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Depression and functional status among African American stroke survivors in inpatient rehabilitation

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Abstract

Purpose—To examine the prevalence of post-stroke depression (PSD) among African American stroke survivors and the association of depression with functional status at inpatient rehabilitation facility (IRF) discharge.

Methods—Secondary data analysis was conducted of a patient cohort who received care at three IRFs in the United States from 2009–2011. Functional status was measured by the Functional Independence Measure (FIM). Multiple linear regression models were used to examine associations of PSD and FIM motor and cognitive scores.

Results—Of 458 African American stroke survivors, 48.5% were female, 84% had an ischemic stroke, and the mean age was 60.8 ± 13.6 years. Only 15.4% ($n=71$) had documentation of PSD. Bivariate analyses to identify factors associated with depression identified a higher percentage of patients with depression than without who were retired due to disability (17.1% vs. 11.6%) or employed (31.4% vs. 19.6%) pre-stroke ($p=0.041$). Dysphagia, cognitive deficits, and a lower admission motor FIM score were also significantly more common among those with depression. There was no significant relationship between depression and functional status after adjusting for patient characteristics.

Conclusions—In this study 15% of the African Americans who received rehabilitation after a stroke had documentation of PSD but this was not associated with functional status at discharge.

Keywords

depression; functional status; inpatient rehabilitation; African American; Black

Each year, approximately 795,000 people experience a stroke in the United States (U.S.).¹ Stroke is the fifth leading cause of death in the U.S. and a leading cause of motor and non-motor impairments and disability.² Stroke and poor rehabilitative outcomes affect African Americans disproportionately. Approximately 4% of African Americans have a history of stroke, compared to 3% of their Caucasian counterparts; the age-adjusted death rate from stroke is 1.9 per 100,000 for African Americans compared to 0.88 among Caucasians.¹ African American stroke survivors also have greater functional impairment on admission to rehabilitation facilities than Caucasians, and experience greater physical limitations post-rehabilitation than Caucasians.^{1,3}

Rehabilitation potential and functional recovery are influenced by depression.⁴ Estimates among the general population of stroke survivors suggest that approximately a third experience depression over the course of recovery.¹ However, like other outcomes, post-stroke depression differs by race.^{5, 6} Independent of the timing and instrument used for assessment, previous reports of depression among African American stroke survivors range from 10.2 to 43.9%.^{3, 7–10} Although depression among African American stroke survivors

negatively impacts overall health and quality of life,^{11, 12} the association with functional recovery is unclear.

A literature review on depression by race revealed 15 studies measured depression and included African Americans in their sample. Of these 15, seven studies reported depression specifically among African American stroke survivors of which only 4 studies reported function.^{3,7-9} However, no studies to date have specifically measured depression and functional status among African American stroke survivors who receive inpatient rehabilitation. There is a significant lack of knowledge of the prevalence of depression among African American stroke survivors and the association of their depression with functional outcomes. To our knowledge this is the first study to 1) determine the prevalence of post-stroke depression among African American stroke survivors who received inpatient rehabilitation, and 2) examine the association of post-stroke depression and other patient characteristics with functional outcomes among African American stroke survivors at discharge from inpatient rehabilitation. Addressing these knowledge gaps provides an important foundation from which to improve measurement and care plans for African Americans post-stroke.

METHODS

This retrospective study included data for patients who received inpatient rehabilitative care at one of three regional inpatient rehabilitation facilities in the Southeastern United States, were discharged between 2009 to 2011, and had a Rehabilitation Impairment Category of 01 (stroke cases with a diagnosis of cerebral ischemia due to vascular thrombosis, embolism, or hemorrhage).¹³ Of these 2,089 stroke patients, there were 1,570 consecutive patients for which data on depression were chart abstracted. Of those, 904 were African Americans and eligible for this study. Patients were then excluded who were not admitted for rehabilitation, were admitted for reasons other than acute rehabilitation or had documentation of premorbid depression.¹⁴

Data collected at the participating inpatient rehabilitation facilities were entered as part of routine clinical practice into the health system's electronic medical records and into the national eRehabData® rehabilitation registry specifically designed for rehabilitation outcome analyses and federal reporting.¹⁵ For this study, eRehabData was used for all variables except presence or absence of depression. Data from chart reviews and from eRehabData were integrated using patient's date of birth, admission and discharge dates. This study was approved by the institutional review boards for Carolinas HealthCare System, Duke University, and Winston Salem State University.

Documentation of depression was identified in the history and physical (H&P) as well as the discharge summary of patient medical records. Chart reviews were completed by trained abstractors (clinical and non-clinical personnel) using a structured protocol and data abstraction tool.¹³ Ten percent of all charts were re-abstracted and agreement between the abstractors was reached for each variable where agreement was less than 95%. Depression was defined as a patient with documentation in his or her electronic medical record with "depression" in the H&P or the discharge summary. Bi-polar diagnosis was not considered

unless depression was also documented. For each patient chart reviewed, the chart abstractors indicated: 1) Yes (depression was documented) since stroke onset with no premorbid condition; 2) Yes (depression was documented) since onset and was also a premorbid condition; 3) No (documentation that patient was not depressed); 4) Not Documented. It was determined in discussions with subject matter expert clinicians that depression was not documented for patients who did not exhibit signs or symptoms of depression. Therefore, patients with “no depression” or “depression not documented” were combined as no post-stroke depression.

Function was measured as part of clinical practice using the Functional Independence Measure (FIMTM), a widely used measure of functional outcomes of inpatient rehabilitation.¹⁶ The FIM is an 18-item scale that assesses severity of disability in terms of burden of care or an individual's need for assistance in six areas of function (self-care, sphincter control, mobility, locomotion, communication, and social cognition). These six areas of function create two domains: motor and cognitive. The motor domain includes 13 items and the social-cognitive domain has 5 items. Each item is scored on a 7-point Likert scale indicating the amount of assistance required to perform the item (1 = total assistance, 7 = total independence).¹⁶ Three scores can be generated from the FIM: a total score, a motor score, and a cognitive score. The FIM total score can range from 18 to 126 (18 indicates complete dependence and 126 is complete independence). The FIM motor score can range from 13 to 91 (13 indicating complete dependence and 91 complete independence). The FIM cognitive score can range from 5 to 35 (5 indicating total dependence and 35 total independence).¹⁷ This study examined the FIM total, motor and cognitive scores for aim 2. Socio-demographic data and clinical factors from eRehabData® included in the study were gender, age, marital status, living arrangements, pre-hospital vocation, insurance status, comorbidities, and complications. Marital status and living arrangements were highly correlated; only marital status was included in the final outcome models.

Descriptive statistics were used to determine the percentage of African American stroke survivors receiving rehabilitation who had post-stroke depression. Patient characteristics of stroke survivors with and without any indication of depression were then compared using chi-square tests for categorical variables and t-test for continuous variables. Fisher's Exact Tests were performed when the cells had less than five participants.¹⁸ T-tests were used to determine if mean functional outcome scores at discharge (overall total score, and motor and cognitive subscale scores) differed for African Americans with and without depression. All tests were 2-sided and calculated by comparing only non-missing values. Results are presented as means and standard deviations for continuous variables, and frequencies and percentages for categorical variables.

To examine the relationship between depression and functional status at discharge, multiple regression models were built with each functional outcome (FIM total, motor and cognitive scores) with and without adjusting for sociodemographic and patient clinical variables. The level of significance was set at $\alpha=0.05$. All statistical analyses were performed using SAS version 9.3 (SAS Ins., Cary).

RESULTS

Sample

Of the 526 African American stroke patients eligible for this study, 458 met inclusion criteria (Figure 1). The age of this study's sample ranged from 18 to 98 years (mean 61.1 SD 13.6 years). More than half were males (51.8%). The majority of the stroke survivors (84.7%) experienced ischemic stroke and 52.8% of African Americans had documented hypertension. Less than a quarter of the sample reported to live alone prior to their stroke (22.3%) and 34.7% were never married. The most frequent vocation was retirement, with 41.7% due to age and 12.5% due to disability. Medicare was the most common health insurance for the patients in the sample (Table 1).

Characteristics of Patients with and without Depression

Among the 458 African American stroke patients included in the study, 70 (15.3%) had new onset depression documented post-stroke. Among those depressed, 38 (54.3%) were female and 32 (42.7%) were male (Table 1). Stroke survivors with post-stroke depression were more commonly retired due to disability (17.1% vs 11.6%, $p=0.041$) or were employed pre-stroke (31.4% vs. 19.6%, $p=0.041$) than those without post-stroke depression. Furthermore those with depression were more likely to have dysphagia (60% vs 44.1%, $p=0.014$) and a discharge diagnostic code for cognitive deficits (50% vs. 28.6%, $p=0.000$) than those without post-stroke depression. African American patients with post-stroke depression had a lower motor FIM score on admission to rehabilitation (48.6 SD 17.9) than those without depression (53.5 SD 17.0, $p=0.027$).

Depression and Functional Status at Discharge

Findings for the regression models examining the association of depression with all three outcomes (FIM total, FIM motor, and FIM cognitive) at discharge are presented in Table 2. Without adjusting for covariates, a lower FIM motor score at discharge ($\beta = -4.92$, $p = 0.024$) was significantly associated with depression, whereas total FIM ($\beta = -5.81$, $p = 0.054$) and cognitive FIM ($\beta = -0.88$, $p = 0.378$) scores were not. After adjusting for patient sociodemographic and clinical characteristics, the linear regression analysis failed to detect significant associations between depression and functional status at discharge (FIM total ($p=0.479$), motor ($p=0.347$), or cognitive($p=0.914$)).

The mean total FIM score at discharge was 75.6 (SD 23.2). Table 3 presents the patient characteristics associated with total FIM in the multivariate regression model. Patients were more likely to have a lower total FIM score at discharge (indicating more functional dependence) if they were older ($\beta = -0.26$, $p = 0.001$) or had experienced a urinary tract infection ($\beta = -4.92$, $p = 0.002$) as a post-stroke complication. Total FIM score at discharge was higher for patients who experienced an ischemic stroke ($\beta = 2.32$, $p = 0.017$), as well as those admitted with higher motor ($\beta = 0.82$, $p<0.001$) and cognitive ($\beta = 1.32$, $p<0.001$) function scores.

Results were similar for motor function at discharge (Table 4). The mean motor FIM score was 52.73 (SD 17.18) at discharge from inpatient rehabilitation. Stroke survivors had lower

motor FIM scores if they were older ($\beta = -0.21$, $p = 0.001$) or experienced a urinary tract infection as a post-stroke complication during the inpatient rehabilitation admission ($\beta = -3.64$, $p = 0.004$). Those with an ischemic stroke had higher discharge motor FIM scores ($\beta = 1.76$, $p = 0.022$) as did those with comorbid kidney disease ($\beta = 2.63$, $p = 0.045$), high admission motor function scores ($\beta = 0.82$, $p < 0.001$), and high admission cognitive function scores ($\beta = 0.48$, $p < 0.001$).

The mean cognitive FIM score at discharge was 22.88 (SD 7.71). Table 5 presents the patient characteristics associated with total FIM in the multivariate regression model. Older age and having a urinary tract infection were also associated with worse cognition ($\beta = -0.26$, $p = 0.001$ and $\beta = -1.28$, $p = 0.011$, respectively). Those who were married also had lower discharge cognitive FIM scores ($\beta = -0.82$, $p = 0.027$). Patients admitted to inpatient rehabilitation with higher cognitive function had high discharge cognitive FIM scores ($\beta = 0.84$, $p < 0.001$).

DISCUSSION

This is the first study of depression and function among African American stroke survivors who received inpatient rehabilitation in the United States. There were two main findings: (1) 15.3% of African American adults had new onset depression post-stroke, which is lower than the estimated one third of the general stroke survivor population,^{1,19} and (2) there was no significant association between depression and functional status after adjusting for patient characteristics among African American stroke survivors at discharge from inpatient rehabilitation.

Our study findings of the prevalence of depression are comparable to studies of African American stroke survivors assessed in other settings (10.2–43.9%)^{3, 5–10, 12}. We expect that the variation in the timing of assessments (e.g., number of days post-stroke) and measures of depression (e.g., clinical documentation²⁰, antidepressant use²¹, or standardized instruments²²) contribute to the different findings across studies.

In this study, it was more common for African American stroke survivors retired due to disability or employed pre-stroke to have depression. This may be an important area for additional research and to address clinically as depression at one month post-stroke was found in a previous study to have a reasonably strong but not statistically significant effect on the likelihood of returning to work within a year.²³ The relationship between dysphagia and depression also warrants additional research. In this study, dysphagia was more common among those with depression than without. Similarly, Kauhanen and colleagues reported an increase in depression among patients with dysphagia at 3 and 12 months post-stroke.²⁴

Cultural differences exist in the clinical presentation of depression and should also be considered as a factor influencing provider identification of depression or depressive symptoms. Caucasians are more likely to verbalize depression and present with mood or cognitive symptoms such as suicidal thoughts, psychomotor agitation, and psychic anxiety.²⁵ On the other hand, African Americans typically exhibit somatic and neurovegetative symptoms of depression such as hypersomnia, hyperphagia, and weight gain. Somatic

symptoms and comorbid medical problems may impede accurate identification and diagnosis of depression.^{25,26} Older African Americans have also been found to underreport symptoms due to denial or failure to recognize symptoms as part of depression.²³ Additional research in post-acute stroke care is needed on these factors and differences by age and race. The development of an instrument for use in clinical practice and validated for identification of depression among African Americans after a stroke should be considered. It is likely that post-stroke depression experienced by African Americans is currently under-reported.²⁵ Our findings for functional outcomes among African Americans aligns with previous studies of the general stroke population in inpatient rehabilitation indicating lower admission motor FIM scores for those with depression.^{27,28} However, our study did not identify an association of depression with functional status among African Americans as was found in the only other study conducted of patients in inpatient rehabilitation. Saxena, Ng, Koh, Yong, and Fong studied depression among stroke patients receiving inpatient rehabilitation in Singapore to determine if depressive symptoms independently influenced functional recovery.²⁹ Baseline depressive status and improvement of depressive symptoms over 6 months were associated with functional recovery. Additional studies of patients who received inpatient rehabilitation are needed to further explore this relationship.

Overall, African Americans with post-stroke depression were more functionally impaired at discharge from rehabilitation than those without depression. These findings are clinically significant and supports the need for health professionals to regularly assess stroke patients for depression throughout their recovery in order to prevent additional challenges for these individuals.

The retrospective design and use of existing data were limitations of this study. Clinical and administrative data were not collected for the purposes of research; therefore, additional factors known to influence functional status such as pre-stroke level of disability were not examined as they were not accessible. Although standardized depression screening tools are not being used across all stroke patients uniformly,¹⁷ and no current scale has been found to be as adequate as depression defined by interview,³⁰ this study may be limited by accepting any clinical documentation of depression rather than relying on a formal and standardized assessment. It is likely that depression in this study was under-reported in clinical documentation.³¹ Further, a prospective longitudinal study could more clearly delineate the association between depression and function throughout the stroke patient's recovery.

CONCLUSIONS

This study provides useful insight into post-stroke depression and the functional status of African Americans who received inpatient rehabilitation. Using a clinician's determination of depression, this study found prevalence of depression was lower than previously reported for African Americans evaluated in other settings and post-stroke depression was not associated with functional status. Future research with instruments to assess for depression validated for use with African Americans post-stroke may further clarify this relationship. With valid and appropriate tools for depression screening and diagnosis, health care providers could provide early intervention and treatment of post-stroke depression to prevent additional challenges throughout their recovery. Research is needed to assess the trajectories

of depression and functional status over time, examine the impact of additional patient characteristics such as stroke severity and pharmacological and non-pharmacological treatment for depression, and identify the optimal patient-centered depression interventions for African American stroke survivors.

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Figure 1.
Study Population

Table 1

Descriptive and Bivariate statistics of Study Characteristics Associated With Depression

Variable N (%) unless otherwise stated	Overall n=458	Depression n=70 (15.3%)	No Depression n=388 (84.7%)	p-value
Age	61.1 ± 13.6	59.1 ± 13.9	61.4 ± 13.5	0.200
Gender, Female	221 (48.3%)	38 (54.3%)	183 (47.2%)	0.273
Marital Status				0.767
Married	144 (31.4%)	21 (30.0%)	123 (31.7%)	
Never	159 (34.7%)	23 (32.9%)	136 (35.1%)	
Separated or Divorced	83 (18.1%)	12 (17.1%)	71 (18.3%)	
Widowed	72 (15.7%)	14 (20.0%)	58 (14.9%)	
Living Arrangements Pre-Stroke				0.957
Alone	93 (22.3%)	14 (20.0%)	79 (20.4%)	
Family	310 (74.3%)	50 (71.4%)	260 (67.0%)	
Other	14 (3.4%)	2 (2.9%)	12 (3.1%)	
Pre-hospital Vocation				0.041
Retired due to Age	191 (41.7%)	24 (34.3%)	167 (43.0%)	
Retired due to Disability	57 (12.5%)	12 (17.1%)	45 (11.6%)	
Employed	98 (21.4%)	22 (31.4%)	76 (19.6%)	
Others	112 (24.5%)	12 (17.1%)	100 (25.8%)	
Primary Insurance				0.176
Private	109 (23.8%)	20 (28.6%)	89 (23.0%)	
Medicare	217 (47.4%)	26 (37.1%)	191 (49.1%)	
Medicaid	132 (28.8%)	24 (34.3%)	108 (27.8%)	
Type of Stroke				0.913
Hemorrhagic	70 (15.3%)	11 (15.7%)	59 (15.2%)	
Ischemic	388 (84.7%)	59 (84.3%)	329 (84.8%)	
Comorbidities				
Atrial Fibrillation	50 (10.92%)	8 (11.4%)	42 (10.8%)	0.882
Diabetes	129 (28.2%)	23 (32.9%)	106 (27.3%)	0.343
Kidney Disease	114 (24.9%)	15 (21.4%)	99 (25.5%)	0.467
Hypertension	242 (52.8%)	37 (52.9%)	205 (52.8%)	0.997
Hyperlipidemia	150 (32.8%)	17 (24.3%)	133 (34.3%)	0.101
Coronary Artery Disease	29 (6.3%)	5 (7.1%)	24 (6.2%)	0.762 *
Hyponatremia	29 (6.3%)	7 (10.0%)	22 (5.7%)	0.171 *
Complications				
Urinary Tract Infection	116 (25.3%)	22 (31.4%)	94 (24.2%)	0.202
Dysphagia	213 (46.5%)	42 (60.0%)	171 (44.1%)	0.014
Aphasia	112 (24.5%)	20 (28.6%)	92 (23.7%)	0.384
Speech Disturbance	142 (31.0%)	26 (37.1%)	116 (29.9%)	0.228
Cognitive Deficit	146 (31.9%)	35 (50.0%)	111 (28.6%)	0.000
Neglect	31 (6.9%)	7 (10.0%)	24 (7.4%)	0.297 *
Ataxia	43 (9.4%)	8 (11.4%)	35 (9.0%)	0.525

Variable N (%) unless otherwise stated	Overall n=458	Depression n=70 (15.3%)	No Depression n=388 (84.7%)	p-value
Length of Stay	18.2±10.8	20.4 ± 10.1	17.8 ± 10.9	0.059
Admission FIM Motor Score	33.2±12.3	30.1±13.4	32.8±12.0	0.027
Admission FIM Cognitive Score	17.9±7.0	17.0 ± 6.4	18.0±7.1	0.267

*
Fisher Exact Test

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Table 2

Linear regression model for FIM total score, motor score and cognitive score at discharge with depression status (unadjusted and adjusting for all other covariates)

Parameter	Unadjusted		Adjusted*	
	Estimate	p-value	Estimate	P-value
FIM total score at discharge				
Depression Yes vs. No	-5.81	0.054	-1.33	0.479
FIM motor score at discharge				
Depression Yes vs. No	-4.92	0.024	-1.40	0.347
FIM cognitive score at discharge				
Depression Yes vs. No	-0.88	0.378	0.06	0.914

Table 3

Factors Independently Associated with Total Functional Independence Measure (FIM) at Discharge

Total FIM	Estimate	Wald	95% Confidence Limits	P-value
Depression	-1.33	-5.03	2.36	0.479
Age	-0.26	-0.42	-0.11	0.001
Gender, Female (vs. Male)	0.49	-0.90	1.88	0.489
Marital Status				
Never	-0.90	-3.13	1.33	0.428
Married	-2.09	-4.38	0.21	0.075
Widowed	2.65	-0.49	5.79	0.098
Separated or Divorced	REF	REF	REF	REF
Pre-hospital Vocation				
Retired for Age	-0.02	-2.88	2.79	0.991
Retired due to Disability	2.55	-0.61	5.71	0.114
Employed	-1.04	-4.06	2.00	0.503
Others	REF	REF	REF	REF
Primary Insurance				
Medicare	1.01	-1.27	3.28	0.387
Medicaid	-0.57	-3.07	1.92	0.653
Private	REF	REF	REF	REF
Type of Stroke, Ischemic (vs. Hemorrhagic)	2.32	0.41	4.24	0.017
Comorbidities				
Atrial Fibrillation	-0.60	-4.87	3.67	0.784
Diabetes	-1.12	-4.12	1.87	0.463
Kidney Disease	3.06	-0.20	6.31	0.066
Hypertension	1.61	-1.36	4.58	0.289
Hyperlipidemia	2.26	-0.71	5.22	0.136
Coronary Artery Disease	0.07	-5.36	5.50	0.979
Hyponatremia	-0.87	-6.25	4.51	0.752
Complications				
Urinary Tract Infections	-4.92	-8.04	-1.80	0.002
Dysphagia	0.95	-1.07	2.96	0.359
Aphasia	-0.04	-1.99	1.92	0.970
Speech Disturbance	-0.38	-3.27	2.51	0.797
Cognitive Deficit	-2.21	-5.15	0.73	0.141
Neglect	0.19	-0.87	1.25	0.727
Ataxia	-2.67	-7.13	1.79	0.241
Admission FIM Motor	0.82	0.69	0.96	<0.001
Admission FIM Cognitive	1.32	1.06	1.57	<0.001

Table 4

Factors Independently Associated with Functional Independence Measure (FIM) Motor at Discharge

FIM Motor	Estimate	Wald	95% Confidence Limits	P-value
Depression	-1.40	-4.31	1.51	0.347
Age	-0.21	-0.33	-0.09	0.001
Gender, Female (vs. Male)	0.19	-0.90	1.29	0.729
Marital Status				
Never	-0.73	-2.48	1.03	0.418
Married	-1.27	-3.08	0.54	0.169
Widowed	2.19	-0.28	4.67	0.083
Separated or Divorced	REF	REF	REF	REF
Pre-hospital Vocation				
Retired for Age	-0.31	-2.52	1.91	0.786
Retired due to Disability	2.23	-0.26	4.72	0.079
Employed	-1.22	-3.41	1.36	0.400
Others	REF	REF	REF	REF
Primary Insurance				
Medicare	-0.71	-2.67	1.26	0.483
Medicaid	0.72	-1.08	2.51	0.434
Private	REF	REF	REF	REF
Type of Stroke, Ischemic (vs. Hemorrhagic)	1.76	0.25	3.27	0.022
Comorbidities				
Atrial Fibrillation	-0.41	-3.77	2.96	0.813
Diabetes	-1.08	-3.44	1.28	0.369
Kidney Disease	2.63	0.06	5.19	0.045
Hypertension	1.81	-0.53	4.15	0.130
Hyperlipidemia	1.83	-0.51	4.17	0.125
Coronary Artery Disease	0.48	-4.76	3.80	0.827
Hyponatremia	-0.49	-4.73	3.75	0.821
Complications				
Urinary Tract Infections	-3.64	-6.10	-1.17	0.004
Dysphagia	0.83	-0.76	2.42	0.306
Aphasia	0.39	-1.15	1.93	0.618
Speech Disturbance	-0.14	-2.42	2.14	0.907
Cognitive Deficit	-1.49	-3.81	0.83	0.207
Neglect	0.17	-0.66	1.01	0.683
Ataxia	-1.63	-5.15	1.88	0.363
Admission FIM Motor	0.82	0.71	0.92	<0.001
Admission FIM Cognitive	0.48	0.27	0.68	<0.001

Table 5

Factors Independently Associated with Cognitive Functional Independence Measure (FIM) at Discharge

FIM Cognitive	Estimate	Wald	95% Confidence Limits	P-value
Depression	0.06	−1.10	1.23	0.914
Age	−0.26	−0.42	−0.11	0.001
Gender, Female (vs. Male)	0.30	−0.14	0.74	0.183
Marital Status				
Never	−0.18	−0.88	0.52	0.621
Married	−0.82	−1.54	−0.10	0.027
Widowed	0.46	−0.53	1.44	0.357
Separated/Divorced	REF	REF	REF	REF
Pre-hospital Vocation				
Retired for Age	0.29	−0.59	1.17	0.519
Retired due to Disability	0.32	−0.67	1.32	0.526
Employed	−0.01	−0.96	0.94	0.985
Others	REF	REF	REF	REF
Primary Insurance				
Medicare	0.13	−0.65	0.92	0.743
Medicaid	0.29	−1.54	1.46	0.409
Private	REF	REF	REF	REF
Type of Stroke, Ischemic (vs. Hemorrhagic)	0.56	−0.04	1.16	0.068
Comorbidities				
Atrial Fibrillation	−0.19	−1.54	1.15	0.780
Diabetes	−0.04	−0.98	0.91	0.930
Kidney Disease	0.43	−0.59	1.46	0.409
Hypertension	−0.20	−1.14	0.73	0.673
Hyperlipidemia	0.43	−0.51	1.36	0.371
Coronary Artery Disease	0.55	−1.16	2.26	0.527
Hyponatremia	−0.38	−2.07	1.32	0.662
Complications				
Urinary Tract Infections	−1.28	−2.27	−0.30	0.011
Dysphagia	0.12	−0.52	0.75	0.724
Aphasia	−0.43	−1.05	0.19	0.172
Speech Disturbance	−0.25	−1.16	0.67	0.598
Cognitive Deficit	−0.72	−1.64	0.21	0.130
Neglect	0.02	−0.32	0.35	0.929
Ataxia	−1.04	−2.44	0.37	0.147
Admission FIM Motor	0.01	−0.34	0.05	0.790
Admission FIM Cognitive	0.84	0.76	0.92	<0.001