The National Violent Death Reporting System

Past, Present, and Future

Alex E. Crosby, MD, MPH,[1] James A. Mercy, PhD,[1] Debra Houry, MD, MPH[2]

Each and every day in the U.S., more than 160 people die as a result of violence due to homicides and suicides.[1] These violent deaths constitute an urgent public health problem. Homicide and suicide, taken together, were the fourth leading cause of years of potential life lost in the U.S. in 2014.[2] Each year, more than 55,000 people die in the U.S. as a result of violence-related injuries.[3] In 2014, suicide was the tenth leading cause of death, claiming more than 42,000 lives[1] and resulting in an economic cost estimated to be $53.2 billion, largely associated with lost work productivity.[4,5] From 2005 to 2014, the national suicide rate rose for 9 straight years from 10.9 per 100,000 in 2005 to 13.0 per 100,000 in 2014, an increase of more than 18%,[6] and now ranks as the second leading cause of death among adolescents and young adults.[7,8] Homicide rates in the U.S. have declined over the long term, but are still a major problem resulting in an economic cost estimated at $26.4 billion.[2,5] Among high-income nations, the U.S. historically has the highest homicide rate.[9] Homicides disproportionately affect boys and men, adolescents and young adults, and certain racial/ethnic groups, such as non-Hispanic blacks, non-Hispanic American Indian/Alaska Natives, and Hispanics.[10] These groups have not experienced the same level of decline and, in some cases, rates have increased.[11] Homicide is the third leading cause of death for 10- to 24-year-olds in the U.S. and the leading cause of death for male and female African Americans aged 10–34 years.[1] Suicide and homicide are preventable, but to address this problem as efficiently and effectively as possible, practitioners need data that are both timely and provide information that is useful in guiding preventive actions.

The National Violent Death Reporting System (NVDRS) provides data on violent deaths that are critical for informing prevention strategies and tracking progress in reducing homicides and suicides. NVDRS was created as a response to a 1999 Institute of Medicine report outlining the need for a national fatal intentional injury system.[12] In 2001, the U.S. National Strategy for Suicide Prevention developed from the U.S. Public Health Service's Surgeon General's Office also recommended starting NVDRS[13] and, in 2002, the Institute of Medicine added its recommendation that the Centers for Disease Control and Prevention (CDC) establish NVDRS.[14] Before implementation of NVDRS, single data sources (e.g., death certificates or law enforcement data systems) provided only limited information and few circumstances from which to understand patterns of violent deaths. NVDRS fills this gap in surveillance as the first multistate system to provide detailed information on circumstances precipitating violent deaths, the first to link multiple source documents on violence-related deaths to enable researchers to understand each death more completely, and the first to link multiple deaths that are related to one another (e.g., multiple homicides, multiple suicides, and cases of homicide followed by the suicide of the suspected perpetrator).[12] The three main goals of NVDRS are to:

1. collect detailed information about violent deaths in the U.S., including when, where, and how they occurred;
2. link data collected by law enforcement, vital statistics, and coroners' offices into the reporting system; and
3. provide information to help public health officials, violence prevention groups, law enforcement, and policymakers better understand the problems and guide national, state, and local actions to prevent violent deaths.

Each of the individual sources of information (death certificates, coroner/medical examiner, law enforcement)

From the [1]Division of Violence Prevention, National Center for Injury Prevention and Control, Centers for Disease Control and Prevention, Atlanta, Georgia; and [2]National Center for Injury Prevention and Control, Centers for Disease Control and Prevention, Atlanta, Georgia

Address correspondence to: Alex E. Crosby, MD, MPH, Division of Violence Prevention, National Center for Injury Prevention and Control, Centers for Disease Control and Prevention, 4770 Buford Highway NE, MS F-63, Atlanta GA 30341. E-mail: aec1@cdc.gov.

This article is part of the supplement issue titled National Violent Death Reporting System: Analyses and Commentary.

0749-3797/$36.00

http://dx.doi.org/10.1016/j.amepre.2016.07.022

by themselves are valuable, but compiled together, the richness of NVDRS is unparalleled. For example, although electronic death records can report on rates and trends in violent deaths in a timely fashion, they often do not include the circumstances of the event that are available in the medical examiner/coroner's report, nor do they record any information on the perpetrator that is contributed by law enforcement data. Medical examiner/coroner records can add information such as prior mental illness, recent crises in the decedent's life, whether the person had disclosed their suicidal intent to anyone, or chronic medical conditions, but will not include information such as a restraining order (from law enforcement data). Together, these data give a much fuller picture and can allow for a more informed prevention effort. Further, NVDRS using all of its sources of data is often more accurate at identifying specific types of violent death (e.g., deaths due to lethal force being used by law enforcement officers in the line of duty; homicides followed by suicides) and can identify more cases than single data sources.[15]

Data can be generated from NVDRS that allow for characterization of violent deaths in ways that were previously very difficult to do and that open up new possibilities for prevention. NVDRS, for example, allows researchers to link violent deaths that occur in the same event. In one study of homicides followed by suicides, researchers were able to show that the majority of the incidents were associated with prior intimate partner conflicts and make recommendations for prevention of those kinds of events.[16] Investigators who use death certificates alone can only access limited information about the circumstances of homicides or suicides but, most importantly, they are unable to link suicide incidents with the relevant homicide(s). The rich circumstantial information that is generated by NVDRS allows investigators to examine issues that would not be possible with death certificate, law enforcement, or medical examiner/coroner information alone. For example, researchers at CDC were able to conduct a study examining the association between eviction and foreclosure and suicides. They documented significant increases in eviction- and foreclosure-related suicide during the U.S. housing crisis of the mid-2000s.[17] In another example, results from research using NVDRS data have called into question some commonly held beliefs about suicides among military personnel. Logan et al.[18] showed that the most common precipitating factor associated with suicide among active duty personnel was intimate partner problems, suggesting that intimate partner problems are as important, if not more, than military stress. Another study by Kaplan and colleagues[19] showed that veterans were at higher risk for suicide compared with nonveterans in all age groups except the oldest (>65 years), and that a focus should be made on the younger veteran population. A multiple-state study of intimate partner homicide and corollary homicides demonstrated that the burden of intimate partner violence extends beyond the couple involved and often involves family members and friends.[20] These types of findings strengthen initiatives focusing on identifying at-risk persons in diverse environments and preventing these deaths.[21]

State Health Departments that collect NVDRS data have used the data to great effect to identify areas of need and provide data to parties that are involved in addressing those problem areas. For example, the Oregon Violent Death Reporting System staff developed a report describing the patterns of suicide among veterans in the state. They also worked with the local Veterans Health Administration to provide information that could allow prevention specialists to focus on at-risk veteran populations.[22] In another example, the Oklahoma Violent Death Reporting System produced a state report examining death due to the use of lethal force by law enforcement officers (i.e., legal intervention deaths).[23] The staff was able to show that their system provided a better assessment of the total number of events, could describe recent increases in the number of events, show that certain groups were disproportionately affected, and provide information on the circumstances associated with a majority of the events. Data from the Rhode Island Violent Death Reporting System were used to determine the incidence of suicide by age group.[24] Data showed that slightly more than 42% of the state's suicides were among working adults aged 35–54 years. Those suicides represented medical costs of $115,699 and work loss costs of approximately $40,000,000. These suicide data along with suicide attempt data were presented to the Rhode Island Injury Community Planning Group's Suicide Prevention Subcommittee to provide them with a better understanding of the populations most affected by suicide. The subcommittee convened a statewide suicide prevention symposium that included the state's two largest employers to discuss approaches to preventing suicide among a working-age population.[24] The North Carolina Violent Death Reporting System linked its records from the North Carolina Division of Aging and Adult Services' Adult Protective Services (APS) to examine violent deaths among persons aged ≥18 years in care of APS.[24] The State was able, for the first time, to quantify and describe these deaths. They found that violence-related APS deaths occurred most often among people aged 45–54 years, whereas all other types of APS deaths occurred most often among those aged >75 years. As a result, they improved elder abuse and neglect

surveillance, developed an adult fatality case review protocol and data collection process, and initiated targeted elder abuse and neglect prevention programs and improved staff training to identify violent death risks among APS clients.

State health departments and civil society are using valuable information provided by NVDRS to reduce the large number of suicides and homicides that occur every day in the U.S. Currently, NVDRS is in 32 states, with plans to expand. The goal is to cover all 50 states, Washington, DC, and the U.S. territories to truly realize a complete surveillance system for the U.S. If NVDRS was implemented in all 50 states, the U.S. would have a complete data system for describing and tracking the urgent public health problem posed by suicides and homicides in this country; researchers would be able to use these data to evaluate state policies designed to reduce violent death; and the nation would have a system that would be able to monitor, characterize, and generate new solutions for issues that are presently at the forefront of concern for many Americans, such as deaths caused by the use of lethal force by law enforcement officers, suicide among veterans, the increasing national suicide rate, and complex incidents involving multiple victims. In sum, as the nation seeks solutions for the vexing problems of suicide and homicide, NVDRS provides objective, reliable information that will guide us to solutions that are effective and sustainable.

The NVDRS staff is constantly looking at ways to increase timeliness and to get the data into the hands of prevention program implementers and decision makers faster. Further, with new advances in data visualization, they are considering new formats to help consumers better review and understand the reports. They continue to look at new aspects of the data that can generate unique and innovative prevention efforts. Additional planned reports include an analysis of violent deaths in vulnerable populations, such as sexual minority groups, law enforcement officers killed in the line of duty, deaths due to the use of lethal force by law enforcement officers in the line of duty, homicides with multiple victims, and inequities in violent deaths. While efforts are underway to expand and update the system, we will continue to consider ways that the data can be used to protect the public and decrease the burden of violent deaths in the U.S.

Publication of this article was supported by the Centers for Disease Control and Prevention. The findings and conclusions in this article are those of the author(s) and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

No financial disclosures were reported by the authors of this paper.

References

1. Murphy SL, Kochanek KD, Xu JQ, Arias E. *Mortality in the United States, 2014. NCHS Data Brief, no. 229*. Hyattsville, MD: National Center for Health Statistic; 2015.
2. Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. Web-based Injury Statistics Query and Reporting System (WISQARS). www.cdc.gov/ncipc/wisqars. Published 2005. Accessed December 21, 2015.
3. Institute of Medicine, National Research Council. *Priorities for Research to Reduce the Threat of Firearm-Related Violence*. Washington, DC: The National Academies Press; 2013.
4. Shepard DS, Gurewich D, Lwin AK, Reed GA, Silverman MM. Suicide and suicidal attempts in the United States: costs and policy implications. In press. Online October 29. *Suicide Life Threat Behav*. In press. Online October 29, 2015. http://dx.doi.org/10.1111/sltb.12225.
5. Florence C, Simon T, Haegerich T, Luo F, Zhou C. Estimated lifetime medical and work-loss costs of fatal injuries—United States, 2013. *MMWR Morb Mortal Wkly Rep*. 2015;64:1074–1077. http://dx.doi.org/10.15585/mmwr.mm6438a4.
6. Centers for Disease Control and Prevention, National Center for Health Statistics. Underlying cause of death 1999–2014 on CDC WONDER online database, released 2015. http://wonder.cdc.gov/ucd-icd10.html. Accessed December 23, 2015.
7. Crosby AE, Ortega L, Stevens MR. Suicides—United States, 2005–2009. CDC Health Disparities and Inequalities Report—United States, 2013. *MMWR Morb Mortal Wkly Rep*. 2013;62(suppl):177–181.
8. Curtin SC, Warner M, Hedegaard H. *Increase in suicide in the United States, 1999–2014. NCHS Data Brief, no. 241*. Hyattsville, MD: National Center for Health Statistics; 2016.
9. Hemenway D, Miller M. Firearm availability and homicide rates across 26 high-income countries. *J Trauma*. 2000;49(6):985–988. http://dx.doi.org/10.1097/00005373-200012000-00001.
10. Logan JE, Hall J, McDaniel D, Stevens MR. Homicides—United States, 2007 and 2009. CDC Health Disparities and Inequalities Report—United States, 2013. *MMWR Morb Mortal Wkly Rep*. 2013;62 (suppl):164–170.
11. Davey M, Smith M. Murder rates rising sharply in many U.S. cities. *The New York Times*. www.nytimes.com/2015/09/01/us/murder-rates-rising-sharply-in-many-us-cities.html?_r=0. Published August 31, 2015. Accessed on January 15, 2016.
12. Bonnie RJ, Fulco CE, Liverman CT, eds. Reducing the Burden of Injury: Advancing Prevention and Treatment. Washington, DC: National Academies Press, 1999. www.nap.edu/openbook.php?record_id=6321. Accessed July 2015.
13. DHHS, Public Health Service. *National Strategy for Suicide Prevention: Goals and Objectives for Action*. Washington, DC: DHHS, Public Health Service; 2001.
14. Goldsmith SK, Pellmar TC, Kleinman AM, Bunney WE, eds. Reducing Suicide: A National Imperative. Washington, DC: National Academies Press; 2002.
15. Barber C, Azrael D, Cohen A, et al. Homicides by police: comparing counts from the National Violent Death Reporting System, Vital Statistics, and Supplementary Homicide Reports. *Am J Public Health*. 2016;106(5):922–927. http://dx.doi.org/10.2105/AJPH.2016.303074.
16. Logan J, Hill HA, Black ML, et al. Characteristics of perpetrators in homicide-followed-by-suicide incidents: National Violent Death Reporting System—17 U.S. States, 2003—2005. *Am J Epidemiol*. 2008;168(9):1056–1064. http://dx.doi.org/10.1093/aje/kwn213.
17. Fowler KA, Gladden RM, Vagi KJ, Barnes J, Frazier L. Increase in suicides associated with home eviction and foreclosure during the U.S.

housing crisis: findings from 16 National Violent Death Reporting System States, 2005–2010. *Am J Public Health*. 2015;105(2):311–316. http://dx.doi.org/10.2105/AJPH.2014.301945.

18. Logan JE, Skopp NA, Reger MA, et al. Precipitating circumstances of suicide among active duty U.S. Army personnel versus U.S. civilians, 2005–2010. *Suicide Life Threat Behav*. 2015;45(1):65–77. http://dx.doi.org/10.1111/sltb.12111.
19. Kaplan MS, McFarland BH, Huguet N, Valenstein M. Suicide risk and precipitating circumstances among young, middle-aged, and older male veterans. *Am J Public Health*. 2012;102(suppl 1):S131–S137. http://dx.doi.org/10.2105/AJPH.2011.300445.
20. Smith SG, Fowler KA, Niolon PH. Intimate partner homicide and corollary victims in 16 states: National Violent Death Reporting System, 2003–2009. *Am J Public Health*. 2014;104(3):461–466. http://dx.doi.org/10.2105/AJPH.2013.301582.
21. DHHS Office of the Surgeon General and National Action Alliance for Suicide Prevention. *2012 National Strategy for Suicide Prevention: Goals and Objectives for Action*. Washington, DC: DHHS; September 2012.
22. Shen X, Millet L. *Suicides Among Veterans in Oregon, 2014*. Portland, OR: Oregon Health Authority; 2014.
23. Oklahoma Violent Death Reporting System. Legal Intervention Deaths in Oklahoma, 2015. www.ok.gov/health2/documents/OKVDRS_Brief_Legal_Intervention_Deaths.pdf. Accessed December 21, 2015.
24. Safe States Alliance. *NVDRS: Stories from the Frontlines of Violent Death Surveillance*. Atlanta, GA: Safe States Alliance; 2013.