

# Suicide as a Public Health Issue in the State of Florida

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## Abstract

**Objectives:** Suicide rates in the United States were shown to vary by state and region. Our objectives were to investigate the frequency, methods, and patterns seen at Florida hospitals that admitted patients for intentional self-harm between the years 2000 and 2010 and examine the characteristics and trends of suicide attempters in the State of Florida during the past decade.

**Methods:** A retrospective review of all admissions in the State of Florida during the years 2000 through 2010 for patients identified by E-codes for self-inflicted injury to examine the frequency, methods, and characteristics of patients admitted after a deliberate self-injury.

**Results:** The state trend from 2000 to 2010 showed a steady rise that was greater in rural counties of Florida when compared with more urban settings. The method of deliberate self-harm chosen varied by gender, age group, ethnicity, and season. Adults and the elderly chose more lethal methods of suicide such as firearms more often than children and adolescents.

**Conclusions:** Suicide represents an extraordinary burden on society in terms of costs and resources. Programs in Florida designed to increase awareness and prevention of suicide should help reduce the burden intentional self-harm places on the healthcare system.

## INTRODUCTION

Suicide rates in the United States were shown to vary by state and region. For example, western mountain states have suicide rates twice as high as the national average with the majority of these by violent means (1). For the State of Florida, the rate of suicidal behaviors per 1000 population has continued to rise. Figure 1 depicts the state trend from 2000 to 2010 as well as the rates of self-injury in rural and urban counties for the last decade. In the past, suicide was viewed as a private act that emphasized treating the individual. Suicide prevention, however, requires a combination of medical, psychiatric, social and behavioral interventions (1,2). Suicide presents a burden on the healthcare system in terms of costs and resources. Stakeholders in healthcare, government and the public sectors can all serve to improve suicide prevention programs.

The report by the Surgeon General of the United States recognized the challenge of preventing suicide as a public health and public policy crisis (4). A campaign to increase awareness and prevention of suicide behavior may reduce the burden intentional self-harm places on the healthcare system. The purpose of the present study was to investigate

the frequency, methods, and patterns seen at Florida hospitals that admitted patients for intentional self-harm between the years 2000 and 2010. Our objective was to examine the characteristics and trends of suicide attempters in the State of Florida during the past decade. We investigated the trends, methods, and patterns seen at Florida hospitals for intentional self-harm during the past decade. A retrospective review was conducted of admissions in Florida during the years 2000 through 2010 for patients admitted after a deliberate self-injury. The rates of admission for self-injury in rural counties of Florida were compared with more urban settings.

## METHODS

After Institutional Review Board approval, a retrospective review of all admissions in the State of Florida during the years 2000 through 2010 was completed to examine the frequency, methods, and characteristics of patients admitted after an intentional self-injury. Patients were identified by E-codes for self-inflicted injury that included ingestion of a substance, cutting, firearms use, hanging, inhalation, jumping from a high place, drowning, and other means that included use of a corrosive. Demographic information collected included age, gender, and ethnicity. Age was

divided into three age groups (Pediatric: ages < 1 – 15, Adult: ages 16 – 64, and Elderly: ages 65+). Ethnicity included Asians, Blacks, Whites, Hispanics and Native Americans.

In addition to demographic variables, distance from a Level 1 Trauma Center hospital, payer type, length of stay, and total charges associated with the inpatient episode were collected. Census data for 2000 and 2010 used zip code level population data to determine residence living within 10 miles of Level 1 Trauma Center hospitals. The payer type indicates the patient's insurance status and type, the latter indicating to what extent the financial burden of disease is borne by the commercial insurance industry or the public sector (taxpayers). Length of stay, or hospital bed days used, and to some degree the hospital charges, provide an indication of the inpatient resources utilized to treat the consequences of suicide attempts.

The data used in the analysis were obtained from the Florida Agency for Health Care Administration inpatient datasets from 2000 to 2010. These data include a record of every inpatient episode in the state and provide all data elements used in the analysis. It should be pointed out here that the E-codes which were used to identify self-inflicted injury cases were recorded as part of 10 diagnosis fields prior to the 2006 calendar year. Starting in 2006, the datasets included three dedicated fields used solely for recording E-codes. Therefore, there is at least the potential that some E-codes were not recoded prior to 2006 for patients who had 10 or more ICD9-CM codes. While it is not possible to assess precisely how often such omissions occurred, two preliminary analyses were performed to assess its potential, concluding that potential omissions in the data, if any, were small. First, within the population of patients admitted with injuries (ICD-9 codes between 800 and 959) before 2006, the percentage of patients with 10 diagnosis codes was obtained. This provides an upper limit of patients whose E-codes were not recorded due to the lack of an available data entry field. Second, the time trend of hospitalizations associated with self-inflicted injuries was examined to determine the existence of a significant “jump” starting in 2006, the first year when E-codes were given dedicated fields in the record.

## **RESULTS**

The state trend in deliberate self-harm in Florida showed a steady rise. Regression of the rate on a simple time trend indicates a significant upward trend ( $p < 0.01$ ) in the more

rural counties compared to urban centers. Figure 1 also shows the rates for 2000 and 2010, the census years for which zip code level population data was available, for hospitalization of residence living within 10 miles of Level 1 Trauma Center hospitals. Because zip code level population data was not available for the inter-census years, it was not possible to assess the actual annual trend in hospitalization for this geographic definition, however, the two points indicate not only a significant drop between 2000 and 2010 but also a substantially lower rate compared to the larger county and state populations. GIS® software (ERSI, Redlands, CA) helped to visualize the incidence of intentional self-harm across the State of Florida for 2010 (See Figure 2). As can be seen, the distribution of self-injury was concentrated in the more densely populated areas of the state.

There were 146874 patients admitted for deliberate self-harm between 2000 and 2010 in the State of Florida. The average number of admissions for any one year was 13352.2 with a standard deviation of 1601.5. Fifty eight percent of the hospital admissions were females. The age group that averaged the most suicide attempts over the decade was the 16 to 64 age group with the majority being in the younger 21 to 44 year olds followed by the 45 to 64 year olds. Whites made up 76.3% of hospital admissions, followed by Hispanics with 10.5%. Blacks were 9.2% of hospital admissions and Asians and Native Americans together made up less than 1%. Other racial groups accounted for 3.4% of all admissions. Patients ingested a substance 79% of the time in a suicide attempt, followed by cutting at 14.7% of the cases. Firearm use was 1.3% of hospital admissions and hanging another 1%. Admissions for inhalation were 0.6%, jumping from a high place 0.5%, followed by drowning at 0.1%. Other methods of deliberate self-harm made up the remainder.

The method of deliberate self-harm chosen varied by gender, age group and ethnicity. Although for both men and women ingestion of a substance was the most frequently chosen method followed by cutting, 5.1% of males represented the more violent means of suicide by firearms, hanging, or jumping whereas women chose these methods 1.7% of the time (See Figure 3). The method of deliberate self-harm also differed by age. Figure 4 shows that while the majority of all three age groups used ingestion of a substance and cutting, pediatric patients chose hanging, jumping from a high place, then firearms. That was contrasted with adult and elderly patients whose next most frequent choices were

firearms, hanging, and inhalation. The method of suicide attempts varied by ethnicity as well. For Whites, Blacks, and Hispanics, ingestion of a substance and cutting were the most common mechanisms of self-harm. More violent methods of suicide by ethnicity such as use of a firearm, hanging, or jumping for Whites, Blacks, and Hispanics were 2.8%, 3.5%, and 2.6%, respectively (See Figure 5).

The data also show a strong seasonal aspect associated with self-injury. Figure 6 shows the distribution of self-injury related hospitalizations per quarter within each year. In every year examined, the rate of inpatient discharges associated with self-injury was highest in the third quarter that includes the summer months July, August, and September. In most years this peak was followed by a substantial drop in the fourth quarter, including the holiday season. An age breakdown of this trend indicated that it was entirely driven by the non-elderly adult population defined here as 20 to 64 years old. An examination of the elderly population (ages 65 and older) and the high-school to college age population (ages 15 to 23) did not reveal a similar seasonal pattern for those groups.

## **DISCUSSION**

The present study reported the demographic characteristics of deliberate self-harm for the State of Florida between 2000 and 2010. The trend for the state during this time was a gradual increase in suicide attempts and self-injury. In particular, the rate of deliberate self-injury was rising in rural areas faster than urban areas. This was consistent with Liu et al. who found that suicide death rates were higher in rural areas compared to urban centers, especially among the elderly (5). The majority of admissions to hospitals in the State of Florida for suicide and self-injury were white, adult (non-elderly) and female by means of ingesting a substance. Adults and the elderly chose more lethal methods of suicide such as firearms more often than children and adolescents. Suicide rates were shown to vary when season of the year was examined with the highest rates in the summer months.

Using the presence of a level 1 Trauma Center as a surrogate for access to comprehensive treatment, including medical and preventive screening, the data show a substantially lower rate associated with the population living closest (within 10 miles) of these hospitals. Among factors contributing to higher suicide risk in rural areas are lack of access to treatment, hesitance to seek assistance because of social scrutiny, and seasonal variability (6,7). Possible explanations are an impoverished life with limited formal

and informal support systems to prevent suicide. Improving the social safety net for those who have intentionally harmed themselves may be effective in lowering the risk of repetition.

The higher rates of suicides in the summer and lower rates in winter were consistent with past research. Bridges, Yip and Yang reported that in the United States, the seasonal variation of suicide was highest in the summer and spring and lowest during the winter months (8). Similar findings were shown in most countries around the world. The seasonal variation of suicides was also found to differ between men and women as well as the specific suicide method used (9). Explanations of seasonal variation in suicide include exposure to sunlight and environmental temperature. A positive relationship was shown between the incidence of suicide and total hours of sunshine. Barker, Hawton, Fagg and Jennison showed the role of sunshine may induce adverse changes in neurotransmitter systems implicated in depression that peak during the month of maximum daylight (10). Furthermore, environmental heat was also found to stress physiological and behavioral systems which may trigger a suicidal act (11).

Suicide attempters transported to Emergency Departments (ED) were shown to be at increased risk of repetition and may eventually kill themselves (12). For patients seen in the ED for intentional self-harm 25% made another attempt within the following year and 1% will complete suicide (13,14). That is a rate 100 times greater than in the general population. Gairin, House and Owens found that almost 40% of suicides had been treated in an ED for an accident in the previous year (15). Kiankhooy et al. (2009) reported that 1.1% of trauma patients admitted for deliberate self-injury in rural United States eventually reattempted (6). Assessment of suicide risk factors in the Emergency Department may be viewed as a form of brief intervention (16). Thus, a suicide risk assessment completed in the ED may prevent future self-harm (17).

The screening for suicide risk has been proposed in the primary care setting since suicide most often arises in acute depressive illness. Unfortunately, Schulberg found that only 27% of patients who met criteria for depressive disorders were diagnosed by their primary care physician (18). Health disparities research showed that not only were racial and ethnic minorities and low income people disproportionately affected by depression but less than one quarter received appropriate treatment in the primary care setting (19). Conwell et al. reported that among older adults, 70% had

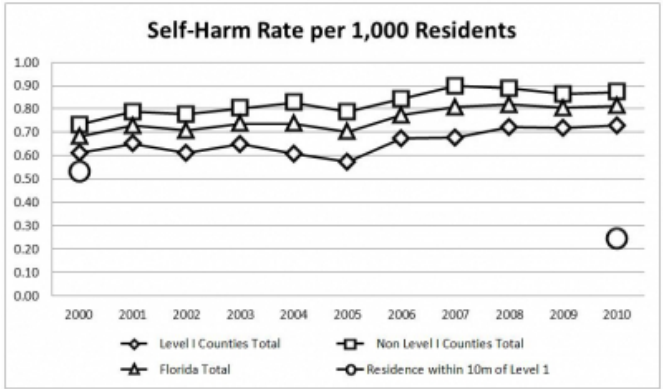
visited their primary care physician within one month of the suicide (20). The US Preventive Services Task Force found no conclusive evidence that routine screening for suicide risk by primary care physicians decreases suicide attempts or mortality (21, 22).

CONCLUSIONS

According to Gunnell and Frankel the more successful large scale suicide prevention strategies focused on targeting high-risk groups and limiting the availability of means for individuals to succeed at suicide (23). The Suicide Prevention Resource Center, supported by a grant from the Substance Abuse and Mental Health Services Administration is devoted to advancing the Surgeon General’s national strategy for suicide prevention in Florida. In 2013 the Florida Legislature passed a state law that prohibited from purchasing firearms or retaining or applying for a concealed weapon or firearms license individuals who voluntarily admitted themselves into a psychiatric facility after an involuntary examination by a physician and was found to be an imminent danger. Suicide represents an extraordinary hardship and extols a tremendous burden on society in terms of costs and resources. Programs such as these in Florida designed to increase awareness and prevention of suicide should help reduce the burden intentional self-harm places on the healthcare system.

Florida 1

The rate of hospitalization associated with self-inflicted injuries from 2000-2010

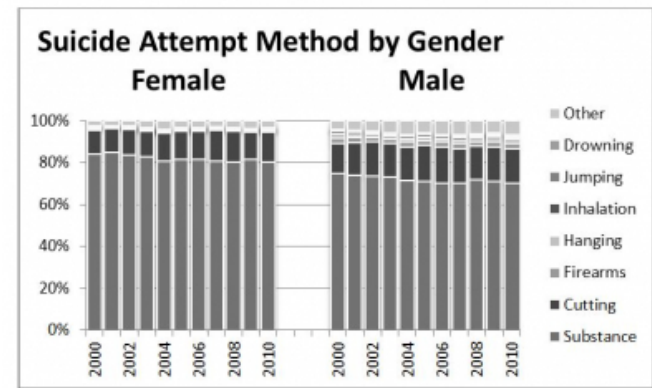


Florida 2

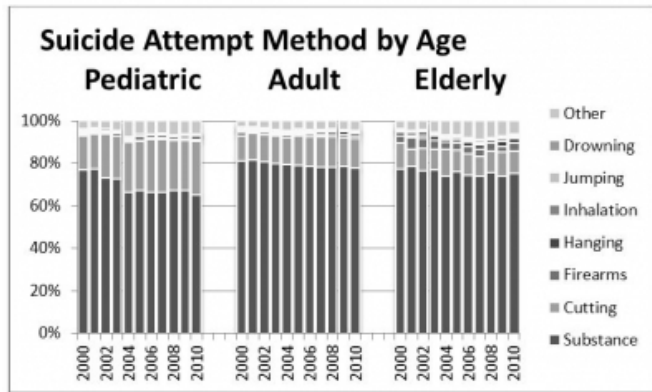
Florida Distribution of Self-Injury in 2010 (N = 14344)



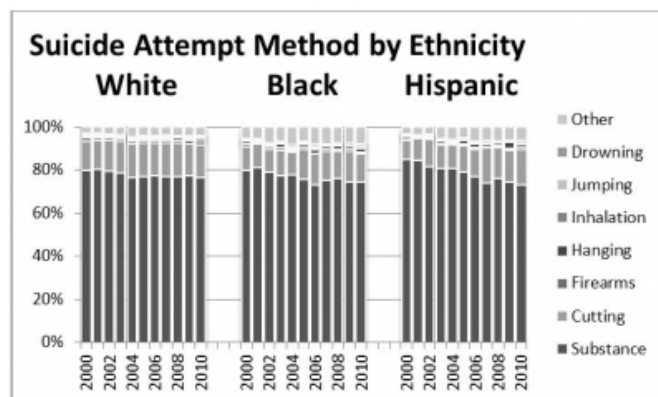
Florida 3



Florida 4

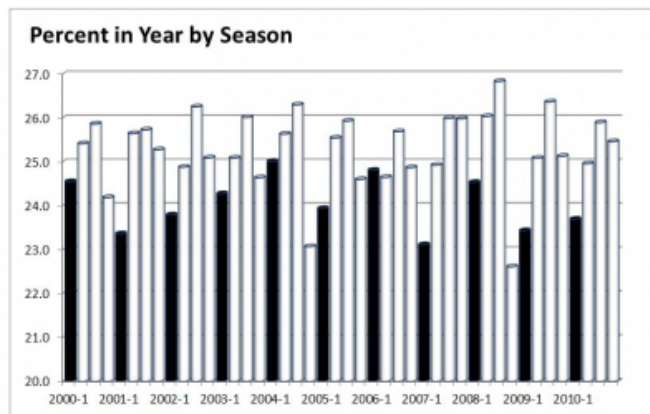


## Florida 5



## Florida 6

Seasonal changes in deliberate self-harm in percentage.



## References

1. Steljes TPV, Fullerton-Gleason L, Kuhls D, Shires T, Fildes J. Epidemiology of suicide and the impact on western trauma centers. *J Trauma*. 2005; 58:772-777.
2. Knox KL, Conwell Y, Caine ED. If suicide is a public health problem, what are we doing to prevent it? *Am J Public Health*. 2004; 94:37-45.
3. Bittner JG, Hawkins ML, Atteberry LR, Ferdinand CH, Medeiros RS. Impact of traumatic suicide methods on a Level 1 trauma center. *Am Surg*. 2010; 76:176-181.
4. Surgeon General of the United States: A National Suicide Prevention Strategy. Washington, DC: US Public Health Service, Available at: <http://www.surgeongeneral.gov/library/reports/national-strategy-suicide-prevention/index.html>. (accessed Oct 30, 2012)
5. Liu Q, Zhang L, Li J, et al. The gap in injury mortality rates between urban and rural residents of Hubei province, China. *BMC Public Health*. 2012; 12:180.
6. Kiankhooy A, Crookes B, Privette A, Osler T, Sartorelli K. (2009). Fait accompli: Suicide in a rural trauma setting. *J Trauma*. 2009; 67:366-371.
7. Micciolo, R., Williams, P., Zimmerman-Tansella, C., & Tansella, M. (1991). Geographical and urban-rural variation in the seasonality of suicide: Some further evidence. *J Affect Disord*. 1991; 21:39-43.
8. Bridges FS, Yip PSF, Yang KCT. Seasonal changes in suicide in the United States, 1971 to 2000. *Percept Mot Skills*. 2005; 100:920-924.
9. Lester D, Frank ML. Sex differences in the seasonal distribution of suicides. *Br J Psychiatry*. 1988; 153:115-117.
10. Barker A, Hawton K, Fagg J, Jennison C. Seasonal and weather factors in parasuicide. *Br J Psychiatry*. 1994; 165:375-380.
11. Lambert G, Reid C, Kaye D, Jennings G, Esler M. Increased suicide rate in the middle-aged and its association with hours of sunlight. *Am J Psychiatry*. 2003; 160:793-795.
12. Comtois KA. A review of interventions to reduce the prevalence of parasuicide. *Psychiatr Serv*. 2002; 53:1138-44.
13. Platt S, Hawton K, Kreitman N, Fagg J, Foster J. Recent clinical and epidemiological trends in parasuicide in Edinburgh and Oxford: A tale of two cities. *Psychol Med*. 1988; 18:405-418.
14. Hawton K, Fagg J. Suicide, and other causes of death, following attempted suicide. *Br J Psychiatry*. 1988; 152:359-366.
15. Gairin I, House A, Owens D. Attendance at the accident and emergency department in the year before suicide: Retrospective study. *Br J Psychiatry*. 2003; 183:28-33.
16. Ryb GE, Soderstrom CA, Kufera MA, Dischinger P. Longitudinal study of suicide after traumatic injury. *J Trauma*. 2006; 61:799-804.
17. Crawford MJ, Turnbull G, Wessely S. Deliberate self-harm assessment by accident and emergency staff – an intervention study. *J Accid Emerg Med*. 1998; 15:18-22.
18. Schulberg HC. The role of the primary care physician in preventing suicide. In *Suicide Prevention & Intervention: Summary of a Workshop*. Institute of Medicine. 2001; pp. 15-17.
19. Cole S, Reims K, Kershner L, McCombs HG, Little K, Ford DE. Improving care for depression: Performance measures, outcomes and insights from the Health Disparities Collaboratives. *J Health Care Poor Underserved*. 2012; 23:S154-173.
20. Conwell Y, Lyness JM, Duberstein P, Cox C, Seidlitz L, DiGiorgio A, Caine ED. Completed suicide among older patients in primary care practices: A controlled study. *J Am Geriatr Soc*. 2000; 48:23-29.
21. Gaynes BN, West SL, Ford CA, Frame P, Klein J, Lohr KN. Screening for suicide risk in adults: A summary of the evidence for the U.S. Preventive Services Task Force. *Ann Intern Med*. 2004; 140:822-835.
22. U.S. Preventive Services Task Force. Screening for suicide risk. *Ann of Intern Med*. 2004; 140:820-821.
23. Gunnell D, Frankel S. Prevention of suicide: Aspirations and evidence. *BMJ*. 1994; 308:1227-1233.

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