

Youth Suicide in Wisconsin: Mortality, Hospitalizations, and Risk Factors

Todd L. Eisenberg, MD; Randall L. Glysch, MS; Patrick L. Remington, MD, MPH;
Murray L. Katcher, MD, PhD

ABSTRACT

Objective: To review Wisconsin data on youth suicide mortality, hospitalizations from nonfatal self-inflicted injuries, and self-reported risk behaviors.

Methods: Suicide mortality data for youth (defined here as persons 10-24 years of age) were obtained from the Centers for Disease Control and Prevention (CDC) for 1995-2001 and from the Wisconsin Division of Public Health for 2002. Hospitalization data for Wisconsin from 1995-2002 were obtained from the Wisconsin Division of Public Health. Survey data on self-reported risk behaviors were obtained from the CDC for 2001.

Results: While the rate of youth suicide declined by 24% in the United States during the 9-year period studied, Wisconsin's rate declined only slightly (8%). Firearms accounted for 60% of completed youth suicides in Wisconsin. Medication overdoses and cutting accounted for 88% of self-inflicted injury hospitalizations for Wisconsin youth from 1995 to 2002. Wisconsin high school students reported similar rates of risk factor behaviors as youth in New Jersey (the state with the lowest suicide rates in the nation), but were more likely to use firearms (60% versus 32%).

Conclusion: Rates of suicide mortality, attempts, and self-reported risk behaviors among youth in Wisconsin

continue to be unacceptably high. Physicians can play an important role in reducing youth suicide rates by acting within their clinical practices, as leaders in community suicide-prevention activities, and as advocates for policy change.

INTRODUCTION

Suicide is a major public health problem in Wisconsin. In Wisconsin in 2002, 627 individuals died of suicide, making it the 10th leading cause of death overall in the state. Wisconsin's suicide rate is 3 times greater than its homicide rate and nearly 8 times greater than its HIV death rate.¹ Suicide extracts a heavy toll in terms of loss of productive years of life and causes extreme pain and suffering to surviving family and friends. In Wisconsin in 2002, 112 youths committed suicide, making suicide the second leading cause of death for that age group.² Self-harming behavior is much more widespread; estimates of adolescent suicide attempts that cause injuries range from 50 to 100 times the frequency of completed suicides.³

In this study, trends in suicide mortality, morbidity, and self-reported risk behaviors in Wisconsin and the United States were examined. Because New Jersey has the lowest youth suicide rate of any state in the country and also has many effective youth suicide prevention programs,⁴ Wisconsin data were compared to those of New Jersey. This information may be useful to identify opportunities for suicide prevention and intervention in the future.

METHODS

Data were obtained via the Web-based Injury Statistics Query and Reporting System (WISQARS) program (an on-line electronic link to the Centers for Disease Control and Prevention's [CDC] data library). Suicide rates, number of deaths, and data on gender, race, age, and method were obtained for youth ages 10-24 years in the United States, Wisconsin, and New Jersey from 1993 to 2001.² Mortality data for Wisconsin for 2002 were obtained from the Division of Public Health

Doctor Eisenberg was a fourth-year medical student at the University of Wisconsin Medical School (UWMS) when this study was conducted, and is currently a psychiatry resident at the University of Minnesota. Mr Glysch is a research scientist in the Bureau of Community Health Promotion (BCHP), Division of Public Health (DPH), Wisconsin Department of Health and Family Services (DHFS), Madison. Doctor Remington is a professor of Population Health Sciences at UWMS and director of the University of Wisconsin Population Health Institute, Madison. Doctor Katcher is chief medical officer, BCHP, DPH, DHFS; and clinical professor, Departments of Pediatrics, UWMS and Medical College of Wisconsin. Please address correspondence to: Murray L. Katcher, MD, PhD, Wisconsin Division of Public Health, 1 W Wilson St, Rm 233, Madison, WI 53701-2659; phone 608.266.5818; fax 608.266.8925; e-mail katchml@dhs.state.wi.us.

(DPH), Wisconsin Interactive Statistics on Health (WISH) data query system.⁵ For mortality trends, 3-year moving averages were used to allow comparison of trends over time and to smooth random fluctuations that may occur when data are analyzed annually. ICD-9 codes were used for all data from 1993 to 1998 (E950-959), and ICD-10 codes were used for 1999-2002 (ICD-10 X60-X84, Y87.0, U03). In order to assess the significance of the differences in rates, 95% confidence intervals for each rate (where 95% CI = +1.96 square root [$p^*(1-p)/N$], where p = rate and N = population size) were calculated.⁶

Hospitalizations, hospitalization rates, and costs from 1995 to 2002 were obtained from the DPH WISH system.⁵ Counties were defined as urban or rural based on urban-rural continuum codes developed by the Economic Research Service of the US Department of Agriculture.

Survey data were obtained from the CDC's Youth Risk Behavior Surveillance System for 2001, via an on-line link to the CDC's electronic library.⁷ Incidence rates refer to responses to questions asking about the prior 12-month period; recent rates refer to responses to questions regarding the prior 30 days. The series of suicide-related questions included the following:

- "During the past 12 months, did you ever feel so sad or hopeless almost every day for 2 weeks or more in a row that you stopped doing some usual activities?"
- "During the past 12 months, did you ever seriously consider attempting suicide?"
- "During the past 12 months, did you make a plan about how you would attempt suicide?"
- "During the past 12 months, how many times did you actually attempt suicide?"
- "If you attempted suicide during the past 12 months, did any attempt result in an injury, poisoning, or overdose that had to be treated by a doctor or nurse?"

Other questions and other methodological information on this CDC-sponsored survey are available at www.cdc.gov/yrbbs.

RESULTS

Suicide Mortality

The overall rate of youth suicide mortality in Wisconsin decreased slightly from 1994 to 2000 (as measured by the 3-year moving averages; see Figure 1). Rates decreased less in Wisconsin (8%) than in the United States as a whole or New Jersey (24% each). Rates of youth suicide in Wisconsin decreased from 1994 to 1997 but increased 3% from 1997 to 2000. From 1997 to 2000,

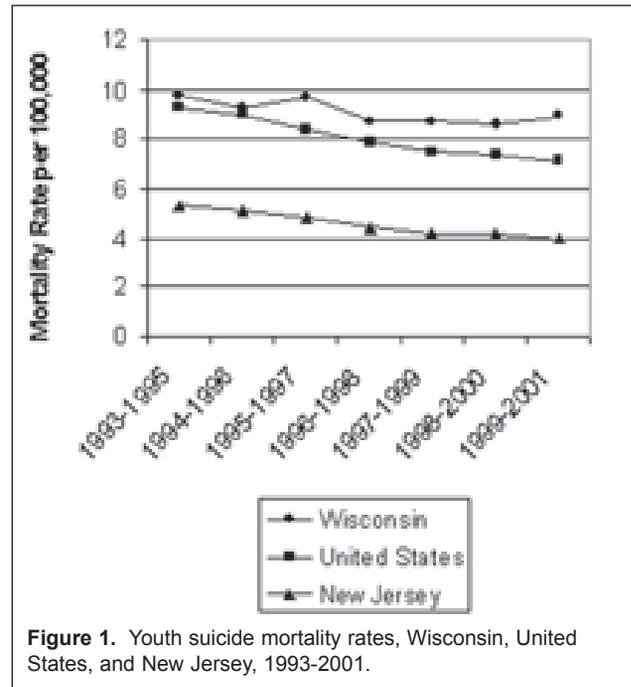


Figure 1. Youth suicide mortality rates, Wisconsin, United States, and New Jersey, 1993-2001.

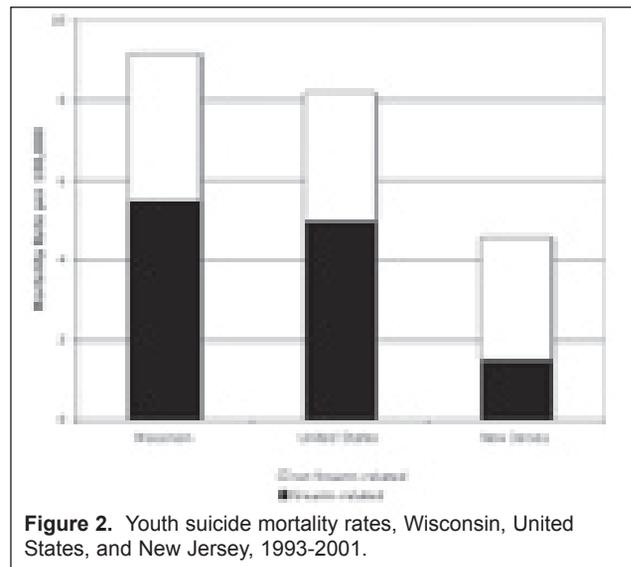


Figure 2. Youth suicide mortality rates, Wisconsin, United States, and New Jersey, 1993-2001.

rates decreased in the United States (11%) and New Jersey (9%). In 1994, Wisconsin's youth suicide mortality rate was 9.8 per 100,000, compared to 9.3 in the United States as a whole and 5.3 in New Jersey. In 2000, Wisconsin's youth suicide rate was 9.0 per 100,000, compared to 7.1 in the United States as a whole and 4.0 in New Jersey.

Firearms accounted for 60% of the suicide deaths in Wisconsin during 1994-2000, compared to 61% in the United States and 32% in New Jersey (Figure 2). From 1994 to 2000, firearm-related youth suicides decreased 23% in Wisconsin, compared to a 36% decrease in the

Table 1. Deaths, Hospitalizations, and Hospitalization Costs Related to Suicidal Behavior, Wisconsin, Ages 10-24 Years, 1995-2002

	No. of Deaths	No. of Hospitalizations	Total Hospitalization Cost (\$ million)
Total (10-24)	838	13,507	\$70
Cause			
Firearm	468	116	\$3.4
Suffocation	249	153	\$2.0
Overdose	64	9524	\$39
Cutting	5	2346	\$11
Gender			
Male	714	4399	\$29
Female	123	9108	\$41
Age Group			
10-14	62	1866	\$9.1
15-19	322	6901	\$35
20-24	454	4740	\$26
Residence			
Urban	503	8104	\$42
Rural	335	4957	\$25
Race/Ethnicity			
White	750	11,479	\$59
Black	53	863	\$4.6
American Indian	21	253	\$1.2
American Asian	14	16	\$0.93
Hispanic	11	372	\$1.9

Self-Inflicted Injury Hospitalizations

From 1995 to 2002, more than 13,500 youth were hospitalized for suicide-related issues (Table 1). Most of these hospitalizations were the result of 2 mechanisms of self-injury: overdose (71% of hospitalizations) and cutting (17%). Firearm injuries accounted for less than 1% of hospitalizations related to suicide attempts for this age group. Suffocation resulted in many completed suicides (30% of total) but relatively few (1.1%) hospitalizations. The total cost of hospitalizations for this 8-year period was \$70 million.

Like youth suicide mortality rates, hospitalizations due to self-inflicted injuries for youths decreased through the 1990s but increased in recent years (Figure 3). More than 1800 hospitalizations occurred in both 2001 and 2002. This number of hospitalizations had not occurred since 1995. (A low number of self-inflicted hospitalizations [1435] occurred in 1999.)

Hospitalization and mortality rates vary by age, gender, and race. Females were hospitalized at more than twice the rate of males, but male deaths outnumbered female deaths by a ratio of almost 6 to 1. Among age subgroups, 15-19 year olds incurred a majority of hospitalization costs. More than half of the suicide deaths were among 20-24 year olds. Hospitalization rates and mortality rates were >50% higher in rural counties than urban counties. American Indians had the highest hospitalization and mortality rates of any racial/ethnic group. Rates of hospitalization and mortality for African American, American Asian, and Hispanic youths were less than rates for white or American Indian youths.

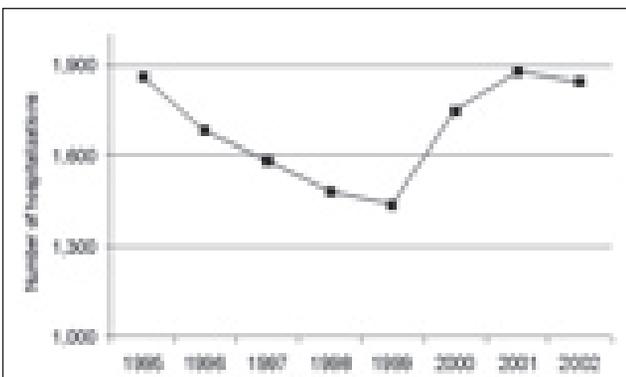


Figure 3. Hospitalizations, self-inflicted injuries, Wisconsin, 1995-2002.

United States and a 42% decrease in New Jersey.

Wisconsin's rate of completed suicides not related to firearms increased by 21% (3.3 per 100,000 to 4.0 per 100,000) from 1994 to 2000. In this time period, the rate held steady at 3.2 for the United States and decreased by 15% (3.4 to 2.9) in New Jersey.

Survey Data

In Wisconsin in 2001, around one-fifth of high school students (19.9%) reported seriously considering suicide within 12 months of being surveyed (Table 2). Many of those considering suicide (43%, or 8.6% of total) reported attempting suicide. One in 40 (2.5%) students reported needing medical attention because of a suicide attempt. Few significant differences existed in self-reports of suicidal behavior and risk factors for suicide between Wisconsin and either the United States as a whole or New Jersey.

Many Wisconsin high school students surveyed in 2001 reported having 1 or more risk factors for suicide. One-quarter (26.7%) of Wisconsin high school students identified themselves as feeling so sad or hopeless almost every day for 2 or more weeks in a row that they stopped doing some usual activities. More than half of Wisconsin students (54.1%) reported using alcohol in the past 30 days. Compared with students in the entire United States, students in Wisconsin and New Jersey (55.7%) reported significantly higher al-

Table 2. Risk Factors for Suicide and for Suicidal Behavior, Youth Risk Behavior Survey, 2001

	Wisconsin		United States		New Jersey	
	95% CI		95% CI		95% CI	
Suicidal Behaviors						
Incidence of suicide attempt	8.6	+ 1.3	8.8	+ 0.8	8.4	+ 1.8
Incidence of suicide attempt requiring medical attention	2.5	+ 0.8	2.6	+ 0.4	2.4	+ 0.7
Incidence of suicide plan	—	—	14.8	+ 1.1	13.0	+ 1.7
Incidence of seriously considering suicide	19.9	+ 2.0	19.0	+ 1.4	17.3	+ 2.1
Risk Factors						
Incidence of feeling sad or hopeless for 2 weeks or more that affected usual activities	26.7	+ 2.6	28.3	+ 1.3	30.7	+ 3.0
Recent alcohol use	54.1	+ 4.1	47.1	+ 2.2	55.7	+ 5.0
Recent episodic heavy drinking	34.2	+ 3.5	29.9	+ 2.0	32.6	+ 5.6
Recent marijuana use	25.1	+ 2.9	23.9	+ 1.5	24.9	+ 4.2
Incidence of school failure	6.8	+ 1.1	6.3	+ 0.8	5.0	+ 1.5

cohol use. More than one-third of Wisconsin students (34.2%) reported binge drinking in the past 30 days. One quarter of Wisconsin students (25.1%) had used marijuana in the past 30 days. Figures in New Jersey and the United States were not significantly different for binge drinking or marijuana use. One of every 15 Wisconsin students (95% CI: 5.7%-7.9%) reported school failure—receiving mostly Ds or Fs for the past 12 months. This was significantly higher than New Jersey but not significantly different from the United States.

DISCUSSION

The data presented in this study suggest that the declining trend in Wisconsin youth suicide rate observed during the 1990s⁸ has not continued into the present decade. While youth suicide mortality rates continued to decrease in the United States in the early years of the 21st century, the rate in Wisconsin leveled off, or may have increased slightly. Firearms now account for a majority (60%) of youth suicide deaths in Wisconsin. Meanwhile, self-inflicted injury hospitalizations increased 29% from 1999 to 2002. The large majority of youth suicide-related hospital admissions and hospital costs in Wisconsin were for overdose and cutting. Although the observed trends may reflect random variation in rates (due to the relatively small number of deaths), they provide the only available information in Wisconsin on the success of public health efforts directed toward reducing youth suicide.

Two issues stand out in the comparison of suicide rates in Wisconsin to those in New Jersey. First, because of the difference in total suicide rates, significant differences in risk behaviors between Wisconsin and New Jersey might be expected. However, other than

school failure, self-reported risk behavior rates were not significantly higher in Wisconsin than in New Jersey. In particular, there was not a significant difference in the incidence of self-reports of episodes of depressed mood. In contrast to similar rates of self-reported risk behaviors, the proportion of suicides that involve firearms in Wisconsin is nearly twice that in New Jersey. Firearms were related to 60% of youth suicide deaths in Wisconsin during 1993-2001, versus 32% in New Jersey. If the rate of firearm-related youth suicides in Wisconsin were equal to New Jersey's rate in this time period, approximately 250 fewer Wisconsin youth would have died.

Several limitations should be considered when interpreting the survey results. First, it would be ideal to examine trends in suicide among youth separately for youth ages 10-14, 15-19, and 20-24. However, this is not possible for Wisconsin, given the low number of events in each age group. Second, there are limitations inherent in self-reported data, and high school students surveyed do not represent the full range of ages considered in this paper. Also, students were surveyed on a very limited number of risk factors for suicide. Finally, since the data are based on survey responses of a sample of high school students in each state, the results may not be representative of the entire youth population in those states.

Personal, psychological, family, antecedent event, social, and cultural factors influence suicide rates.^{9,10} Risk factors for youth in the United States include prior suicide attempts, substance abuse, and psychiatric conditions such as depressive disorders. In fact, based on psychological autopsies, 90% or more of people who commit suicide have at least 1 DSM-IV diagnosis.¹¹ Other risk factors include history of

physical abuse, violence perpetration, stressful life events, alcohol use, marijuana use, school problems, hopelessness, access to firearms, homosexuality, exposure to suicide, and family history of suicide.^{9,10,12} Chronic illnesses such as epilepsy and systemic lupus erythematosus have been associated with higher rates of youth suicide.¹³⁻¹⁵ Protective factors include family cohesion, religiosity, resiliency, empathy, coping and problem-solving skills, intellectual competence, and social support.¹⁰

A physician motivated to prevent patients' suicidal behavior should consider a variety of methods. First, physicians must recognize those who have mental illness or other risk factors for suicide. Physicians must routinely assess youths' mental health, especially by screening for depression, and provide anticipatory guidance.¹⁶⁻¹⁸ The practices of keeping a gun locked and unloaded, and storing ammunition locked and in a separate location are each associated with a protective effect and suggest a feasible strategy to reduce injuries and death of children and teenagers in homes where guns are stored.¹⁹ Despite recommendations, counseling still does not reach all those adolescents in need. There remains much room for improvement in physicians' adherence to national guidelines for adolescent care.²⁰

Second, health care professionals should protect those youth who are found to be at risk. Parents of youth at risk for suicide should be advised to remove guns and ammunition from the home.³ Physicians should foster relationships with colleagues in child and adolescent psychiatry, clinical psychology, law enforcement, and other professions to manage the care of youth at risk for suicide. Because mental and physical health services are often provided through different systems of care, extra effort is necessary to assure good communication, continuity, and follow-up.³

Physicians and other health care professionals can help to decrease youth suicide through community, advocacy, and research activities. Physicians should be familiar with community, state, and national resources for youth suicide, including mental health agencies, family and children's services, crisis hotlines, and crisis intervention centers. Advocacy issues include firearm safety laws affecting children and adolescents, removal of financial barriers to mental health care access, and funding of public health programming. Physicians can contribute to needed research by participating in practice-based research projects related to risk factors for youth suicide and

advocating for resources to enhance the level of violent-injury tracking activities and funding for violence control and prevention research.

CONCLUSION

Suicide and self-inflicted injuries among youth in Wisconsin are problems that have increased in magnitude during the past few years, with Wisconsin youth intentionally hurting and killing themselves at a significantly higher rate than youth across the country. In addition, firearms appear to be involved in a disproportionately large number of suicides in Wisconsin. Given the multiple factors involved in suicidal behavior, a comprehensive effort to reduce suicide is needed. While part of that effort includes improving access to mental health assessment and mental health care, this is only part of the solution; according to 1 study, mental health access was greater in Wisconsin than in New Jersey in the late 1990s.²¹ What is needed is a comprehensive system to provide mental health services to youth in Wisconsin. Further research must be done to determine what physicians and other health care professionals can do to create a safer environment, particularly for those youth with mental illness. Physicians must define their roles—as clinicians, colleagues, advocates, researchers, and educators—and develop appropriate skills to address the issue of suicide effectively.

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