Suicide Acts in 8 States: Incidence and Case Fatality Rates by Demographics and Method

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ABSTRACT

Objectives. This study examined incidence rates of medically identified suicide acts (self-inflicted injuries, either fatal or nonfatal) and case fatality rates by age, sex, race, and method used.

Methods. The authors analyzed data on 10 892 suicides and 57 439 attempted suicides among hospital-admitted individuals in 8 states, along with 6219 attempted suicides among individuals released from emergency departments in 2 states.

Results. The 8 states experienced a mean of 11 suicides and 119 attempted suicides per 100 000 residents each year. Groups with high suicide rates were men, the elderly, and Whites; groups with high attempted suicide rates were teenagers, young adults, women, and Blacks and Whites aged 25 to 44 years. Blacks aged 15 to 44 years evidenced high attempted suicide rates undocumented in previous studies. Poisoning and firearm were the most common methods used among those attempting suicide and those completing suicide acts, respectively. The most lethal method was firearm.

Conclusions. The characteristics of suicides and attempted suicides differ dramatically. Method used is important in the lethality of the act. (*Am J Public Health.* 2000;90:1885–1891)

In 1997, suicide was the eighth leading cause of death in the United States.[1] The epidemiology of suicide is fairly well understood. Annually, about 11 of every 100 000 Americans commit suicide. Suicides rates increase with age, are highest among Whites, and are more than 4 times higher among males than among females.[2–4]

Suicide is the most severe outcome of suicidal behavior. Suicidal behaviors range from thoughts of suicide (suicide ideation) to nonfatal self-inflicted injury and suicide. In this article, we refer to any self-inflicted injury, whether fatal or nonfatal, as a "suicide act" (as recommended by O'Carroll et al.[5]). We label completed suicide acts "suicides" and nonfatal suicide acts "attempted suicides."

Information on attempted suicides is primarily generated by local surveillance systems and select population surveys of self-reported behavior. Different definitions of attempted suicide, respondent interpretations of surveys, and question formats make comparisons between studies of self-reported attempted suicide difficult.

A survey of Nevada college freshmen aged 18 to 24 years showed that self-reported attempted suicide does not necessarily imply self-injury.[6] Of 40 respondents who reported suicide attempts, 18% required hospitalization, 28% sought medical attention, and 35% did not seek medical attention; 20% of cases did not result in injury. The researchers concluded that self-reported attempted suicide provided little information on the intent of the act.

Characteristics of suicide attempts are dramatically different from characteristics of suicides. Consistently, studies have revealed high attempted suicide rates among young adults and declining rates with increasing age.[6–10]

Attempted suicide is more common in women than in men.[7,8,11–13] A 5-year review of hospital records in the Chicago area showed that rates of attempted suicide among young people aged 15 to 19 years were nearly 3 times higher in females than males.[11] The 1996 Youth Risk Behavior Survey indicates that young women aged 15 to 19 years are about 2 times more likely than male youths in the same age group to report either suicide ideation or attempted suicide in the previous 12 months.[7] In the National Institute of Mental Health (NIMH) Epidemiologic Catchment Area Study, lifetime prevalence rates of self-reported attempted suicide among adults 25 years or older were nearly 3 times greater in women than in men.[14]

Studies comparing attempted suicide rates by race and ethnicity have yielded conflicting results. Findings from the Youth Risk Behavior Survey showed that Hispanics were significantly more likely than Whites, but not significantly more likely than Blacks, to report attempting suicide.[7] In a study of Black and White South Carolina high school students, Whites had higher rates of attempted suicide.[8] However, the rate of medically treated attempts was highest among Black girls. According to Moscicki et al.,[14] Black adults 25 years or older had lower odds of attempting suicide than non-Blacks in the NIMH Epidemiologic Catchment Area Study. Sorenson and Golding's[12] investigation of lifetime prevalence rates of suicide ideation and attempts in the NIMH Epidemiologic Catchment Area Study showed that Hispanics had lower ideation and attempt rates than non-Hispanic Whites.

The few studies exploring suicide methods suggest that the method used in the suicide act is related to the outcome. A 1970 study conducted in Allegheny County, Pa, showed

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that the most lethal suicide methods were firearms, drowning, and hanging; the least lethal methods were cutting, gas poisoning (excluding carbon monoxide), and drug overdose.[15] Between 1980 and 1992, the Centers for Disease Control and Prevention reported increases in the proportion of firearm-related suicides concurring with rising suicide rates.[2,3]

With the advent of external cause-of-injury coding (E-coding), data on suicide attempts identified by state health systems are becoming increasingly available. E-coding provides information on the mechanism that caused the injury and on injury intent. About half of US states routinely began collecting E-coded hospital discharge data in the 1990s.[16] According to a 1998 survey of statewide hospital discharge data systems, E-coding is mandated in 24 states[16]; as of 1997, however, only 3 states were centrally collecting E-coded emergency department data.

The present study is, to our knowledge, the first multistate epidemiologic examination of pooled E-coded discharge data and vital statistics data. We integrated these data into a single epidemiologic analysis of nearly 65 000 medically identified suicide attempts and 11 000 suicides to compute annual incidence of suicide acts and case fatality rates in 8 states, by victim age, sex, and race and by method used.

Methods

We defined medically identified suicide acts as cases logged in medical records and E-coded, according to the *International Classification of Diseases, Ninth Revision, Clinical Modification*, as intentional self-inflicted injuries (codes E950.0–E959.9).[17] However, we did not include in our analysis thoughts of suicide, suicide attempts that did not result in injury, and suicide attempts that resulted in injury not serious enough to be treated in an emergency department or require hospitalization.

We pooled previously acquired data from 8 state hospital discharge data systems (California [1993], Maryland [1994–1995], Missouri [1994], New York [1994], South Carolina [1997], Utah [1992–1995 and 1997], Washington [1989–1991], and Vermont [1990]) to examine cases involving admittance to a hospital. The pooled data included more than 600 000 live injury discharges. Those deceased at discharge were excluded because we assumed that they were captured in the mortality files. More than 90% of injury cases had E codes. From these, we captured 57 439 medically identified suicide attempts. We pooled data from 2 E-coded state emergency department files (Missouri, 1994, and South Carolina, 1997), capturing 6219 treated and released (emergency department only) case patients. State counts of suicide, separately matched to the year of the discharge data for each state, were derived from E-coded US vital statistics data.[18] The data sources provided information on race/ethnicity (except Utah, Vermont, and Washington), sex, and age of the victim.

To eliminate readmissions and double counting of the same attempt, we excluded patients transferring from another hospital or inpatient department and cases coded as late effects of a suicide attempt (E959; 372 cases) from the analysis. However, fatalities resulting from late effects (10 cases) were included in the count of suicides.

The method used in the suicide act was identified according to E-code: drug overdose/poison ingestion (E950), poisoning by gas (E951, E952), suffocation/hanging (E953), drowning (E954), firearm (E955.0–E955.4), cutting/piercing instrument (E956), jumping from high places (E957), and other (E958, E955.5, E955.9). "Other" includes jumping/lying before a moving object, fire/scald, electrocution, motor vehicle crash, caustic substance, explosive device, and unspecified means.

Numbers of patients treated only in the emergency department in the states without emergency department data were estimated via the ratio of emergency-department–only cases per admission, by suicide method used, based on the 2 states with emergency department data available. This procedure assumed that admitted and nonadmitted victims were comparable demographically.

Demographic data were used to compute rates. These data were derived from the 1995 *Statistical Abstract of the United States*[19] and from the Census Bureau Web site,[20] which provides annual state population estimates by age, sex, and race/ethnicity.

Some people who attempt suicide make more than one attempt.[9,10,21] We estimated number of attempts rather than number of attempters.

Results

State Counts and Estimates

Results showed that, annually, an estimated 92 000 suicide acts were identified in California, Maryland, Missouri, New York, South Carolina, Utah, Washington, and Vermont combined (130 acts per 100 000 population; see Tables 1 and 2). Of all suicide acts, 8.8% were fatal (Table 2), a rate of 11.4 per 100 000 population. Annually, there were 61 suicide attempts involving hospitalization per 100 000 population and an estimated 58 attempts involving only a visit to the emergency department per 100 000 population (Table 2).

The epidemiology of suicide acts closely resembled that of attempted suicide, because about 9 of 10 suicide acts are nonfatal. Suicide act rates were high in adolescents and young adults (Table 2) and lowest among children (0–14 years) and the elderly (64 years and older). However, the case fatality rate (percentage of suicide acts that are fatal) increased with age (Table 2). Although suicide act rates were lowest for individuals 65 years or older, almost 31% of these acts were fatal.

Women were more likely than men to commit a suicide act, and this was particularly the case in the 15- to 19-year age group (Table 3). However, suicide acts among men were almost 5 times more likely to be fatal than suicide acts among women (15.8% vs 3.3%; Table 2). Men 65 years or older had the highest case fatality rate (45%) (Table 3).

Suicide act rates were highest among Whites and Blacks and lowest among Hispanics (Table 2). Regardless of sex, Whites and Blacks had the highest attempted suicide rates (females: 150 and 142 per 100 000 population, respectively; males: 109 and 115 per 100 000 population, respectively). White males evidenced the highest suicide rate (23 per 100 000 population), nearly twice the second highest rate of 13 suicides per 100 000 Black males. Suicide acts among Whites and among males were also most likely to be fatal. (Tables detailing incidence and case fatality rates by race/ethnicity and sex are available from the authors.)

Whites of any age and Blacks younger than 45 years had the highest suicide act rates (Table 4). Regardless of age, suicide act rates were lowest among Hispanics. Case fatality rates were highest among Whites older than 65 years.

Suicide Method

Suicide methods varied in lethality, as measured by case fatality rate. Firearms, drowning, and suffocation/hanging were the most lethal. The least lethal methods were drug overdose/poison ingestion and cutting/piercing.

We lacked enough cases involving only visits to the emergency department in the 2 state emergency department data sets to compute reliable age-specific rates by method and sex and by method and race/ethnicity. Therefore, analyses of suicide method by sex, age, and race were based on attempted suicides involving hospitalization and suicides only.

Men were more likely than women to choose the 3 most lethal methods (24% vs 4%), while women were more likely to choose the

TABLE 1—Average Annual Numbers of Suicide Attempts and Deaths in 8 US States, by State, Sex, Age Group, Race/Ethnicity, and Method Used

	Suicides,[a] No. (%)	Attempts		Total, No. (%)
		Hospitalized,[b] No. (%)	ED Only,[c] No. (%)	
State	8110 (100)	43069 (100)	40900 (100)	92100 (100)
California	3875 (48)	18774 (44)	17700 (43)	40300 (44)
Maryland	529 (7)	3829 (9)	3600 (9)	8000 (9)
Missouri	728 (9)	5156 (12)	3705 (9)	9600 (10)
New York	1498 (18)	9186 (21)	8900 (22)	19600 (21)
South Carolina	497 (6)	1512 (4)	2514 (6)	4500 (5)
Utah	227 (3)	1089 (3)	1100 (3)	2400 (3)
Vermont	84 (1)	429 (1)	400 (1)	900 (1)
Washington	672 (8)	3094 (7)	3000 (7)	6800 (7)
Sex[d]				
Male	6436 (79)	16782 (39)	17600 (43)	40800 (44)
Female	1674 (21)	26287 (61)	23300 (57)	51300 (56)
Age, y				
0–14	64 (1)	1758 (4)	1600 (4)	3400 (4)
15–19	474 (6)	6131 (14)	5500 (13)	12100 (13)
20–24	749 (9)	5438 (13)	5300 (13)	11500 (12)
25–44	3288 (41)	22220 (52)	21500 (53)	47000 (51)
45–64	1900 (23)	5663 (13)	5200 (13)	12800 (14)
≥65	1627 (20)	1859 (4)	1800 (4)	5300 (6)
Unknown	8 (0)	0 (0)	0 (0)	8 (0)
Race/ethnicity[e]				
White non-Hispanic	5519 (77)	26238 (68)	24800 (68)	56600 (69)
Black non-Hispanic	589 (8)	5202 (14)	4800 (13)	10600 (13)
Other non-Hispanic	340 (5)	2226 (6)	2100 (6)	4700 (6)
Hispanic	656 (9)	4174 (11)	4000 (11)	8800 (11)
Unknown	23 (0)	617 (2)	700 (2)	1300 (2)
Method				
Drug/poison ingestion	1001 (12)	36947 (86)	27710 (68)	65660 (71)
Poison by gas	461 (6)	288 (1)	360 (1)	1110 (1)
Suffocation/hanging	1405 (17)	238 (1)	650 (2)	2290 (2)
Drowning/submersion	112 (1)	25 (0)	30 (0)	170 (0)
Firearm	4365 (54)	529 (1)	400 (1)	5290 (6)
Cut/pierce	158 (2)	3689 (9)	9260 (23)	13110 (14)
Jump	314 (4)	338 (1)	260 (1)	910 (1)
Other	284 (4)	1014 (2)	2240 (5)	3540 (4)
Late effects	10 (0)	…	…	…

Note. Hospitalized = admitted to the hospital (deaths excluded); ED Only = treated in the emergency department and released alive.
[a]Based on vital statistics data from California (1993), Maryland (1993–1994, most recent available), Missouri (1994), New York (1994), South Carolina (1996, most recent available), Utah (1992–1996), Washington (1989–1991), and Vermont (1990).
[b]Based on hospital discharge data from California (1993), Maryland (1994–1995), Missouri (1994), New York (1994), South Carolina (1997), Utah (1992–1995,1997), Washington (1989–1991), and Vermont (1990). Excludes fatalities.
[c]Estimated by applying combined South Carolina and Missouri ratios of hospital admissions to ED-only visits, by method used, to cases in the 6 other state hospital discharge files.
[d]23 Utah cases with encrypted sex were distributed in proportion to known Utah cases.
[e]Excludes Utah, Washington, and Vermont.

2 least lethal methods (93% vs 68%). Women younger than 45 years used drug and poison ingestion in 9 of 10 acts.

Among suicide victims and those admitted to the hospital after an attempt, method choice varied dramatically according to age group. Suicide acts among the elderly were more likely to involve a highly lethal method. However, when we controlled for method by stratifying, the case fatality rate still rose steadily by age group and remained higher in males than in females.

Choice of method varied little between races. The only notable difference involved the firearms category, in which Hispanics were above the average (1.8% of suicide acts) and those of other races (Asian Americans and Native Americans) were below the average (0.6% of suicide acts). The distribution of methods was similar among the 8 states. (Tables describing suicide method prevalence rates by sex and age and by race/ethnicity and age are available from the authors.)

Discussion

Limitations

The 8 states analyzed do not represent the United States either demographically or geographically. Notably, the populations of these states involve a higher percentage of Hispanics (17%) and a greater proportion of residents below the poverty level. The average annual suicide rate in the 8 states during 1986 to 1994 was slightly lower than that of the nation as a whole (11.4 vs 11.7 per 100000).[1] Because these pooled states are not representative of the United States as a whole, the state findings were not used to extrapolate to national estimates of suicide acts.

For several reasons, our counts of suicide acts may be low. Reporting criteria for determining whether an injury was a suicide act may differ between states. Suicide acts can be misclassified as unintentional or of undetermined intent. If half of the 2% of injury deaths coded

TABLE 2—Crude Annual Suicide Act Rates and Case Fatality Rates, by State, Sex, Age Group, Race/Ethnicity, and Method: 8 US States, 1989–1997

	Suicides per 100 000[a]	Attempts per 100 000		Suicide Acts per 100 000	Case Fatality Rate,[d] %
		Hospitalized[b]	ED Only[c]		
State	11.4	61	58	130	8.8
California	12.4	60	56	128	9.6
Maryland	10.6	77	72	160	6.6
Missouri	13.8	98	70	182	7.6
New York	8.3	51	49	108	7.6
South Carolina	13.6	41	69	123	11.0
Utah	11.8	57	57	124	9.5
Vermont	14.9	76	71	159	9.3
Washington	13.7	63	61	139	9.9
Sex[e]					
Male	18.5	48	50	117	15.8
Female	4.7	73	65	143	3.3
Age, y					
0–14	0.4	11	10	21	1.9
15–19	10.1	131	118	259	3.9
20–24	14.8	107	105	227	6.5
25–44	14.1	95	92	201	7.0
45–64	14.3	43	39	96	14.8
≥65	19.5	22	22	63	30.7
Race/ethnicity[f]					
White non-Hispanic	14.0	67	63	144	9.8
Black non-Hispanic	7.6	67	62	137	5.6
Other non-Hispanic	7.4	49	46	103	7.2
Hispanic	5.6	35	34	75	7.5
Method					
Drug/poison ingestion	…	…	…	…	1.5
Poison by gas	…	…	…	…	41.5
Suffocation/hanging	…	…	…	…	61.4
Drowning/submersion	…	…	…	…	65.9
Firearm	…	…	…	…	82.5
Cut/pierce	…	…	…	…	1.2
Jump	…	…	…	…	34.5
Other	…	…	…	…	8.0

Note. Hospitalized = admitted to the hospital (deaths excluded); ED Only = treated in the emergency department and released alive.
[a]Based on vital statistics data from California (1993), Maryland (1993–1994, most recent available), Missouri (1994), New York (1994), South Carolina (1996, most recent available), Utah (1992–1996), Washington (1989–1991), and Vermont (1990).
[b]Based on hospital discharge data from California (1993), Maryland (1994–1995), Missouri (1994), New York (1994), South Carolina (1997), Utah (1992–1995,1997), Washington (1989–1991), and Vermont (1990).
[c]Estimated by applying combined South Carolina and Missouri ratios of hospital admissions to ED-only visits, by method used, to cases in the 6 other state hospital discharge files.
[d]Suicides divided by total suicide acts.
[e]Twenty-three Utah cases with encrypted sex were distributed in proportion to known Utah cases.
[f]Excludes Utah, Washington, and Vermont.

as "intent unknown" were suicides, the national suicide death rate would rise by about 5%. Research suggests that suicide deaths may be underestimated by 10% to 50%.[22]

Reasons for not reporting an injury as intentional include failure to recognize the intent or reluctance to impose stigma, guilt, and possible loss of insurance benefits. In addition, rates of seeking medical treatment for injuries may differ by age, race, and sex, as may identification of a suicide act.

We found that case fatality rates vary by state. This discrepancy may reflect real differences or may be due to differences in factors such as coding guidelines, use of postmortem examinations in determining cause of death, and training and qualifications of coroners and medical examiners across states.[23] Differences also may reflect variations between the states in regard to suicide attempters' hospital "admission threshold," the level of threat of a reattempt warranting admission for observation.

The method used in an attempted suicide is a source of bias in terms of seeking medical care. Lethal methods are more likely to be seen in hospital-treated victims (as compared with victims treated in physicians' offices) than are less lethal methods. Our estimates, therefore, probably underrepresent the overall frequency of less lethal methods.

Suicide attempts treated only in clinics and physicians' offices were not included in our estimates. A Belgian study showed that 28% of suicide attempts reported by general practitioners did not involve a referral to a higher level of care.[24] In the Allegheny County, Pennsylvania, study mentioned earlier, 28% of suicide acts were not medically treated or treatment was unknown,[15] and the Nevada college survey showed that of the 18 self-reported medically attended suicide attempts, 11 (61%) did not involve hospitalization.[6]

To reiterate, our population-based rates measured attempts—rather than attempters—per 100 000 population. We elected not to use attempts to estimate attempters because of the lack of appropriate adjusting factors. Just as the lethality of attempts varies greatly by age, race, and sex of the victim, the number of attempts a suicidal person makes in a given year may vary by these characteristics.[21]

TABLE 3—Average Annual Number of Suicides and Attempted Suicides, with Crude Incidence Rates and Case Fatality Rates in 8 US States, by Age Group and Sex

Age, y	Sex	Suicides[a]	Attempts		Total Acts	Attempts per 100 000	Suicides per 100 000	Case Fatality Rate,[d] %
			Hospitalized[b]	ED Only[c]				
0–14	Male[e]	45	297	400	742	8	1	6.1
	Female	19	1461	1200	2680	34	0	0.7
15–19	Male	395	1812	1800	4007	149	16	9.9
	Female	79	4319	3700	8098	357	4	1.0
20–24	Male	653	2253	2400	5306	177	25	12.3
	Female	96	3185	2800	6081	246	4	1.6
25–44	Male	2640	9503	10000	22143	166	22	11.9
	Female	648	12717	11600	24965	209	6	2.6
45–64	Male	1414	2176	2200	5790	68	22	24.4
	Female	486	3487	3000	6973	94	7	7.0
≥65	Male	1282	741	800	2823	45	38	45.4
	Female	345	1118	1000	2463	43	7	14.0
Unknown	Male	7	0	0	7	0	0	0.0
	Female	1	0	0	1	0	0	0.0

Note. Hospitalized = admitted to the hospital (deaths excluded); ED Only = treated in the emergency department and released alive.
[a]Based on vital statistics data from California (1993), Maryland (1993–1994, most recent available), Missouri (1994), New York (1994), South Carolina (1996, most recent available), Utah (1992–1996), Washington (1989–1991), and Vermont (1990).
[b]Based on hospital discharge data from California (1993), Maryland (1994–1995), Missouri (1994), New York (1994), South Carolina (1997), Utah (1992–1995,1997), Washington (1989–1991), and Vermont (1990).
[c]Estimated by applying combined South Carolina and Missouri ratios of hospital admissions to ED-only visits, by method used, to cases in the 6 other state hospital discharge files.
[d]Suicides divided by total suicide acts.
[e]23 Utah cases with encrypted sex were distributed in proportion to known Utah cases.

TABLE 4—Average Annual Number of Suicides and Attempted Suicides, with Crude Incidence Rates and Case Fatality Rates in 5 US States, by Age Group and Race/Ethnicity

Age, y	Race/Ethnicity	Suicides[a]	Attempts		Total Acts	Attempts per 100 000	Suicides per 100 000	Case Fatality Rate,[d] %
			Hospitalized[b]	ED Only[c]				
0–14	White non-Hispanic	30	896	800	1726	22	0	1.7
	Black non-Hispanic	10	240	200	450	22	1	2.2
	Other non-Hispanic	3	120	100	223	20	0	1.3
	Hispanic	11	278	300	589	16	0	1.9
15–19	White non-Hispanic	243	3126	2900	6269	274	11	3.9
	Black non-Hispanic	48	768	700	1516	244	8	3.2
	Other non-Hispanic	25	461	400	886	279	8	2.8
	Hispanic	78	906	800	1784	171	8	4.4
20–24	White non-Hispanic	384	2858	2800	6042	235	16	6.4
	Black non-Hispanic	104	753	600	1457	226	17	7.1
	Other non-Hispanic	45	367	300	712	175	12	6.3
	Hispanic	114	771	700	1585	133	10	7.2
25–44	White non-Hispanic	2155	13904	13300	29359	214	17	7.3
	Black non-Hispanic	281	2919	2800	6000	221	11	4.7
	Other non-Hispanic	146	958	1000	2104	119	9	6.9
	Hispanic	328	1800	1800	3928	89	8	8.4
45–64	White non-Hispanic	1400	4018	3600	9018	91	17	15.5
	Black non-Hispanic	109	459	400	968	65	8	11.3
	Other non-Hispanic	68	241	200	509	53	8	13.4
	Hispanic	91	343	300	734	44	6	12.4
≥65	White non-Hispanic	1307	1436	1400	4143	47	22	31.5
	Black non-Hispanic	39	63	100	202	26	6	19.3
	Other non-Hispanic	54	79	100	233	53	16	23.2
	Hispanic	38	76	100	214	31	7	17.8

Note. Hospitalized = admitted to the hospital (excludes deaths); ED Only = treated in the emergency department and released alive.
[a]Based on vital statistics data from California (1993), Maryland (1993–1994, most recent available), Missouri (1994), New York (1994), and South Carolina (1996, most recent available).
[b]Based on hospital discharge data from California (1993), Maryland (1994–1995), Missouri (1994), New York (1994), and South Carolina (1997).
[c]Estimated by applying combined South Carolina and Missouri ratios of hospital admissions to ED-only visits, by method used, to cases in the 3 other state hospital discharge files.
[d]Suicides divided by suicide acts.

Comparison With Previous Studies

Most studies examining attempted suicide rates use limited, select population groups, deal with only one method, or rely on self-reported data.[4,6–9,11,12,14,25] Our study was more comprehensive because it examined all medically identified, hospital-treated suicide attempts and suicides in 8 states. Our case definition was more restrictive and did not include suicide attempts that did not result in injury or resulted in only minor injury.

In the 1996 Youth Risk Behavior Survey, 2.8% of respondents aged 15 to 19 years reported a suicide attempt in the previous year that resulted in an injury, poisoning, or overdose treated by a doctor or nurse.[7] Our estimate of hospital-treated suicide attempts among those in the 15- to 19-year age group is much lower (0.3%). Differing definitions of attempted suicide and the coding issues discussed here may also contribute to the discrepancy between Youth Risk Behavior Survey self-reports and hospital data on medically identified attempts. A study of medically identified teen suicide attempts in Oregon revealed a similar discrepancy between self-reports and hospital record data.[9]

Our findings of high attempted suicide rates among women, adolescents, and young adults are consistent with select population and self-report studies.[4,6–9,11,12,14] They have not, however, previously been well documented by a large-scale study not relying on self-reports.

Our finding of high suicide attempt rates among Blacks, particularly those aged 25 to 44, conflicts with self-report data indicating that Whites have higher attempted suicide rates.[7,8] One explanation is the inherent differences between self-reported data and hospital discharge data. Indeed, our findings are consistent with the results of studies of adolescent attempted suicide restricted to self-reports of medically treated attempts[8] or based on hospital records.[11]

Our finding of a below-average attempted suicide rate for Hispanic adolescents contradicts the high self-reported rates from the Youth Risk Behavior Survey.[7] It is unclear whether the difference was a result of identification difficulties or differential willingness to self-report in surveys.

Conclusions

To our knowledge, this study is the first to jointly analyze E-coded hospital discharge data, vital statistics data, and census data from several states. This technique offers several advantages. When these morbidity and mortality data are combined, they support better epidemiological research by providing a large number of cases that allow detailed descriptive comparisons. E-coded data are not subject to the limitations of self-report data. Cases are restricted to those severe enough to require a visit to the emergency department or hospitalization. Finally, standardized medical identification of cases by E code permits easier comparability between studies.

This study is purely descriptive, and therefore no causal inferences can be made. Instead, the results inform needs assessments, prevention programming, and evaluation.

The epidemiology of suicide acts changes dramatically when morbidity data are incorporated into the analysis. Groups with high suicide rates include men, the elderly, and Whites. Groups with high rates of attempted suicide are very different: teenagers and young adults, women (particularly young women), and Blacks and Whites aged 25 to 44 years. Poisoning is the most common method in attempted suicides, and firearm is the most common method in suicides.

High attempted suicide rates among Black adults younger than 45 years have not previously been reported. Attempted suicide rates among Blacks rival those among Whites, whose high suicide mortality rates have already been documented.[4] Studies of suicide mortality overlook the problem of high attempted suicide rates among Blacks because of low case fatality rates. Research on this issue is a priority if the risks for this population are to be better understood.

Interpretation of racial/ethnic differences in suicide act rates is complex. Rather than reflecting variations in risk between race groups, differences may represent disparities in risk by socioeconomic status. Minority households, particularly Black households, are overrepresented in lower socioeconomic strata.[19] In addition, observed racial differences in suicide act rates may reflect underlying cultural, religious, and historical determinants. Measurement of these distal determinants was not possible. Finally, guidelines for coding race and ethnicity vary by state, further complicating interpretation of the results.

Choice of method plays a role in the lethality of the suicide act. Firearm is the most lethal method and drug overdose/poison ingestion the least lethal. We found that groups most at risk of suicide (men and the elderly) are also more likely to choose the most lethal methods. According to the "perception of fatalness" factor in Beck's Suicide Intent Scale,[26] choosing a more lethal method may reflect a greater intent to die. However, method is not the only factor in the lethality of the act. After stratification by method, the case fatality rate remains greater in men than in women and still rises with age.

Restricting access to lethal and popular suicide methods may prevent suicides. Kreitman and Platt,[27] in their landmark study of suicide in Britain, showed a relationship between the removal of carbon monoxide from domestic gas and a fall in the suicide rate. Researchers suggest that limiting quantities of prescription drugs, prescribing less toxic forms of drugs, and improving awareness of drug toxicity may decrease the case fatality rate of drug overdose suicide acts.[28,29] Increasing suicide rates[2,3] may be the result of a shift to more lethal mechanisms. Reducing firearm access through policy initiatives or by removing guns from high-risk homes could reduce suicide act rates or force attempters to switch to means that typically are less lethal.[30–34] □

Contributors

R. S. Spicer and T. R. Miller jointly designed the study, analyzed the data, interpreted the results, and wrote the paper.

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