There are highly effective data systems for tracking a range of public health outcomes that are utilized by Federal and State partners to inform prevention efforts. The National Highway Traffic Safety Administration’s Fatality Analysis Reporting System (FARS) is an example of a well-established data system that can track the incidence and characteristics of motor vehicle crashes and drive prevention efforts in the United States.\(^1\)\(^2\) Like FARS data, data on violent deaths are contained in many data sources including death certificates (DC), coroner/medical examiner (CME) reports including toxicology reports, and law enforcement (LE) reports. Additionally, violent deaths such as multiple homicides or homicides/suicides that are related are not linked in the databases above. Public health leaders are aware of the need for a national surveillance system for violent deaths.\(^1\)\(^2\)

In 1999, the Institute of Medicine recommended that Centers for Disease Control and Prevention (CDC) develop a fatal intentional injury surveillance system.\(^3\)\(^4\) Six foundations pooled their private resources to fund a pilot program called the National Violent Injury Statistics System (NVISS).\(^2\)\(^3\)\(^5\) The Harvard School of Public Health provided technical leadership for NVISS and officials from the CDC provided technical assistance.\(^6\) NVISS data were used successfully in 2000 to secure congressional funding of $1.5 million to support the administration of the National Violent Death Reporting System (NVDRS) in seven state health departments beginning in 2002.\(^2\)\(^3\) In 2003, congress approved additional funds to expand NVDRS to six more states; and by 2009, eighteen states were participating in NVDRS.\(^2\)\(^3\) In 2014, an increase in federal funding allowed NVDRS to expand to another fourteen states, raising the total to 32 states.\(^6\) CDC’s goal is to secure sufficient funding to support all 50 states, all U.S. territories, and the District of Columbia in the system. Today, NVDRS funded states utilize methods for gathering information established by NVISS.\(^3\)

Rhode Island has received CDC funding for NVDRS since 2003 and has been collecting data since 2004. Last year, Rhode Island was one of 32 states that secured a new 5-year grant that provides funding through 2019.

The collection and dissemination of comprehensive information on violent deaths in a standardized manner is critical to support violence prevention efforts in Rhode Island. The goal of the Rhode Island Violent Death Reporting System (RIVDRS) is to collect timely, accurate, and comprehensive surveillance data on all violent deaths using web-based data entry system and guidelines provided by CDC, and disseminate data to the public and stakeholders working to prevent violence in their communities.\(^6\) Figure 1 displays the overall picture of RIVDRS.

**Figure 1. The Diagram of Data In and Out**

<table>
<thead>
<tr>
<th>ME reports (OSME)</th>
<th>DC records (OVR)</th>
<th>LE reports (Police Department)</th>
<th>NIBRS data (State Police)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crime Lab data</td>
<td>Child Death Review</td>
<td>HDD</td>
<td></td>
</tr>
<tr>
<td>RIVDRS</td>
<td></td>
<td>NVDRS software</td>
<td>Cloud</td>
</tr>
</tbody>
</table>

**METHODS**

**Data Sources**

RIVDRS collects violent death data from four major data sources: 1) death certificates; 2) medical examiner reports, including toxicology reports; 3) law enforcement reports, including Supplementary Homicide Reports and National Incident-Based Reporting System; 4) crime laboratories.\(^7\) RIVDRS is a population-based surveillance system that collects all violent deaths that occur among Rhode Island.\(^2\) It is a joint project of the Office of State Medical Examiners and the Center for Health Data and Analysis at the Rhode Island Department of Health. RIVDRS details demographic characteristics, mechanisms of injury, location of death, toxicology information (blood alcohol or drug content), circumstances preceding the deaths (e.g., physical and mental health problems, job loss, family stressors, interpersonal relationships), etc. The data are collected and stored in a nested manner; for instance, a victim is considered nested within a violent incident and a suspect is nested within a victim. Analyses and data linkages must
Definitions

Violent deaths: Based on the World Health Organization definition, a violent death results from the intentional use of physical force or power against oneself, another person, or against a group or community. The International Classification of Diseases, 10th revision (ICD-10) codes are used to identify the underlying cause of deaths. Violent deaths include suicides (ICD-10: X60–X84, Y87.0), homicides (X85–Y09, Y87.1), deaths from legal intervention [a subtype of homicide where the victim is killed by law enforcement acting in the line of duty] (Y35.0–Y35.4, Y87.2, Y89.0), deaths of undetermined intent (Y10–Y34, Y87.2, Y89.9), unintentional firearm fatalities (W32–W34, and Y86 restricted to firearm accidents), deaths related to terrorism (U01–U03).

State occurrent violent death: “The initial injury must have occurred within the state or on those portions of the American Indian reservations within the state.”

Youth suicide: Suicide committed by a person less than 25 years of age. There is generally a lower age limit on suicide because young children are not thought to have the capacity to intentionally kill themselves because they do not fully understand the finality of the act. RIVDRS has generally set that lower limit at 13; however, two deaths among twelve-year-olds in 2011 were included.

Analyses

Rhode Island is the smallest state, with a population that has been stable at just over 1 million for over ten years [1.053 million in 2013]. RIVDRS data for the period 2004–2013 were used for this study. Percentages by manner of death and age group were calculated. Statistical analyses were conducted with SAS 9.4 (SAS Institute Inc. Cary, North Carolina, USA).

RESULTS

Table 1 compares the 2012 and 2013 RIVRDS data. During these two years, the number of deaths increased by 36.4%, from 151 in 2012 to 206 in 2013.

Table 1. Rhode Island Violent Deaths Under Surveillance, 2012–2013

<table>
<thead>
<tr>
<th>Manner of death</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suicide</td>
<td>107</td>
<td>137</td>
</tr>
<tr>
<td>Homicide</td>
<td>30</td>
<td>33</td>
</tr>
<tr>
<td>Undetermined cause</td>
<td>12</td>
<td>35</td>
</tr>
<tr>
<td>Legal intervention</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Unintentional firearm</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>151</td>
<td>206</td>
</tr>
</tbody>
</table>

Figure 3 shows trends of the suicides, homicides, and undetermined deaths for the 10-year time period 2004–2013. The majority of Rhode Island violent deaths were suicides. Annual numbers of total suicide in Rhode Island increased steadily from the 75 reported in 2005 to 134 in 2010, an overall increase of 78.7%. The numbers moderated a bit in 2011 and 2012, but were still over 100 per year. A new high was reached in 2013, with 137 reported. Compared to suicide, homicide was relatively stable across years.

Figure 4 displays suicide deaths by two age groups and by incident year in Rhode Island, during 2004-2013. Overall, there was an increase in the total number of suicide deaths across each year in Rhode Island. The suicides were predominately among adults. The adult trend for suicide deaths was very similar to total suicide deaths in Rhode Island. Youth suicide varied quite a bit year to year with no clear trend; and contributed little if any to the increase in total suicides in Rhode Island since 2004.

Figure 5 illustrates the 10-year trend in suicides in Rhode Island among five age groups. The highest percentage of suicide was among persons aged 45-64 years (482 deaths or 50.0% of all adult suicides). The next highest percentage of suicide was among adults aged 25–44 years (356 deaths).
DISCUSSION

RIVDRS is a primary source of data on fatal intentional injury related to the leading causes of mortality in Rhode Island’s population. RIVDRS is a critical surveillance tool for a number of the Health Department’s programs, particularly in the area of injury prevention. It also provides a vital source of data for other state agencies and community organizations as they work towards reducing violent deaths among the populations they serve. Additionally, RIVDRS can provide data on Rhode Island’s progress towards the achievement of related Healthy People 2020 Objectives [national objectives managed by the Office of Disease Prevention and Health Promotion within the U.S. Department of Health and Human Services].

Suicide is the leading cause of violent death in Rhode Island. The number of suicides has increased each year in Rhode Island from 2004-2013. In Rhode Island, the highest number of suicides occurred among the middle-aged (45 to 64 years). There are more deaths due to suicide in Rhode Island than due to car crashes. An understanding of suicide is important for public health interventions. Early recognition of high-risk individuals may successfully prevent suicide. RIVDRS collects circumstance information related to areas such as mental health/substance abuse, interpersonal issues, life stressors, and events preceding the suicide. Suicide is a serious public health problem and many suicides are preventable. Early recognition of high-risk individuals and linkage to services may successfully prevent suicide.

Data strengths

RIVDRS strengths include the following: 1) the system combines information from the different data sources and provides a complete picture of violent deaths; 2) RIVDRS is able to link records on violent deaths that are related and happened within 24 hours of each other, for instance, homicides followed by the suicide of the suspect, or multiple homicides; 3) annual RIVDRS data sets allow for trend analyses in Rhode Island; 4) the same data are collected in 32 states allowing comparison with other states; 5) the NVDRS implemented a new web-based system in August 2013, which is an improved system and has enhanced data entry; 6) since the NVDRS is state-based, states can choose to capture data beyond what the CDC collects. For instance, Rhode Island can choose to collect data that law enforcement and other agencies that have a role in violence prevention deem valuable. Thus, Rhode Island can analyze data that are richer than those available to the CDC, unlike most public health surveillance systems, the system is incident based rather than person based; the Web-based Injury Statistics Query and Reporting System (WISQARS) allows the general public or researchers to obtain injury data or reports easily and quickly. An automated data query system for all violent deaths is under WISQARS website.

Data limitations

There are some limitations of the system as well: 1) in Rhode Island, LE does not release homicide data until the case has been adjudicated, and this can result in very long time lags; 2) Rhode Island has not been able to obtain data from the Massachusetts Violent Death Reporting System on Rhode Island victims who died in Massachusetts due to their state’s restrictions; 3) RIVDRS is in the process of determining how to best evaluate timeliness, completeness, and data quality of the program, and the level of missing data after a given time period.

In summary, RIVDRS covers all types of violent deaths (e.g. suicides, homicides) and includes data on demographics, location of death, circumstances of death, cause of death, toxicology test results, etc. This system pools data on violent deaths from multiple sources into a usable, anonymous database. These sources include reports from vital records, medical examiner, law enforcement, crime lab, and child death review team data.
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References

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Disclosure
The authors have no financial interests to disclose.

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