Predictors of functional status in patients with a stroke or geriatric disease admitted to hospital

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Background

In the Netherlands, there are approximately two million hospitalizations every year.[3] Hospitalization is defined as staying in a hospital for more than one day.[3] Many of these hospitalizations involve patients with a stroke or geriatric disease. In 2014, nearly 46,000 patients were admitted to hospitals with a stroke,[4] and in 2011, approximately 25,000 patients were admitted with a geriatric disease.[5] Although the causes of a stroke and geriatric disease are different, the consequences of these diseases are partly similar. A stroke is caused by a problem in the blood circulation of the brain,[6] and geriatric disease is caused by multiple problems, such as delirium, continence problems, falls, and pressure ulcers.[7,8] However, both a stroke and geriatric disease often result in a combination of physical, psychological, and social problems.[6,7,9] For this reason, a serious consequence of both these diseases is functional decline.[10–13]

Functional decline is shown to be a frequent phenomenon in elderly hospitalized patients.[14] Thirty to 60% of the hospitalized patients older than 70 years have functional decline at discharge.[15] In this study, functional status is defined as the level of independence in activities of daily living (ADL), such as bathing, dressing, using a toilet, transferring out of a bed or chair, and eating without assistance, as well as the degree of mobility. Functional decline is the loss of this independence in ADL or reduced mobility.[16,17] Furthermore, functional decline is associated with a wide range of negative outcomes, such as increased risk of mortality, higher rates of rehospitalization, institutionalization, change in quality of life, and higher costs of care.[11,12,16,18]

Two groups of factors contribute to functional decline: (a) Personal factors, such as age and cognitive status;[11,12,15,16,18,19] and (b) iatrogenic effects of hospitalization, such as prolonged bedrest and intravenous lines.[12,14,15,17,18] Factors that predict functional decline in older hospitalized patients are age, diagnosis, activities in daily living, cognitive impairment, residence, lower functional status, preadmission disability in instrumental activities in daily life, and length of hospital stay.[18,20] Most of these studies focused on one primary predictor of functional status.[18] However, the prediction of functional decline in these studies were limited because multiple predictors have an influence on functional status. Furthermore, few studies contained the outcome measure functional status. In most studies, other concepts, such as mortality rates or number of admissions to nursing homes, were used as outcome measures.[18,20] In conclusion, the combined prediction of factors on functional status is still unknown.

Nurses play an important role during hospitalization and are regarded as coordinators of a multidisciplinary team.[13] Initiating, administering, and monitoring interventions are important

aspects of their role.[13,21,22] Many predictors of the functional status during hospitalization, such as prolonged bedrest, can be influenced by nursing care.[10] In addition, in rehabilitation care of stroke patients, nurses optimize underlying physical capabilities by encouraging the patients to participate in daily care, which may lead to maintenance of functional status and prevention of functional decline.[13]

However, there is little evidence about which factors at hospital admission predict the functional status at discharge in patients with a stroke or geriatric disease. It is important to obtain more evidence about these predictors in order to initiate and develop appropriate nursing interventions.

Aim

The aim of this study was to identify which factors at hospital admission predict the functional status at discharge in patients with a stroke or geriatric disease. In the longer term, with the results of this study, we are able to improve nursing care by giving directions for nursing interventions focusing on maintenance of functional status and prevention of functional decline.

Method

Design

The design of this study was a prospective observational multicenter study, in which the researcher followed a specific group without manipulation.[23] Furthermore, a prospective design ensured that predictors were measured before the main study outcome[24] to identify factors that predict the functional status at discharge.

The hospital's Medical Ethics Committee approved the study (reference number university hospital: 15-157/C, reference number general hospital: 1512-657). This study did not require approval from the Medical Ethical Review Committee on Research on Humans.[25] The study was conducted according to the Helsinki Declaration[26] and the Dutch Personal Data Protection Act (Wbp).[27]

Setting, Participants, and Sample Size

The population of interest were patients admitted to hospital with a stroke or geriatric disease. This study was conducted on the neurologic and geriatric nursing wards in a general and university hospital in the Netherlands from February 2016 to April 2016. Both hospitals were included to increase the degree of generalizability[24] because of the differences in the populations between these types of hospitals. All patients with a stroke or geriatric disease, and an expected hospital stay of more than two days, were approached for participation. Patients were excluded from the study if they: (a) Were too ill to participate; (b)

did not stay for more than 48 hours; or (c) were not able to speak Dutch, except for patients with cognitive or communicative disorders, such as aphasia.

In studies with a multivariable predictive character like this, ten participants are required per predictor variable.[28] In this study, 122 patients were included, which indicated a maximum of 12 predictors could be included.

Measurements

Outcome measure.

The main study outcome was the functional status at discharge. Functional status was operationalized as the degree of independence in ADL, measured with the Barthel Index (BI),[29–31] and the degree of mobility, measured with the Elderly Mobility Scale (EMS) by observations.[32–34] With the BI, ten activities of daily living were scored on a scale from 0 (fully dependent) to 20 (independent).[35,36] The BI is homogenous (Cronbach's alpha = .96), has an excellent inter-rater reliability, and has an excellent agreement on total scores (mean kappa = .88, range .85 to .90).[36,37] With the EMS, seven elements of mobility were scored on a scale from 0 (fully dependent) to 20 (independent).[32–34] The EMS has a good construct validity and an excellent inter-rater reliability (Spearman's correlation coefficient .88, $p < .0001$).[32,33]

Additionally, the functional status at discharge was included as the outcome measure, and the functional status at hospital admission was included as a potential predictor.

Baseline data.

From all participating patients, baseline data were collected, including the following demographic characteristics: Age in years, gender, marital status (coded as single, married/cohabiting, or widowed/divorced), and educational level (coded as low, medium, or high). Additionally, the following potential predictors of functional status at discharge were collected at baseline: Kind of disease (coded as stroke and/or geriatric disease), degree of independence in ADL at hospital admission (measured with BI), degree of mobility at hospital admission (measured with EMS), presence of cognitive impairments (measured with the mini mental state examination (MMSE)), presence of aphasia (measured with the short version of the Frenchay Aphasia Screening Test (FAST)), presence of hearing impairments, presence of vision impairments, number of chronic diseases, presence of falls during the preceding six months, length of hospital stay in days, number of medications, nutritional status (measured with Malnutrition Universal Screening Tool (MUST)), and presence of delirium. These predictors were based on literature and clinical practice.[24] The measurements are described in Table 1.

*Table 1

Procedures

All eligible patients were informed about the study and received an information letter from the researcher. Subsequently, the researcher asked patients to participate in the study and to sign informed consent. Written informed consent was obtained from all participants.

Firstly, the researcher screened participating patients on cognitive impairments, using the MMSE, and aphasia, using the short version of the FAST. Patients with cognitive impairments and/or aphasia were considered incapacitated patients, i.e., absence of communication skills. For incapacitated patients, the legal representative was approached for written informed consent.

Secondly, the researcher collected baseline data within 36 hours after admission with a case report form. Some predictors, such as kind of disease and length of hospital admission, were supplemented on the day of discharge. The main study outcome, functional status at discharge, was measured on the day of discharge or the day before.

For incapacitated patients, the legal representative was approached to supplement information regarding potential predictors, such as marital status or presence of falls during the preceding six months.

Data Analysis

All statistical analyses were performed with IBM SPSS Statistics, version 22.0 (IBM Corp., New York, U.S.A.)[38]

Missing values were replaced through multiple imputation to reduce bias and to increase the statistical power.[39,40] With this technique, ten copies of the data were created and replaced based on a random sample from their predicted distribution.[39–41]

Descriptive statistics were used to present demographic characteristics and potential predictors. Continuous variables were expressed as means and standard deviations and categorical variables as frequencies and percentages. In addition, differences in functional statuses at hospital admission and discharge were expressed as means and standard deviations of ΔBI and ΔEMS.

Before regression analysis, expected correlations among predictors were calculated using Pearson's correlations. For a correlation of greater than .7, the predictor with the highest correlation coefficient with the functional status at discharge was included in the regression analysis.[42] Hereby, the variance of functional status was explained by unique predictors.

Univariable linear regression was used to identify the association of a single predictor with functional status at discharge. First, the assumptions of linearity, homoscedasticity, and normality were checked using a scatterplot, normal probability plot, and histograms. These checks confirmed the data were linear, homoscedastic, and normally distributed. Second, predictors with $p \leq .15$ were selected for multivariable linear regression analysis.[43,44] This p-value was chosen in order to prevent potentially important factors being wrongly rejected.[43] Subsequently, multivariable linear regression analysis was used to analyze the correlation between functional status at discharge and the various predictors. A backward stepwise method was used to identify which predictors explained the largest proportion of variability in the functional status.[41] For removal of variables, $p > .05$ was used, and $p \leq .1$ was used for including variables.[41] These p-values were chosen to maximize the proportion of variables that had a significant contribution to the prediction of functional status.[42,43] In addition, collinearity between predictors were checked using variance inflation factors (VIF).[41] These checks confirmed that, there was no collinearity between predictors in both multivariable regression analyses, all VIF values were less than 2.2. In this way, a large variance in functional status were predicted with as few predictors as possible.

Results

Participants

During the inclusion period, 251 patients were identified as eligible for this study. In total, 204 patients were approached for inclusion, of which 122 (59.8%) patients were included. Most of the excluded patients declined to participate (n = 32, 39%), were too ill (n = 19, 23.2%), or did not stay for more than 48 hours (n = 18, 22%), as shown in Figure 1.

**Figure 1*

Missing Values

The data was incomplete in 68.42% of the variables and 44.26% of the cases. The total missing values was 4.4%.

Baseline Data

Mean age of participating patients was 77 years (SD = 13.04, range 37 to 95 years), and 50 (41%) were male. Sixty (49.2%) patients were diagnosed with a stroke and 66 (54.1%) with geriatric disease. Sixty-three patients (51.64%) were considered incapacitated, based on the presence of cognitive impairments and/or presence of aphasia. The degree of independence in ADL on BI between hospital admission and discharge increased, on average, by 2.67 points (SD = 4.99, range -16 to 18 points). The degree of mobility increased, on average, by 2.82 points (SD = 6.32, range -14 to 20 points) on EMS. Further descriptive statistics are

presented in Table 2 for the demographic data and potential predictors and in Table 3 for the functional status.

**Table 2*

**Table 3*

Correlations among Predictors

There was a significant correlation (r_p = .86) among degree of independence in ADL and degree of mobility at hospital admission. Based on the highest correlation coefficient with functional status at discharge, only degree of independence in ADL at hospital admission was included as a potential predictor in the regression analysis.

Univariable Linear Regression

In the univariable linear regression analysis, all predictors ($p < .15$) were associated with the degree of independence in ADL at discharge, except for gender, marital status, and number of chronic diseases, as shown in Table 4. Regarding the degree of mobility, only number of chronic diseases showed no association.

Multivariable Linear Regression

Degree of independence in ADL at discharge.

The multivariable linear regression analysis showed that degree of independence in ADL at hospital admission was the most important factor (β = .578) in the prediction of degree of independence in ADL at discharge. Other predictors remaining in the model were kind of disease (β = -.143), educational level (medium β = .055, high β = .013), absence of communication skills (β = -.142), presence of hearing impairments (β = -.103), presence of vision impairments (β = -.084), nutritional status (low risk of malnutrition β = .033, medium risk of malnutrition β = .183), and presence of delirium (β = -.129), as shown in Table 4. These predictors explained 60.5% of the variance in degree of independence in ADL at discharge.

Degree of mobility at discharge.

The multivariable linear regression analysis also showed that degree of independence in ADL at hospital admission was the most important factor (β = .449) in the prediction of degree of mobility at discharge. Other predictors remaining in the model were age (β = -.122), gender (β = -.131), marital status (single β = .046, married/cohabiting β = -.034) , educational level (medium β = -.05, high β = -.142), absence of communication skills (β = -.182), presence of hearing impairments (β = -.06), presence of vision impairments (β = -.065), presence of falls during the preceding six months (β = -.045), number of medications

(β = -.043), and nutritional status (low risk of malnutrition β = .092, medium risk of malnutrition (β = .298), as shown in Table 4. These predictors explained 43.7 % of the variance in degree of mobility at discharge.

**Table 4*

Discussion

This study presents which factors at hospital admission predict the functional status at discharge in patients with a stroke or geriatric disease. The strongest predictor is degree of independence in ADL at hospital admission. Patients have a better functional status at discharge when they have a greater degree of independence in ADL at hospital admission. Furthermore, educational level, absence of communication skills, presence of hearing impairments, presence of vision impairments, and nutritional status are factors that predict the functional status at discharge. Kind of disease and presence of delirium are factors that only predict the degree of independence in ADL at discharge. Age, gender, marital status, presence of falls during the preceding six months, and number of medications are factors that only predict the degree of mobility at discharge.

In line with results of other studies, degree of independence in ADL at hospital admission is an important factor in the prediction of functional status at discharge.[14,18,20,45] Additionally, previous research demonstrated that presence of delirium and cognitive impairments are also important predictors of the functional status.[11,20,46] This study confirms that patients without communication skills, based on the presence of cognitive impairments and/or aphasia, have a lower functional status at discharge. In addition, presence of delirium limits patients in their independence in ADL at discharge. Previous research demonstrated that presence of geriatric conditions, such as urine incontinence, fall risk, and delirium, is correlated with a high risk of functional decline.[47] This study confirms that patients with a geriatric disease are more dependent in ADL at discharge than patients with a stroke, possibly because a stroke is an acute disorder and a geriatric disease has a gradual onset. Thus, there may have been preselection in which stroke patients who were severely ill declined to participate. Based on clinical practice, the number of chronic diseases was included as a potential predictor. However, this predictor has no significant correlation with functional status. This result was confirmed in a systematic review, in which comorbidity was, in none of the studies, a significant predictor of adverse outcomes.[20] Previous research demonstrated that a low educational level is a risk for functional decline, tested using a multivariable approach.[48] This study confirms that patients with medium or high educational levels have greater functional status at discharge than patients with low educational levels in the univariable linear regression. However, in the multivariable regression analysis, patients

with high educational levels have worse functional status than patients with low educational levels, possibly because a high educational level was strongly correlated with other predictors in the multivariable regression analysis.

Differences between previous research and this study were found in the predictors age, length of hospital stay, and number of medications. Age was often identified as an important predictor in previous research, wherein an increased age was associated with a higher degree of dependency.[11,16,18,20,45] However, in this study, age was removed from the multivariable regression analysis with degree of independence in ADL at discharge. In contrast to previous research,[11] length of hospital stay showed no correlation with functional status at discharge in the multivariable regression analysis. Likewise, in contrast to previous research,[15] use of medication showed no correlation with degree of independence in ADL at discharge in the multivariable regression analysis. Differences between previous research and this study may be explained by the multivariable approach of this study since the betas changed substantially between the univariable and multivariable linear regressions. This change can be explained by the fact that predictors are also correlated with other predictors in a multivariable regression analysis. In addition, remaining predictors in the multivariable regression may have a stronger predictive value in the prediction of functional status, whereby age, length of hospital stay, and number of medications were removed from the final model.

Some limitations of this study should be considered. Firstly, not all eligible patients were approached for inclusion by the researchers because of practical matters, such as time constraints and limited manpower. However, based on baseline characteristics, these patients were not significantly different from the included patients. Therefore, no selection bias has occurred. Secondly, the outcome measure, i.e., functional status at discharge, had many missing values because patients were already discharged. However, missing data were imputed using multiple imputation. This is the best method available to deal with both random and nonrandom missing values, resulting in unbiased estimates of the variables.[40] Thirdly, given the sample size, only 12 predictors could be included in the multivariable linear regression analyses. However, there were 14 predictors included in the multivariable regression analysis for the degree of independence in ADL at discharge and 17 predictors for the degree of mobility at discharge, since all of these predictors showed a correlation with functional status at discharge in the univariable linear regression. This implies that the results of the multivariable regression must be interpreted carefully. In reality, the predictors will explain a smaller variance in the functional status at discharge. A strength of this study is the multivariable approach because multiple predictors have an influence on functional status. Using the multivariable linear regression analysis, the correlation between predictors was

also included, while previous studies focused on a single predictor of functional status.[18] A second strength is the data was carefully and thoroughly collected, with solid and widely used measurements, by a team of trained researchers. Ambiguities regarding the method of data collection were discussed in the research team. A third strength is the degree of generalizability since this study was conducted in two types of hospitals, resulting in a representative sample of the population of interest.

In daily practice, it is difficult to influence degree of independence in ADL at hospital admission, since most of the patients hospitalize acutely. However, during hospital stay, nursing interventions can optimize the degree of independence in ADL, in order to maintain functional status and prevent functional decline. For example, nurses can support patients to engage in ADL, such as encouraging the patient to stand and walk to the toilet rather than providing a urinal or bedpan. Furthermore, early mobilization, more therapeutic activities, daily orientation, feeding assistance, and optimization of hearing and vision by stimulating patients to wear their hearing aids and glasses, are also examples of nursing interventions that can influence predicting factors to optimize the functional status at discharge.

Regarding the explained variance in functional status in this study, future research is needed to identify more predictors of functional status at discharge in patients with a stroke or geriatric disease, in order to explain a larger variance in functional status and to optimize nursing interventions for maintenance of functional status and prevention of functional decline.

Conclusion

This study identified factors at hospital admission that predict the functional status at discharge in patients with a stroke or geriatric disease, in which the strongest predictor is degree of independence in ADL at hospital admission. The identified predictors give directions for nursing interventions focusing on maintenance of functional status and prevention of functional decline to improve nursing care. However, future research is needed to identify all predictors of the functional status in patients with a stroke or geriatric disease and were admitted to hospital.

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Figures and tables

Table 1

Details of measurements

Potential predictor	Measurement
Kind of disease	Coded as stroke and/or geriatric disease, such as pneumonia, urinary tract infection, falls, pressure ulcers, or delirium based on chart review.
Presence of cognitive impairments	Measured with the MMSE by interviewing. This instrument consists of 11 questions, focusing on five cognitive aspects of mental function, ranging from 0 to 30. A score < 24 indicates cognitive impairment.[49,50] Validity: MMSE has a sensitivity of 87% in patients with dementia, and in neurological and psychiatric patients, from 21% to 76% and a moderate to high level of specificity.[51] Reliability: The MMSE has an alpha between .83 and .96 for internal consistency tested in hospital patients and an alpha between .80 and .95 for test-retest reliability.[51]
Presence of aphasia	Measured with the short version of the FAST by interviewing. This instrument consists of seven assignments, focusing on two major aspects of language, ranging from 0 to 20. A score < 17 for patients ≤ 60 years of age; a score < 16 for patients aged ≥ 61 years and ≤ 70 years; or a score < 15 for patients ≥ 71 years of age indicates aphasia.[52] Validity: FAST has a sensitivity of 87% and a specificity of 80%.[53] Reliability: FAST has a kappa of 1.0 for the test-retest reliability and an inter-observer agreement of 93%.[53]
Presence of chronic diseases	In this study, chronic diseases were those that existed before hospital admission.[54] All chronic disease were classified in categories based on International Classification of Diseases ten criteria.[55] The total number of categories were scored based on chart review.
Number of medications	Measured as total number of drugs already used before hospitalization based on chart review.
Nutritional status	Measured with MUST based on anamnesis. This questionnaire consists of three questions regarding BMI, weight loss, and the expected food consumption. The score ranges from 0 to 6. A score of 0 indicates a low risk of malnutrition, a score of 1 indicates a medium risk, and a score of ≥2 indicates a high risk.[56] Validity: MUST has a good content validity based on a multidisciplinary working group and an excellent concurrent validity with other tools.[57] Sensitivity and specificity are unknown.[58] Reliability: MUST has a kappa ranging from .8 to 1.0 for inter-rater agreement.[57,58]
Presence of delirium	In this study, delirium is defined as an acute disorder of attention and cognitive functioning and often fluctuates over time.[46,59] Presence of a delirium is based on the diagnosis by arts and reported in chart.
Note. MMSE: Mini Mental State Examination; FAST: Frenchay Aphasia Screening Test; MUST: Malnutrition Universal Screening Tool; BMI: Body Mass Index	

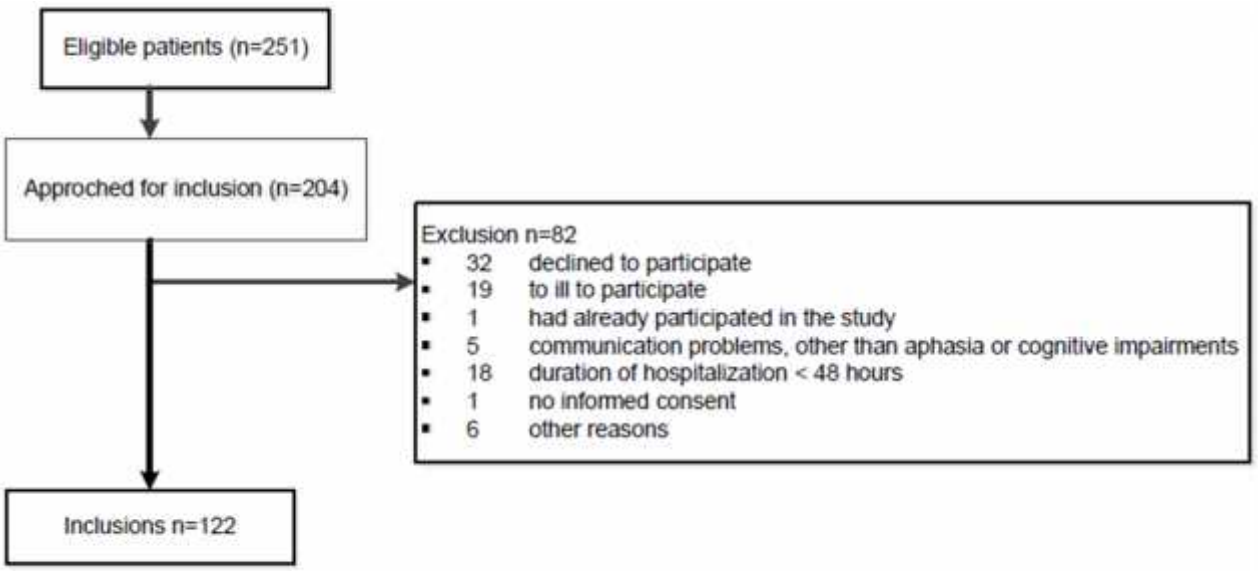

Figure 1. Flow chart of the numbers of patients included and excluded.

Table 2

Demographic characteristics and potential predictors of the functional status of included patients (n=122)

Variable	
Age in years, mean (SD; min-max)	77.02 (13.04; 37-95)
Gender, n (%)	
- Male	50 (41)
- Female	72 (59)
Kind of disease*, n (%)	
- Stroke	60 (49.2)
- Geriatric disease	66 (54.1)
Marital status, n (%)	
- Single	11 (9.02)
- Married/cohabiting	66 (54.1)
- Widowed/divorced	45 (36.89)
Educational level, n (%)	
- Low	33 (27.05)
- Medium	55 (45.08)
- High	34 (27.87)
Absence of communication skills, n (%)	63 (51.64)
Hearing impairments, n (%)	43 (35.2)
Vision impairments, n (%)	90 (73.77)
Number of chronic diseases, mean (SD; min-max)	2.67 (1.55; 0-10)
Falls during the preceding 3-6** months, n (%)	61 (50)
Length of hospital stay in days, mean (SD; min-max)	9.44 (5.81; 2-37)
Number of medications, mean (SD; min-max)	7.07 (4.97; 0-21)
Nutritional status (MUST), n (%)	
- Low risk of malnutrition (MUST = 0)	91 (74.6)
- Medium risk of malnutrition (MUST = 1)	12 (9.8)
- High risk of malnutrition (MUST $\geq$ 2)	19 (15.6)
Delirium, n (%)	27 (22.1)

Note. SD: standard deviation; MUST: Malnutrition Universal Screening Tool

*Some patients had both a stroke and a geriatric disease; **In the general hospital, measured over six months, and in the university hospital, measured over three months.

Table 3

Functional status at hospital admission and discharge of included patients (n=122)

Variable	mean (SD; min-max)
Independence in ADL at hospital admission (BI)	8.98 (5.84; 0-20)
Mobility at hospital admission (EMS)	7.90 (6.08; 0-20)
Independence in ADL at hospital discharge (BI)	12.04 (6.47; 0-20)
Mobility at hospital discharge (EMS)	10.95 (6.43; 0-20)
ΔBI	2.67 (4.99; -16-18)
ΔEMS	2.82 (6.32; -14-20)

Note. SD: standard deviation; ADL: Activities of daily living; BI: Barthel Index; EMS: Elderly Mobility Scale

ΔBI = BI at discharge – BI at hospital admission

ΔEMS = EMS at discharge – EMS at hospital admission

Table 4

Univariable and multivariable linear regression correlation coefficient between demographic characteristics and predictors and functional status at discharge (n=122)

	Degree of independence in ADL at discharge (BI)		Degree of mobility at discharge (EMS)	
	Univariable linear regression	Multivariable linear regression	Univariable linear regression	Multivariable linear regression
Variable	**Beta coefficient, (p-value)**	**Beta coefficient, (p-value)**	**Beta coefficient , (p-value)**	**Beta coefficient , (p-value)**
Age in years	-.325 (.000)*	Dropped	-.309 (.000)*	-.122 (.000)
Gender	-.029 (.33)	n.e.	-.090 (.003)*	-.131 (.000)
Kind of disease***	-.27 (.000)*	-.143 (.000)	-.162 (.000)*	Dropped
Marital status				
- Single	.027 (.399)	n.e.	.089 (.006)*	.046 (.07)
- Married/cohabiting	.043 (.180)		.125 (.000)*	-.034 (.266)
- Widowed/divorced	**		**	**
Educational level				
- Low	**	**	**	**
- Medium	.091 (.011)*	.055 (.022)	.072 (.049)*	-.05 (.109)
- High	.201 (.000)*	.013 (.605)	.116 (.001)*	-.142 (.000)
Independence in ADL at hospital admission (BI)	.664 (.000)*	.578 (.000)	.534 (.000)*	.449 (.000)
Absence of communication skills	-.522 (.000)*	-.142 (.000)	-.423 (.000)*	-.182 (.000)
Hearing impairments	-.203 (.000)*	-.103 (.000)	-.14 (.000)*	-.06 (.017)
Vision impairments	-.244 (.000)*	-.084 (.000)	-.227 (.000)*	-.065 (.024)
Number of chronic diseases	-.001 (.985)	n.e.	-.002 (.949)	n.e.
Falls during the preceding 3-6**** months	-.263 (.000)*	Dropped	-.233 (.000)*	-.045 (.086)
Length of hospital stay in days	-.223 (.000)*	Dropped	-.132 (.000)*	Dropped
Number of medications	-.112 (.000)*	Dropped	-.075 (.013)*	-.043 (.089)
Nutritional status (MUST)				
- Low risk of malnutrition (MUST = 0)	.124 (.000)*	.033 (.197)	.162 (.000)*	.092 (.002)
- Medium risk of malnutrition (MUST = 1)	.153 (.000)*	.183 (.000)	.254 (.000)*	.298 (.000)
- High risk of malnutrition (MUST ≥ 2)	**	**	**	**
Delirium	-.399 (.000)*	-.129 (.000)	-.242 (.000)*	Dropped
Explained variance (Adjusted R Square)		60.5%		43.7%)

Note. ADL: Activities of daily living; BI: Barthel Index; EMS: Elderly Mobility Scale; MUST: Malnutrition Universal Screening Tool; n.e.: Not entered

*p-value < .15; **Reference category; ***Diagnosis geriatric diseases was used in the regression analysis; ****In the general hospital, measured over six months, and in the university hospital, measured over three months.

Abstract

Background: In the Netherlands, there are approximately two million hospitalizations every year. Many of these hospitalizations involve patients with a stroke or geriatric disease. A serious consequence of both these diseases is functional decline. Many factors that predict the functional status at discharge can be influenced by nursing care. However, there is little evidence about which factors at hospital admission predict the functional status at discharge in patients with a stroke or geriatric disease. It is important to obtain more evidence about these predictors in order to give directions for nursing interventions focusing on maintenance of functional status and prevention of functional decline.

Aim: To identify which factors at hospital admission predict the functional status at discharge in patients with a stroke or geriatric disease.

Methods: A prospective observational multicenter study. 122 patients were included. Demographic characteristics and predictors were collected at baseline. Functional status at discharge was operationalized as degree of independence in ADL and degree of mobility. Analyses were performed using multivariable linear regression.

Results: The strongest predictor of the functional status at discharge is degree of independence in ADL at hospital admission. Furthermore, educational level, absence of communication skills, hearing impairments, vision impairments, and nutritional status are factors that predict the functional status at discharge. Kind of disease and presence of delirium are factors that only predict the degree of independence in ADL at discharge. Age, gender, marital status, presence of falls during the preceding six months, and number of medications are factors that only predict the degree of mobility at discharge.

Conclusion and implications: This study identifies factors at hospital admission that predict the functional status at discharge in patients with a stroke or geriatric disease. These predictors give directions for nursing interventions focusing on maintenance of functional status and prevention of functional decline.

Keywords: Functional status, predictors, hospitalization [MeSH], stroke [MeSH], geriatric disease.

Samenvatting

Achtergrond: In Nederland vinden jaarlijks ongeveer 2 miljoen ziekenhuisopnames plaats. Hiervan worden veel patiënten opgenomen met een beroerte of geriatrische aandoening. Een gevolg van deze ziekten is functionele achteruitgang. Veel factoren, die de functionele status bij ontslag voorspellen, kunnen worden beïnvloed door de verpleegkundige zorg. Er is echter onvoldoende bekend over welke factoren bij opname de functionele status bij ontslag voorspellen bij patiënten met een beroerte of geriatrische aandoening. Het is belangrijk om meer kennis te krijgen over deze predictoren, zodat er richting kan worden gegeven aan verpleegkundige interventies, gericht op het behoud van de functionele status en het voorkomen van functionele achteruitgang.

Doel: Identificeren welke factoren bij ziekenhuisopname de functionele status bij ontslag voorspellen bij patiënten met een beroerte of geriatrische aandoening.

Methode: Een prospectieve observationele multicenter studie met 122 patiënten. Demografische gegevens en predictoren werden verzameld bij opname. De functionele status bij ontslag omvatte de mate van afhankelijkheid in ADL en de mate van mobiliteit. Analyses werden uitgevoerd middels een multivariabele lineaire regressie.

Resultaten: De belangrijkste predictor van de functionele status bij ontslag is de mate van afhankelijkheid in ADL bij opname. De factoren opleidingsniveau, afwezigheid van communicatieve vaardigheden, gehoorproblemen, gezichtsproblemen en voedingstoestand voorspellen de functionele status bij ontslag. Aard van de ziekte en aanwezigheid van een delier zijn factoren die alleen de mate van afhankelijk in ADL bij ontslag voorspellen. Leeftijd, geslacht, burgerlijke staat, valincidenten gedurende de afgelopen 6 maand, en aantal medicijnen zijn factoren die alleen de mate van mobiliteit bij ontslag voorspellen.

Conclusie en implicaties: Deze studie identificeert factoren bij ziekenhuisopname die de functionele status bij ontslag voorspellen, bij patiënten met een beroerte of geriatrische aandoening. Deze predictoren geven richting aan verpleegkundigen interventies gericht op het behoud van de functionele status en het voorkomen van functionele achteruitgang.

Trefwoorden: Functionele status, predictoren, beroerte, geriatrische ziekte, ziekenhuisopname