh.wa.gov/public-health-

healthcare-providers/healthcare-professions-and-facilities/data-exchange-0/syndromic-surveillance-rhino/data-description

10. Soole R, Kõlves K, De Leo D. Suicide in Children: A Systematic Review. Archives of Suicide Research. 2014;19(3):285-304. doi:10.1080/13811118.2014.996694

11. Centers for Disease Control and Prevention - National Syndromic Surveillance Program. Self-harm and Suicide-related - Syndrome Definition Committee | Knowledge Repository. knowledgerepository.syndromicsurveillance.org. Published June 15, 2018. Accessed May 14, 2022. https://knowledgerepository.syndromicsurveillance.org/self-harm-and-suicide-related-syndrome-definition-committee

12. Revising the Suspected Suicide Attempt Definition CDC Emergency Department Surveillance of Nonfatal Suicide-Related Outcomes (ED-SNSRO) WA DOH Reverse Site Visit, September 2021

13. Gbedegnon Roseric Azondekon. ESSENCE CCDD Categories:: Documentation for Rnssp R Markdown Templates. Github.io. Published 2022. Accessed June 7, 2022. https://cdcgov.github.io/Rnssp-rmd-templates/templates/essenceccdd/

14. Silge J. 3 Analyzing word and document frequency: tf-idf | Text Mining with R. Tidytextmining.com. Published September 2, 2019. https://www.tidytextmining.com/tfidf.html

15. Washington State Department of Health. COVID-19 Data Dashboard | DOH. doh.wa.gov. Published May 14, 2022. https://doh.wa.gov/emergencies/covid-19/data-dashboard

16. Washington Governor: Jay Inslee. Inslee announces vaccine eligibility expansion to all adults April 15 | Governor Jay Inslee. www.governor.wa.gov. Published March 31, 2021. Accessed May 14, 2022. https://www.governor.wa.gov/news-media/inslee-announces-vaccine-eligibility-expansion-all-adults-april-15#:~:text=Jay%20Inslee%20today%20announced%20that

17. Washington State Department of Health. SARS-CoV-2 Sequencing and Variants in Washington State.; 2022. Accessed May 14, 2022. https://doh.wa.gov/sites/default/files/2022-02/420-316-SequencingAndVariantsReport.pdf?uid=627ede4013743

18. Hartnett KP, Kite-Powell A, DeVies J, et al. Impact of the COVID-19 Pandemic on Emergency Department Visits — United States, January 1, 2019–May 30, 2020. MMWR Morbidity and Mortality Weekly Report. 2020;69(23):699-704. doi:10.15585/mmwr.mm6923e1

19. National Center for Health Statistics. Data Access - Urban Rural Classification Scheme for Counties. www.cdc.gov. Published December 2, 2019. https://www.cdc.gov/nchs/data_access/urban_rural.htm
20. Department of Health Agency Standards for Reporting Data with Small Numbers. https://doh.wa.gov/sites/default/files/legacy/Documents/1500//SmallNumbers.pdf
21. Substance Abuse and Mental Health Services Administration. (2021). Key substance use and mental health indicators in the United States: Results from the 2020 National Survey on Drug Use and Health (HHS Publication No. PEP21-07-01-003, NSDUH Series H-56). Rockville, MD: Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration. Retrieved from https://www.samhsa.gov/data/
22. Washington State Department of Health. Purpose.; 2022. Accessed May 14, 2022. https://doh.wa.gov/sites/default/files/2022-05/821-102-BehavioralHealthImpactReport-20220425.pdf?uid=627d60dc35348
23. Soares WE, Melnick ER, Nath B, et al. Emergency Department Visits for Nonfatal Opioid Overdose During the COVID-19 Pandemic Across Six US Health Care Systems. Annals of Emergency Medicine. 2022;79(2):158-167. doi:10.1016/j.annemergmed.2021.03.013
24. Bohnert ASB, Ilgen MA. Understanding Links among Opioid Use, Overdose, and Suicide. Ingelfinger JR, ed. New England Journal of Medicine. 2019;380(1):71-79. doi:10.1056/nejmra1802148
25. Oquendo MA, Volkow ND. Suicide: A Silent Contributor to Opioid-Overdose Deaths. New England Journal of Medicine. 2018;378(17):1567-1569. doi:10.1056/nejmp1801417
26. Zolopa C, Burack JA, O'Connor RM, et al. Changes in Youth Mental Health, Psychological Wellbeing, and Substance Use During the COVID-19 Pandemic: A Rapid Review. Adolescent Research Review. 2022;7(2):161-177. doi:10.1007/s40894-022-00185-6
27. Healthy Youth Survey 2021 Report of Results Statewide Results.; 2022. https://www.askhys.net/library/2021/StateMultiGr.pdf
28. Healthy Youth Survey 2018 Report of Results Statewide Results.; 2019. Accessed June 1, 2022. https://www.askhys.net/library/2018/StateMultiGr.pdf
29. Pathways Into and Through Mental Health Services for Children and Adolescents. Psychiatric Services. Published 2020. Accessed June 1, 2022. https://ps-psychiatryonline-org.offcampus.lib.washington.edu/doi/full/10.1176/appi.ps.54.1.60

30. Ligus K, Fritzson E, Hennessy EA, Acabchuk RL, Bellizzi K. Disruptions in the management and care of university students with preexisting mental health conditions during the COVID-19 pandemic. Translational Behavioral Medicine. 2021;11(3):802-807. doi:10.1093/tbm/ibab020
31. Hertz MF, Kilmer G, Verlenden J, et al. Adolescent Mental Health, Connectedness, and Mode of School Instruction During COVID-19. Journal of Adolescent Health. 2022;70(1):57-63. doi:10.1016/j.jadohealth.2021.10.021
32. Jones SE, Ethier KA, Hertz M, et al. Mental Health, Suicidality, and Connectedness Among High School Students During the COVID-19 Pandemic — Adolescent Behaviors and Experiences Survey, United States, January–June 2021. MMWR Supplements. 2022;71(3):16-21. doi:10.15585/mmwr.su7103a3
33. Spiller HA, Ackerman JP, Spiller NE, Casavant MJ. Sex- and Age-specific Increases in Suicide Attempts by Self-Poisoning in the United States among Youth and Young Adults from 2000 to 2018. The Journal of Pediatrics. 2019;210:201-208. doi:10.1016/j.jpeds.2019.02.045
34. Washington State Department of Health. COVID-19 Youth Behavioral Health Impact Situation Report.; 2022. Accessed May 14, 2022. https://doh.wa.gov/sites/default/files/2022-03/821-135-YouthBehavioralHealthSitRep-March2022.pdf?uid=627e939cb1e0a
35. Products - Data Briefs - Number 377 - September 2020. Published 2022. Accessed June 1, 2022. https://www.cdc.gov/nchs/products/databriefs/db377.htm
36. Trends of intentional drug overdose among youth: a population-based cohort study. Clinical Toxicology. Published 2020. Accessed June 1, 2022. https://www-tandfonline-com.offcampus.lib.washington.edu/doi/full/10.1080/15563650.2019.1687900?casa_token=CZ1a5Bl9ZcAAAAA%3AHdMV0W5dqjepAxzDsrAD9uJ97V1RG5JNbpr7Guzi92aKEM9WCeseuw950Lns_UtJPVBbWPzGLsVQ
37. Hawton K, Bergen H, Simkin S, et al. Long term effect of reduced pack sizes of paracetamol on poisoning deaths and liver transplant activity in England and Wales: interrupted time series analyses. BMJ. 2013;346(feb07 1):f403-f403. doi:10.1136/bmj.f403
38. Kersloot MG, van Putten FJP, Abu-Hanna A, Cornet R, Arts DL. Natural language processing algorithms for mapping clinical text fragments onto ontology concepts: a systematic review and recommendations for future studies. Journal of Biomedical Semantics. 2020;11(1). doi:10.1186/s13326-020-00231-z

39. Youth Risk Behavior Survey: Data Summary & Trends Report 2009-2019. Centers for Disease Control and Prevention. https://www.cdc.gov/healthyyouth/data/yrbs/index.htm. Published October 27, 2020. Accessed May 14, 2022.
40. Plemmons G, Hall M, Doupnik S, et al. Hospitalization for Suicide Ideation or Attempt: 2008–2015. Pediatrics. 2018;141(6):e20172426. doi:10.1542/peds.2017-2426
41. Hamza CA, Stewart SL, Willoughby T. Examining the link between nonsuicidal self-injury and suicidal behavior: A review of the literature and an integrated model. Clinical Psychology Review. 2012;32(6):482-495. doi:10.1016/j.cpr.2012.05.003

Chapter 7. SUPPLEMENTARY APPENDIX

Iterative Design Approach of Lethal Mean Classification Method:

After generating our lists of lethal mean specific free-text terms (as previously described in the core Methods section), we conducted an iterative design approach to implement tweaks and ensure appropriate performance of our classification method.

We utilized our initial lists of lethal mean specific terms to classify the lethal means of all study records. Next, a random sample of 10 records with no lethal mean classification and another random sample of 10 records with multiple lethal mean classifications were extracted and manually reviewed (by TB). This rationale for reviewing these two samples was to 1) understand what visit records our classification approach was missing and why (to improve the overall sensitivity of the classification method) and 2) to qualitatively evaluate the specificity of the classification method (I.e., did records with multiple classified means truly have multiple means present?). After implementing minor fixes and repeating this design process 6 times, the final review resulted in few meaningful errors, prompting the study team to finish editing the lethal mean classification method.

Over the course of this design process, changes to the classification method included adding and removing certain phrases from the lists of lethal mean specific terms, incorporating negation clauses (I.e., if a record contains "X" and not "Y" then classify as "Z" lethal mean) and structuring the free-text classification in a hierarchical order with the Clinical Impression field being utilized first followed by Admit Reason, Chief Complaint, and the Triage Notes fields respectively (Figure 2).

This order was decided by TB and LL based on the characteristics and availability of data for each of the free-text EMR fields. Clinical Impression, which is a medical provider's ascertainment of the patient's medical condition (used for treatment planning), was placed first because of its concise, clear, and descriptive narrative of a patient's condition. Admit Reason, which is a medical provider's rationale for transferring the patient from the ED to inpatient care, was placed second because of its short, descriptive nature and its high probability of being documented later in the patient's medical visit wherein there may be more clarity regarding the potential mean utilized due to patient/family report or diagnostic tests. The Chief Complaint field, which is the patient's articulated reason for the visit, was placed third given the high variability and availability of this data. Triage Notes was placed last as this field is utilized for many different purposes including documenting psychiatric observations and safety protocols, patient safety assessments, and notes between nursing staff. While the diverse use cases of the Triage Fields increase the contextual richness, it also increases the potential for errors with automated classification approaches like the one employed in this study. One example of this is when hospitals include patient safety assessments questions within their Triage Note field (such as "Patient has access to firearms: No") which may inadvertently misclassify lethal means if the classification method is not tuned properly.

In summary, the ordered free-text lethal mean classification sought to prioritize EMR fields that had concise narratives, emerged near the end of a patient's visit, and were entered by a medical provider. Despite this approach, lethal mean classification relied heavily on ICD-10 codes and contextually rich yet heterogeneous free-text included in the Chief Complaint and Triage Notes fields (Supplementary Appendix Table 1).

Supplementary Appendix Table 1:
EMR Fields Utilized to Classify Lethal Mean(s)

Data Source		ICD-10	Clinical Impression (CI)	Admit Reason (AR)	Chief Complaint (CC)	Triage Note (TN)	Total Classified	Not Classified
CDC SSA *(N = 7,786)*	Count	6019	80	140	350	579	7168	618
	%	77.31%	1.03%	1.8%	4.5%	7.44%	92.06%	7.94%
WA DOH SSA *(N = 4,838)*	Count	2932	81	138	225	824	4200	638
	%	60.6%	1.67%	2.85%	4.65%	17.03%	86.81%	13.19%
All *(N = 12,624))*	Count	8951	161	278	575	1403	11368	1256
	%	70.9%	1.28%	2.2	4.55%	11.11%	90.05%	9.95%