Original Research

A Descriptive Analysis of Patients With Attempted Suicide at a Rural Level I Trauma Center

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Abstract

Objectives

For patients with self-harm, suicide attempt, or suicide completion, the trauma bay is often the single point of contact. Regional differences and patterns exist for suicide that should be studied to enhance preventive strategies. Our goal was to critically evaluate the suicidal population of Southeast Georgia over a 9-year period.

Methods

A retrospective review of our trauma database from January 2010 through December 2019 was conducted at a Level I Trauma Center. All ages were included. All patients arriving with attempted suicide or death due to a suicidal complication were included. Patients with deaths highly suspicious for suicide were also included. Exclusion criteria included accidental motor vehicle death, accidental generalized deaths, and accidental drowning. Age, gender, race, ethnicity, mechanism of injury (MOI), death rates, length of stay (LOS), injury severity score (ISS), home zip code, day of the week, transfer vs. from scene, location of injury, alcohol levels, and urine drug screening results were analyzed.

Results

From 2010 to 2019, there were 381 total suicides with 260 survivals and 121 completions (mortality: 31.7%) at our Level I Trauma Center. The majority of suicides were performed by middle-aged White men with an average age of 40 years (SD: 17.2). This was true even if the White race was not the majority race in the patient's zip code. The majority of the time, these patients presented directly from the scene and, if the patient's suicide location was known, it usually took place at their home. Other common areas included secluded areas, such as wooded areas, and personal vehicles. Of the suicides, 11.6% were performed within the criminal justice system including jail and solitary confinement. The average LOS following admission was 7.51 days (SD: 22.1). The majority of suicides came from the metro Savannah district, which has higher unemployment and poverty rates than other parts of our study area. Gun violence was the most common MOI for suicide (75%). If suicide was attempted via a penetrating mechanism including glass, knife, or gun, there was an increased rate of death when compared to our general data (38% vs. 31%). When the gun mechanisms were analyzed as a group, there was a 57% rate of death after arrival at the hospital. Acute alcohol intoxication was present in 56.6% of patients and 80 (21%) had drugs in their system.

Conclusion

Our data demonstrate epidemiologic and socioeconomic trends in Southeast Georgia. This included increased alcohol intoxication, deaths related to gun use, and in a higher incidence of suicide among White males, including geographic locations where the White race is not the majority. Suicides and suicide attempts were also more common in areas with higher unemployment rates.

Keywords

suicide; completed suicides; attempted suicides; prevention and control; Georgia; statistics and numerical data; racial groups; race; alcoholism; alcohol abuse; substance abuse

HCA Healthcare

HCA Healthcare Journal of Medicine

Introduction

For patients with self-harm, suicidal attempt, or death by suicidal complication, acute care hospitals often serve as the primary point of contact, with the trauma bay demonstrating some of the most heroic efforts to save the injured. Because of suicide's high incidence and potential for prevention, determining how to most effectively prevent suicide is a public health imperative.[1] With more than 800 000 global suicides each year, an increasing mortality rate of 24%, and 115 suicide deaths in the United State (US) per day[1], our goal was to better define our rural Level I Trauma Center's role in this global public health problem and the needs of the districts that it serves. Several studies have illustrated regional differences in patterns of suicides, which are important to know and recognize in the establishment of effective prevention. These examples include an increased rate of suicide among Chinese women from poverty states via pesticide poisoning[2], higher suicide rates amongst the indigenous populations within Australia, Canada, and the US, with much higher rates of early, childhood substance abuse in those affected[3], and an overall lower pattern of suicide among Blacks in the US.[4] A deeper knowledge of the contributions of psychological and biological factors during different life stages in different populations could be critical for developing preventative programs.[5] With each community's evaluation of how this global problem surfaces at the regional level, community outreach and prevention can be more focused and impactful.

Methods

A retrospective chart review of our trauma database from January 2010 through December 2019 was conducted at our rural Level I Trauma Center. We included patients of all ages, all pa-tients arriving with attempted and completed suicides or death due to a suicidal complication, and all patients with deaths highly suspicious for suicide. Exclusion criteria included accidental motor vehicle death, accidental generalized deaths, and accidental drowning. Age, gender, race, ethnicity, mechanism of injury (MOI), death rates, length of stay (LOS), injury severity score (ISS), home zip code location, day of the week, transfer versus from the scene, location of injury, alcohol levels, and urine drug screening results were analyzed. All analyses were performed using the statistical software SPSS (Released 2020. IBM SPSS Statistics for Windows, Version 27.0. Armonk, NY: IBM Corp). Categorical variables were summarized using frequencies and percentages, while descriptive statistics for continuous variables included mean, median, standard deviation, and minimum and maximum values.

Results

Demographic data are shown in **Table 1**. There were 381 suicide patients with an average age of 40 years (standard deviation [SD]: 17.2). The youngest patient was 14 years of age with the oldest patient over 89 years. Male patients outnumbered females 290 (76.1%) to 91 (23.9%). Of the patients who attempted suicide, 260 (68.2%) survived, while 121 (31.8%) died. As for presentation, 283 (74.3%) patients presented directly from the scene, while 98 (25.7%) patients were transferred from outside hospitals. The average hospital LOS was 7.51 days (SD: 22.1). There were 68 Black patients (18%), 292 White patients (77%), 19 of other races (5%), and 2 of unknown race (<1%). The ethnicities of the patients were: not Hispanic or Latino (341 patients; 89.5%), Hispanic or Latino (15 patients; 3.9%), and 25 (6.5%) unknown. The number of suicides by day of the week was

Table 1. Demographics of Suicides at a Level 1 Trauma Center 2010-2019

	Total patients; N = 381
Age, y, mean (SD)	40 (17.2)
Female gender, n (%)	91 (23.9)
Arrival from scene, n (%)	283 (74.3)
Survivors, n (%)	260 (68.2)
Length of stay, days (SD)	7.51 (22.1)
Penetrating injury, n (%)	284 (74.5)
Acute alcohol intoxication, n (%)	213 (55.9)
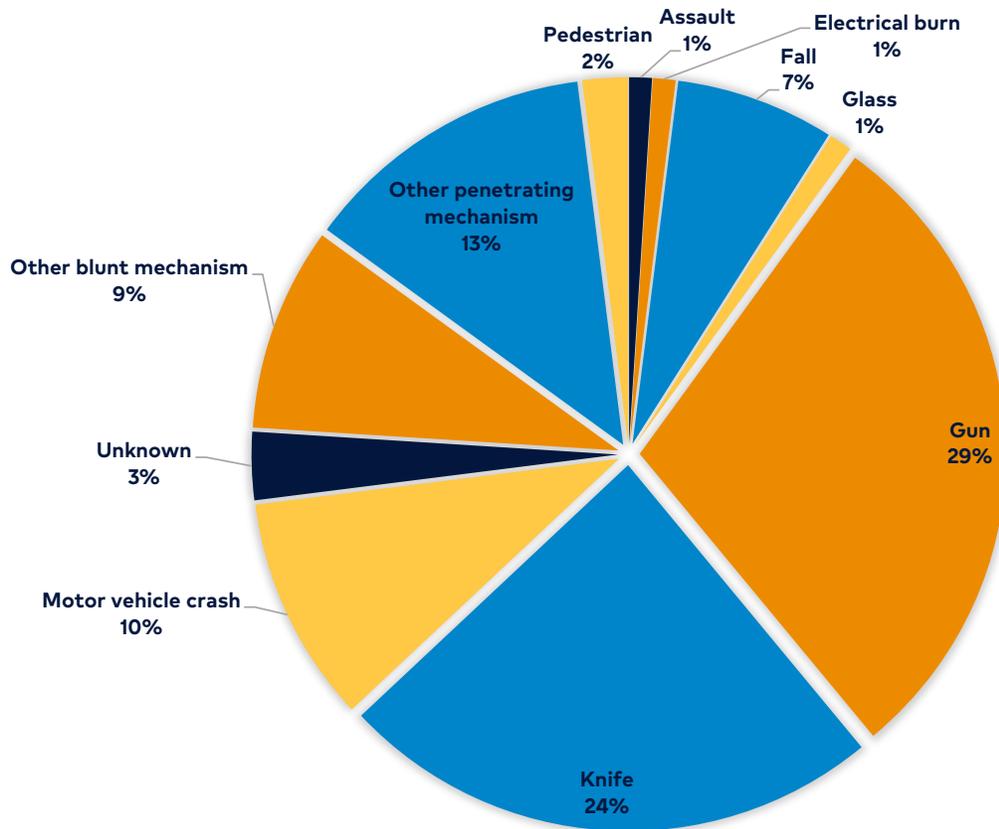
Figure 1. Mechanism of injury recorded across all suicides (attempts and completions) from January 2010 to December 2019.

as follows: Sunday (56 patients, 14.7%), Monday (57 patients, 15.0%), Tuesday (53 patients, 13.9%), Wednesday (48 patients, 12.6%), Thursday (55 patients, 14.4%), Friday (57 patients, 15.0%), and Saturday (55 patients, 14.4%). There were several individual dates that had 2 incidences of suicide during the study period; June 25, 2018, was notable for having the highest suicide rate of 3. The majority of suicide locations (84%) were unknown; however, of the known 60 locations, the patient's home was most common (23%). Other common locations included isolated areas such as wooded areas (5%), bridges (7%), balconies (5%), hotels (10%), or personal vehicles (3%). Of the patients involved in the criminal justice system, 6 patients committed suicide in jail (10%), 1 in solitary confinement (1.6%), and 1 in the back of a police car (1.6%). With a large catchment area, the distribution of zip codes among suicide victims was evaluated. Of the 79 zip codes represented, 104 patients came from the following 4 zip codes: 31419 (36 patients), 31405 (25 patients), 31406 (19 patients), and 31401 (24 patients). These 4 zip codes cumulatively repre-

sent the metro Savannah area, which includes 6 areas with particularly high poverty levels.

The most common MOIs were penetrating mechanisms 284 (74.5%) including suicides via gun, knife, glass, and other penetrating mechanisms as shown in **Figure 1**. Blunt mechanisms included falls and pedestrians struck by motor vehicles. While gun violence was the predominant mechanism for males and females (53% and 45%, respectively), there was a higher rate of falls for females (12%), which was the second most prevalent MOI for females. Males' second and third most common MOIs were other penetrating mechanisms and knife mechanisms (14% and 10%, respectively). MOI was also critically evaluated among age categories (**Table 2**). Gun-related MOIs remain the predominant mechanism, even in our 14-18 age range, at 50%. If the MOI was gun-related, over half the patient died (55% of gun-related MOI died; 59% males died; 42% females died; 53% Black patients died, 57% White patients died; 38% other races died).

Table 2. Three Predominant Mechanisms of Injury Across Each Age Range

Age ranges (years)	Most common MOI (%)	Second most common MOI (%)	Third most common MOI (%)
14-18	Gun (50%)	Other penetrating mechanism (13%)/Motor vehicle crash (13%)	Falls (10%)
19-25	Gun (52%)	Fall (16%)	MVC (11%)
26-35	Gun (41%)	Other penetrating mechanism (13%)	Knife (13%)
36-45	Gun (47%)	MVC (10%)	Knife (10%)
46-55	Gun (46%)	Other penetrating mechanism (23%)	Knife (19%)
56-65	Gun (56%)	Other penetrating mechanism (15%)	Fall (15%)
66+	Gun (83%)	Knife (8%)	Other penetrating mechanism (6%)

Analyses of alcohol (ETOH) and drug intoxication were completed and of the 369 patients with ETOH and drug intoxication screening at the time of arrival, 213 (55.9%) had greater than 10 mg/dL alcohol in their blood, and 80 (21%) patients were confirmed to have drugs in their system. The breakdown of drugs detected is as follows: 24 (6%) benzodiazepines, 11 (3%) amphetamines, 25 (7%) tetrahydrocannabinol (THC), 7 (7%) cocaine, and 2 (0.5%) opioids. Of the remaining patients, 79 (21%) tested negative and the remaining 12 were not tested (3.1%). Of the patients testing positive for drugs, 28 (35%) were positive for multiple substances.

Discussion

At our rural Level I Trauma Center, middle aged White men were the predominant patient population presenting with suicide. This was also true in the Savannah metro populations that are majority Black. For example, zip code 31405 includes Garden City, Georgetown, and the surrounds the Hunter Army base. The population in this area is 45.61% Black, 45.21% White, and 6.15% Hispanic, according to the 2014 US Census data.[6] Even in this population, the majority of suicides were completed by White patients (58.0%). Overall, the most common zip codes represented in our population reflected higher unemployment rates at 18.8% at the time of this study, above Georgia's unemployment rate of 12.2%, and higher than the US unemployment rate of 13.3% (June 2021). All 4 zip codes most commonly represented in our study also had increased rates of children eligible to receive free or reduced lunch programs, a common marker of poverty, with rates ranging between 61 and 74% in these areas.

Penetrating MOIs involving gun violence were the most common in our study. Further, if the suicide attempt was by penetrating mechanism including glass, knife, or gun, there was an increased rate of death when compared to our general data (38% vs. 31%). When MOI was extrapolated and all gun mechanisms were combined, there was a 57.0% rate of death after arrival at our Level I Trauma Center. As a Level I Trauma Center serving rural Georgia, gun safety education, including education on protection for those who are currently suicidal or are at risk of becoming suicidal, including those suffering from mental illness, is paramount to controlling the increasing suicide rates in our area.

It has been shown that drug and alcohol use contribute to suicide. The most common substance at the time of suicide in our population was alcohol. In a national survey, Kessler, Borges, and Walters (1999)[7] found that individuals with alcohol use disorder were at 4.6 times greater risk for suicidal ideation and 6.5 times greater risk for attempted suicide than their counterparts without alcohol use disorder. Acute alcohol use, without a history of alcohol abuse or dependency, has also been implicated as a potent risk factor for attempted and completed suicide among individuals.[8] This was borne out in our study as well, as 56.6% of the

patients demonstrated acute alcohol intoxication. Savannah, Georgia is known for its St. Patrick's Day festivities that are associated with large quantities of green beer. Despite this large holiday celebration, there was no association between St. Patrick's Day and suicide in Savannah.

The goal of this study was to identify Southeast Georgia's needs based on records from its Level I Trauma Center and predict strategies that may reduce the incidence of suicide in this area. We intend to use this information to collaborate with public health organizations to develop new strategies to connect these populations with needed healthcare, especially those with addiction or substance abuse, with strategies that include substance abuse counseling at observed high-incidence zip code locations with primary care access initiatives; local school level counseling and discussion at the elementary, middle and high school levels to promote connectedness ("avoid isolation, reach out"); and lastly, to continue penetrating trauma violence prevention strategies at the national level. Further, we hope to create gun safety education programs that address suicide prevention.

Limitations

Our study had several limitations. First, it was a single institution study across Southeastern rural Georgia and metro Savannah and is difficult to generalize to clinical practice, although it does reflect regional variability for public health measures in the setting of a preventable disease. It was also a retrospective study with some missing data points.

Conclusion

Our data demonstrated epidemiologic and socioeconomic trends of suicide in Southeast Georgia. These included increased acute alcohol intoxication, deaths related to gun use, and higher incidence of suicide among White males, including in geographic locations where the White race was not in the majority. Suicides were more common in areas with higher unemployment rates. Suicide by gun was more likely to result in death. The data study period occurred prior to the COVID-19 pandemic and, considering the study's correlation with isolation, future directions for study would include an analysis of suicide rates before and after the COVID-19 pandemic shutdown period, as well as a post-interventional analysis after implementation of community-based strategies.

Conflicts of Interest

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