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Original article

Use of alcohol before suicide in the United States

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ABSTRACT

Purpose: Few studies have compared acute use of alcohol in suicide decedents with that in a nonsuicide group. This study provides the first national analysis of acute use of alcohol before suicide compared with an estimate of acute use of alcohol in a living sample.
Methods: Pooled 2003–2011 National Violent Death Reporting System data were used to estimate the prevalence of postmortem blood alcohol content positivity (blood alcohol content >0.0 g/dL) and intoxication (blood alcohol content ≥0.08 g/dL). Population estimates of comparable use of alcohol (within the past 48 hours) were based on the National Epidemiologic Survey on Alcohol and Related Conditions.
Results: Compared with the living sample, male and female suicide decedents showed, respectively, a 1.83-fold (95% confidence interval [CI], 1.73–1.93) and 2.40-fold (95% CI, 2.24–2.57) increased risk of alcohol ingestion before their death after age, race/ethnicity, and chronic alcohol problems were controlled. Furthermore, male and female decedents exhibited, respectively, a 6.18-fold (95% CI, 5.57–6.86) and a 10.04-fold (95% CI, 8.67–11.64) increased risk of being intoxicated before their death after confounders were considered.
Conclusions: The findings underscore the crucial need to include among the essential components of suicide prevention policies programs that minimize the use of alcohol, particularly drinking to intoxication.

Introduction

Suicide continues to be an urgent global public health problem [1]. In the United States, 38,364 people died by suicide in 2010, representing the 10th leading overall cause of death and fifth leading cause of years of potential life lost (YPLL). Men across the age span, but particularly in older age, have a higher suicide rate than do women at any age [2].

Alcohol plays a key role in suicide [3–6]. According to the US Centers for Disease Control and Prevention (CDC), on average, 7,266 suicides (23%) and 243,516 YPLL (36%) were attributable to alcohol annually in 2001–2005 [7]. There have been several uncontrolled descriptive studies of the association of acute use of alcohol and suicide [6], including several reports of national US data by our investigative team [8–10]. This literature confirms that alcohol is commonly consumed before suicide; for example, our group recently reported that 37% of male and 29% of female suicide decedents in a US national sample had positive blood alcohol levels [8]. These data further showed that individuals who drank before suicide tended to consume high levels of alcohol; we recorded estimates of mean blood alcohol concentrations (BACs) of 0.15 g/dL and 0.13 g/dL in male and female suicide decedents, respectively, who used alcohol before suicide [10], levels that far exceed the 0.08 g/dL legal limit for drinking and driving in the United States.

What is missing from such data is the ability to compare drinking in suicide decedents with that in a nonsuicide comparison group, a procedure that would allow for estimation of the degree

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of risk for suicide associated with drinking occasions and heavy drinking occasions, respectively. Indeed, to our knowledge, there has been only one study that systematically compared acute use of alcohol in suicide decedents with that in a nonsuicide comparison group [11]. Using a case-control study of 149 firearm suicides, Branas et al. [11] found acute alcohol intoxication to increase firearm suicide risk. Although the report by Branas et al. is informative, its generalizability to suicides nationally or to suicides using other methods is unclear. Its small sample size also does not allow for estimates of risk in men versus women (i.e., $n < 20$ female suicides) or in specific age groups, a key limitation in light of dramatic differences in drinking (and heavy drinking) in the general population as a function of age and gender [12].

The primary purpose of the present study was to provide the first estimates based on US national data of relative risk of suicide associated with (a) drinking occasions and (b) heavy drinking occasions. We hypothesized that suicide decedents had higher drinking rates and levels before death than a living sample. This study addressed these issues using the National Violent Death Reporting System (NVDRS), a large well-characterized database with unrivaled toxicology information. The primary aim of the study was to compare acute alcohol use among suicide decedents with drinking patterns of a living population. The results can be used to facilitate the development of more effective clinical practices, treatment programs, and public policies to reduce the incidence of alcohol-associated suicides.

Methods

This study used restricted pooled data for decedents from the 2003–2011 NVDRS [13]. Supported by the CDC, the NVDRS is a state-based active surveillance system that provides a detailed account of violent deaths in the participating states. Although a smaller cohort of states participated in 2003 and 2004, in 2005–2011, 16 states (Alaska, Colorado, Georgia, Kentucky, Maryland, Massachusetts, New Jersey, New Mexico, North Carolina, Oklahoma, Oregon, Rhode Island, South Carolina, Utah, Virginia, and Wisconsin) contributed data to the NVDRS. In 2010, Ohio joined the NVDRS.

The data were gathered from coroner/medical examiner (C/ME) records, police reports, death certificates, toxicology laboratories, crime laboratories, and Bureau of Alcohol, Tobacco, Firearms, and Explosives firearm trace reports. Information on acute alcohol use was based on toxicological analyses of decedents as part of the C/ME investigation. Suicide decedents were identified using the *International Classification of Diseases*, 10th Revision codes X60–X84 or Y87.0 [14]. Pooled 2003–2011 NVDRS data yielded 82,519 suicide decedents (Fig. 1). A detailed description of the sample characteristics appears elsewhere [8,9,15]. The Human Subjects Review Committee at Portland State University approved this study.

As shown in Figure 1, 68% of male ($n = 44,456$) and 73% of female ($n = 13,083$) suicide decedents were tested for BAC. BAC positivity (BAC+) refers to the presence of alcohol versus its absence (BAC negative). The BAC was first coded as a continuous measure in terms of weight by volume and then classified as any detectable BAC (BAC+) versus none. Decedents were further classified into those with a BAC of 0.08 g/dL or more (the legal limit for driving in all US states) and those with a BAC of less than 0.08 g/dL. Percent of decedents who underwent autopsy in each participating NVDRS states appears in Appendix 1.

Alcohol problem (AP) information was derived from C/ME and law enforcement records and denotes whether the decedent was reported by family, friends, or health care providers to have had an AP before death. Gender and age (categorized into 5-year age groups) were obtained from death certificates. Prevalence rates of BAC+ and BAC 0.08 g/dL or more were estimated for all groups.

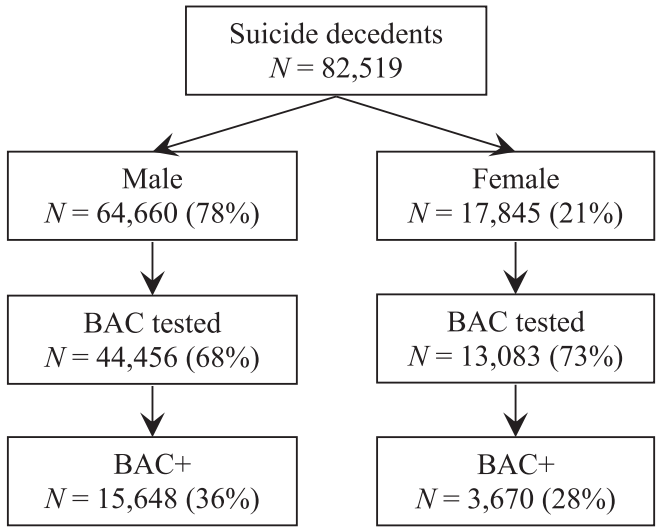

Fig. 1. Study population in the NVDRS, 2003–2011. BAC+ = BAC positivity (BAC > 0.0 g/dL).

Living sample

The 2001–2002 National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) [16] data were used as the comparison group. The NESARC was conducted by the US Census Bureau under the direction of the National Institute on Alcohol Abuse and Alcoholism and is a nationally representative longitudinal survey of 43,093 noninstitutionalized adults in the United States, involving in-person interviews. It was used to assess alcohol use, heavy episodic drinking, and APs. The NESARC response rate for the first

Table 1
Characteristics of NVDRS suicide decedents and NESARC participants

Characteristics	NVDRS ($n = 52,276$)	NESARC ($n = 43,093$)
Gender		
Men	76.9	47.9
Women	23.2	52.1
Age (y)		
18–20	4.1	5.9
21–24	6.8	7.1
25–29	8.4	8.8
30–34	8.4	9.7
35–39	9.5	10.4
40–44	11.3	10.8
45–49	12.4	10.0
50–54	11.6	8.8
55–59	8.7	6.9
60–64	5.8	5.4
65–69	3.8	4.6
70–74	2.9	4.3
≥75	6.4	7.4
Race/ethnicity		
White	85.1	70.9
African American	6.8	11.1
AI/AN	1.5	2.1
Asian/PI	1.8	4.4
Hispanic	4.8	11.6
MSA		
Non-MSA	17.6	19.7
MSA	82.4	80.3

AI/AN = American Indian/Alaska Native; MSA = Metropolitan Statistical Area; PI = Pacific Islander.