Analysis of Intentional and Unintentional Drug Overdose Deaths Occurring in Rhode Island, 2016–2019

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INTRODUCTION

Drug overdose deaths have increased nationally and in Rhode Island.[1,2] Overdose deaths are classified by intent; thus, it is important to understand differences that exist between intentional overdose deaths (suicides) and unintentional overdose deaths (accidental overdoses) so tailored interventions can be implemented to prevent deaths across different risk groups. The Rhode Island Department of Health (RIDOH) has reported suicide deaths since 2004 through the Rhode Island Violent Death Reporting System (RIVDRS), which is part of the National Violent Death Reporting System (NVDRS). Since 2016, RIDOH has reported unintentional drug overdose deaths through the State Unintentional Drug Overdose Reporting System (SUDORS). SUDORS was added as a module within the web-based data system for NVDRS, so RIVDRS and SUDORS contain many identical data elements, including demographics, toxicology, and circumstances surrounding the deaths. Past research has summarized characteristics of those who died of an accidental drug overdose in Rhode Island using SUDORS data.[2,3] In this article, characteristics of individuals who died from an intentional drug overdose death in RIVDRS will be compared to those who died from an unintentional drug overdose death in SUDORS to better understand differences by intent.

METHODS

Intentional and unintentional drug overdose deaths that occurred in Rhode Island from 2016–2019 were pulled from RIVDRS and SUDORS, respectively. The intentional drug overdose group included suicide deaths by poisoning while the unintentional drug overdose group included accidental drug overdose deaths. Drug overdose deaths of undetermined intent were excluded from this analysis.

Demographic variables were pulled to evaluate differences by age, sex, race/ethnicity, education level, and occupation. Like past analyses,[4] occupation was derived from the 'usual occupation' variable and coded into standard occupation categories according to the 2018 Standard Occupational Classification System.[5]

Circumstance variables relating to mental health and substance abuse were pulled, and specific mental health diagnoses were evaluated among those with a known mental health problem. Toxicology variables were utilized to identify substances contributing to cause of death, along with the number of substances contributing to cause of death.

The proportion of intentional versus unintentional drug overdose deaths were calculated for the select characteristics and compared for statistical significance using chi-square tests (α=0.05). Fisher exact tests were used for expected cell counts <5. All analyses were performed using SAS (version 9.4).

RESULTS

From 2016 to 2019 there were 95 intentional drug overdose deaths (yearly range 18–30) and 1,236 unintentional drug overdose deaths (yearly range 299–325) that occurred in Rhode Island.

Overall, nearly three quarters of unintentional overdose deaths were among males, compared to approximately half of the intentional overdose deaths (**Table 1**, p<0.0001). Differences were also observed by age, where victims of intentional overdoses tended to be older (48.4% versus 20.2% 55+ years old); and education level, where intentional overdose victims were more likely to have a bachelor's degree or higher (20.0% versus 6.2%). Differences were observed by race/ethnicity (p=0.0017). Most deaths occurred among White, Non-Hispanic individuals; however, the proportion of deaths among White, Non-Hispanics was lower for unintentional overdose victims (79.8% versus 95.8%).

Differences were also observed by occupation (**Table 1**, p<0.0001). Of note, a higher proportion of intentional overdose deaths were observed among management, business, science, and arts occupations, while a higher proportion of unintentional overdose deaths were observed among natural resources, construction, and maintenance occupations.

Victims of intentional overdoses were more likely to have a known mental health problem (77.9% versus 51.6%, **Table 2**), while victims of unintentional overdoses were more likely to have a known substance abuse problem (84.5% versus 24.2%). Among individuals with a known mental health problem, intentional overdose victims were more likely to be diagnosed with depression, while unintentional overdose victims were more likely to be diagnosed with anxiety.

Opioids contributed to the cause of death among more than 85% of unintentional overdose victims, while antidepressants (44.2%) and benzodiazepines (34.7%) were commonly contributed to the cause of death among intentional overdose victims. When looking at differences in the number of substances (**Table 2**, p<0.0001), intentional overdose victims were more likely to have a single substance contributing to cause of death (46.3% versus 26.7%), compared to multiple substances among unintentional overdose victims.

Table 1. Characteristics of intentional and unintentional drug overdose deaths that occurred in Rhode Island, 2016–2019.[1]

Characteristics	Intentional Overdose Deaths n=95 n (%)	Unintentional Overdose Deaths n=1,236 n (%)	p-value[2]
Sex			
Female	49 (51.6)	332 (26.9)	<0.0001
Male	46 (48.4)	904 (73.1)	
Age Group			
<35	11 (11.6)	386 (31.2)	<0.0001
35–54	38 (40.0)	600 (48.5)	
55+	46 (48.4)	250 (20.2)	
Race/Ethnicity			
Non-Hispanic White	91 (95.8)	973 (79.9)	0.0017
Non-Hispanic Black	<5	77 (6.3)	
Hispanic	<5	148 (12.2)	
Other	<5	20 (1.6)	
Education			
Less than High School	18 (19.0)	364 (29.5)	<0.0001
High School Graduate	32 (33.7)	500 (40.5)	
Some College or Associates Degree	23 (24.2)	222 (18.0)	
Bachelor's or Higher	19 (20.0)	77 (6.2)	
Unknown	<5	73 (5.9)	
Occupation[3]			
Management, Business, Science, & Arts Occupations	30 (31.6)	194 (15.7)	<0.0001
Service Occupations	13 (13.7)	209 (16.9)	
Sales & Office Occupations	10 (10.5)	72 (5.8)	
Natural Resources, Construction, & Maintenance Occupations	9 (9.5)	310 (25.1)	
Production, Transportation, & Material Moving Occupations	8 (8.4)	117 (9.5)	
Unemployed	<5	44 (3.6)	
Disabled	<5	105 (8.5)	
Not seeking paid work	8 (8.4)	98 (7.9)	
Unspecified/Unknown	12 (12.6)	87 (7.0)	

[1]Intentional deaths identified from the Rhode Island Violent Death Reporting system (RIVDRS); unintentional deaths identified from the State Unintentional Drug Overdose Reporting System (SUDORS). Counts <5 not reported.

[2]Chi-square test; Fisher's Exact test for expected cell counts <5.

[3]Categories based on Standard Occupational Classification System, US Bureau of Labor.

Table 2. Mental health and substance characteristics of intentional and unintentional drug overdose deaths that occurred in Rhode Island, 2016–2019.[1]

Characteristics	Intentional Overdose Deaths n=95 n (%)	Unintentional Overdose Deaths n=1,236 n (%)	p-value[2]
Mental Health and Substance Abuse Circumstances[3,4]			
Known Mental Health Problem	74 (77.9)	598 (51.6)	<0.0001
Known Substance Abuse Problem	23 (24.2)	979 (84.5)	<0.0001
Known Alcohol Abuse Problem	27 (28.4)	252 (21.7)	0.1324
Mental Health Diagnoses[4,5]			
Anxiety	27 (36.5)	308 (51.5)	0.0148
Depression	58 (78.4)	341 (57.0)	0.0004
Anxiety & Depression	21 (28.4)	170 (28.4)	0.9929
Bipolar	12 (16.2)	88 (14.7)	0.7323
Substances Contributing to Cause of Death[4]			
Opiate	29 (30.5)	1,068 (86.4)	<0.0001
Alcohol	15 (15.8)	309 (25.0)	0.0438
Amphetamine	<5	58 (4.7)	0.7969
Anticonvulsant	7 (7.4)	28 (2.3)	0.0097
Antidepressant	42 (44.2)	177 (14.3)	<0.0001
Antipsychotic	11 (11.6)	28 (2.3)	<0.0001
Benzodiazepines	33 (34.7)	233 (18.9)	<0.0001
Carbon Monoxide	19 (20.0)	<5	<0.0001
Cocaine	<5	522 (42.2)	<0.0001
Other	13 (13.7)	262 (21.2)	0.0878
Number of Substances Contributing to Cause of Death			
1	44 (46.3)	293 (26.7)	<0.0001
2	14 (14.7)	278 (22.5)	
3	21 (22.1)	311 (25.2)	
4+	16 (16.8)	354 (28.6)	

[1]Intentional deaths identified from the Rhode Island Violent Death Reporting system (RIVDRS); unintentional deaths identified from the State Unintentional Drug Overdose Reporting System (SUDORS). Counts <5 not reported.

[2]Chi-square test; Fisher's Exact test for expected cell counts <5

[3]Denominators based on deaths with available circumstance information. For intentional deaths (n=95); for unintentional deaths (n=1,159).

[4]Groups within category are not mutually exclusive.

[5]Calculated among those with known mental health problem.

DISCUSSION

Using 2016–2019 data from RIVDRS and SUDORS, this analysis highlighted several differences between victims who died from intentional versus unintentional drug overdoses. Prior analyses that focused primarily on accidental overdoses[2-4] identified males, younger individuals, and those working in natural resources, construction, and maintenance occupations to be at highest risk of accidental fatal overdoses. This analysis confirmed these findings and found that intentional overdose victims tended to be older, have higher levels of education, and work in management, business, science, and arts occupations. The differences observed by education level and occupation are likely explained, at least partially, by the observed differences in age, as individuals who are older are more likely to have higher education and work in management level positions.

This work demonstrates that demographic, toxicology, and circumstantial variables vary by intentionality, and supports the need for tailored interventions to prevent overdose deaths based on intent. The importance of screening for suicidal risk as part of interventions to prevent overdose deaths among suicidal persons has been described,[6] and is supported by this analysis, including the findings that intentional overdose victims had higher rates of known mental health problems and diagnosed depression. The differences by substances contributing to the cause of death also support different interventions based on intent. Fatal intentional overdoses were strongly linked to antidepressants and a single substance, while fatal unintentional overdoses were strongly linked to opioids along with other substances such as alcohol and cocaine. Future analyses linking prescription drug data with intentional overdose victims may suggest more targeted interventions for this population, while continuing to analyze opioid prescriptions and the use of synthetic opioids will be critical among unintentional overdose victims. The use of synthetic opioids, such as fentanyl, has driven recent increases in unintentional overdose deaths and likely has contributed to the observation of decreasing proportion of suicide among opioid deaths.[7] The use of fentanyl impacted our findings as less than 5 of the opioid-associated suicide deaths involved fentanyl, compared to approximately 75% of the opioid-associated accidental overdose deaths.

There are few limitations to this analysis that should be noted. First, the data could be influenced by undetermined drug overdose deaths, as these deaths are not able to be classified as suicides or accidental based on death certificate, coroner/medical examiner, or law enforcement information. Similarly, misclassification of intentional deaths as accidental deaths could impact the data. Past national studies have suggested approximately 20% of undetermined poisoning deaths may be suicides.[7] While potential misclassification is possible, we believe it would have had a small impact on these findings. During the study period, a relatively small number of undetermined overdose deaths were identified (n=21) and the numbers were consistent across years. Finally, this analysis was limited to 2016–2019 data as these were the most recent years with complete data for both RIVDRS and SUDORS. As additional data are available, statistical power will increase and further, more in-depth analyses should be performed.

Despite these limitations, these findings support the need for tailored and comprehensive interventions as characteristics of fatal drug overdoses were observed to differ by intent. Understanding intent to prevent overdose deaths is critical as studies have shown a high risk for suicide death following a nonfatal overdose.[8] Continued combined analyses with RIVDRS and SUDORS data will be helpful to better understand linkages between suicides by poisoning and accidental drug overdose deaths, along with changes in risk profiles over time.

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