Firearm Injury Prevention:

Innovative Clinical Solutions to a Community Health Emergency

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Preamble

The COVID-19 pandemic, economic distress, societal inequities, political strife and the widespread increase in both access to firearms and firearm misuse across the United States have acted in synergy to magnify firearm-related injury and death. According to the Gun Violence Archive, more than 36,000 firearm-related deaths and more than 32,000 firearm-related injuries occurred in the first 10 months of 2022 alone. Firearm-related morbidity and mortality have been increasing annually in the United States and now approach the highest rates ever recorded. On almost any day, an even casual glance at the evening news makes clear that firearm misuse leading to injury and death across our country is a national health emergency. Yet, firearms and the injuries associated with them are widely viewed through a partisan political lens in our country, which has impaired our nation's ability to craft a unified and cohesive health strategy to decrease firearm morbidity and mortality.

We are not divided, however, on our shared belief that no innocent person, much less school children, should ever be threatened or harmed by firearms. Furthermore, we understand that firearm-related injuries and deaths are caused by a very small fraction of the more than 81 million gun owners in the United States who share common interests of safety, security and health. What can we, as clinicians, do to prevent firearm-related injuries and deaths? Here, we seek to reframe the issue as a community health problem that can be addressed through the application of scientific and public health principles without infringing on constitutional rights and protections. We believe the way forward is firearm education, safety and the incorporation of "Firearm Health" into health maintenance. We believe that if the principles of Firearm Health are widely applied, avoidable injuries and deaths could be mitigated.

Firearm Health

A confluence of education, training, competence and firearm security — for healthcare providers and the patients, families and communities they care for.

Introduction

As a whole, firearm-related violence, injury and death is a national health emergency that affects every community in the United States[1] and is a "neglected global health issue." In 2021, the clinicians who are a part of Envision Healthcare provided care to more than 30 million patients across the United States through our anesthesiology, emergency medicine, hospital medicine, pain management, radiology, surgery and women's and children's specialties. As parents, friends, colleagues and community members, Envision clinicians experience the impact of firearm-related harms daily. Since caring for the communities we serve is our charge, Envision and its clinicians must unite with colleagues across the nation to proactively prevent firearm-related injuries and deaths.[2-5] Here, we call attention to the burning platform that firearm-related morbidity and mortality represents across our nation and present a multidisciplinary, multifaceted approach to address the problem.

In 2016, an estimated 251,000 deaths worldwide were due to firearm-related injuries.[6] The United States accounted for the world's second-highest number of firearm-related deaths. From 2018 to 2020, the Centers for Disease Control and Prevention (CDC) identified 124,669 firearm-related deaths in total, including 72,665 suicides and 47,756 homicides.[7-9]

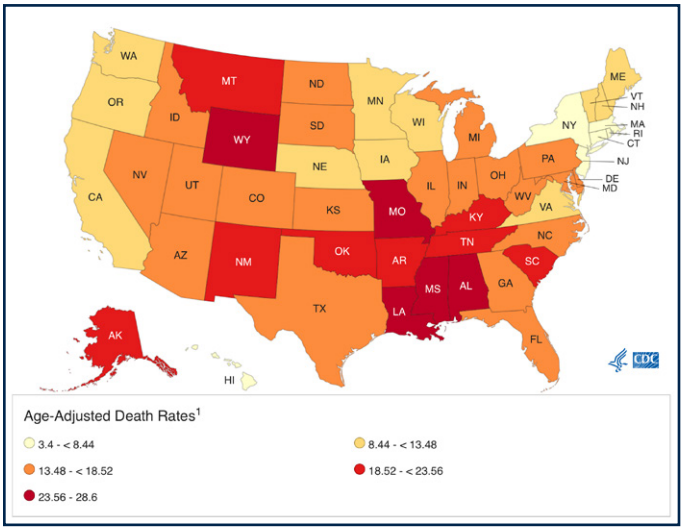
Consistent with recent increases in firearm-related deaths among adults, homicide and suicide by firearm are now among the four leading causes of death for children and adolescents aged 1 through 17 and young adults aged 18 through 24.[10]

In 2020, for persons younger than 65, the number of Years of Potential Life Lost (YPLL) in the United States from firearm-related homicide and suicide was 636,697 and 448,175, respectively. These two causes combined represent more than 62 percent of all YPLL by violent causes tracked by the CDC. Use of firearms in the legal course of duty by police, active-duty military members and other security agents are not represented but constituted 16,623 YPLL.[11]

These statistics underscore that firearm-related harm adversely affects Americans of all ages and walks of life. Indeed, firearm-related injury and death spare no ZIP code (Figures 1 & 2).[12,13] Further evidence of this unfortunate phenomenon is informed by a continuous stream of predictable media reports covering this subject. In a November 2017 opinion piece published in reaction to the First Baptist Church Sutherland Springs, Texas, mass shooting, Nicholas Kristof, writing in The New York Times, explained that the extensive data and charts included in his article were readily available, which allowed him to research and write his opinion piece well in advance of the tragedy.[14-16]

Figure 1. Firearm Violence Spares No ZIP Code

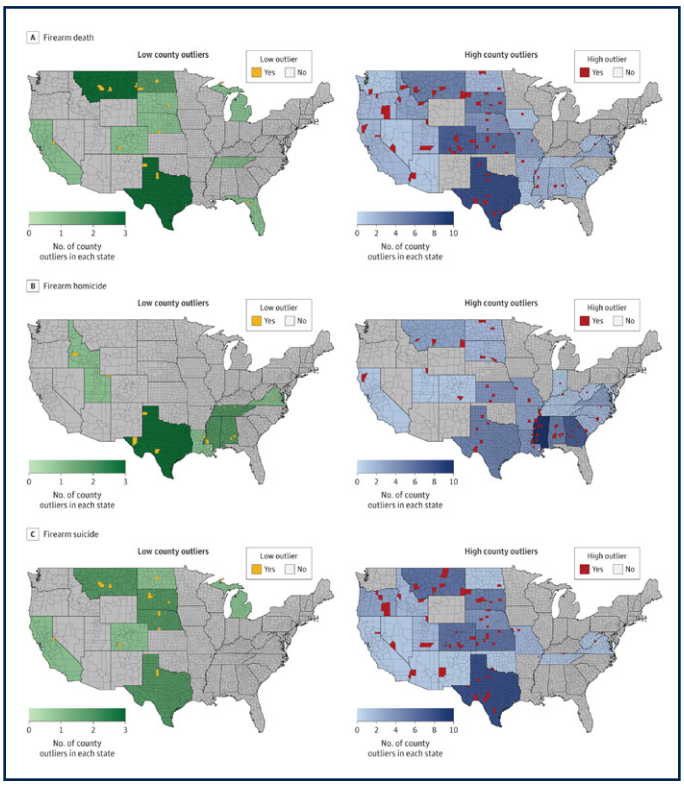
Firearm-Related Mortality Rate by State (2020)



12. https://www.cdc.gov/nchs/pressroom/sosmap/firearm_mortality/firearm.htm

Figure 2. Firearm Violence Spares No ZIP Code

Low and High County Outliers (Hot Spots) for Firearm Mortality Rates in 2015 to 2019, in the Contiguous 48 US States



13. doi:10.1001/jamanetworkopen.2022.15557

Non-fatal firearm-related injuries sustained by Americans from 2016 to 2018 totaled 228,380.[17] The clinical and financial burden of these injuries further underscores the severe individual and societal cost of firearm-related harm. A retrospective study examining healthcare-related costs from 2006 to 2014 of 150,930 firearm-injured patients arriving alive at a hospital found an annualized cost of approximately $2.8 billion, with higher costs associated with patients who died in the emergency department (ED) or were discharged to additional care.[14]

The American Medical Association's and the American Nursing Association's professional codes of ethics charge both doctors and nurses with safeguarding public health.[18,19] This obligation to protect and improve the health and well-being of people and their communities[20] is demonstrated by the successes of past and current public health initiatives. Historically, serious threats to public health, including smallpox, polio, human immunodeficiency virus (HIV), Ebola, Zika, mpox, tobacco use, vehicular accidents and opioid misuse and abuse, have been acknowledged, investigated and mitigated by a robust educational, intervention and scientifically informed public health response, even when involving extensive regulation (vehicular safety and tobacco, for example), without sacrificing individual rights.[21-28] These successes should inform the development and implementation of effective prevention and treatment modalities. Our recent experience with COVID-19 fulsomely demonstrates that when adherence to evidence-based public health standards is not followed, communities suffer and people die needlessly.

Firearm-Related Death and Injury Prevention: Healthcare Policies and Positions

The reduction of firearm-related death and injury is founded upon and in alignment with the recommendations and policies promulgated by internationally recognized healthcare organizations, scientists and public health practitioners. The following eight tenets are based upon the position statements endorsed by the World Health Organization,[29] the American Medical Association,[30] the American College of Physicians,[31] the American College of Surgeons,[32] the American College of Emergency Physicians,[33] the American Society of Anesthesiology,[34] the American Academy of Pediatrics,[35] the American Nurses Association,[36] the American Association of Nurse Practitioners,[37] the California Medical Association,[38] the American Public Health Association[39] and other leading healthcare providers.[40-44] The tenets include the following:

- **Firearm-related injuries and deaths are a crisis of health. Clinicians have an ethical and professional responsibility to treat it as they would any other serious public health threat.**
- **Adequate and unrestricted federal funding for firearm injury prevention research is needed.**
- **Interventions intended to prevent firearm-related injury and death must be evidence-based and tailored to the needs of citizens, families, communities and respectful to their status as firearm owners or non-owners.**
- **Existing laws regarding firearms should be enforced.**
- **Affordable mental health services should be immediately available to those at risk of perpetrating firearm-related harms and those exposed to firearm-related violence.**
- **Individuals with mental illness must not be stigmatized. Generally speaking, mental illness does not increase the risk of hurting others. Indeed, persons suffering from mental illness are more likely to be victims of violence than perpetrators.**

- **Clinician education is needed to increase awareness of risks, benefits and options related to firearm storage, carriage, handling and use. When relevant to the health encounter and potentially beneficial to individual, family and/or community health outcomes, clinicians can and should address these options with their patients directly and advise accordingly. Patient-centric education is the cornerstone concept of Firearm Health.**
- **When appropriate, clinicians should publicly advocate for their patients and communities to improve health outcomes, including the reduction of firearm-related injuries and deaths.**

We Are Ethically and Professionally Obligated to Approach Firearm-Related Injury as a Public Health Issue

As a preventable health crisis, firearm-related injury is a critical human and civil rights issue.[31,38]

A comprehensive health approach to firearm-related injury includes a population-based, prevention-focused, systems-based and inclusive approach that is blame free.[18,38,40-42]

Successful evidence-based methods and strategies used to combat other health crises, such as evaluating incidence, prevalence, root causes, research and public outreach,[21-23,31,42] can positively influence the public will and increase awareness. Collectively, these two elements — will and awareness — are critical to attitudinal and behavioral changes in community norms that are relevant to firearm-related morbidity and mortality-risk mitigation.[38,40,41,43]

Clinicians can play an important role in the promotion of health and well-being.[19,20] As such, we strive to prevent death and injury due to firearm-related misuse and negligent behavior when feasible.[38] Viewed through the lens of health, violence is a disease that requires preventative interventions, especially when there exists a risk of involving firearms.[44] Ideally, clinicians will work within a health system that supports education around firearm injury, its relevance to healthcare outcomes and support for patient communication, inclusive of strategies to mitigate potential risks associated with firearm ownership.[38,44] Furthermore, through their routine and customary medical practices, clinicians may be able to identify and facilitate the treatment of individuals at risk for perpetrating firearm-related harm, whether self-directed or interpersonal.[41,42]

Clinicians can work to improve health outcomes and build public trust by advocating for the health interests of their patients and communities. Similar nonpartisan actions can and should be applied to the health crisis of firearm-related injury and death, which may include engaging their medical group, hospital and partners with which they provide care in firearm-related injury prevention strategies.[45] Envision's proactive stance includes the following:

- **Support of this white paper.**
- **Making educational materials available to clinicians, patients and clinical support teams where appropriate.**
- **Participating in the development of national clinical quality measures aimed at reducing avoidable firearm injury.**
- **Encouraging dialogue about the misuse of firearms to perpetrate violence through employee active shooter event training.**[46]
- **Providing counseling and opportunities to support friends and colleagues who may experience psychological trauma when caring for patients of firearm-related tragedies.**

As trusted healthcare providers and community members, clinician engagement in activities designed to prevent firearm-related harm is a powerful means of informing our patients, families, colleagues and communities of our commitment to upholding our ethical and professional responsibilities to protect them from firearm-related injury and death.

Firearm Injury Prevention Research Funding

There is no lack of researchers, including clinician-investigators, interested in conducting firearm injury research. However, research requires funding. In 1996, the U.S. Congress enacted the 1996 Omnibus Consolidated Appropriations Bill, which stipulated that no firearm-related, injury prevention research funded through the CDC may be used to support or promote firearm control.[47-50] Known as the Dickey Amendment, this stipulation was included in every appropriations bill funding the CDC since 1996, thus effectively blocking the CDC from supporting firearm-related injury prevention research.[51] In 2011, the Dickey Amendment was applied to the National Institutes of Health, further curbing research of factors that contribute to this critical health problem. Firearm-related injury was the least researched cause of death in the United States between 2004 and 2015.[52]

Evidence-based interventions and best practices rely on research. Without a robust inquiry into the factors that contribute to firearm-related injury and death, tailored and effective interventions can neither be designed, tested nor implemented.

Congress again included the Dickey Amendment in a March 2018 spending bill but noted that the Secretary of Health and Human Services may authorize the CDC to research firearm injury causes.[53] In 2020, the CDC funded 18 studies aimed at preventing firearm-related deaths and injuries among children and adults.[54] Regrettably, the perceived distinction between firearm-related research and firearm control advocacy is unclear to many social and political leaders. This ambiguity has led to confusion and less impactful public health research efforts while a searing public health crisis continues without meaningful action.[51] The immediate solution is to eliminate all restrictions to government-funded firearm morbidity and mortality research, thus allowing for scientifically informed public health measures aimed at mitigating individual risk and enhancing community safety. Such efforts may be more efficient and impactful through the engagement of the firearm-owning community, who comprise a substantial and essential part of the "public" in the public health approach.

As Hills-Evans and colleagues noted, researchers in other areas of medical and scientific inquiry are increasingly seeking research funding from non-federal sources, and investigators researching firearm injury prevention should do the same.[49] Several foundations providing grant funding opportunities are focused on firearm-related policy and injury prevention.[55,56] The American Foundation for Firearm Injury Reduction in Medicine (AFFIRM) is now a program at the Aspen Institute. AFFIRM is a nonprofit coalition of physician and medical professional organizations (including the American Medical Association, the American College of Emergency Physicians, the Massachusetts Medical Society and the *Annals of Internal Medicine*) that recognizes the importance of physician leadership in this public health crisis and maintains a strictly nonpartisan focus on the health interests of patients, their families and our communities.[57] As such, AFFIRM at the Aspen Institute (AAI) is advocating for private and public funding for inclusive, community-centric, expert-led, multidisciplinary firearm injury prevention research.

Envision shares AAI's nonpartisan goal of increasing community safety and well-being through firearm-related research and education. Envision is actively engaging AAI to help provide clinicians and patients with requisite firearm health education and to identify research opportunities for our clinicians.

As community-based clinicians and clinical researchers, we also recognize the constraints of federal funding and understand the importance of institutional support for the research of firearm-related injury. The Envision Healthcare Research Institute (EVRI) supports both sponsor-funded research and investigator-initiated clinical research. EVRI offers Envision clinicians the guidance, support and infrastructure necessary to conduct urgently needed, innovative firearm health-related research that is tailored to the needs of the communities we serve.

Firearm-Related Injury Interventions

Although the incidence of firearm-related injury is nationally distributed, impacting all communities,[58] rates of firearm-related harm differ substantially by ethnicity, gender, age and socioeconomic status. As previously discussed, suicide prevalence exceeds homicide prevalence in the United States.[8,9,59] In 2015, suicide rates for men were 3.5 times that of women. Although most suicides are by non-Hispanic White people, American Indian/Alaska Native people had the highest rate of suicide, at 22.2 per 100,000. Firearm-related suicide accounts for almost half of all suicides in the United States and is the most common method of suicide by men and the second most common method by women.

Similarly, in 2015, male firearm-related homicide rates were nearly 4 times that of females, and rates among 20- to 29-year-old males were nearly 5 times that of females.[58] In the same year, African American people comprised more than half of all firearm-related homicide victims, with the highest homicide rate of any ethnic group (35.0 per 100,000), a rate 12.5 times that of non-Hispanic White men (2.8 per 100,000). Firearms were used in 70.3 percent of all homicides and were the most commonly used method of homicide by both men (75.2 percent) and women (52.0 percent).

Just as individuals who die by suicide or perpetrate homicides are a heterogeneous group, there are unique characteristics among those who perpetrate mass casualty shootings. A descriptive study of 97 mass casualty, firearm-related acts in the United States (defined as equal to or greater than three fatalities) between 1982 and 2018 found that the median age of perpetrators was 35 while the median age of school shooting perpetrators was 21.[60] Of 16 school shootings evaluated, 12 were perpetrated by individuals aged 18 and above. Males perpetrated nearly all of the mass casualty shootings referenced in the study (94 out of 97 incidents). Mental instability was associated with 53.6 percent of perpetrators, as discerned through diagnoses from civilian or military medical records, court proceedings specific to competency, family reports of a history of mental health diagnosis or news reports of family or acquaintance testimony. Yet, generally, psychiatric illness is not associated with harming others. Indeed, it tends to be a risk factor for being injured.[61]

Although individual-level differences in gender, age, ethnicity and race correlate with differences in firearm-related injury, research demonstrates that community-level factors, such as exposure to firearm misuse and negligent behavior at home and through social networks, or living in lower-income communities may increase the risk for firearm-related injuries and deaths.[62,63] Effective firearm injury prevention interventions must take many shapes and forms — there is no one-size-fits-all approach.

Acute medical care provided to persons injured by firearms may be the most publicly visible role for clinicians,[3] but not our only clinical role. In daily practice, we engage in individual-level firearm injury and mortality prevention by addressing known risk factors for harm, such as unsecured firearms in the home or in vehicles that may lead to access by unauthorized persons. We talk with and care for patients who may be at risk of perpetrating or being victims of firearm-related injuries, such as those with suicidal ideation, others who may be involved in violent intimate partner relationships, patients with substance use disorders with violent conduct or patients with declining cognitive function, among other relevant presentations.[3] Newly developed evidence-based screening tools and community interventions are becoming available to further support firearm-related harm. One such intervention, the SaFETy Score, holds promise for predicting risk of future interpersonal firearm-related harm among urban young people aged 14 to 24.[64] This four-item risk-prediction tool incorporates the number of patient-received firearm threats, firearm shots heard, fight frequency and friends carrying weapons. The SaFETY Score further stratifies risk and informs tailored preventive interventions. Suicide risk assessment and prevention strategies may also be applied by practitioners within all specialties.

Universal suicide screening (i.e., the Patient Safety Screener) is a secondary screening tool sometimes used by an emergency department clinician following a positive initial screening. The introduction of follow-up telephone calls after hospitalization, ideally with partner or caregiver involvement, has resulted in a relative suicide risk reduction of 20 percent among patients aged 24 to 47.[65]

Pervasive community firearm-related injury can be modeled and addressed medically as an endemic public health problem. The Cure Violence Health Model attempts to interrupt firearm-related violence transmission by decreasing the overall risk for firearm misuse and by altering community norms through utilization of trained community workers who actively and directly engage victims of firearm violence, families and friends both inside and outside of hospital settings.[66] Partnerships with local hospitals that share data are critical elements of this program and have been successfully implemented in large cities worldwide. These and other community-shared interventions, such as the widely successful hospital-based violence intervention programs, offer opportunities to actively engage in preventing injuries and death related to firearm misuse and negligent behavior.

Mental Health

In its position paper on firearm-related injuries and deaths in the United States, the American College of Physicians warned against the widespread stigmatization of patients with mental health issues.[31] It is essential that patients receive proper and timely diagnosis, that they are provided access to care and treatment and that they are followed by clinicians with appropriate training to prevent and reduce the risk of firearm-related suicide, homicide, victimization, injury and death. Envision, a clinician-led medical group, is aligned with this view.

Scant population-level evidence supports the assumption that individuals with mental illness are more likely than others to commit firearm violence.[67] Only 4 percent of all violent acts in the United States can be directly attributed to mental illness. The influence of other contributing factors, such as a history of prior violent conduct (especially if recent), childhood abuse and other traumatic experiences, binge drinking, substance abuse and adverse social determinants of health, may be far more relevant to the underlying problem.

Firearm death rates have increased in the United States.[68] For example, from 2019 to 2020, homicides due to firearms increased by approximately 35 percent. However traumatic, disruptive and painful to families and their communities, the publicity and media awareness surrounding these events conditions the public to both fear and stigmatize those with mental illness.[69] Envision clinicians are committed to ending mental health stigmatization that incorrectly implicates firearm violence.

The larger medical issue is the protection of and care for those individuals who are diagnosed with mental illness because — counter to media and social depictions and as previously stated — they are far more likely to be victims of interpersonal violence than perpetrators. Patients in this group, however, are also at higher risk of self-directed harm, including suicide.[59] One way we can enhance the safety of this vulnerable group is by advocating for the legitimate need of clinicians to understand and recognize the risk of self-directed or interpersonal harm among patients. When the risk of harm is identified, it becomes relevant to consider and discuss firearm access and storage and to put time and distance between the firearm and the person at risk of misusing it. In such instances, it is essential for clinicians to explain their clinical concerns about specific health outcomes related to firearm access.[70] This contextual, patient-centric practice may help to mitigate risk for patients at risk for firearm-related injury or death. Labeling patients with mental illness as the population most dangerous to their communities is both unfounded and unwarranted.

Innovative Approaches

To effect real change, action is necessary. We must be aware not only of the relationship between health factors that influence violent behaviors and firearm access but also of our role in advising patients and their families on firearm injury risk reduction strategies in the appropriate context.[71] The mission of medicine inspires us to use our First Amendment[70] rights in support of our patients, their families and our communities, and as healthcare leaders, clinicians' views are respected and influential.[72] As evidenced by AFFIRM at the Aspen Institute, clinicians who use their voices and influence to maintain a nonpartisan, health-oriented perspective are also well placed to connect an essential diversity of stakeholders committed to positively impacting their communities. The clinicians of Envision, joined by colleagues around the nation, should advocate for the implementation of nonpartisan, evidence-based, health-oriented strategies to reduce firearm-related injury and death and collaborate with their communities (both faith-based and secular) in a shared mission of reducing firearm-related injury and death at every opportunity.

Conclusion

As clinicians, we are embedded in our communities. We are the safety net of care for all who need it. We share common ground — and common suffering — with our patients and their families. We also reflect our communities' views on firearm ownership and safety, as the percentage of physicians who own guns may even exceed that of the general population.[73] Our diverse views are not a weakness but instead strengthen our approach to ending firearm-related injury and death by allowing us to support evidence-based, patient-centric firearm safety strategies while also understanding and respecting diverse views on firearm ownership.[70]

Preventing firearm-related injury and death in our communities is founded upon our belief that the issue is a serious threat to our collective health and well-being. As clinicians, we have an ethical obligation to support and protect our patients and their families from firearm injury. We support appropriate and unrestricted federal funding for nonpartisan firearm injury prevention research. We encourage implementing evidence-based, compassionate and effective firearm injury preventive interventions into clinical practice. We promote stigma-free mental health screening and connections to care for our patients. We also advocate for an objective forum to discuss and innovate firearm injury prevention strategies with our patients, their families and our communities. We are committed to engaging our patients in honest, transparent, non-judgmental discussions about firearms, firearm health and the risk of firearm misuse and related injuries. Finally, we understand that not all clinicians feel comfortable discussing firearm safety with their patients, but as with any form of preventative healthcare, education relative to firearm safety and how best to communicate this information remains a major focus.

Envision's leaders and clinician colleagues endeavor to engage stakeholders with varied views and experiences, ask questions, conduct research and select, test and implement interventions. This inclusive and comprehensive approach, consistent with our clinicians' deep community ties and shared common experiences, allows us to connect with and care for patients and their families from a place of shared values. This unique relationship places us at the fulcrum of this public health crisis and helps us realize our shared goal to make our homes, schools and communities safe from firearm-related morbidity and mortality.

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