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Alzheimer's & Dementia 7 (2011) 567–573

Alzheimer's & Dementia

Predictors of suicide in patients with dementia

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Abstract

Background: Assessing predictors of suicide and means of completion in patients with dementia may aid the development of interventions to reduce risk of suicide among the growing population of individuals with dementia.

Methods: This national, retrospective, cohort study used data from the Department of Veterans Affairs (fiscal years 2001–2005). The sample included patients ≥60 years old diagnosed with dementia (N = 294,952), of which 241 committed suicide. Potential predictors of suicide were identified using logistic regression. Suicide methods are also reported.

Results: Increased risk of suicide was associated with white race (OR: 2.4, 95% CI: 1.2, 4.8), depression (OR: 2.0, 95% CI: 1.5, 2.9), a history of inpatient psychiatric hospitalizations (OR: 2.3, 95% CI: 1.5, 3.5), and prescription fills of antidepressants (OR: 2.1, 95% CI: 1.6, 2.8) or anxiolytics (OR: 2.0, 95% CI: 1.5, 2.7). Nursing home admission was associated with lower suicide risk (OR: 0.3, 95% CI: 0.1, 0.8). Severity of medical comorbidity did not affect risk of suicide. Sensitivity analysis indicated that the majority of suicides occurred in those who were newly diagnosed with dementia. Firearms were the most common method of suicide (73%) used.

Conclusions: Given the higher rate of suicide in those receiving treatment for psychiatric symptoms and the high proportion that died using firearms, closer monitoring and assessment of gun access may be an important part of initial treatment planning for older male patients with dementia, particularly those with symptoms of depression or anxiety.

Keywords: Suicide; Dementia; Elderly

1. Introduction

In many countries, including the United States, older adult men are at a greater risk for suicide than other segments of the population. Already a significant public health concern, the number of suicides in later life is expected to increase as the population ages. Developing effective interventions to reduce suicide risk in elderly population requires the identification of risk and protective factors [1]. To date, several risk factors for later-life suicide have been identified, the most significant of which is the presence of a major psychiatric illness [2]. Major depression is the psychiatric disorder most strongly associated with suicide in the elderly people, although psychotic disorders, anxiety disorders, and substance abuse also increase risk [3], as does poor physical health status and impaired functional capacity [4].

Dementia is a prevalent disorder of later life and is associated with neuropsychiatric symptoms such as depression, psychosis, and anxiety, which have themselves been identified as risk factors for suicide. Although the risk of dementia increases with age [5], the role of dementia as an independent risk factor for suicide is not well understood. While some investigators have reported increased risk for suicide among older adults diagnosed with dementia, especially early in the course of dementia [6,7], others have found no association between cognitive impairment and subsequent death by suicide in later life [8]. A recent review concluded

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doi:10.1016/j.jalz.2011.01.006

that the risk of suicide in patients with dementia appears to be the same as that of the age-matched general population, but noted that many studies had significant methodological limitations [9].

Although studies to date are mixed regarding the role of dementia itself as a risk factor for suicide, investigation of predictors of suicide among patients with dementia is warranted given the prevalence of dementia among elderly population, particularly the "oldest old." Assessing risk factors within the population of patients with dementia such as demographics, the presence of associated neuropsychiatric symptoms, and use of health services may help researchers to understand which patients are particularly at risk and who might need closer monitoring and assessment as part of dementia care. Assessing suicide risks by stage of dementia may also be helpful in targeting interventions. Traditionally, suicide risk has been thought to increase at the time of diagnosis and during the early stages of dementia, when patients have fears of the future regarding physical and mental decline and concerns about burdening their families emotionally and financially. In contrast, suicide risk may decrease when dementia becomes advanced and cognitive and functional impairments diminish both insight and the ability to prepare and execute a plan [10].

Further investigation regarding the relationship between dementia and suicide is warranted given the aging population and the importance of both dementia and suicide as public health issues. The department of Veterans Affairs (VA) provides a useful context in which to examine these critical issues for a number of reasons, including: (1) a large aging patient population; (2) high quality pharmacy and health services data from VA that can be linked to other critical large-scale data resources; and (3) the ability of the VA to translate research findings into clinical practice enhancements. The current study aims to examine potential predictors of suicide in older veteran patients diagnosed with dementia.

In this study, we compared VA patients with dementia who committed suicide during the study period versus those who did not by demographic characteristics, medical comorbidity, healthcare utilization, and use of medication variables. In addition, we examined the relationship between dementia severity and suicide and the methods used by those who committed suicide.

2. Methods

2.1. Study cohort

Patients aged ≥60 years who had been diagnosed with dementia in VA healthcare settings between fiscal year 2001 through 2005 (FY01–FY05) were identified in the VA National Care Patient Database (NCPD). Vital status and cause of death for these patients were obtained from the National Death Index (NDI). The NDI compiles death record data for all US residents from state vital statistics offices. The NDI has the greatest sensitivity in determining vital status among population-level sources of mortality data and is considered the "gold standard" for mortality assessment [11]. Established procedures were used to identify "true" matches in cases where the NDI search resulted in multiple records as potential matches [12].

The VA Ann Arbor Healthcare System Institutional Review Board approved the study. All identifiers were removed to ensure confidentiality.

The final sample included 294,952 patients.

2.2. Measures

2.2.1. Demographics

Data on gender, marital status, race, ethnicity, and age of the population under study were obtained at cohort entry from the NCPD. Age categories included 60 to 69, 70 to 79, 80 to 89, and 90+. Ethnicity was defined as Hispanic or not, and race defined as white, African American, or other. "Other" race included patients of Asian, Native Hawaiian, Pacific Islander, or Native American race/ethnicity and patients who were multiracial.

2.2.2. Dementia

We identified patients diagnosed with dementia using codes from the International Classification of Diseases, ninth revision (ICD 9), selected for identifying dementia cases by a collaborative effort of the VA Offices of Geriatric Research & Evaluation and Geriatrics and Extended Care. These codes have also been used in previous studies published by our group [13,14]. As one of the aims of this study was to examine stage of dementia as a risk factor, an inclusive coding scheme was used in order to capture the earliest stages of dementia where less specific diagnoses such as "memory loss" may be assigned. For a sensitivity analysis, we also grouped patients as having specific (e.g., Alzheimers Disease) versus less specific dementia diagnoses (e.g., memory impairment). Specific dementia diagnoses were represented by the ICD 9 diagnoses 046.1, 046.3, 290.0, 290.1x, 290.2x, 290.3, 290.4x, 291.2, 294.10, 294.11, 331.0, 331.1, and 331.82. Less specific dementia diagnoses included ICD 9 diagnoses 294.8, 294.9, 310.0, 310.1, 331.2, 331.3, 331.4, 331.7, 331.89, 331.9, and 780.93.

2.2.3. Suicide

Suicide deaths during the study period were identified and categorized using the NDI [15] and included ICD-10 codes X60–X84, Y87.0, and U03.

2.2.4. Psychiatric and medical comorbidities

Comorbid psychiatric disorders were identified at cohort entry and included post-traumatic stress disorder (PTSD), any other anxiety disorder, depression, and any personality disorder. As in previous studies by our group [16], the diagnosis of depression was inclusive (ICD-9 codes 296.2×, 296.3×, 296.90, 296.99, 298.0, 300.4, 311, 293.83,

301.12, 309.0, or 309.1) given the fact that the majority of later-life depression is treated in primary care settings, and less specific depression diagnoses are often used in primary care settings. The presence of any substance use disorder (except nicotine dependence) and indicators of schizophrenia and bipolar disorder were also obtained. We used a modified version of the Charlson Comorbidity Index [17] to measure medical comorbidity, with the original Charlson weights based on 18 medical comorbidities (excluding dementia). In the final model, we used indicators for comorbidity and included only those showing statistically significant associations or meaningfully large coefficients.

2.2.5. Healthcare utilization

Healthcare use was determined from the NCPD. We examined use of inpatient (IP), outpatient (OP), and nursing home (NH) services during the period of 6 months before patients' entry into the cohort. Healthcare use was divided into psychiatric (psych) and medical/surgical (nonpsych) care.

2.2.6. Psychiatric prescription medication use

Medication use was determined from outpatient VA pharmacy records during the period of 6 months before patients' entry into the cohort. Medications of interest included antianxiety agents, cholinesterase inhibitors, antidepressants, and antipsychotics.

2.2.7. Dementia severity

Given that dementia gradually worsens over time and that changes can generally be seen on a yearly basis, we created a proxy for dementia severity (a variable unavailable in the administrative record). Using a subset of veterans who were found to be consistent users of VA health care in the 3-years before the study period, we produced a "time since dementia diagnosis" variable. The latter was defined as the time between the initial appearance of a dementia diagnosis in our administrative data and the patient's index diagnosis during the study period (FY01–FY05).

2.3. Statistical analysis

Categorical differences between the two study groups (patients with dementia who died from suicide vs the remainder of the total patient sample with dementia) in demographic variables, comorbidity characteristics, healthcare utilization, and psychiatric medication use were assessed by means of chi-square tests of independence. Subsequently, multivariate logistic regression models were used to identify potential predictors of suicide. Independent variables included in the multivariate logistic model were sex, age, race, marital status, psychiatric comorbidities, medical comorbidities, healthcare utilization, and medication use. We used SAS version 9.2 (SAS Institute, Cary, NC) to perform all analyses.

3. Results

3.1. Demographic characteristics

A total of 294,952 patients aged ≥60 years who received the diagnosis of dementia within the VA during the study period were eligible for study inclusion. Given the VA population, the vast majority of the sample was male (97.2%). Almost half of the overall sample was white (47.2%), and a majority were married (62.9%).

Among these patients, 241 (0.09%) died by suicide during the study period.

3.2. Demographic characteristics associated with suicide

The demographic characteristics of the overall patient sample and the subsample of patients who died from suicide are presented in Table 1, along with bivariate statistics. In bivariate analyses, younger age and white race were associated with higher rates of suicide.

3.3. Comorbidity characteristics associated with suicide

Table 2 presents the comorbidities of both the overall cohort as well as for the suicide versus nonsuicide subsamples. With regard to comorbid psychiatric illness, patients who died by suicide were more likely to have histories of substance abuse, bipolar disorder, anxiety disorders (excluding PTSD), and depression.

The nonsuicide group had higher rates of overall medical burden as compared with the suicide group (defined as Charlson score of >1; suicide group = 32.0% vs nonsuicide group = 41.3%, $\chi^2 = 11.81$, $P < .003$). The nonsuicide group also had higher rates than the suicide group on three of the specific disease groupings (cerebrovascular disease, $\chi^2 = 4.10$, $P < .05$; diabetes with complications, $\chi^2 = 4.50$, $P < .04$; and renal disease $\chi^2 = 5.94$, $P < .02$; Table 2).

3.4. Healthcare utilization associated with suicide

Table 3 shows healthcare utilization by study group. A significantly greater number of those who died by committing suicide had previous inpatient ($\chi^2 = 70.71$, $P < .0001$) or outpatient ($\chi^2 = 69.68$, $P < .0001$) psychiatric care, whereas significantly fewer had nursing home care ($\chi^2 = 8.47$, $P < .004$).

3.5. Psychotropic medication use associated with suicide

Psychotropic use by study group is shown in Table 4; psychotropic use was higher for every class of medications within the suicide group. Most notably, 61.4% of this group had been prescribed an antidepressant as compared with 30.9% of the nonsuicide group ($\chi^2 = 105.15$, $P < .0001$).

Table 1
Sociodemographic characteristics

Characteristics	Total cohort (n = 294,952)	Suicide		χ^2	*df*	*P* value
		Yes (n = 241)	No (n = 294,711)			
Sex						
Male	286,640 (97.2)	238 (98.8)	286,402 (97.2)	2.18	1	.14
Female	8,312 (2.8)	3 (1.2)	8,309 (2.8)			
Age group						
60–69	42,171 (14.3)	66 (27.4)	42,105 (14.3)	42.02	3	<.0001
70–79	126,572 (42.9)	108 (44.8)	126,464 (42.9)			
80–89	118,219 (40.1)	64 (26.6)	118,155 (40.1)			
90+	7,990 (2.7)	3 (1.2)	7,987 (2.7)			
Race						
White	139,142 (47.2)	153 (63.5)	138,989 (47.2)	27.58	4	<.0001
Black	24,120 (8.2)	9 (3.7)	24,111 (8.2)			
American Indian	414 (0.1)	0 (0)	414 (0.1)			
Asian/Pacific Islander	824 (0.3)	0 (0)	824 (0.3)			
Unknown	130,452 (44.2)	79 (32.8)	130,373 (44.2)			
Marital status						
Married	185,623 (62.9)	139 (57.7)	185,484 (62.9)	2.86	1	.09
Not married	109,329 (37.1)	102 (42.3)	109,227 (37.1)			

3.6. Multivariate logistic regression models

In multivariate analyses (Table 5), white patients remained at a greater risk of dying by suicide (OR: 1.49, 95% CI: 1.14–1.95). Among psychiatric diagnoses, only a history of depression placed patients at significantly higher risk of dying by suicide (OR: 2.04, 95% CI: 1.45, 2.85). Almost 25% of the suicide group had a diagnosed depression, as compared with approximately 9% of the nonsuicide group. Schizophrenia was associated with a significantly lower risk of suicide. In the multivariate analyses, none of the relationships between suicide and physical comorbidities retained significance. A history of inpatient psychiatric care was significantly associated with increased risk of suicide (OR: 2.31, 95% CI: 1.54, 3.46), whereas an inpatient nursing home stay was associated with a lower risk of suicide (OR: 0.33, 95% CI: 0.14, 0.75). Two psychiatric medication classes remained significantly associated with suicide in the multivariate model: anti-anxiety medications (OR: 1.98, 95% CI: 1.48, 2.65) and antidepressants (OR: 2.11, 95% CI: 1.57, 2.84).

3.7. Methods of suicide

Using NDI data, we were able to examine methods of suicide among patients who took their lives during the study period. The method used in the vast majority of suicides was a firearm (72.6%). The next most common methods were self-poisoning and hanging (9.5% each). Much less common means used in suicide were harming with a sharp object (2.9%), jumping from a high place or moving object (2.4%), drowning (1.2%), or self-immolation (0.4%).

3.8. Relationship between dementia severity and suicide

We examined the likelihood of suicide based on a patient's stage of dementia at time of cohort entry. This analysis was performed using a subgroup of patients (N = 136) with consistent VA healthcare utilization in the 3 years before cohort entry. Time since first dementia diagnosis in the 3 years before study entry was categorized as (1) 0 years between initial diagnosis and cohort entry; (2) 1 year

Table 2
Comorbidity characteristics

Comorbidity	Total cohort (n = 294,952)	Suicide		χ^2	*df*	*P* value
		Yes (n = 241)	No (n = 294,711)			
Substance abuse	8,011 (2.7)	14 (5.8)	7,997 (2.7)	8.73	1	.003
Bipolar disorder	2,956 (1)	6 (2.5)	2,950 (1)	5.38	1	.02
Depression	27,079 (9.2)	59 (24.5)	27,020 (9.2)	67.72	1	<.0001
PTSD	4,149 (1.4)	6 (2.5)	4,143 (1.4)	2.04	1	.153
Schizophrenia	5,496 (1.9)	4 (1.7)	5,492 (1.9)	0.05	1	.812
Other anxiety disorder	7,807 (2.6)	17 (7.1)	7,790 (2.6)	18.18	1	<.0001
Charlson score >1	121,734 (41.27)	77 (32.0)	121,657 (41.3)	11.81	2	.003
Cerebrovascular disease	63,534 (21.5)	39 (16.2)	63,495 (21.5)	4.10	1	.043
Diabetes with end-organ complications	19,888 (6.7)	8 (3.3)	19,880 (6.7)	4.50	1	.034
Renal disease	28,322 (9.6)	12 (5.0)	28,310 (9.6)	5.94	1	.015

Table 3
Health care utilization

Health care type	Total cohort (n = 294,952)	Suicide		χ^2	*df*	*P* value
		Yes (n = 241)	No (n = 294,711)			
IP NH stay	21,808 (7.4)	6 (2.5)	21,802 (7.4)	8.47	1	.004
IP nonpsych stay	63,866 (21.7)	51 (21.2)	63,815 (21.7)	0.03	1	.853
IP psych stay	10,626 (3.6)	33 (13.7)	10,593 (3.6)	70.71	1	<.0001
OP nonpsych visit	284,597 (96.5)	237 (98.3)	284,360 (96.5)	2.44	1	.118
OP psych visit	89,817 (30.5)	133 (55.2)	89,684 (30.4)	69.68	1	<.0001

Abbreviations: IP, inpatient; OP, outpatient; NH, nursing home.

between initial diagnosis and cohort entry; (3) 2 years between initial diagnosis and cohort entry; or (4) 3 years between initial diagnosis and cohort entry. In this categorization, a patient with a first diagnosis of dementia occurring during the study period could be construed as a new dementia diagnosis, whereas a patient who had a diagnosis of dementia occurring 3 years before study entry could be construed as reflecting a more advanced stage dementia. The results indicated that the majority of suicides (75.0%) occurred in those with new dementia diagnoses (e.g., diagnosis during the study period).

3.9. Relationship between specificity of dementia diagnosis and suicide

In additional sensitivity analyses, we examined patients with specific dementia diagnoses (e.g., Alzheimer's, vascular dementia) as compared with those with less-specific dementia diagnoses (e.g., chronic organic brain syndrome, memory loss). About 56% of cohort had a less-specific diagnosis. Having a specific versus a non-specific dementia diagnosis did not affect the risk for suicide (OR: 0.806, 95% CI: 0.618, 1.051), controlling for other variables in the model. Given this, analyses for individual dementia diagnoses were not performed.

4. Discussion

This large national cohort study allowed the identification of several risk factors for suicide in patients with dementia, which are consistent with findings of previous research. Risk factors for suicide in patients with dementia previously described include depression and younger age [9]. As anticipated, we found comorbid depression to be associated with substantially increased risk for suicide. In contrast, comorbid schizophrenia was found to be a potentially protective factor among elderly individuals with dementia. Our results further suggest that the majority of suicides were among patients receiving psychiatric treatment. Additionally, patients who committed suicide in our study were younger than those who did not, and the majority of suicides appeared to occur in those newly diagnosed with dementia. However, unlike many previous studies, concurrent medical comorbidities were not found to increase risk. Although previous work regarding suicide and self-injurious behaviour in nursing homes has been inconclusive, we found a decreased risk of suicide in patients with nursing home admissions. In terms of methods of committing suicide, the vast majority of patients with dementia took their lives using a firearm (73%).

Patients in our study who died by suicide were younger as compared with those who did not. This is consistent with previous research in the VA population [18] but at odds with epidemiological observation in the general population aged ≥60 years, in which risk for suicide in men rises continuously through old-old age. In this sample of veterans with dementia, the greater risk with young-old age could reflect several factors. Those with earlier onset Alzheimer's type dementia may have a more aggressive, neuropsychiatrically complex illness. Younger age of onset carries a higher likelihood of a family history of dementia, which may influence the patient's outlook of the future. There is a growing evidence that depression and anxiety are more likely to occur early in the course of dementia [19]. Anxiety related to the diagnosis of dementia at an earlier age may drive suicidal behaviour.

The relationship between depression and later-life suicide is well-established [20]. Perhaps not surprisingly, the

Table 4
Psychiatric medication prescriptions

Medication type prescribed	Total cohort (n = 294,952)	Suicide		χ^2	*df*	*P* value
		Yes (n = 241)	No (n = 294,711)			
Anxiolytic	40,562 (13.8)	87 (36.1)	40,475 (13.7)	101.56	1	<.0001
Cholinesterase-inhibitor	57,114 (19.4)	49 (20.3)	57,065 (19.4)	0.145	1	.704
Anticonvulsant	29,356 (10.0)	57 (23.7)	29,299 (10.0)	50.50	1	<.0001
Antidepressant	91,142 (30.9)	148 (61.4)	90,994 (30.9)	105.15	1	<.0001
Antipsychotic	37,939 (12.9)	63 (26.1)	37,876 (12.9)	37.94	1	<.0001

Table 5
Multivariate logistic regression identifying potential predictors of suicide in dementia

Independent variables	Odds ratio (95% CI)	Wald χ^2	*P* value
Age, 60–69 vs 90+	2.23 (0.69, 7.15)	1.8077	.1788
Age, 70–79 vs 90+	1.60 (0.51, 5.06)	0.6379	.4245
Age, 80–89 vs 90+	1.21 (0.38, 3.86)	0.1040	.7471
Male vs female	2.49 (0.79, 7.83)	2.4496	.1176
White vs non-white	1.49 (1.14, 1.95)	8.2684	.0040
Married vs non-married	0.80 (0.61, 1.04)	2.6772	.1018
Has substance abuse vs none	1.08 (0.61, 1.92)	0.0692	.7924
Has bipolar disorder vs none	0.91 (0.39, 2.12)	0.0488	.8251
Has depression vs none	2.04 (1.45, 2.85)	17.1488	<.0001
Has PTSD vs none	0.60 (0.26, 1.38)	1.4340	.2311
Has schizophrenia vs none	0.34 (0.12, 0.95)	4.2649	.0389
Has other anxiety vs none	1.03 (0.60, 1.77)	0.0143	.9049
Charlson score index	0.96 (0.87, 1.05)	0.8525	.3558
Has CEREV vs none	0.71 (0.49, 1.03)	3.3261	.0682
Has DMPlus vs none	0.50 (0.23, 1.07)	3.1642	.0753
Has renal disease vs none	0.65 (0.34, 1.23)	1.7384	.1873
Has IP NH stay vs none	0.33 (0.14, 0.75)	7.0038	.0081
Has IP nonpsych stay vs None	1.14 (0.81, 1.61)	0.5832	.4451
Has IP psych stay vs none	2.31 (1.54, 3.46)	16.2763	<.0001
Has OP nonpsych visit vs none	1.80 (0.67, 4.85)	1.3429	.2465
Has OP psych visit vs none	1.30 (0.97, 1.75)	3.0776	.0794
Prescribed anti-anxiety vs none	1.98 (1.48, 2.65)	21.2109	<.0001
Prescribed cholinesterase inhibitor vs none	0.99 (0.72, 1.37)	0.0021	.9636
Prescribed antidepressant vs none	2.11 (1.57, 2.84)	24.6308	<.0001

individuals in this study who died by suicide were significantly more likely to have been diagnosed with depression. Prescription of an antidepressant was as strong a predictor as having a diagnosis of depression. Interestingly, however, more patients were prescribed antidepressants than those who actually carried the diagnosis of depression. The difference between the number of patients with a depression diagnosis (27,079 total in cohort) and those prescribed antidepressants (91,142) may represent either an underreporting of depression diagnoses or may represent the prescription of antidepressants for reasons other than affective disorder, such as pain or sleep.

Prescription of an anti-anxiety medication was also a strong predictor of suicide. Recent work by Pfeiffer et al [21] found that comorbid anxiety disorders and fills of an anti-anxiety medications were associated with risk of suicide among a mixed aged cohort of depressed patients. They also found that prescription of an anti-anxiety medication was a stronger predictor of completed suicide than any anxiety diagnosis consistent with our findings. As expected, we found that patients who died by suicide were far more likely to have had psychiatric care (both inpatient and outpatient). Given that a number of patients with dementia and neuropsychiatric symptoms might not receive a separate comorbid psychiatric diagnosis, our findings suggest that those dementia patients with accompanying neuropsychiatric symptoms (indicated either by an accompanying diagnosis of depression or receipt of antidepressants or anxiolytics) are at higher risk for suicide than those with cognitive symptoms only.

In contrast to many previous studies, concurrent medical comorbidities were not found to increase risk of suicide. In perhaps the largest study of this issue, Waern et al [22] found that serious physical illness was independently associated with suicide in elderly people. Conwell et al [4] recently reported similar findings, noting that physical illness and associated functional impairments were more common in older adults who committed suicide. However, a limitation of this study is that we were unable to assess the effect of disability resulting from medical comorbidities, which represents a potential confounder in the medical comorbidity-suicide relationship.

A noteworthy finding in our study was that the majority (75%) of suicides occurred in those with a new dementia diagnosis. This finding would seem to confirm both the conventional wisdom as well as limited research [6,7] that the most significant concern for suicide in dementia is early in the course of illness. Placed in this context, our finding that a history of nursing home care decreased the likelihood of suicide significantly could be expected. Although data concerning suicidal behaviour in nursing home residents are limited and contradictory [23,24], the very structured, supervised nature of such facilities and the limited access to firearms may limit suicidal behaviours. It is also possible that this group of patients represents those with more severe cognitive and/or physical limitations who would thus have more difficulty preparing and executing a suicide plan. Similarly, we found that a diagnosis of schizophrenia, an illness also associated with executive and planning deficits, was potentially protective.

Several limitations are inherent in the use of registry data. Given the VA population, the cohort was primarily male, and the study results may not be generalizable to other populations. Because registry dementia diagnoses are clinical, cases not yet diagnosed with dementia (likelier earlier cases where the risk of suicide may be the greatest) cannot be ascertained. However, our definition of "dementia" was purposefully inclusive to capture as many early cases as possible. A final limitation of our study is the use of a proxy as an indicator of dementia severity, i.e., time since dementia diagnosis. To the extent that this might not be an adequate proxy, our analyses must be interpreted with caution. However, given that the existing literature suggests that suicide is an uncommon event in patients with dementia, and that recruiting the large numbers of patients with mild cognitive impairment and dementia necessary for prospective, longitudinal studies may be difficult, large registry studies such as ours are important to address potential risk factors.

At present, our findings suggest that patients with accompanying neuropsychiatric symptoms of depression and anxiety in psychiatric treatment who are early in their course of dementia are at greatest risk for suicide. Timely identification and intervention addressing the complex issues of depression and dementia in these patients may help to mitigate their increased risk. Our findings also support the growing evidence that restricting access to firearms is one of the most effective strategies for prevention of suicide [25]. Given the high rate of suicide by firearms, closer monitoring and assessment of access to firearms may be an essential part of treatment planning for older male patients with dementia.

Acknowledgments

This research was supported by grants from the Department of Veterans Affairs, Health Services Research and Development Service, IIR 04-211-1, and by the National Institute of Mental Health, R01-MH078698-01. Resources were also contributed by the Serious Mental Illness Treatment, Research, and Evaluation Center, Ann Arbor, MI. The views expressed in this article are those of the authors and do not necessarily represent the views of the Department of Veterans Affairs.

References

[1] Conwell Y, Thompson C. Suicidal behavior in elders. Psychiatr Clin North Am 2008;31:333–56.
[2] Conwell Y, Duberstein P, Caine E. Risk factors for suicide in later life. Biol Psychiatry 2002;52:193–204.
[3] Cina SS, Smith MM, Collins KK, Conradi SS. Dyadic deaths involving Huntington's disease: a case report. Am J Forensic Med Pathol 1996; 17:49–52.
[4] Conwell Y, Duberstein PR, Hirsch JK, Conner KR, Eberly S, Caine ED. Health status and suicide in the second half of life. Int J Geriatr Psychiatry 2010;25:371–9.
[5] Matthews F, Brayne C. The incidence of dementia in England and Wales: findings from the five identical sites of the MRC CFA Study. PLoS Med 2005;2:e193.
[6] Erlangsen A, Zarit SH, Conwell Y. Hospital-diagnosed dementia and suicide: a longitudinal study using prospective, nationwide register data. Am J Geriatr Psychiatry 2008;16:220–8.
[7] Draper B, Peisah C, Snowdon J, Brodaty H. Early dementia diagnosis and the risk of suicide and euthanasia. Alzheimers Dement 2010; 6:75–82.
[8] Turvey C, Conwell Y, Jones M, Phillips C, Simonsick E, Pearson J, et al. Risk factors for late-life suicide: a prospective, community-based study. Am J Geriatr Psychiatry 2002;10:398–406.
[9] Haw C, Harwood D, Hawton K. Dementia and suicidal behavior: a review of the literature. Int Psychogeriatr 2009;21:440–53.
[10] Conwell Y. Dementia. Crisis 1995;16:5–6.
[11] Cowper DC, Kubal JD, Maynard C, Hynes DM. A primer and comparative review of major US mortality databases. Ann Epidemiol 2002; 12:462–8.
[12] Sohn MW, Arnold N, Maynard C, Hynes DM. Accuracy and completeness of mortality data in the Department of Veterans Affairs. Popul Health Metr 2006;4:2.
[13] Kales HC, Blow FC, Copeland LA, Bingham RC, Kammerer EE, Mellow AM. Health care utilization by older patients with coexisting dementia and depression. Am J Psychiatry 1999;156:550–6.
[14] Kales HC, Valenstein M, Kim HM, McCarthy JF, Ganoczy D, Cunningham F, et al. Mortality risk in patients with dementia treated with antipsychotics versus other psychiatric medications. Am J Psychiatry 2007;164:1568–76. quiz 623.
[15] World Health Organization. International statistical classification of diseases and related health problems, 10th Rev (ICD-10). 2nd ed. Geneva, Switzerland: World Health Organization; 2004.
[16] Kales HC, Kim MH, Austin KL, Valenstein M. Who receives outpatient monitoring during high-risk depression treatment periods? J Am Geriatr Soc 2010;58:908–13.
[17] Charlson ME, Pompei P, Ales KL, MacKenzie CR. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. J Chronic Dis 1987;40:373–83.
[18] McCarthy J, Valenstein M, Kim HM, Ilgen M, Zivin K, Blow F. Suicide mortality among patients receiving care in the veterans health administration health system. Am J Epidemiol 2009; 169:1033–8.
[19] Savva G, Zaccai J, Matthews F, Davidson J, McKeith I, Brayne C. Prevalence, correlates and course of behavioural and psychological symptoms of dementia in the population. Br J Psychiatry 2009; 194:212–9.
[20] Conwell Y, Duberstein PR, Cox C, Herrmann JH, Forbes NT, Caine ED. Relationships of age and axis I diagnoses in victims of completed suicide: a psychological autopsy study. Am J Psychiatry 1996; 153:1001–8.
[21] Pfeiffer P, Ganoczy D, Ilgen M, Zivin K, Valenstein M. Comorbid anxiety as a suicide risk factor among depressed veterans. Depress Anxiety 2009;26:752–7.
[22] Waern M, Rubenowitz E, Runeson B, Skoog I, Wilhelmson K, Allebeck P. Burden of illness and suicide in elderly people: case-control study. Br Med J 2002;324:1355–7.
[23] Scocco P, Rapattoni M, Fantoni G, Galuppo M, De Biasi F, de Girolamo G, et al. Suicidal behaviour in nursing homes: a survey in a region of north-east Italy. Int J Geriatr Psychiatry 2006;21:307–11.
[24] Menghini VV, Evans JM. Suicide among nursing home residents: a population-based study. J Am Med Dir Assoc 2000;1:47–50.
[25] Andrés AR, Hempstead K. Gun control and suicide: the impact of state firearm regulations in the United States, 1995-2004. Health Policy (in press).