2-2021

Evaluation of Firearm Suicide among Patients Treated across the Jefferson Enterprise

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Introduction and Objective

- Suicide is a critical public health issue
- From 2008-2012, suicide was the 2nd leading cause of death in the U.S. for those between 10-24 years of age[1]
- Since 2008, suicide has been ranked as one of the top ten leading causes of death in the U.S.[2]
- Self-inflicted trauma with a firearm is a common mechanism
- In 2019, 80% of firearm-related fatalities in Canada were due to suicide[3]
- From 2004 to 2015, 37% of suicides among U.S. children involved a firearm[4]
- Within the city of Philadelphia, approximately 5% of all shootings are intentionally self-inflicted[5]
- From 1999-2013, firearm suicide in the U.S. was the largest contributor to firearm death (58.5%)[6]
- In a cross-sectional survey conducted in 2013 involving physicians and nurses at 8 Emergency Departments
  - 67% of nurses and 44% of physicians believed that patients who committed suicide with a firearm were more than likely to have died by suicide through other means if the firearm had not been present[7]

- So why do states with more restrictive gun laws experience lower rates of suicide? [8]

Introduction and Objective

- Current studies related to risk factor evaluation involving firearm suicide are limited to
  - small scale community-based assessments
  - large national or international retrospective cohorts
- Results are conflicting and not translatable to clinical practice
- Limited literature pertaining to suicide causality and risk stratification in and around Philadelphia

- This study aims to identify risk factors among patients treated across the Jefferson enterprise in order to provide clinicians with the evidence necessary to better prevent suicide
- Impact: recent evidence to support suicide prevention strategies
  - Improve/create screening tools[11]

Research Question & Hypothesis

- Research Question: What are the risk factors associated with patients treated across the Jefferson enterprise that attempt suicide with or without a firearm?
  - Patients treated at Jefferson between 11/30/2016 and 1/15/2021 for a self-inflicted gunshot wound(s) and/or attempted suicide
  - Patients treated in an emergency department, inpatient hospital service, and/or outpatient facility
  - Locations included
    - Jefferson Cherry Hill Hospital, Jefferson Stratford Hospital, Jefferson Washington Township Hospital, Jefferson Methodist Hospital, TJUH

- Hypothesis: Adolescents (13-18 years old)[9] of non-Hispanic white race/ethnicity[9] with accessible firearms within the household[10] are at the highest risk of firearm suicide.

Approach and Results

- Study design: Patient Chart Review using EPIC
- Population: Patients treated within the Jefferson Enterprise between 2016-2021 for a self-inflicted gunshot wound and/or attempted suicide
- Comparison group: Other mechanisms of suicide compared to firearm suicide
- Independent variable (potential risk factors): Patient demographics, past medical history, etc.
- Outcome (dependent variable): Incidence/Prevalence of Suicide
- Data source and collection: Performed by the Jefferson Enterprise Health Data Science Team
  - All the following ICD-10 codes were used for capture including all A/S/D subclassifications
  - X71-X83 = intentional self-harm
  - T36-T71 (all subclassifications ending in 2A/2S/2D or XA/XS/XD) = intentional poisoning
  - Y21-Y33 = injury of undetermined intent
  - R45.851 = suicidal ideation
  - T14.91 = attempted suicide
- Analysis: Risk factor identification and stratification based on
  - Demographics = age, sex, race, ethnicity, address
  - Encounter information = medical history, surgical history, medication history, ICD codes used for capture
  - Other = C-SSRS risk level, physical activity, stress, social connections, intimate partner violence
    - C-SSRS (Columbia-Suicide Severity Rating Scale) is a questionnaire used to assess/quantify suicide risk as well as track treatment response

Results and Analysis

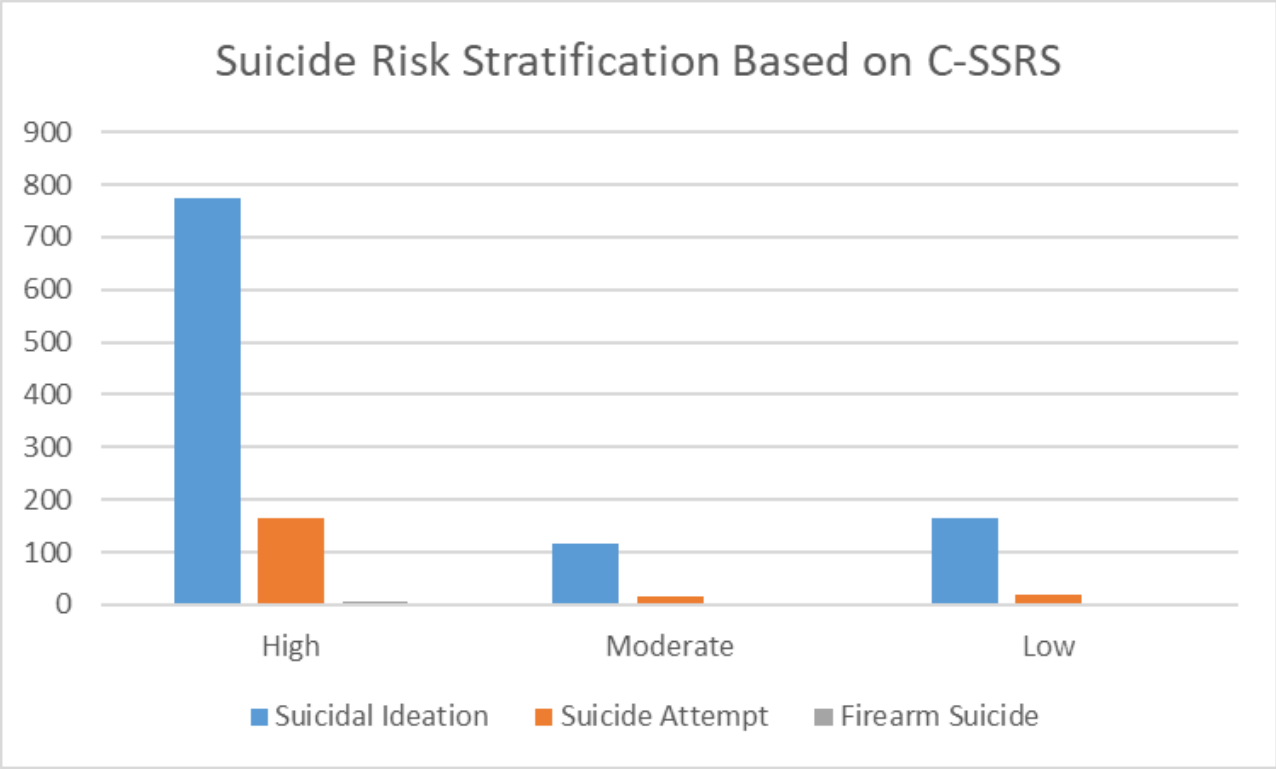
- Across all ICD code criteria, 16260 patients were captured
- 6120 patients presented with suicidal ideations
- 861 presented having attempted suicide
  - Average age = 41.69
  - 415 males, 446 females
  - 515 White/Caucasian, 220 Black/African American, 48 Hispanic, 21 Asian, many others
  - 422 live in Philadelphia
  - 322 with a history of depression
- 17 patients presented with self-inflicted gunshot wound(s) of undetermined intent
  - Average age = 45.76
  - 15 males, 2 females
  - 3 White/Caucasian, 9 Black/African American, 1 Hispanic, 1 Asian, 1 Indian, 2 Unknown
  - 11 live in Philadelphia
  - 1 with a history of depression
- 14 patients presented with intentional self-inflicted gunshot wound(s)
  - Average age = 44.5
  - 13 males, 1 female
  - 12 White/Caucasian, 1 Black/African American
  - 7 live in Philadelphia
  - 5 with a history of depression

Results and Analysis

- More on the intentional self-inflicted gunshot wound(s) cohort…
- Only 1 of 5 patients with depression was diagnosed prior to intentional self-inflicted gunshot wound
  - Other psychiatric conditions included bipolar disorder and schizophrenia
- 9 with no history of depression or any other psychiatric condition
- In terms of C-SSRS
  - 7 patients with documented C-SSRS values
  - 1 of the 7 was documented as having a high C-SSRS risk level 6 months prior to attempting suicide with a firearm
  - All other C-SSRS values documented after intentional self-inflicted gunshot wound
- 8 patients with documented extensive surgical history post firearm suicide attempt
  - Of these patients, 7 of the 8 underwent several reconstructive surgeries involving the mandible/face
  - 3 underwent an explorative laparotomy

- So how can we prevent firearm suicide?
- Suicidal ideation is often predictive of/a precursor to Suicidal behavior
- Identify ideation = an opportunity for suicide prevention

Results and Analysis



Conclusions

- Partially supports hypothesis
- Middle-aged white/Caucasian men accounted for majority of firearm related suicide
- Limited past medical/psychiatric history
- Incredibly traumatic
- Existing literature suggests firearm suicide is more common in adolescents/young adults[9]
- 90% of individuals who have completed suicide have shown show signs of mental illness[12]
- 90-95% of firearm suicide is lethal[13]

- Likely a lack of effective screening and/or interactions with Jefferson health prior to attempting firearm suicide

- Implications = need for more comprehensive screening
- Challenges
  - Suicidal ideation and suicidal behavior can be short-term and long-term entities
  - Suicidal ideation and behavior can be independent

- C-SSRS has been proven to be an effective intervention tool for preventing suicides
- Already used frequently at Jeff
- With more evidence showing the impact of C-SSRS screening in patients with suicidal ideation, more likely that more patients are screened/more suicides are prevented

Future Directions

- Expand and further evaluate the firearm suicide cohort
  - Via chart review, procedural codes, other ICD codes
- Analyze the attempted suicide cohort and suicidal ideation cohort
  - Review mechanisms, demographics, medical history, surgical history, medications, etc
- Compare firearm suicide to attempted suicide and suicidal ideation

- Analyze C-SSRS scoring across all patients that presented with suicidal ideation and/or attempted suicide
  - Thorough review of patients with both ideation and attempted suicide (when did they present, did C-SSRS risk level fluctuate?)
  - Ultimately use cohort information to investigate if C-SSRS was more effective in specific populations

- Plans to work with A.I. Dupont and cross share data regarding suicide/suicidal ideation in Children and adolescents

Acknowledgements

- Stanton B. Miller, MD, MPH, FACS (Principal Investigator)
- Michael Li, PhD (Jefferson Health Data Science Team)
- Rupsa Boelig, MD, MS (Research/Scholarly Inquiry advisor)
- Vinutha Vasanthu (Jefferson Health Data Science Team)
- Girish Majeti (Jefferson Health Data Science Team)

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