

The Health Status of Elderly Persons in the Last Year of Life: A Comparison of Deaths by Suicide, Injury, and Natural Causes

ABSTRACT

Objectives. This study identified health status variables related to suicide by elderly persons and compared the health status of suicide decedents with natural death and injury decedents.

Methods. Data were obtained from the 1986 National Mortality Followback Survey.

Results. When other variables were controlled for, suicide decedents were significantly more likely than injury decedents to have a history of cancer (odds ratio [OR] = 51.94), moderate (OR = 29.37) or heavy (OR = 22.87) alcohol use, and mental or emotional disorder (OR = 10.91) and to be White (OR = 18.54) and male (OR = 9.12).

Conclusions. The findings indicate that a history of cancer should be considered as a risk for suicide in the elderly. (*Am J Public Health.* 1997; 87:434-437)

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Introduction

Suicide rates among the elderly are rising.¹ Little is known about the relationship of health status to suicide in this group. The purpose of this study was to identify health status variables related to suicide in persons aged 65 years and older and to compare suicide decedents with natural death and injury decedents on health status variables, sociodemographic variables, activities of daily living, and the use of health services during the last year of life.

Methods

Data Source

Data from the 1986 National Mortality Followback Survey, a representative sample of 18 733 persons aged 25 and older who died during 1985 and 1986,^{2,3} were used for this analysis. The survey was a complex stratified random sample of the Current Mortality Sample, a systematic 10% sample of all deaths in the United States. To produce national estimates, weighting was used for all analyses; to adjust for the complex sampling design, the program SUDAAN was employed.⁴ The survey included death-certificate data and an in-depth interview with the next of kin approximately 6 months after the subject's death. The response rate for the interviews was 89%, yielding 16 598 completed questionnaires.

The decedents 65 years and older (n = 10 134) were grouped into three categories according to cause of death (*Manual of the International Classification of Diseases, Injuries, and Causes of Death*, 9th revision [ICD-9] code) on their death certificates:

1. Suicide completers died by means of drugs or other ingested or inhaled substances, hanging, gun use, or other self-inflicted injury (n = 47; weighted n = 7788).
2. Natural-cause decedents died of malignant processes, cardiovascular dis-

ease, pulmonary conditions, and all other natural causes (n = 9928; weighted n = 436 555).

3. Injury decedents died of motor vehicle crashes, homicide, or any other external cause (n = 159; weighted n = 23 810).

Only those decedents for whom a health status questionnaire was available were used for this analysis (suicide n = 41; natural cause n = 8981; injury n = 159; total n = 9181).

Analytic Approach

Chi-square analyses were used to test for significant differences between the three groups; then, logistic regression was used to build multivariate models with the dichotomous dependent variable suicide/natural-cause death or suicide/injury death. Variables included in the logistic regression modeling were those indicated as important in previous research or those found to be significant by chi square. Variables kept in the model either were statistically significant or appeared to have an effect on beta coefficients of other variables. Multicollinearity diagnostics were conducted, and they demonstrated no problems.

Results

Chi-Square Analysis

Suicide completers compared with natural-cause decedents. Several statistically significant differences related to health were found between the suicide

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and natural death group ($P < .05$). (See Table 1.) The suicide completers were less likely to have had a stroke, limitations in activities of daily living, or mental disorientation, but had a higher occurrence of emotional or mental disorders and more visits to a psychiatrist in the year before death. They were also more likely to be moderate to heavy drinkers. Furthermore, the suicide completers were more likely to be male and White and less likely to have very low income.

Surprisingly, the suicide completers and natural death decedents had a similar number of nights in a hospital in their last year of life; this suggests that the suicide completers either had a serious illness or had made a suicide attempt (previous or final) requiring institutional care. Presence of illness among the suicide completers is partially supported by the data on activities of daily living: while suicide completers had significantly lower levels of activities-of-daily-living limitations, 20% experienced a severe activities-of-daily-living limitation, and 40% were reported to have been close to death during their last year of life.

Suicide decedents compared with injury decedents. Injury decedents were expected to be more similar to suicide decedents on health status variables than natural death decedents; they were persons who, except for a traumatic event, would not otherwise have died. Although the suicide and injury groups bore resemblances in age and regional distributions, the differences in race, sex, and distribution of assets were significant, underscoring the White, male, nonpoor characteristics of the suicide group (Table 1).

Data not shown in the tables indicate a dual nature to the injury group: some were active persons in relatively good health (25% were motor vehicle-related fatalities); others were physically frail (25% died in falls). The injury group was less likely than the suicide group to have nearly died in the final year of life (as assessed by asking the respondent if the decedent had been "close to death in the year before dying"); however, the injury group had a strikingly similar average number of nights in a hospital during the final year of life.

The suicide decedents differed significantly from the injury decedents on several variables. The suicide group had higher rates of mental or emotional problems and lung conditions, and lower rates of stroke and diabetes. They were also more likely to be either moderate or heavy consumers of alcohol.

TABLE 1—Sociodemographic and Health Characteristics (Weighted) of Suicide Completers Compared with Natural-Cause and Injury Deaths for Decedents Aged 65 Years and Older, United States, 1986

Characteristic	Suicide (n = 41)	Natural Cause (n = 8981)	P^a	Injury (n = 159)	P^a
Age ^b (65–74), mean	76.0	79.4		77.2	
Sex (male), %	84.2	47.3	0.00	48.5	0.00
Race (White), %	97.4	90.1	0.00	85.8	0.00
Married at death (yes), %	55.9	41.3	0.08	42.2	0.15
Living arrangements (alone), %	31.7	31.7	1.00	35.1	0.70
Residence (metropolitan), %	64.8	71.2	0.42	62.8	0.82
Region			0.12		0.88
Northeast, %	10.7	21.4		13.7	
Midwest, %	29.7	27.7		24.1	
South, %	49.3	34.8		49.6	
West, %	10.4	16.2		12.6	
Assets			0.02		0.05
Less than \$5 000, %	29.7	49.9		49.7	
\$5 000 to \$49 000, %	49.5	24.6		26.3	
\$50 000 and over, %	20.8	25.5		24.0	
Education			0.84		0.76
Less than high school, %	60.1	60.1		57.5	
High school graduate, %	26.7	23.9		24.4	
College, %	13.2	16.0		18.1	
No. health problems, mean	1.9	2.2		1.6	
ADL limits (0–5), mean	0.9	2.7		1.7	
ADL limits (level)			0.00		0.33
None, %	65.3	28.2		51.3	
Mild (walking), %	5.4	5.6		3.9	
Moderate (bathing/dressing), %	8.0	8.8		8.2	
Severe (eating/toileting), %	21.3	57.3		36.6	
Mental status (disoriented), %	5.5	19.1	0.00	12.2	0.17
Almost died in previous yr, %	40.0	31.8	0.33	13.6	0.01
Psychiatrist visit in previous yr, %	16.2	3.4	0.05	3.5	0.06
Hospital nights in previous yr, mean	28.7	28.0		27.4	
Health history					
High blood pressure, %	37.2	50.0	0.12	49.9	0.18
Myocardial infarction, %	21.9	31.4	0.17	21.6	0.98
Angina, %	19.6	16.6	0.65	11.7	0.29
Stroke, %	5.7	31.1	0.00	17.5	0.03
Alzheimer's disease, %	11.1	14.2	0.56	14.9	0.54
Mental/emotional disorder, %	34.1	10.4	0.01	10.1	0.01
Diabetes, %	5.5	12.1	0.17	18.4	0.00
Cancer, %	15.1	24.0	0.15	3.3	0.07
Asthma, %	16.6	6.3	0.11	6.3	0.13
Lung condition, %	34.3	19.9	0.09	11.5	0.02
Alcohol consumption			0.00		0.00
None, %	5.7	31.8		44.1	
Moderate (1–2 drinks/day), %	32.9	16.4		12.6	
Heavy (3 or more drinks/day), %	61.4	51.8		43.3	

Note. Based on 1986 National Mortality Followback Survey, National Center for Health Statistics; includes only those decedents for whom there was a health status questionnaire. ADL = activities of daily living.

^a P test for significance of difference between the cause of death in column and suicide.

Logistic Regression Findings

Model 1: Suicides compared with natural-cause deaths. Table 2, Model 1, shows logistic regression findings when

the dependent variable was suicide versus natural death. Variables in this model were limited to functional status, sociodemographic variables, and emotional or men-

TABLE 2—Adjusted Odds Ratios (ORs) and 95% Confidence Intervals (CIs) Comparing Persons Dying from Suicide with Persons Dying from Natural Causes (Model 1) and from Other Injury (Model 2)

Characteristic	Model 1, Suicide vs Natural, OR (95% CI)	Model 2, Suicide vs Injury, OR (95% CI)
Sex		
Male	3.39 (1.49, 7.72)	9.12 (1.59, 52.16)
Female	1.00	1.00
Race		
White	4.71 (1.10, 20.09)	18.54 (1.51, 227.88)
Non-White	1.00	1.00
Age		
85+	1.14 (0.37, 3.48)	4.57 (0.85, 24.67)
75–84	1.05 (0.48, 2.30)	1.07 (0.32, 3.55)
65–74	1.00	1.00
Marital status		
Married	0.76 (0.38, 1.55)	0.90 (0.29, 2.79)
Not married	1.00	1.00
Education		
Less than high school	1.03 (0.41, 2.59)	2.75 (0.75, 10.01)
High school graduate	1.15 (0.40, 3.31)	5.93 (1.34, 26.30)
Some college	1.00	1.00
Assets		
Less than \$4 999	0.75 (0.30, 1.84)	1.00 (0.21, 4.70)
\$5 000–\$49 999	2.66 (1.22, 5.84)	3.10 (0.51, 18.79)
\$50 000 plus	1.00	1.00
History of mental/emotional disorder		
Yes	5.81 (2.81, 12.00)	10.91 (2.56, 46.54)
No	1.00	1.00
Alcohol		
Heavy (3+ drinks/day)	8.94 (1.39, 57.51)	22.87 (1.59, 328.85)
Moderate (1–2 drinks/day)	10.59 (1.58, 70.90)	29.37 (1.41, 612.78)
None	1.00	1.00
Activities-of-daily-living limit		
None	5.05 (2.13, 11.97)	2.20 (0.57, 8.52)
Mild (walking)	1.03 (0.12, 8.73)	1.57 (0.02, 100.00)
Moderate (bathing/dressing)	2.44 (0.64, 9.23)	3.42 (0.24, 49.19)
Severe (eating/toileting)	1.00	1.00
Cancer		
Yes	...	51.94 (10.01, 269.45)
No	...	1.00

tal disorders. Other specific health conditions were excluded because of the health-related cause of death of natural-cause decedents. In this analysis, suicide decedents compared with natural-cause decedents were over 3 times more likely to be male and almost 5 times more likely to be White; decedents in the “middle asset” group were about 2.5 times more likely to die by means of suicide; moderate and heavy alcohol users were approximately 9 times more likely to die by suicide; decedents with no activities-of-daily-living limitation were 5 times more likely to die by suicide; and decedents with a history of mental or emotional problems were 6 times more likely to die by suicide.

Model 2: Suicide compared with injury deaths. Table 2, Model 2, shows the logistic regression findings when the dependent variable was suicide versus injury death. The control variables included in Model 2 were identical to those in Model 1, except that in Model 2, cancer was included in the modeling process. Health conditions suggested by bivariate analysis (cancer, asthma, and lung conditions) were included in preliminary models, but only cancer was retained in the final model because the other health variables did not significantly improve prediction. Compared with injury decedents, suicide decedents were 9 times more likely to be male, 18.5 times more likely to be White, 29 times more likely to

be moderate alcohol users, 23 times more likely to be heavy alcohol users, nearly 11 times more likely to have mental or emotional problems, and 52 times more likely to have cancer. Assets did not enter significantly into the model; however, suicide completers were 6 times more likely to be high school graduates than injury decedents. As expected, the confidence intervals for the odds ratios were wide owing to the small cell sizes for some variables; thus, these odds ratios should be interpreted cautiously.

Discussion

Findings from the logistic regression procedures comparing suicide with natural death and injury death were consistent with the literature in relation to gender,^{5–8} race,^{5,6,8} alcohol use,^{9–11} and mental and emotional problems^{9,11–13}; however, these findings are not consistent with some studies with respect to age^{5–8} and marital status.^{10,13} The lack of significance of age and marital status may be due to the multivariate aspect of the analyses, which controlled simultaneously for multiple variables, including age, marital status, gender, and alcohol consumption. In addition, the lack of significance of older age may be related to limiting the study to the elderly or to the small number in the group aged 75 and older. Further, the dichotomization of marital status into married and not married may have obscured differences in the not-married group (single/divorced/widowed).

One health status variable, a history of cancer, significantly improved the fit of model 2. Persons with cancer were 52 times more likely to die by suicide than by injury. This finding is consistent with a number of studies in the United States and Europe that have found that the presence of cancer increases the risk of suicide.^{14–18}

Our bivariate analysis revealed the suicide decedents were less likely than the injury decedents to have had a stroke. This may be because those who have had a stroke may not have the physical ability to carry out the act or access to the means to commit suicide regardless of whether they experience suicidal thoughts or intentions.¹⁹ In addition, having had a stroke may also put one at greater risk for injury death because of impaired mental or physical ability.

Although suicide completers had a four times greater rate of seeing a psychiatrist than injury decedents, the majority of suicide completers (84%) had not visited a psychiatrist during the last

year of life. This finding may indicate that elderly persons at risk for suicide are either not being referred for psychiatric care, are not following through on seeking psychiatric care when referred, or receive care from other mental health professionals.

Limitations of the Analysis

Certain limitations were inherent in this study. First, although some basic psychiatric information was available, no information was available on history of previous suicide attempts or psychiatric diagnoses. Second, deaths by suicide could be underestimated in this sample. Third, the relationship of the proxy respondents to decedents varied; respondents who were not immediate family members may have provided less accurate information; in most cases, however, the proxies were close family members. Fourth, informants may have had selective recall; those who knew the death was a suicide may have sought to justify the suicide with their responses. Last, the restriction of the research to persons aged 65 years and older reduced the sample of about 500 adult suicide completers to 47 (weighted, this equals 7788 persons). Although the proportions and coefficients are accurate, the variances were greatly increased, reducing the chance of finding statistical significance.

Conclusions

The analyses of this national data set provide important confirmatory evidence about gender, race, alcohol use, and psychiatric conditions as risk factors for suicide in the elderly. In addition, the findings related to physical illness as a risk factor revealed preliminary evidence that cancer is a risk factor for suicide. □

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