



RESEARCH ARTICLE

Risk factors of mortality in older patients with dementia in psychiatric care

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Funding information

Alzheimer Nederland, Grant/Award Number: project no WE.03-2012-38; Netherlands Heart Foundation, Grant/Award Number: 31653251

Objective: To examine the mortality risk, and its risk factors, of older patients with dementia in psychiatric care.

Methods: We constructed a cohort of dementia patients through data linkage of four Dutch registers: the Psychiatric Case Register Middle Netherlands (PCR-MN), the hospital discharge register, the population register, and the national cause of death register. All dementia patients in PCR-MN aged between 60 and 100 years between 1 January 2000 and 31 December 2010 were included. Risk factors of mortality were investigated using Cox proportional hazard regression models with adjustment for age, sex, setting of care, nationality, marital status, dementia type, and psychiatric and somatic comorbidities.

Results: In total, 4297 patients were included with a median age of 80 years. The 1-year, 3-year, and 5-year mortality were 16.4%, 44.4%, and 63.5%, respectively. Determinants that increased the 1-year mortality were: male sex (adjusted hazard ratio [HR]: 1.49; 95% confidence interval [95% CI], 1.26-1.76), higher age (HR 1.08; 95% CI, 1.07-1.09), inpatient psychiatric care (HR 1.52; 95% CI, 1.19-1.93), more somatic comorbidities (HR 1.67; 95% CI, 1.49-1.87), and cardiovascular disease separately (HR 1.54; 95% CI, 1.30-1.82). Results for 3-year and 5-year mortality were comparable. Living together/married increased the 3- and 5-year mortality, and Dutch nationality increased the 5-year mortality. There were no differences in mortality with different types of psychiatric comorbidity.

Conclusion: Mortality of dementia patients in psychiatric care was high, much higher than mortality in the general older population. The results of this study should raise awareness about their unfavourable prognosis, particularly older patients, men, inpatients, and patients with more somatic comorbidity.

KEYWORDS

dementia, mortality, older adults, psychiatric, risk factors

1 | INTRODUCTION

Dementia is a disease with a poor prognosis. A two to four times higher mortality risk in patients with dementia compared with older patients without dementia has been reported.^{1,2} The prognosis of an individual patient with dementia depends on several patient- and disease-specific factors. Increasing age, male sex, low socioeconomic status, and presence of vascular risk factors have been shown to increase mortality in dementia patients.²⁻⁴ Also, psychiatric comorbidities, especially depression, have been investigated as a possible risk factor, however, with variable results. Most studies reported a higher risk of mortality in the case of coexisting depression and dementia.⁵⁻¹³ However, some studies did not.¹⁴⁻¹⁶ Data for the coexistence of dementia and other psychiatric diseases are lacking. One study did not find a difference in mortality between patients with dementia with or without psychiatric comorbidity.¹⁷ However, only few participants in this study had a different psychiatric diagnosis than depression. To our knowledge, no studies have been performed that examined determinants of mortality risk in patients with dementia in a psychiatric setting or with different types of psychiatric comorbidity. Psychiatric comorbidity is very common in dementia,¹⁸ so knowledge of the risk factors of mortality in these patients is important. Moreover, patients with dementia in a psychiatric setting are maybe not comparable with dementia patients in the somatic setting. Therefore, this knowledge can improve awareness of which patients are at particular increased risk of mortality. The aim of this study was to study the mortality risk and its risk factors in older patients with dementia in psychiatric care.

2 | MATERIALS AND METHODS

2.1 | Databases

A cohort of dementia patients in psychiatric care facilities was constructed through data linkage of four Dutch national registers: the Psychiatric Case Register Middle Netherlands (PCR-MN), the hospital discharge register (HDR), the population register (PR), and the national cause of death register. The PCR-MN registers all psychiatric diagnoses of in and outpatients of psychiatric services in the province of Utrecht, the Netherlands. It covers an urban region with roughly 780 000 citizens. Patients in this database who are diagnosed with dementia in a psychiatric setting either have no, one, or more other psychiatric diagnosis.¹⁹ The nationwide HDR contains information on patients admitted in approximately 100 Dutch hospitals or patients who visited the day clinic. It contains patients' demographics, admission data, and primary and secondary diagnoses. The primary and secondary diagnoses are determined at discharge and coded using the 9th version of the International Classification of Disease codes (ICD-codes).²⁰ The nationwide PR contains information on all legally residing citizens in the Netherlands, including date of birth, sex, current address, postal code, nationality, and native country. The national cause of death register contains information on date of death and primary and underlying causes of death. Death reports are coded according to the

Key Points

- Mortality of patients with dementia in psychiatric care was high. In comparison, much higher than mortality in the general older population.
- Risk factors increasing mortality of dementia patients in a psychiatric setting are male sex, higher age, living together/married, inpatients, and more somatic comorbidity.
- Different types of psychiatric comorbidity had no influence on mortality of these dementia patients.

International Classification of Disease codes, 10th version.²¹ The overall validity of the HDR has been shown to be high.²² The PR is also used to issue passports in the Netherlands and therefore the accuracy of these data is expected to be very high. The national cause of death register is completed by medical doctors in case of death. The date of death is expected to be very high, the reliability of cause(s) of death is depended on the accuracy of these doctors.

2.2 | Cohort identification

We constructed a cohort using the PCR-MN and selecting all patients with dementia in this database aged between 60 and 100 years, included between 1 January 2000 and 31 December 2010. These patients were linked with the PR using the record identification number assigned to each resident in the Netherlands with a unique combination of date of birth, sex, and the numeric part of the postal code. Eighty-six percent of cases could be linked to the PR. Next we linked to the National Cause of Death Register to retrieve data on date and cause(s) of death and to the HDR to retrieve data on comorbidities based on previous hospital admissions. Patients were included from their earliest date of diagnosis for dementia in the PCR-MN and were censored in case of death or at the end of the study period.

2.3 | Determinants

We obtained the following information for the cohort: age, sex, setting of psychiatric care, nationality, marital status (married/living together or alone), date of inclusion in PCR-MN, type of dementia, type of psychiatric comorbidity, and somatic comorbidities.

All the psychiatric and dementia diagnoses were retrieved from the PCR-MN. These diagnoses were determined by one of the psychiatrists in a psychiatric setting. In the Netherlands, the DSM criteria are common practice for making a psychiatric diagnosis. The psychiatric diagnoses included schizophrenia, mood disorders (depression and bipolar disease), and other disorders (personality disorders, adaptive disorders, anxiety disorders, and substance abuse). The type of dementia was categorised in vascular dementia or other dementia

(including Alzheimer's dementia; specific types of dementia other than vascular dementia are not registered in the PCR-MN). The setting of psychiatric care was either ambulatory or inpatient. Marital status was retrieved from the PR and was categorised in patients married or living with a partner and patients living alone. Nationality was retrieved from the PR and categorised in patients from Dutch nationality or other nationality. The somatic comorbidities were retrieved from the HDR categorised using the modified Charlson Comorbidity Index (CCI). The index ranges from 0 to 24 points and has proven to be a valid predictor of 1-year mortality after hospital admission.²³ This score has been widely used in research as a measure of comorbidities. Because all patients in our cohort had dementia, we excluded dementia from the CCI. In the analyses, comorbidities were divided into the following groups: 0, 1-2, or ≥ 3 points on the CCI. Moreover, we examined cardiovascular comorbidities separately, including myocardial infarction, congestive heart failure, cerebrovascular disease, and peripheral vascular disease.

2.4 | Outcome measures

One-year, 3-year, and 5-year mortality risk was defined as risk of death within 1, 3, or 5 years after inclusion in the PCR-MN, respectively. Date and cause(s) of death were retrieved from the National Cause of Death Register. One-year follow-up was available for all included patients between 2000 and 2009, 3-year follow-up was available for all included patients between 2000 and 2007, and 5-year follow-up was available for all included patients between 2000 and 2005.

2.5 | Statistical analysis

Baseline characteristics were calculated as mean with corresponding standard deviation or, in case of a skewed distribution, as median and interquartile range, or as percentages.

One-year, 3-year, and 5-year mortality risks were obtained through crosstabs. Risk factors for mortality were examined using Cox proportional hazard regression models. Hazard ratios (HRs) and their corresponding 95% confidence intervals (95% CIs) were calculated. HRs were adjusted for age, sex, setting of psychiatric care, nationality, marital status, somatic comorbidity (CCI), cardiovascular disease separately, type of dementia, and type of psychiatric comorbidity.

We used SPSS software, version 20.0 (SPSS Inc., Chicago, Illinois) for the analyses. A *P* value < .05 was considered statistically significant.

2.6 | Ethics

Linkage of data from the different registries was performed in agreement with the privacy legislation in the Netherlands.²⁴ Only coded records and data sets were involved. All linkages and analyses were performed in a secure environment of Statistics Netherlands.

2.7 | Funding

This study was supported by Alzheimer Nederland (project no WE.03-2012-38) and by a grant from the Netherlands Heart Foundation (grant number 31653251) as part of the project "Cardiovascular disease in the Netherlands: figures and facts" of the Netherlands Heart Foundation. The sponsor had no role in the design, conduct, writing, or interpretation of the results.

3 | RESULTS

In total, 4297 patients were included for 1-year mortality, 2952 patient for 3-year mortality, and 1418 patients for 5-year mortality. The mean age of the patients was 80 years and the majority were women. Most patients were of Dutch nationality. More than half of the patients had no important somatic comorbidity according to the CCI. The majority of patients had no other psychiatric comorbidity. Depression was the most common psychiatric comorbidity. About one third of the patients had vascular dementia, while the other patients had another type of dementia, including Alzheimer disease. Table 1 shows baseline characteristics.

3.1 | Absolute mortality risks

The absolute mortality risks are shown in Table 2. Absolute mortality risks were high, as more than half of the patients had died after 5 years. The 1-year, 3-year, and 5-year mortality were 16.4%, 44.4% and 63.5%, respectively. Men had higher absolute risks than women with a 1-year mortality of 19.5% and 13.9%, respectively. Of the psychiatric comorbidities, patients with mood disorders had the highest absolute mortality risks, ranging from 15.8% after 1 year to 60.2% after 5 years.

3.2 | Risk factors for mortality

Table 3 shows the risks factors for mortality and their HRs. Mortality was significantly higher in men (adjusted HR of 1-year mortality: 1.49; 95% CI, 1.26-1.76), in patients of higher age (HR 1.08; 95% CI, 1.07-1.09), in patients with more somatic comorbidity according to the CCI (HR 1.67; 95% CI, 1.49-1.87), and in patients with cardiovascular disease (HR 1.54; 95% CI, 1.30-1.82). Furthermore, patients admitted for inpatient psychiatric care were at higher risk of mortality (HR 1.52; 95% CI, 1.29-1.93). The 3-year and 5-year mortality was also higher in patients living with a partner/married (HR 1.29; 95% CI, 1.13-1.47 and HR 1.36; 95% CI, 1.15-1.60, respectively) and the 5-year mortality in patients with a Dutch nationality (HR 1.48; 95% CI, 1.12-1.95).

There were no differences in mortality between different types of psychiatric comorbidity (adjusted HR of 1-year mortality for schizophrenia: 0.85; 95% CI, 0.55-1.33; for mood disorders: 1.11; 95% CI, 0.80-1.54; and for "other" psychiatric disorders: 0.91; 95% CI, 0.66-1.26, with reference group all other psychiatric disorders). There were also no differences in mortality between patients with vascular dementia compared with all other types of dementia (adjusted HR of 1-year mortality 0.98; 95% CI, 0.84-1.14).

TABLE 1 Baseline characteristics of patients with dementia in psychiatric care

	1-year mortality (n = 4297)	3-year mortality (n = 2952)	5-year mortality (n = 1418)
Male (n,%)	1859 (43.3)	1255 (42.5)	584 (41.2)
Age in years (median, range)	80 (60-99)	80 (60-99)	80 (60-98)
<i>Age in years (n,%)</i>			
60-69 years	472 (11.0)	308 (10.4)	143 (10.1)
70-79 years	1465 (34.1)	1043 (35.3)	545 (38.4)
80-89 years	2022 (47.1)	1379 (46.7)	637 (44.9)
90-99 years	338 (7.9)	222 (7.5)	93 (6.6)
<i>Marital status (n,%)</i>			
Married/living together	1615 (37.6)	1060 (35.9)	476 (33.6)
Alone	2682 (62.4)	1892 (64.1)	942 (66.4)
<i>Nationality (n,%)</i>			
Dutch	3988 (92.8)	2753 (93.3)	1319 (93.0)
Other	309 (7.2)	199 (6.7)	99 (7.0)
<i>Charlson comorbidity index (n,%)</i>			
0	2778 (64.6)	1925 (65.2)	976 (68.8)
1-2	1300 (30.3)	883 (29.9)	376 (26.5)
≥3	218 (5.1)	144 (4.9)	66 (4.7)
<i>Cardiovascular disease (n,%)</i>			
<i>Dementia (n,%)</i>			
Vascular	1582 (36.8)	1134 (38.4)	513 (36.2)
Other	2715 (63.2)	1818 (61.6)	905 (63.8)
<i>Psychiatric diagnoses (n,%)</i>			
Schizophrenia	213 (6.0)	147 (5.0)	87 (6.1)
Mood disorders	603 (14.0)	412 (14.0)	197 (13.9)
Depression	533 (12.4)	359 (12.2)	171 (12.1)
Bipolar disorder	70 (1.6)	53 (1.8)	26 (1.8)
Other	604 (14.1)	398 (13.5)	173 (12.2)
Personality disorders	215 (5.0)	149 (5.0)	74 (5.2)
Adaptive disorder	121 (2.8)	61 (2.1)	24 (1.7)
Fear	132 (3.1)	88 (3.0)	40 (2.8)
Substance abuse	241 (5.6)	158 (5.4)	62 (4.4)
No psychiatric comorbidity	3166 (73.7)	2188 (74.1)	1062 (74.9)
<i>Psychiatric care (n,%)</i>			
Inpatient	420 (9.8)	296 (10.0)	190 (13.4)
Ambulant	3877 (90.2)	2656 (90.0)	1228 (86.6)
Follow-up in days (median, range)	836 (1-4012)	1142 (1-4012)	1200 (1-4012)

The effect estimates of the possible risk factors attenuated in the three-year and five-year mortality, but are comparable with results for 1-year mortality.

4 | DISCUSSION

This study in patients with dementia in psychiatric care showed that absolute mortality risks were high compared with the general Dutch

population. The 1-year, 3-year, and 5-year mortality risks were 16.4%, 44.4%, and 63.5%, respectively. The 1-year mortality for 80-year-old men and women in the Netherlands in 2016 was 5.4% and 3.5%, respectively.²⁵ Risk factors of mortality were male sex, older age, admitted for inpatient psychiatric care, more somatic comorbidities, more cardiovascular disease separately, living together/being married, and Dutch nationality.

Some of the risk factors (higher age, male sex, and cardiovascular comorbidities) found in this study population with patients with

TABLE 2 Absolute mortality risks of patients with dementia in psychiatric care

	1-year mortality (n = 4297)	3-year mortality (n = 2952)	5-year mortality (n = 1418)
Total (n,%)	703 (16.4)	1312 (44.4)	900 (63.5)
Gender (n,%)			
Male	363 (19.5)	622 (49.6)	396 (67.8)
Female	340 (13.9)	690 (40.7)	504 (60.4)
Age (n,%)			
60-69 years	29 (6.1)	75 (24.4)	58 (40.6)
70-79 years	185 (12.6)	377 (36.1)	299 (54.9)
80-89 years	374 (18.5)	704 (51.1)	458 (71.9)
90-99 years	115 (34.0)	156 (70.3)	85 (91.4)
Marital status (n,%)			
Married/living together	282 (17.5)	505 (47.6)	322 (67.6)
Alone	421 (15.7)	807 (42.7)	578 (61.4)
Nationality (n,%)			
Dutch	661 (16.6)	1235 (44.9)	846 (64.1)
Other	42 (13.6)	77 (38.7)	54 (54.5)
CCI (n,%)			
0	356 (12.8)	769 (39.9)	575 (58.9)
1-2	266 (20.5)	448 (50.7)	266 (70.7)
≥3	81 (37.2)	95 (66.0)	59 (89.4)
Cardiovascular disease (n,%)			
Present	208 (23.1)	322 (52.7)	205 (75.1)
No cardiovascular disease	495 (14.6)	990 (42.3)	695 (60.7)
Dementia (n,%)			
Vascular	277 (17.5)	508 (44.8)	328 (63.9)
Other	426 (15.7)	804 (44.2)	572 (63.2)
Psychiatric diagnoses (n,%)			
Schizophrenia	25 (11.7)	65 (44.2)	53 (60.9)
Mood disorder			
-Depression	84 (15.8)	169 (41.0)	103 (60.2)
-Bipolar disorder	*	17 (32.1)	12 (46.2)
Other			
-Personality disorders	25 (11.6)	50 (33.6)	42 (56.8)
-Adaptive disorder	12 (9.9)	19 (31.1)	*
-Fear	20 (15.2)	36 (40.9)	24 (60.0)
-Substance abuse	29 (12.0)	61 (38.6)	30 (48.4)
No psychiatric comorbidity	550 (17.4)	1006 (46.0)	696 (65.5)
Psychiatric care (n,%)			
Inpatient	82 (19.5)	146 (49.3)	132 (69.5)
Ambulatory	621 (16.0)	1166 (43.9)	768 (62.5)

* = < 10 participants

dementia and psychiatric comorbidity are consistent with earlier studies done in a general dementia population.^{2,3,26} Dutch nationality was unexpectedly associated with an increased 5-year mortality risk in this study population. In earlier studies, mostly from the United States, being of an ethnic minority was a possible risk factor for mortality.²⁷

However, in the United States, there is a different racial variation than in Europe, which could influence the mortality risk. The only earlier study done in a Dutch hospital-based population showed no differences in the mortality in patients with dementia from different nationalities.²⁷ Relatively, few patients in our cohort were from non-Dutch

TABLE 3 Risk factors for mortality in patients with dementia in psychiatric care

	1-year mortality (HR, 95%-CI)	Adjusted hazard ratio [†] (HR, 95%-CI)	3-year mortality (HR, 95%-CI)	Adjusted hazard ratio [†] (HR, 95%-CI)	5-year mortality (HR, 95%-CI)	Adjusted hazard ratio [†] (HR, 95%-CI)
<i>Gender</i>						
Men	1.44 (1.25-1.67)*	1.49 (1.26-1.76)*	1.32 (1.18-1.47)*	1.38 (1.22-1.56)*	1.25 (1.09-1.42)*	1.28 (1.10-1.49)*
Women	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
<i>Age</i>	1.76 (1.59-1.94)*	1.08 (1.07-1.09)*	1.63 (1.52-1.76)*	1.07 (1.06-1.08)*	1.62 (1.48-1.78)*	1.07 (1.06-1.08)*
<i>Marital Status</i>						
Married/living together	1.12 (0.97-1.31)	1.19 (1.00-1.42)	1.16 (1.04-1.30)*	1.29 (1.13-1.47)*	1.19 (1.04-1.37)*	1.36 (1.15-1.60)*
Alone	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
<i>Nationality</i>						
Dutch	1.23 (0.90-1.68)	1.16 (0.85-1.58)	1.23 (0.98-1.55)	1.22 (0.97-1.53)	1.37 (1.04-1.80)*	1.48 (1.12-1.95)*
Other	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
<i>CCI</i>	1.77 (1.59-1.98)*	1.67 (1.49-1.87)*	1.45 (1.33-1.58)*	1.40 (1.28-1.53)*	1.50 (1.34-1.67)*	1.41 (1.26-1.58)*
<i>Cardiovascular disease</i>						
<i>Dementia</i>						
Vascular	1.13 (0.97-1.31)	0.98 (0.84-1.14)	1.03 (0.92-1.15)	0.93 (0.83-1.04)	0.99 (0.86-1.13)	0.88 (0.77-1.01)
Other	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Inpatient in psychiatric care	1.30 (1.03-1.63)*	1.52 (1.19-1.93)*	1.25 (1.06-1.49)*	1.47 (1.23-1.76)*	1.28 (1.06-1.54)*	1.53 (1.25-1.89)*
Ambulatory	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
<i>Psychiatric comorbidity[‡]</i>						
Schizophrenia	0.83 (0.54-1.27)	0.85 (0.55-1.33)	1.16 (0.88-1.53)	1.19 (0.89-1.58)	1.13 (0.83-1.55)	1.17 (0.85-1.62)
Mood disorders	1.27 (0.92-1.76)	1.11 (0.80-1.54)	1.10 (0.87-1.37)	1.05 (0.83-1.32)	1.12 (0.85-1.48)	1.08 (0.81-1.42)
Other [§]	0.83 (0.60-1.13)	0.91 (0.66-1.26)	0.80 (0.64-1.00)*	0.91 (0.73-1.15)	0.72 (0.55-0.95)*	0.85 (0.64-1.14)

HR = hazard ratio.

95%-CI = 95%-confidence interval

CCI = Charlson Comorbidity Index

*p-value <0.05

Ref. = reference category.

[†]adjusted for gender, age, marital status, nationality, type of dementia, setting of care, somatic and psychiatric comorbidities.

[‡]HR of a specific psychiatric disorder compared to all other psychiatric disorders.

[§]other = personality disorder, adaptive disorder, fear and substance abuse.

nationality. Maybe there are specific ethnicities that lower the mortality risk, but because of the low number of patients from all the different ethnic backgrounds it was not possible to investigate this further.

Another unexpected finding was that patients who were married or living together were also at increased 3-year and 5-year mortality risk. Possibly, dementia patients with a partner are referred for psychiatric care later, thus entering psychiatric care with more advanced disease. However, it might also be that married people are referred earlier as they are likely to have a spouse who is seeing earlier signs of dementia. Information on severity of dementia, however, was not available from the databases.

This study showed that different types of psychiatric comorbidity (schizophrenia, mood disorders, and other disorders) had the same impact on mortality in patients with dementia. To our knowledge, previous studies that directly compared mortality risks between several types of psychiatric comorbidity in dementia patients are scarce. One previous study showed that different types of psychiatric

comorbidity did not have a significant impact on mortality, but numbers of patients were very small (ranging from 60 patients with depression to three patients with psychotic disorder).¹⁷ There are previous studies that documented a higher mortality risk in patients with dementia and depression compared with patients with dementia without depression.⁵⁻¹³ In the current study, patients with specific types of psychiatric comorbidity had lower mortality risks when compared with patients without psychiatric comorbidity (Table 2). A possible explanation is that patients with a psychiatric disorder that are already under continuing psychiatric care before they develop cognitive impairment were included in the database at an earlier stage of dementia than patients that had no psychiatric diagnosis and presented in a psychiatric setting because of dementia. Unfortunately, in the database, there was no information on the stage of dementia. Therefore, it was not possible to investigate this assumption.

To the best of our knowledge, this is the first study that investigated the prognostic factors of patients with dementia in psychiatric

care. One of the strengths of this study is the large study population, the population-based character of the sampling, and large number of risk factors included. Furthermore, patients were followed for a long time enabling calculation of risks after as long as 5 years. All patients registered in psychiatric care facilities in the Utrecht district with different psychiatric comorbidities were included, which ensures generalisability of the outcomes.

A limitation is the inability to take the severity of dementia and other types of dementia than vascular dementia into account. This could also explain why vascular dementia had no influence on mortality. Vascular dementia was not only compared with Alzheimer disease, but also with other dementia types, for example, dementia with Lewy Bodies, which could influence the comparison because of different mortality risks for the different types of dementia in the comparison group. Because this cohort was based on existing health care databases, the completeness and reliability of the data depended on the documentation of the health care provider. Probably, this also explains that a relatively small part of our cohort had somatic comorbidities according to the CCI. Apart from the completeness, the overall validity of the registers used has been proven to be high.¹⁹

This study showed a high mortality in patients with dementia in psychiatric care. The results of the present study should raise awareness in clinicians and caregivers about the unfavourable prognosis of those patients, particularly of older inpatient men with more somatic comorbidity. We recommend to perform further studies that provide a more individualised risk assessment of the prognosis of an individual patient.

5 | CONCLUSION

Mortality of patients with dementia in psychiatric care is high. In comparison, much higher than mortality in the general older population. The results of the present study should raise awareness in clinicians and caregivers about the unfavourable prognosis of patients with dementia in psychiatric care, particularly of older inpatient men with more somatic comorbidity.

ACKNOWLEDGEMENTS

All authors were involved in conception and design of the study. NG, IvdV, IV and HK contributed to the data acquisition. NG, IvdV, IV, HK, and MB contributed to the analysis and writing of the manuscript. All authors critically reviewed and approved the final manuscript.

This study was supported by Alzheimer Nederland (project no WE.03-2012-38) and by a grant from the Netherlands Heart Foundation (grant number 31653251) as part of the project 'Cardiovascular disease in the Netherlands: figures and facts' of the Netherlands Heart Foundation. The sponsors had no role in the design, conduct, writing, or interpretation of the results.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

DATA AVAILABILITY STATEMENT

Unfortunately, it is not possible to share the data of this study. This because the raw data is in a secure environment of Statistics Netherlands, which is not available for people without special clearance by this institute.

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How to cite this article: Golüke NMS, Geerlings MI, van de Vorst IE, et al. Risk factors of mortality in older patients with dementia in psychiatric care. *Int J Geriatr Psychiatry*. 2020;35:174-181. <https://doi.org/10.1002/gps.5232>