American Academy of Pediatrics
DEDICATED TO THE HEALTH OF ALL CHILDREN™

POLICY STATEMENT

Firearm-Related Injuries Affecting the Pediatric Population

The absence of guns from children's homes and communities is the most reliable and effective measure to prevent firearm-related injuries in children and adolescents. Adolescent suicide risk is strongly associated with firearm availability. Safe gun storage (guns unloaded and locked, ammunition locked separately) reduces children's risk of injury. Physician counseling of parents about firearm safety appears to be effective, but firearm safety education programs directed at children are ineffective. The American Academy of Pediatrics continues to support a number of specific measures to reduce the destructive effects of guns in the lives of children and adolescents, including the regulation of the manufacture, sale, purchase, ownership, and use of firearms; a ban on semiautomatic assault weapons; and the strongest possible regulations of handguns for civilian use.

SCOPE OF THE PROBLEM

Although rates have declined since the American Academy of Pediatrics (AAP) issued the original policy statement in 1992, firearm-related deaths continue as 1 of the top 3 causes of death in American youth.[1] As shown in Fig 1, the firearm-associated death rate among youth ages 15 to 19 has fallen from its peak of 27.8 deaths per 100 000 in 1994 to 11.4 per 100 000 in 2009, driven by a decline in firearm homicide rates.[1] No single study has adequately explained the decline in firearm-related homicide rates. Postulated reasons include improved socioeconomic conditions, violence prevention programs, decline in the crack/cocaine market, changes in legislation, declines in firearms availability for other reasons, and community policing. Nevertheless, firearm-associated death and disability rates remain unacceptably high.

Of all injury deaths of individuals 15 through 19 years of age in the United States in 2009, more than 1 (28.7%) in 4 were firearm related, and of those younger than 20 years, nearly 1 (19.5%) in 5 were firearm related.[1] These firearm deaths result from homicide, suicide, and unintentional injury (Fig 2). Black Americans are particularly affected; injuries from firearms were the leading cause of death among black males 15 through 34 years of age in 2009.[2] Although national data cannot fully document urban and rural differences in the patterns of injuries from firearms that involve children, local data indicate that children in rural areas as well as in urban areas are at risk for firearm-related mortality.[3–5]

COUNCIL ON INJURY, VIOLENCE, AND POISON PREVENTION EXECUTIVE COMMITTEE

KEY WORDS
child, adolescent, violence, homicide, suicide, injury, epidemiology, policy

ABBREVIATIONS
AAP—American Academy of Pediatrics
NVDRS—National Violent Death Reporting System

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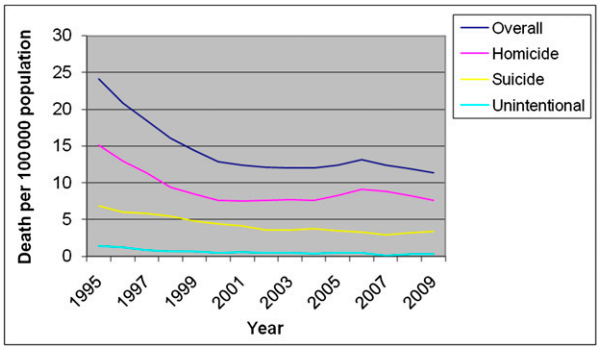

FIGURE 1

Firearm-related death rates per 100 000 people 15 through 19 years of age in the United States, 1995–2009. (Adapted from National Center for Injury Prevention and Control, US Centers for Disease Control and Prevention. Web-Based Injury Statistics Query & Reporting System (WISQARS) Injury Mortality Reports, 1999–2009, for national, regional, and states [May, 2012]. Available at: http://webappa.cdc.gov/sasweb/ncipc/. Accessed June 8, 2012).

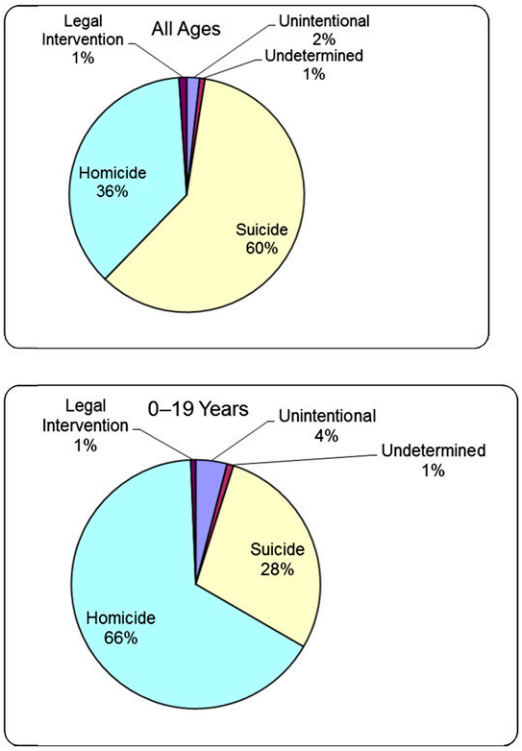

FIGURE 2

Injury intent: US 2009 firearm-related deaths, for all ages (n = 31 593) and in children from birth through 19 years of age (n = 2966). (Adapted from National Center for Injury Prevention and Control, US Centers for Disease Control and Prevention. Web-Based Injury Statistics Query & Reporting System (WISQARS) Injury Mortality Reports, 1999–2009, for national, regional, and states [May, 2012]. Available at: http://webappa.cdc.gov/sasweb/ncipc/. Accessed June 8, 2012).

The National Violent Death Reporting System (NVDRS), administered by the Centers for Disease Control and Prevention, provides detailed surveillance of all violent deaths in participating states. The NVDRS system uses sources of data to allow analysis of each death (homicides, suicides, and others), including the detailed history and circumstances of the fatal incident. Data concerning mental health, substance abuse, race, age group, previous history, method of injury, and relationship of suspect to victim are included. Suspects and multiple victims can be studied together, allowing for comparisons of victim and perpetrator characteristics.[6–8] The NVDRS can provide useful information concerning childhood mortality from firearms; limited raw data from this system are now available online.[1]

INTERNATIONAL COMPARISONS

The United States has the highest rates of firearm-related deaths (including homicide, suicide, and unintentional deaths) among high-income countries.[9] For youth 15 to 24 years of age, firearm homicide rates, as documented by Richardson and Hemenway,[9] were 35.7 times higher than in other countries. For children 5 to 14 years of age, firearm suicide rates were 8 times higher, and death rates from unintentional firearm injuries were 10 times higher in the United States than other high-income countries. The difference in rates may be related to the ease of availability of guns in the United States compared with other high-income countries. This is particularly true for suicides, as guns carry a high case-fatality rate.[10] Suicides among the young are typically impulsive,[11] and easy access to lethal weapons largely determines outcome.

ECONOMIC COSTS OF FIREARM-RELATED INJURY

Corso and colleagues[12] calculated the financial cost to society resulting from gun-related assaults and homicides in 2000. The amount totaled $17.4 billion, including $0.8 billion in direct medical costs and $16.6 billion in lost productivity. In the same year, self-inflicted firearm injuries and suicides cost society $16.4 billion, including

$16.3 billion in lost productivity and $0.1 billion in direct medical costs. The analysis found that average direct medical cost per case for nonfatal firearm assaults and self-inflicted injuries resulting in hospitalization were $24 353 and $7234 respectively.[12] The method for calculating the medical costs includes ambulance transport costs, coroner/medical examiner costs, emergency department costs, hospital readmission costs, and inpatient hospitalization and/or nursing home costs.[12] Work loss costs were calculated by the net present value of future wage earning and losses in household productivity.

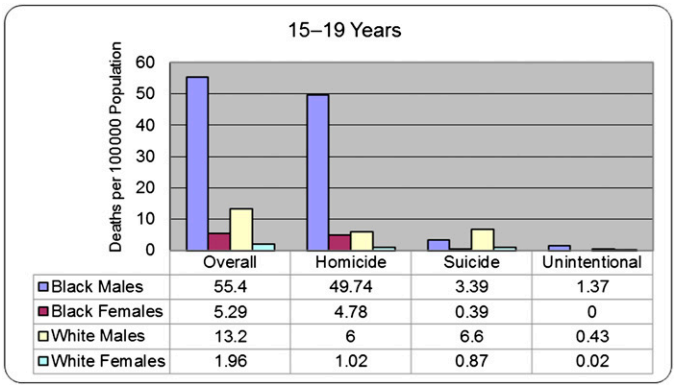

FIGURE 3
Firearm-related death rates per 100 000 black and white people 15 through 19 years of age in the United States, 2009. (Adapted from National Center for Injury Prevention and Control, US Centers for Disease Control and Prevention. Web-Based Injury Statistics Query & Reporting System (WISQARS) Injury Mortality Reports, 1999–2009, for national, regional, and states [May, 2012]. Available at: http://webappa.cdc.gov/sasweb/ncipc/. Accessed June 8, 2012).

HOMICIDE

In 2009, 84.5% of all homicides of people 15 through 19 years of age were firearm-related.[1] Deaths of male individuals outnumber deaths of female individuals (Fig 3). Young black men from 15 through 34 years of age have the highest rates of firearm-related homicide.[1] In 2010 in the United States, 67.5% of all homicides were committed with a firearm, and in 68.5% of those cases, a handgun was used as the murder weapon.[13] Firearm homicide rates were higher in major urban areas than in the nation as a whole (5.2 per 100 000 vs 4.2 per 100 000). Within the 50 largest metropolitan areas, they were highest in the central cities (9.7 per 100 000).[3]

An understanding of the characteristics of firearm-related homicides is important when interventions are being planned. Most homicides occur during interpersonal conflict, typically between relatives, friends, or acquaintances.[13] Recognized risk factors for violence involving children and adolescents include exposure to family violence, history of antisocial behavior, depression, suicidal ideation, drug/alcohol use, poor school performance, bullying, and isolation from peer groups.[14] The occurrence of shootings in schools, although rare, deserves serious study and calls for local and national responses.

SUICIDE

Suicide Risk Among Adolescents and Firearm Availability

In 2009, suicide was the third leading cause of death for American youth 15 to 19 years of age. Firearms remained the most common method used for suicide in this age group, accounting for 736 deaths (3.4 per 100 000).[1] Of all common methods used for attempting suicide, firearms are the most lethal, with approximately a 90% mortality rate.[15] Adolescents are at a relatively high risk of attempting suicide as a consequence of their often impulsive behavior. Choosing a highly lethal method such as a firearm to attempt suicide leads to higher suicide fatality rates overall, in part because most survivors of serious suicide attempts do not die of renewed attempts.[16] Thus, easy access to firearms contributes to an increased risk of suicide among youth this age. Although handguns are used in most youth firearm suicides, long guns (shotguns and rifles) are also used in a large percentage of suicides in rural areas, where they are more widely available.[17,18] Strong evidence suggests that the presence of firearms in the home increases the risk of suicide among adolescents. A review of existing data from case-control studies and ecological data found that firearm availability plays a large role in increasing the risk of youth suicide.[19] Several individual-level and ecologic studies, including nationally representative studies, have corroborated these earlier findings.[20–24] The association of a gun in the home and increased risk of suicide among adolescents has been well documented. From a clinical perspective, it is important to note that this association is significant even in those teens without a previous psychiatric diagnosis.[25,26] The odds of suicide are particularly high if the gun is kept loaded.[25,26]

Data concerning the effects of laws restricting firearm ownership show varying results.[27–29] Interestingly, laws reducing child access, which primarily requires safe storage, appear to be associated with lower overall adolescent suicide rates, whereas purchase restrictions did not result in this reduction.[29] Other studies have

established the finding that safe storage of firearms reduces the risk of adolescent suicide.[30]

UNINTENTIONAL FIREARM-RELATED DEATHS

In 2009, 114 children and adolescents younger than 20 years died as a result of unintentional firearm-related injuries.[1] Perhaps surprisingly, 66 of these 114 unintentional deaths occurred in the 15- to 19-year age group. Fatal shootings are usually inflicted by other children or youth, typically friends or siblings.[31,32] There are few recent systemically collected data concerning the precise circumstances of unintentional firearm injury deaths among these 114 children.

NONFATAL FIREARM-RELATED INJURIES

According to data from emergency departments in the 66 hospitals in the National Electronic Injury Surveillance System All-Injury Program, an estimated 73 505 people of all ages were treated for nonfatal firearm-related injuries in US hospital emergency departments in 2010, among them 15 576 children and adolescents younger than 20 years.[1] Of those, 6236 (40%) required hospitalization for their injuries. Adolescents 15 to 19 years of age had nonfatal firearm injury rates nearly 3 times that of the general population (62.9 vs 23.9 per 100 000).[1] Most (79%) of the nonfatal injuries to adolescents were attributable to assault, and assault-related injuries were responsible for 84.5% of hospitalizations.[1]

ADOLESCENT CHARACTERISTICS AND ACCESS TO GUNS

The 2011 *National Youth Risk Behavior Surveillance* reported that 5.1% of students in grades 9 through 12 had carried guns during the past month, with boys more likely to report carrying guns than girls (8.6% vs 1.4%).[33] Well-established behavioral risk factors for carrying guns include gang membership, use of alcohol and other drugs, victimization by violence, and perpetration of violence.[34–36] As with other risk behaviors, adolescents substantially overestimate the percentage of their peers who carry guns, and interestingly, gun carrying is highly associated with that normative perception.[35] Adolescence is marked by a search for identity, independence, and autonomy. Accompanying characteristics may be curiosity, the strong influence of the peer group, rites of passage, belief in invincibility, impulsiveness, immaturity, mood swings, and substance abuse. The perception of danger by adolescents may be influenced by many factors, including the media, as well as the reality of their own lives. A view of the world as a dangerous place during this particularly vulnerable developmental period may lead to conflict, injury, and death, especially when access to guns is easy.

GUNS AND GUN OWNERSHIP

It is estimated that 57 million Americans owned 283 million firearms in 2004, representing 38% of all households and 26% of all adults having or owning at least 1 gun. Of these, 60% were long guns and the remaining 40% were handguns.[37] Of the handguns, 50% were revolvers, 35% were semiautomatic pistols, and 15% were other types.[37] More recently, there has been a troubling increase in serious and disabling injuries resulting from high-velocity nonpowder guns.[38]

Prevalence of gun ownership by household varies significantly geographically, with an estimated low of 5.2% in the District of Columbia to 62.8% of all households in Wyoming.[39] In a study of gun-owning Americans with children under 18 years of age, 21.7% stored a gun loaded, 31.5% stored a gun unlocked, and 8.3% stored at least 1 gun unlocked and loaded.[40] Household firearm owners with adolescents 13 through 17 years of age report leaving their firearms unlocked 41.7% of the time, compared with only 28.8% of household firearm owners with children 0 through 12 years of age.[40]

Most gun owners report the leading motivation for ownership is recreational; however, nearly three-quarters of handgun owners said self-protection was the primary reason for owning a gun.[41] Research in several US urban areas indicates that a gun stored in the home is associated with a threefold increase in the risk of homicide and a fivefold increase in the risk of suicide.[42–44] Evidence from Philadelphia suggests that firearm possession increases the risk of being shot in an assault. In a carefully conducted case-control study, Branas and colleagues found that people possessing a gun were more than 4 times more likely to be shot in an assault than those not in possession of a firearm.[45]

LEGAL ISSUES

A 2008 Supreme Court decision struck down the handgun ban in the District of Columbia, concluding that the second amendment to the US Constitution establishes individual rights to gun ownership.[46] In the subsequent 2010 Supreme Court case of *McDonald v the City of Chicago*, the Court ruled that the 14th Amendment extends the 2nd Amendment protections of the federal government to states and localities against laws that infringe on "the right to keep and bear arms."[47]

Because Chicago was the only locality in the country to possess an outright handgun ban, the *McDonald* ruling did not have an immediate effect on state and local gun laws outside the Chicago area. The ruling set the stage

for Second Amendment legal challenges to local and state gun laws, however, including laws requiring the safe storage of firearms and trigger locks, as well as laws aimed at protecting children from firearms. There have been and will likely continue to be a number of state and local legal challenges to restrictions on firearm acquisition and use in the United States. These include challenges to measures specifically pertaining to access to firearms by children. Pediatricians should, nonetheless, continue to provide anticipatory guidance to children and their families regarding keeping children safe from injury, including restriction of access to guns.

IMPLICATIONS OF DATA FOR PREVENTION STRATEGIES

The following summary of data suggests a number of intervention strategies:

- Firearm-related injuries are often fatal; primary prevention is essential.
- Suicide fatality rates increase if guns are present in the home.
- Access to guns increases the number of conflict-related deaths and injuries.
- Access to guns and unsafe storage practices creates risk of serious unintentional injury and death.
- Most firearm-related injuries and deaths of children and adolescents involve a handgun, but long guns are involved a large number of unintentional injuries and suicides, especially in rural areas.

Preventing Firearm Injuries in Children

A number of design options have been proposed to decrease the likelihood of unintentional injury by a firearm, as well as limiting access by unauthorized users. These include trigger locks, lock boxes, personalized safety mechanisms, and trigger pressures that are too high for young children.[48] A multisite study found that keeping a gun locked and keeping a gun unloaded have protective effects of 73% and 70%, respectively, with regard to risk of both unintentional injury and suicide for children and teenagers. These findings were consistent for both handguns and long guns (rifles and shotguns).[30]

Gun avoidance programs are designed to educate children as a way of reducing firearm injury (eg, Eddie Eagle, STAR); however, several evaluation studies have demonstrated that such programs do not prevent risk behaviors[49–51] and may even increase gun handling among children.[45] In contrast, results of a large national randomized controlled trial demonstrated that brief physician counseling directed at parents, combined with distribution of gunlocks, may be effective in promoting safer storage of guns in homes with children.[52] A recent randomized controlled trial found that a safe storage campaign with gun safe distribution was both feasible and effective at limiting household exposure to unlocked and loaded guns.[53]

A number of factors may be important in reducing exposure to violence and the results of that exposure in children and adolescents. Some curricula targeting younger children and those at low risk of violence have been evaluated and have shown positive results.[54] Resiliency-based violence-prevention strategies in preschool children have shown improvement in teacher interactional skills supporting children's resiliency and improvement in children's prosocial behaviors.[55] Other studies have shown that both family support and early childhood education result in reductions in delinquency[56]; however, one study has shown that, for seventh-grade children exposed to high levels of violence as victims or witnesses, a conflict-resolution class produced more anxiety, depression, and aggression.[57] School curricula aimed at reducing violence should be specific to the population and include evaluation components to determine their effectiveness.[58]

The AAP statement on youth violence prevention suggests many ways in which pediatricians and communities can respond to violence.[59] This policy endorses use of the *Connected Kids: Safe, Strong, Secure* violence-prevention program. This program provides counseling suggestions concerning a number of violence-related topics and parent information brochures specifically related to reducing unintentional injuries to young children and suicide risk among adolescents. The *Connected Kids* program was developed on the basis of expert opinion and focus groups of parents around the United States.[60–62] The clinical guide and parent information material provides parents with factual information from which they can make their own decisions. For parents of young children, handgun storage is placed in the context of preventing child access to other dangerous household products. Parents of adolescents have counseling and written materials that describe the relationship between the availability of lethal weapons and fatal teen suicide attempts. These concepts have been incorporated in the new *Bright Futures* toolkit, and pediatricians will find items concerning gun safety incorporated into relevant previsit questionnaires.[63] The AAP also advocates for reduction of television viewing by children, because media exposure results in increases in childhood and youth violence. In particular, media tends to romanticize the

use of firearms as a means of resolving conflicts. The AAP policy statement on media violence provides specific background information and recommendations for pediatricians.[64]

Pediatricians can benefit from knowing local community resources that assist with guidance when patients and families are at high risk of firearm-related injury. Pediatricians may partner with other community members and community-based organizations to identify and publicize these resources.

SUMMARY AND RECOMMENDATIONS

Firearm-related injury to children is associated with death and severe morbidity and is a significant public health problem. Child health care professionals can and should provide effective leadership in efforts to prevent gun violence, injury, and death. The AAP recognizes the importance of a variety of countermeasures (educational, environmental, engineering, enactment, enforcement, economic incentives, and evaluation) to dramatically curb the number of firearm-related injuries to children. The AAP makes the following recommendations, which reaffirm and expand on the 1992 and 2000 policy statements[65,66]:

1. The AAP affirms that the most effective measure to prevent suicide, homicide, and unintentional firearm-related injuries to children and adolescents is the absence of guns from homes and communities. Although the US Supreme Court ruling in the case of *McDonald v City of Chicago* struck down comprehensive local and statewide firearm bans, pediatricians should continue to advocate for the strongest possible legislative and regulatory approaches to prevent firearm injuries and deaths.
2. Health information for parents:
   a. Pediatricians and other child health care professionals are urged to counsel parents about the dangers of allowing children and adolescents to have access to guns inside and outside the home. The AAP recommends that pediatricians incorporate questions about the presence and availability of firearms into their patient history taking and urge parents who possess guns to prevent access to these guns by children. Safer storage of guns reduces injuries, and physician counseling linked with distribution of cable locks appear to increase safer storage. Nevertheless, the safest home for a child or adolescent is one without firearms.
   b. The presence of guns in the home increases the risk of lethal suicidal acts among adolescents. Health care professionals should counsel the parents of all adolescents to remove guns from the home or restrict access to them. This advice should be reiterated and reinforced for patients with mood disorders, substance abuse problems (including alcohol), or a history of suicide attempts.
3. The AAP urges that guns be subject to consumer product regulations regarding child access, safety, and design. In addition, the AAP continues to support law enforcement activities that trace the origins of firearms used in the commission of crimes and that these data be used to enforce regulations aimed at preventing illegal sales to minors.
   a. Evidence supports the effectiveness of regulation that limits child access to firearms.
   b. The AAP supports efforts to reduce the destructive power of handguns and handgun ammunition via regulation of the manufacture and importation of classes of guns. Engineering efforts (eg, personalized safety mechanisms and trigger locks) may be of benefit and need further study. Trigger locks, lock boxes, gun safes, and safe storage legislation are encouraged by the AAP. Other measures aimed at regulating access of guns should include legislative actions, such as mandatory waiting periods, closure of the gun show loophole, mental health restrictions for gun purchases, and background checks.
   c. The AAP recommends restoration of the ban on the sale of assault weapons to the general public.
4. The AAP supports the funding of research related to the prevention of firearm injury, including surveillance through the NVDRS; accurate evaluation of health care–based screening and intervention; and local, regional, and national efforts to identify and disseminate violence prevention resources.
5. The AAP supports the education of physicians and other professionals interested in understanding the effects of firearms and how to reduce the morbidity and mortality associated with their use.

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