INJURY CLASSIC

Handguns as a pediatric problem

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This is the latest paper in a series of Injury Classics. Our goal is to reprint one or two such papers in each issue to introduce newcomers to these old, often quoted, and important contributions. As many are difficult to find, it should help all of us to have a copy at hand. Your suggestions about future articles are welcome. Write to the editor with details of your favourite, most quoted paper.

Handgun injury is a major cause of morbidity and mortality in American society, particularly among young people. Large numbers of children are affected by handgun violence through the loss of fathers, brothers, and other relatives. Young children are injured, and occasionally killed, in handgun “accidents”. Some young children and many adolescents are murdered with handguns. Like infant mortality, handgun violence in the United States is a medical as well as a social problem. Because of the great lethality of handguns and their very limited ability to provide personal protection, handgun injury can best be reduced by making handguns less available. Handgun control cannot reduce rates of crime or interpersonal assault, but it can reduce the frequency and severity of injury arising from these situations toward the much lower levels found in other countries. The involvement of children in the United States handgun injury epidemic warrants effective pediatrician involvement in efforts toward handgun control.

Introduction

The first handgun victim in Chicago in 1985 was a 13 year old boy who was killed by a stray bullet from a gun fired in celebration of the New Year’s arrival. The same week, an 8 year old Chicago boy killed a 6 year old with a handgun he thought was a toy. A few weeks later, a Chicago child was shot to death on the same street corner on which his grandfather had met a similar fate several years earlier. In July, a 5 year old child sustained irreversible spinal cord injury when playing with a family member’s gun. These and numerous similar incidents make it clear that handguns affect and endanger children as well as adults. However, the risk to children is seldom mentioned in debates about handguns, which may explain why pediatricians as a group have not yet confronted handgun control as an issue of direct professional concern. We will review the ample evidence that guns, particularly handguns, do affect the environment of children in the United States—and the children themselves—in a most detrimental way. We will go on to argue that children and adults in the United States face an epidemic of handgun violence, an epidemic that must be countered with strong preventive measures. Pediatricians, it will be argued, should play a role in advocating such preventive measures.

Handgun death and injury in the United States

The role of handguns in American life is virtually unparalleled in other countries.^{1 2(p397)} One week in a large city in the United States can produce more handgun trauma victims than other countries will witness in a year. Firearms rank as the second leading cause of fatal injuries in the United States, while there are relatively few such deaths in other countries.^{2(p397)} The comparison is stark: over 10 000 handgun homicides in the United States compared to 52 or fewer in other developed countries. In some portions of the United States population, particularly young black men, handgun death rates match or exceed those for motor vehicle injury, the overall leading cause of death among the young.^{3(pp85–6)}

After a steady decline from the 1930s to the 1960s, the last two decades have witnessed a striking rise in gun related homicides. Baker *et al*^{3(pp90–1)} note that “between 1960 and 1980 the death rate from firearm homicide increased by 160% (from 2.6 to 6.8), while all other homicides increased by only 85% (from 2.0 to 3.7)”. The most rapid rate of increase has been in the 5 to 9 year age group.^{3(pp90–1)}

In 1982, close to 33 000 deaths annually in the United States resulted from firearm injuries: homicides, 13 841; legal intervention, 276; suicide, 16 575; unintentional infliction (accidents) 1756; and undetermined, 540.⁴ Since these gun deaths disproportionately involve young people, they constitute a major cause of lost years of potential life.^{3(pp83,130)} In addition, according to the “best available national estimate” there were 155 000 non-fatal firearm injuries in 1972.^{3(p129)} There are no exact figures on the percentage of all fatal and non-fatal injuries attributable to handguns, as opposed to long guns. However, FBI statistics indicate that 80% of all firearm homicides involve handguns.^{3(p133)} Similar data are not available for suicides and accidental injuries, but there is good evidence that recent increases in suicide rates have been largely due to handguns.^{5 6} “Although they are believed to constitute only one fourth of all firearms in the United States, handguns account for three fourths of firearm homicides as well as the bulk of other deaths caused by firearms.”⁷

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Table 1 Six leading causes of death, children and youths, 1981, by age^a

Cause of death	<1 year		1-4 years		5-14 years		15-24 years	
	Rank	Rate ^b	Rank	Rate	Rank	Rate	Rank	Rate
Certain conditions originating in the perinatal period	1	599.7	—	—	—	—	—	—
Accidents and adverse effects	3	27.3	1	23.6	1	14.2	1	56.0
Congenital abnormalities	2	248.5	2	7.6	3	1.6	6	1.4
Malignant neoplasms			3	4.9	2	4.1	4	5.7
Diseases of the heart	5	21.3	5	2.5	5	0.9	5	2.6
Homicide, legal intervention	6	6.1	4	2.6	4	1.3	2	14.7
Suicide					6	0.5	3	12.3
Pneumonia and influenza	4	22.6	6	1.8	6	0.5		
All causes		1207.3		60.2		29.4		107.1

^a Source: National Center for Health Statistics. Monthly vital statistics report, vol 33, June 22, 1984.^b Rate per 100 000 population.

Handguns and pediatrics

GUN ORPHANS

With 33 000 firearm deaths each year in the United States, a large and growing number of American children are forced to confront the loss of a gun-injured parent or other loved one. Added to this are the parents and others temporarily or permanently damaged by gun injuries. The impact of such trauma on children and their families has become familiar to many pediatricians. The epidemiologic and developmental features of this most widespread pediatric aspect of handgun violence remain completely unexplored.

DATA DEFICITS

The devastation caused by handguns among children and adolescents occasionally receives media attention, for example, when a high school basketball superstar was murdered in Chicago in late 1984. However, systematic and sustained attention to the problem is notably lacking. For example, in an effort to bring together available data on childhood handgun deaths and injuries for this article, calls were made to the Consumer Product Safety Commission, National Safety Council, the National Coalition to Ban Handguns, Handgun Control, Inc, Illinois Citizens for Handgun Control, the National Center for Health Statistics (NCHS), and the Illinois Criminal Justice Information Authority. None of these agencies had analysed data concerning childhood handgun injuries, and only two had data available for independent analysis. The NCHS data are based on death certificates, which do not distinguish the type of firearm involved in the deaths.^{3(pp113-35)} Those data indicate that unintentional firearm injuries decreased in the period from 1968 to 1979, while suicide and homicide firearm deaths increased markedly, particularly for children and adolescents.^{3(pp135-6)}

Table 2 Firearm murders of Illinois children, 1973-83^a

Age	Handgun	Long-gun ^b	Unspecified	Ratio handgun:other ^c
<5 years	18	5	2	2.6
5-9 years	18	2	1	6.0
10-14 years	66	17	3	3.3
15-19 years	860	125	30	5.6
Unknown	22	3	7	2.2
Total	984	152	43	5.1

^a Illinois Victim-Level Murder File. Derived from Supplementary Homicide Reports of the Uniform Crime Reports (LS Miller, November 13, December 7, 1984. Illinois Criminal Justice Information Authority [personal communication]).^b Shotguns and rifles.^c Death by handgun ÷ long gun + unspecified categories.

Data from the Illinois Criminal Justice Information Authority are presented below. The available data document a serious problem, but they provide too few details for thorough analysis.

Both the unavailability of data concerning the involvement of children in the gun epidemic, and the lack of necessary detail in the available data, reflect the lack of child oriented (pediatric and other) attention to injuries involving guns.

VERY YOUNG GUN INJURY VICTIMS

When young children are the direct victims of handgun violence, it is occasionally deliberate. A recent study in Cleveland documented that 15% of homicides among children 0 to 4 years old were due to firearms.⁸ Gun injuries to young children are more often unintentional. In some instances the child is caught in the crossfire of an adult argument or robbery; more often, a child gets hold of a gun that has been acquired by a family member as protection from assault, and plays with it, unaware of the fact that it is real and loaded.^{9 10} Since the purpose of buying the gun is poorly served if it is under lock and key, the tendency is to keep it readily accessible to deal with emergencies. This makes the gun the epitome of an inherently and unreasonably dangerous attractive nuisance for children in the United States, raised as they are with toy guns that are strikingly realistic in appearance.^{1 11}

OLDER CHILDREN

Among older children and young adults, a growing number of gun related deaths result from the intentional use of guns. As table 1 indicates, homicide is now a leading cause of death in childhood, adolescence, and early adult life. Firearms are the leading means of homicides from early adolescence.^{3(pp81-82)12} In the Cleveland study, 57% of homicides of children five to 14 years old were due to firearms.⁸

Table 2 and fig 1 show the age and firearm-type distribution of the 1179 firearm homicides of persons under 20 years of age in Illinois from 1973 to 1983. The overwhelming majority of the homicides were due to handguns. Eighty seven per cent of the handgun deaths occurred in the 15 to 19 year age group; the age distribution for the long-gun deaths is comparable. As fig 1 shows, the rise in handgun deaths actually began at age 12, suggesting that access to handguns or involvement in social

Figure 1 Handgun homicides in Illinois from 1973 to 1983.

Table 3 Handgun homicides of Illinois children, 1973–83^a

Age	Male		Female	
	No	% Non-white ^b	No	% Non-white ^b
<5 years	11	45	7	57
5–9 years	9	67	9	33
10–14 years	47	66	19	74
15–19 years	734	64	126	61
Total ^c	820	64	164	61

^a Illinois Victim-Level Murder File. Louise Miller, Illinois Criminal Justice Information Authority. November 29, 1984 (personal communication).

^b In Chicago only, white Latins included with white; outside of Chicago, all Latins included with non-white.

^c Includes age unknown.

situations involving handguns occurred very early in adolescence.

Table 3 shows that non-white males were particularly affected by homicidal gun violence. The perpetrators and circumstances of the child gun homicides are shown in table 4. It is apparent that the classifications used to tabulate these deaths are designed for adult victims, with the result that many cases appear in the unilluminating category of “other” for both perpetrator and circumstances. Further study is clearly needed regarding adolescent handgun homicide deaths and the circumstances that promote them.

Table 4 Handgun homicides of Illinois children,^a 1973–83, with regard to perpetrator and circumstances, by age

	<5 years		5–9 years		10–14 years		15–19 years		All ^b	
	No	%	No	%	No	%	No	%	No	%
Perpetrator ^c										
Stranger	2	15	2	18	12	32	134	27	152	27
Friend	—	—	1	9	7	19	79	16	89	16
Parent	7	54	4	36	2	5	7	1	20	4
Other family	2	15	2	18	4	11	23	5	31	6
Other	2	15	2	18	12	32	245	50	264	47
All	13	99	11	99	37	99	488	99	556	100
Circumstances										
Parent-child	1	8	—	—	—	—	5	1	6	1
Robbery, burglary, suspect felony, other felony	0	—	4	31	6	10	118	15	130	14
Drug offence or gangs	1	8	1	8	13	22	133	17	148	16
Other ^d	10	83	8	62	40	68	550	68	617	68
All	12	99	13	101	59	100	806	101	901	99

^a Illinois Victim-Level Murder File. Derived from Supplementary Homicide Reports of the Uniform Crime Reports. L S Miller, November 28, 1984, Illinois Criminal Justice Information Authority (personal communication).

^b Includes age unknown.

^c Missing observations: perpetrator, 428; circumstances, 83.

^d Other: spouse-spouse, other family, gambling offence, lovers' triangle, money argument, other arguments, alcohol brawl, drug brawl, sniper attack, other non-felony, unknown.

Guns are a major factor not only in adolescent homicide, but in adolescent suicide as well. Suicide rates in adolescence have increased over the last 50 years, with disproportionate increases in firearm suicides, such that handguns now account for approximately two thirds of adolescent suicides.¹³ Indeed, most of the recent increase in suicide rates among young people is attributable to firearms, mostly handguns.¹⁴ The much higher rate of use of firearms among suicide deaths is due to the great “effectiveness” of handguns, which—unlike other means—do not allow opportunity for rescue or reconsideration.

Several factors may contribute to the use of guns by older children. Television and movies acclimate viewers to high levels of violence by portraying the world as threatening, and depicting guns as solutions to interpersonal and societal problems.^{2(p399)15} By presenting an implausible number of people surviving gunshot trauma with trivial results, the entertainment media minimize the dangers of gunplay and desensitize children (and adults) to the enormity of each death and injury. Thus, while children learn early that lions are dangerous and must be caged in zoos, the media provide no such message about the family handgun, often kept in an unlocked drawer at the bedside.

How can children be protected?

Substantial variations in rates of handgun violence among countries¹ and within the United States^{3(pp75,89,134)7} suggest that handgun injury can be reduced. Compared to the 10 728 verified handgun homicides in the United States in 1979, there were 52 or fewer deaths during the same year in Canada, Great Britain, Japan, Sweden, Switzerland, and West Germany.^{16(p17)} The proportion of the population owning guns in different regions of the United States generally parallels the percentage of homicides involving firearms.^{3(p86)7 17} Similar correlations appear to exist between levels of handgun ownership and suicide rates.^{3(p76)}

Since firearm injury reflects handgun availability, it is reasonable to expect that all hand-

Table 5 Approaches to prevention of handgun injuries

Principle	Applicability to handguns	Possible countermeasures
Prevent the marshalling of potentially injurious agents	Kinetic energy is imparted to bullet	Do not manufacture or import guns, ammunition
Reduce their amounts	Large amount of energy involved	Reduce muzzle velocity; make bullets that deform on impact with skin
Prevent inappropriate release of the agent	Fired in passion, by children	Safety catches, ban in homes
Modify the release of the agent	Multiple bullets in many guns	Limit to single bullet
Separate in time or space	Handy always	Restrict to firing ranges
Separate with physical barriers	Bullet penetrates body	Same as above; bulletproof garments
Modify surfaces and basic structures	Bullet penetrates body	Same as above; bulletproof garments
Increase resistance to injury	Not applicable	Not applicable
Provide emergency response	Rapid fatalities	Improve emergency medical team response
Provide medical care and rehabilitation	Permanent damage	Regionalised trauma care and rehabilitation

gun injuries can be reduced by restricting availability via handgun control.

Handguns are hazardous because they rapidly transmit deadly force. This hazard is enhanced by the fact that they are easily obtained, concealed, and used. As for all injuries, the two available injury control approaches include environmental modification (mandated changes in gun availability, structure, or use) and education (to promote changes in gun use behaviours). Until recently; emphasis has been on education. As Waller^{2(pp399,487)} noted:

Registration of handguns is vehemently opposed by the National Rifle Association, which instead promotes gun safety programs predominantly aimed at hunters, although even in rural areas only a minority of the shooting involve [sic] hunting. . . . Education of parents is recommended by some groups as the best approach to firearm safety in the United States. To date, however, there is little or no evidence that this approach has been of any value.

Recognized principles of injury control can guide efforts to impede the transfer of deadly force by handguns. The application of Haddon's^{18 19} 10 generic prevention approaches to handguns is displayed in table 5. Most current approaches to handgun violence have focused on strategies for effective emergency response and for effective medical care and rehabilitation, measures which minimize but do not prevent injury. Promising legislative approaches to prevention that are particularly likely to protect children include: removing handguns from the home environment (separation of guns and potential victims); restricting the possession of guns and ammunition (preventing the marshalling of potentially injurious agents or reducing their amounts); prohibiting the manufacture of ammunition (preventing the marshalling of potentially injurious agents); prohibiting the sale of any gun that can fire more than once without reloading (modifying the release of the agent); restricting muzzle velocity; improving trigger locks; and restricting the sale of ammunition to plastic bullets (modifying basic structures). Maximal success of these approaches would depend on

active enforcement and on evolving changes in social norms (for example, over time, keeping a gun in a household with children should be seen as obviously reckless).

Firearm regulation can be applied at a number of different points in time: (1) the time of manufacture or importation, (2) the time of sale or transfer, (3) the period of possession, and (4) the time of use of the gun.⁷

A variety of specific handgun control proposals have been made, including restrictive and permissive licensing; requiring a license or permit to purchase, carry, or possess a handgun; total or partial registration; notice of transfer; waiting periods; stricter licensing of dealers; certification of proficiency; mandatory sentencing for illegally carrying a handgun; and a ban on the manufacture, sale, and importation of handguns or handgun parts. The more restrictive the proposal, the more likely it is to reduce handgun violence.^{16(pp31-4)}

Obstacles to handgun injury control

Just as identifiable sources of contagion and specific host factors support epidemics of infection, identifiable factors promote the epidemic of handgun violence in the United States. One such factor is the set of cultural myths which surround the role of the handgun in American history. While recent research has contradicted the notion that the American West was settled by men who were fast on the trigger,^{15 20} this image is deeply entrenched in the minds of many Americans and reinforced by movies and television.

However, even more critical to fostering gun use is ease of access to handguns, as summarized in table 6. In most communities, there are few impediments to the free purchase and ownership of these deadly weapons.

An obstacle to progress in controlling handguns is the fact that much of the public debate concerning handguns has dwelled on inaccurate claims and assertions about handguns, especially as regards the protection afforded by handguns and the constitutional "right" to possess handguns (see discussion below). This is in sharp contrast to the public debates concerning child restraints or childproof drug packages, but it is similar to the intermittent debate over fluoridation of municipal water supplies.²¹ Two fallacies are particularly important to the pro-gun position put forward by gun manufacturers, the National Rifle Association, and other promoters of gun use: (1) that handgun ownership protects the gun owner and his/her family, and (2) that guns are no more dan-

Table 6 Relationship between access to handguns and violent death

Evidence	References
Regional handgun ownership prevalence parallels proportion of suicides involving handguns	3
Regional handgun ownership prevalence parallels proportion of homicides involving firearms	3, 7, 17
Handguns are more efficient deadly weapons than the usual alternatives, fists and knives	4, 22-24

gerous than other weapons. In fact, guns are six times more likely to kill or injure a member of the owner's household than they are to be successfully used in protecting that household.²² In addition, guns are such efficient means of mobilizing and transferring destructive force that each gun assault is at least five times more likely to result in death than an assault with the next most deadly weapon, a knife.²²⁻²⁴

The problem of handgun injury is apparent to the American people, among whom there is strong sentiment for curbing handgun availability. Public opinion polls have consistently shown that the majority of Americans favour some degree of handgun control and regulation.^{16(pp14-16)} However, the pro-gun lobby has, until recently, succeeded in blocking most gun control measures.¹⁵ In recent months and years, a growing number of localities around the country have responded to citizen concern and alarming statistics by adopting gun control ordinances. In November 1985, a solid majority of voters in Oak Park, Illinois supported continuation of that community's ban on the private possession of handguns.

Because local gun ordinances vary dramatically from one another, however, the result of the recent wave of control measures is a legal patchwork of controls with contradictory rules in contiguous areas. A coordinated national gun control policy is probably necessary for effective reduction of handgun mortality and morbidity rates, but current laws are neither strong nor coordinated.^{16 25}

Overcoming the obstacles: a role for pediatricians

The success or failure of current efforts to restrict handgun use will have a significant effect on children, who currently face a future in which handguns are commonplace. Physicians need to be involved in efforts to understand the causes of handgun deaths and the ways to reduce their number. Almost a decade ago Browning²⁶ pointed out that:

It is because of the direct parallel between previously defined public health problems and the emphasis on prevention that it is now compellingly clear that we need to redefine our approach to handgun violence and its consequences as one of our major public health problems. As such, it is a matter of appropriate concern to physicians and organized medicine and one in which they should have a major interest.

A useful model for the role that pediatricians could play in seeking to reduce handgun violence is their role in reducing motor vehicle crash injury. This has included education (both directly, by discussing the importance of restraint systems with parents, and indirectly, by conveying the same message to the public at large), advocacy (developing support for and testifying on behalf of child restraint legislation), and support (providing expertise and pressure to assure that education and legislation can and will be translated into the desired protective actions).

Similar activities are called for in tackling the handgun problem. The American Academy of

Pediatrics has begun this work by adopting a strong statement supporting handgun control.²⁷ Pediatricians must become informed spokespersons concerning the issues involved in the handgun debate. Educating parents regarding the dangers of handguns serves a dual purpose: it eliminates that particular danger in some homes, and it fosters support for legislative approaches to this health problem. In this and other ways, pediatricians and other physicians are most likely to affect local gun control efforts, which can establish the precedent and momentum needed to achieve the needed uniform state and nationwide controls. The most fruitful approaches in any particular area will depend on local conditions, including existing legislation and extent of popular support. To date, the most far reaching local approaches have been handgun bans in Morton Grove, Evanston, and Oak Park, Illinois. Handgun control groups, which exist throughout the United States, can use physician expertise and can help to orchestrate legislative efforts.

As with child restraint legislation, a major aspect of advocacy must be dealing with arguments against the legislation. For handguns, the predominant counterargument involves physical insecurity. For poorer communities in particular, this is partially the result of inadequate police protection. Physicians must emphasize the fact that, wishes to the contrary notwithstanding, handguns in fact reduce the security of home and neighborhood; physical insecurity must be dealt with in more rational and effective ways. Another frequent counterargument to handgun control is the assertion that the Second Amendment to the United States Constitution (providing that "A well regulated militia being necessary to the security of a free state, the right of the people to keep and bear arms shall not be infringed") prohibits restrictions on the possession of firearms. In fact, there is a well established history of United States Supreme Court decisions rejecting that position in favour of the view that the Second Amendment protects a collective, not a personal, right to bear arms.²⁸

Summary

Handgun injury is a major cause of morbidity and mortality in American society, particularly for young people. Large numbers of children are affected by handgun violence through the loss of fathers, brothers, and other relatives. Young children are injured and sometimes killed in handgun accidents. Some children and many adolescents are murdered with handguns. Because of their great lethality and very limited ability to provide personal protection, the great burden of handgun injury can best be reduced by making handguns less available.

Handgun control cannot reduce rates of crime or interpersonal assault, but it can be expected to reduce the frequency and severity of injury which grows out of these situations, to levels closer to the much lower ones found in other countries. Pediatricians can contribute to this effort, as they have to the efforts to reduce

the morbidity and mortality from poisonings and motor vehicle passenger injury.

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Children “safer to avoid road crossings” says editor of well known safety journal!

Professor Barry Pless, whose name can be found on front cover of this journal, seemed to suggest that children should not use pedestrian crossings, when speaking to reporters at the conference associated with the launch of the supplement that accompanied this journal in December 1998. His remarks, reported in London's *Evening Standard*, did not find favour with road safety expert David Rogers of the Royal Society for the Prevention of Accidents (RoSPA). Could this be a matter of not believing everything you read in newspapers or were our editor's remarks misunderstood? Over to you, Barry.

Editors note: Bad reporting or misunderstanding? Both! What I tried to say was that children should not assume road crossings were safe. I said that they must make eye contact with drivers, no matter where they cross, because motorists cannot be counted on to always stop, look, and respect child pedestrian rights.

Skaters halt Paris traffic

Hot blooded young Britons are racing to Paris for the weekend, not for candle lit dinners and romantic strolls but to join thousands of French roller skaters hurtling at full pelt through the city (reported *The Times* in January). It seems that some 7000 people gather in the Place d'Italie each weekend and then speed for two hours and 17 miles, halting traffic. The event has gained an international following with skaters from across Europe.

Ski injury costs soar

It can cost your or your insurer from £2500 to £25 500 if you break your leg while skiing. Perhaps surprisingly, the most expensive country is not the US but Switzerland. These are the findings of a study by British travel insurer, Home & Overseas. However, the cost of a five day stay in hospital in the US was almost four times that in most European ski areas (*The Sunday Times* (London), January 1999).