

Firearms Injuries and Deaths: A Critical Public Health Issue

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Synopsis

The prevention of firearm deaths and injuries is one of the most complex and controversial issues

facing the public health profession in recent years. Laws have been enacted to control or discourage private gun ownership, and especially to eliminate guns from the hands of criminals, but the laws' effects in reducing crime and firearm-related injuries and deaths have been disappointing. Gunshot wounds are the 12th leading cause of death in the United States and more than half of all suicides are committed with guns. There are virtually no reliable data on the number of nonfatal firearm injuries. One of the most troubling aspects of handgun violence is that children often are the victims.

Educational efforts have been attempted to promote the safer use of firearms, but they have not led to a significant reduction in the number of fatalities, since most firearm incidents are intended to do harm.

“**F**EW HEALTH ISSUES in our recent history have engendered as complex and lasting a controversy as that surrounding the prevention of firearm deaths and injuries. Through individual and collective action, health professionals can become a potent force to control this epidemic of modern times” (1). There is unquestionably a need to treat this public health matter with as much urgency as any dread disease.

Accurate figures are not available, but there are perhaps 180 to 200 million firearms in the United States, of which 55 to 60 million are handguns (2, 3). In the wake of the increasing incidence of gun-related violent crimes and accidental and intentional deaths and injuries, laws have been enacted to control or discourage private gun ownership, especially by criminals.

Gun-control proponents contend that increasing rates of firearm-related homicides and suicides are related to increasing availability of firearms. Nationwide, firearms are involved in 58 percent of all homicides and 57 percent of all suicides. Moreover, high rates of homicides, suicides, and unintentional deaths from firearms correlate with high regional or local rates of gun ownership (4). Proponents also contend that guns produce more crime than

they prevent. While there is no way of determining how many crimes may have been deterred because of gun ownership (5), a survey is believed possible (using a sampling frame of the National Opinion Research Center at the University of Chicago) (personal communication from G. J. Wintemute, MD, University of California, Davis, Aug. 3, 1987).

Gun-control opponents argue that such laws abrogate citizens' rights under the Constitution to bear arms in peacetime. They also cite data showing that handguns are not a major cause of injuries and deaths, particularly when compared with cardiovascular disease, cancer, diabetes, and accidents involving automobiles, falls, drownings, and fires.

However, available data appears to indicate otherwise (see table). In a recent symposium on the subject of gun control, Kaplan (5) raised a number of questions that need consideration

- What effect would the complete absence of guns have on domestic violence or predatory crimes?
- Would gun control laws, even if enforced successfully and completely, reduce crimes by those who are the greatest threat to society?

Twelve leading causes of death in the United States, 1983 (6)

All causes	2,019,201
Heart disease	770,432
Cancer	442,986
Stroke (cardiovascular disease)	155,598
Accidents, all causes	92,488
Motor vehicle	44,452
Falls	12,024
Drowning	6,353
Fires, burns	5,028
Ingestion of food and other objects	3,387
Firearms	¹ 1,696
Pneumonia	54,423
Diabetes mellitus	36,246
Suicide, all means	28,295
Firearms-related	² 6,600
Chronic liver disease, cirrhosis	27,266
Atherosclerosis	36,371
Homicides	19,530
Firearms-related	² 12,040
Perinatal conditions	19,310
Nephritis, nephrosis	18,998
Total firearms-related	32,099

¹ This total is believed to include about 500 handgun and 300 hunting accidents.

² An additional 257 deaths occurred during legal intervention; 507 deaths were from undetermined causes, either accidental or intentional.

- If only some firearms were less available, would criminals turn to unrestricted weapons, such as shotguns and rifles, which are more likely to kill than handguns, and whose barrels can be shortened for concealability?

- If deprived of guns entirely, would assailants use another type of weapon doing as much damage?

Guns, both handguns and long guns, irrefutably are extremely dangerous and capable of causing unacceptable and unnecessary numbers of injuries and fatalities, even when used by responsible persons. If society hopes or intends to reduce significantly the number of firearm-related injuries and deaths, it might be willing to remove guns, especially handguns, from the hands of persons who are a threat to society, and to remove from society those persons who threaten the public with guns or other lethal weapons. Meanwhile, the education of legitimate firearms owners and users in the proper handling and storing of firearms must continue, which might help to reduce unnecessary deaths and injuries.

Extent and Consequences

Fatalities. In 1983, firearm injuries were ranked among the 12 leading causes of death in the United States (6). Compared to all other causes of accidental death, firearm accidents ranked among the top

10. Exactly where firearm accidents rank is uncertain because of differences in definitions and reporting (3).

The number of fatal firearm accidents among civilians in the United States held nearly steady at approximately 2,200 per year from 1936 until 1966. The rate, however, actually declined from about 2.2 to 1.4 per 100,000 persons in that period because of population growth. The number of deaths annually increased to 2,400 in 1966 and to 2,900 in 1967. The increase in the number of firearm-related homicides closely paralleled the increase in the number of all homicides in the period 1962-68 (7).

Kellerman and Reay studied the epidemiology of deaths from firearms in the home by reviewing all gunshot deaths in the State of Washington in the period 1978-83. Of the 743 firearm-related deaths, 70.5 percent of which were caused by handguns, 398 deaths, or 54 percent, occurred in the home where the firearm was kept, and only 9 of the 398, or 2.3 percent, were justifiable homicides. In other words, for every firearm homicide related to self-protection, there were 1.3 accidental deaths, 4.6 criminal homicides, and 37 suicides (8).

An analysis of 26,442 firearm deaths among California residents from 1977 through 1983 disclosed that firearms were the number one cause of death for black men aged 25 to 34 years and black women aged 15 to 24 years. Firearms were among the top 10 causes of death in the State; moreover, its firearm homicide, suicide, and unintentional death rates were similar to the median for all States (1).

In another study, the accidental firearm fatality rate increased three-fold in Cuyahoga County, OH, in the period 1967-73 (9). The deaths, which occurred most commonly among those aged 25 to 34 years, were more frequent in the central city (Cleveland) than in the suburbs, usually took place within the home, and were more prevalent among men, especially nonwhites. About one-half of the adults had been drinking alcohol at the time of the fatality.

The authors of the study believed that the frequency of fatalities was related to increased availability of handguns (1 retail dealer was said to have been selling 30 to 40 handguns per day, 7 days a week). They also believed that the presence of a loaded weapon was more likely to be associated with an accidental death than with killing an intruder (about 41 percent of the accidental deaths for children up to age 15 years and about 70 percent of accidental deaths of adults were from self-inflicted gunshots.)

Paulson and Rushforth reported similar findings for the period 1958-82 (10). When Rushforth and coworkers analyzed homicide patterns in Cuyahoga County, OH, for the period 1958-74, the trends noted were consistent with those in other metropolitan counties, and the increased use of handguns was the factor most consistently associated with those trends (11). Firearms were used more frequently and firearm deaths were more prevalent than other modes of killing males (such as by cutting or piercing weapons), but there was a greater relative increase in homicides using objects other than firearms and knives among white women in cities. Although the homicide rate increased during the period 1958-74, the proportion of white male victims of felonious homicide who were killed by firearms rather than by other weapons was constant at about 76 percent, but the rate of killings increased 6-fold. Overall, the increase in homicide rates was not believed to result solely from an increase in firearm deaths.

An examination of firearm fatalities in South Carolina in the period 1970-78 disclosed 5,808 deaths, either accidental, homicide, suicide, or from undetermined cause, for an average incidence of 645 fatalities per year, or a rate of 23.4 per 100,000 population. In 1975, firearms were the sixth leading specific cause of all deaths, a rate of 2.9 percent. Significant declines in the fatality rates during the 1970s allegedly resulted from decreases in rates for nonwhites (12).

Fatalities among children. One of the more troubling aspects of handgun violence is the fact that children very often are the victims of fatal gunshot wounds, self-inflicted either intentionally or accidentally, or received as innocent bystanders in scenes of domestic or street violence. Schetky noted that gun accidents are the fifth leading cause of death in young children (13).

Most unintentional firearm deaths among children younger than 15 years resulted from guns used in play that had been left loaded and not locked up. The 88 cases of such deaths in one study represented 64 percent of all unintentional firearm deaths and 19 percent of all firearm deaths in California in the period 1977-83 (14). The gun wielder was another family member in 24 percent of the deaths, was a playmate in 35 percent, and 70 percent of the gun wielders were boys aged 10 to 14 years. The authors found that unintentional deaths of friends and family members in the home were up to 6 times more common than shootings of criminals.

To verify the extent of the firearms hazard in

their community, Patterson and Smith surveyed 150 families who attended the pediatric clinic at the University of Texas Medical Branch, Galveston. The authors found that 38 percent of the families had at least one gun in the home; 55 percent of this group said that their guns were always loaded; and 10 percent said that their weapons were loaded, unlocked, and within reach of a child (15).

Of 210 cases of accidental gunshot deaths (39 percent were handgun-related) in North Carolina in the period 1976-80, 94 were self-inflicted and 116 were inflicted by others. Most of the victims were white men, and 31 percent were younger than 15 years. In 16 percent of the accidents involving children, the victims were playing with guns, while in 14 percent of the accidents the weapons were dropped or mishandled (16).

Paulson and Rushforth, in their review of homicides in Cuyahoga County, OH, in the period 1958-82, found that among children who were victims of homicide, more than 15 percent of those younger than 4 years, 49 percent of those 5 to 9 years, and 63 percent of those 10 to 14 years died of firearm injuries, and 55 percent of those were from handguns (10).

Suicide. Depression and chronic alcoholism are reported to be the major reasons Americans commit or attempt suicide (17). As of 1982, the annual number of suicides in this country was 28,000, a significant number of whom were young or old. Almost 50,000 persons 15 to 24 years old committed suicide in the period 1970-80; the number and rate for young adults (20 to 24 years) was twice that for teenagers (15 to 19 years). The greatest proportion of suicides among both men and women was committed with a firearm (18). The firearm suicide rate among those of both sexes aged 15 to 24 years roughly paralleled the rate for all other means, but it increased by 139 percent in the period 1933-82. The rate for means other than firearms increased 32 percent. Beginning in 1970, however, the firearm suicide rate for those in this age group, especially men, rose dramatically compared to the rise for other means, and about 3 times faster for 15- to 19-year-olds, and 10 times faster for 20- to 24-year-olds (19).

One explanation for the rise has been a concomitant increase in the availability of firearms. However, much of the available data are inadequate for indicating more than a suggested causal relationship, in part because statistics on suicide are underestimated. Firearms have been the traditional method of suicide for 10- to 14-year-old males and 10- to 24-year-old females. Overall growth in sui-

cide rates has slowed since 1980, and suicide rates related to the use of firearms are only slightly higher than those for other means (19).

The same authors also investigated specific suicide methods among adolescents by breaking the data down into 5-year age groups, rather than the usual 10-year grouping (20). Boyd and Moscicki urged physicians treating depressed or potentially suicidal patients to inquire about the availability of weapons and to try to prevent access.

Markush and Bartolucci compared the prevalence of firearms with the regional incidence of suicide and determined that a significant demographic relationship between firearms and suicide applied only to white males (21, 22). The availability of alcohol and the increasing prevalence of its abuse also may be a significant reason for the rising suicide rate among minors. In 1960-83, firearms victims 10 to 19 years old in Allegheny County, PA, were about five times more likely to have been drinking beforehand than nonfirearm victims (23).

For anyone intent on suicide, firearms are an assured means of death; about half of the victims choose this method (7). Had these same persons resorted to less immediate means because of the lack of availability of guns, their lives may have been more likely to be saved. A limited number of those who receive speedy emergency treatment are glad to be alive and may not try again (24). Because hanging, asphyxiation, and drowning can be as irreversible as using a gun if intervention is not in time, the number of suicides may not be reduced significantly because of a lack of firearms as long as persons intent on dying can find a lethal means (7). Availability of a firearm is probably a big factor in the cases of those who are highly impulsive, and for whom intentions of suicide occur less than 24 hours before the event (25).

Injuries. Because of errors and reporting system incompatibilities, there are virtually no reliable data available on the numbers of nonfatal firearm injuries. Existing data are often misclassified or incompatible between systems (26). Nonfatal injuries from firearms are presumed to greatly outnumber fatal injuries from firearms. In a relatively small study, Waller and Whorton (27) found that 6 percent of unintentional gunshot wounds were fatal. The figure probably is little different today. In 1968, nonfatal injuries from firearms were estimated to be 3 times more common than deaths; in 1972, the ratio was 5:1 (28).

The "best guess" of Wright and Rossi (29) for 1975 was 170,000 \pm 75,000 injuries, and 30 times

more injuries were inflicted by knives and other penetrating weapons than by guns. In the absence of an adequate database, only the crudest estimates are available on which to formulate legislative policy and shape efforts to change this aspect of society (28).

Inadequate government funding can be blamed for much of the lack of research and data collection. The disparity in the allocation of Federal grant money for this purpose is stressed in Jagger's comparison of National Institutes of Health research grants for firearm injuries versus five "low-frequency infectious diseases" (LID) (cholera, diphtheria, poliomyelitis, congenital rubella syndrome, and rabies). There were more than 198,000 firearm injuries compared to 17 cases of LID, yet LIDs were the subject of 19 NIH grants while firearm injuries were the subject of none (28). An early study disclosed that in California only motor vehicle crashes and falls surpassed firearms as a cause of spinal cord injuries (23). At the Rehabilitation Institute of Chicago, however, 24 percent of admissions were for treatment of spinal cord injuries from gunshot wounds, compared with 20 percent for those related to automobile accidents (30).

Firearms and Violence

According to Kleck, there is little evidence to show that the possession of a gun will trigger aggression in its user (31). Instead, the gun, especially insofar as robberies are concerned, may inhibit as well as stimulate aggression. He contends that robbers with guns are less likely to assault their victims than those armed with other weapons. Weak assailants are more apt to use guns when their intended victims are stronger than they are (for instance, women against men, and the elderly against youths). Kleck also believes that it may not be entirely plausible to conclude that guns are really more deadly than knives, because the gun may be used in situations where the intent is to inflict more serious bodily harm. Consider, however, the findings from a study of 1,639 cases of interpersonal violence in Denmark; 60 percent of the incidents involving firearms were lethal, and no more than 7 percent involving knives were lethal (32). These figures are supported by Newton and Zimring, who have asserted that the use of guns is 5 times more likely to result in death than the use of knives (7).

Crimes committed in residences have been increasing sharply, in line with the numbers of homes

with firearms, which may indicate that guns in the hands of home owners do not necessarily deter crime. More likely, the opposite is true (7). Incidents involving civilians using guns against criminals, although highly publicized by news media, may be based on inadequate data. Unpublished data from the Federal Bureau of Investigation in 1983 indicate that there were 490 justifiable homicides (that is, "excusable") by civilians (422 with firearms) during 1981; there is no way of knowing how many of these were in self-defense because data of this type are not collected. In Detroit alone, of 297 excusable homicides, 124 were justifiably committed by civilians and only a very small number of these were believed to be accidental (31).

The 25 accidental deaths from home firearm accidents in Detroit in 1967 exceeded the number of residential robbers and burglars killed in 4 1/2 years (23). One argument is that if homeowners did shoot and kill some burglars and robbers, one could infer that robbers might perceive an armed victim as a threat and avoid him or her; burglars would not expect to have a confrontation (7). However, both burglars and robbers would be more likely to carry guns if they expected their victims to be armed.

Business burglaries are more prevalent nationwide than robberies, according to the Small Business Administration; usually the crime takes place when the premises are not occupied by guards or operating personnel, in which case guns would offer no protective value (7).

Educational Programs

Numerous organizations have developed, or are in the process of preparing, educational materials and programs on proper storing and handling of firearms. The largest group, the National Rifle Association (NRA), supports more than 2,000 civilian rifle clubs and trains more than 96,000 teenagers annually (3). The American Legion offers the NRA's basic firearms education courses at local posts.

The Police Executive Research Forum and the Handgun Information Center (HIC) are nonprofit organizations dedicated to public information and education about handguns and handgun violence. One of the most ambitious recent community education projects was developed jointly by these two organizations. A citywide campaign was conducted in Charlotte, NC, during the entire month of April 1985. Program planning and post-critique,

including a discussion of difficulties that were encountered, are presented in "Handgun Safety Campaign: Program Manual" (33). For communities interested in this or similar programs, HIC will provide partial funding to "fill gaps in local campaign resources" and possibly to match local funds. HIC also will provide copies of its brochure and news media materials to law enforcement agencies at nominal cost.

The Foundation for Handgun Education, another nonprofit educational organization dedicated to reducing handgun violence, operates in conjunction with the National Coalition to Ban Handguns. The coalition is composed of 31 national educational, religious, medical, and professional organizations whose common goal is to prevent needless injuries and loss of life from handgun violence. The foundation also acts as a clearinghouse for firearms litigation information. The foundation has recently begun in Cleveland phase one of a national education campaign to heighten the public's awareness of handgun risks and to "change the attitudes and behaviors of the American people." This city was selected as a marketing research model because it has a high incidence of handgun-related violence (34).

Effectiveness. The Charlotte program was evaluated by Vogel and Dean (35), who tested its effectiveness against five hypotheses. This program, of questionable merit because it used nonstandard methods and relied on self-reporting of personal behavior, showed statistical significance in only one of the five hypotheses, that is, those persons exposed to the campaign were more likely to lock up their guns. Most of the controversy raised by the citizens of Charlotte dealt with the recommendation to store the guns and ammunition in separate locations as a means of improving safety.

Wintemute and Teret believe it unlikely that "expanded educational efforts to promote the safe use of firearms will lead to significant future reductions in firearm deaths," because more than 95 percent of the firearms incidents are intended to do harm (1).

Crime-Deterrent Legislation

Legislative efforts to control possession of handguns. More than 20,000 Federal, State, and local gun laws in the United States deal with the sale, distribution, and use of firearms—more laws than anywhere else in the world. Most States have some form of firearm control; Massachusetts passed the

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first law in the 1600s, Kentucky in 1813, Indiana in 1819, and Arkansas and Georgia in 1837 (7).

Over the years, a number of polls have shown that the general population is in favor of controls, yet Congress usually has responded only after sensational acts of violence have occurred. Most of the proposed legislation, especially relating to handguns, has encountered stiff opposition and has been either defeated entirely or watered down to the point of ineffectual control. More important, most gun-control legislation has been aimed at the use of guns after they have been placed in circulation, not before their introduction in the market. The National Firearms Act of 1934, for example, was enacted during the reign of the Capone-era mobsters to cope with the civilian ownership of "gangster-type" automatic weapons; however, it emerged as a tax measure (36,7). The Federal Firearms Act of 1938 regulates interstate shipment and receipt of firearms. The Omnibus Crime Control and Safe Streets Act of 1968 and the Gun Control Act of 1968 were prompted by assassinations in the 1960s (36). Newton and Zimring have provided a detailed discussion of the scope and effectiveness of Federal as well as foreign firearms legislation and its administration (7).

The nation's first gun-control laws and many of today's municipal laws proscribe the "place and manner" of carrying and using firearms to prevent illegitimate use. "Permissive" laws rely on ownership permits, which are denied to certain relatively small, definable groups who are presumed to be unacceptable risks to society. Unfortunately, purchasers are not required to prove they are not in a high-risk group.

Thus, an alternative is a "restrictive" law that does require proof of character and a valid, justifiable reason for ownership. "Registration" complements the licensing process and is one of the cheapest options to administer, but it is not a popular approach and no one can be certain about how effective it would be. Such laws assume that registered owners will be responsible about storage and transfer of their weapons in order that they

not fall into the wrong hands. The "transfer-notice" in place of registration is meant to report whenever a gun is given, sold, lost, or stolen. Transfer notice is thought to be simpler and less burdensome to owners and its records cheaper to maintain, making it possibly more feasible than registration (37). How effective compliance would be with either system is not known (7). However, controls will probably remain ineffectual as long as interstate traffic in arms sales continues (37).

Legislative options have been proposed to correct inadequacies in the current situation. Among them are (a) regulating the manufacturing and importing of firearms and barring the interstate flow of firearms to "unqualified buyers;" (b) requiring dealers to verify a buyer's place of residence; (c) substantially increasing the cost of a dealer's license; (d) requiring that all private sales be conducted through firearm dealers (30); and (e) holding individual firearm manufacturers, distributors, and owners liable in instances of wrongful deaths or injuries resulting from the use of weapons identified with them (38).

Effectiveness. The Comptroller General's Report to Congress in 1978 on the effectiveness and costs of handgun control pointed out "strong and widespread disagreement" about the effectiveness and costs of various measures for gun control in the United States. The report analyzed the various means of reducing gun-related crime, the extent to which firearms were used in violent crimes, and the relationships between firearm availability, violent crime, and handgun control (36).

The report found little solid data about the number of firearms and firearm owners in the United States, and only a few empirical studies on evaluation of gun-control laws. None of the studies showed decreased levels of violence because of gun control measures, and the report acknowledged that it was too soon to evaluate properly the influence of more severe or mandatory sentencing measures. The report concluded that gun control does not seem to be the answer to national levels of crime, inasmuch as the roots of crime go deeply into the socioeconomic fabric of contemporary society (36).

At the time of the report, only 20 states and the District of Columbia attempted to screen for undesirable applicants, and the screening methods were highly variable. Of the 20, only New York and Massachusetts required the applicant to provide proof of character and reason for ownership (7).

Baltimore's "buy-back" program, from August to November 1974, in which owners were given \$50

for each weapon turned in and a \$150 bounty was paid for information leading to a confiscation, was analyzed after the program ended. Based on very limited data over a 17-month period, there was no statistically significant decrease in overall crime (such as murders, assaults, robberies, and aggravated assaults) that could be attributed to the program, no lasting decrease in firearm assaults and robberies or aggravated assaults, and no appreciable drop in the rate of murders committed with firearms (36).

Even the most carefully drafted and enforced gun-control laws have had a questionable impact on crime. Most, while still on the books, are obsolete, unenforced, and unenforceable, undoubtedly because of a lack of uniformity nationwide and the inability of any of them to halt the interstate transport of arms (7). According to the Project CUE of the Bureau of Alcohol, Tobacco, and Firearms, controls limit the availability of guns in States which have restrictive laws, but the nonuniformity of the laws and the ineffectiveness of bans on out-of-State sales does not entirely prevent the import of weapons. Officials of Project CUE contended that criminals may have been forced to use older weapons, suggesting that the project had some effect, but more extensive analysis would be necessary to confirm this contention (35).

Current State legislation is a "hodge-podge," full of loopholes, and lacks effective enforcement (36). The Gun Control Act of 1968 offers little improvement: it cannot halt interstate movement of arms because it does not require dealers to verify the buyer's place of residence, and it is unable to prevent non-dealers from buying arms in one State and transporting and selling in another State. Furthermore, any adult who claims some "address for business" can pay \$10 a year and obtain a Federal firearm dealer's license. For private sales, no licenses are required (31).

At least 70 percent of the U.S. population is subject to gun purchase or acquisition statutes, and 66 percent is subject to a police check either before or after the purchase of a handgun. Yet the literature abounds with accounts of ineffectual enforcement. In Illinois, for example, most gun-related arrests in the period 1972-76 were for "unlawful use of a deadly weapon"; in actuality, the suspects were apprehended for another infraction, and the charges usually were for carrying a concealed weapon.

Only about 12 percent of the persons convicted in the period 1968-73 under Chicago's gun registra-

tion ordinance (in addition to Illinois' "fairly strict" license law) served time in jail, and the mean term was 36 days. About a tenth as many were convicted for unlawful possession and about a fifth for not having a firearms owner's license. Based on an estimated 1.7 million gun owners in Illinois, about 28 percent do not have gun licenses; therefore, about 500,000 persons could be arrested on that charge alone (31). The situation in New York City, which like Chicago allegedly has an "extremely strict" gun control law, is no better. The bans enacted in San Francisco in 1982 (later struck down by an appellate court) and Morton Grove, IL (in 1981), although not total prohibitions because they covered only handguns, allowed firearms to be kept at home or at work. San Francisco's law, in response to the assassination of a mayor and a councilman, would seem to be a flat prohibition on the possession of any handgun and with no restriction on long guns; actually, its many exceptions that are subject to interpretation, such as private citizens of "good moral character," "for good cause," and for "business purposes," provide many loopholes for legitimate ownership. Morton Grove's law was prompted by an application to open a gun shop in the community. This law survived both State and Federal courts, but it too has a number of exceptions, the broadest of which pertain to police officers and "special agents" (39).

Overcrowded prisons, overburdened prosecutor case loads, excessive paperwork, and other priorities for limited resources are blamed as the reasons for enforcement laxity. For example, Chicago has a special court for gun cases, but its judges are reluctant to sentence a violator of a simple gun law to prison, especially a "respectable citizen," when, for lack of space, a murderer or rapist must be released (31).

Legislative efforts to increase penalties. Because handgun bans have turned out to be economically and politically infeasible, some gun control advocates have urged more severe punishment for persons who commit crimes while using guns. The Bartley-Fox Amendment of 1974 to Massachusetts General Law imposed a mandatory 1-year sentence, without suspension, probation, parole, or furlough, on anyone convicted of illegally carrying a gun (that is, carrying without proper identification and authorization to possess or carry a weapon).

The intent of the law was to require a finding and to prevent plea bargaining in which a judge could impose a lesser sentence than mandated. In theory, judges and parole boards no longer would

be able to decide the length of sentence of the offender; the effect, however, was to shift discretion about guilt or innocence from the courts to the arresting officers and district attorneys. They became more selective of persons to be searched, reported, arrested, or charged, in order to avoid charging the "otherwise innocent" (40).

Other States have emulated the Bartley-Fox Amendment, such as Connecticut, Hawaii, Maryland, New Hampshire, and the Virgin Islands. Only Maryland's law (which is most like Massachusetts' law, but without a mandatory penalty, in general, on the first offense, and with an escalating sentence with prior convictions) attempted to eliminate most of the judicial discretion. Hawaii perhaps has the harshest law: a 2- to 5-year sentence, with no probation and no required finding (41). The Michigan Felony Firearm Statute (enacted about 1979) mandatorily added 2 years to the sentence of a convicted felon who possessed a firearm during the commission of a crime. If strictly enforced, this law should have obviated the shortcomings inherent in the Bartley-Fox Amendment. However, in practice, no differences were observed in the length of sentences imposed between crimes with or without guns; the courts merely adjusted the sentence of the primary felony downward to compensate for the mandatory 2-year addition (40).

California Penal Code 12022, enacted in 1977, is similar to Michigan law: it added a 1-year prison sentence for anyone, including accomplices, armed with a firearm while committing or attempting to commit a felony, and 2 years added if the weapon was actually used in the crime. However, as in Michigan, the courts in California have refused to abide by the letter of the law. California's law is not used by the courts except against the most serious of repeat offenders and then probably as a means of "throwing the book" at them. Again, perhaps judges resent this incursion, or they may believe that other weapons, such as knives and clubs, used in crimes of assault (such as homicides and rapes), are "messier and more heinous" than firearms. In other crimes, it has been reasoned that these types of laws interfere with the plea-bargaining process (40).

The New York experience indicates that harsh or mandatory prison sentences have not proven effective deterrents against drug and other felony offenses, or in reducing the flow of illegal drugs or the overall level of serious crime. The effectiveness of such measures are further degraded by the difficulties confronting police in combating serious crimes, a large number of which are unreported,

and the lack of convictions under the laws. Additionally, the costs can be staggering; the estimated costs of operating the New York City mandatory prison law in 1974 were nearly \$20 million for personnel and \$30,000 per cell for construction (41).

Inasmuch as the criminal justice system is already overcrowded, this alternative to gun control may be doomed to failure (41). The U.S. Department of Justice, Bureau of Justice Statistics, estimated that the Federal prison system was operating at 27 to 59 percent above capacity at the end of 1986. The number of inmates at Federal and State prisons reached an all-time high of 546,659, an increase of 217,000 since 1980 (41).

Apart from prison overcrowding, leading national crime commissions oppose mandatory sentences because

- Judges cannot base sentences on what they perceive as "individual factors" and may, therefore, dismiss or acquit the accused, or juries may fail to convict, because they believe the mandatory sentence is inappropriate to the individual or the crime.

- Such sentences may seriously interfere with bargaining attempts to obtain a plea of guilty and thereby induce judges and prosecutors to use *sub rosa* means to avoid mandatory sentences.

- The courts, as well as the police and prosecuting attorneys, may simply refuse to enforce, or may even misconstrue, the law.

- Incarceration is ineffective and may even be counterproductive when it is applied to all crimes and most offenders (41).

Other Means and Issues

Boston Youth Program. A demonstration project funded by the Robert Wood Johnson Foundation experimented with role-playing techniques as a possible means of handling depression and solving disputes without violence. Both depression and violence are considered potential precursors of firearm injuries, suicides, and homicides. The program, called the Boston Youth Program, was developed for 10th-grade health students in four Boston schools and one community agency. Eighty-seven percent of its participants said they enjoyed the program, 73 percent found it helpful in dealing with depression, and 63 percent found it helpful in handling anger (42).

Improved weapons design. Irrespective of the suc-

cess or failure of all other measures to reduce gun-related deaths and injuries (such as gun control and crime deterrent laws and public education), it appears prudent to require improvements or modifications to firearms designs to make them as safe as possible. Improvements should, as a minimum, indicate whether the weapon is loaded or ready to fire, function to help prevent accidental discharge, and make the weapon less concealable on the person (26). Redesigning weapons to improve their safety would be far simpler than attempting to change the behavior of the gun owner or user, bearing in mind that children lack an understanding of the consequences and dangers of firearm use. If the Federal Government can legislate and enforce the design and manufacture of child-restraint aspirin bottles, it would seem possible to require steps to help to child-proof handguns (43).

Tort liability. Some now advocate product liability litigation to reduce firearm crime and violence and their associated injuries and deaths (26). A symposium devoted to the pros and cons of manufacturer liability and victim awards under tort law, with consideration for the immediate victim as well as the bystander (38), considered the case *James Brady v. John Hinkley and R. G. Industries* (43)

Teret and Wintemute urged that handgun manufacturers be made liable and financially responsible for injuries arising from their products, apart from the fact that the weapons functioned as intended and their dangers were not hidden. The authors contended that the manufacturer should know and should have foreseen the public health significance of his product from the extensive epidemiologic data and, therefore, should be presumed culpable (44).

Turley and Harrison contended that the manufacturers should be responsible for acts committed by their products, inasmuch as the utility and social benefits of their products are far outweighed by the potential risks of injury and death from their misuse (43).

"There is no greater perversion of the free enterprise system than that which seeks to reap profits from human suffering. Who should bear the cost when the products sold by these merchants of destruction accomplish exactly what they are intended to accomplish? It's time to make them pay for the wrongs which a sane society can no longer tolerate. If the notions of morality, conscience and common sense are not enough to constrain these corporations, then just maybe redistributing some of their dollars to the innocent victims of crime will suffice." (43) they said.

Three developments in the strict liability law may have "set the stage" for its application to handgun suppliers, bystander recovery, foreseeable environment of use, and the question of defect. A large body of law relating to motor vehicles and other consumer products parallels the situation with handguns and may furnish adequate legal precedence (43).

Turley and Harrison (43) contended that strict liability or negligence suits that force the handgun manufacturers, distributors, and owners to compensate victims for wrongful gun-related injuries or deaths would make it uneconomical to manufacture, sell, or use handguns.

Halbrook (45) is of the opposite opinion, arguing that the principles of strict liability or negligence *per se* cannot be applied when the defendant has complied with existing statutes. However, in *Kelley et al v. RG Industries Inc. et al*, the Maryland Court of Appeals ruled in 1985 that the "Saturday night special" was an "unreasonably dangerous product, and its manufacturers and distributors may be liable for harm that results from its use" (1). RG Industries, one of the primary manufacturers of these weapons, was eventually forced out of business.

Plastic handguns. Wintemute and coworkers (14) have called attention to an important emerging issue, the recent introduction of plastic handguns, which, if unrestrained, could pose additional public health and security risk. Promoted as "dishwasher safe" and "for women to use as a self-defense weapon," plastic handguns are more readily mistaken by children for a toy, and can be used by terrorists to defeat airport and courtroom security measures. Plastic handguns, being nonmetallic, are transparent to X-ray detection devices. Several bills attempting to cope with this issue have been introduced in the 100th Congress, such as H. R. 84, H. R. 155, H. R. 1005, and S. 465.46.

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