

# Child and Adolescent Suicide Attempts: An Opportunity for Emergency Departments to Provide Injury Prevention Education

BONNIE L. McMANUS, MD,\*† MARKUS J.P. KRUESI, MD,‡  
ARNIM E. DONTES, MBA,‡ CHRISTIAN R. DEFAZIO, MD,†  
JOHN T. PIOTROWSKI, MD,† PAUL J. WOODWARD, PhD‡

The study objectives were to ascertain whether caretakers of suicidal children and adolescents received emergency department (ED) injury prevention education and to determine if injury prevention education and the medical outcome after a drug overdose are associated with caretakers restricting access to means of suicide. Participants were adult caretakers of children and adolescents who deliberately ingested a drug and received ED evaluation. Information was obtained by poison center chart review and phone interview. Fourteen percent of caretakers reported receiving injury prevention education concerning restriction of access to potential means of suicide at home. ED injury prevention education is significantly associated with caretakers restricting access to suicidal means, even when controlling for medical outcome from the attempt. Because parents are less likely to restrict access to means of suicide without education, injury prevention education about restricting access to means of suicide should be given in the ED. (*Am J Emerg Med* 1997;15:357-360. Copyright © 1997 by W.B. Saunders Company)

Traditionally, injury prevention education has focused on reducing pediatric morbidity and mortality. However, most caretakers of children and adolescents with preventable pediatric injuries who are treated and released by emergency department (ED) personnel do not receive documented injury prevention education.<sup>1</sup> Questions have been raised in the emergency medicine literature asking whether injury prevention education is indicated in the ED<sup>2</sup> or in cases of attempted suicide by poisoning.<sup>1</sup>

Youth suicide attempts may represent an opportunity for injury prevention education in the ED. Suicide attempts by adolescents are a familiar presentation in most EDs. In Oregon, the only state with mandated reporting of adolescent suicide attempts, the annual rates of suicide attempts presenting to EDs from 1988 to 1992 ranged from a low of 118.1 per 100,000 for Asians to 307.6 per 100,000 for African-Americans 10 to 17 years of age.<sup>3</sup> The overall attempt rate for 1988 to 1993 was 196.6 per 100,000 adolescents age 10 to 17 years.<sup>4</sup> It is known that an initial suicide attempt greatly increases the risk of a subsequent

suicide attempt.<sup>3</sup> Drug overdoses account for the majority of suicide attempts in both male and female adolescents, whereas firearms are involved in the majority of fatalities in both male and female adolescents.<sup>5</sup>

"Means Restriction" is one strategy for injury prevention education as it applies to suicidal children and adolescents. Means restriction attempts to prevent suicide by limiting access to firearms, drugs, and other common means of committing suicide.<sup>6</sup> The Centers for Disease Control's publication, "Youth Suicide Prevention Programs: A Resource Guide," suggests that means restriction may be a potentially important strategy in reducing the rate of suicide among young people but notes that no evaluation of such efforts has occurred.<sup>6</sup>

We were unable to find any data on injury prevention education as it relates to means restriction in the ED for adolescent suicide attempts. The objectives of our study were (1) to describe the extent to which adult caretakers of suicidal children and adolescents received ED injury prevention education and (2) to determine if ED injury prevention education to caretakers and the adolescents' medical outcome after the suicide attempt are associated with the caretakers subsequently restricting access to means of suicide.

## MATERIALS AND METHODS

This study included review of charts from a regional poison control center, followed by a structured telephone follow-up interview. Adult caretakers of adolescents who attempted suicide by drug overdose were chosen for study for two reasons. First, it was the caretaker who called the poison control center after the child's suicide attempt and therefore was aware of the incident. Second, caretakers would be able to confirm what injury prevention education took place in the ED and what, if any, means restriction precautions the caretaker had subsequently implemented at home.

In the follow-up interview the caretakers of the adolescents were asked whether, at the time of the ingestion, they had over-the-counter drugs, prescription drugs, alcohol, street drugs, or firearms in the house. It was ascertained whether any member of the ED staff advised them to dispose of or lock up these substances and whether this action was carried out at home. If means restriction was not addressed in the ED, caretakers were asked if they restricted access to lethal means on their own.

Patient charts from all contacts at a regional poison control center that received 51,485 calls from January 1 to December 31, 1993, were individually reviewed. A subject was eligible for study if (1) the patient took an intentional drug overdose or other toxic ingestion that was considered to be a suicide attempt by the poison

From the \*Toxikon Consortium, Cook County Hospital; and the †Department of Emergency Medicine and ‡Institute for Juvenile Research, Department of Psychiatry, University of Illinois at Chicago. Manuscript received April 10, 1996; accepted May 7, 1996.

Supported by a grant from the Ronald McDonald House Charities. Address reprint requests to Dr Kruesi, Institute for Juvenile Research, 907 South Wolcott Avenue (M/C 747), Chicago IL 60612-7347.

*Key Words:* Emergency department, suicide, adolescent, child, injury prevention, overdose, firearms, means restriction.

Copyright © 1997 by W.B. Saunders Company  
0735-6757/97/1504-0006\$5.00/0

control specialist, (2) he or she was 6 to 20 years old, (3) the initial contact with the poison control center was by an adult family member or caretaker, and (4) the patient was evaluated in an ED.

A subject was considered lost to follow-up if he or she was unable to be contacted because (1) of a wrong or nonexistent telephone number, (2) the subject moved without leaving a forwarding number, (3) the telephone had been permanently disconnected, (4) we failed to reach anyone at the given telephone number after 10 calls were made at various times of the day and week, (5) a pager number or pay phone was reached with the responding party not knowing the caller or patient, or (6) an answering machine was reached after 10 calls and then 3 messages were left with no response.

Information was obtained through a structured phone interview with the adult who contacted the poison control center or other responsible adult caretaker. The adolescent was not interviewed. The interviews took place an average of 15 months after the overdose, with a range of 2 to 19 months. Interviews were conducted by three physicians who had reviewed all documentation regarding each case. The interviewers described the study and obtained phone consent. This investigation was approved by the University of Illinois at Chicago's institutional review board.

The following information was obtained by poison center chart review:

1. Demographics including age, sex, race, location, relationship of caller, shared household between caller and patient, and site of exposure.
2. Medical outcome defined as either no effect or adverse medical outcome. Adverse medical outcome included any notable medical effect ranging from minor through moderate, major, and death using the American Association of Poison Control Center's criteria.<sup>7</sup> All patients were followed until medically stable.

A structured interview was used to obtain the following categorical variables:

1. Presence or absence in the home of the following means of suicide at the time of the attempt: firearms, over-the-counter medications, prescription medications, or street drugs.
2. Occurrence of injury prevention education by any ED staff defined as an adult caretaker being advised to dispose of or lock up suicidal means listed above.
3. Caretaker manipulation of the home environment following the suicide attempt in an attempt to make it safer (either spontaneous action or because of recommendation). This was defined as having locked up or disposed of available means of suicide.
4. Presence of caretaker concern about repeat attempt.

Statistical analyses were performed on demographics of subjects lost to follow-up and those successfully interviewed to determine any sample bias. Descriptive statistics were calculated on information obtained. A multiple logistic regression model was used to determine the likelihood of caretaker restricting access to suicidal means associated with medical outcome and injury prevention education after controlling for age, gender, and time from ingestion to follow-up. From the model, adjusted odds ratios (ORs) and 95% confidence intervals were computed.<sup>8</sup> Alpha level for all statistical test was at 0.05. All statistical analyses were performed using SPSS for Windows Version 6.1 (SPSS, Inc, Chicago, IL, 1994).

## RESULTS

Seventy-one cases met the inclusion criteria. Fifty-four (76%) were successfully followed up. No significant differences existed between those contacted and those lost to follow-up regarding age, sex, race, location, relationship of caller to patient, or medical outcome.

Girls accounted for 74% of the group. Sixty-one percent of all patients were Caucasian, 28% were African American, and 11% were Hispanic. Forty-eight percent of the adolescents were from an urban area, 49% from suburbs, and 3% from rural areas. Age ranged from 10 to 20 years, with 76% from 13 to 17 years. The family member who called the poison control center was the mother in 66% of the cases, an adult sister in 10% of the cases, the father in 9% of the cases, and other relatives in 15% of the cases. The attempt took place at home in 96% of the cases, with the remainder divided equally among other residence, school, and public areas. The caretaker and patient shared a common household in 97% of the cases.

Eighty-four percent took an acute ingestion, whereas 16% were classified as an "acute-on-chronic" ingestion (an acute overdose of a medication that is being taken regularly). Seventy-one percent took over-the-counter medications, and in 75% of the cases the ingested medication belonged to a relative. A single medication was ingested in 64% of the cases. All overdoses were oral except for one adolescent who overdosed using her metered dose albuterol inhaler. Medical outcome of 71 subjects was no effect in 47% of the cases and adverse outcome in 53% of the cases. There were no fatalities.

During the follow-up phone interview, the caretakers of the adolescents who attempted suicide by ingestion reported the following potentially lethal means available in the home at the time of the attempt: 75% had prescription medication, 86% had over-the-counter medications, 2.2% had street drugs, and 24.5% had firearms. Overall, 51 of 54 (94.4%) households had at least one form of means of suicide available at the time of the attempt.

Suicide was addressed with 42% of the family members by a member of the ED staff, whereas 54% reported that suicide was not discussed and 4% could not recall. Injury prevention education about restricting access to over-the-counter medication, prescription medication, and street drugs was given at rates of 9.4%, 12.2%, and 2.2%, respectively. No caretaker reported being educated that firearms in the home increase the risk of suicide. At follow-up, 76% of the adults were not worried about the possibility of a repeat suicide attempt by the adolescent.

Of the 51 caretakers who had suicidal means accessible in the home at the time of ingestion, 61% (31/51) had not restricted access to means of suicide. Of those who received education about restricting access to medications, 86% reported they had locked up or disposed of those means at the time of the follow-up interview, compared with only 32% of the families who were not given injury prevention education (Fischer's exact test,  $P = .011$ ). An adverse medical outcome in the adolescent caused by the poisoning was also significantly associated with the caretaker limiting the availability of means of suicide ( $\chi^2 = 4.41$ ,  $P = .036$ ).

Injury prevention education in the ED after a suicide attempt significantly increases the odds of caretaker action to restrict access to potentially lethal means even when controlling for the medical outcome of the attempt (Table 1).

Statistical tests were performed on the demographic variables of adolescent's age and sex, and a confounding variable, the amount of time from the ingestion and the follow-up. A chi-square test between adolescent boys and girls and caretakers who did and did not limit access to lethal means was not significant ( $\chi^2 = 1.02$ ,  $df = 1$ ,  $P = .31$ ). Differences were also not found between the mean age of the adolescents whose caretakers restricted access to drugs and/or firearms and those who did not restrict access (paired  $t$  test value = 0.91,  $df = 49$ , two-tailed  $P$  value = .4) and the number of days until follow-up of parents who disposed of drugs and/or firearms and those who did not restrict access (paired  $t$  test value = 0.79,  $df = 48$ , two-tailed  $P$  value = .4).

## DISCUSSION

Caretakers of suicidal adolescents educated in the ED about injury prevention take action to limit access to means of suicide, whereas caretakers not educated about restricting access are significantly less likely to do so. Unfortunately, in the ED, injury prevention education concerning suicide attempts occurs infrequently. Only 14% of caretakers of suicidal adolescents in this study received injury prevention education in the ED.

Our finding that injury prevention education occurs infrequently is similar to other studies. Of 1,449 injured pediatric patients presenting to an ED, only 3% received documented injury prevention education.<sup>1</sup> Although firearms are the leading means of suicide,<sup>5</sup> a study of pediatric nurse practitioners found that advice about firearm safety in the home was routinely given to only 7% of pediatric patients' families.<sup>9</sup>

Failure to warn caretakers of suicidal adolescents about the risk of firearms is of particular concern. Firearms are the most common means of suicide in both sexes and account for the majority of completed adolescent suicide in the United States.<sup>5</sup> Case control studies consistently find that firearm presence in the home significantly increases suicide risk.<sup>10,11</sup> Suicide attempts by firearm are disproportionately

likely to be fatal.<sup>12</sup> Firearms are prevalent; the United States Department of Justice estimates that 49% of households contain firearms.<sup>13</sup> The 24.5% of households in this study reporting the presence of a firearm may represent an undercount.

Our study is limited by its small sample size and the potential for problems in recall or misreporting to give socially desirable results. The association between injury prevention education and means restriction could reflect a lack of recall by noncompliant caretakers. Another limitation is that not all toxic exposures are reported to a regional poison control center<sup>16,17</sup>; therefore, the generalizability of our findings is unknown. Future studies need to prospectively document injury prevention education by ED staff, caretaker receipt and comprehension of the message, and compliance on follow-up.

We recommend injury prevention education to caretakers of suicidal adolescents. Caretakers are in the best position to modify their home environment. Our data confirm the importance of the home as a focus for injury prevention. Ninety-four percent of our study population homes had medications, the most common means of suicide attempts. More than 24% of the homes had firearms, the most common means of completed suicide. The presence of these agents in the home is of critical importance because we found that 96% of our patients made their suicide attempt at home. Moreover, adolescents who make one suicide attempt are at increased risk for another.<sup>5,14</sup> The Oregon ED surveillance found that 27% of adolescent suicide attempts were by those who had made prior attempts during the previous 5 years.<sup>3</sup> It is likely this is an underestimate because prior attempt status was unknown in 26% of cases. Adverse medical outcome from an attempt may represent an enhanced opportunity for caretaker action. In our data, caretakers were more likely to limit access if the adolescent had an adverse medical outcome associated with the attempt.

In response to the question of whether injury prevention education is indicated for adolescent suicide attempts, our results suggest the answer is yes. However, questions remain as to what impedes such education. Is knowledge among ED staff about adolescent suicide a factor? A recent study of law enforcement experience with voluntary firearm disposal for suicide prevention found that at least for some individuals, inaccurate information about the role of firearms in adoles-

**TABLE 1.** Adjusted Odds Ratios Associating Caretaker Restricting Access to Suicidal Means With Injury Prevention Education and Medical Outcome

	Crude Distribution Number		Adjusted Odds Ratio*	95% Confidence Interval*
	Means Not Restricted	Means Restricted		
<b>Injury Prevention Education</b>				
Not Given	30	12	1.00	—
Given	1	6	16.75	(1.41, 198.96)
<b>Medical Outcome</b>				
No Adverse Outcome	19	4	1.00	—
Adverse Outcome	12	14	5.36	(1.18, 24.41)

\*Calculations were computed from a multiple logistic regression model. The model included not only two predictor variables, injury prevention education and medical outcome, but also three controlling variables, gender of adolescent (male, female), age of adolescent (in years), and time from ingestion to follow-up (in months, which was determined by number of days divided by 30).

cent suicide is a potential barrier to means restriction efforts.<sup>15</sup> Have ED staff had training in psychiatric emergencies and relevant injury prevention education strategies? Is it the familiar situation of a busy ED usurping time that could be spent educating family members? Are safe methods for firearm disposal available? Future studies are needed to better characterize our findings and answer these questions.

## CONCLUSION

Few families of suicidal adolescents receive injury prevention education in the ED about restricting access to potentially lethal means of suicide in the home. Injury prevention education is associated with caretaker action to restrict access to available means of suicide. Because caretakers are less likely to restrict access to means of suicide without being educated, we believe that injury prevention education about restricting access to means of suicide should be given in the ED.

The authors thank Michael Fendrich, PhD, for statistical consultation and the Rush-Presbyterian-St. Luke's Poison Control Center for its assistance with this study.

## REFERENCES

1. Dunn KA, Cline DM, Grant T, et al: Injury prevention instruction in the emergency department. *Ann Emerg Med* 1993;22:1280-1285
2. Baillie L: Health promotion—Childhood accidents: The A&E nurses role. *Nurs Standard* 1994;8:30-34
3. Adolescent Suicide. CD Summary—Center for Disease Prevention and Epidemiology, Oregon Health Division, 1993, p 42
4. Fatal and nonfatal suicide attempts among adolescents—Oregon, 1988-1993. *Morbidity Mortality Wkly Rep* 1995;44:312-323
5. Ryland DH, Kruesi MJP: Suicide among adolescents. *Int Rev Psychiatry* 1992;4:185-195
6. National Center for Injury Prevention and Control: Youth Suicide Prevention Programs: A Resource Guide. Atlanta, GA, Centers for Disease Control, 1992
7. Litovitz TL, Clark LR, Soloway RA: 1993 Annual report of the American Association of Poison Control Centers Toxic Exposure Surveillance System. *Am J Emerg Med* 1994;12:546-584
8. Hosmer DW, Lemeshow S: *Applied Logistic Regression*. New York, NY, John Wiley and Sons, 1990
9. Jones NE: Injury prevention: A survey of clinical practice. *J Pediatr Health Care* 1992;6:182-186
10. Kellermann AL, Rivara FP, Somes G, et al: Suicide in the home in relation to gun ownership. *N Engl J Med* 1992;327:467-72
11. Brent DA, Perper JA, Moritz G, et al: Firearms and adolescent suicide. *Am J Dis Child* 1993;147:1066-1071
12. Card JJ: Lethality of suicidal methods and suicide risk: Two distinct concepts. *Omega* 1974;5:37-45
13. US Dept of Justice, Bureau of Justice Statistics: *Sourcebook of Criminal Justice Statistics*. Washington, DC, US Department of Justice, 1991
14. Spirito A, Plummer B, Gispert M, et al: Adolescent suicide attempts: Outcomes at follow-up. *Am J Orthopsychiatr* 1992;62:464-468
15. Fendrich MF, Kruesi MJP, Grossman J, et al: Police collection of firearms to prevent suicide: Correlates of recent turn-in experience. *Policing: An International Journal of Police Strategies and Management* (in press)
16. Linakis JG, Frederick KA: Poisoning deaths not reported to the regional poison control center. *Ann Emerg Med* 1993;22:1822-1828
17. Harchelroad F, Clark RF, Dean B: Treated vs reported toxic exposures: Discrepancies between a poison control center and a member hospital. *Vet Hum Toxicol* 1990;32:156-159