Firearm Storage Patterns in US Homes With Children

ABSTRACT

Objectives. This study determined the prevalence and storage patterns of firearms in US homes with children.

Methods. We analyzed data from the 1994 National Health Interview Survey and Year 2000 objectives supplement. A multistage sample design was used to represent the civilian noninstitutionalized US population.

Results. Respondents from 35% of the homes with children younger than 18 years (representing more than 22 million children in more than 11 million homes) reported having at least 1 firearm. Among homes with children and firearms, 43% had at least 1 unlocked firearm (i.e., not in a locked place and not locked with a trigger lock or other locking mechanism). Overall, 9% kept firearms unlocked and loaded, and 4% kept them unlocked, unloaded, and stored with ammunition; thus, a total of 13% of the homes with children and firearms—1.4 million homes with 2.6 million children—stored firearms in a manner most accessible to children. In contrast, 39% of these families kept firearms locked, unloaded, and separate from ammunition.

Conclusions. Many children live in homes with firearms that are stored in an accessible manner. Efforts to prevent children's access to firearms are needed. (*Am J Public Health.* 2000; 90:588–594)

Mark A. Schuster, MD, PhD, Todd M. Franke, PhD, Amy M. Bastian, MPH, Sinaroth Sor, MD, and Neal Halfon, MD, MPH

Newspapers, magazines, and television programs often report children killing or injuring themselves and others with firearms.[1–4] Children as young as 3 to 4 years are able to pull the trigger of most handguns,[5] and children of all ages may find firearms in the home and accidentally shoot someone.[2–4,6–9] Children (mostly adolescents) also use firearms from the home to commit suicide,[10,11] and some steal firearms from the home or elsewhere to use when committing a crime.[12–14]

Organizations representing children and organizations representing firearm owners make recommendations for the storage of firearms and ammunition. The American Academy of Pediatrics[15] and *Bright Futures*[16] recommend storing firearms locked, unloaded, and separate from locked ammunition. The National Rifle Association[17] recommends storing firearms unloaded and inaccessible to children. The Sporting Arms and Ammunition Manufacturers' Institute[18] recommends storing firearms and ammunition secured in a safe place, separate from each other. *Healthy People 2000: National Health Promotion and Disease Prevention Objectives*[19] has set a goal for the year 2000 of "reduc[ing] by 20% the proportion of people who possess weapons that are inappropriately stored and therefore dangerously available."

Some organizations recommend the use of trigger locks to prevent accidental or unauthorized firing of firearms.[20] A trigger lock fits around the trigger to prevent it from being squeezed, and the lock is removed with a key, a combination, or another mechanism. Firearm lockboxes also are available, including models that are portable and that attach to a bed frame.[21,22]

Since 1989, a number of states and cities have passed laws designed to encourage safer storage of firearms. These laws hold a gun owner responsible when a child gains access to a firearm and injures or kills someone with it. Some laws go further, such as a 1990 Connecticut law that requires dealers to offer trigger locks for sale at the time of purchase.[23] In at least several cases, parents and others have been held liable for injuries caused by children who have gained access to improperly stored firearms.[24,25] One study reported that state firearm storage laws, particularly in states that make improper storage a felony, are associated with lower statewide rates of unintentional firearm-related deaths among children.[26]

Studies have found that many firearm owners, including those in homes with children, do not keep firearms locked, unloaded, and separate from ammunition.[27–35] However, nationally representative data that allow population estimates for homes and for children have not been available, and few studies have covered use of trigger locks.

In this article, we used a nationally representative household-based interview survey to determine the presence of firearms and fire-

The authors are with the University of California, Los Angeles. Mark A. Schuster is with the Department of Pediatrics, School of Medicine, and the Department of Health Services, School of Public Health. Todd M. Franke is with the Department of Social Welfare, School of Public Policy and Social Research. Amy M. Bastian and Sinaroth Sor are with the Department of Pediatrics, School of Medicine. Neal Halfon is with the Department of Pediatrics, School of Medicine, and the Department of Community Health Sciences, School of Public Health. Drs Schuster and Halfon are also with RAND, Santa Monica, Calif.

Requests for reprints should be sent to Mark A. Schuster, MD, PhD, RAND, 1700 Main St, Santa Monica, CA 90407-2138 (e-mail: schuster@rand.org).

This article was accepted October 5, 1999.

Note. All analyses, interpretations, and conclusions are the work of the authors and not of the National Center for Health Statistics, which is responsible for only the initial data. In addition, the views expressed are those of the authors and do not necessarily represent the opinions of the funding agency or of the institutions with which the authors are affiliated.

arm storage patterns in homes with children younger than 18 years in the United States.

Methods

Survey and Sample

The data come from the 1994 National Health Interview Survey (NHIS) and the 1994 NHIS Year 2000 Objectives supplement. The National Center for Health Statistics (NCHS) administers these surveys.

The NHIS is an annual survey that covers demographics, health, health care utilization, and insurance. The Year 2000 supplement covers topics related to the US Department of Health and Human Services' *Healthy People 2000* health objectives.[19] One section of the supplement covers firearms.

Trained survey administrators from the Bureau of the Census conducted the interview survey in the home. A multistage sample design was used to represent the civilian noninstitutionalized US population.

Half of the households in the 1994 core NHIS sample were randomly assigned to receive the Year 2000 supplement. The firearm items were administered to 1 randomly selected adult per family. The household response rate from the core NHIS was 94.1% (45 435 households), and the response rate for the households eligible for the Year 2000 supplement was 84.5%, for an overall Year 2000 response rate of 79.5%. The total sample for the supplement consisted of 19 738 families in 19 374 households; 6990 of these families had children. We use "family" and "home" interchangeably in this article.

Outcome Variables

The principal outcome variables for this study were presence of firearms in the home and firearm storage patterns. The interviewer began the firearm section by instructing the respondent that "firearms include pistols, shotguns, rifles, and other types of guns. Do not include guns that cannot fire, starter pistols, or BB guns." The initial firearm item asked, "Are any firearms now kept in or around your home? Include those kept in a garage, outdoor storage area, truck, or car." There were 0.9% of respondents who refused to answer or said that they did not know, and 1.8% for whom the response was reported as not ascertained; these respondents were excluded from analyses that use this item.

We created a derived variable with 6 mutually exclusive categories incorporating firearm and ammunition storage patterns. These categories appear as column headings in Table 3 and range from "unlocked, loaded" to "locked, unloaded, without ammunition." Respondents in homes with more than 1 firearm were asked, "Is at least 1 of the firearms kept loaded and unlocked?" Those who answered "yes" were placed in the "unlocked, loaded" category.

We used several survey items to classify the remaining respondents. First, we divided firearm storage into locked and unlocked and then divided each of these categories into loaded and unloaded. Finally, we divided unloaded by whether firearms were stored with or without ammunition. When a home had more than 1 firearm stored in different ways, we categorized the home based on the storage pattern that would make it easiest for a child to gain access to and shoot the firearm. For example, if some firearms in a home were loaded and some were unloaded, the storage pattern was classified as loaded.

Because of the way survey items were asked, if a household had 2 firearms—one stored "locked, unloaded, and without ammunition," and another stored "locked, unloaded, and with ammunition,"—it would be categorized as having firearms stored "unlocked, unloaded, and with ammunition," This classification issue does not apply to the other categories, and it is unlikely to change the qualitative nature of the results.

The survey items included the word "now" to indicate that they were referring to storage patterns at the time of the interview. For example, respondents whose firearm was unloaded were asked an initial ammunition item that read, "Is any ammunition now kept in or around your home?" Those who answered "yes" were asked 2 additional items: "How much of the ammunition is kept in a locked place? Would you say all, some, or none?" and "Where is this ammunition kept—is it kept with the firearm or kept in a separate place away from the firearm?"

When reporting whether firearms were locked, we included both firearms stored in a locked place and firearms stored with a trigger lock or other locking mechanism. The survey item covering trigger locks asked the respondent to report all the ways in which firearms were kept in the home: "taken apart," "with a trigger lock or other locking mechanism," "assembled without a locking mechanism," "other," or "don't know." This phrasing allowed us to determine whether at least 1 firearm had a trigger lock, but it did not allow us to determine whether all firearms (in homes with more than 1 firearm) had trigger locks. Therefore, respondents with firearms stored in an unlocked place were categorized as having firearms locked if they both reported use of trigger locks and did not report other answers such as "assembled without a locking mechanism."

Because firearms stored unlocked and loaded and firearms stored unlocked, unloaded, and with ammunition are the most accessible to children, we combined the 2 groups into the category "firearms stored unlocked and loaded or with ammunition" for some analyses.

Independent Variables

We selected independent variables (Table 1) that had been found to be significant predictors of 1 of the outcome variables in at least 1 prior study.[31–33,35,36] We also included the child's age and sex and 2 variables that we predicted would be associated with a higher probability of having a firearm: a household member in a protective services occupation (i.e., police officer) or with military experience. The NHIS defines children as aged 0 to 17 years (i.e., up to but not including 18 years).

Data Analysis

We report univariate and bivariate statistics and results of logistic regressions. The data set includes variables for individual children (because a family can have more than 1 child) and for families. Therefore, we used both the child and the family as units of analysis. Specifically, the child is the unit of analysis for the top portion of Tables 1 and 3; all other analyses use the family as the unit of analysis.

The NCHS provides household weights and person weights in the core data set so that national population-based estimates can be made. We consulted the NCHS about adjustment of weights for use with the Year 2000 supplement. We used the core household weights for family-level analyses and the core person weights for child-level analyses. Because the supplement was administered to a random sample of half of the core NHIS households, we multiplied the weights by 2 and adjusted for the supplement's nonresponse rate. Standard errors were computed with standard methods that incorporate the complex sampling design.[37]

Results

Presence of Firearms by Child Characteristics

Of the children in the United States, 34% (representing more than 22 million children) live in homes in which respondents reported the presence of a firearm (Table 1). The percentage of children living in homes with firearms increases with the child's age, from 28% for children younger than 1 year to 38% for children aged 13 to 17 years.

TABLE 1—Percentages and Population Estimates of Firearms in Homes in the United States, by Characteristics of Children (Newborn to 17 Years) and of Homes with Children

	Have Firearms in Home		
	%	(95% CI)	Population Estimate
Characteristics of children[a]			
Total	33.5	(31.7, 35.3)	22 338 000
Sex			
Female	32.8	(30.8, 34.8)	10 761 000
Male	34.3	(32.1, 36.5)	11 577 000
Age of youngest child, y			
<1	27.8	(23.9, 31.7)	1 099 000
1–4	29.6	(27.2, 32.0)	4 582 000
5–12	33.5	(31.5, 35.5)	9 948 000
13–17	38.4	(35.9, 40.9)	6 709 000
Characteristics of homes with children[a]			
Total			
Adults in home	35.3	(33.5, 37.1)	11 145 000
Adult male present	41.4	(39.6, 43.2)	10 384 000
Only adult female(s) present	11.7	(9.5, 13.9)	762 000
Sex of respondent			
Female	30.8	(28.8, 32.8)	6 020 000
Male	42.7	(40.3, 45.1)	5 125 000
Race/ethnicity of respondent			
African American	16.4	(13.9, 18.9)	662 000
Hispanic	14.5	(12.1, 16.9)	517 000
Other	16.2	(11.7, 20.7)	229 000
White	43.2	(41.2, 45.2)	9 738 000
Education of parent/guardian[b]			
Grades 1–11	19.7	(16.6, 22.8)	690 000
Grade 12	38.2	(35.8, 40.6)	4 164 000
1–3 years of college	38.3	(35.6, 41.0)	3 066 000
≥4 years of college	35.5	(33.1, 37.9)	3 220 000
Poverty level			
Below poverty threshold	15.8	(13.3, 18.3)	791 000
At or above poverty threshold	40.3	(38.5, 42.1)	10 050 000
Metropolitan statistical area size in persons			
Non–metropolitan statistical area	56.3	(52.6, 60.0)	4 170 000
<100 000	48.0	(31.9, 64.1)	246 000
100 000–249 999	46.6	(41.9, 51.3)	932 000
250 000–999 999	31.5	(28.0, 35.0)	2 613 000
≥1 000 000	23.8	(21.8, 25.8)	3 185 000
Region			
Midwest	40.2	(37.1, 43.3)	3 164 000
Northeast	22.7	(18.4, 27.0)	1 408 000
South	41.7	(38.8, 44.6)	4 348 000
West	31.5	(28.0, 35.0)	2 225 000
Occupation			
Protective services	65.4	(58.3, 72.5)	531 000
Other	34.5	(32.7, 36.3)	10 614 000
Military experience			
Yes	49.3	(46.2, 52.4)	3 039 000
No	32.1	(30.3, 33.9)	8 042 000

Note. CI = confidence interval.
[a]Some data were collected for each child (n = 13 345), and some data were collected for each family (n = 6990).
[b]Highest education level of responsible adult family member(s) in the home.

Presence of Firearms in Homes With Children

Thirty-five percent of the homes with children (representing more than 11 million homes) were reported to have at least 1 firearm (Table 1), and 69% of these homes had more than 1 firearm. Thirty-four percent of homes without children had at least 1 firearm, which was very similar to the rate for homes with children.

Among homes with children, those with an adult man in the home were more likely than those with only adult women to have a firearm (41% vs 12%). Having a firearm also varied by poverty level, race/ethnicity, region of the country, and other characteristics (Table 1).

In a logistic regression predicting whether a home with children had a firearm, most of the bivariate patterns persisted (Table 2, first regression).

Type of Firearms in Homes With Children and Firearms

Among homes with children and firearms, 53% had a handgun, 61% had a shotgun, 65% had a rifle, and 2% had another type of firearm. Sixteen percent had only handguns, 14% had only shotguns, 14% had only rifles, 0.3% had only other types of firearms, and 56% had more than 1 type of firearm.

Firearm Storage Patterns in Homes With Children and Firearms

Of the homes with children and firearms, 55% were reported to have 1 or more firearms in an unlocked place, and 43% had unlocked firearms (i.e., not in a locked place and not locked with a trigger lock or other locking mechanism). Thirty-eight percent had trigger locks on at least 1 firearm, and 13% had 1 or more firearms taken apart. Regardless of whether their firearms are locked, 14% of the homes with children and firearms had loaded firearms, and 18% had unloaded firearms stored with ammunition.

Table 3 combines the different firearm storage patterns. It shows that 9% of the homes with children and firearms had firearms unlocked and loaded, and another 4% had them unlocked, unloaded, and stored with ammunition; thus, a total of about 13% of homes—about 1.4 million homes with about 2.6 million children—had firearms stored in a manner most accessible to children. Thirty-nine percent of the homes had their firearms locked, unloaded, and stored separately from ammunition. These percentages are quite different from those of homes with firearms but no children: 28% had firearms unlocked and loaded or with ammunition, and 25% had firearms locked, unloaded, and separate from ammunition.

If we consider firearms that are "taken apart" to be the equivalent of "locked, unloaded," the change in the percentage stored unlocked and loaded or with ammunition is minimal, and the percentage stored locked, unloaded, and separate from ammunition increases to 44%.

In a logistic regression model, homes with children and firearms in the South are more likely than homes in other regions to have firearms unlocked and loaded or with

TABLE 2—Logistic Regressions Predicting the Presence of Firearms in Homes With Children and Predicting Storage of Firearms in Homes With Children and Firearms

	One or More Firearms in the Home[a] (n = 6368)		Firearms Stored Unlocked and Loaded or With Ammunition[b] (n = 2134)	
	Odds Ratio	(95% CI)	Odds Ratio	(95% CI)
Age of youngest child, y				
<1	0.85	(0.72, 1.01)	0.58	(0.41, 0.83)
1–4	0.80	(0.62, 1.04)	0.69	(0.43, 1.10)
5–12	0.83	(0.65, 1.04)	0.47	(0.28, 0.79)
13–17	1.00	. . .	1.00	. . .
Race/ethnicity of respondent				
African American	0.39	(0.31, 0.50)	0.62	(0.38, 1.01)
Hispanic	0.33	(0.26, 0.41)	0.88	(0.39, 1.97)
Other	0.31	(0.22, 0.45)	0.69	(0.17, 2.75)
White	1.00	. . .	1.00	. . .
Adults in home				
Adult male present	3.93	(3.03, 5.09)	0.75	(0.44, 1.26)
Only adult female(s) present	1.00	. . .	1.00	. . .
Education of parent/guardian[c]				
Grades 1–11	1.10	(0.84, 1.44)	1.46	(0.32, 1.03)
Grade 12	1.40	(1.20, 1.63)	1.21	(0.85, 1.72)
1–3 years of college	1.23	(1.05, 1.45)	1.26	(0.89, 1.78)
≥4 years of college	1.00	. . .	1.00	. . .
Poverty level				
Below poverty threshold	0.42	(0.34, 0.53)	1.14	(0.75, 1.73)
At or above poverty threshold	1.00	. . .	1.00	. . .
Metropolitan statistical area size in persons				
Non–metropolitan statistical area	3.47	(2.86, 4.21)	1.29	(0.86, 1.91)
<100 000	2.39	(0.95, 5.97)	0.95	(0.63, 1.44)
100 000–249 999	2.36	(1.91, 2.91)	1.38	(0.84, 2.26)
250 000–999 999	1.36	(1.12, 1.65)	1.15	(0.76, 1.74)
≥1 000 000	1.00	. . .	1.00	. . .
Region				
Midwest	0.68	(0.57, 0.82)	0.47	(0.29, 0.74)
Northeast	0.37	(0.28, 0.49)	0.31	(0.17, 0.58)
West	0.75	(0.61, 0.92)	0.51	(0.36, 0.72)
South	1.00	. . .	1.00	. . .
Occupation				
Protective services	3.39	(2.35, 4.89)	3.46	(2.19, 5.47)
Other	1.00	. . .	1.00	. . .
Military experience				
Yes	1.36	(1.16, 1.60)	1.16	(0.87, 1.57)
No	1.00	. . .	1.00	. . .

Note. CI = confidence interval.
[a]Odds ratios were obtained with logistic regression to predict the presence of a firearm in the home for homes with children. The dependent variable was set to 1 if the respondent reported ≥1 firearm in the home, and it was set to 0 if the respondent reported no firearms in the home.
[b]Odds ratios were obtained by predicting how firearms are stored in homes with firearms and children. The dependent variable was set to 1 if firearms were stored unlocked and loaded or with ammunition and it was set to 0 if they were stored in another manner.
[c]Highest education level of responsible adult family member(s) in the home.

ammunition. Homes with teenagers are more likely than homes with children in some younger age groups to store firearms in this manner, as are homes with people in protective services (Table 2, second regression).

Discussion

Thirty-five percent of the homes with children in the United States—representing more than 11 million homes with more than 22 million children younger than 18 years—have firearms. Although there has been much debate over gun control and gun rights, there has been a fair amount of consensus that firearms in homes with children should be stored in an inaccessible manner. Thirty-nine percent of the homes with children and firearms store the firearms in the manner that makes them least accessible to children: locked (in a locked place or with a trigger lock), unloaded, and separate from ammunition. Many firearms are stored in a manner that increases the chances of a child's gaining access to a firearm and discharging it. More than 4.7 million homes with more than 8.3 million children store firearms unlocked, including about 946 000 homes with firearms unlocked and loaded and about 425 000 homes with firearms unlocked, unloaded, and with ammunition.

Reports from the 1980s and early 1990s, many of them based on data from national polls, typically found firearms reported in 40% to 50% of homes.[38,39] However, recent studies have found percentages more similar to our finding that firearms are reported in 35% of US homes (regardless of whether there are children in the home).[27,38] It is not clear whether firearm ownership has recently declined or whether the differences reflect different survey methodologies and biases.

A strength of the NHIS is that it covers a nationally representative sample with a relatively high response rate. Another strength is that the firearm items were incorporated into an extensive interview, so interviewers had time to develop a rapport with respondents and could ask sensitive questions in the context of less sensitive items. Nonetheless, reporting bias is always possible in a survey such as this one.

Registered firearm owners have been generally found to provide valid responses to questions about firearm ownership, although even some of them fail to report their firearms on surveys.[40,41] Although less is known about unregistered firearm owners, we believe that at least some would have denied having a firearm, particularly in a survey sponsored by the federal government. Because home interviews were conducted by an interviewer previously unknown to the respondent, some respondents without firearms might have reported having one because, for safety reasons, they did not want anyone to know that they had no firearm in the home. In addition, the interview was conducted with a random adult in the home, so some respondents may not have known about a firearm that was kept by a spouse or an adolescent. This may in part explain why men were more likely than women to report firearms, even though most lived in 2-adult homes.

Similarly, in homes with children and firearms, we found a smaller percentage with firearms unlocked and loaded (9%) than was found in some prior studies. For example, Hemenway et al. found in a national telephone survey of firearm owners that 14% of the respondents with children younger than 18 years kept firearms unlocked and loaded.[28] By contrast, our findings were slightly higher than those of a study of parents in 29 pediatric practices in 7 states, which found that 7% of the parents with firearms in the home had at least 1 firearm unlocked and loaded.[32] We

TABLE 3—Percentages and Population Estimates of Storage Patterns of Firearms in Homes With at Least 1 Firearm, for All Children and for All Homes With Children

Firearm Storage Patterns	Unlocked, Loaded	Unlocked, Unloaded, With Ammunition	Unlocked, Unloaded, Without Ammunition	Locked, Loaded	Locked, Unloaded, With Ammunition	Locked, Unloaded, Without Ammunition
Children[a] (n = 4075)						
% (95% CI)	8.1 (6.6, 9.6)	4.3 (3.1, 5.5)	27.0 (24.8, 29.2)	5.6 (4.5, 6.7)	13.4 (11.7, 15.1)	41.6 (39.1, 44.1)
Population estimate	1 708 000	911 000	5 705 000	1 192 000	2 826 000	8 791 000
Homes with children[a] (n = 2206)						
% (95% CI)	9.0 (7.6, 10.4)	4.0 (3.0, 5.0)	27.5 (25.5, 29.5)	6.5 (5.4, 7.6)	13.5 (12.0, 15.0)	39.5 (37.1, 41.8)[b]
Population estimate	946 000	425 000	2 895 000	680 000	1 422 000	4 155 000
Homes without children (n = 3869)						
% (95% CI)	22.3 (20.6, 24)[b]	6.2 (5.4, 6.9)[b]	27.0 (25.5, 28.6)	9.0 (7.9, 10.1)	10.2 (9.1, 11.3)	25.4 (23.9, 26.9)
Population estimate	4 043 820	1 091 569	4 904 382	1 637 974	1 854 665	4 608 579

Note. CI = confidence interval; locked refers to storage in a locked place (e.g., a locked closet or safe) or with a trigger lock.
[a]Because a home can have more than 1 child, data are presented for children to show the level of exposure and for homes to show the number of sites with different storage patterns. Because of space considerations, confidence intervals are presented only for percentages, but the confidence intervals for the population estimates can be calculated from the confidence intervals for the percentages.
[b]39.5% rounds down to 39% in the text of the article because it stands for 39.49%. When 22.3% and 6.2% are added in the text, the sum of 28.5% rounds down to 28%.

expected our national sample to show a higher rate of unlocked and loaded firearms than the pediatric sample, given the uneven age distribution and other biases that can occur with a practice-based convenience sample. The NHIS item on trigger locks, which enabled expansion of the definition of a "locked" firearm, may explain some of the differences as well. We also believe that people with firearms (in our study and in other studies) may overreport storing them locked, unloaded, and separate from ammunition because that is generally the socially desirable response.

The NHIS did not ask people why they had firearms or why they stored them in a particular manner. Other studies have suggested that a major reason that people keep firearms unlocked and loaded is for protection.[28,30,33] Accessible firearms used for protection may save lives and prevent injuries. Studies of the incidence of defensive firearm use report widely divergent numbers.[38,42–44] These studies face many methodological challenges,[39,42–45] and it is difficult in such studies to determine whether the outcome of a defensive use would have been worse without access to a firearm and whether a locking mechanism would have prevented timely defensive use of a firearm.

Various strategies have been proposed to prevent children from gaining access to and using firearms stored in the home: inclusion of trigger locks with all firearms for sale, manufacture of "personalized" firearms that can be fired only by authorized users, and addition of an indicator to firearms that signifies when ammunition is in the firing chamber.[22,46,47] Another approach is to use the judicial system to create incentives to reduce the risk of children gaining access to firearms (e.g., firearm storage laws). Each of these approaches has proponents and opponents.

Several medical organizations recommend that physicians address firearm-related issues with their patients and their patients' parents,[20,48,49] and several articles include recommendations for how to address firearm and violence issues in the clinical setting.[50–55] In addition, the American Academy of Pediatrics provides a self-training program to teach physicians how to provide counseling.[56] Studies suggest that many physicians, whether they care for children or adults, do not provide counseling on firearm safety.[57–64] With limited time to provide counseling on many topics, physicians, nurses, and other clinicians must decide which issues are most important to address individual families. In making such decisions, clinicians may want to keep in mind that many US homes with children have firearms and that several studies have shown that parents are receptive to clinical provision of advice about firearm storage and safety.[65,66] Clinicians also may want to tailor advice to their patients' individual needs and circumstances.

Several studies have shown that many adolescents own or have access to firearms,[67–71] so special efforts may be warranted to address firearm safety issues directly with adolescents.[72] Few evaluations of clinical or other strategies to increase firearm safety have been published; further research on such strategies is needed.

Clinicians, public health workers, and lawmakers, of course, do not control what goes on in the homes of children. Ultimately, families will decide what they feel is best for their particular circumstances. We can, however, make sure that when families make these decisions, they are informed about the risks associated with firearms and how to reduce those risks. □

Contributors

M. A. Schuster planned the study, analyzed the data, and wrote the paper. T. M. Franke oversaw statistical issues. A. M. Bastian performed the programming. S. Sor provided research assistance. N. Halfon contributed to the analyses and to the writing of the paper.

Acknowledgments

This research was funded in part by the Maternal and Child Health Bureau, Health Resources and Services Administration (MCU-069385) and by the Centers for Disease Control and Prevention (U48/CCU 915773).

Presented in part at the annual meeting of the Pediatric Academic Society, New Orleans, La, May 3, 1998.

We are indebted to Naihua Duan, PhD, Frederick P. Rivara, MD, MPH, and Eugene Volokh, JD, for comments on a draft of this paper; to J. Neil Russell, PhD, of the National Center for Health Statistics, for technical support in analyzing the data; and to Phinney L. Ahn, BS, Baback B. Gabbey, BA, Cung B. Pham, BA, and Yuko Sano, AB, for research assistance.

References

1. CNN.com. Are US schools safe? Available at: http://www.cnn.com/specials/1998/schools. Accessed June 27, 1999.
2. Dryman S. Henderson boy, 4, shot by 6-year old. *Asheville Citizen-Times.* February 23, 1999:1.

3. March W. Deadly curiosity. *Tampa Tribune.* December 9, 1998:1.
4. Ryan P. Guns & kids. *Tampa Tribune.* August 21, 1995:1.
5. Naureckas SM, Galanter C, Naureckas ET, Donovan M, Christoffel KK. Children's and women's ability to fire handguns. *Arch Pediatr Adolesc Med.* 1995;149:1318–1322.
6. Keck NJ, Istre GR, Coury DL, Jordan F, Eaton AP. Characteristics of fatal gunshot wounds in the home in Oklahoma: 1982–1983. *Am J Dis Child.* 1988;142:623–626.
7. Martin JR, Sklar DP, McFeeley P. Accidental firearm fatalities among New Mexico children. *Ann Emerg Med.* 1991;20:58–61.
8. Ordog GJ, Wasserberger J, Schatz I, et al. Gunshot wounds in children under 10 years of age. *Am J Dis Child.* 1988;142:618–622.
9. Wintemute GJ, Teret SP, Kraus JF, Wright MA, Bradfield G. When children shoot children: 88 unintended deaths in California. *JAMA.* 1987; 257:3107–3109.
10. Boyd JH, Moscicki EK. Firearms and youth suicide. *Am J Public Health.* 1986;76:1240–1242.
11. Centers for Disease Control and Prevention. Recommended framework for presenting injury mortality data. *MMWR Morb Mortal Wkly Rep.* 1997;46(no. RR-14):1–32.
12. Boy charged with attempted murder in shooting of 14-year-old girl. *Associated Press.* January 28, 1999;AM cycle.
13. Cloud J. Just a routine school shooting: TJ Solomon's violent rampage seemed to be a cry for help. Was it also a signal that Columbine was just the beginning? *Time.* 1999;153(21): 34–38, 43.
14. Labi N. The hunter and the choirboy. *Time.* 1998;151(13):28–37.
15. Committee on Psychosocial Aspects of Child and Family Health. *Guidelines for Health Supervision III.* Elk Grove Village, Ill: American Academy of Pediatrics; 1997.
16. Green M. *Bright Futures: Guidelines for Health Supervision of Infants, Children, and Adolescents.* Arlington, Va: National Center for Education in Maternal and Child Health; 1994.
17. National Rifle Association. *A Parent's Guide to Gun Safety* [brochure]. Fairfax, Va: National Rifle Association; May 1995.
18. Sporting Arms and Ammunition Manufacturers' Institute (SAAMI). *Firearm Safety Depends on You* [brochure]. Newtown, Conn: SAAMI; June 1997.
19. *Healthy People 2000: National Health Promotion and Disease Prevention Objectives.* Washington, DC: US Dept of Health and Human Services; 1991. DHHS publication PHS 91-50212.
20. American College of Physicians. Firearm injury prevention. *Ann Intern Med.* 1998;128:236–241.
21. Bates L. Gun locks and lock boxes: what works? What doesn't? *Women Guns.* 1998;9:32–43.
22. Freed LH, Vernick JS, Hargarten SW. Prevention of firearms-related injuries and deaths among youth: product-oriented approach. *Pediatr Clin North Am.* 1998;45:427–438.
23. *Child Access Prevention Laws: State Summaries* [fact sheet]. Washington, DC: Handgun Control Inc; December 1998.
24. White AM. A new trend in gun control: criminal liability for the negligent storage of firearms. *Houston Law Rev.* 1993;30:1389–1431.
25. Henigan DA. Victims' litigation targets gun violence. *Trial.* 1995;31:50–55.
26. Cummings P, Grossman DC, Rivara FP, Koepsell TD. State gun safe storage laws and child mortality due to firearms. *JAMA.* 1997;278:1084–1086.
27. Cook PJ, Ludwig J. *Guns in America. Results of a Comprehensive National Survey on Firearms Ownership and Use.* Washington, DC: Police Foundation; 1996. Summary Report.
28. Hemenway D, Solnick SJ, Azrael DR. Firearm training and storage. *JAMA.* 1995;273:46–50.
29. Morrison TC, Hofstetter CR, Hovell MF. Firearm ownership and safety practices: a random-digit dial survey of San Diego. *Am J Prev Med.* 1995;11:364–370.
30. Patterson PJ, Smith LR. Firearms in the home and child safety. *Am J Dis Child.* 1987;141: 221–223.
31. Senturia YD, Christoffel KK, Donovan M. Children's household exposure to guns: a pediatric practice-based survey. *Pediatrics.* 1994;93: 469–475.
32. Senturia YD, Christoffel KK, Donovan M. Gun storage patterns in US homes with children: a pediatric practice-based survey. Pediatric Practice Research Group. *Arch Pediatr Adolesc Med.* 1996;150:265–269.
33. Weil DS, Hemenway D. Loaded guns in the home: analysis of a national random survey of gun owners. *JAMA.* 1992;267:3033–3037.
34. Wiktor SZ, Gallaher MM, Baron RC, Watson ME, Sewell CM. Firearms in New Mexico. *West J Med.* 1994;161:137–139.
35. Powell KE, Jacklin BC, Nelson DE, Bland S. State estimates of household exposure to firearms, loaded firearms, and handguns, 1991 through 1995. *Am J Public Health.* 1998;88: 969–972.
36. Nelson DE, Grant-Worley JA, Powell K, Mercy J, Holtzman D. Population estimates of household firearm storage practices and firearm carrying in Oregon. *JAMA.* 1996;275:1744–1748.
37. *Stata Statistical Software, Release 5.0* [computer program]. College Station, Tex: Stata Corp; 1997.
38. Kleck G. *Targeting Guns: Firearms and Their Control.* New York, NY: Aldine De Gruyter; 1997.
39. Cook PJ. Notes on the availability and prevalence of firearms. *Am J Prev Med.* 1993;9 (suppl 1):33–38.
40. Kellermann AL, Rivara FP, Banton J, Reay D, Fligner CL. Validating survey responses to questions about gun ownership among owners of registered handguns. *Am J Epidemiol.* 1990;131:1080–1084.
41. Rafferty AP, Thrush JC, Smith PK, McGee HB. Validity of a household gun question in a telephone survey. *Public Health Rep.* 1995;110: 282–288.
42. Kleck G, Gertz M. Armed resistance to crime: the prevalence and nature of self-defense with a gun. *J Criminal Law Criminol.* 1995;86: 150–187.
43. Kleck G, Gertz M. Policy and perspective: the illegitimacy of one-sided speculation: getting the defensive gun use estimate down. *J Criminal Law Criminol.* 1997;87:1446–1461.
44. Hemenway D. Policy and perspective: survey research and self-defense gun use: an explanation of extreme overestimates. *J Criminal Law Criminol.* 1997;87:1430–1444.
45. Morgenstern H. Gun availability and violent death [editorial]. *Am J Public Health.* 1997; 87:899–901.
46. Polston MD, Weil DS. Unsafe by design: using tort actions to reduce firearm-related injuries. *Stanford Law Policy Rev.* 1997;8:13–21.
47. Teret SP, Webster DW, Vernick JS, et al. Support for new policies to regulate firearms: results of two national surveys. *N Engl J Med.* 1998; 339:813–818.
48. Committee on Adolescence. Firearms and adolescents. *Pediatrics.* 1992;89:784–787.
49. Committee on Injury and Poison Prevention. Firearm injuries affecting the pediatric population. *Pediatrics.* 1992;89:788–790.
50. Findings, recommendations, and action steps. *Pediatrics.* 1994;94(4, pt 2):579–586.
51. Alpert EJ, Sege RD, Bradshaw YS. Interpersonal violence and the education of physicians. *Acad Med.* 1997;72(suppl):S41–S50.
52. Rivara FP, Farrington DP. Prevention of violence: role of the pediatrician. *Arch Pediatr Adolesc Med.* 1995;149:421–429.
53. Slaby RG, Stringham P. Prevention of peer and community violence: the pediatrician's role. *Pediatrics.* 1994;94:608–616.
54. Spivak H. Violence prevention: a call to action. *Pediatrics.* 1994;94:577–578.
55. Webster DW, Wilson MEH. Gun violence among youth and the pediatrician's role in primary prevention. *Pediatrics.* 1994;94:617–622.
56. American Academy of Pediatrics, Center to Prevent Handgun Violence. *STOP: Steps to Prevent Firearm Injury.* Elk Grove Village, Ill: American Academy of Pediatrics; 1994.
57. Barkin S, Duan N, Fink A, Brook RH, Gelberg L. The smoking gun: do clinicians follow guidelines on firearm safety counseling? *Arch Pediatr Adolesc Med.* 1998;152:749–756.
58. Cassel CK, Nelson EA, Smith TW, Schwab W, Barlow B, Gary NE. Internists' and surgeons' attitudes toward guns and firearm injury prevention. *Ann Intern Med.* 1998;128:224–230.
59. Everett SA, Price JH, Bedell AW, Telljohann SK. Family practice physicians' firearm safety counseling beliefs and behaviors. *J Community Health.* 1997;22:313–324.
60. Fargason CA, Johnston C. Gun ownership and counseling of Alabama pediatricians. *Arch Pediatr Adolesc Med.* 1995;149:442–446.
61. Grossman DC, Mang K, Rivara FP. Firearm injury prevention counseling by pediatricians and family physicians: practices and beliefs. *Arch Pediatr Adolesc Med.* 1995;149:973–977.
62. Olson LM, Christoffel KK, O'Connor KG. Pediatricians' experience with and attitudes toward firearms: results of a national survey. *Arch Pediatr Adolesc Med.* 1997;151:352–359.
63. Rosenquist GC, O'Donnell R, Cheng TL, Ottolini M, Makowski S, Cohen GJ. Firearm counseling by practicing general pediatricians. *Ambulatory Child Health.* 1998;4:13–19.
64. Webster DW, Wilson MEH, Duggan AK, Pakula LC. Firearm injury prevention counseling: a study of pediatricians' beliefs and practices. *Pediatrics.* 1992;89:902–907.
65. Webster DW, Wilson MEH, Duggan AK, Pakula LC. Parents' beliefs about preventing

gun injuries to children. *Pediatrics.* 1992;89: 908–914.

66. Haught K, Grossman D, Connell F. Parents' attitudes toward firearm injury prevention counseling in urban pediatric clinics. *Pediatrics.* 1995;96:649–653.
67. Callahan CM, Rivara FP. Urban high school youth and handguns: a school-based survey. *JAMA.* 1992;267:3038–3042.
68. Hemenway D, Prothrow-Stith D, Bergstein JM, Ander R, Kennedy BP. Gun carrying among adolescents. *Law Contemp Probl.* 1996;59:39–53.
69. Sadowski LA, Cairns RB, Earp JA. Firearm ownership among nonurban adolescents. *Am J Dis Child.* 1989;143:1410–1413.
70. Sheley JF, Wright JD. Gun acquisition and possession in selected juvenile samples. *National Institute of Justice Office of Juvenile Justice and Delinquency Prevention Research in Brief.* December 1993:1–11. NCJ 145326.
71. Sheley JF, Wright JD. High school youths, weapons, and violence: a national survey. *National Institute of Justice Office of Juvenile Justice and Delinquency Prevention Research in Brief.* October 1998:1–18. NCJ 172857.
72. Adolescents and firearms: position paper of the Society for Adolescent Medicine. *J Adolesc Health.* 1998;23:117–118.