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Firearm Violence in America

Is There a Solution?

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Keywords

• Gun violence • Firearms • Injury • Death • Trauma • Public health • Suicide

Key points

- Firearm-related violence is a public health crisis that results in nearly 40,000 deaths per year.
- This is a uniquely American problem; the United States has the highest firearm-related mortality worldwide among industrialized countries.
- Suicide and homicide account for 60% and 40% of firearm-related deaths, seen primarily in older white communities and younger black communities, respectively.
- Although there is a perceived national divide regarding gun legislation reform, literature shows that Americans have more commonalities than often thought regarding firearm injury prevention.
- A multipronged approach is needed to bolster firearm injury–prevention programs and reduce firearm-related injury and death. Some of the important steps forward include increasing federal funding for research, expanding universal background checks, uniting professional organizations to promote and create change, and improving mental health access.

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INTRODUCTION

Firearm injury is a public health crisis in the United States. Every day, an average of 109 individuals are killed, and more than 240 people suffer injuries secondary to firearm violence [1,2]. Although the United States is a world leader in many arenas, we are failing when it comes to firearm injury prevention. Firearm-related injury and death is a public health problem creating a vast burden of disease across the spectrum of ages and socioeconomic groups in this country. In addition, firearm-related violence has a substantial economic burden of more than 229 billion dollars per year to the United States health care system [3,4]. Most concerning, despite advances in trauma systems and health care capabilities, the fatality rate secondary to firearms has not significantly changed or improved [5,6].

EPIDEMIOLOGY OF FIREARM VIOLENCE

In 2017, the Centers for Disease Control and Prevention (CDC) reported 39,773 deaths from firearm injury. This figure accounts for 58% of all intentional injuries in the United States. Of these firearm-related deaths, 23,854 (60%) were suicides and 15,919 (40%) were homicides [1,6]. These numbers are the highest that have been seen in the past 40 years. Since 1999, there has been a 17% increase in firearm-related intentional injury mortalities, with 7000 more suicide deaths secondary to firearms in 2017 compared with 1999 [1,7].

In the United States, we have nearly the same number of deaths from firearms as compared with motor vehicle collisions (MVC). MVCs account for 10.6 deaths/100,000, whereas firearms account for 10.5 deaths/100,000, followed by falls at 10.4 deaths/100,000 [8]. Interestingly, although there is nearly the same number of deaths from MVCs as firearms, only 5% of patients cared for by trauma centers are from firearm-related injuries; this emphasizes the high severity of injury and associated firearm mortality [8].

Firearm violence: a uniquely American problem

Although we have so much to be proud of in America, it is clear that one of the areas where we have fallen short compared with our peer nations is preventing firearm-related injury and death. The rate of firearm-related violence, suicides, and unintentional injuries in the United States is the highest among industrialized countries. Specifically, the US firearm homicide rate is 25.2 times higher and the suicide rate is 8 times higher than other developed nations [9,10]. This problem is an American problem for our children as well. The mortality of American children is 11 times the rate seen in other high-income countries [9].

Estimates based on self-reporting projections indicate there are nearly 400 million firearms owned privately by civilians in the United States, putting the United States first among all nations when comparing the number of privately owned firearms across different countries [11,12]. There is now substantial literature confirming that the presence of firearms in the home increases the likelihood of homicide, suicide, and unintentional injury for the firearm owner and those with access [5,11,13,14].

Not only does America continue to face an extraordinary mortality nationwide secondary to firearm-related violence, but also the intensity of violence appears to be increasing. Patients are experiencing higher-caliber wounds and multiple gunshot wounds opposed to one; overall, the proportion of nonsurvivable traumatic injuries has increased [15]. The fatality rate secondary to firearm-related violence in 1 urban trauma center showed a significant increase from 9.5% during 2000 to 2003 to 18.3% during 2004 to 2005, and this trend is continuing to increase [6,15].

Firearm-related homicide

The greatest burden of homicide is seen most prominently in young men, specifically in black and Hispanic communities. The overall firearm mortality between the ages of 20 to 29 is 5 times higher in the black community than in the Hispanic community, and 17 times higher than the white community in the same age distribution [1]. In addition, firearm-related mortality among black women in the United States is higher than all other races in each age bracket [1].

Overall, a disproportionate burden of firearm-related death falls on our minorities. In addition, these rates have not been affected by previous legislation with the goal for reform. Previous firearm legislation aimed at decreasing pediatric, unintentional, self-harm, and overall firearm-related fatality rates has shown no effect on the overall homicide rate nor the mortality among the black community [16].

Firearm-related suicide

Firearm-related suicide is seen primarily in older, white communities. Although 85% of firearm-related injury and death among the black population is related to homicide, 75% of injury and death in the white population is related to suicide. The highest rate of mortality due to suicide by firearms is among white men older than 70 years of age [1]. Availability of firearms has been shown to be associated with increased risk of suicide in the home among both adolescents and adults [13,14]. Although mental illness has been shown not to be a significant contributor to homicide-related deaths, access to firearms among patients with preexisting mental illness results in a significantly increased rate of suicide [17,18].

High-risk populations: children and adolescents

Children and adolescents are especially at risk for injury and mortality attributed to firearms. Among children and teenagers less than 20 years of age, 8 children are killed by firearms every day [1]. Unfortunately, children account for 45% of fatalities in domestic mass shootings and 10% of fatalities in mass shootings [19]. Not only are children direct victims of injury and death secondary to firearms but also 1 in every 5 teenagers (aged 14–17 years) have also witnessed shootings [18].

Mass shootings

Although mass shootings are only responsible for less than 2% of all firearm-related deaths, mass shootings in the United States have been increasing in

frequency since at least 2011. Although the term "mass shooting" has different definitions among organizations, it is defined here as any firearm-related incident resulting in injury or death of 4 or more people. In 2000, the Federal Bureau of Investigation (FBI) identified only 7 deaths secondary to active shooter incidents [20]. In comparison, the Gun Violence Archives reported 376 mass shootings in 2017 alone [21]. Other sources report the number of mass shootings in 2017 to be even higher, with deaths totaling 590 persons [21]. Most importantly, semiautomatic weapons are commonly used in active shooter incidents, resulting in more people being injured or killed [22].

CHALLENGES TO FIREARM-RELATED INJURY PREVENTION

Despite the massive toll firearm violence takes on the United States, our nation continues to struggle with tackling this public health crisis. One of the barriers to moving the needle forward has been that the manner in which this process has been approached. Similar to how the health care community has addressed other public health problems, firearm-related injury should follow a similar approach. For example, when MVC fatalities were rising, the nation moved toward safer roads, developing seatbelts and ensuring compliance, and improving vehicle safety. With high mortalities seen secondary to cigarette smoking and lung cancer, an effective antismoking campaign was developed. Public health advances regarding firearm-related violence must be a priority in this country as well.

Two conflicting narratives

One important obstacle to improving firearm injury prevention is the assumption that there are 2 conflicting viewpoints in the United States related to firearms. The leaders of the American College of Surgeons Committee on Trauma (ACS COT) described these 2 "conflicting narratives" [7].

One narrative sees firearms as a fundamental American right, necessary in society for protection. This viewpoint links "gun control" to "freedom control." People who share this viewpoint see firearm regulations as a reduction in personal liberty. The second narrative sees firearms as harmful and unnecessary. Those who hold this viewpoint believe guns represent violence and therefore link "gun control" to "violence control." They believe firearms put their personal safety and their families at risk [7].

It is thought that these vastly different viewpoints have brought our nation to a standstill and prevented improvement in violence and injury prevention. However, the reality is that we, as Americans, have more in common than we have that divides us; research has demonstrated that we are not nearly as different as is often portrayed.

In 2015, a public opinion survey from the Johns Hopkins Center for Gun Policy and Research was conducted among gun owners and nonowners. Both 84% of gun owners and 84% of nonowners favored background checks for all gun sales. In addition, 78% of gun owners and 80% of nonowners favored preventing sales to people with temporary domestic violence

restraining orders. Most of both owners and nonowners also supported the release of data on which gun dealers sell the most guns used in crimes, requiring a license before buying a gun to verify identify, and temporarily removing guns from individuals who pose immediate threat of harm to self or others [23].

Limitations to research funding

In 1996, Congress passed the Dickey Amendment in the omnibus spending bill mandating that none of the funds made available for injury prevention and control at the CDC could be used to "advocate or promote gun control" [24]. In addition, in that same spending bill, Congress stripped the CDC of 2.6 million dollars, which happened to be the exact amount allocated in the prior year to firearm research. These actions severely limited research funding dedicated to firearm-related violence over the past 2 decades [25]. In 2011, this was extended to include all federal agencies, including the National Institutes of Health (NIH) [26]. More recently, in 2013, President Obama signed an executive order permitting the CDC to study or sponsor research dedicated to firearm injury prevention [27]. Although this executive order created opportunities for funding injury prevention secondary to firearm-related injury and death, Congress has failed to appropriate the necessary funds to allow for research in this arena.

This funding limitation has substantially impacted firearm-related violence research. Violent injury secondary to firearms is the most poorly addressed public health problem in the United States and is drastically underfunded given its substantial burden of disease [7]. One study compared the mortality and research funding of different disease states. The number of deaths from firearm violence and sepsis were nearly the same in 2014. However, when comparing funding, the aid dedicated to gun violence research was 0.7% that of sepsis, and the publication volume was only 4% [28]. Of all diseases compared in this study, firearm violence was the least researched cause of death [28].

SOLUTIONS TO DECREASING FIREARM-RELATED INJURIES

Expand universal background checks

The Brady Handgun Violence Prevention Act, or "The Brady Bill," was signed into law in 1993 by President Clinton and instituted background checks at federally licensed gun dealerships; it was designed to prevent high-risk individuals from purchasing firearms. This bill instituted the FBI to run each firearm purchaser through the National Instant Criminal Background Check System. Prohibited users include felons, fugitives, domestic abusers, and dangerously mentally ill individuals. Since the success of the Brady Bill and Brady Campaign, more than 3 million attempts to purchase firearms have been prevented; about half of these blocked attempts were attempted purchases by felons [29].

Background checks are a strongly evidence-based method to reduce firearm violence and mortality. In addition, this process is critical to ensuring

appropriate individuals have access to obtaining firearms, and avoiding sales or transfer of firearms to criminals or others who should not have access to these weapons.

Although the Brady Bill has been successful in limiting gun sales in federally licensed gun dealerships, 40% of firearms are sold through nonlicensed dealers who are not mandated to perform background checks [30,31]. Currently, background checks are not required for guns sold at gun shows, online, or through private transfers. In total, these sales account for an estimated 6.6 million firearms [31,32]. Another way to think about it is 1 in 5 gun sales take places with "no questions asked," resulting in thousands of guns going into the hands of people that should not have them.

Many health care organizations, along with firearm research experts, believe universal background checks would decrease firearm violence [33]. Some of the pending legislation that has not yet been passed has attempted to expand Brady background checks to all gun sales, including those sold at gun shows and over the Internet. It would prohibit the transfer of firearms between private parties unless a licensed importer, manufacturer, or dealer has first taken possession of the firearm to submit a background check. In addition, it calls for gun owners to report lost or stolen firearms to the US Department of Justice and local law enforcement within 48 hours of discovery. Although this legislation is pending, nothing has been passed to move these initiatives forward.

Expansion of extreme risk protective orders

Extreme risk protective orders currently are state-level firearm-prevention measures that allow police or family members to petition state courts to have firearms temporarily removed from an individual who may be at risk to themselves or others. These laws are referred to differently in different states, such as "Gun Violence Restraining Orders" or "Extreme Risk Protection Orders" [34]. Connecticut was the first state to enact such a regulation in 1999 [35]. By the end of 2018, a total of 13 states had enacted such laws.

Although specifics of these provisions differ by state, each allows for a period of court-ordered temporary removal of a firearm from a high-risk individual on the order of weeks to months. Experts believe that expanding such laws to all states would significantly improve firearm safety, allowing for action to be taken to prevent high-risk individuals from harming themselves or others once a weapon is already in their possession [36]. In addition, the National Rifle Association (NRA) has voiced limited support for such laws [37].

Bolster funding for firearm-related research

As discussed, firearm-related research is drastically underfunded and does not match the national burden of disease. Improving funding is absolutely critical to produce high-quality, rigorous academic analysis of firearm injury in the United States and is the best way to prevent it. The CDC, the NIH, and the National Institute of Justice need to increase funding allocation toward firearm injury–prevention research.

Recently, private organizations and a select group of local and state governments have worked to improve funding irrespective of the federal funding for this research. However, funding does not match the burden of death and injury attributed to gun violence in comparison to other mechanisms in this country. As funding improves and more research is completed, this research must be made available so legislators, policy makers, and health care providers alike can enact evidence-based policy changes to decrease firearm-related injury and mortality.

Physician's role in prevention

Physicians and health care providers have a unique role in preventing firearm-related injury. As trusted sources of health information, physicians are able to counsel patients regarding firearm ownership and safety and identify individuals who might be particularly high risk for firearm injury [38]. Motivational interviewing and physician counseling have been shown to be effective in improving safe storage of firearms in the home [39]. Safe storage is especially important in homes in which there are children present or in those persons who have increased risk of suicide or self-harm. Training for medical students, resident physicians, and practicing physicians regarding important firearm safety assessment tools and knowledge is crucial to improve the physician's role in preventing firearm violence. It is especially important this occurs across specialties and includes a spectrum of physicians, including surgeons, pediatricians, emergency physicians, family medicine practitioners, intensivists, and internists.

Physician involvement in firearm violence prevention was questioned by the NRA with a strong response from both the physician and the nonmedical community alike [37,40]. Encouraging and training providers to discuss firearms with patients is a crucial way physicians can begin to reduce the firearm epidemic in the United States.

Organizations working toward a mutual goal

Medical and surgical professional organizations and societies have historically supported a public health approach to major issues resulting in mortality. For example, tobacco use, MVC, and unintentional poisonings were all managed from a public health standpoint to reduce fatalities by professional organizations. Throughout the United States, physicians have first-hand experience with firearm-related violence and the resulting impact on their patients' lives. In turn, many professional organizations have developed consensus statements and recommendations regarding firearm violence that use a public health approach to tackle this difficult issue.

The ACS COT is strongly pursuing prevention efforts and has published a clear position statement promoting injury prevention [41]. This strategy supports approaching firearm violence from a public health standpoint, evaluating evidence regarding trauma center networks' violence-prevention programs and committing to a collegial and professional dialogue to work toward reducing mortality (Box 1) [8,41,42]. The ACS COT is pursuing these commitments

Box 1: American College of Surgeons Committee on Trauma's position statement on firearm injury–prevention strategy

1. Commitment to approach firearm violence as a public health problem
2. Evaluation of evidence for violence-prevention programs, particularly those implemented through trauma center networks
3. Commitment to create a forum for civil, collegial, and professional dialogue on reducing deaths

Data from Jenkins DH, Winchell RJ, Coimbra R, et al. Position statement of the American College of Surgeons Committee on Trauma on the National Academies of Sciences, Engineering and Medicine Report: A national trauma care system: integrating military and civilian trauma systems to achieve zero preventable deaths after injury. J Trauma Acute Care Surg. 2016; 81:819-823.

by holding town hall meetings, conferencing with stakeholders to create policy development for firearm injury prevention, and supporting a research agenda. The ACS COT has also proposed how to engage movement toward this solution (Box 2) [8]. They have also proposed solutions to reduce firearm violence that include restricting firearm ownership for anyone who is a danger to themselves or others, encouraging responsible ownership regarding safety and educations, and improving mental health access and understanding of the proximate causes of violence (Box 3) [7].

The American Association for the Surgery of Trauma has also identified firearm-related injury and mortality as an unacceptable public health problem. In a 2018 publication in the *Trauma Surgery Acute Care Open Access Journal*, they challenged branches of government and professional organizations to address firearm violence and proposed more detailed solutions to the problem

Box 2: American College of Surgeons Committee on Trauma's proposed engagement to solution on firearm injury–prevention strategy

1. Bridge the chasm of the 2 narratives' sides with professionalism, respect, and tolerance
2. Center on what is the right thing to do for our patients
3. Recognize and respect philosophic differences
4. Acknowledge opposing views and respect them
5. Appeal to the middle
6. Commit to not move forward with legislative initiatives until there is consensus that involves elements of both narratives
7. Focus on making guns safer rather than eliminating guns
8. Articulating not just freedom, but freedom with responsibility

Data from Stewart RM, Kuhls DA. Firearm injury prevention: a consensus approach to reducing preventable deaths. J Trauma Acute Care Surg. 2016; 80:850-852.

Box 3: American College of Surgeons Committee on Trauma's proposed solution to firearm injury prevention

1. Anyone who is a danger to themselves or others should not have a firearm
2. Responsible ownership includes safe storage, education, training, and a commitment to keep firearms out of the hands of family members at high risk of self-harm, unlawful purchasers, and violent offenders
3. Improvement of mental health access, hygiene, and treatment
4. Identification, understanding, and addressing proximate causes of violence

Data from Stewart RM, Kuhls DA, Rotondo MF, et al. Freedom with responsibility: A consensus strategy for preventing injury, death, and disability from firearm violence. J Am Coll Surg. 2018; 227:281-283.

(Box 4) [43]. Similarly, a consensus statement with recommendations regarding decreasing firearm-related injuries was developed by the leaders of the following organizations: American Academy of Family Physicians, American Academy of Pediatrics, American College of Emergency Physicians, American

Box 4: American Association for the Surgery of Trauma's statement on firearm injury solution

1. Strengthen National Instant Criminal Background Check System and require background check on all firearm sales
2. Standardize a waiting period for firearm sales
3. Promote responsible firearm ownership, including training of new owners, safe storage, and application of practical technologic safety strategies
4. Strictly regulate the sale of high-capacity magazine-fed semiautomatic rifles
5. Strictly regulate the sale of bump stocks and trigger actuators
6. Strictly regulate high-volume ammunition sales
7. Require reporting of all firearm sales: both public and private
8. Require firearm owners to report lost or stolen weapons to law enforcement
9. Remove firearms from accused perpetrators of intimate partner violence and those threatening violence to others until their case is adjudicated
10. Encourage and train physicians to counsel their patients about firearm safety and health risks associated with firearm ownership
11. Improve access to quality of medical care, including behavioral health services to reduce suicide and gun-related violence
12. Mandate new federal funding from the NIH and CDC for research on firearm injuries and injury-prevention strategies commensurate with the burden of disease
13. Support bleeding control training for the public and public access to bleeding control kits
14. Create a National Trauma Care System

Data from Croce MA. AAST statement on firearm injury. Trauma Surg Acute Care Open. 2018;3:e000204. https://doi.org/10.1136/tsaco-2108-000204.

Congress of Obstetricians and Gynecologists, American College of Physicians, American College of Surgeons, American Psychiatric Association, American Public Health Association, and American Bar Association [33].

The Eastern Association for the Surgery of Trauma (EAST) recently released a Firearm Injury Prevention Statement in January 2019 underscoring their commitment to the health and safety of patients and their communities along with the recognition that current efforts are insufficient to reduce firearm-related injuries. The EAST consensus statement appropriately describes firearm violence as a public health crisis and supports evidence-based strategies to reduce firearm injuries; this statement emphasizes federal funding, programs to prevent violence and teach conflict resolution, firearm safety related to storage and usage, universal background checks with waiting periods, and limited access to highly lethal firearms and accessories (Box 5) [44].

Although these organizations continue to work toward common goals, there is still more that can be accomplished. The medical and surgical organizations need to work together in a cohesive manner to improve funding, publish firearm-related research, and use their collective power to influence regulatory decisions that reduce the number of injuries and deaths attributable to firearm violence. Overall, a united approach is required to move toward solving this complex health problem.

Box 5: Eastern Association for the Surgery of Trauma's consensus statement on firearm injury prevention

1. Federal funding of firearm-related research to inform solutions
2. Violence and injury–prevention programs that address conflict resolution
3. Programs that teach nonviolent conflict resolution, coping strategies, and anger management
4. Improved access and quality of mental health services
5. Recognition of other factors (structural violence, domestic violence, mental health)
6. Limited access to firearms through mandatory safe storage, gun locks, trigger locks, and so forth
7. Expanded universal background checks to include all firearms sales in any venue
8. Mandatory waiting periods and universal background checks for firearm acquisition
9. Limited civilian access to highly lethal firearms and firearm accessories (high-velocity rifles, high-capacity magazines, trigger cranks, and bump stocks)
10. Limited dissemination of technology to enhance lethality or bypass standard safety and/or screening (eg, 3D printing firearms)

Data from EAST Board of Directors. Eastern Association for the Surgery of Trauma Firearm Injury Prevention Statement. J trauma Acute Care Surg. 2019; 86(1):168-170.

Campaigns to raise public awareness and change legislation

One of the most important aspects of any public health crisis is creating public awareness that a problem exists and how to resolve it. Currently, multiple campaigns exist to help improve firearm violence and injury prevention. For example, The Brady Campaign to Prevent Gun Violence is a mission of the Brady organization and its Million Mom March to create a safer America. Their goal is to decrease firearm-related deaths in the United States by half by 2025 by impact-driven, engaging campaigns (Box 6) [45].

A second well-known campaign in the United States is the End Family Fire campaign. Brady and The Ad Council have led the End Family Fire campaign by dedicating resources to improve safe gun storage and responsible gun ownership. Through television commercials and public service announcements, education and encouragement are provided to the public to learn more about proper gun safety, storage, and responsible ownership [46]. These efforts must be expanded and ideally funded by federal and state funds similar to the public health campaigns that have existed in the past.

Better access and availability to mental health resources

Overall, the percentage of violent injury committed by people affected by mental health illnesses and substance abuse disorders is relatively low. One study revealed less than 5% of patients with firearm-related injuries from 2006 to 2014 at a level 1 trauma center had mental health disorders [2]. However, although mental health accounted for a low percentage of overall injuries, the mortality of this subgroup was 38.5%, indicating the severity of injury and the association with suicide [2].

Although mental health is only a small overall contributing factor to firearm-related homicide in our society, there is a strong relationship between mental health disorders and suicide. Therefore, improving access to mental health treatment and resources is an important aspect of any public policy aimed at reducing injury.

There needs to be an open discussion surrounding mental health to foster an environment of support rather than social stigma. Although there is a low percentage of violent acts committed by people with mental health disorders, studies have shown patients who receive adequate treatment from health

Box 6: Brady Campaign to Prevent Gun Violence's proposed solutions to decrease firearm-related deaths

1. Policy focus for Brady background checks to be applied to all gun sales
2. Stop the 5% of gun dealers who supply 90% of all crime guns
3. Lead a new conversation, change social norms regarding the real dangers of guns in the home to prevent homicides, suicides, and unintentional shootings

From Brady: United Against Gun Violence. Available at: https://www.bradyunited.org/the-brady-plan; with permission.

professionals are less likely to commit violence [47]. Enhanced mental healthcare has been proposed by policy makers as a way to improve firearm violence, and data reveal this would likely decrease deaths associated with mental health disorders, specifically those secondary to suicide [48,49]. Resources and support are also needed to help coordinate mental health and substance use disorders among state, local, and community-based behavioral health systems.

SUMMARY

Firearm-related injury and death is a public health crisis in this country with mortality nearly equivalent to MVC. Despite the massive burden of disease that exists, the funding dedicated to research is grossly deficient. This complex health problem requires a multidisciplinary, interprofessional approach to create the multimodal solution to develop data-driven policies to reduce firearm injury and death in this country. Understanding that most Americans are united in the approach to dealing with firearm-related violence, a commitment is needed to approach this in a nonpartisan manner that mitigates the spread of false narratives and allows us to work across disciplines with stakeholders in the pursuit for common sense legislation that allows us to reduce firearm-related injuries and death.

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