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Suicide in Older Adults With and Without Known Mental Illness: Results From the National Violent Death Reporting System, 2003–2016

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Abstract

Introduction—Suicide risk increases with age and evidence exists for the underdiagnosis and undertreatment of suicide risk in older adults. Recent data suggest that many U.S. adults who die from suicide do not have a known mental health condition. This study compares the characteristics and precipitating circumstances of geriatric suicide decedents with and without known mental illnesses.

Methods—This study was a retrospective analysis of suicide deaths for adults aged ≥65 years from the National Violent Death Reporting System, 2003–2016 (N=26,884). ORs compared sociodemographic and clinical characteristics, cause of death, and precipitating circumstances based on coroner/medical examiner and law enforcement reports. Data were collected and analyzed in 2019.

Results—Most older male (69.1%) and female (50.2%) suicide decedents did not have a known mental illness. A physical health problem was the most prevalent precipitating circumstance, but more common among older adults without known mental illness. Past suicide attempt, disclosure of suicidal intent, depressed mood, and substance use were more common among those with a known mental illness. More than three fourths of suicide decedents did not disclose their suicidal intent. Most suicide deaths involved firearms, which were disproportionately used by decedents without known mental illness (81.6% of male and 44.6% of female decedents) compared with those with known mental illness (70.5% of male and 30.0% of female decedents).

Conclusions—A majority of older adults who die from suicide do not have a known mental health condition. The rapidly growing U.S. geriatric population calls for more effective methods to identify and treat at-risk older adults, particularly those who are male.

INTRODUCTION

Suicide risk increases with age, particularly for male individuals,¹ and the U.S. geriatric population is growing rapidly.² Suicide prevention in later life is challenging owing to fewer

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warning signs, greater use of deadlier methods (i.e., firearms), and poorer physical health, making any act of self-harm more lethal.^{1,3}

A recent report by the Centers for Disease Control and Prevention indicated that 54% of suicide decedents in 2015 did not have a known mental illness.⁴ These data are consistent with other research showing that 95% of older adults had a healthcare encounter in the year before death from suicide (67% in month prior to death); however, most encounters do not include a recorded mental health diagnosis.^{5–7} Evidence also exists for the undertreatment of geriatric depression and suicide risk in primary care and emergency department settings.^{8–16} These findings strongly suggest that many healthcare encounters are missed opportunities for initiation of potentially lifesaving mental health care for older adults.

The purpose of this study is to compare older adults with and without known mental illness who died from suicide using data from the National Violent Death Reporting System (NVDRS). This well-characterized, nationally representative¹⁷ U.S. database contains extensive information on the characteristics of suicide decedents and the circumstances that precipitated their deaths. Advances in knowledge of suicide among older adults without known mental health conditions are likely to stimulate progress in prevention research and help inform selective and universal suicide prevention initiatives for healthcare providers and policymakers.

METHODS

Study Sample

The cohort was extracted from the NVDRS for all 32 participating states from 2003 through 2016. The NVDRS and its methodology are extensively described elsewhere.¹⁸ The manner, cause, and precipitating circumstances of death are coded by abstractors based on their review of multiple sources, including death certificates and reports from coroners, medical examiners, and law enforcement. The cohort was restricted to adults aged ≥ 65 years with cause of death classified as intentional self-harm/suicide.

Measures

Demographic characteristics included age, sex, race/ethnicity, and marital status. Mental health characteristics included depressed at the time of death (not a clinical diagnosis), substance use problems, past mental health or substance abuse treatment, and prior suicide attempt.

Precipitating circumstances included: (1) physical health problems, (2) relationship problems, (3) recent deaths of family/friends, (4) legal problems, (5) job/financial problems, (6) disclosure of suicide intent, and (7) leaving a suicide note. All variables are coded in the NVDRS as binary (yes versus no/not available/unknown). Suicide methods included: (1) firearms; (2) hanging/strangulation/suffocation; (3) poisoning due to medicine, alcohol/drug, or gas (e.g., carbon monoxide); (4) laceration/sharp object; (5) jumping from heights; or (6) other (e.g., contact with moving objects, drowning, fire, hypothermia, and electrocution).

Known mental illness was defined as whether or not a decedent was identified as having a current mental health problem (yes versus no/not available/unknown) based on law enforcement or coroner/medical examiner reports. This approach was also used in the recent Centers for Disease Control and Prevention report.⁴

Statistical Analysis

The authors calculated ORs with 95% CIs to compare decedents with and without known mental illness. To account for large differences in suicide deaths between male and female decedents, analyses were stratified by sex. To compensate for the large sample size and number of comparisons, the Bonferroni-adjusted p -value for significance was set at $p < 0.0016$. All analyses were conducted in 2019. The study was approved by the Yale University IRB.

RESULTS

Of the 26,884 suicide deaths, 83.2% occurred in male adults (Table 1). Male decedents (69.1%) were also more likely than female decedents (50.2%) to have no known mental illness (OR=2.22, 95% CI=2.08, 2.37). For both sexes, known mental illness was more likely among younger, married decedents. Among those with unknown mental illness, 31.0% of male and 28.8% of female decedents were identified as being depressed with greater likelihood of recognized depression among those with known mental illness (49.4% of male and 36.2% of female decedents). Known mental illness was also associated with substance use problems, prior suicide attempts, prior mental health/substance use treatment, and disclose suicidal intent.

Physical health problem was the most frequent precipitating circumstance and was documented in disproportionately more decedents without known mental illness (Table 1). Conversely, older adults with known mental illness were more likely to have experienced relationship problems or death of relative or friend. Firearms were the most frequent means of suicide for both sexes, but used disproportionately more often by older male and female decedents without known mental illness. Among male decedents, all other suicide methods were associated with known mental illness.

DISCUSSION

A large proportion of U.S. older adults who died from suicide did not have a known mental illness. Physical illness was the most common precipitating circumstance, but more commonly documented for older adults without known mental illness. Firearms were the most common suicide method, but used disproportionately more often by male and female decedents without known mental illness.

The finding that 69% of older male and 50% of female decedents did not have a known mental illness is consistent with smaller, case-control samples that observed two thirds of older adults with fatal and non-fatal self-harm did not have a prior mental health diagnosis.^{19–21} Many older adults live with untreated mental illness,^{22–25} including those with recent suicide plans and attempts,²⁶ and research shows healthcare providers are less likely to

screen and treat geriatric depression and suicide risk,^{8–15} particularly among male patients.^{16,27} Notwithstanding questions about the validity of postmortem diagnosis of mental illness,²⁸ it is very likely that some percentage of older adults who die from suicide had undiagnosed and untreated mental health conditions.

The finding that firearms were disproportionately used more often among older adults without known mental illness lend support to the growing recognition of the potentially critical role healthcare providers can play in counseling patients on means restriction and safety.^{29–36} Roughly half of firearms owners believe that providers discussing firearm safety with patients is appropriate sometimes.^{37,38} Half of U.S. older adults have a gun in the home³⁹ with no observed associations between firearm ownership or storage practices and mental health status,^{40–42} including memory problems.⁴³ Nonetheless, having a firearm in the home significantly raises risk of suicide death^{44,45} that cannot be sufficiently explained by any known or proposed confounding variable (e.g., mental health).⁴⁶

Suicide rates are significantly higher in rural regions,⁴⁷ where access to healthcare services is also lower^{48,49} and firearm ownership is higher.³⁹ Thus, rural residence may partially explain these findings regarding high rates of unknown mental illness and firearm suicides.^{50,51} Some researchers have focused on cultural scripts of masculinity (e.g., stoicism, self-reliance) and culture of suicide as contributing to low help-seeking and high suicide rates in rural regions.^{52–55}

Limitations

Study limitations include the NVDRS reliance on reports by law enforcement and medical examiners, which are prone to inaccurate or incomplete data.⁵⁶ Furthermore, these reports are based on unstandardized, informant interviews that are not performed by trained researchers or clinicians; therefore, informant and interviewer bias and misattribution of precipitating circumstances are possible.⁵⁷ Also, NVDRS data abstractors' selection of “no” for current mental illness is not distinguishable from “unknown” or “unavailable.” Thus, it is likely that these data contain false negatives for mental illness and other precipitating factors.

CONCLUSIONS

Despite these limitations, this study highlights a need for prevention efforts that address a broad range of risk factors for late-life suicide. Increasing access to mental health care, including telehealth in rural areas, show promise.^{58–61} Universal and selective suicide prevention initiatives in healthcare settings can reduce suicide risk.^{62,63} Multilevel, community-based suicide prevention programs in other countries and collaborative depression care models in U.S. primary care settings show promise.^{64,65} Targeted community efforts to reduce stigma and improve help seeking in older adults,^{66–68} particularly men,⁶⁹ and other population-based strategies (e.g., legislation that reduces access to handguns)^{70–72} may be effective at reaching vulnerable adults and reducing suicide rates. Further research is needed to better understand late-life suicide and to identify evidence-based, comprehensive approaches to suicide prevention in the rapidly growing geriatric population.

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TJS had full access to all of the data in the study and assumes full responsibility for the integrity of the data and accuracy of the data analysis. Acquisition and analysis of the data: TJS. Concept and design: TJS and STW. Drafting of the manuscript: TJS. Critical revision of the manuscript: STW.

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Table 1.Characteristics of Suicides, Aged 65 Years, by Known or Unknown Mental Illness, Stratified by Sex^a

Characteristic	Males (n=22,313)					Females (n=4,516)				
	Total, %	Known mental illness (N=6,893)	Unknown mental illness (N=15,420)	OR (95% CI) ^b	p-value	Total, %	Known mental illness (N=2,249)	Unknown mental illness (N=2,267)	OR (95% CI) ^b	p-value
Total (N=26,884)	83.2	30.9	69.1			16.8	49.8	50.2		
Sociodemographic										
Age, years										
65–69 (n=7,893)	27.7	33.2	25.3	1.46 (1.37, 1.55)	<0.001	37.7	43.6	31.8	1.66 (1.47, 1.87)	<0.001
70–74 (n=6,055)	22.5	24.1	21.8	1.14 (1.07, 1.22)	<0.001	22.9	24.2	21.7	1.15 (1.00, 1.32)	0.043
75–79 (n=4,917)	18.8	18.8	18.8	1.00 (0.93, 1.07)	0.936	15.9	14.6	17.2	0.83 (0.70, 0.97)	0.020
80–84 (n=4,091)	15.8	13.3	17.0	0.75 (0.69, 0.82)	<0.001	12.3	10.1	14.5	0.66 (0.55, 0.80)	<0.001
85 (n=3,928)	15.1	10.6	17.1	0.58 (0.53, 0.63)	<0.001	11.2	7.5	14.9	0.46 (0.38, 0.56)	<0.001
Race/Ethnicity										
White (n=24,851)	92.9	93.4	92.7	1.11 (1.00, 1.24)	0.059	91.4	92.1	90.6	1.21 (0.98, 1.19)	0.068
African American (n=754)	2.9	2.6	3.1	0.83 (0.69, 0.98)	0.033	2.3	2.3	2.3	0.97 (0.65, 1.43)	0.875
Other (n=1,279)	4.2	4.1	4.3	0.95 (0.83, 1.10)	0.531	6.3	5.6	7.1	0.78 (0.61, 0.99)	0.045
Marital status										
Married or common law (n=12,679)	50.0	53.9	48.2	1.25 (1.18, 1.33)	<0.001	33.9	36.9	30.8	1.31 (1.16, 1.49)	<0.001
Divorced or separated (n=5,384)	19.5	19.8	19.4	1.02 (0.95, 1.10)	0.492	22.6	23.7	21.5	1.13 (0.99, 1.30)	0.75
Widowed (n=6,689)	22.5	6.0	16.5	0.76 (0.71, 0.81)	<0.001	37.1	16.8	20.2	0.75 (0.67, 0.85)	<0.001
Never married (n=1,743)	6.7	6.3	6.9	0.90 (0.80, 1.01)	0.067	5.4	4.9	5.8	0.85 (0.65, 1.10)	0.208
Mental health										
Depressed at the time of death (n=9,819)	36.7	49.4	31.0	2.17 (2.05, 2.30)	<0.001	36.2	43.8	28.8	1.92 (1.70, 2.17)	<0.001
Past mental health or substance	22.5	97.3	2.7	275.44 (230.71, 328.85)	<0.001	39.9	78.5	1.6	270.37 (156.83, 309.64)	<0.001

Characteristic	Males (n=22,313)					Females (n=4,516)				
	Total, %	Known mental illness (N=6,893)	Unknown mental illness (N=15,420)	OR (95% CI) ^b	p-value	Total, %	Known mental illness (N=2,249)	Unknown mental illness (N=2,267)	OR (95% CI) ^b	p-value
abuse treatment (n=6,823)										
Alcohol use problem (n=1,774)	6.8	10.4	5.2	2.11 (1.90, 2.34)	<0.001	5.6	7.9	3.4	2.48 (1.88, 3.26)	<0.001
Other substance use problem (n=602)	1.8	2.8	1.3	2.10 (1.72, 2.57)	<0.001	4.5	6.1	3.0	2.10 (1.56, 2.82)	<0.001
History of suicide attempt (n=2,360)	6.6	14.1	3.2	4.88 (4.36, 5.46)	<0.001	19.7	30.3	9.3	4.25 (3.60, 5.03)	<0.001
Precipitating circumstances										
Physical health problem (n=13,643)	52.6	50.4	53.6	0.88 (0.83, 0.93)	<0.001	42.3	39.3	45.3	0.78 (0.69, 0.88)	<0.001
Intimate partner problem (n=2,223)	8.9	10.7	8.1	1.35 (1.23, 1.49)	<0.001	5.2	6.1	4.2	1.47 (1.12, 1.92)	0.005
Family relationship problem (n=1,009)	2.2	2.4	1.9	1.27 (1.04, 1.54)	0.016	3.2	2.3	1.8	1.25 (1.02, 1.49)	0.020
Suicide of relative or friend (n=337)	1.2	1.8	0.9	1.96 (1.54, 2.49)	<0.001	1.4	1.6	1.3	1.30 (0.79, 2.14)	0.299
Death of relative or friend (n=2,444)	9.0	10.7	8.2	1.34 (1.21, 1.47)	<0.001	9.7	11.7	7.8	1.58 (1.29, 1.93)	<0.001
Legal problem (n=891)	3.5	3.6	3.7	0.83 (0.68, 1.00)	0.045	0.9	1.0	0.7	1.40 (0.68, 2.86)	0.379
Job or financial problem (n=1,415)	5.4	6.0	2.8	1.69 (1.41, 2.03)	<0.001	4.6	5.2	4.1	1.37 (0.73, 2.56)	0.328
Disclosed suicidal intent (n=5,968)	22.5	27.7	20.2	1.52 (1.42, 1.62)	<0.001	20.8	24.1	17.6	1.50 (1.29, 1.73)	<0.001
Left suicide note (n=8,169)	28.6	27.9	29.0	0.95 (0.89, 1.10)	0.105	39.3	37.8	40.9	0.88 (0.78, 0.99)	0.028
Suicide means										
Firearms (n=19,158)	78.2	70.5	81.6	0.54 (0.50, 0.57)	<0.001	37.3	30.0	44.6	0.53 (0.47, 0.60)	<0.001
Poisoning (n=3,182)	6.8	8.1	6.2	1.33 (1.19, 1.48)	<0.001	36.8	42.9	30.9	1.68 (1.49, 1.90)	<0.001
Hanging, strangulation, or suffocation (n=2,767)	9.5	14.2	7.4	2.08 (1.90, 2.28)	<0.001	14.2	14.8	13.6	1.10 (0.93, 1.30)	0.276
Laceration or piercing (n=490)	2.4	2.8	1.3	2.17 (1.77, 2.65)	<0.001	2.2	2.7	1.8	1.52 (1.02, 2.29)	0.039

Characteristic	Males (n=22,313)					Females (n=4,516)				
	Total, %	Known mental illness (N=6,893)	Unknown mental illness (N=15,420)	OR (95% CI) ^b	p-value	Total, %	Known mental illness (N=2,249)	Unknown mental illness (N=2,267)	OR (95% CI) ^b	p-value
Jumping (n=373)	1.1	1.6	0.9	1.81 (1.40 , 2.34)	<0.001	2.9	3.4	2.3	1.46 (1.02, 2.08)	0.036
Other (n=755)	2.2	2.6	2.1	1.28 (1.07 , 1.55)	<0.001	5.6	5.7	5.6	1.02 (0.80, 1.32)	0.846

^aData come from the following 32 States participating in the National Violent Death Reporting System (NVDRS) between 2003–2016: Alaska, Arizona, Colorado, Connecticut, Georgia, Hawaii, Illinois, Indiana, Iowa, Kansas, Kentucky, Maine, Maryland, Massachusetts, Michigan, Minnesota, New Hampshire, New Jersey, New Mexico, New York, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, Utah, Vermont, Virginia, Washington, Wisconsin.

^bOR reflects the risk among adults with known mental illness relative to adults with no known mental illness. Boldface indicates statistical significance ($p < 0.001$), per Bonferroni-correction for multiple comparisons and large sample size.