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ORIGINAL ARTICLE

Hopelessness and Other Depressive Symptoms in Adults 70 Years and Older as Predictors of All-Cause Mortality Within 3 Months After Acute Hospitalization: The Hospital-ADL Study

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ABSTRACT

Objective: Depression among older adults predicts mortality after acute hospitalization. Depression is highly heterogeneous in its presentation of symptoms, whereas individual symptoms may differ in predictive value. This study aimed to investigate the prevalence of individual cognitive-affective depressive symptoms during acute hospitalization and investigate the predictive value of both overall and individual cognitive-affective depressive symptoms for mortality between admission up to 3-month postdischarge among older patients.

Methods: A prospective multicenter cohort study enrolled 401 acutely hospitalized patients 70 years and older (Hospitalization-Associated Disability and impact on daily Life Study). The predictive value of depressive symptoms, assessed using the Geriatric Depression Scale 15, during acute hospitalization on mortality was analyzed with multiple logistic regression.

Results: The analytic sample included 398 patients (M (SD) = 79.6 (6.6) years; 51% men). Results showed that 9.3% of participants died within 3 months, with symptoms of apathy being most frequently reported. The depression total score during hospitalization was associated with increased mortality risk (admission: odds ratio [OR] = 1.2, 95% confidence interval [CI] = 1.2–1.3; discharge: OR = 1.2, 95% CI = 1.2–1.4). Stepwise multiple logistic regression analyses yielded the finding that feelings of hopelessness during acute hospitalization were a strong unique predictor of mortality (admission: OR = 3.6, 95% CI = 1.8–7.4; discharge: OR = 5.7, 95% CI = 2.5–13.1). These associations were robust to adjustment for demographic factors, somatic symptoms, and medical comorbidities.

Conclusions: Symptoms of apathy were most frequently reported in response to acute hospitalization. However, feelings of hopelessness about their situation were the strongest cognitive-affective predictor of mortality. These results imply that this item is important in identifying patients who are in the last phase of their lives and for whom palliative care may be important.

Key words: acute hospitalization, apathy, depressive symptoms, hopelessness, mortality, older patients.

INTRODUCTION

Elevated symptoms of depression are highly prevalent among older adults across populations and healthcare settings and associated with higher mortality (1–5). Among acutely hospitalized older adults, the prevalence of patients with a clinical diagnosis of depression or reporting clinically elevated depressive symptoms ranges between 21% and 31% (6–9). Significantly, clinical and subthreshold levels of depressive symptoms have been associated with higher rates of mortality (1–5,10,11). The mechanisms underlying the association between depressive symptoms and mortality are not fully understood, but they are likely to involve multiple pathways (e.g., biological and behavioral).

Typically, depression status is determined by summing up a range of symptoms until a predetermined cutoff value is met (12–15). However, this approach belies the true complexity of

ADL = activity of daily living, **CI** = confidence interval, **CCI** = Charlson Comorbidity Index, **GDS** = Geriatric Depression Scale, **Hospital-ADL study** = Hospitalization-Associated Disability and impact on daily Life Study, **MMSE** = Mini-Mental State Examination, **OR** = odds ratio

SDC Supplemental Content

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depression as a highly heterogeneous syndrome (16,17), whereby different patients may display distinct symptom constellations (14,15,18) and may therefore have different associations with mortality (19). Most studies distinguish the symptom of depression by means of cognitive-affective symptoms (e.g., anhedonia, negative thoughts, and hopelessness) and somatic symptoms (e.g., fatigue and insomnia) (20,21). Research on cardiac patients has suggested that somatic symptoms are more predictive of mortality than cognitive-affective symptoms (22). This observation may imply confounding factors, given that most of the somatic depressive symptoms overlap with the medical illness symptoms or features of the aging process (23). On the other hand, the role of individual cognitive-affective symptoms alone, i.e., without investigating somatic symptoms, in mortality has not been well studied. Although previous research has suggested that cognitive-affective depressive symptoms such as apathy and hopelessness predict mortality (24–28), most of these studies focused on nonhospitalized adults (25–27) and/or have not specifically studied adults 60 years and older (27,28). Little is known about high-risk and older groups, such as acutely hospitalized older adults, who have an increased 3-month mortality risk (29). Understanding depression heterogeneity and the specific cognitive-affective symptoms that predict mortality among acutely hospitalized patients may aid the identification of individuals at elevated risk as well as those likely to benefit most from tailored interventions.

In light of the above, the aims of this study were to investigate the following: (1) the prevalence of individual cognitive-affective depressive symptoms during acute hospitalization (i.e., within 48 hours after admission and at discharge); (2) the predictive value of overall cognitive-affective depressive symptoms (both at admission and discharge) on mortality within 3-month postdischarge; and (3) the predictive value of specific cognitive-affective depressive symptoms (both at admission and discharge) on mortality within 3-month postdischarge among acutely hospitalized older patients.

METHODS

Design and Setting

Participants were enrolled in the Hospitalization-Associated Disability and impact on daily Life Study (Hospital-ADL study), described in detail elsewhere (30). In brief, the Hospital-ADL study is a multicenter prospective cohort study designed by an interdisciplinary team of researchers in the fields of geriatrics, nursing, psychology, physical therapy, and rehabilitation. Six hospitals in the Netherlands participated, with local approval being provided by all six hospitals. Data were collected between October 1, 2015, and June 1, 2017. The study was approved by the institutional review board of the Amsterdam University Medical Centers, an academic medical center in the Netherlands, and the research was performed according to the Dutch Medical Research Involving Human Subjects Act and the principles of the Declaration of Helsinki (1964).

Study Sample

A total of 401 participants were recruited from those who were acutely admitted at the internal medicine, cardiology, or geriatrics departments in the participating hospitals. Inclusion criteria involved the following: being admitted for 48 hours or more; approval from the attending medical doctor (MD) to contact patients; sufficient Dutch language proficiency to complete questionnaires; and a score of 15 or higher on the Mini-Mental State Examination (MMSE). We excluded delirious patients. In this sense, the first measurement was performed within 48 hours after admission, and a delirious state would interfere with MMSE performance and would yield a result below 15 points on the MMSE. Patients were excluded if they (1) had a life expectancy of 3 months or less as projected by the attending MD or (2) were disabled in all six basic activities of daily living (ADLs) as determined by the Katz-ADL index (31).

Procedures

Two researchers (R.V.S. and L.R.) visited the participating wards on Mondays, Wednesdays, and Fridays and contacted all eligible patients within 48 hours after hospital admission. The patients were informed about the objectives of the Hospital-ADL study and the study procedures. All participants provided written informed consent before inclusion. After informed consent was obtained, patients were enrolled in the study, and a trained geriatric team completed personal interviews within 48 hours after admission and at discharge.

Measurements

Depressive Symptoms

These were measured with the Dutch version of the Geriatric Depression Scale 15 (GDS-15) (32) at admission and discharge. The GDS-15 is a short version of the GDS-30 (33), comprising 15 symptom items scored on a binary (yes/no) scale, and assessing depressive symptoms over the preceding week. The total GDS-15 score is the sum of the 15 items (range = 0–15), whereby a score of 6 points or higher is considered indicative of clinically elevated depressive symptoms. This instrument has been specifically developed for use in geriatric populations and is widely used in acute hospital settings (34). The GDS-15 excludes certain symptoms that may be confounded by medical illnesses or the aging process, which would complicate the diagnosis of depression (35–38). Specifically, the GDS-15 does not include somatic symptoms such as significant malnutrition, fatigue, pain, and sleep disturbances (39); instead, it mainly focuses on cognitive symptoms of depression such as feelings of hopelessness, worthlessness, and happiness. A subdimension of the GDS-15 is apathy, measured by the GDS-3A (40), with the apathy subscale consisting of three items: (1) "*Have you dropped many of your activities and interests?*"; (2) "*Do you prefer to stay at home, rather than going out and doing new things?*"; and (3) *"Do you feel full of energy?*" (40). The GDS-15 has a mean sensitivity of 0.88 and specificity of 0.79 among older inpatients and 0.77 and 0.75 for older outpatients (35). Compared with the 14-item Apathy Scale (41), the GDS-3A has a mean sensitivity of 0.69 and specificity of 0.85 among older adults (≥85 years) (40).

Confounders

Potential confounders selected for the current analyses were demographic variables (i.e., age, sex, and education), hospital admission diagnoses, cognitive impairment, body mass index (BMI), smoking, somatic symptoms (i.e., malnutrition, fatigue, pain, and sleep quality), and severity of comorbid diseases. The MMSE was applied to classify the severity of a cognitive impairment. The MMSE is a validated instrument of cognitive impairment that assesses memory, attention, language, and planning. Cognitive impairment is defined as a score of 23 or less (range = 0–30) (42). BMI was measured at admission with the following formula: weight (kilogram) / height^2 (square meter), with both weight and height being measured at admission. Smoking at admission was measured with the binary (yes/no) question: *"Do you smoke?"* Somatic symptom presence or severity was included as potential confounders, because they may indicate illness severity or related somatic confounders (i.e., malnutrition, fatigue, pain, and sleep quality). Malnutrition was measured with the Short Nutritional Assessment Questionnaire (43,44), which consists of the following three questions: (1) *"Did you lose weight unintentionally?";* (2) *"Did you experience a decreased appetite over the last month?";* and (3) "*Did you use supplemental drinks or tube feeding over the last month?"* The total score of the Short

Nutritional Assessment Questionnaire was the sum of the raw scores, whereby a score of 2 or higher was indicative of malnutrition (45). Fatigue and pain were each measured using a Numeric Rating Scale. In this regard, for both symptoms, we used a continuous scale with a score range between 0 and 10 (0 representing no fatigue/pain and 10 the worst possible fatigue/pain), whereby a score of 4 or higher was defined as fatigue and pain (46,47). Finally, subjective sleep quality was measured with one item of the Pittsburgh Sleep Quality Index using a four-point Likert scale ranging between 0 (good) to 3 (poor) (48): "*During the past month, how would you rate your sleep quality overall?*" The severity of comorbid diseases was measured with the age-combined Charlson Comorbidity Index (CCI) (49), in which each comorbid disease is assigned a score of 1, 2, 3, or 6, depending on the risk of mortality. Furthermore, each decade of the age of older than 40 years adds 1 point to the risk (e.g. 70–79 years = 3 points; 80–89 years = 4 points; and 90–99 years = 5 points), and these points for age are added to the score from the CCI, with higher scores indicating a greater risk of mortality (49).

Outcome Variable

Mortality from admission up to 3-month postdischarge was the main outcome, which was measured using the medical records of participants or by report from family members or the patients' general practitioners. The exact date of death was registered, whereas the cause of death was not recorded.

Statistical Analysis

Baseline characteristics and prevalence of depressive symptoms were summarized using descriptive statistics. The predictor(s) of total mortality were measured with logistic regression analyses, which were structured as follows: first, an analysis was used to determine the predictive value of the total GDS-15 score for total mortality—model 1: crude model; model 2: crude model adjusted for demographic variables (i.e., age, sex, and education) and hospital admission diagnoses; and model 3: additionally adjusted for cognitive impairment, BMI, smoking, somatic symptoms, and disease severity. To identify whether specific items predict total mortality, we then used univariable logistic regression analyses to determine the predictive value of each individual GDS-15 item for total mortality within 3-month postdischarge. These univariable analyses were followed by a multiple logistic regression analysis with a backward selection procedure to identify which depression item or combination of items would constitute the best model for predicting mortality within 3-month postdischarge. The stepwise procedure implied that all items were entered in the analyses, and in each step, the GDS-15 item with the highest p values was removed from the analyses until only GDS-15 items with a significant predictive value remained in the final model. The unique contribution of these significant predictors of mortality was determined after adjusting for the previously mentioned confounders. In addition, Cox proportional hazards models were also used to assess the effect of confounding factors (i.e., models 1, 2, and 3). In addition, we examined the interaction effects of the GDS-15 total score/items with sex and cognitive impairment in mortality within 3-month postdischarge. For all regression analyses, the odds ratios (ORs), 95% confidence intervals (CIs) and p values were reported. All analyses were performed using IBM SPSS Statistics for Windows, Version 24.0 (IBM Corp, Armonk, NY). Statistical significance was set at $p < .05$ (two-tailed).

The present analyses were performed in the context of a larger study, and no a priori sample size calculation was performed for the present analyses (30). The achieved power was measured with post hoc analyses using G*Power, Version 3.1.

RESULTS

Description of the Sample

Figure 1 provides a recruitment flowchart of the Hospital-ADL study. There were 1024 acutely hospitalized patients admitted to the participating hospital wards for 48 hours or more between October 2015 and February 2017. Of the 1024 unplanned admissions, 519 met the inclusion criteria and were available to be contacted by the researchers. Of these, 401 agreed to participate. Three patients had no GDS-15 data at each measurement and were excluded from the sample. The analytic sample for the current study included 398 acutely hospitalized patients (M (SD) age = 79.6 (6.6) years). As can be seen from Table 1, approximately half (51.0%) of all the participants were male, and the most common hospital admission diagnoses were cardiac (30.4%) or respiratory diseases (18.6%). At hospital admission, 19.4% had moderate cognitive impairment and 22.7% had clinically elevated depressive symptoms. Of the somatic symptoms, 77% were fatigued, whereas nearly 40% had malnutrition and/or pain. Of the 398 patients, 37 patients (9.3%) were deceased within 3-month postdischarge. Of

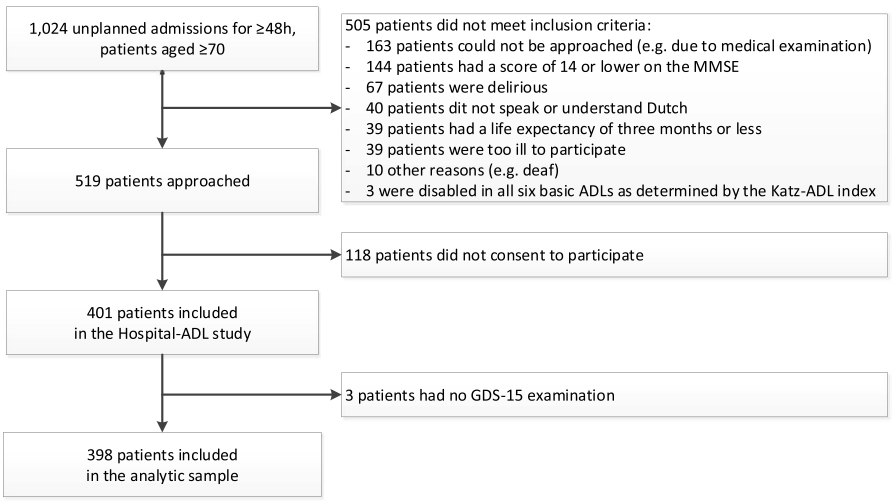

FIGURE 1. Flow chart of the Hospital-ADL study. Abbreviations: MMSE = Mini-Mental State Examination; ADLs = Activities of Daily Living; GDS-15 = Geriatric Depression Scale 15.

TABLE 1. Baseline Characteristics of Analytic Sample ($N = 398$)

Characteristics	All Patients ($N = 398$)
Demographics	
Age, mean (SD), y	79.6 (6.6)
Male sex, *n* (%)	203 (51.0)
Education, *n* (%)	
Primary school	101 (25.4)
ETS/DSS	89 (22.4)
SVE	117 (29.4)
HLHS/TLE	91 (22.9)
Hospital admission diagnoses, *n* (%)	
Cardiac	121 (30.4)
Gastrointestinal	45 (11.3)
Infection	58 (14.6)
Respiratory	74 (18.6)
Cancer (including hematology)	13 (3.3)
Electrolyte disturbance	10 (2.5)
Renal	15 (3.8)
Other	62 (15.6)
BMI, mean (SD)	25.2 (5.1)
Smoking, *n* (%)	43 (10.8)
Cognitive impairment, *n* (%)[a]	73 (19.4)
Somatic symptoms	
Malnutrition, n (%)[b]	153 (38.5)
Fatigue, *n* (%)[c]	305 (77.0)
Pain, *n* (%)[d]	147 (37.0)
Sleep quality, mean (SD)	1.8 (1.1)
Severity of comorbid diseases	
CCI score, mean (SD)[e]	5.7 (2.0)

N = total number of participants; SD = standard deviation; y = year; *n* = number of participants in a subgroup of the sample; PS = Primary School; ETS/DSS = elementary technical school/domestic science school; SVE = secondary vocational education; HLHS/TLE = higher-level high school/third-level education; BMI = body mass index; CCI = Charlson Comorbidity Index.

[a] Cognitively impaired if a score of less than 24 on the MMSE at admission (range = 0–30).

[b] Malnutrition if a score of 2 or higher on the Short Nutritional Assessment Questionnaire at admission (range = 0–7).

[c] Fatigue if a score of 4 or higher on the Numeric Rating Scale at admission (range, 0–10);

[d] Pain if a score of 4 or higher on the Numeric Rating Scale at admission (range = 0–10).

[e] Age-combined CCI score: a higher score indicating more or more severe comorbidity.

these 37 patients, eight (21.6%) passed away during hospitalization, and analyses at discharge were performed on the 29 patients who passed away after discharge.

Prevalences of Cognitive-Affective Depressive Symptoms

Data on depressive symptoms were complete for 99.7% of the 398 patients assessed within 48 hours after admission and for 87.2% of the assessments at discharge. The Cronbach's α's for the GDS-15 were .76 and .79 within 48 hours after admission or at discharge, respectively. Figure 2 highlights the prevalence of each depressive symptom during acute hospitalization (i.e., assessed within 48 hours after admission and at discharge). As shown in Figure 2, symptoms of apathy (GDS items 2, 9, and 13) were the most reported. More than 70% of patients reported a loss of energy during hospitalization (GDS-13), more than 50% reported preferring to stay at home, rather than going out and doing new things (GDS-9), and approximately 45% had dropped many of their activities and interests (GDS-2).

Total Score of Depressive Symptoms and Mortality

Table 2 shows that the total score on the GDS-15 was a significant predictor of mortality when measured within 48 hours after admission (OR = 1.2, 95% CI = 1.1–1.3) and at discharge (OR = 1.2, 95% CI = 1.1–1.4). Adjustments for confounders only marginally influenced this relationship (Table 2).

Individual Depressive Symptoms and Mortality

Table 3 shows that 8 of the 15 depressive items collected within 48 hours after admission were individually predictive of mortality within 3-month postdischarge. The strongest associations were found for two items of feelings of hopelessness (item 14: OR = 3.6, 95% CI = 1.8–7.4 and item 8: OR = 3.4, 95% CI = 1.6–7.3). At discharge, 7 of 15 depressive items were predictive of mortality within 3-month postdischarge. Again, one item of feelings of hopelessness was the strongest predictor of mortality (item 14: OR = 5.7, 95% CI = 2.5–13.1), followed by "thoughts that people are better off than you" (item 15: OR = 4.1, 95% CI = 1.5–11.2). Only feelings of hopelessness and feelings of anhedonia (i.e., a reduction in activities and interests) were predictive of mortality at both time points.

Table 4 shows that at admission, a feeling of hopelessness regarding their situation (GDS-14: "*Do you feel that your situation is hopeless?*") was a significant predictor of mortality (OR = 3.6, 95% CI = 1.8–7.4). At discharge, again, a feeling of hopelessness regarding their situation was a significant unique predictor of mortality (OR = 5.7, 95% CI = 2.5–13.1). After further adjustment for demographics (i.e., age, sex, and education), hospital admission diagnoses, cognitive impairment, BMI, smoking, somatic symptoms (i.e., malnutrition, fatigue, pain, and sleep quality at admission), and the severity of comorbid diseases, feelings of hopelessness regarding their situation remained unaltered as a significantly unique predictor of mortality (at admission: OR = 5.0, 95% CI = 1.9–13.1; at discharge: OR = 5.2, 95% CI = 1.8–15.5) (Table 4).

Survival analyses reveal that feelings of hopelessness regarding their situation at admission and discharge were a significant predictor of mortality (at admission: hazard ratio (HR) = 3.7, 95% CI = 1.8–7.5; at discharge: HR = 5.3, 95% CI = 2.1–13.1). Again, after further adjustment for confounders, feelings of hopelessness remained unaltered as a significant predictor of mortality at admission (HR = 3.6, 95% CI = 1.5–8.8) (see Supplementary Figure S1, Supplemental Digital Content, http://links.lww.com/PSYMED/A556, which illustrates the survival functions according to hopelessness regarding their situation at admission). Adjustments for confounders, only marginally influenced this relationship at discharge (HR = 3.0, 95% CI = 0.9–10.3) (see Supplementary Figure S2, Supplemental Digital Content, http://links.lww.com/PSYMED/A556, which illustrates the survival functions according to hopelessness regarding their situation at discharge).

Thus, more than 40% of the patients who reported feelings of hopelessness about their situation at admission died between

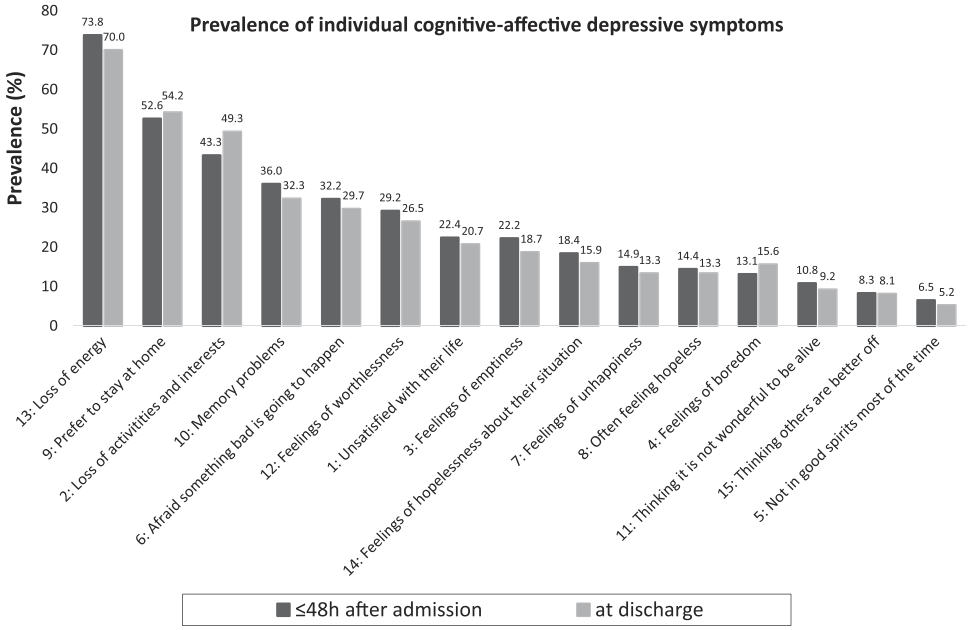

FIGURE 2. Prevalence of individual depressive symptoms within 48 hours after admission and at discharge. Color image is available only in online version (www.psychosomaticmedicine.org).

admission and 3-month postdischarge: in addition, when measured at discharge, this percentage increased to more than 45%. Patients who were hopeless about their situation at admission and discharge had significantly more depressive symptoms, were more often malnourished, and had higher levels of medical comorbidities at baseline when compared with patients who were not hopeless about their situation at admission and discharge (see Supplementary Table S1, Supplemental Digital Content, http://links.lww.com/PSYMED/A556, which illustrates the baseline characteristics of the analytic sample according to hopelessness regarding their situation at admission and discharge).

Interaction Effects of Sex and Cognitive Impairment in Mortality

Table 5 shows no significant interaction of sex and GDS-15 total score or feelings of hopelessness at admission or discharge predicting mortality within 3-month postdischarge. Furthermore, Table 6 also shows no significant interaction of cognitive impairment and GDS-15 total score/feelings of hopelessness in predicting mortality within 3-month postdischarge.

DISCUSSION

This study of 398 acutely hospitalized older patients aimed to assess the prevalences of individual cognitive-affective depressive symptoms during hospitalization and the predictive value of the total GDS-15 score of mortality in addition to determining whether individual depressive symptoms are predictive of mortality. The results revealed that the most frequently reported depressive symptoms during acute hospitalization pertained to the construct of apathy (GDS-3A). In line with previous research (1–5,10,11), higher levels of depressive symptoms predicted mortality in these patients. A novel finding was that feelings of hopelessness specifically predicted mortality between admission and 3-month postdischarge in this sample, even after adjustment for potential confounders such as somatic symptoms and disease severity. In this regard, between 40% and 45% of patients who reported feeling hopeless about their situation passed away between admission and 3-month postdischarge.

The observation that hopelessness predicts mortality is in line with findings from younger community-dwelling adults, which demonstrate that feelings of hopelessness are a stronger predictor

TABLE 2. Results of Multivariable Logistic Regression Analyses Among the Total Analytic Sample (N = 398) for the Total Score of the GDS-15 on Mortality at Admission and at Discharge

		Model 1a			Model 2b			Model 3c		
Variable	Time Point	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*
GDS-15 total score	Admission	1.2	1.1–1.3	**<.001**	1.2	1.1–1.4	**.001**	1.2	1.0–1.4	**.027**
	Discharge	1.2	1.1–1.4	**.001**	1.2	1.1–1.4	**.005**	1.1	1.0–1.3	.16

GDS-15 = Geriatric Depression Scale 15; OR = odds ratio; 95% CI = 95% confidence interval.

1a: crude model.

2b: crude model, adjusted for demographic variables (i.e., age, sex, and education) and hospital admission diagnoses.

3c: additionally adjusted for cognitive impairment, BMI, smoking, somatic symptoms, and disease severity.

TABLE 3. Results of Univariable Logistic Regression Analyses for Each GDS-15 Item on Mortality From Admission up to 3-Month Postdischarge

	Time Point					
	At Admission			At Discharge		
GDS-15 Item	OR	95% CI	*p*	OR	95% CI	*p*
1: Unsatisfied with their life	2.7	1.3–5.4	**.006**	1.8	0.8–4.4	.18
2: Loss of activities and interests	2.0	1.0–4.1	**.042**	3.0	1.2–7.4	**.015**
3: Feelings of emptiness	2.1	1.0–4.3	**.046**	2.1	0.9–5.1	.10
4: Feelings of boredom	2.4	1.1–5.5	**.034**	1.7	0.7–4.5	.28
5: Not in good spirits most of the time	0.4	0.5–3.0	.36	4.3	1.3–14.3	**.017**
6: Afraid something bad is going to happen	1.0	0.5–2.1	.99	1.1	0.4–2.5	.91
7: Feelings of unhappiness	2.4	1.1–5.3	**.029**	2.2	0.8–5.7	.12
8: Often feeling hopeless	3.4	1.6–7.3	**.001**	2.7	1.1–6.9	**.034**
9: Prefer to stay at home	1.8	0.9–3.6	.12	2.5	1.0–6.0	**.049**
10: Memory problems	1.2	0.6–2.5	.53	1.1	0.5–2.6	.80
11: Thinking it is not wonderful to be alive	2.2	0.9–5.3	.091	3.5	1.3–9.6	**.013**
12: Feelings of worthlessness	2.9	1.5–5.7	**.002**	1.8	0.8–4.2	.15
13: Loss of energy	1.1	0.5–2.5	.78	0.8	0.3–1.9	.60
14: Feelings of hopelessness about their situation	3.6	1.8–7.4	**<.001**	5.7	2.5–13.1	**<.001**
15: Thinking others are better off	1.8	0.7–5.1	.24	4.1	1.5–11.2	**.007**

GDS-15 = Geriatric Depression Scale 15; OR = odds ratio; 95% CI = 95% confidence interval.

of cardiovascular mortality than total depressive symptoms (25,27). Such an association has not previously been studied for older acutely hospitalized patients. At present, the mechanisms that explain the observed association need to be determined. Possibly, patients with feelings of hopelessness are less likely to engage in behaviors that are conducive to recovery, such as eating well, doing the required exercises, and taking their prescribed medication (26). Studies into younger populations have observed that hopeless people have a greater progression of carotid atherosclerosis, which is suggestive of a biobehavioral mechanism that could contribute to the elevated increased risk of mortality (50,51). On the other hand, there may be reverse causation, i.e., when patients feel that they may die in the short term (e.g., when an end-of-life conversation has taken place), which may potentially induce feelings of hopelessness.

In this study, feelings of hopelessness were measured with two items of the Dutch version of the GDS-15: one item is more trait-like and asks whether patients often feel hopeless (item 8), whereas the other item asks whether patients feel hopeless about their situation (item 14) (32). Only the latter was a significant predictor of mortality. Possibly, this state-like hopelessness item (item 14) may be more responsive to stressors such as acute hospitalization (52) than the trait-like formulation of how often one feels hopeless. Further research focusing on the potential differential impact of (state and trait) hopelessness and the risk on mortality among older hospitalized patients may be relevant to identify patients at elevated risk.

The high prevalence of symptoms of apathy is possibly related to the fact that we focused on patients with an acute illness. Recent qualitative research has shown that symptoms of apathy remain postacute hospitalization: patients feel less active and experience a lack of initiative or motivation (53). The observed prevalences of apathy (between 43% and 73%) in the current study were higher than in research among older hip-fracture patients (54) but were, for example, comparable with those among older patients with acute stroke (55). Interestingly, in addition to the items of feelings

TABLE 4. Results of Multivariable Logistic Regression Analyses for GDS-14 Item on Mortality at Admission and Discharge

		Model 1a			Model 2b			Model 3c		
Variable	Time Point	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*
GDS-14 hopelessness	Admission	3.6	1.8–7.4	**<.001**	3.9	1.8–8.7	**.001**	5.0	1.9–13.1	**.001**
	Discharge	5.7	2.5–13.1	**<.001**	5.1	2.1–12.6	**<.001**	5.2	1.8–15.5	**.003**

GDS-14 = Item 14 of the Geriatric Depression Scale; OR = odds ratio; 95% CI = 95% confidence interval.

1a: crude model.

2b: crude model adjusted for demographic variables (i.e., age, sex, and education) and hospital admission diagnoses.

3c: additionally adjusted for cognitive impairment, BMI, smoking, somatic symptoms, and disease severity.

TABLE 5. Results of Logistic Regression Analyses for Total GDS-15 Score and GDS-14 Item at Admission and Discharge on Mortality According to Sex

		Model 1		
Time point	Variable	OR	95% CI	*p*
Admission	GDS-15 total score	1.2	1.1–1.4	**.009**
	Sex	0.9	0.2–3.4	.91
	GDS-15 total score by sex	0.9	0.8–1.2	.97
	GDS-14 hopelessness	3.6	1.3–9.9	**.012**
	Sex	1.1	0.5–2.6	.82
	GDS-14 hopelessness by sex	1.0	0.2–4.2	.99
Discharge	GDS-15 total score	1.2	1.0–1.4	**.028**
	Sex	1.1	0.2–4.5	.95
	GDS-15 total score by sex	1.0	0.8–1.3	.94
	GDS-14 hopelessness	4.1	1.3–13.3	**.017**
	Sex	0.9	0.3–2.6	.81
	GDS-14 hopelessness by sex	2.0	0.4–11.0	.40

GDS = Geriatric Depression Scale; OR = odds ratio; 95% CI = 95% confidence interval.

of hopelessness, loss of activities and interests (i.e., anhedonia) was the other GDS-15 item that was predictive of mortality at both time points (i.e., at admission and discharge). This is in line with previous research wherein anhedonia predicted mortality in particularly cardiac patients (56,57). However, the high prevalence of apathy symptoms means that it was not predictive of mortality in this sample after applying backward selection. Furthermore, compared with other depressive symptoms, the prevalence of apathy symptoms is consistent with the suggestion that apathy may be a distinguishable syndrome rather than integral to having a depressive disorder (58). Apathy, as a syndrome in itself, is often confused with depression in older patients, because of an overlap in symptoms such as loss of interest and initiative, fatigue, and poor executive functioning (40).

The observed heterogeneity of depressive symptoms could have important implications for tailoring interventions for older patients. The previously mentioned findings show that individual depressive symptoms differ in their impact on mortality. Previous research has shown that depression is a complex and broad phenotype, whereby "incident depression" and "anhedonic depression" have been associated with an increased risk of mortality, particularly among cardiac patients (59). This study found that recognition of feelings of hopelessness during acute hospitalization seem important in identifying acutely hospitalized older individuals at risk for mortality. The predictive value of feelings of hopelessness, i.e., a negative outlook toward the future, suggests that this GDS-15 item may be important in identifying those acutely hospitalized older patients who are in the last phase of their lives and for whom palliative care may be important. A key element of palliative care can be psychiatric consultation, whereby, for example, cognitive (behavioral) therapy results in significantly greater improvements in feelings of hopelessness (60,61). It should be noted that patients with a life expectancy of 3 months or less, as projected by the attending MD at admission, were excluded from this study. Such a selection would restrict the impact of reverse causation, because those with a strong inclination that they may not live long (and thus were more likely to report feeling of hopelessness) were excluded. Regardless, the results demonstrate a strong relationship between feelings of hopelessness and subsequent mortality. This observation is also in line with evidence that clinicians' estimates of survival among older patients may be incomplete and tend to be inaccurate (62). The present results

TABLE 6. Results of Logistic Regression Analyses for Total GDS-15 Score and GDS-14 Item at Admission and Discharge on Mortality According to Cognitive Impairment

		Model 1		
Time Point	Variable	OR	95% CI	*p*
Admission	GDS-15 total score	1.2	1.0–1.3	**.013**
	Cognitive impairment	1.2	0.2–6.0	.84
	GDS-15 total score by cognitive impairment	1.0	0.8–1.3	.95
	GDS-14 hopelessness	3.0	1.3–7.3	**.013**
	Cognitive impairment	1.4	0.5–3.9	.54
	GDS-14 hopelessness by cognitive impairment	0.9	0.2–5.1	.94
Discharge	GDS-15 total score	1.1	0.9–1.3	.33
	Cognitive impairment	0.3	0.0–3.0	.34
	GDS-15 total score by cognitive impairment	1.2	0.9–1.7	.14
	GDS-14 hopelessness	4.9	1.7–13.5	**.003**
	Cognitive impairment	1.4	0.4–5.1	.64
	GDS-14 hopelessness by cognitive impairment	1.2	0.2–8.4	.85

GDS = Geriatric Depression Scale; OR = odds ratio; 95% CI = 95% confidence interval.

Statistically significant *p* values ($p \leq .05$) are bolded.

indicate that the hopelessness item of the GDS-15 may be a useful screening question for increasing clinicians' prognostic accuracy and could perhaps be combined with other validated tools, such as the Palliative Prognostic Index (63). Finally, because suicide rates are consistently the highest among older adults worldwide, this is an important area for future research, given that previous research has shown that hopelessness may be an indicator of suicide risk in later life (64).

A main strength and novel aspect of the current study is the fact that cognitive-affective depressive symptoms were also investigated at a symptom level, instead of only analyzing total scores, as is done in most studies. Based on results from this study, we suggest that analyses focused on the relationship between specific depressive symptoms and poor outcomes will provide substantial insights that could not be discovered by studies relying on total sum scores alone. However, some limitations should also be noted. First, the present study had no data on the cause of death. Such data, including suicide, would have helped to further illuminate the mechanisms by which hopelessness is related to mortality. Moreover, the study had limited information on the type of psychiatric/psychological and medical interventions that patients had received during hospitalization or postdischarge, which also would have helped further illuminate the mechanisms by which hopelessness is related to mortality. Third, the small proportion of mortality is a limitation: only large effect sizes could be detected, with large CIs, and it is possible that larger samples would have allowed for the identification of additional depressive symptoms that independently predict mortality. Fourth, we assessed all cognitive-affective depressive symptoms with a questionnaire, which limited the amount of information we could gather. For example, we assessed feelings of hopelessness about patients' situations with a single yes/no question, which prevented a more fine-grained assessment of the severity of feelings of hopelessness about their situation and whether there is a dose-dependent association with mortality, as suggested by previous research (25–27).

CONCLUSIONS

Apathetic symptoms were most frequently reported during and postacute hospitalization. However, the main finding of the current study was the predictive value of feelings of hopelessness regarding patients' situation on mortality after acute hospitalization and up to 3-month postdischarge. Taken together, these results imply the possible importance of the item "feelings of hopelessness about one's situation" in identifying patients who are in the last phase of their lives and for whom palliative care may be important.

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