Depression and Risk of Nursing Home Admission Among Older Adults in Home Care in Europe: Results From the Aged in Home Care (AdHOC) Study

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Objective: Depression is a frequent condition observed among nursing home residents. However, so far, limited data are available on the impact of depression on nursing home admission. The aim of the present study was to assess the effect of depression on the risk of nursing home admission in a group of older adults receiving home care in Europe.

Method: We conducted a longitudinal analysis using data from the Aged in Home Care (AdHOC) database, which contains information on older adults receiving home care services in 11 European countries. Subjects had been admitted to the home care programs between 2001 and 2003. Depression was diagnosed as a score ≥ 3 on the Minimum Data Set (MDS) Depression Rating Scale. Information on nursing home admission was collected semiannually for 1 year by trained research personnel.

Results: The mean age of 2718 older adults entering the study was 82.4 (SD = 7.3) years, 2047 (75.3%) were women, and 331 (12.2%) were depressed. Overall, 49/331 depressed participants (14.8%) and 252/2387 nondepressed participants (10.6%) were admitted to a nursing home (p = .02). After adjusting for potential confounders, the risk of nursing home admission was significantly higher for depressed participants (hazard ratio = 1.43, 95% CI = 1.02 to 2.02). The risk of nursing home admission progressively and significantly increased as MDS Depression Rating Scale score increased (signifying more severe depression) (p = .001 for linear trend).

Conclusions: In older adults receiving home care in Europe, depression is associated with an increased risk for nursing home admission. This association increases with severity of depression.

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In the spirit of full disclosure and in compliance with all ACCME Essential Areas and Policies, the faculty for this CME article were asked to complete a statement regarding all relevant financial relationships between themselves or their spouse/partner and any commercial interest (i.e., any proprietary entity producing health care goods or services consumed by, or used on, patients) occurring within at least 12 months prior to joining this activity. The CME Institute has resolved any conflicts of interest that were identified. The disclosures are as follows: Drs. Onder, Liperoti, Soldato, Cipriani, Bernabei, and Landi have no personal affiliations or financial relationships with any proprietary entity producing health care goods or services consumed by, or used on, patients to disclose relative to the article.

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Depression in the older population is a major health issue, both because of its high prevalence and because of its adverse health consequences. About 12% to 20% of community-dwelling older persons suffer from symptoms of depression.[1,2] Many cross-sectional studies have demonstrated that, compared with nondepressed subjects, depressed older persons have poorer health status, higher prevalence of disability, and more severe medical comorbidity.[3–7] In addition, longitudinal studies have shown that depression represents a risk factor for adverse outcomes including increased morbidity and mortality and incomplete or delayed recovery from illness and disability.[8–10]

Depression is also a frequent condition observed among nursing home residents. It has been shown that more than 60% of cognitively intact individuals in a nursing home had depression.[11] However, so far, limited data are available on the impact of depressive symptoms on nursing home admission. In a group of ambulatory older adults hospitalized with heart failure, depression was associated with a significantly increased risk of nursing home admission.[12] In addition, in patients with dementia, depression was shown to increase the rate of

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TAKE-HOME POINTS

- Depression is associated with poorer health status and with an increased risk of nursing home admission among older adults in home care.
- Depression is largely undertreated, and less than one fifth of depressed older adults receive pharmacologic treatment.
- Clinicians should routinely assess the presence of depressive symptoms in older adults.

institutionalization.[13,14] In contrast with these findings, among 401 patients aged 75 years and older and admitted to the internal medicine service of an academic hospital, depressive symptoms were associated with an increased risk of hospital readmission and with higher inpatient services utilization, but no significant effect was shown on nursing home admission.[15] Finally, in a large population of Medicare beneficiaries aged 65 or older, individuals who identified themselves as feeling sad or depressed much of the time over the previous year were at significantly higher risk of nursing home admission.[16]

Therefore, the aim of the present study was to assess if depression was associated with an increased risk of nursing home admission in a large group of older adults receiving home care in Europe.

METHOD

Study Population

The study population consisted of a random sample of elders who were admitted to the home care programs in 11 different European Home Health Agencies between 2001 and 2003 and who participated in the Aged in Home Care (AdHOC) project, under the sponsorship of the European Union.[17] The AdHOC project analyzed the structure and organizational characteristics of home care services in 11 European countries, along with the clinical and functional characteristics of their clients. The home care clients were assessed in the following urban areas: Prague (Czech Republic), Copenhagen (Denmark), Helsinki (Finland), Amiens (France), Nurnberg and Bayreuth (Germany), Reykjavik (Iceland), Milan (Italy), Rotterdam (the Netherlands), Oslo (Norway), Stockholm (Sweden), and Maidstone and Ashford (United Kingdom). For each site, a sample was obtained from a randomized list of all subjects aged 65 years or more already receiving home care services. When specific services (e.g., "integrated" or "social" only) were provided by different agencies, the sample from each agency reflected the overall proportion of clients receiving the services of interest.

All persons in the sample were assessed by a trained staff that collected data on the Minimum Data Set–Home Care (MDS-HC) form following the guidelines published in the MDS-HC manual.[18] In Finland, France, Germany, and Iceland, assessments were conducted by agency personnel, while in all other countries, they were conducted by research assistants recruited for the project. All received standardized training on how to complete the assessment instrument. Ethical approval for the study was obtained in all countries according to local regulations.

Minimum Data Set–Home Care Assessment Data

The MDS-HC contains over 350 data elements including sociodemographic variables and numerous clinical items about both physical and cognitive status, as well as clinical diagnoses. The MDS-HC also includes information about an extensive array of signs, symptoms, syndromes, and treatments being provided.[18,19] A variety of different, multi-item summary scales are embedded in the MDS-HC measurement. The cognitive performance scale (CPS) was used to assess cognitive status.[19,20] Cognitive impairment was categorized as follows: moderate (CPS score 2 to 4) and severe (CPS score ≥ 5). Activities of daily living (ADL) were used to assess physical function, and ADL disability was defined as the need of assistance in 1 or more of the following ADL: eating, dressing, transferring, mobility in bed, personal hygiene, and toileting. Behavioral symptoms were considered to be present if the participant exhibited 1 or more of the following symptoms in the 3 days prior to assessment: wandering, being verbally abusive, being physically abusive, displaying socially inappropriate behavior, and actively resisting care.

Depression Assessment

MDS Depression Rating Scale was used to assess the presence of depressive symptoms.[21] This scale is based on presence of the following depressive symptoms: (1) feeling of sadness or being depressed; (2) persistent anger with self or others; (3) expression of what appear to be unrealistic fears; (4) repetitive health complaints; (5) repetitive anxious complaints; (6) sad, pained, worried facial expressions; (7) recurrent crying, tearfulness; (8) withdrawal from activities of interest; and (9) reduced social interaction. Based on a previous observation, partici-

pants with a Depression Rating Scale score ≥ 3 were considered depressed.[21] The MDS Depression Rating Scale has proven reliable for detecting depression among older adults, and, when tested against diagnoses of major or nonmajor depression, sensitivity was 91% and specificity was 69%.[21]

Nursing Home Admission

The length of follow-up was 1 year. The outcome was admission to nursing home. Information was collected every 6 months by trained research personnel, and the date of nursing home admission was recorded. The first report of a nursing home admission was considered as the event.

Study Sample

From the initial sample of 4007 participants, those enrolled in Finland were excluded, as data on nursing home admission were not collected (N = 187). Additionally, we excluded participants with severe cognitive impairment, defined as a CPS score ≥ 5 (N = 309); those with terminal illness (N = 24); those with diagnosis of cancer (N = 280); and those with missing data for depression (N = 26). Finally, 463 participants (14.6% of study sample) lacking follow-up assessment were excluded. This resulted in a sample size of 2718 participants. Compared with participants included in the study, those lacking follow-up assessment were significantly less likely to live alone (59.2% vs. 64.0%, p = .046), but these 2 groups did not differ significantly for age (82.5 ± 6.9 vs. 82.4 ± 7.3 years, p = .71), gender (female gender 74.7% vs. 75.3%, p = .79), prevalence of depression (11.4% vs. 12.2%, p = .66) and pain (40.6% vs. 44.0%, p = .18), cognitive impairment (20.5% vs. 24.3%, p = .08), ADL disability (32.8% vs. 33.1%, p = .89), or presence of behavioral symptoms (6.7% vs. 5.2%, p = .17).

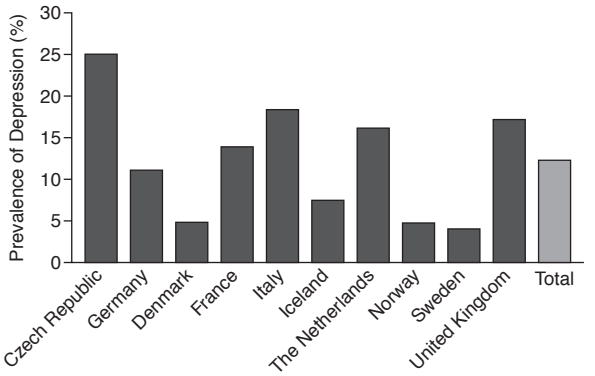
Analytic Approach

Baseline characteristics of study participants according to presence of depression were compared using analyses of variance for normally distributed variables, nonparametric Kruskal-Wallis H tests for skewed variables, and χ^2 analyses for dichotomous variables.

Cox proportional hazards regressions were fitted to evaluate the effect of depression on time to nursing home admission, adjusting for potential confounders. The first report of nursing home admission at follow-up was considered as the event. To rule out departure from proportionality assumption, we examined the log-log survival function. Participants with no evidence of nursing home admission were censored at the time of their deaths or at the end of the follow-up. Analyses are adjusted for age, gender, site, living alone, cognitive impairment, ADL disability, presence of behavioral symptoms, daily pain, ischemic heart disease, congestive heart failure, stroke, osteoarthritis, diabetes, and hypertension. Analysis was also repeated after stratification of the sample in 3 groups of countries discriminated on the basis of sociodemographic, functional, and clinical variables of participants.[17] Cluster 1 includes Czech Republic, Sweden, Denmark, Finland, Iceland, Norway, and the Netherlands; cluster 2 includes Italy and France; and cluster 3 includes Germany and United Kingdom.

Finally, additional Cox proportional hazards regressions were fitted to evaluate the effect of single depressive symptoms included in the MDS Depression Rating Scale and of the overall number of depressive symptoms on the risk of nursing home admission. All analyses were performed using SPSS for Windows version 10.0 (SPSS Inc.; Chicago, Ill.)

Figure 1. Prevalence of Depression Among AdHOC Study Participants by Country



Abbreviation: AdHOC = Aged in Home Care.

RESULTS

The mean age of 2718 older adults entering the study was 82.4 (SD = 7.3) years, and 2047 (75.3%) were women. Of the total sample, 331 participants (12.2%) were diagnosed as depressed based on the MDS Depression Rating Scale. As shown in Figure 1, prevalence of depression differed substantially among study sites, ranging from 4.0% in Sweden to 24.9% in Czech Republic (Figure 1).

Characteristics of the study population according to presence of depression are summarized in Table 1. Compared with nondepressed participants, depressed participants were slightly younger; were more likely to be women and to present with a flare-up of a chronic or recurrent condition; were less likely to live alone; had a higher prevalence of ADL disability, cognitive impairment, and behavioral symptoms; and experienced more comorbid conditions, including ischemic heart disease, congestive heart failure, hypertension, stroke, diabetes,

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Table 1. Characteristics of Study Population According to Presence of Depression[a]

Characteristic	No Depression (N = 2387)	Depression (N = 331)	p
Age, mean ± SD, y	82.6 ± 7.3	81.3 ± 7.4	.003
Female gender	1782 (74.7)	265 (80.1)	.033
Living alone	1542 (64.6)	197 (59.5)	.07
ADL disability[b]	755 (31.7)	143 (43.5)	< .001
Moderate cognitive impairment	518 (21.7)	142 (42.9)	< .001
Flare-up of a chronic or recurrent condition	242 (10.1)	77 (23.3)	< .001
Presence of behavioral symptoms	85 (3.6)	55 (16.6)	< .001
Presence of daily pain[c]	980 (41.4)	205 (62.3)	< .001
Diseases			
Ischemic heart disease	442 (18.5)	98 (29.6)	< .001
Congestive heart failure	540 (22.6)	99 (29.9)	.003
Hypertension	788 (33.0)	137 (41.4)	.003
Stroke	380 (15.9)	80 (24.2)	< .001
Diabetes	405 (17.0)	77 (23.3)	.005
Chronic obstructive pulmonary disease	255 (10.7)	42 (12.7)	.27
Osteoarthritis	668 (28.0)	116 (35.0)	.008
Caregiver			
No caregiver	330 (13.8)	48 (14.5)	.11
Caregiver present, not living with patient	1419 (59.4)	178 (53.8)	
Caregiver present, living with patient	638 (26.7)	105 (31.7)	
Hours of formal care per week, mean ± SD	20.9 ± 32.5	21.8 ± 31.8	.65

[a]Data shown as N (%) unless otherwise indicated.
[b]N = 2385 for no depression and N = 329 for depression, due to missing values.
[c]N = 2366 for no depression and N = 329 for depression, due to missing values.
Abbreviation: ADL = activities of daily living.

and osteoarthritis. Hours of formal care received per week were slightly higher in the depressed group, but this result did not reach statistical significance. Among depressed participants, only 62 (19%) were receiving an antidepressant drug.

Mean follow-up time was 10.0 ± 3.7 months among nondepressed participants and 9.4 ± 3.9 months among depressed participants. One-year mortality did not differ significantly between depressed and nondepressed participants: 37 of 331 (11.2%) depressed participants died (crude incident rate per patient-year = 0.14), compared with 306 of 2387 (12.8%) nondepressed participants (crude incident rate per patient-year = 0.15). As shown in Table 2, 49 of 331 (14.8%) depressed participants and 252 of 2387 (10.6%) nondepressed participants were admitted to a nursing home (p = .02). The crude incident rate per patient-year was 0.13 among nondepressed participants and 0.19 among depressed participants. After adjusting for potential confounders, the risk of nursing home admission was significantly higher for depressed participants (adjusted hazard ratio [HR] = 1.43, 95% CI = 1.02 to 2.02). In addition, the association between depression and nursing home admission was consistent in the 3 clusters of countries defined on the basis of characteristics of participants (cluster 1: adjusted HR = 1.45, 95% CI =1.00 to 2.12; cluster 2: adjusted HR = 1.33, 95% CI = 0.41 to 4.27; cluster 3: adjusted HR = 1.45, 95% CI = 0.77 to 2.74).

When examining individual symptoms included in the MDS Depression Rating Scale, we observed that presence of all symptoms was associated with an increased risk of nursing home admission. The adjusted risk of nursing home admission for these symptoms ranged from 1.69 (recurrent health complaints) to 1.16 (recurrent crying, tearfulness).

Figure 2 summarizes the adjusted hazard ratios for nursing home admission across different groups, according to the MDS Depression Rating Scale. The risk of nursing home admission progressively and significantly increased as MDS Depression Rating Scale increments increased (signifying more severe depression) (p = .001 for linear trend): compared with participants with an MDS Depression Rating Scale score of 0, the hazard ratios for nursing home admission were 1.45 (95% CI = 1.11 to 1.90) for those with a score of 1 or 2, 1.54 (95% CI = 1.03 to 2.31) for those with a score of 3 or 4, and 2.23 (95% CI = 1.24 to 3.99) for those with a score of 5 or higher.

DISCUSSION

Based on our findings in older adults receiving home care in Europe, depression appears to be associated with an increased risk for nursing home admission. This association increases with severity of depression.

The higher risk of nursing home admission that we observed among depressed patients may be due to a number of factors. First, it has been hypothesized that psychological distress can activate neuro-regulated biological processes. This can result in diminished ability to combat pathologic processes, thus favoring the onset of negative outcomes determining nursing home admission. This phenomenon, described by Engel as the "giving-up–given-up complex," could explain the increased risk of adverse outcomes observed among depressed patients.[22] According to this hypothesis, depression adversely affects cardiac, gastrointestinal, endocrine, neurologic, and immune processes by increasing sympathetic tone and decreasing vagal tone.[23–25]

Second, depressed patients can amplify somatic symptoms, leading to exaggeration of negative stimuli.[26] In this context, it has been suggested that emotional distress can lead to increased attention directed toward one's body, with a consequent decrease in the threshold of any noxious somatic sensation.[27]

Third, depression may determine poorer adherence to healthy lifestyles. Depression may be associated with reduced physical activity, poor diet, noncompliance with medical treatment, and increased alcohol use.[2,28]

Table 2. Depression and Risk of Nursing Home Admission

Variable	Participants Admitted to Nursing Home, N/N (%)	Crude Incident Rate per Patient-Year	Crude Hazard Ratio (95% CI)	Adjusted[a] Hazard Ratio (95% CI)
No depression	252/2387 (10.6)	0.13	1 (reference)	1 (reference)
Depression	49/331 (14.8)	0.19	1.52 (1.12 to 2.06)	1.43 (1.02 to 2.02)
Depressive symptoms				
Feeling of sadness				
Not present	230/2178 (10.6)	0.14	1 (reference)	1 (reference)
Present	71/540 (13.1)	0.17	1.37 (1.05 to 1.79)	1.25 (0.93 to 1.68)
Persistent anger				
Not present	261/2450 (10.7)	0.13	1 (reference)	1 (reference)
Present	40/268 (14.9)	0.19	1.48 (1.06 to 2.06)	1.30 (0.90 to 1.86)
Unrealistic fears				
Not present	267/2498 (10.7)	0.13	1 (reference)	1 (reference)
Present	34/220 (15.5)	0.20	1.54 (1.07 to 2.19)	1.36 (0.91 to 2.02)
Health complaints				
Not present	257/2481 (10.4)	0.12	1 (reference)	1 (reference)
Present	44/237 (18.6)	0.24	1.94 (1.41 to 2.67)	1.69 (1.21 to 2.37)
Anxious complaints				
Not present	271/2539 (10.7)	0.13	1 (reference)	1 (reference)
Present	30/179 (16.8)	0.21	1.66 (1.14 to 2.43)	1.53 (1.03 to 2.27)
Sad, pained, worried				
Not present	237/2239 (10.6)	0.13	1 (reference)	1 (reference)
Present	64/479 (13.4)	0.17	1.36 (1.03 to 1.79)	1.38 (1.02 to 1.86)
Recurrent crying				
Not present	264/2436 (10.8)	0.13	1 (reference)	1 (reference)
Present	37/282 (13.1)	0.16	1.26 (0.89 to 1.78)	1.16 (0.80 to 1.67)
Withdrawal activities				
Not present	243/2347 (10.4)	0.12	1 (reference)	1 (reference)
Present	58/371 (15.6)	0.20	1.63 (1.22 to 2.17)	1.20 (0.87 to 1.64)
Reduced interactions				
Not present	215/2188 (9.8)	0.12	1 (reference)	1 (reference)
Present	85/530 (16.0)	0.21	1.81 (1.41 to 2.33)	1.28 (0.98 to 1.68)

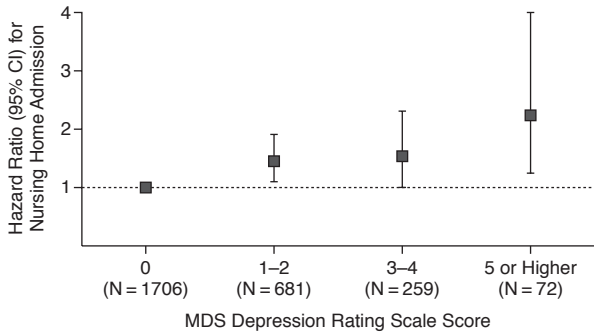
[a]Adjusted for age, gender, site, living alone, cognitive impairment, activities of daily living disability, presence of behavioral symptoms, daily pain, ischemic heart disease, congestive heart failure, stroke, osteoarthritis, diabetes, and hypertension.

An alternative explanation to our findings is that the link between depression and nursing home admission is caused by unmeasured confounders. Although analyses are restricted to participants without severe cognitive impairment and cancer and results are adjusted for many potential confounders, we cannot rule out that residual confounders, including (unmeasured) diseases and inflammation, may have affected our results.

The present study has several limitations. First, although we adjusted the analyses for many factors potentially affecting the risk of nursing home admission, the impact of residual confounding factors, including (unmeasured) diseases remains a possibility. Second, results of the present study are based on an elderly sample receiving home care in Europe and cannot be extrapolated to younger subjects living in other settings. Third, although the MDS-HC is a standardized, comprehensive assessment instrument, the recording of depressive symptoms is not its specific focus. Depressive symptoms were assessed on the basis of clinical records and consultation of primary caregivers and patient clinicians, but also independent observation and conversation with participants. Therefore, the potential for overestimation or underestimation of symptoms, depending on the training of study personnel and time spent with participants, remains a concern and may explain differences observed in studies assessing reliability of the MDS Depression Rating Scale.[21,29–32]

Finally, differences in organization of services and payment systems may have influenced our results. We had no data on nursing home characteristics (long-term and short-term rehabilitative nursing homes) or on structural and organizational characteristics of local health care systems, including nursing home bed availability. Payment systems for long-term care show great variation across countries in the study: long-term institutional care is usually paid for by either public funds (state or municipal) or, less commonly, private insurance, but with relevant differences depending on country.[33] Some government-financed programs may require a copayment (for example, in Italy and France). Some countries rely heavily on the tax revenues collected by municipalities and the state to pay for the care of all citizens (for example, Denmark and Sweden). In Iceland and the Netherlands, people pay a certain amount from their pensions, but there is no requirement to pay long-term care expenses from capital accumulated prior to retirement. Private insurance programs are not well developed in most nations in this

Figure 2. Risk of Nursing Home Admission According to Number of Depressive Symptoms[a]



[a]p = .001 for linear trend. Adjusted for age, gender, site, living alone, cognitive impairment, activities of daily living disability, presence of behavioral symptoms, daily pain, ischemic heart disease, congestive heart failure, stroke, osteoarthritis, diabetes, hypertension.
Abbreviation: MDS = Minimum Data Set.

study group. Although such programs are under consideration as a way of funding long-term care to varying degrees in many countries, many European countries are still heavily reliant on the state and society for the financial basis of long-term care.

The AdHOC project is the first research study to examine the characteristics of recipients of community care services in European countries in a comparable manner. Data were generated by the use of a common comprehensive standardized assessment instrument, namely the MDS-HC, created by an international multidisciplinary research collaboration. In an increasingly unified European Union, the AdHOC study has the potential to look at outcomes and services across nations. Identification of risk factors for negative outcomes, including nursing home admission, could not only help in the study and implementation of interventions aimed at improving patients' quality of life, but also provide agencies with the opportunity to design cost-effective services of the highest quality. This study represents a first step toward identifying the relationship between depressive symptoms and the subsequent use of institutional long-term care services, which will enable the planning of interventions aimed at reducing health care costs related to depression. In this context, it is noteworthy that only one fifth of depressed older adults participating in this study received antidepressant drugs, and future research should assess if use of these drugs may impact on nursing home admission and reduce costs.

In conclusion, this study provides evidence from a large sample of elderly showing that depression is associated with an increased risk of nursing home admission. More research is required to establish if treatment of depressive symptoms may result in better outcomes for older adults and the specific groups of elders that are most effectively targeted for treatment. Future studies of health care resources consumption in the elderly should consider multiple complex aspects of aging, including depression.

Disclosure of off-label usage: The authors have determined that, to the best of their knowledge, no investigational information about pharmaceutical agents that is outside U.S. Food and Drug Administration–approved labeling has been presented in this article.

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