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Firearm Violence in America: A Growing Health Problem

Abstract
Firearm injury is a disease that afflicts many individuals in the United States, either directly or indirectly. Trauma and critical care nurses have direct experience with this life-threatening disease and recognize the high lethality and life-altering consequences of these injuries. The magnitude of this health problem requires a focus on primary prevention. We recognize that any focus on firearm injury is often contentious and political; however, nurses bring a ready-made credibility and focus on evidence-based practice to the prevention of this disease.

Keywords
firearm, violence, injury, prevention

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Critical Care Nursing Clinics of North America: ***Firearm Violence in America: A Growing Health Problem***

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Each year, nearly 30,000 people die in the United States from gunshot wounds [1], [2] and every day more than 160 people require emergency department treatment for non-fatal gunshot wounds. [3] Firearm injury is the second leading cause of injury death following only motor vehicle crashes. [4] When both direct and indirect costs of fatal and non-fatal firearms are considered, the cost of firearm injury exceeds 120 billion dollars. [5, 6]

Critical care and trauma nurses frequently manage patients who sustain gunshot wounds and are well versed in managing the physical consequences of these injuries. Because of the lethality of firearms as a mechanism of injury, it becomes essential that nurses look beyond the management of the gunshot wound to consider the risk factors for firearm injury. Just as nurses focus on promoting health by working with patients and families to minimize cardiac risk factors, we need to develop strategies to prevent the disease of firearm injury. This article explores the magnitude of the problem of firearm injury and its known and presumed risk factors.

Nursing has the potential to add an important voice to the dialogue about firearm violence in the United States. Because much of the discussion about guns is highly politicized and emotional, it has been difficult to study firearm injury as a health problem and to design and test interventions to reduce it. For example, although the fatality rate of firearm violence is similar to HIV/AIDS - a recognized epidemic by the Center for Disease Control and Prevention (CDC), [7] the funding of scientific studies lags

dramatically. HIV/AIDS research was awarded the highest amount of funding from the CDC in 2004, in excess of $800 million dollars. [8] However, since 1997, the CDC has been limited in its ability to fund research about firearm injury - despite the fact that it is the second leading cause of injury death. [9] The lack of sustained financial support for research on a major cause of injury death creates roadblocks in reducing this cause of injury.

Urban trauma centers experience a disproportionate number of patients admitted with firearm injury. However, firearm injury and death are not solely an urban problem. [10] Surprising to most, rural areas experience firearm mortality rates comparable to those found in urban areas; the difference is in the intent. In rural areas, the rate of firearm suicides closely resembles the rate of firearm homicides in urban cities. [11] Because of the high fatality rate and immediacy of death when firearms are used in suicide, rural trauma centers rarely see these patients, helping to make firearm suicide invisible to clinicians.

Magnitude of the Problem

In 2002, there were 30,242 firearm deaths in the United States. Suicide is the most frequent cause of firearm death, occurring at a higher rate than homicide. [16] Firearm suicide is the second leading cause of death for individuals' ages 55 to 64 years and the third leading cause of death for those ages 10 to 54 years. Firearm homicide is the second leading cause of death for ages 15 to 34 years and the fourth leading cause of death for ages 5 to 14 years and 35 to 44 years. Overall, for all ages, firearm suicide ranks second and firearm homicide ranks fourth as leading causes of injury death. [17]

Recently the World Health Organization identified violence as a priority public health concern globally. Many weapons and intents are involved with violent injury and need to be studied. In the United States, firearms and violence are a major concern. Violence and firearm death rates in the US are disproportionately high when compared to other industrialized countries. The US contributes about 30,000 of the estimated 115,000 reported firearm deaths from approximately 50 upper- and middle-income countries. [18] Among industrialized nations, the US firearm-related death rate is more than twice that of the next highest country. Compared to high-income Asian countries (Taiwan, Singapore, Hong Kong, and Japan), the firearm mortality rate in the US is over 70 times higher (14.24 in the US compared to 0.1925 in Asia). [15] When we expand international comparisons to all countries, the U.S. remains among the top five countries in terms of number of firearm deaths and crude firearm death rates. The other four countries in the top tier are Colombia, South Africa, Brazil, and Mexico. [16]

The burden of firearm injury is borne predominately by men and this is true among all industrialized countries. Women, however, are also affected and women in the U.S. die from firearm injuries in a higher proportion than in most other high-income countries. [15] Nor are children immune from firearm injury; in 1995, the overall firearm-related death rate among American children younger than 15 years was nearly 12 times higher than for children in 25 other industrialized countries combined. [17]

A recent study estimated the years of life lost to firearm deaths and the contribution of these deaths to the gap in life expectancy. The average American loses 103.6 days of life due to firearm deaths, including 45.9 days from homicides and 52.3 days from suicides. The disproportionate effect of firearm homicides on young black

males and firearm suicides on white males creates a greater loss of life for those populations. Young black males lose nearly one full year (300 days) and white males lose five months (100 days) as a result of firearm deaths in the U.S. [18]

Firearm injury is a costly disease. The average direct cost of medical care is about $17,000 per gunshot injury. Annually, lifetime medical costs are estimated at between $2 and $3 billion, with assaults accounting for $1.7 billion or 74% of the total costs. Government programs cover between 40 – 50% of these costs; private insurance covers 18% and 33% by other sources. These costs may result in increased costs for other patients. Since many victims have limited ability to pay for medical care, hospitals defer this unpaid debt, resulting in increases in insurance costs. [5] Adding to the direct cost of injury are the non-monetary costs of pain, suffering, and lost quality of life (e.g. loss of paid and unpaid work). The total figure for all firearm injuries is close to $123 billion. [6]

Intent of Firearm Injuries and Deaths

Interpersonal. Interpersonal violence with firearms account for more firearm injuries but fewer deaths than self-inflicted injuries. Most recent data puts the homicide rate in the United States at 6.12 per 100,000 - a total of 17,638 deaths. Firearms are the weapon of choice a majority of the time. [2] Historical increases of the homicide rate in the United States have been attributed to the increase of violent acts committed by young people. This increase in youth homicide and violence was predominantly due to a significant increase in the use of handguns by youth. [19], [20]

Interpersonal firearm injury and firearm homicide victims are disproportionately young, black and male. In 2002, the majority (78%) of homicide victims were 40 years of age and younger and 54% percent of victims were between 15 and 29 years. Black males and black females are more likely to be the victims of firearm homicide than their white counterparts. The age-adjusted rate of firearm homicide among black males in 2002 (28.6 per 100,000) was more than eight times that of white males (3.4 per 100,000). Black males ages 20-24 years had the highest rate at 105.5 per 100,000 people. [2], [21]

Ethnographic accounts of violent urban areas imply that young, inner city black males carry and use a firearm differently than other youth. A firearm in the inner city improves youths' image by presenting a "bad" and dangerous persons and can increase their perceived level of respect from others in the community. They are not only more likely to carry a gun, but also to use them to kill, rather than threaten, another person or adversary. [22], [23], [24]

Self-inflicted. Suicide is the 11th leading cause of death among Americans [2] and a firearm is used almost 60% of the time. [25] Due to their lethality, attempts with firearms result in death 70-90% of the time. By contrast, only 10-15% of suicide attempts by any other means are fatal. [26]

Firearm suicide mostly affects middle-aged and elderly (over age 75) white males. [13] About 80% (13,809) of the firearm suicide victims in 2002 were white males, a rate of 11.92. [12] Females attempt suicide 3 times more frequently than males, however males are more likely to use a firearm. [27] Consequently, more male suicide attempts are fatal. In 2002, 59% of suicides among males and 33% among females were committed with a firearm. [28], [12] Firearm suicides are more prevalent among

Hispanics, American Indians and Alaskan Natives compared to other ethnic groups, especially among males. Between 1979 and 1997, the rate of firearm suicide among African-American males ages 15 to19 increased by 133% (from 3.6 per 100,000 to 8.4 per 100,000), while the rate among same-age white males increased only 7% (from 9.7 per 100,000 to 10.4 per 100,000). [29]

Unintentional. Unintentional firearm deaths represent a small proportion of firearm fatalities and have steadily declined since the 1930s. This decline is positive, but it is important to remember that when firearms are unintentionally fired, the injuries are less likely to be lethal. Thus for every unintentional firearm death there are 13 people treated for a non-fatal unintentional firearm injury. [30]

Risk Factors for Firearm Injury

Emergency department, trauma center, and hospital staff witness the effects of firearm injury and death daily. Professional associations such as the American College of Physicians [31], the American Academy of Emergency Medicine [32], and the American Academy of Pediatrics [33] have made public statements or issued position papers identifying firearm injury as a public health epidemic and highlighting the unique role physicians, nurses and hospital staff can play in prevention.

Viewing firearm violence as a public health issue broadens the way by which we can consider and evaluate risk for firearm injury. It is not solely about the gun, but an array of factors that come together at a point in time (the gun, bullets, the gun carrier, and the injured) in a complex environment (e.g. social, economic, physical, and cultural).

Simply owning a firearm puts an individual at risk. A gun in the home is a risk factor for gun-related homicide and suicide as well as unintentional injuries and death. [34], [35], [36] Estimates put firearms in approximately one-third of US households with nearly 200 million privately owned guns. [37] The correlation between firearm availability and rates of homicide and suicide is consistent across high-income industrialized nations: where there are more firearms, there are higher rates of homicide and suicide overall. [37], [38], [39]

Firearm homicide is more likely to occur outside of the home, during nighttime activity where there is a high number of people coming and going with low levels of guardianship (family members, friends, teachers, police, etc.). [40] This indicates the importance of the environment and points to potential points of intervention. Such as removing guns from legally prohibited carriers or changing the environment by increasing the adult presence and vigilance in high-risk environments.

Suicide differs from homicide in that the gun carrier is him/herself the victim. Studies have consistently found that the presence of a gun in the home is a risk factor for suicide in the home for all household members, and that the purchase of a firearm from a licensed dealer is associated with becoming a suicide victim. [25], [34] Additionally, a loaded gun, an unlocked gun, and/or access to a handgun are also closely associated with suicide. [38], [41]

Firearm injury occurs in complex environments. Just as we can effectively reduce firearm violence by interrupting one of the paths (gun, carrier, victim), understanding the environments where firearm violence occurs also provides points for intervention. Even those not directly affected by firearm homicides or suicides or living in a violent

community are still susceptible to the impact of firearm deaths on society. The introduction of firearms into a community at risk for economic, physical and social disorder can signal the beginning of a downward cycle. [42] In 1995, Hemenway, Solnick and Azrael examined the connection of firearms and community feelings of safety. They found that 85% of non-gun owners reported they would feel less safe if more people in their community acquired firearms. When a neighbor purchases or owns a firearm, it can send a message to the community that crime has increased and there is a need for protection. [43] An increase in fear may cause neighbors to avoid one another, a reduction in community interaction, and weak group membership and external bonds. [42] Together, these can create low levels of social trust, cohesion and collective efficacy. Neighborhoods that lack social supports experience an increase in neighborhood violence, violent victimization, and homicide. [42], [44] All of which reinforces the message that there is a need for protection and, possibly, the need for a firearm [45], [42]; creating a cycle of disinvestment and decline in a community and an increase in violence and firearms. [42]

Reducing Firearm Injury

Injury scientists are credited with one of the 10 top public health achievements of the 20th Century - reducing deaths from motor vehicle crashes. [46] The success in reducing crash-related deaths was not linked to removing all cars from society, but rather by improving car design (e.g. seat belts, air bags); altering behavior (e.g. making it socially unacceptable to drink and drive); and changing the environment (e.g. improved highway design, rumble strips on the right side of major highways). We can follow this very model to reduce firearm injury. [14] Such interventions as improving gun design

(load chamber indicators; magazine safeties) [47]; altering behavior (e.g. unload and lock all guns at all times) [48]; and changing the environment (e.g. removing drug markets) [19] should all be considered.

However, research is still needed in the field of firearm injury. According to the recent report, *Firearms and Violence: A Critical Review*, by the National Research Council, there is an insufficient body of evidence by which to evaluate the effectiveness of firearm prevention programs. Many programs have not been evaluated, leaving questions about their impact on firearm violence. The report recommends that, "existing and future firearm violence prevention should be based on general prevention theory and research and incorporate evaluation into the implementation design". [49]

Nurses are in a unique position to move beyond the care of the gunshot wound patient to work within their communities to reduce firearm injury. Because we deal first hand with consequences of gun shot wounds to patients and families, nurses bring credibility to the discussion. Keeping the suggestions of the National Research Council in mind, the acronym SPEAK UP represents the steps necessary to examine the problem within one's own community (See Table 1). By staying data-driven, supporting evidence-based interventions, and recognizing the multiple points of intervention (gun, carrier, victim behavior, and environment), nurses can facilitate primary prevention interventions.

Conclusion

Firearm injury is a disease that afflicts many individuals in the United States, either directly or indirectly. Trauma and critical care nurses have direct experience with this life-threatening disease and recognize the high lethality and life-altering

consequences of these injuries. The magnitude of this health problem requires a focus on primary prevention. We recognize that any focus on firearm injury is often contentious and political; however, nurses bring a ready-made credibility and focus on evidence-based practice to the prevention of this disease.

Summary Points:

- Firearm homicide and suicide are leading causes of violent death in the United States
- Firearm injury is a public health problem that requires a focus on primary prevention
- Trauma and critical care nurses are well prepared to focus on evidence-based prevention of firearm injury

Table 1: Speak Up: How to Examine the Problem in Your Own Community

Step	Explanation	Example
Speak from data	What kind of data?	- Person: Intent, Location, Demographics - Weapon: Type, Make, Model - Circumstances
	Where did the data come from?	- Hospital Sources - Medical Examiner - Crime Lab - Law Enforcement
	How do we get it?	- Develop partnerships with data owners
	What do we do with it?	- Use data to describe the problem in your community
Pull in Experts	Identify key individuals	- Experts and stakeholders
Educate Yourself & Others	Educate yourself	- Read, read and read some more - Start with the national picture and move to your local community - Get information on 2 key pieces: public health profile of firearm violence and local laws and regulations that affect your community
	Educate others	- Generate discussions in a variety of public forums: community clubs, meetings of business leaders, local legislators - Use data from the community, ground discussions in data, firearm violence is a public health issue - Remind everyone to always look at the facts
Advocate for Effective Interventions	Advocate for national, state and local data surveillance and intervention systems	- National Violent Death Reporting System: uniformed, detailed information on violent deaths and provides data to direct interventions and evaluate policy decisions
	Where to focus? Know the unique profile of your local community to help guide interventions	- Universal interventions focus on every one - Selected interventions focus on high-risk groups - Indicated interventions focus on high-risk individuals
	Maximize your advocacy: one message with many messengers.	- Message – to decrease injury and death - Messengers - health care providers; advisory board members; community coalition members; local politicians; local media
Know How Interventions will be Evaluated	Does the intervention make a difference?	- Possible measures include: Reduced firearm mortality Reduced serious injury Increased knowledge of community leaders Change in behavior
Unite on Common Ground	Is there common ground?	- Reasonable middle ground includes: Support data/research Create safe environments and behaviors Influence by education Support enforcement of laws Develop community responsibility
Prepare for Other Viewpoints	Prepare for opposing view points	- Know your data - Know its strengths and weaknesses - Stay on message - Remember the goal is to reduce injuries from firearm violence – a goal that all members of society can support

References:

1. Ikeda RM, Gorwitz R, James SP, Powell KE, Mercy JA. Fatal firearm injuries in the United States 1962-1994. Violence Surveillance Summary Series 1997;(3).

2. U.S. Centers for Disease Control and Prevention WISQARS database. Centers for Disease Control and Prevention. (Accessed April 18, 2005, at http://www.cdc.gov/ncipc/wisqars/.)

3. Wiebe, D. Homicide and suicide risks associated with firearms in the home: a national case-control study. Ann Emerg Med 2003;41(6):771-782.

4. State Injury Profiles 2001. Centers for Disease Control and Prevention (Accessed April 18, 2005, at http://www.cdc.gov/ncipc/StateProfiles/index.htm.)

5. Cook PJ, Lawrence BA, Ludwig J, Miller TR. The medical costs of gunshot injuries in the United States. JAMA 1999;281(5):447-454.

6. Miller, TR, Cohen MA. Costs of gunshot and cut/stab wounds in the United States, with some Canadian comparisons. Accid Anal Prev 1997;29(3):329-341.

7. HIV/AIDS prevention strategic plan through 2005. Centers for Disease Control and Prevention. (Accessed August 9, 2005, at http://www.cdc.gov/hiv/partners/PSP/Changing_Epidemic.htm.)

8. FY 2005 CDC/ATSDR Appropriation Fact Sheet. CDC Financial Management Office. (Accessed August 9, 2005 at http://www.cdc.gov/fmo/fmofybudget.htm.)

9. Branas CC, Wiebe DJ, Schwab CW, Richmond TS. Getting past the "f" word in federally funded public health research. Inj Prev 2005;11:191-192.

10. Harris AR, Thomas SH, Fisher GA, Hirsch DJ. Murder and medicine: the lethality of criminal assault 1960-1999. Homicide Studies 2002;6(2):128-166.

11. Branas CC, Nance ML, Elliot MR, Richmond TS, Schwab CW. Urban – rural shift in intentional firearm death: different causes, same results. Am J Public Health 2004;94(10):1750-1755.

12. CDC Wonder data. Center for Disease Control and Prevention. (Accessed November 11, 2005, at http://wonder.cdc.gov/mortSQL.html.)

13. CDC Injury Death Chart. National Center for Injury Prevention and Control. (Accessed November 9, 2005, at http://www.cdc.gov/ncipc/wisqars.)

14. Krug EG, Dahlberg LL, Mercy JA, Zwi AB, Lozano R, eds. World Report on Violence and Health. Geneva: World Health Organization; 2002.

15. Krug EG, Powell KE, Dahlberg LL. Firearm-related deaths in the United States and 35 other high- and upper-middle-income countries. Int J Epidemiol 1998; 27: 214-221.

16. Richmond TS, Cheney R, Schwab CW. The global burden of non-conflict related firearm mortality. Inj Prev In Press.

17. National Center for Injury Prevention and Control. Rates of homicide, suicide, and firearm-related death among children—26 industrialized countries. Morbidity and Mortality Weekly Report 1997;46(5):101-105.

18. Lemaire J. The cost of firearm deaths in the United States: reduced life expectancies and increased insurance costs. The Journal of Risk and Insurance 2005;72(3):359-374.

19. Blumstein A. Youth, guns, and violent crime. Children, Youth and Gun Violence 2002;12(2):39-53.

20. Beaman V, Annest JL, Mercy JA, Kresnow M, Pollock DA. Lethality of firearm-related injuries in the United States population. Ann Emerg Med 2000;35(3):258-66.

21. Kochanek KD, Murphy SL, Anderson RN, Scott C. Deaths: final data for 2002. National Vital Statistics Reports. Hyattsville, MD: National Center for Health Statistics; 2004.

22. Anderson, E. Code of the Street: Decency, Violence, and the Moral Life of the Inner City. New York: W. W. Norton, 1999.

23. Nielsen AL, Martinez R, Rosenfeld R. Firearm use, injury, and lethality in assaultive violence: an examination of ethnic differences. Homicide Studies 2005;9(2):83-108.

24. Wilkinson, D L. Violent events and social identity: specifying the relationship between respect and masculinity in inner-city youth violence. Sociological Studies of Children and Youth 2001;8:235-269.

25. Miller M, Hemenway D, Azrael D. Firearms and suicide in the northeast. J Trauma 2004;57:626-632.

26. Jamison KR. Night Falls Fast: Understanding Suicide. New York: Knopf; 1999.

27. U.S.A. Suicide: 2002 Official Final Data. American Association of Suicidology. (Accessed April 5, 2005, at http://www.suicidology.org/displaycommon.cfm?an=1&subarticlenbr=44.)

28. Annest JL, Mercy JA, Gibson DR, Ryan GW. National estimates of nonfatal firearm-related injuries: beyond the tip of the iceberg. JAMA 1995;273(22):1749-1754.

29. Joe S, Kaplan MS. Firearm-related suicide among young african-american males. Psychiatric Services 2002;53(3):332-4.

30. Gotsch K.E., Annest J.L., Mercy J.A., Ryan G.W. Surveillance for fatal and non-fatal firearm-related injuries—United States, 1993–1998. Morbidity and Mortality Weekly Report 2001;50(SS-2):1-36.

31. Ginsberg JA. Firearm injury prevention. Ann Intern Med 1998;128(3):236-241.

32. American Academy of Emergency Medicine and Firearms Injury Prevention. American Academy of Emergency Medicine. (Accessed August 16, 2005, at http://www.aaem.org/committees/firearms.shtml.)

33. American Academy of Pediatrics. Firearm-related injuries affecting the pediatric population. Pediatrics 2000;105:888-895.

34. Wiebe D. Homicide and suicide risks associated with firearms in the home: a national case-control study. Ann Emerg Med 2003;41(6):771-782.

35. Wiebe D. Firearms in US homes as a risk factor for unintentional gunshot fatality. Accid Anal Prev 2003;35:711-716.

36. Wintemute G. Mortality among recent purchasers of handguns. N Engl J Med 1999;341:1583-1589.

37. Hemenway D, Miller M. Firearm availability and homicide rates across 26 high-income countries. J Trauma 2000;49(6):985-988.

38. Brent DA, Bridge J. Firearms availability and suicide: evidence, interventions, and future directions. American Behavioral Scientist 2003;46(9):1192-1210.

39. Hepburn LM, Hemenway D. Firearm availability and homicide: a review of the literature. Aggression and Violent Behavior 2004;9:417-440.

40. Branas C, Richmond T, Schwab C. Firearm homicide and firearm suicide: opposite but equal. Public Health Rep 2004;(119):114 – 119.

41. Conwell Y, Duberstein PR, Connor K, Eberly S, Cox C, Caine ED. Access to firearms and risk for suicide in middle-aged and older adults. Am J Geriatr Psychiatry 2002;10(4):407-416.

42. Kawachi I, Kennedy BP, Wilkinson RG. Crime: social disorganization and relative deprivation. Soc Sci Med 1999;48:719-731.

43. Hemenway D, Solnick SJ, Azrael DR. Firearms and community feelings of safety. Journal of Criminal Law and Criminology 1995;86(1):121-132.

44. Kennedy BP, Ichiro K, Prothrow-Stith D, Lochner K, Gupta V. Social capital, income inequality, and firearm violent crime. Soc Sci Med 1998;47(1):7-17.

45. Wei E, Hipwell A, Pardini D, Beyers JM, Loeber R. Block observations of neighbourhood physical disorder are associated with neighbourhood crime, firearm injuries and death, and teen births. J Epidemiol Comm Health 2005;59:904-908.

46. National Center for Injury Prevention & Control. Achievements in public health, 1900-1999. Motor-vehicle safety: a 20th century public health achievement. Morbidity and Mortality Weekly Reports 1999;48(18):369-374.

47. Vernick JS, O'Brien M, Hepburn LM, Johnson SB, Webster DW, Hargarten SW. Unintentional and undetermined firearm related deaths: a preventable death analysis for three safety devices. Inj Prev 2003;9(4):307-311.

48. Grossman DC, Mueller BA, Riedy C, Dowd MD, Villaveces A, Prodzinski J. Gun storage practices and risk of youth suicide and unintentional firearm injuries. JAMA 2005;293(6)707-714.

49. Wellford CF, Pepper JV, Petris CV, eds. National Research Council. Firearms and Violence: A Critical Review. Committee to Improve research Information and Data on Firearms. Washington, DC: The National Academies Press; 2005.