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Informal caregivers and racial/ethnic variation in health service use of stroke survivors

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Abstract—We investigated the racial and ethnic variation in health service use among stroke survivors with informal caregivers in a number of Department of Veterans Affairs Medical Centers in one Veterans Integrated Service Network in the southeastern United States. We focused on the role of caregivers as an enabling factor in the use of health services. One hundred twenty-five veterans who had been hospitalized after an acute stroke, been released home, and identified an informal caregiver were enrolled in the study. Veterans and caregivers were surveyed at four time points over 12 months. Poisson multivariate regression analyses were used to model the relative risk (RR) of health service use. African Americans and Puerto Ricans were half as likely as Caucasians to use inpatient therapy services (RR = 0.522 and 0.494, respectively; $p < 0.01$), Puerto Ricans were less likely to be admitted to the hospital (RR = 0.689, $p < 0.05$), and Puerto Ricans were more likely to use outpatient services than Caucasians (RR = 1.230, $p < 0.01$). Stroke survivors that received more hours of informal care were associated with a higher likelihood of outpatient service use (RR = 1.01, $p < 0.01$). Stroke survivors living with their caregiver had a lower likelihood of inpatient therapy use (RR = 0.791, $p < 0.01$) and a higher likelihood of outpatient service use (RR = 1.17, $p < 0.01$). Greater likelihood of inpatient therapy (RR = 1.340, $p < 0.01$) and outpatient services (RR = 1.160, $p < 0.05$) was related to caregivers who received outside help. This study provides insight into the role of informal care in health service use for stroke survivors.

Key words: caregiving, Caucasian, health service use, informal caregiving, race/ethnicity, rehabilitation, stroke, stroke survivor, veterans.

INTRODUCTION

Stroke is the leading cause of serious long-term disability affecting more than four million people in the United States [1–3]. An estimated 500,000 strokes occur each year in the United States and between 11,000 and 15,000 of those strokes are seen among veterans receiving services through the Department of Veterans Affairs (VA) health system. Approximately 80,000 veterans in the VA system are stroke survivors [4–6]. Research indicates that racial/ethnic variations exist in the incidence and mortality of stroke. African Americans and Latinos have a higher incidence of stroke and greater stroke mortality, especially at younger ages and in the lower socioeconomic tiers [1,7–10]. Latino and African-American stroke patients are twice as likely as Caucasian patients to experience a recurrent stroke within 2 years of their first

Abbreviations: ADL = activities of daily living, ANOVA = analysis of variance, CI = confidence interval, FAI = Frenchay Activities Index, FIM = Functional Independence Measure, HSD = Honestly Significant Difference, IADL = instrumental activities of daily living, RR = relative risk, VA = Department of Veterans Affairs, VAMC = VA medical center, VISN = Veterans Integrated Service Network.

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stroke and have greater residual physical impairment after stroke [11–12]. Within Latino subgroups variations also exist, with higher levels of stroke mortality among Puerto Ricans than Cuban or Mexican Americans [13]. Most stroke survivors are released home, often to informal caregivers, for a period of recovery.

African Americans, Latinos, and other minority groups in the United States often face barriers that restrict their use of health services [14]. After stroke, a variety of health services may be used by survivors, including hospital admissions; speech, occupational, and physical therapy; outpatient clinic visits, and various formal care services in the home. Given that African-American and Latino groups face greater stroke burden and greater poststroke disability, examining patterns of health services use of these groups is important. Using Andersen's Behavioral Model of Health Services Use to guide our research questions, we first investigate the racial and ethnic variation in health service use among stroke survivors in our sample. Second, we examine the degree to which caregiver context is an enabling factor in the use of health services for the veterans in our sample of veterans.

According to Andersen's Behavioral Model of Health Services Use, barriers and facilitators to health service use can be used to explain patterns of utilization [15]. Under this model, three types of factors affect the use of health services: predisposing, enabling, and need. Predisposing factors such as race, age, sex, and education affect whether a particular individual will use health services. Enabling factors can be those that enable or impede health service use, including living arrangements, access to healthcare, income, and social and family support. Need factors are specific to health status and physical/mental functioning. Individuals with greater impairment need more care and thus may have greater use based on this alone. To our knowledge, no work has explored the role of caregivers as it relates to patterns of health service use.

Postacute stroke recovery in the home is often a long-term process, and an important aspect of recovery is the presence of an informal caregiver. A majority of stroke survivors return home for rehabilitation, usually to an informal caregiver who is a spouse, child, or friend. Little is known about the specific role caregivers play in the recovery process for stroke survivors, but some evidence suggests that some of the racial and ethnic variation in poststroke recovery may be mediated, at least in part, by the presence of a caregiver [16].

Racial/ethnic differences among caregivers for a number of conditions such as Alzheimer disease, dementia, and cancer have been researched in the literature. African-American and Latino caregivers have different attributes when compared with Caucasian caregivers. Latino caregivers are less likely to institutionalize those in their care, or delay institutionalization the longest compared with other racial/ethnic groups [17]. Latino caregivers are also more likely to be family members, and culturally they report a greater sense of duty toward the elderly in their care compared to other racial/ethnic groups [18–19]. Latino caregivers also spend more hours on informal care compared with Caucasian and African-American caregivers [20]. Much of the literature on Latino caregivers has focused on the experiences of Mexican Americans, Puerto Ricans, Cuban Americans, and other Latino groups as a whole. No studies specifically examine differences across ethnic Latino subgroups.

African-American caregivers are more likely to have health problems and have higher mortality rates than Caucasian caregivers [21]. African Americans, conversely, are more likely to have more favorable perceptions of caregiving than Caucasians in contexts other than stroke rehabilitation (i.e., Alzheimer's caregiving) [22] and are more likely to express stronger cultural reasons for providing care than Caucasian caregivers [21].

Given that African-American and Latino stroke survivors face greater poststroke burden and the experience of caregivers differs among these groups, the present study explores the role of caregiving in the use of inpatient and outpatient health services in the first year of recovery at home after acute stroke.

METHODS

Subjects

This article reports on a prospective study of veterans who had an acute stroke between the years 2000 and 2001 and their informal caregivers. Veterans were selected from five geographically and ethnically diverse VA medical centers (VAMCs) in Florida and Puerto Rico (also referred to as Veterans Integrated Service Network [VISN] 8). VISN 8 was selected so that the research team could better understand how the stroke recovery process is managed by veterans and caregivers in our network, which includes South Georgia, Florida, Puerto Rico, and the U.S. Virgin Islands.

Research suggests a 50 percent greater mortality rate from stroke in the "Stroke Belt," which is located across the southeastern United States [23]. In addition to the generally higher stroke incidence for non-Caucasians in the United States evidence shows that these differences are more pronounced in the Southern States. One study found that the average African-American/Caucasian mortality ratio from stroke ranged from 6 to 21 percent higher in Southern States compared with nonsouthern states [24]. Thus our racially/ethnically diverse sample combines an African-American/Caucasian population and Latino population, all of which are more likely to experience greater disparities in stroke outcomes.

Study participants were stroke survivors discharged directly home following hospital care for their stroke (International Classification of Diseases-9th Revision codes 430–438 except 435) [25]. This article is part of a larger study that examined quantitative and qualitative aspects of the recovery process and caregiving poststroke. Home visits lasted between 2 and 2-1/2 hours for all stroke survivor and caregiver assessment activities. One hundred thirty-five veterans were enrolled after their stroke while they were in the hospital. During the 1-month follow-up, this number fell to 125 veterans. Six patients were released to extended care facilities and four patients refused consent. Of the 125 caregivers, 45 were Caucasian, 31 were African American, and 49 were Puerto Rican (8 residing in the United States and 41 residing in Puerto Rico). This study was approved by the University of Florida Health Science Center Institutional Review Board and the VAMC Subcommittee for Clinical Investigations. Informed consent was obtained prior to enrollment.

Measures

Data for the larger study were collected by four methods: in-depth interviews, observations, questionnaires, and medical record abstraction. Interviewers representing the three ethnic groups were trained for data collection and Spanish-speaking data collectors were used for the Latino sample when needed. Trained data collectors went to the stroke survivors' homes to interview them and assess their poststroke recovery. Quantitative data collectors received training in the administration of the Functional Independence Measure (FIM) [26] and the Frenchay Activities Index (FAI) [27] measures that were then administered at the stroke survivors' homes. Caregivers were also present during the visit and were asked to fill out a survey that focused on their caregiving experience. Our outcome variables were health service use in hospitals and outpatient clinics. Data from hospital and outpatient clinic use were abstracted from the medical records of the stroke survivors during the study period at 1, 6, and 12 months poststroke.

Inpatient Hospital Service Use

Inpatient hospital service use consists of two constructs: inpatient therapy and hospital admissions. First, we examined the number of hospital admissions over the course of 1 year poststroke. The second construct is the sum of all physical, occupational, and speech therapy treatments that were taken on an inpatient basis. The average number of hospital admissions over the course of 12 months for stroke survivors was 1.97. The average number of physical therapy, speech therapy, and occupational therapy treatments were 11.64, 2.04, and 6.89, respectively.

Outpatient Clinic Service Use

Use of outpatient services is measured by the number of visits veterans made to general primary care clinics and specialty clinic visits in the first 12 months poststroke. Specialty clinics within the VA are often disease-specific and can include neurology, infectious disease, and multiple sclerosis clinics. Each visit was counted and the two types of visits are summed into a variable that represents outpatient clinic use. An average of 8.64 general care clinic visits and 12.19 specialty clinic visits were made in the 12 months after stroke in our sample.

Predisposing Factors

We controlled for patients' age and educational level at baseline (discharge from the hospital). Age is measured as a continuous variable in years; educational level is measured on a 7-point ordinal scale, with larger numbers indicating higher levels of education (1 = 7 years, 2 = 7–9 years, 3 = 10–11 years, 4 = high school graduate, 5 = some college or technical school, 6 = college graduate, 7 = postcollegiate graduate school).

Enabling Factors

We measured annual income level of the veteran, number of hours caregivers provided care each day, whether caregiver lived with stroke survivor, and whether caregiver received help from others with caregiving activities as enabling factors. Caregivers were asked whether another person helped with the day-to-day

caregiving activities. Income of the veteran was measured on a scale from 1 to 5, with higher numbers indicating greater income (1 = ≤$14,999, 2 = $15,000–$24,999, 3 = $25,000–$34,999, 4 = $35,000–$44,999, 5 = ≥$45,000). Hours of care received per day were measured by self-reports in hours from caregivers. Living arrangements were measured as a dichotomous variable for whether the stroke survivor and caregiver lived together. Caregiver outside help was coded as a dichotomous variable for those who reported receiving help from others with caregiving activities.

Need Factors

To measure the need for health services poststroke, we used two verified measures of poststroke recovery. First we measured functional status or ability to complete activities of daily living (ADL) through the FIM. The FIM consists of 18 questions about toileting, bathing, dressing, eating, and mobility [26]. Scores on the FIM vary from 18 to 126, with 18 representing complete dependence and 126 representing complete independence in performing ADL. We also measured instrumental ADL (IADL) through the FAI [27]. The FAI employs 15 questions to tap elements of social activities such as cooking, cleaning, going out, and pursuing hobbies. FAI scores varied from 15 to 60, with 15 indicating an inability to perform any IADL and 60 indicating an ability to perform all 15 IADL.

Analytic Strategy

First, we displayed the descriptive statistics for caregiver and veteran characteristics. Next, we examined the inpatient and outpatient health service use of veterans in our study and compare use between racial and ethnic groups using a one-way analysis of variance (ANOVA). We distinguished differences between groups by using Tukey post-hoc tests. Finally, given the structure of the scales created for the outcome variables, we employed Poisson regression analysis to examine the relative risk (RR) of health service use among different racial/ethnic groups and other predictors. This technique is most appropriate because we used count outcomes (health services were the actual number of times individuals in the study used particular services over the 12-month study period). We report adjusted RR and 95 percent confidence intervals (CIs) in our tables. RR was calculated by taking the exponential of the beta coefficient (exp(β)) and represents the increase or decrease (by a factor of x) in the risk of service use. Statistical analyses were performed using SPSS 11.1 (SPSS, Inc; Chicago, Illinois) and SAS Version 8.0 (SAS Institute; Cary, North Carolina).

RESULTS

Table 1 displays the descriptive characteristics of the caregivers in our sample. Caregiver race/ethnicity was relatively evenly spread among Caucasians, African Americans, and Puerto Ricans. About one-third of caregivers reported fair or poor health and more than 40 percent had a high school diploma or higher educational level. One-third of caregivers were employed full- or part-time outside the home and a majority lived with the stroke survivor. Most caregivers were spouses of stroke survivors, and given that our veteran population is mostly male, almost 90 percent of the caregivers were female.

Table 2 displays the results of the one-way ANOVA for the health service use of the African-American, Puerto Rican, and Caucasian stroke survivors in our sample. To examine differences within groups we employed a Tukey Honestly Significant Difference (HSD) post hoc test. Results of the Tukey HSD post hoc tests are given in the table as significant differences (at the $p < 0.05$ level) between groups. The table indicates that Puerto Rican stroke survivors used more general care clinic visits than Caucasians and African Americans. Puerto Ricans also

Table 1.
Descriptive characteristics of caregivers.

Characteristic	%
Race/Ethnicity	
Caucasian	36.4
African American	22.2
Puerto Rican	39.7
Other	1.6
General Health	
Fair/Poor Health	34.0
Education Level	
High School Degree or Higher	44.0
Employment	
Employed	33.6
Relationship	
Spouse	61.6
Sex	
Female	87.2
Living Arrangement	
Living with Stroke Survivor	85.6
Average Age (years)	59

used significantly more specialty clinic visits than Caucasians and African Americans. Additionally, African Americans had a smaller, significantly different number of specialty clinic visits than Caucasians.

Table 3 displays the one-way ANOVA test and Tukey HSD post-hoc test for each predictor variable used in our analysis by race/ethnicity. The average age of stroke survivors for our sample was 66.13, with Puerto Ricans significantly older than African Americans in the sample. Average educational level of 4.51 corresponded to some college; average income fell between the first and second categories (1 = <$15K and 2 = $15K–$20K); and most stroke survivors lived with their caregivers (85%). Caregivers spent an average of 8.68 hours per day engaged in caregiving activities. One-quarter of caregivers reported receiving outside help with caregiving activities, although this number was higher for Puerto Rican caregivers. More than 40 percent of Puerto Rican caregivers reported receiving outside help; this number was significantly larger than for Caucasian or African-American caregivers. Levels of functional disability also varied by race/ethnicity. Puerto Ricans had lower average FIM

Table 2.
One-way analysis of variance for health service use of Caucasian, African-American, and Puerto Rican stroke survivors.

Factor	Mean ± SD				*F*	*p*-Value
	Total	Caucasian	African American	Puerto Rican		
Inpatient Service Use						
No. of Hospital Admissions	1.97 ± 1.57	2.32 ± 2.18	1.86 ± 1.09	1.70 ± 1.00	2.10	0.13
No. of Physical Therapy Treatments	11.64 ± 15.24	14.52 ± 18.83	11.54 ± 13.28	8.84 ± 11.91	1.76	0.18
No. of Speech Therapy Treatments	2.04 ± 3.75	2.32 ± 4.27	2.71 ± 4.31	1.28 ± 2.52	1.52	0.18
No. of Occupational Therapy Treatments	6.89 ± 7.60	7.60 ± 7.38	5.91 ± 7.06	6.86 ± 8.32	0.41	0.61
Outpatient Service Use						
No. of General Care Clinic Visits	8.64 ± 6.89	8.34 ± 7.41	6.65* ± 5.35	10.32‡ ± 7.01	3.08	0.049
No. of Specialty Clinic Visits	12.19 ± 12.32	9.98* ± 10.72	9.77*† ± 12.62	16.08‡ ± 12.86	4.16	0.018

*Distinct from Puerto Ricans.
†Distinct from Caucasians.
‡Distinct from African Americans.
SD = standard deviation.

Table 3.
One-way analysis of variance for predisposing, enabling, and need factors of stroke survivors by race/ethnicity.

Factor	Mean ± SD				*F*	*p*-Value
	Total	Caucasian	African American	Puerto Rican		
Predisposing Factors						
Age	66.13 ± 10.61	66.52 ± 10.57	61.23* ± 10.22	69.16† ± 9.85	6.26	0.003
Education Level	4.51 ± 1.23	4.58 ± 1.07	4.31 ± 1.43	4.58 ± 1.23	0.60	0.548
Enabling Factors						
Annual Income	1.86 ± 1.08	2.02 ± 1.15	2.00 ± 1.12	1.62 ± 0.97	2.08	0.130
No. of Hours of Care Provided	8.68 ± 7.21	7.32 ± 7.32	7.93 ± 7.21	10.42 ± 6.69	2.53	0.084
Caregiver Lived with Stroke Survivor	0.85 ± 0.33	0.87 ± 0.34	0.87 ± 0.34	0.84 ± 0.37	0.12	0.887
Caregiver Received Outside Help	0.25 ± 0.44	0.12* ± 032	0.17* ± 0.38	0.42†‡ ± 0.50	6.59	0.002
Need Factors						
ADL Score	106.02 ± 18.69	109.70* ± 13.53	112.23* ± 12.63	98.00†‡ ± 23.55	8.32	<0.001
IADL Score	29.66 ± 10.61	30.73 ± 10.20	33.33* ± 9.26	26.20† ± 10.99	5.12	0.007

*Distinct from Puerto Ricans.
†Distinct from African Americans.
‡Distinct from Caucasians.
ADL = activities of daily living, IADL = instrumental ADL, SD = standard deviation.

scores (indicating lower functionality) than the Caucasian and African-American stroke survivors in our sample. FAI scores were also lower for Puerto Ricans than for African Americans.

Tables 4 and **5** display the results of the Poisson regression analysis for inpatient (hospital admissions; occupational, physical, and speech therapy treatments) and outpatient health service use (clinic visits). **Table 4** displays the RR and 95 percent CIs for inpatient health service use (hospital admissions and inpatient therapy) for Puerto Rican and African-American stroke survivors, adjusting for all factors.

In the model adjusted for predisposing, enabling, and need factors, we saw that African Americans and Puerto Ricans were half as likely (RR = 0.522 and 0.494, respectively) as Caucasians to use inpatient therapy. Other predisposing factors such as age and educational level also slightly but significantly decreased the likelihood of inpatient service use. For every 1 year increase in age, a corresponding 0.982 decrease occurred in the log odds of inpatient health service use for stroke survivors. Similarly, for every increase in educational level, a corresponding 0.889 decrease occurred in odds of inpatient service use. Enabling factors such as income, caregiver living arrangement, and caregiver receipt of outside help also impacted inpatient therapy. Annual income (RR = 1.08) and caregiver having outside help (RR = 1.34) increased the likelihood of inpatient therapy use. Inpatient therapy use was less likely if the stroke survivor lived with the caregiver (RR = 0.791). Need factors, ADL and IADL functioning, reduced the risk of inpatient therapy use. Hospital admissions followed a slightly different pattern than inpatient therapy. Puerto Ricans were less likely to have a hospital admission than Caucasians (RR = 0.689) and those with higher annual incomes were less likely to be admitted to the hospital in the first year poststroke (RR = 0.873).

Table 5 displays the RR and 95 percent CIs for outpatient health service use. In the model adjusted for predisposing, enabling, and need factors, Puerto Ricans were 1.23 times more likely to use outpatient services than Caucasians. Stroke survivors who had caregivers that spent more hours per week providing care were at an increased risk (RR = 1.01) of using outpatient health services. Living with a caregiver increased the risk (RR = 1.17) of outpatient service use, and having a caregiver that received outside help increased the risk (RR = 1.16) of outpatient service use. Higher IADL scores corresponded to increased odds (RR = 1.01).

Table 4.
Poisson regression of inpatient health service use for stroke survivors.

Factor	Inpatient Therapy			Hospital Admissions		
	Relative Risk	95% CI	*p*-Value	Relative Risk	95% CI	*p*-Value
Predisposing Factors						
African American	0.522*	0.465–0.587	<0.001	0.795	0.561–1.120	0.20
Puerto Rican	0.494*	0.444–0.550	<0.001	0.689†	0.498–0.956	0.03
Age	0.982*	0.977–0.987	<0.001	0.991	0.978–1.000	0.22
Education Level	0.889*	0.856–0.924	<0.001	1.040	0.927–1.170	0.49
Enabling Factors						
Annual Income	1.080*	1.030–1.123	<0.001	0.873†	0.765–0.997	0.04
No. of Hours of Care Provided	1.030*	0.996–1.010	0.43	0.989	0.969–1.010	0.28
Caregiver Lived with Stroke Survivor	0.791*	0.698–0.896	<0.001	1.320	0.828–2.110	0.24
Caregiver Received Outside Help	1.340*	1.200–1.500	<0.001	0.965	0.682–1.360	0.84
Need Factors						
ADL Score	0.992*	0.989–0.995	<0.001	1.000	0.992–1.010	0.74
IADL Score	0.985*	0.986–0.996	<0.001	0.985	0.970–1.000	0.058

*$p < 0.05$.

†$p < 0.01$.

ADL = activities of daily living, CI = confidence interval, IADL = instrumental ADL, SD = standard deviation.

Table 5.
Poisson regression of outpatient health service use (clinic visits) for stroke survivors.

Factors	Outpatient Health Service Use		
	Relative Risk	95% CI	*p*-Value
Predisposing Factors			
African American	0.875	0.780–0.983	0.02
Puerto Rican	1.230*	1.120–1.360	<0.001
Age	0.998	0.993–1.002	0.33
Education Level	1.048	1.019–1.092	0.002
Enabling Factors			
Annual Income	1.090*	1.050–1.137	<0.001
No. of Hours of Care Provided	1.010*	1.008–1.020	<0.001
Caregiver Lived with Stroke Survivor	1.170*	1.030–1.336	0.016
Caregiver Received Outside Help	1.160*	1.050–1.276	0.003
Need Factors			
ADL Score	0.993	0.991–0.996	<0.001
IADL Score	1.010*	1.000–1.010	0.009

*$p < 0.05$.
ADL = activities of daily living, CI = confidence interval, IADL = instrumental ADL.

DISCUSSION

The literature suggests that racial and ethnic minorities in the United States face particular barriers to the use of health services that could potentially assist in recovery from acute events. This article explores how the presence of caregivers in the poststroke recovery process affects the use of both inpatient and outpatient health services. Our findings indicate that the relationship between health service use and predisposing, enabling, and need factors is complex. Stroke survivor health service use depends on a host of factors, including race, ethnicity, educational level, IADL scores, and characteristics of their caregivers. African Americans and Puerto Ricans had different patterns of health service use than Caucasians across inpatient and outpatient services. Race and ethnicity remained statistically significant, even when adjusting for all factors in the models.

Factors that predispose individuals to poorer outcomes (older age, less education, minority status) were related to hospital admissions and inpatient therapy use. Puerto Rican stroke survivors had increased risk of hospital admissions and outpatient clinic use but decreased inpatient therapy use. African Americans were less likely to use inpatient therapy but did not differ from Caucasians on hospital admissions or outpatient clinic visits. Those with higher educational levels and older age had a lower likelihood of inpatient therapy.

Need factors, measured by the level of impairment, play an important role in health service use. We hypothesized that those with greater impairment would have a greater need for services and that the need would determine health service use. We used two scales to measure functional status, ADL and IADL mastery, to gage the need factors for stroke survivors. We demonstrated that greater functional mastery of IADL is associated with a lower likelihood of inpatient therapy use but a higher likelihood of outpatient service use. Greater functional independence (ADL) is related to decreased inpatient therapy use.

Literature suggests that enabling factors such as family and social networks play a role in facilitating health service use [14]. Our study finds that stroke survivors who had caregivers who spent more hours providing care had a greater likelihood of outpatient service use. Stroke survivors living with their caregiver had a lower likelihood of inpatient therapy and greater likelihood of outpatient service use. Those with caregivers who received outside help had a greater likelihood of both inpatient and outpatient service use. Thus, caregivers played an important role in postdischarge stroke recovery management and resource use. This finding seems consistent with the literature in that when potential problems arise, family members, who tend to spend more time providing care, may encourage the stroke survivor to seek external help via outpatient clinics.

Stroke survivors living with their caregiver had a lower likelihood of both inpatient therapy use and higher likelihood of outpatient service use. This makes sense, in that live-in caregivers may be more attentive to the daily changes in the stroke patient's mood, appetite, and physical functioning. Caregivers may serve as gatekeepers for clinic appointments and gage when the stroke survivor might need to be seen in the clinic. They may also take on some therapeutic roles, reducing the need for inpatient therapy services. Caregivers who live with stroke survivors are able to quickly address potential problems as they arise. Since live-in caregivers are also likely to be married to the patient, they provide not just physical care and assistance, but also serve as a central figure in the stroke patient's social support network. This combination

of physical and social support may contribute to lowering inpatient therapy and increasing outpatient service use.

As mentioned, the level of impairment plays an important role in health service use. We found that outside caregiver help was related to a higher likelihood of both inpatient therapy and outpatient service use. Simply stated, those stroke survivors with caregivers who received outside help were likely to have greater physical impairment and require more care. We found that Puerto Ricans were more likely than Caucasians and African Americans to have more than one caregiver, a trend that possibly stems from Puerto Ricans' greater sense of duty toward the elderly in their care compared with other racial/ethnic groups [18–19]. We also note that caregivers of Puerto Ricans were more likely than their Caucasian and African-American counterparts to provide more hours of care per day. This may be partly because of Puerto Ricans' greater impairment and also that Latino caregivers are less likely to institutionalize or more likely to delay institutionalization for those in their care [17], making their care needs greater. Of course, Puerto Rican stroke patients are also significantly older than Caucasians or African Americans, and so the age of the patient coupled with their greater impairment likely leads to a greater need for both inpatient and outpatient services. While greater informal caregiving has been shown to reduce health service use, an apparent age effect also should be considered in this trend. Other limitations of this study stem from the limited sample of veterans living in the southeastern United States and being enrolled and treated by VA doctors, which means that all have similar access to the health services assessed in this study.

CONCLUSIONS

This study provides a good explanatory look at the often complex role of stroke caregiving in health services use in the first year poststroke.

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Author Contributions:

Study concept and design: M. Rittman.

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