

# Self-inflicted and Unintentional Firearm Injuries Among Children and Adolescents

## *The Source of the Firearm*

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**Context:** The source and ownership of guns used by children to shoot themselves or others is largely unknown.

**Objective:** To determine the ownership and usual storage location of firearms used in unintentional and self-inflicted intentional firearm deaths and injuries.

**Design:** Retrospective case series.

**Setting:** King County, Washington.

**Patients:** Youths aged from birth to 19 years who sought medical treatment at a level I trauma center for a self-inflicted or unintentional firearm injury between 1990 and 1995 or who presented to the county medical examiner with a fatal self-inflicted or unintentional firearm injury between 1990 and 1995.

**Data Sources:** County medical examiner records, regional police investigative reports, medical records from a level I trauma center, and surveys of victims' families.

**Main Outcome Measures:** Source and ownership of the associated firearm.

**Results:** Fifty-six fatal injuries and 68 nonfatal firearm injuries that met the criteria were identified. Of these, 59 were intentionally self-inflicted deaths and injuries and 65 were unintentional deaths and injuries. A firearm owned by a household member living with the victim was used in 33 (65%) of 51 suicides and suicide attempts and 11 (23%) of 47 unintentional injuries and deaths. Additionally, a firearm owned by another relative, friend, or parent of a friend of the victim was used in 4 (8%) of the 51 suicides and suicide attempts and 23 (49%) of the 47 unintentional injuries and deaths. Parental ownership accounted for 29 (57%) of the 51 suicides and suicide attempts and 9 (19%) of the 47 unintentional injuries and deaths. More than 75% of the guns used in suicide attempts and unintentional injuries were stored in the residence of the victim, a relative, or a friend.

**Conclusion:** Most guns involved in self-inflicted and unintentional firearm injuries originate either from the victim's home or the home of a friend or relative.

*Arch Pediatr Adolesc Med.* 1999;153:875-878

**Editor's Note:** I wonder how many of these victims of home-based firearms would have tried to find or been able to find firearms if they weren't available at home.

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**S**UICIDE IS the third-leading cause of death among adolescents, and firearms are implicated in 65% of deaths among persons younger than age 19 years.<sup>1,2</sup> Unintentional firearm injuries, though far less frequent, led to 440 deaths of children younger than age 19 years in 1995 alone.<sup>3</sup> It is thought that there are 5 times as many visits to emergency departments for nonfatal unintentional firearm injuries compared with fatal injuries.<sup>4</sup>

Access to firearms in the home has been demonstrated to be associated with an elevated risk of suicide in several studies, particularly among adolescents.<sup>5-8</sup> Because gun owners frequently express opposition to removal of weapons from the home, alternative strategies, such as locking and unloading guns, may prove to be more practical, acceptable, and achievable. Although there are few specific guidelines available to define the proper storage of a firearm, currently available options include the use of a single device or a combination of a trigger lock, a locked gun safe, and/or a portable locked handgun box.

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## SUBJECTS AND METHODS

This was a retrospective case series conducted in King County, the largest metropolitan county in the state of Washington, with a total population of 1 564 500, including Seattle. Subjects included individuals aged 19 years and younger who either received emergency department and/or acute inpatient care at Harborview Medical Center, Seattle, for a self-inflicted or unintentional firearm injury, or who were transported to the county medical examiner. Subjects were included if the injury occurred between 1990 and 1995 for hospitalizations and field deaths, and between 1993 and 1995 for emergency department cases. Injuries of interest included unintentional, self-inflicted intentional, or undetermined intent firearm or pellet gun injury (*International Classification of Diseases, Ninth Revision*, codes E922.0-E922.9, E955.0-E955.4, and E985.0-E985.4). Assaultive injuries and homicides were excluded. As the only regional level I trauma center in the county and state, Harborview Medical Center admitted more than 90% of persons of similar age with these types of firearm injuries in this age group in the county (L. Drollette personal communication, Harborview Injury Prevention and Injury Center, August 1998). The Office of the Medical Examiner routinely investigates all fatalities from trauma that occur in the county.

The county Medical Examiner's Office classifies deaths as intentional, unintentional, or of undetermined intent. Medical examiner death investigation records, which often include a police report, usually provided both demographic data and information about the ownership and usual location of the firearm.

The Harborview Medical Center trauma registry was used to identify appropriate cases of nonfatal firearm injuries. Medical records from the same hospital provided demographic data and occasionally provided information regarding the firearm. Medical records were also used to supplement information on fatal cases with medical care prior to death. Police investigative reports were also sought to supplement information pertaining to the firearm on cases obtained from either the Medical Examiner's Office and/or the county hospital trauma registry.

If these sources did not reveal ownership of firearm and/or location of weapon storage, parents and/or close family members of the victims were asked to complete a brief mail survey.

Data were analyzed in univariate and bivariate fashion. This study was approved by the Institutional Review Board of the University of Washington, Seattle.

The effectiveness of secure firearm storage to prevent suicides and unintentional firearm injury has not been estimated; however, it seems plausible that such a strategy could lead to reduced access to firearms. If adults in residential settings are the source of these guns, then securely locking guns may prove effective. However, if guns are largely coming from peers, adult friends, or il-

**Table 1. Deaths and Injuries by Classification of Intent**

	Fatalities	Nonfatal Injuries	Total
Suicide related	46	13	59
Unintentional	10	55	65
Undetermined intent	7	1	8
<b>Total</b>	<b>63</b>	<b>69</b>	<b>132</b>

licit sources, than secure storage of guns in the home may not be a plausible strategy for prevention. A recent evaluation of child gun access prevention laws in the United States showed a 23% lower rate of deaths among children younger than age 10 years in states that had passed such a law, compared with the baseline rate before the law.<sup>9</sup> Smaller effects in the same direction were also seen with suicide and homicide, suggesting that combined efforts of education and enforcement regarding firearm storage may have an impact.

The purpose of this study was to determine the ownership and the usual storage site of firearms implicated in fatal and nonfatal suicide attempts and unintentional firearm injuries occurring among youth in a metropolitan county.

## RESULTS

A group of 132 subjects initially qualified for inclusion in the study, including 63 deaths and 69 nonfatal injuries. Forty-six of these deaths (73%) were classified as intentionally self-inflicted (suicides), 10 were unintentional (accidental) (16%), and 7 were of undetermined intent (11%). Of the 69 nonfatal injuries, 13 (19%) were classified as suicide attempts (self-inflicted intentional), 55 (80%) were unintentional, and only 1 case (1%) was of undetermined intent (**Table 1**). Cases classified as being of undetermined intent were excluded from further analysis since some of these cases could not be completely distinguished from criminal homicides.

Among the fatal and nonfatal suicide attempts, 80% (n = 47) of the victims were boys and 75% (n = 44) were white. The mean age for suicides and attempts was 16.5 years (range, 11-19 years). Among the unintentional deaths and injuries, 94% (n = 61) were boys and 58% (n = 38) were white. The mean age for unintentional events was 14.7 years (range, 4-19 years). Fourteen fatal cases (22%) and 29 nonfatal cases (42%) were from outside of King County.

## LOCATION OF INCIDENT

Fifty fatal and nonfatal suicide attempts (85%) occurred either at the victim's home (76% [n = 45]) or at a relative's or friend's home (8% [n = 5]). Forty-five accidental injuries and fatalities (69%) also occurred at a residence, but only about half of these injuries occurred at the victim's personal residence, with the remainder occurring at a relative's or friend's home (**Table 2**). A variety of other settings accounted for the remainder of incidents.

Just over half of the weapons used in self-inflicted deaths and injuries were handguns (n = 33), about one

**Table 2. Location of Incident (N = 124)**

Location	Suicide Attempts, No. (%)		Unintentional Injuries, No. (%)	
	Fatal (n = 46)	Nonfatal (n = 13)	Fatal (n = 10)	Nonfatal (n = 55)
Victim's home	35 (76)	10 (77)	5 (50)	19 (35)
Relative's/friend's home	3 (7)	2 (15)	4 (40)	17 (31)
Rural or wooded area	2 (4)	0 (0)	0 (0)	6 (11)
Street	0 (0)	0 (0)	0 (0)	3 (5)
Other	6 (13)	1 (8)	1 (10)	7 (13)
Unknown	0 (0)	0 (0)	0 (0)	3 (5)

**Table 3. Gun Ownership by Injury Intent (N = 98)**

Gun Owner	Fatal and Nonfatal Suicide Attempts (n = 51), No. (%)	Unintentional Injuries and Deaths (n = 47), No. (%)
Household member	33 (65)	11 (23)
Victim	12 (24)	11 (23)
Friend, parent of friend	4 (8)	23 (49)
Family member not in household	1 (2)	2 (4)
Stolen	1 (2)	1 (2)

third were rifles (n = 18), and 9% (n = 5) were shotguns. Among the unintentional injury cases, 62% of weapons (n = 40) were handguns, 22% (n = 14) were rifles, 12% (n = 8) were shotguns, and 3% (n = 2) were pellet guns.

Among incidents for which information was available, a household member other than the victim claimed ownership of the firearm in 65% of cases (n = 33) of attempted or completed suicide, compared with only 23% of cases (n = 11) involving unintentional injury or death (P < .0001) (**Table 3**).

Among suicides and suicide attempts, the parent was most often the owner (57% [n = 29]), followed by the victim (24% [n = 12]). Among youths aged 17 years and younger, 71% of suicides and suicide attempts (n = 25) involved the use of the victim's parent's gun. In contrast, a friend or a parent's friend was the most likely gun owner among unintentional cases (49% [n = 23]), followed by the victim (23% [n = 11]) and the parent (19% [n = 9]). Among youths aged 17 years and younger, 26% of cases (n = 9) involved the use of the victim's parent's gun (Table 3).

#### LOCATION OF WEAPON

The usual location of the gun was determined for 85% (n = 50) of suicides and suicide attempts and 62% (n = 40) of unintentional injuries. Among the suicides and suicide attempts, 84% of weapons (n = 42) were stored in the home of the victim and more than half were usually stored in the bedroom. Among the unintentional injury victims, 42% of weapons (n = 17) were stored in the home of the victim, 30% of these firearms (n = 12) were stored in the home of a relative or acquaintance of the victim (eg, a divorced parent or friend), and 12% (n = 5) were usually carried by the shooter (**Table 4**).

**Table 4. Usual Gun Storage Site**

Usual Storage Site	Fatal and Nonfatal Suicide Attempts (n = 50), No. (%)	Unintentional Injuries and Deaths (n = 40), No. (%)
Victim's home	42 (84)	17 (42)
Home of acquaintance or relative	3 (6)	12 (30)
On person of shooter	0 (0)	5 (12)
Other (acquired within 1 day, automobile)	5 (10)	6 (15)

Among all unintentional injuries and deaths the shooter was the victim in 43% of cases (n = 28). The case fatality rate was only 4% (n = 1) when the shooter was the victim, compared with 24% (n = 9) when the shooter was another person.

The circumstances of the unintentional injuries were elicited in 76% of all fatal and nonfatal cases (n = 49). More than half the time (57% [n = 28]), the victim was playing with a gun. Other circumstances included transportation of the gun (17% [n = 8]), hunting (11% [n = 5]), and cleaning of the gun (7% [n = 3]). Forty-six incidents occurred in the absence of adult supervision (94%).

#### COMMENT

Our study reveals that firearms implicated in suicides, suicide attempts, and unintentional injuries among children and adolescents in this metropolitan area come from people and homes familiar to the victims. In suicides and suicide attempts, the most likely owner of the firearm used by the teenager was a household member, especially a parent. In contrast, the most likely owner of a firearm implicated in an unintentional injury or death was a friend or parent of a friend of the victim. In both intentional and unintentional incidents, the firearms were usually stored in the home. These findings have implications for policy makers; our findings support secure firearm storage as one strategy to reduce firearm injury among children. Policies to improve firearm storage practices in homes may have a large impact on these types of injuries. However, parents should recognize that implementation of secure firearm storage practices in their own homes will only be partially effective in reducing unintentional firearm injuries.

One potential limitation of this study is that we could not validate the information regarding ownership and location of the gun. It is conceivable that parents and/or investigators might provide incorrect information because of feelings of guilt or criminal liability. However, there are no criminal statutes in this state or county with regard to improper gun storage, and much of the information gathered was collected by police and professional investigators working with the medical examiner. A second limitation is that since police reports were unavailable for a large proportion of nonfatal cases, intent may have been misclassified in some cases. However, we believe that most misclassification would be of nonfatal assaultive injuries (claimed to be unintentional) and that few true unintentional events would be

misclassified as assaultive. Thus, we believe that it is unlikely misclassification led to missed unintentional cases, but it could have led to the inclusion of some assaults.

Data regarding fatal injuries were more complete and easier to obtain than data regarding nonfatal injuries. This discrepancy was caused by the greater amount of information available on injuries and deaths in those cases in which the medical examiner's office and/or police department are involved. The nonfatal cases were ascertained by surveillance of medical records, which frequently did not provide gun ownership information or reference to an investigative report. Efforts to track nonfatal firearm injuries using regional and state firearm injury registries could improve the accessibility of these data. A final limitation is that the generalizability of our findings to other geographical areas is unknown.

Our results are similar to those of a study from Oregon showing that 78.8% of fatal and nonfatal suicide attempts occurred in the residence of the victim.<sup>2</sup> Another study showed that a large proportion of unintentional firearm deaths occurred while children under age 14 years played with a loaded gun in the residence of the victim.<sup>10</sup>

We conclude that guns used in self-inflicted and unintentional fatalities were most likely obtained and used in a home and also were most likely to be the property of the victim's parent in the case of suicides. Other families' homes were a significant source of firearms in unintentional injuries and deaths.

Accepted for publication December 10, 1998.

This study was funded in part by grant R-49-CCR002570 from the Centers for Disease Control and Prevention, Atlanta, Ga.

Presented at the Annual Meeting of the Ambulatory Pediatric Association, Washington, DC, May 3, 1997.

We appreciate the assistance of the staff of the King County Medical Examiner's Office and Susan Pilcher, RN, Chris Mack, MS, and Kathy Swart-Nelson.

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