

ORIGINAL ARTICLE

Pediatricians' involvement in gun injury prevention

L M Olson, K K Christoffel, K G O'Connor

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Background: Injuries from small arms are of concern internationally. The health perspective is an emerging aspect of international work to reduce these injuries. This aspect has been evident in US firearm injury prevention work for over a decade, exhibited by strong statements from the American Academy of Pediatrics (AAP) to remove firearms from children's environments.

Objectives: To assess trends among US pediatricians related to firearm injury prevention counseling practices and attitudes toward gun legislation.

Design: National random sample, mailed surveys of AAP members: (1) 1994 (response rate = 68.9%, n = 982); (2) 2000 (response rate = 62.4%, n = 922). χ^2 Tests were used to assess bivariate relationships and logistic regression to assess multivariate relationships regarding counseling practices.

Results: Respondents in both years believed that violence prevention should be a priority for pediatricians (91.4% and 92.0%) and reported always or sometimes recommending handgun removal from the home (46.2% and 55.9%, respectively). In 2000, 74% of the respondents were comfortable discussing firearm safety; fewer thought they had sufficient training (32.7%) or time (27.5%) to discuss firearms. In 1994 and 2000, the likelihood of counseling on handgun removal was positively related to recent experience treating a gun injury, female sex and not owning a gun. In both years, >80% of pediatricians thought that gun control legislation or regulations would reduce injury and death.

Conclusions: US pediatricians continue to adopt policies promoting gun injury prevention. The practices and attitudes of pediatricians may be important for public education strategies regarding firearm injury prevention in the US and internationally.

See end of article for authors' affiliations

Correspondence to:
L M Olson, 141 Northwest
Point, Blvd Elk, Grove
Village, American Academy
of Pediatrics, Illinois 60007,
USA; lolson@aap.org

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The danger of firearms has been a prominent pediatric issue in the USA since the 1980s. The American Academy of Pediatrics (AAP) issued two strong statements on firearms in general, and handguns in particular in 1992^{1,2}; these were updated in 2000.³ The AAP statements focus attention on adults' responsibility for protecting children and adolescents from guns, and call for removing firearms, particularly handguns, from the environments of children. The AAP endorsed office-based counseling on the dangers of guns at home and legislation to ban the manufacture, sale and private possession of handguns. Since the first AAP statement, the role of guns in the lives of children, families and doctors has been on the decline, but still high rates of gun injury and death among youth persist in the US.⁴ The firearm death rate (/ 100 000) fell from 8.19 in 1993 to 3.51 in 2003 among those under 20 years of age.⁵

As long as children and adolescents face risk from guns, pediatricians will continue to confront gun injuries. To assure updating of approaches, data are needed periodically on pediatrician counseling and advocacy activities related to gun injury prevention. Although other national or regional surveys of pediatricians' experience with gun injuries and injury prevention counseling exist,^{6–11} trend data on the US experiences nationally are needed. A recent study showed that many medical organizations now have policies related to gun injury prevention, and called for research on how practices of doctors changed after the publication of such policies.¹² As the AAP was the first medical group in the US to deal with this issue, ongoing information from its members may be a harbinger of what will be seen in other disciplines.

Changing firearm injury patterns in the US over the past 5–10 years have implications for itself and for international efforts to control firearm morbidity and mortality.¹³ The US health sector participation in firearm injury prevention has become well established during the past 10–20 years.¹²

Evolutions in this participation may be informative to those working on emerging health sector involvement in small arms injury prevention on the international stage, such as the International Physicians for the Prevention of Nuclear War's International Campaign to Prevent Small Arms Violence¹⁴ and the International Action Network on Small Arms.¹⁵ To inform on work in the US and beyond, this report summarizes the 1994 and 2000 surveys of AAP members that assessed pediatricians' attitudes and self-reported behaviors related to gun injuries and their prevention.¹⁶

METHODS

Sample

This study is based on data gathered through a Periodic Survey of the AAP membership. The surveys are administered to randomly selected non-retired US members of the AAP. Each survey uses a unique sample; across all membership types, the AAP currently has about 60 000 members, and an estimated 80% of board-certified pediatricians in the US.

Survey method

The AAP has conducted two detailed surveys of its members regarding gun injuries and gun injury prevention: periodic survey number 25 (fielded in 1994) and periodic survey number 47 (fielded in 2000). The content was developed by the AAP Department of Research, working with the AAP Committee on Injury and Poison Prevention. The instruments were self-administered, forced-choice questionnaires (eight pages); for each survey an original mail and four follow-up mails were sent. For periodic survey number 25, 1117 completed questionnaires were received (response rate 68.9%), and for periodic survey number 47 1008 questionnaires were received (response

Abbreviation: AAP, American Academy of Pediatrics

Table 1 Comparison of respondents: 1994 and 2000 percentages of US pediatricians reporting

	Mean prior 6 surveys Sample = 6807	1994 periodic survey Sample = 1093	Mean prior 6 surveys Sample = 5687	2000 periodic survey Sample = 1000
All respondents				
Current pediatric residents	995 (14.8)	210 (19.2)	811(14.3)	101 (10.6)
Sex				
Male	4019 (59.0)	628 (56.7)	2803 (49.5)	479 (50.0)
Female	2788 (41.0)	480 (43.3)	2860 (50.5)	479 (50.0)
Age (years)				
<45	4348 (64.5)	695 (63.6)	3338 (59.5)	565 (59.1)
≥45	2393 (35.5)	397 (36.4)	2268 (40.5)	391 (40.9)
Respondents in direct patient care		Sample = 982		Sample = 922
Own a gun (any type)	NA	150 (15.7)	NA	119 (13.2)
Own a handgun	NA	73 (7.6)	NA	59 (6.5)

NA, not applicable.
Values are n (%).

rate 62.4%). The institutional review board of the AAP approved the surveys.

Respondents were asked about: personal gun ownership, experience treating or consulting on a gun injury in the past 12 months, attitudes toward gun safety counseling, current counseling practices regarding gun safety and attitudes toward various gun control legislation. In 2000, questions on perceived barriers to counseling were added. To assess how well the samples represented the AAP membership at the time of the surveys, they were compared with the average respondent characteristics in the six periodic surveys conducted just before each survey.

Data analysis

Analyses were restricted to respondents who provide some form of direct patient care. This resulted in samples of 982 (87.9%) respondents in 1994 and 922 (91.5%) respondents in 2000. In the 1994 survey, the questions on current counseling practices were only asked of those providing injury prevention counseling (766 respondents). In the 2000 survey, the counseling questions were asked of all respondents who provide direct patient care. Given the difference in sample characteristics, statistical comparisons between the 1994 and 2000 surveys were not made for counseling items.

The data were used to describe trends in three behaviors and two attitudes

1. frequency of gun injuries treated in the past 12 months
2. current gun safety counseling practices

3. doctor's personal gun ownership
4. attitudes toward legislation to reduce availability of guns
5. attitudes toward gun safety counseling by pediatricians.

Treatment of gun injuries and current counseling practices were examined for relationships with several physician characteristics: age, sex, resident training status, practice location, practice setting, time spent in general pediatrics, geographic region and gun ownership. Pediatricians were divided into two age groups: <45 and ≥45 years of age. Primary practice location was self-defined by respondents as: urban inner city, urban not inner city, suburban and rural. Practice type was divided into three categories: solo or two-person practice, group practice or staff model HMO, and hospital/ clinic practice or medical school. Being in general pediatrics was defined as <50% time spent in a subspecialty area. Geographic region was categorized as Northeast (New England and middle Atlantic states), Midwest (east north central and west north central), South (south Atlantic, east south central and west south central) and West (mountain and Pacific states), following the regional classifications used by the National Center for Health Statistics (Hyattsville, Maryland, USA). Gun ownership was categorised into three groups: no gun ownership; long gun or air gun ownership only; and handgun ownership (which might also include owning a long gun or air gun). χ^2 Tests of independence and t tests were carried out as appropriate on bivariate relationships.

Logistic regression was used to examine the independent contributions of personal and practice characteristics to the

Table 2 Attitudes toward counseling interventions in 1994 and 2000: percentage responding agree or strongly agree

	1994 n = 982	2000 n = 922
Violence prevention should be a priority issue for pediatricians	91.4	92
Anticipatory guidance on firearm safety could reduce injury or death	82.4	82.7
Pediatricians should identify families who have firearms at home	82.9	87.3*
Pediatricians should recommend the unloading and locking away of firearms	94.6	95.8
Pediatricians should recommend the removal of handguns from home	65.3	60.8
Gun violence is a problem in the community where my practice is located	NA	62
I am comfortable discussing firearm safety with parents	NA	73.6
I have adequate training in firearm safety	NA	32.7
I am confident in my ability to manage patients with gun injuries	NA	23
There is sufficient time in health maintenance visits to address firearm safety	NA	27.5
Parents resent being asked about firearms at home	NA	36.5

*p=0.03.

likelihood of providing counseling, with separate analyses conducted for the 1994 and 2000 samples. The strongest aspect of the AAP's policy was chosen as the primary outcome measure for multivariate analyses (ie, recommending removal of handguns from the home) to provide a wider dispersion of respondent attitudes. An iterative process was used to build the logistic models: bivariate relationships were assessed; relationships suggested by the bivariate tests were further explored using logistic regression. Variables included in the final models were either significant or approached significance at the 0.05 level, or remained in the model because we judged it was important to control for their effect—for example, sex entered first.

RESULTS

Characteristics of respondents

Table 1 shows the similarity between the 1994 and 2000 periodic survey samples, and the AAP membership at the time of each survey. The characteristics of the samples reflect changes in the composition of the pediatric workforce and membership in the AAP. The proportion of female respondents increased from 43% in 1994 to 50% in 2000. The proportion of pediatricians who owned at least one gun (of any type) decreased from 16% in 1994 to 13% in 2000. The proportion that owned a handgun dropped similarly. These trends were examined to assess whether they could be attributed to known shifts in the sex composition of pediatricians—that is, that more pediatricians are now women and women are less likely to own guns. A decline was noted in gun ownership from 1994 to 2000 for both men and women, although the decline was not significant for either.

Experience treating gun injuries

The percentage of respondents in direct patient care reporting that they treated or consulted on a gun injury in the prior

12 months fell from 19.8 in 1994 to 12.7 in 2000 ($p < 0.05$). This decrease was found across all characteristics measured: sex, age, practice location, region, practice type, specialty and residency training status. In both survey years, the proportion of pediatricians reporting that they had treated a gun injury was significantly higher for those aged < 45 years, working in inner-city areas, in hospitals or medical schools, subspecialty practice and in residency training.

Attitudes toward counseling interventions: 1994 and 2000

Support for firearm counseling remained high between 1994 and 2000 (table 2). Most respondents agreed or strongly agreed that violence prevention should be a priority issue for pediatricians (91.4% and 92.0%, respectively), and in both years about 80% of respondents agreed or strongly agreed that anticipatory guidance on firearm safety could reduce injury or death.

Although nearly 75% of year 2000 respondents said they were comfortable discussing firearm safety with parents, only a minority reported they had adequate training in firearm safety (32.7%), were confident in managing patients with gun injuries (23.0%) or had sufficient time in health supervision visits to deal with firearm safety (27.5%).

Current counseling practices: 1994 and 2000

The percentage of pediatricians reporting they always or sometimes identify families who have firearms at home rose from 50.2% in 1994 to 68.8% in 2000 (table 3).

The proportion of pediatricians reporting that they always or sometimes recommend that families unload and lock firearms rose from 62.8% in 1994 to 72.8% in 2000. In 1994, 46.2% reported that they always or sometimes recommend handgun removal from homes; in 2000, 55.9% reported so.

Table 4 shows the association of several factors with a greater likelihood that pediatricians would counsel parents to remove handguns from their homes. In both 1994 and 2000, female pediatricians were more likely to report providing counseling (51.8% v 41.7% for men and 60.6% v 52.2% for men, respectively). In both years, those who had treated a gun injury were significantly more likely to counsel for the removal of handguns. Pediatricians who themselves owned a gun were substantially less likely to counsel parents to remove guns. In 1994, there were regional variations in counseling, with those in the South least likely to urge removal of handguns (37.9%) and those in the West most likely (52.2%), but by 2000 there were no regional differences. In 2000, those who spent most of their time in general pediatrics (62.3%) and those in residency training (67.4%) were more likely to report counseling.

In logistic regression, the dependent variable was current practice of counseling parents who have handguns to remove them from their homes, with support defined as "always" recommending removal. In both 1994 and 2000, sex, recent treatment of gun injuries and practice location had significant independent effects on the likelihood of counseling (table 5). Women, those recently treating a gun injury and those practicing in the inner city were most likely to report counseling. In 2000, age and gun ownership also had significant independent effects, with older pediatricians and non-gun owners more likely to report counseling. Compared with non-gun owners, handgun and long-gun owners had lower odds of advising parents to remove handguns. In 2000, compared with inner-city practice location, the odds for pediatricians from rural practices providing counseling were lower.

Table 3 Percentage of pediatricians providing firearm safety counseling during health supervision visits, 1994 and 2000*

	1994 n=766	2000 n=922
Identify families who have firearms at home		
Always	12.3	15.2
Sometimes	37.9	53.6
Never	49.7	31.2
Counsel families to inquire about the presence of guns in homes where their children play or spend time		
Always	NA	16.1
Sometimes		37.2
Never		46.6
Recommend to families who have firearms the unloading and locking away of guns		
Always	33.5	48.7
Sometimes	29.3	24.1
Never	37.3	27.1
Recommend to families who have handguns their removal from home		
Always	18.4	21.9
Sometimes	27.8	34.0
Never	53.8	44.1

NA, not applicable.

*Samples across years are not directly comparable: the questions in 1994 were asked of those who report they provide injury prevention counseling. In 2000, the questions were asked of those who provide any direct patient care.

Table 4 Percentage of pediatricians who counsel parents to remove handguns from home (always or sometimes combined) by personal and practice characteristics, 1994 and 2000

	1994		2000	
	n = 766	p Value*	n = 922	p Value*
All respondents	46.2		55.9	
Sex		0.007		0.15
Male	41.7		52.2	
Female	51.8		60.6	
Age (years)		0.590		0.688
<45	47.4		57.1	
≥45	45.2		55.7	
Treated gun injury in the past 12 months		0.001		0.008
Yes	59.2		67.4	
No	43.2		54.4	
Own a gun		<0.001		<0.001
Yes	30.7		37.2	
No	49.7		59.2	
Practice location		<0.001		0.808
Inner city	60.5		59.1	
Urban, non-inner city	43.3		56.7	
Suburban	40.1		55.0	
Rural	41.3		58.7	
Region		0.017		0.637
Northeast	50.6		58.5	
Midwest	47.8		56.4	
South	37.9		53.0	
West	52.2		56.4	
Practice type		0.206		0.852
Solo/two person	41.7		56.8	
Group	43.0		54.9	
Hospital/medical school	49.8		57.0	
Specialty		0.928		<0.001
General pediatrics	46.2		62.3	
Subspecialty	45.7		37.1	
Training status		0.921		0.016
Resident	46.0		67.4	
Post resident	46.5		54.4	

*Comparisons are made within the sample year.

Attitudes toward legislative interventions: 1994 and 2000

In both 1994 and 2000, over 80% of pediatricians agreed or strongly agreed that gun control legislation or regulations will help reduce gun-related injuries or death (86.2% and 84.0%, respectively), and almost 92% supported legislation holding gun owners responsible for child and adolescent use of guns. Support for legislation restricting the sale and possession of handguns decreased from 92.3% in 1994 to 86.6% in 2000 ($p < 0.001$). Support for legislation banning the sale and possession of handguns dropped from 76.7% in 1994 to 64.8% in 2000 ($p < 0.001$).

DISCUSSION

Main findings

In 2000, pediatricians in the US overwhelmingly supported gun injury prevention measures: about 90% identified violence prevention as a priority for pediatricians, and about 80% endorsed pediatricians' identification of parents having guns at home. About 80% believed that anticipatory guidance about gun injury prevention can help to reduce gun injury. Even for the sharpest policy recommendations made by the AAP, support remains high: almost 90% for restricting the sale and

possession of handguns and 65% for banning their sale and possession. Pediatricians' support for policies to restrict access to guns is much higher than that reported by the general population. In 1998, only 38% of the adult population in the US was in favor of banning possession of handguns, except for police/authorized officials, and in 2001 only 11% were in favor of a total ban on handguns.¹⁷

A growing percentage of pediatricians reported that they always counsel on gun injury prevention. Three of four respondents reported that they are comfortable doing so, although most state that they need more training and time to provide counseling. Still, almost half of the pediatricians say they always recommend that families who keep firearms unload them and lock them away. These trends parallel other AAP surveys covering domestic violence and community violence, which find both increased concern by pediatricians and a belief that they need more training to deal with issues related to violence.¹⁸ Counseling rates are higher for those who had recently seen a gun injury and lower for those who own guns, and female pediatricians are more likely to counsel than their male colleagues. The increasingly sharp differences observed in practices and opinions between gun owners and non-owners—and between inner city practitioners and rural

Table 5 Predictors of pediatricians' current practice of counseling to always remove handguns from homes

	Model 1: 1994 adjusted OR (95% CI)	Model 2: 2000 adjusted OR (95% CI)
Age (years)		
<45*	1	1
≥45	1.32 (0.85 to 2.05)	1.49† (1.05 to 2.12)
Sex		
Male*	1	1
Female	1.75† (1.16 to 2.65)	1.69† (1.19 to 2.42)
Treated gun injury in the past 12 months		
Did not treat injury*	1	1
Treated injury	1.77† (1.10 to 2.84)	1.91† (1.18 to 3.08)
Gun ownership		
Do not own*	1	1
Handgun owner	0.37 (0.13 to 1.07)	0.13† (0.03 to 0.55)
Long gun/air gun	0.43 (0.16 to 1.13)	0.26† (0.08 to 0.87)
Location		
Inner city*	1	1
Urban, not inner city	0.59† (0.35 to 0.98)	0.73 (0.47 to 1.14)
Suburban	0.61 (0.37 to 1.02)	0.76 (0.50 to 1.15)
Rural	0.70 (0.33 to 1.49)	0.22† (0.08 to 0.58)

*Reference category.
†p<0.05.

ones—suggest that there may be increasing polarization of opinion about guns within US pediatrics.

Study limitations

The data presented are based on pediatricians' self reports; because of social desirability, respondents may be biased toward over-reporting counseling. The survey did not distinguish between minor and severe injuries, so it is not possible to assess what effect severity might have on pediatricians' attitudes or behaviors. The data only reflect clinically practicing US members of the AAP, and so cannot be generalized beyond that group. Although the effect of specific non-response bias is unknown, the response rate is comparable to other national surveys of doctors, and a recent analysis of 50 periodic surveys and other similar surveys of AAP members suggests that such bias is minimal.¹⁹

In each category, reported counseling increased between 1994 and 2000. The increase in reported counseling may be an underestimate, as the sample in 1994 included only those who reported that they provide any injury prevention counseling, whereas the 2000 sample included all those who provide direct patient care. As a result of this change in the 2000 sample, it is probable that the counseling increases shown in the data are conservative.

The 2000 sample had a lower proportion of residents than that in 1994. We believe that the effects of this sampling bias are amply controlled by the inclusion of age (residents are younger), sex (more residents are women) and urbanicity (more residents are in urban areas) in the multivariate analyses. However, the generalizability of the reported results specifically to residents must be done with caution.

The composition of the US pediatric work force continues to change—for example, with a higher proportion of women in recent years. Each survey wave is a snapshot of pediatric opinion at that point of time. Our multivariate analyses specifically controlled for the effects of changes in important parameters, including sex, age, practice location and region, and the bivariate analyses indicate that counseling increases occurred across all categories of pediatricians.

Key points

- The American Academy of Pediatrics (AAP) promotes strong policies to remove firearms from children's environments.
- National surveys of pediatricians suggest continued support and adoption of AAP policy promoting gun injury prevention.
- Pediatricians are counseling patients at rising rates, but seek assistance through training and support.

Implications for prevention

In the USA

Gun violence continues to affect Americans, including pediatricians and their patients' families and communities. Violent crimes in the US involving children are down substantially, but problems clearly remain—in 2003, an average of eight youths aged under 20 years were killed a day by firearms.⁵ Gun safety measures need to be reinforced with each new generation of parents. Research shows that children continue to have access to firearms,²⁰ and access to loaded and unlocked guns has been shown to increase the risk of youth suicide and unintentional firearm injuries.²¹ To date, the evidence of the effectiveness of education in clinical settings to decrease access to guns and promote safe storage is inconclusive;²² new research to determine what prompts gun ownership decisions and gun storage behaviors is needed. But it remains clear that ongoing education of parents and policy makers regarding the means to reduce the risk that guns pose is needed.

Integration of gun injury prevention into medical practice is one promising way to assure that this will happen. The findings presented here suggest that this integration is occurring and that it can be further fostered. On the basis of these results, other specialties can expect a slow and sustained adoption of policy-recommended behaviors and attitudes related to gun injury prevention.

Internationally

These data document the evolving consensus about firearm injury prevention practice and policy among US pediatricians. A similar gradual change toward consensus should be anticipated in related pediatrician—and likely other physician—practices and attitudes in other countries. The influence of personal clinician characteristics and experience with gun injuries on practices and attitudes may also operate elsewhere, and should be assumed unless local data show otherwise. Comparisons of physician practices and attitudes, and trends in these, across nations will be helpful in guiding firearm injury prevention work by health sectors internationally.

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Authors' affiliations

L M Olson, Department of Research, American Academy of Pediatrics, Illinois, USA

K K Christoffel, Department of Pediatrics, Children's Memorial Hospital and Feinberg School of Medicine, Northwestern University, Illinois, USA

K G O'Connor, Department of Research, American Academy of Pediatrics, Illinois, USA

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