Published in final edited form as:

Am J Phys Med Rehabil. 2019 April ; 98(4): 325–330. doi:10.1097/PHM.0000000000001037.

Depression Characterization and Race Among Stroke Survivors Receiving Inpatient Rehabilitation

Terrence Pugh, MD,

Carolinas Medical Center, Department of Physical Medicine and Rehabilitation, Charlotte, North Carolina

Mark A. Hirsch, PhD,

Carolinas Medical Center, Department of Physical Medicine and Rehabilitation, Charlotte, North Carolina

Vu Q. C. Nguyen, MD,

Carolinas Medical Center, Department of Physical Medicine and Rehabilitation, Charlotte, North Carolina

Charles F. Rhoads 3rd, MD,

Carolinas Medical Center, Department of Physical Medicine and Rehabilitation, Charlotte, North Carolina, William Jennings Bryan Dorn Veterans Administration Medical Center, Department of Physical Medicine and Rehabilitation, Columbia, South Carolina

Gabrielle M. Harris, FNP, RN,

Duke University School of Nursing, Durham, North Carolina

Qing Yang, PhD,

Duke University School of Nursing, Durham, North Carolina

J. George Thomas, MD,

Carolinas Medical Center, Department of Physical Medicine and Rehabilitation, Charlotte, North Carolina

Tami Guerrier, BS,

Carolinas Medical Center, Department of Physical Medicine and Rehabilitation, Charlotte, North Carolina

Deanna Hamm, BS,

Carolinas Medical Center, Department of Physical Medicine and Rehabilitation, Charlotte, North Carolina

---

All correspondence should be addressed to: Janet A. Prvu Bettger, ScD, FAHA, DUMC 2919, 40 Medicine Circle, Durham, NC 27710.

Gabrielle M. Harris is in training.

Preliminary findings for this study were presented by GMH at the International Stroke Conference on February 12, 2015, in Nashville, Tennessee. The presentation was entitled: “Depression differs by race among stroke survivors receiving inpatient rehabilitation” and the abstract was published as Harris GM, Thomas JG, Nguyen V, Hirsch MA, Guerrier T, Hamm D, Pereira C, Bettger JP. Depression differs by race among stroke survivors receiving inpatient rehabilitation.

Financial disclosure statements have been obtained, and no conflicts of interest have been reported by the authors or by any individuals in control of the content of this article.

Supplemental digital content is available for this article. Direct URL citations appear in the printed text and are provided in the HTML and PDF versions of this article on the journal’s Web site (www.ajpmr.com).

Carol Pereira, BS,

Duke University, Duke Clinical Research Institute, Durham, North Carolina

Jia Yao, MA,

Duke University School of Nursing, Durham, North Carolina Duke University, Center for Health Policy and Inequalities Research, Durham, North Carolina

Janet A. Prvu Bettger, ScD

Duke University School of Nursing, Durham, North Carolina Duke University, Duke Clinical Research Institute, Durham, North Carolina Duke University, Department of Orthopaedic Surgery, Durham, North Carolina

Abstract

Race and ethnicity play a significant role in poststroke outcomes. This brief report describes the presence of depression among stroke survivors who received inpatient rehabilitation and whether depression differs by race. Data from eRehabData and electronic medical records were analyzed for patients who received rehabilitation after an acute ischemic or hemorrhagic stroke. Of 1501 stroke patients, 61.3% were white, 33.9% were African American, and 4.8% were of other race/ethnic backgrounds. By retrospective clinical review, depression was documented for 29.7% of stroke patients. Premorbid versus new onset of poststroke depression was documented for 13.4% and 21.6% of whites, 7.5% and 11.5% of African American, and 0% and 16.7% of patients of other race/ethnic groups. Compared with whites, African American and people of other races had a lower odds of poststroke depression (African American adjusted odds ratio = 0.52, 95% confidence interval = 0.41–0.68; other races odds ratio = 0.37, 95% confidence interval = 0.19–0.71), after adjusting for all other significant risk factors identified in the bivariate analysis (sex, hyperlipidemia, cognitive deficit, neglect). Depression was documented for one in three stroke survivors who received inpatient rehabilitation and highest among whites especially for prestroke depression. Addressing depression in rehabilitation care needs to consider individual patient characteristics and prestroke health status.

Keywords

Rehabilitation; Stroke; Depression; Comorbidity

In the United States, approximately 795,000 people experience a new or recurrent stroke each year.¹ With a per annum stroke death rate of 130,000, 85% of those who had experienced a stroke will survive and are often with variable levels of disability.¹ A major contributor of disability and complications poststroke is depression.² Internationally, depression is thought to occur in 5%–63% of stroke survivors and in one third of stroke survivors in the United States.^{3–9} Prevalence seems to remain constant in the months after a stroke and does not differ for patients by setting of assessment.¹⁰

Few studies focus on depression specifically in inpatient stroke rehabilitation populations and published reviews of the literature report the prevalence among patients of different race and ethnic groups is unclear.^{2,9,10} Studies to date have been in different regions and countries, have had different inclusion and exclusion criteria, used a variety of methods to

measure or diagnose depression, and not all reported race and ethnicity or used the same categorical groups. In regions with less racial diversity, it is common for all nonwhite patients to be grouped without further specification. According to Johnson et al.,⁹ white race was associated with increased risk of poststroke depression. Recognizing the importance of race and ethnicity in poststroke outcomes and the limitations of previous studies,^{1,2} this study used a population-based sample of stroke patients who received inpatient rehabilitation to (1) examine the presence of depression, both premorbid and new onset poststroke depression or depressive symptoms, among stroke survivors who received inpatient rehabilitation, and (2) determine whether depression rates and characteristics differ by race.

METHOD

Sample

This observational study used eRehabData and medical records abstracted data for discharged patients who received inpatient stroke rehabilitative care at one of three regional inpatient rehabilitation facilities in the southeastern United States between 2009 and 2011. This study conforms to the STrengthening the Reporting of OBservational studies in Epidemiology (STROBE) guidelines and reports the required information accordingly (see Checklist, Supplemental Digital Content 1, <http://links.lww.com/PHM/A667>). Methods have been described in more detail previously.^{11,12} In brief, patients with a Rehabilitation Impairment Category code of 01 were selected (stroke cases with a diagnosis of cerebral ischemia secondary to vascular thrombosis, embolism, or hemorrhage). Of these 2089 stroke patients, there were 1570 consecutive patients for which data on depression were chart abstracted (Fig. 1). Patients were subsequently excluded who did not have an admission class of “initial rehabilitation” and were not admitted for rehabilitation directly from an acute hospital stay.

Data Sources

Data collected at the three 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 inpatient rehabilitation outcome analyses and federal reporting. 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 of the provider organizations and the data coordinating center of the collaborating institutions.

Measures

National consensus to screen for depressive symptoms among stroke patients has not been reached.² Existing instruments are subject to selection by individual providers and organizational policies. The scales used to assess depressive symptoms are not appropriate for all stroke patients. In addition, specified providers able to diagnose depression do not assess all stroke patients in inpatient rehabilitation. Therefore, this study defined depression based on clinical documentation from any inpatient rehabilitation provider. Using a structured chart review protocol and data abstraction tool,^{12–14} trained abstractors (clinical

and nonclinical personnel) identified clinical documentation of depression or depressive symptoms in the patient's medical history and physical assessment completed on admission and the discharge summary. A random sample of 10% of all charts were independently reabstracted by a clinically experienced abstractor. Initial agreement between abstractors was 90% and each discrepancy was resolved before analysis. For each patient chart reviewed, the chart abstractors indicated the following: (1) "yes" (depression was documented) since stroke onset with no premorbid condition; (2) "yes" (depression was documented) since stroke onset and was also a premorbid condition; (3) "no" (documentation that patient was not depressed); and (4) "not documented." It was determined in discussions with subject matter expert clinicians that the standard of practice is for depression to be documented for patients who did exhibit signs or symptoms of depression and that clinicians would not routinely document depression or mood disorders if there were no concerns. Therefore, patients with "no depression" or "depression not documented" were combined. Patients were categorized to have premorbid depression, new onset poststroke depression (depression or depressive symptoms), or "no depression."

Sociodemographic and patient clinical variables for which there was theoretic or empirical evidence of an association with stroke outcomes were included (Table 1).^{9,12,15-18} Marital status and living arrangements were highly correlated (Cramer's $V = 0.33$, $P < 0.0001$); supported by published studies, only marital status was included in the final outcome models.¹⁹

Data Analysis

Means and standard deviations were reported for continuous variables and frequency distributions are described for categorical variables. The prevalence of depression (including premorbid, new onset, or no depression) is reported by different race groups. To identify potential risk factors for depression, the present study compared baseline patient characteristics (sex, age, prehospital vocation, marital status) and clinical variables (diagnosis type, admission impairment group, and presence of comorbidity including atrial fibrillation, diabetes, hyperlipidemia, kidney, hypertension, coronary artery disease, urinary tract infection, hyponatremia, dysphagia, aphasia, speech disorder, cognitive deficit, hemiplegia, neglect, ataxia) between patients with depression (premorbid or new onset combined) and without depression by using Pearson's χ^2 test for categorical variables and t test for continuous variables in the entire study population and within subgroups by race. To examine the association between race/ethnicity and patients' depression status, we included in a multiple logistic regression model all the potential risk factors that were significantly correlated with depression status in the bivariate analysis conducted with the entire population or factors significantly associated with depression status for at least two race subgroups. Stepwise variable selection method was used to build a final logistic regression model. Statistical analyses were performed using SAS Version 9.4 (SAS Ins, Cary, NC). All tests were two-sided, and the level of significance was set at $P < 0.05$.

RESULTS

Of the 1501 patients eligible for the study, 920 (61.29%) were white, 509 (33.91%) were African Americans, and 72 (4.80%) of other race/ethnic backgrounds. Figure 2 shows the relationship between depression and race, presenting the prevalence of premorbid, new onset, and no documented depression for patients who were white, African American, or of other race/ethnicities. Depression was more common for people who were white (35% overall; 13.4% premorbid, and 21.6% new onset) than for African Americans (22% overall; 7.5% premorbid and 14.5% new onset) and people of other race/ethnicities (16.7% overall and all were new onset with 0% premorbid). There was a significant difference between groups ($P < 0.0001$).

With no premorbid depression among patients of other race/ethnicities, we continued the study comparing any depression (premorbid and/or new onset poststroke depression or depressive symptoms) with no depression. Table 1 shows the bivariate analyses comparing the presence of depression by different patient characteristics and clinical variables. Sex, hyperlipidemia, urinary tract infection, dysphagia, cognitive deficit, hemiplegia, and neglect were significantly associated with the presence of depression and considered as potential risk factors. Table 2 presents the bivariate analyses comparing the presence of depression by race and the association with different patient characteristics and clinical variables. We found the same sex relationship with depression (more white and African American women with documented depression than without depression) and the same hyperlipidemia relationship with depression (it was less common for patients with a history of hyperlipidemia who were white or of other race/ethnic groups to have depression documented). It was more common for African Americans with documented depression to be younger than 65 yrs, working or retired because of disability prestroke, and admitted with private or Medicaid health insurance.

Table 3 presents the adjusted odds of depression by race/ethnicity after adjusting for all other risk factors significant in the bivariate analyses. Compared with whites, African Americans and stroke patients of other race and ethnicities had a lower odds of depression (African Americans, adjusted odds ratio [OR] = 0.52, 95% confidence interval [CI] = 0.41–0.68; other race/ethnicities, OR = 0.37, 95% CI = 0.19–0.71). Women (vs. men), people with neglect, cognitive deficits, or without hyperlipidemia were also more likely to have depression.

DISCUSSION

The purpose of this study was to examine the presence of depression among people of different race/ethnicities. The current study of a diverse sample of acute inpatient rehabilitation patients found that by retrospective clinical review, depression overall was documented in almost one third of stroke patients but 11% was premorbid and 19% was new onset poststroke. Whites were more likely to have documentation of depression, both premorbid and new onset, and premorbid depression was not documented for any patients of American Indian, Alaska Native, Asian, Hispanic/Latino, Native Hawaiian, and other Pacific Islander race/ethnicities. One in five African American stroke survivors had depression.

The patient population for the current study was 39% nonwhite, which is similar to the demographics of the US population with 37% of the population Hispanic or nonwhite.²⁰ Although this study found whites more likely to depression documented, other studies have identified high rates of depression for patients of other race/ethnicities. In a smaller study of communitydwelling stroke survivors, 86% of which were African Americans or Latinos and Latinos had the highest likelihood of depression.⁷ National US surveys on racial prevalence of depressive disorders have found that lifetime major depressive disorder is highest for whites (17.9%), followed by Caribbean blacks (12.9%) and African Americans (10.4%).²¹ In other studies, Mexicans, Puerto Ricans, and African Americans had significantly higher odds of recurrent major depressive episodes compared with whites after accounting for age and sex.²² These data support that depression varies among patients of different races and the mechanisms for onset including potential genetic and cultural factors are deserving of further research.^{23–27}

Although professional diagnosis of depression is the criterion standard, it is not feasible to have all stroke patients clinically assessed during an inpatient rehabilitation stay. Use of a standardized scale or instrument to assess for depression introduces additional limitations such as the ability to assess patients with aphasia and cognitive impairment. Furthermore, the stroke community lacks consensus on a specific instrument. We feel that our study's approach to value healthcare provider's documentation of depression has high external validity because it allowed us to include patients with speech, language, and cognitive impairment and was not dependent on the availability of any one healthcare provider. Consistent with previous research, we found that female sex and cognitive deficits increased the risk of depression among stroke patients.^{26,27} The association of neglect with depression was a novel finding and may have implications for clinical assessment. Not only should future research consider approaches to assess and monitor for depression among patients unable to complete oral or written assessments, but there may also be a need for standardized, culturally validated and appropriate methods for evaluation of depression specific to patients of individual racial and ethnic groups. Individual clinicians should be aware that depression may present differently for people of different race/ethnicities, may not be identified on existing standardized assessments, and could be further underestimated among patients with neglect, visual disturbances and impairment, or speech and cognitive deficits.

This retrospective observational study is not without limitations. To minimize selection bias, we used data for consecutive stroke admissions with few exclusions. Because a single assessment for depression cannot be used for all stroke patients, we determined that a patient had depression based on clinician assessment. This can introduce implicit bias because some clinical providers may be more or less aware of patients' mental health. However, we described several advantages to this approach for defining depression previously. As a retrospective observational study, we were limited to the variables that were available in the medical record. Variables with known association to poststroke depression, such as premorbid alcohol use, were not available. Family involvement in rehabilitation and other cultural factors may have been informative in our analysis. It is plausible that in communities with higher levels of interdependency and support, depression rates may be lower after inpatient rehabilitation. It is also plausible that there are strong cultural

differences rather than simply genetic differences that lead to a higher rate of depression in different racial groups. Utilization of nonstandardized reports of depression may limit the ability to compare this study of depression frequency with studies using standardized depression measurement instruments or formal diagnosis. Despite these limitations, this study highlights several areas for consideration and future investigation.

CONCLUSIONS

Depression is a clinical condition that affects a third of stroke survivors. Early identification of those with premorbid depression and those at risk for depression could have major implications for treatment, referral for services, patient outcomes, and quality of life. This study found that one in five African Americans and patients of other race/ethnicities and one in three whites had depression based on retrospective clinical review. Women were more likely than men to have depression documented as were patients with cognitive deficits and spatial neglect. Measurement research is needed to develop and evaluate assessments that are sensitive to rehabilitation patients and patients of different race/ethnicities. With improved awareness of the presence of depression and how it varies among our patients, care and family teaching can be tailored to meet individual needs.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

This study was supported in part by NIH NR25GM102739, NIH/NINR P30NR014139, and institutional grants from Duke University School of Nursing and Cannon Research Center Carolinas Medical Center.

REFERENCES

1. Benjamin EJ, Blaha MJ, Chiuve SE, et al.: Heart disease and stroke statistics-2017 update: a report from the American Heart Association. *Circulation* 2017;135:e146–603 [PubMed: 28122885]
2. Towfighi A, Ovbiagele B, El Hussein N, et al.: Poststroke depression: a scientific statement for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke* 2017;48:e30–43 [PubMed: 27932603]
3. Srivastava A, Taly AB, Gupta A, et al.: Post-stroke depression: prevalence and relationship with disability in chronic stroke survivors. *Ann Indian Acad Neurol* 2010;13:123–7 [PubMed: 20814496]
4. Carod-Artal FJ, Ferreira Coral L, Trizotto DS, et al.: Post-stroke depression: prevalence and determinants in Brazilian stroke patients. *Cerebrovasc Dis* 2009;28:157–65 [PubMed: 19556768]
5. Gyagenda JO, Ddumba E, Odokonyero R, et al.: Post-stroke depression among stroke survivors attending two hospitals in Kampala, Uganda. *Afr Health Sci* 2015;15:1220–31 [PubMed: 26958024]
6. Rajashekar P, Pai K, Thunga R, et al.: Post-stroke depression and lesion location: a hospital based cross-sectional study. *Indian J Psychiatry* 2013;55:343–8 [PubMed: 24459304]
7. Fei K, Benn EK, Negron R, et al.: Prevalence of depression among stroke survivors: racial-ethnic differences. *Stroke* 2016;47:512–5 [PubMed: 26628384]
8. Aben I, Verhey F, Strik J, et al.: A comparative study into the one year cumulative incidence of depression after stroke and myocardial infarction. *J Neurol Neurosurg Psychiatry* 2003;74:581–5 [PubMed: 12700297]

9. Johnson JL, Minarik PA, Nystrom KV et al.: Post-stroke depression incidence and risk factors: an integrative literature review. *JNeurosci Nurs* 2006;38(4 Suppl):316–27 [PubMed: 16989301]
10. Hackett ML, Pickles K: Part I: frequency of depression after stroke: an updated systematic review and meta-analysis of observational studies. *Int J Stroke* 2014;9:1017–25 [PubMed: 25117911]
11. Nguyen VQ, Prvu Bettger J, Guerrier T, et al.: Factors associated with discharge to home versus discharge to institutional care after inpatient stroke rehabilitation. *Arch Phys Med Rehabil* 2015;96:1297–303 [PubMed: 25823940]
12. Harris GM, Collins-McNeil J, Yang Q, et al.: Depression and functional status among African American stroke survivors in inpatient rehabilitation. *J Stroke Cerebrovasc Dis* 2017;26:116–24 [PubMed: 27720524]
13. Banks NJ: Designing medical record abstraction forms. *Int J Qual Health Care* 1998;10:163–7 [PubMed: 9690890]
14. HealthCare Systems Research Network: Medical record abstraction best practices guide: a guide to optimizing multi-site medical records abstraction studies. Available at: http://www.hcsrn.org/en/Tools%20&%20Materials/Plan_Field/Multisite%20Chart%20Abstraction%20Guide.pdf. Accessed November 8, 2017
15. Shi Y, Yang D, Zeng Y, et al.: Risk factors for post-stroke depression: a meta-analysis. *Front Aging Neurosci* 2017;9:218 [PubMed: 28744213]
16. Saxena A, Suman A: Magnitude and determinants of depression in acute stroke patients admitted in a rural tertiary care hospital. *J Neurosci Rural Pract* 2015;6:202–7 [PubMed: 25883481]
17. Zhang Y, He JR, Liang HB, et al.: Diabetes mellitus is associated with late-onset post-stroke depression. *J Affect Disord* 2017;221:222–6 [PubMed: 28654846]
18. De Ryck A, Brouns R, Franssen E, et al.: A prospective study on the prevalence and risk factors of post-stroke depression. *Cerebrovasc Dis Extra* 2013;3:1–13 [PubMed: 23626594]
19. Burvill P, Johnson G, Jamrozik K, et al.: Risk factors for post-stroke depression. *Int J Geriatr Psychiatry* 1997;12:219–26 [PubMed: 9097215]
20. U.S. Census Bureau QuickFacts. Available at: <https://www.census.gov/quickfacts/>. Accessed October 11, 2016
21. Williams DR, Gonzalez HM, Neighbors H, et al.: Prevalence and distribution of major depressive disorder in African Americans, Caribbean blacks, and non-Hispanic whites: results from the National Survey of American Life. *Arch Gen Psychiatry* 2007;64:305–15 [PubMed: 17339519]
22. Gonzalez HM, Tarraf W, Whitfield KE, et al.: The epidemiology of major depression and ethnicity in the United States. *J Psychiatr Res* 2010;44:1043–51 [PubMed: 20537350]
23. Guo WY, Zhang ZH, Mu JL, et al.: Relationship between 5-HTTLPR polymorphism and post-stroke depression. *Genet Mol Res* 2016; 15: doi: 10.4238/gmr.15017460
24. Kim JM, Stewart R, Kang HJ, et al.: A longitudinal study of BDNF promoter methylation and genotype with post-stroke depression. *J Affect Disord* 2013;149:93–9 [PubMed: 23399480]
25. Shi Y, Xiang Y, Yang Y, et al.: Depression after minor stroke: prevalence and predictors. *J Psychosom Res* 2015;79:143–7 [PubMed: 25868687]
26. Jiang XG, Lin Y, Li YS: Correlative study on risk factors of depression among acute stroke patients. *Eur Rev Med Pharmacol Sci* 2014; 18:1315–23 [PubMed: 24867509]
27. Cassidy E, O'Connor R, O'Keane V: Prevalence of post-stroke depression in an Irish sample and its relationship with disability and outcome following inpatient rehabilitation. *Disabil Rehabil* 2004;26:71–7 [PubMed: 14668142]

FIGURE 1.
Study population.

FIGURE 2.

Presence of depression for patients of white, African American, and other race/ethnicities. Other race/ethnicity includes American Indian, Alaska Native, Asian, Native Hawaiian/Other Pacific Islander, Hispanic/Latino.

Table 1.

Patient characteristics overall and for those with and without depression

	Total	No Depression	Depression	P
<i>n</i> (%)	1501	1055 (70.29%)	446 (29.71%)	
Age, mean $\pm$ SD, yr		65.53 $\pm$ 14.22	64.21 $\pm$ 13.53	0.0958
Sex				<.0001
Female	718 (47.83)	467 (44.27)	251 (56.28)	
Male	783 (52.17)	588 (55.73)	195 (43.72)	
Prehospital vocation				0.1327
Retired age	763 (50.83)	550 (52.13)	213 (47.76)	
Retired disability	139 (9.26)	90 (8.53)	49 (10.99)	
Employed	309 (20.59)	206 (19.53)	103 (23.09)	
Others	290 (19.32)	209 (19.81)	81 (18.16)	
Payer, primary				0.2445
Private	352	235 (22.27)	117 (26.23)	
Medicaid	279	201 (19.05)	78 (17.49)	
Medicare	870	619 (58.67)	251 (56.28)	
Marital status				0.4747
Never	331 (22.05)	243 (23.03)	88 (19.73)	
Married	694 (46.24)	486 (46.07)	208 (46.64)	
Widowed	266 (17.72)	180 (17.06)	86 (19.28)	
Separated or Divorced	210 (13.99)	146 (13.84)	64 (14.35)	
Diagnosis				0.6223
Hemorrhagic	267 (17.79)	191 (18.10)	76 (17.04)	
Ischemic	1234 (82.21)	864 (81.90)	370 (82.96)	
Admit impairment group				0.2479
Left (right CVA)	621 (41.37)	426 (40.38)	195 (43.72)	
Right (left CVA)	672 (44.77)	481 (45.59)	191 (42.83)	
Bilateral	108 (7.20)	71 (6.73)	37 (8.30)	
No paresis	48 (3.20)	39 (3.70)	9 (2.02)	
Other	52 (3.46)	38 (2.53)	14 (0.93)	

	Total	No Depression	Depression	P
Medical history				
Atrial fibrillation	251 (16.72)	181 (17.16)	70 (15.70)	0.4881
Diabetes	358 (23.85)	255 (24.17)	103 (23.09)	0.6547
Kidney disease	294 (19.59)	214 (20.28)	80 (17.94)	0.2950
Hypertension	765 (50.97)	542 (51.37)	223 (50.00)	0.6264
Coronary artery disease	117 (7.79)	83 (7.87)	34 (7.62)	0.8720
Hyperlipidemia	446 (29.71)	343 (32.51)	103 (23.09)	0.0003
Complications during rehabilitation				
Urinary tract infection	431 (28.71)	287 (27.20)	144 (32.29)	0.0467
Hyponatremia	119 (7.93)	84 (7.96)	35 (7.85)	0.9402
Dysphagia	730 (48.63)	494 (46.82)	236 (52.91)	0.0310
Aphasia	381 (25.38)	269 (25.50)	112 (25.11)	0.8754
Speech disorder	413 (27.51)	290 (27.49)	123 (27.58)	0.9714
Cognitive deficit	478 (31.85)	316 (29.95)	162 (36.32)	0.0155
Hemiplegia	151 (10.06)	117 (11.09)	34 (7.62)	0.0413
Neglect	132 (8.79)	80 (7.58)	52 (11.66)	0.0108
Ataxia	147 (9.79)	107 (10.14)	40 (8.97)	0.4845

CVA, cerebrovascular accident.

Table 2.

Factors associated with depression for white, African American, and other race/ethnic stroke survivors

Variables	White (<i>n</i> = 920)		African American (<i>n</i> = 509)		Other Race/Ethnicity (<i>n</i> = 72)	
	Depressed	Not Depressed	Depressed	Not Depressed	Depressed	Not Depressed
<i>n</i> (%)	322 (35.0%)	598 (65.0%)	112 (22.0%)	397 (78.0%)	12 (16.7%)	60 (83.3%)
Age 65 yrs	59.6%	63.3%	29.5%	40.5%	33.3%	52.5%
Sex, female	56.4%	43.3%	59.8%	46.8%	50.0%	32.2%
Prestroke employment status						
Retired for age	54.9%	59.3%	31.3%	42.8%	16.7%	44.1%
Retired for disability	8.5%	6.9%	17.9%	11.7%	16.7%	5.1%
Employed	20.1%	18.7%	31.3%	19.2%	33.3%	27.1%
Not working, student, or homemaker	16.6%	15.2%	19.6%	26.3%	33.3%	23.7%
Payer, primary						
Private	24.8%	23.3%	33.0%	24.1%	33.3%	30.5%
Medicare	64.9%	66.5%	34.8%	48.9%	33.3%	45.8%
Medicaid	10.3%	10.3%	32.1%	27.1%	33.3%	23.7%
History of hyperlipidemia	14.4%	22.6%	19.6%	23.8%	0%	27.1%

Items significant at $P < 0.05$ are indicated in bold.

No association with depression for any group: marital status; prehospital living arrangements; has secondary health insurance; stroke type; admit impairment group; history of atrial fibrillation, diabetes, kidney disease, hypertension, coronary artery disease; stroke complications of hyponatremia or urinary tract infection; and stroke deficits dysphagia, aphasia, speech disturbance, cognitive deficits, hemiplegia, neglect, and ataxia.

Table 3.

Adjusted odds of depression for stroke survivors of different race/ethnicities

Variable	OR	95% CI
Race (reference white)		
African American	0.52	0.41–0.68
Other race/ethnicities ^a	0.37	0.19–0.71
Sex, female (vs. male)	1.62	1.29–2.03
History of hyperlipidemia	0.69	0.53–0.89
Cognitive deficit	1.30	1.02–1.65
Neglect	1.50	1.03–2.19

^aOther race/ethnicity includes American Indian, Alaska Native, Asian, Hispanic/Latino, and Native Hawaiian/Other Pacific Islander.