SUICIDE

Using NVDRS data for suicide prevention: promising practices in seven states

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Injury Prevention 2006;**12**(Suppl II):ii28–ii32. doi: 10.1136/ip.2006.012443

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Accepted 31 July 2006

Objectives: This article describes how seven states participating in a new public health surveillance system for violent death in the US, the National Violent Death Reporting System (NVDRS), have used data to support local suicide prevention activities.

Setting: The NVDRS is unique in that it augments death certificate data with event and circumstance information from death investigation reports filed by coroners, medical examiners, and law enforcement. These data illuminate why the victim ended his or her life, fatal injury patterns, and toxicological findings at death.

Results: Current suicide prevention efforts using these data fall into three categories: describing the problem of suicide and identifying opportunities for intervention; collaborating on statewide suicide prevention plans; and forming new partnerships for targeted prevention initiatives. Taken together, these three areas show early promise for state suicide prevention efforts.

Conclusions: In each of the states, NVDRS data analyses are being shared with injury prevention colleagues, suicide prevention planning groups and policymakers, and adapted to respond to unique state and local suicide problems. A powerful surveillance tool, the NVDRS is bringing new clarity and direction to these state-based efforts. The NVDRS can serve as a model for other countries looking to establish timely suicide surveillance systems and data driven prevention strategies.

Suicide is the eighth leading cause of death among males in the US, and the eleventh leading cause overall.[1] Yet it is only within the past couple of decades that suicide has been framed as a preventable public health problem.[2] The Surgeon General's 1999 *Call to action to prevent suicide*[3] and the 2001 *National strategy for suicide prevention*[4] called for the creation of surveillance systems to better define and track the problem and guide and evaluate interventions. Responding to this call, and backed by the Institute of Medicine's report, *Reducing suicide: a national imperative*,[5] which explicitly recommended the adoption of the National Violent Death Reporting System, the Centers for Disease Control and Prevention (CDC) established the NVDRS in 2002.

The NVDRS is currently implemented in 17 states. Previously, death certificates were the only ongoing data source on suicides, supplying limited information such as decedent demographics, place and date of death, and method of death. The NVDRS augments these data by linking to it information from death investigation reports filed by coroners, medical examiners, and law enforcement that illuminate why the victim ended his or her life.[6] Data include toxicological test results; the victim's mental health and treatment status; previous suicide attempts and threats; and whether the victim was coping with problems involving physical health, intimate partner relationships, school, work, and other issues. The CDC contracts with a state agency (usually the state health department) to collect the data using software supplied by the CDC. The state agency controls the manner in which the data are collected and released locally and can add state defined data elements. The data are forwarded to the CDC's national database stripped of personally identifying information.

The systematic collection of state level data on the precipitating circumstances associated with suicide was unprecedented. In the late 1999s and early 2000s, most states in the nation responded to the Surgeon General's call to action by establishing statewide planning bodies to chart a course for reducing suicide.[7] The only local data to guide these early efforts were death certificates; most states relied on psychological autopsy studies conducted in other states or other countries to describe risk factors and precipitating circumstances.[8]

This article describes how the more detailed state level data made available by the NVDRS have been used thus far in seven states that were early adopters of the NVDRS: Alaska, Colorado, Maryland, New Jersey, Oregon, South Carolina, and Virginia. Alaska and Colorado began data collection in 2004; the others in 2003. Because these systems are still in the relatively early phases of data collection and analysis, their suicide prevention efforts currently fall into three areas:

1. describing the problem of suicide and identifying opportunities for intervention;
2. collaborating on statewide suicide prevention plans; and
3. forming new partnerships for targeted prevention initiatives.

CASE DEFINITION

The case definition for data noted throughout this paper is decedents who were residents of one of the seven NVDRS states, who died during the data collection year (2004 for Alaska and Colorado, 2003 for the remainder), and whose death certificate indicated an underlying cause of death in the suicide category (codes X60–X84, Y87.0, or U03 of the International Classification of Disease, 10th Revision, US version). We used the Pearson χ^2 statistic when comparing the proportion of victim groups for whom various circumstances were endorsed.

Abbreviations: CDC, Centers for Disease Control and Prevention; NCHS, National Center for Health Statistics; NVDRS, National Violent Death Reporting System; SUPRE, Suicide Prevention; WHO, World Health Organization.

DESCRIBING THE STATE SUICIDE PROBLEM AND IDENTIFYING OPPORTUNITIES FOR INTERVENTION

The NVDRS data enable states to examine the demographic characteristics of the groups at highest risk for suicide in the state (table 1) as well as those circumstances preceding suicide that may assist in tailoring prevention strategies (figs 1 and 2).

Nationally, 2003 marked the first year in which the age adjusted suicide rate among mid-life adults ages 35–64 (15.0 per 100 000) surpassed that of elders 65 and over (14.6 per 100 000).[1] The age distribution of suicide risk varies locally, however, and in some of the NVDRS states, elder suicide rates continued to outstrip that of younger age groups (table 1). Oregon had the sixth highest elder suicide rate in the nation;[1] Oregon VDRS personnel examined the circumstances noted in elders' death investigation reports and learned that most were coping with a physical health problem and that 37% had visited a physician in the last 30 days (fig 1). While psychological autopsy studies are divided on whether physical illness is an independent risk factor for suicide after controlling for depressive illness,[9] the finding does suggest the critical role that healthcare providers can play in screening for, and responding to, suicide risk.

Mid-life adult men make up the largest number of suicide decedents, and strategies for reaching out to this group have not yet been well developed.[10] The Colorado site investigated the occupations of decedents and found that construction was the most frequently noted industry, accounting for 14% of the state's 776 suicide victims ages 18 and older (male and female) in 2004. This suggests that unions and construction employers may serve as potential new partners for targeting this population. Also in Colorado, 30 suicide victims aged 18 and older died either during attempted arrest, while under arrest or while in jail or prison, suggesting the need to work with law enforcement and criminal justice personnel on minimizing suicide risk.

The Virginia site's report on 2003 deaths noted that, overall, one in four suicide decedents had served in the armed services and, among males ages 65 or over, nearly 60% were veterans. Although veterans did not appear to be over-represented among suicide decedents (61% of US men over the age of 65 are veterans), the finding does suggest a venue (veteran's hospitals and services) for reaching older men to screen for suicide risk. For instance, the Virginia Department of Veteran's Services reported 17 194 hospital admissions and 733 851 outpatient visits by veterans for fiscal year 2005; these numbers represent a profound potential for assessments and referrals for suicide prevention (personal communication with Fred Fralin, Benefits Services Manager, Virginia Department of Veterans' Services, 26 June 2006).

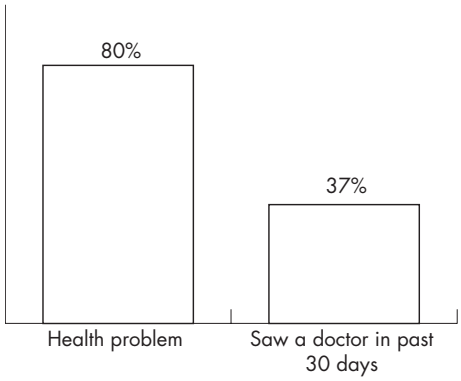

Figure 1 Proportion of male suicide victims ages 65 or over whose death investigation report noted a health problem or a recent physician visit, Oregon, 2003.

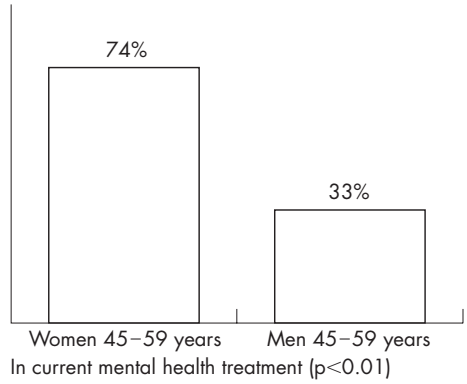

Figure 2 Proportion of suicide victims 45–59 years old whose death investigation report noted they were in current mental health treatment, by gender, Maryland, 2003.

Maryland's VDRS data suggest the need for different prevention strategies for women and men. Both the highest rates and the largest number of female victims were those aged 45–59. Among women and men aged 45–59 for whom the death investigation report provided at least partial information on circumstances associated with the suicide (38 of the 39 women and 87 of the 95 men), a higher proportion of women than men were noted as being in current mental health treatment ($p<0.01$). These findings suggest that interventions focused on improving mental healthcare are an indicated strategy for women in this age group, but relying solely on that strategy for men may miss a significant portion of potential victims.

Victims who have not previously come to the attention of the mental healthcare system pose a unique challenge to suicide prevention. The New Jersey VDRS project investigated who these victims are. Among New Jersey cases about which circumstance information was available, there was no documentation of a mental health disorder or a previous suicide attempt in over 40% of the cases. These suicides differed from those for whom a previous mental health history was documented in several important ways: they were more likely to occur among non-whites and the foreign-born and were more likely to be committed with a firearm. These findings are being shared with suicide prevention policymakers in the state.

COLLABORATING ON STATEWIDE STRATEGIC PLANS FOR SUICIDE PREVENTION

One objective of the *National strategy for suicide prevention* was to increase the number of states with a comprehensive suicide plan in order to focus intervention efforts, resources, and funding. Six of the seven NVDRS states that are the subject of this paper have released suicide prevention plans, and the seventh is in the process of developing one with the assistance of NVDRS data.[7] Three of the state's plans focus only on youth suicide, but at least two of these are currently developing plans for other age groups, again with the assistance of NVDRS data. Particularly in these early stages of data collection and report release, surveillance data from the NVDRS are re-energizing the planning process in several states.

Collaborations between NVDRS sites and statewide suicide prevention groups were strongest among the first-wave NVDRS adopters (Maryland, New Jersey, Oregon, South Carolina, Virginia), as most of these had already released reports on their 2003 cases.

For example, in Oregon where suicides outnumbered homicides nearly 6-to-1 in 2003, suicide prevention is a

Table 1 Suicide in seven study sites: selected characteristics

	Alaska*		Colorado		Maryland		New Jersey		Oregon†		South Carolina		Virginia	
	n	Rate‡	n	Rate	n	Rate	n	Rate	n	Rate	n	Rate	n	Rate
Completed suicides	153	23.3	792	17.0	464	8.4	575	6.7	588	16.5	496	12.0	779	10.5
Gender														
Male	119	35.3	606	25.9	370	13.9	453	10.8	478	27.0	390	19.3	601	16.5
Female	34	10.7	186	8.1	94	3.3	122	2.8	110	6.1	106	5.0	178	4.7
Race														
American Indian	55	52.9	6	8.3	0	0.0	0	0.0	6	10.3	1	NA	1	NA
Asian/Pacific Islander	4	NA§	14	10.4	16	6.5	14	NA	5	NA	3	NA	13	3.9
Black	5	NA	23	11.5	58	3.7	51	4.0	4	NA	65	5.2	89	5.9
White	88	18.8	749	17.7	386	10.7	493	7.3	572	17.3	427	15.1	674	12.2
Other	1	NA	0	NA	4	NA	17	NA	0	NA	0	NA	1	NA
Unknown	0	NA	0	NA	0	NA	0	NA	1	NA	0	NA	1	NA
Ethnicity														
Hispanic	5	NA	95	11.6	7	2.7	40	3.2	18	5.5	5	NA	12	3.0
Age (years)														
10–19	27	24.3	58	8.7	26	3.3	20	1.7	16	3.2	18	3.1	44	4.3
20–29	41	48.5	114	17.7	72	10.5	68	6.7	79	16.0	67	11.5	116	11.4
30–49	59	28.6	342	23.6	174	10.0	251	9.2	224	21.5	215	17.9	321	14.0
50–64	19	17.5	189	24.8	103	11.0	141	9.8	144	23.2	102	14.4	156	12.5
65–74	5	NA	37	14.1	41	12.6	43	7.7	44	19.9	47	16.8	75	16.7
75+	2	NA	52	23.8	48	16.0	51	9.0	81	34.8	47	20.2	67	17.2
Unknown							1	NA						
Mechanism of injury	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Firearm	93	60.8	401	50.6	222	47.8	173	30.1	330	56.1	337	67.9	435	55.8
Poisoning	21	13.7	186	23.5	82	17.7	121	21.0	112	19.0	61	12.3	145	18.6
Hanging/suffocation	34	22.2	166	21.0	129	27.8	206	35.8	102	17.3	72	14.5	147	18.9
Jump from a high place	2	1.3	8	1.0	19	4.1	17	3.0	13	2.2	5	1.0	11	1.4
Sharp or blunt object	1	0.7	10	1.3	6	1.3	23	4.0	13	2.2	9	1.8	17	2.2
Other	2	1.3	21	2.7	6	1.3	35	6.1	18	3.1	12	2.4	24	3.1

*Data for Maryland, New Jersey, Oregon, South Carolina, and Virginia reflect 2003 violent deaths to the state's resident population. Data from Alaska and Colorado reflect 2004 deaths to the state's resident population.
†Deaths relating to the Death with Dignity Act (physician assisted suicides) are not classified as suicides and are therefore not included in this table.
‡Crude rates per 100 000.
§Unless otherwise indicated, rates are not provided where the number of cases is fewer than 6. For the state of New Jersey, rates are provided only when the number of cases is 20 or more. This practice is consistent with the National Center for Health Statistics' (NCHS) data release policy. According to NCHS standards, rates based on fewer than 20 cases are considered unreliable for analysis purposes.

priority. While Oregon had already developed a youth suicide prevention plan, it released the Oregon Older Adult Suicide Prevention Plan in early 2006. Oregon's VDRS data and personnel took a lead role in defining the scope and characteristics of this plan. The Oregon site has added state defined data elements to the system, such as the date of the victim's last physician visit, in response to local planning needs. Oregon has also released a fact sheet on elder suicide.

Like Oregon, Virginia had already released a youth suicide prevention plan for the state. The Virginia VDRS site is a member of the group that is now developing the state's lifespan approach to suicide prevention. Virginia is a 2005 recipient of federal Garret Lee Smith Memorial Act funds for youth suicide prevention, and the NVDRS site is supplying data to assist in planning interventions.

New Jersey's VDRS program is immersed in a wide network of suicide prevention collaborations and is recognized as a critical resource for collaborative work on suicide prevention. New Jersey has not previously released a state plan and is currently developing a lifespan suicide prevention plan. NVDRS data are being used in that effort. Preliminary data from the New Jersey VDRS were used by the New Jersey team when they participated in the Suicide Prevention Resource Center's Bi-Regional Suicide Prevention Conference in June 2005. This conference was geared towards assisting states in developing their plans.

In South Carolina, data collection started with year 2003 deaths and immediately began to impact suicide prevention in the state. Preliminary data were used in the South Carolina Suicide Prevention Strategic Plan, which was released in June 2005. The overall focus of the plan is to increase public awareness of suicide as a public health problem. The State Suicide Prevention Strategic Plan led to formation of the South Carolina Suicide Prevention Coalition. NVDRS staff in South Carolina and the State Department of Health and Environmental Control participate in this new Coalition.

FORMING NEW PARTNERSHIPS FOR TARGETED PREVENTION INITIATIVES

The final use of NVDRS data is in sparking new or renewed partnerships between NVDRS agencies and other state or local agencies focused on suicide or violence prevention. These new partnerships put surveillance data into the hands of subject matter experts who apply them in developing or evaluating interventions.

Alaska's VDRS initiatives will assist researchers and injury prevention specialists in three areas. The first is the firearm locker installation program, which is conducted jointly by Harborview Injury Prevention and the Alaska Tribal Native Health Consortium-Injury Prevention Programs. The suicide rate in Alaska is among the highest in the nation, and is particularly high (53 per 100 000) among American Indians/Alaskan natives. Since many high risk populations in Alaska participate in subsistence and sport hunting, the firearm locker installation program has two functions: to prevent accidental discharge by a youth and to hinder easy access to loaded firearms during chemical intoxication and/or a mental health crisis. Second, the Alaska Departments of Law and Public Safety is collaborating with the Alaska VDRS project to provide expanded analyses and more specific data on the environment, weapons, and victim/perpetrator histories in domestic violence related death events. A dangerous time for a victim of intimate partner abuse is when she or he is attempting to leave the relationship. As legislative statutes and regulations are developed, evaluated, and modified in the area of domestic violence, this partnership will identify strategies that are most effective in protecting victims of abuse. Third, the Alaska VDRS data will be used to complement forensic data from suicide cases as part of the Alaska Suicide Follow-Back Study. Designed as a psychological autopsy study to review circumstances leading to a suicide attempt, including review of medical and school records, this study is being conducted by the Alaska Injury Prevention Center through the Alaska Statewide Suicide Prevention Council

Virginia's VDRS project is taking advantage of the incident-based feature of the NVDRS to describe multiple victim incidents, such as murder-suicides, homicides with multiple victims, and suicide pacts. Of the 39 multiple victim death events identified for 2003, 18 were family or intimate partner homicides, and in 14 of these the suspect also took his own life. Using these data as a springboard, collaborations are now underway between VDRS project staff and the Virginia Sexual and Domestic Violence Action Alliance to use Virginia's VDRS data to understand the dynamics of murder-suicides and intimate partner violence perpetration. Also in Virginia, publication of a statistical overview of Virginia's VDRS data from 2003 has prompted requests for detailed community level portraits of suicide victims, circumstances, and mechanisms of injury to assist localities in understanding and preventing suicide in their own communities. This Virginia Department of Health collaborative effort is between NVDRS staff in the Office of the Chief Medical Examiner and the Center for Injury and Violence Prevention.

LIMITATIONS

NVDRS data on the circumstances that precede suicide depend upon the completeness and quality of the death investigation reports from which they are drawn. Coroners, medical examiners, and law enforcement vary from one jurisdiction to the next and from one individual to the next in the types of questions they ask during a death investigation, who they ask, and whether and how thoroughly they record the information. What may appear to be, for example, a higher treatment rate among victims in one jurisdiction over another may in fact reflect one medical examiner's office more thorough documentation than another's. It is important, therefore, particularly as the system grows to a 50-state system, to work toward greater uniformity in death investigation procedures and documentation. As NVDRS sites apply the data to local injury problems and share results with the death investigators who supplied the data, this should become easier to do.

CONCLUSION

Taken together, these three areas of use for NVDRS data—better describing the problem and identifying opportunities for prevention, revitalizing strategic planning processes within states, and forging new partnerships for prevention initiatives—show early promise for state suicide prevention efforts. In each of these seven states, NVDRS data analyses are being shared with injury prevention colleagues, suicide prevention planning groups and policymakers, and are being adapted to respond to unique suicide problems. A powerful surveillance tool, the NVDRS is bringing new clarity and direction to these state based efforts.

At the same time, the need for suicide prevention strategies on the international level has been recognized. The World Health Organization (WHO) describes suicide as a largely preventable public health problem and has acknowledged that greater reliability is needed in suicide reporting within countries.[11] This is one of the components of WHO's suicide prevention (SUPRE) program, a worldwide initiative that also seeks to break down the barriers to talking about suicide in order to prevent it. In its *Guidelines for suicide prevention*, the International Association of Suicide Prevention notes great variation in quality and availability of suicide data by country

Key points

- Data from the National Violent Death Reporting System (NVDRS) are being used to shape suicide prevention efforts at state and local levels.
- Because these data describe victim characteristics and link these with suicide event characteristics, the NVDRS assists localities in clarifying their unique problems with suicide.
- Planning groups are relying on NVDRS data to craft or refine suicide prevention plans.
- NVDRS data findings are creating new partnerships for targeted suicide prevention initiatives.

and that results to date indicate differences in demographic characteristics and methods of suicide between countries.[12] Implemented internationally, the NVDRS initiative could be a valuable tool for providing information useful for framing effective suicide prevention strategies within countries, creating databases for international comparisons, and serving as a model for countries in developing data infrastructure and basic surveillance strategies.

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This work was supported by the Centers for Disease Control and Prevention (CDC), National Violent Death Reporting System Grant: VA, U17/CCU322391; CO, U17/CCU823101; NJ, U17/CCU222395; AK, U17/CCU023102; OR, U17/CCU022393; MD, U17/CCU322392; SC, U17/CCU422396.

The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.

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