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Increase in Suicide by Hanging/Suffocation in the U.S., 2000–2010

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Abstract

Background—Recently, suicide exceeded motor vehicle accidents as the leading cause of injury death in the U.S. However, details of this change in suicide methods and its relationship to individual demographics such as age, and societal influences, have not been reported.

Purpose—To determine the characteristics of the changes in suicide rates between 2000 and 2010.

Methods—Data came from CDC's Web-Based Injury Statistics Query and Reporting System (WISQARS™). Line charts were plotted to reveal changes in suicide rates by firearm, poisoning, and hanging/suffocation (ICD-10 codes: X72–X74, X60–X69, and X70). The measure of change used is the percentage change in suicide rate between 2000 and 2010.

Results—The overall suicide rate increased from 10.4 to 12.1 per 100,000 population between 2000 and 2010, a 16% increase. The majority of the increase was attributable to suicide by hanging/suffocation (52%) and by poisoning (19%). Subgroup analysis showed: (1) suicide by hanging/suffocation increased by 104% among those aged 45–59 years androse steadily in all age groups except those aged ≥70 years; (2) the largest increase in suicide by poisoning (85%) occurred among those aged 60–69 years; and (3) suicide by firearm decreased by 24% among those aged 15–24 years but increased by 22% among those aged 45–59 years. The case fatality rates for suicide by hanging/suffocation during 2000–2010 ranged from 69% to 84%, close to those for suicide by firearm. Analyses were conducted in 2012.

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Conclusions—Substantial increases in suicide by hanging/suffocation and poisoning merit attention from policymakers and call for innovations and changes in suicide prevention approaches.

Introduction

Suicide was recently reported[1] to exceed motor vehicle accidents as the leading cause of injury death among Americans. The increasing prevalence of suicide mortality poses a challenge to injury prevention efforts. Unreported are the changes in the epidemiologic characteristics of suicide, an understanding of which is critical to prevention. The current paper highlights changes in the methods of suicide committed in the U.S. between 2000 and 2010, particularly in relation to age and the availability of means.

Methods

Data were extracted from the CDC's Web-based Injury Statistics Query and Reporting System (WISQARS™).[2] The ICD-10 describes deaths coded as X70 as "intentional self-harm by hanging, strangulation, and suffocation." In the current paper, the cause of these deaths is referred to as "hanging/suffocation," given that suffocation means depriving access to air or oxygen, and a common means of accomplishing this in order to kill oneself is by suspension or hanging. The ICD-10 codes for suicide by firearm, poisoning, and hanging/suffocation are X72–X74, X60–X69, and X70, respectively.

The case fatality rate was determined from WISQARS data for mortality and morbidity and was calculated as: (age-adjusted mortality)/(age-adjusted mortality + age-adjusted morbidity) *100%.

Morbidity data used in WISQARS Nonfatal Injury Reports were obtained from an expansion of the National Electronic Injury Surveillance System (NEISS) that is based on data from approximately 500,000 injury-related emergency department cases yearly. Line charts were plotted to reveal changes over the period studied in suicide rates per 100,000 population by method for each age group. In addition, the percentage change in rate was used to quantify changes in suicide rates between 2000 and 2010, calculated as: (rate in 2010 − rate in 2000)/(rate in 2000)*100%.

A χ^2 test was used to examine the significance of rate differences. Analyses were conducted in 2012.

Results

In 2010, the 38,364 suicides in the U.S. reflected an overall rate increase of 16% since 2000, from 10.4 to 12.1 per 100,000 population (Table 1). Taken together, suicide by firearm, hanging/suffocation, and poisoning constituted 93% of suicide by all methods. Between 2000 and 2010, most of the increase in suicide was due to an increase in hanging/suffocation. The proportion of all suicide by hanging/suffocation increased from 19% to 26%, and that by poisoning increased from 16% to 17%. Suicide by firearm remained the predominant type, although the proportion decreased from 56% to 50%.

Detailed examination by population group and method revealed that between 2000 and 2010, suicide rates increased faster for women/girls than for men/boys (percentage change in rates: 26% vs 11%). The rates for whites, Asians, and Native Americans rose by 20%, 12%, and 10%, respectively, and rates among blacks decreased by 6%. The suicide rate increased most among those aged 45–59 years (by 39%); in contrast, it dropped by 8% among the population aged ≥70 years. Suicide by hanging/suffocation increased by 52% for all ages combined, and by poisoning by 19%. There was little net change in the rate of suicide by firearm, which decreased slightly between 2000 and 2006 and then increased gradually between 2006 and 2010 (Figure 1).

Changes in method of suicide varied across age groups. Suicide by firearm, which is the most common type, decreased by 24% in the group aged 15–24 years, and increased by 22% in the group aged 45–59 years. For those aged 25–44 years, firearm suicide began to increase substantially in 2006 following a slight decrease during 2000–2006. Between 2000 and 2010, suicide by hanging/suffocation rose by 104% (i.e., more than doubled) for those aged 45–59 years and increased steadily in all other age groups except those aged ≥70 years (Table 1), for whom there was a small decline (Figure 1).

The largest increase in suicide by poisoning (85%) was in the group aged 60–69 years. Rates of suicide by poisoning changed little during these years for some age groups; however, in the groups aged 45–59 years and 60–69 years, rates increased steadily (Figure 1). The case fatality rates for each of three most common suicide methods remained relatively stable. The case fatality rates for suicide by hanging/suffocation were close to those by firearm, ranging from 69% to 84%. In 2010, the case fatality rates were 81% for suicide by firearm, 75% for hanging/suffocation, and 2% for poisoning.

Discussion

The current findings reveal that hanging/suffocation played a major role in the increase in suicide rates between 2000 and 2010. Similar increases through 2005 were reported among whites by Hu et al. in 2008,[3] but few efforts have been made to respond to these changes. Recognition of the changes in suicide methods is important because of the need for preventive measures directed toward this growing problem.

The increase in suicide was evident beginning in 2001, prior to the economic downturn. After 2005, the increase accelerated and may well have been influenced by the effects of the recession.[4,5] With several notable exceptions, little attention has been given to the methods used in suicide and suicide attempts, although the availability of specific means of self-destruction has been shown to influence both preferred methods[6] and case/fatality rates.[6–8]

Reductions in availability of firearms, pesticides, and coal gas have been associated with reduced suicide rates.[8] Important reductions have occurred in the lethality of some means, such as motor vehicle exhaust.[9] The choice of means and methods is often influenced by cultural, religious, and social factors.[10] In addition to changes in the availability of means (as in the case of some drugs and medications), changes in the social acceptability of means and methods may also reduce suicide rates. Reporting by the media, as well as other

individual and community perceptions, may play a role in shaping social acceptability norms.[6]

Hanging/suffocation is almost as lethal as firearm use as a means of suicide. The lack of an increase in case fatality rates indicates that the increase in mortality rates from suicide by hanging/suffocation is related to an increase in suicide attempts by this method. The dramatic increase in suicide by hanging in the U.S. is of special concern because of the widespread availability of rope and other accessories used in hanging. Prevention strategies that are effective within inpatient settings should be given greater attention for their potential to reduce suicide in other settings as well. Such strategies include installing break-away closet bars, lowering the height of anchor points, and increasing the awareness of risk indicators.

In the absence of evidence of a trend in assigning suicidal intent to poisoning deaths, it seems reasonable to interpret the increase in suicide by poisoning as being due to the increase in intentional overdoses. Fortunately, the recent attention to the problem of increased fatal overdoses and availability of prescription opioids may result in some reduction in widespread availability of painkillers, with concomitant decreases in suicide by poisoning.

Conclusion

The recent increases in suicide by hanging/suffocation and poisoning call for innovations and changes in suicide prevention approaches. The revised National Suicide Prevention Strategy released on September 10, 2012 (World Suicide Prevention Day) outlines national priorities for suicide prevention in the next decade. One goal is to promote efforts to reduce access to lethal means of self-harm; however, no proposal has been made to date on how, specifically, to reduce hanging deaths. High-quality research should be supported to develop interventions to curb the rise in suicide by hanging.

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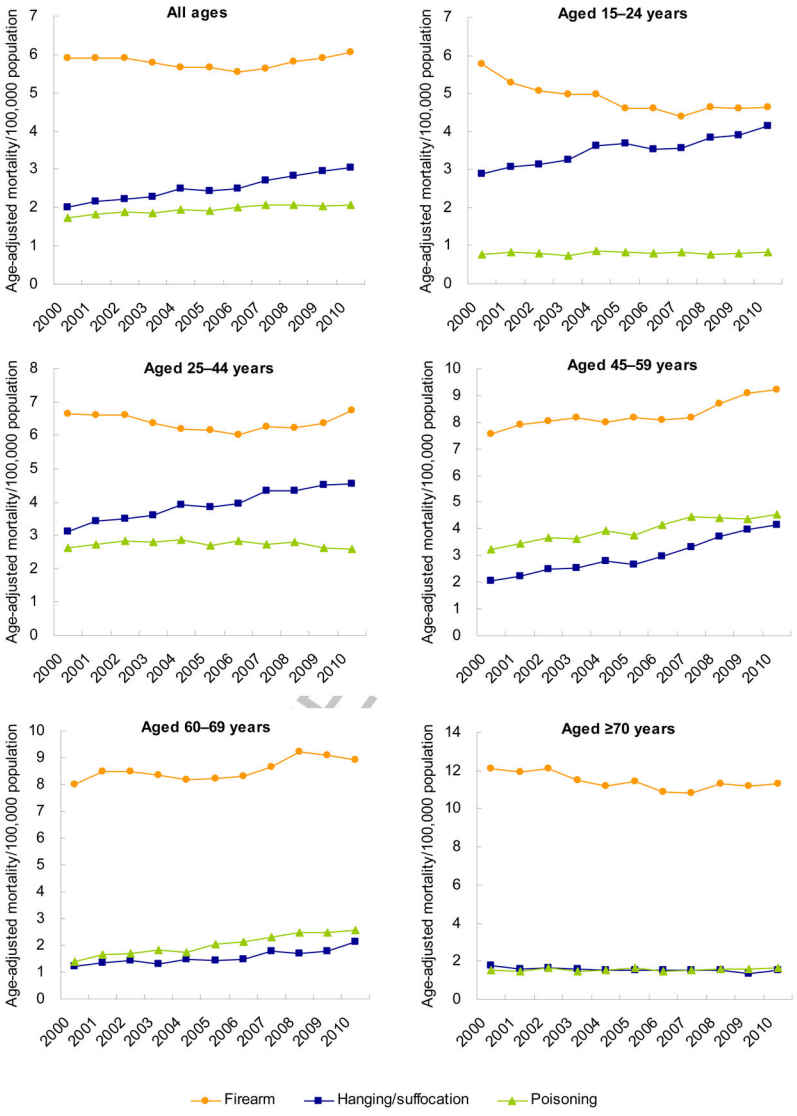

Figure 1.

Age-adjusted mortality/100,000 population, by age group and method of suicide, U.S., 2000–2010

Table 1

Suicide rate/100,000 population by age group and method, U.S., 2000–2010

Age (years)	Method	2000	2010	Percentage change in rate
All	All	10.4	12.1	**16****
	Firearm	5.9	6.1	**3***
	Hanging/suffocation	2.0	3.1	**52****
	Poisoning	1.7	2.1	**19****
15–24	All	10.2	10.5	3
	Firearm	5.8	4.6	**−24****
	Hanging/suffocation	2.9	4.2	**44****
	Poisoning	0.8	0.8	9
25–44	All	13.4	15.1	**12****
	Firearm	6.7	6.7	1
	Hanging/suffocation	3.1	4.6	**47****
	Poisoning	2.6	2.6	−2
45–59	All	14.0	19.4	**39****
	Firearm	7.5	9.2	**22****
	Hanging/suffocation	2.0	4.2	**104****
	Poisoning	3.2	4.5	**40****
60–69	All	11.4	14.7	**29****
	Firearm	8.0	8.9	**12****
	Hanging/suffocation	1.2	2.1	**77****
	Poisoning	1.4	2.5	**85****
≥70	All	16.6	15.3	**−8****
	Firearm	12.1	11.3	**−7****
	Hanging/suffocation	1.8	1.6	**−13***
	Poisoning	1.5	1.6	7

Note: Boldface indicates significance. Suicide data were not included for children aged <15 years, due to the extremely low rates among this age group.

* $p<0.05$,

** $p<0.01$