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Author manuscript

*J Stroke Cerebrovasc Dis.* Author manuscript; available in PMC 2017 August 01.

Published in final edited form as:

*J Stroke Cerebrovasc Dis.* 2016 August ; 25(8): 1851–1855. doi:10.1016/j.jstrokecerebrovasdis.2016.03.015.

## Mexican Americans are Less Likely to Return to Work Following Stroke: Clinical and Policy Implications

Lesli E. Skolarus, MD, MS<sup>1</sup>, Jeffrey J. Wing, PhD<sup>2</sup>, Lewis B. Morgenstern, MD<sup>1</sup>, Devin L. Brown, MD, MS<sup>1</sup>, and Lynda D. Lisabeth, PhD<sup>1</sup>

<sup>1</sup>Stroke Program, University of Michigan

<sup>2</sup>Department of Public Health, Grand Valley State University

<sup>3</sup>Department of Epidemiology, University of Michigan

### Abstract

**Background**—Greater post-stroke disability and US employment policies may disadvantage minority stroke survivors from returning to work. We explored ethnic differences in return to work among Mexican Americans (MAs) and non-Hispanic whites (NHWs) working at the time of their stroke.

**Methods**—Stroke patients were identified from the population-based Brain Attack Surveillance in Corpus Christi (BASIC) study from August 2011–December 2013. Employment status was obtained at baseline and 90-day interviews. Sequential logistic regression models were built to assess ethnic differences in return to work after accounting for: 1) age (<65 vs ≥65), 2) sex; 3) 90-day NIHSS, and 4) education (<high school vs ≥high school).

**Findings**—Of the 729 MA and NHW stroke survivors who completed the baseline interview, 197 (27%) were working at the time of their stroke of which 125 (63%) completed the 90-day outcome interview. Forty-nine (40%) stroke survivors returned to work by 90 days. MAs were less likely to return to work (OR=0.45, 95%CI 0.22–0.94) than NHWs. The ethnic difference became non-significant after adjusting for NIHSS (OR=0.59, 95%CI 0.24–1.44) and further attenuated after adjusting for education (OR=0.85, 95%CI 0.32–2.22).

**Conclusion**—The majority of stroke survivors did not return to work within 90 days of their stroke. MA stroke survivors were less likely to return to work after stroke than NHWs which was due to their greater neurologic deficits and lower educational attainment compared with NHWs. Future work should focus on clinical and policy efforts to reduce ethnic disparities in return to work.

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Lesli E. Skolarus, MD, MS, University of Michigan, 1500 East Medical Center SPC# 5899, Ann Arbor, MI 48109, (734)936-9075, lerusche@umich.edu.

No Disclosures

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## Keywords

Stroke; disparities; survivorship

While overall stroke incidence has declined, stroke incidence in the working age population has remained stable.[1, 2] Working age stroke survivors face unique challenges compared to the retirement age population, most notably employment and the accompanying health insurance, as well as family responsibilities such as caring for children and aging parents. Not surprisingly, return to work is highly important to working age stroke survivors and contributes to their life satisfaction and subjective well-being. [3–5] In the US, lost earnings are the largest driver of the projected \$ 2.2 trillion in stroke costs over the next 4 decades suggesting a high societal importance of stroke survivors returning to work.[6]

Americans rely less on government social spending and more heavily on employers and tax subsidies compared to other wealthy democratic industrialized countries.[7] Therefore, events such as stroke that can change the course of employment have widespread ramifications for stroke survivors and their families as well as society. These ramifications may be even more pronounced among Mexican Americans (MAs) who are younger at the time of their stroke and have more post-stroke disability than non-Hispanic whites (NHW). [2, 8] Furthermore, our previous work has shown that MA stroke patients have lower income and thus unemployment following stroke may have greater financial implications than for NHWs.[9]

Despite the fact that return to work is important to society and to stroke survivors and their families, previous research exploring return to work among stroke survivors has been limited by selection bias, including a focus on patients in rehabilitation, which likely differ in their frequency of returning to work,[10] and variable time to follow up ranging from 90 days to 27 years by which time other events may have occurred which impact return to work.[11, 12] In a population based stroke surveillance study, we compared the proportion of stroke survivors who returned to work within 90 days following their stroke by ethnicity and investigated the role of sociodemographic factors and stroke severity in this association. We also explored the economic consequences of stroke among those who were working at the time of their stroke overall and by ethnicity.

## Methods

The Brain Attack Surveillance in Corpus Christi (BASIC) project is a population-based stroke surveillance study in Nueces County. Nueces County, located in south Texas, is a predominantly urban, bi-ethnic community. The population is 340,000 residents and is predominately MA (62%); 32% of the population is NHW.[13] All stroke cases in patients older than 44 years are ascertained by both active and passive surveillance methods.[2] All suspected strokes are validated by a neurologist or stroke fellowship-trained emergency medicine physician blinded to race/ethnicity and age using source documentation. This study includes stroke patients identified between August 2011 and December 2013 who were employed at the time of their stroke. All patients with a validated stroke were invited to

participate in a baseline interview and medical record abstraction, as well as an outcome interview conducted about 90 days after the stroke.

## Variables

**Return to Work**—Stroke patient paid employment status, whether full or part time, was ascertained at the baseline interview. Return to work status and whether at the same paid job were obtained at the 90-day post-stroke interview for those working at the time of their stroke. At the 90-day interview, the family's ability to pay for all of their expenses since the stroke (less than adequate, adequate, more than adequate) and anticipated change in family's yearly income after the stroke (decrease, remain about the same, increase) were queried.

**Ethnicity**—Ethnicity defined as MA or NHW was taken from the baseline interview. We excluded other ethnicities due to their small numbers which would preclude comparisons.

**Other covariates**—Variables were abstracted from the medical record by trained abstractors. These included demographics (age, sex) and medical comorbidities (prior stroke/transient ischemic attack, atrial fibrillation, hypertension, diabetes, coronary artery disease/MI, congestive heart failure, smoking, hyperlipidemia, cancer, chronic obstructive pulmonary disease and end stage renal disease). Education (less than high school, high school, some college/vocational school, college graduate) was obtained from the baseline interview. Neurologic deficits were measured via the National Institutes of Health Stroke Scale (NIHSS) and ascertained from the medical record at baseline and from a certified study coordinator at the 90-day interview.[14]

## Statistical Analysis

Descriptive statistics were used to compare sociodemographics, comorbidities, stroke severity and the financial impact of stroke by ethnicity. Ethnic differences in return to work (primary outcome) were assessed using logistic regression models. Sequential models were built in the following manner adjusting for: 1) age (<65 vs ≥65); 2) sex; 3) 90-day NIHSS; and 4) educational attainment (<high school vs ≥high school). Analyses were performed using SAS. This study was approved by the University of Michigan Institutional Review Board (IRB) as well as the IRBs of the 2 hospital systems in Nueces County.

## Results

There were 729 MA and NHW stroke survivors who completed the baseline interview. Of these, 197 (27%) were working at the time of their stroke, of which 125 (63%) completed the 90-day outcome interview and were included in the analysis. Median age of MAs was 60 years (IQR 55–68) and 59 (IQR 51–66) for NHWs (Table 1). There was no ethnic difference in baseline neurologic deficits ( $p=0.53$ ). MAs had more diabetes than NHWs (59% vs 24%,  $p<0.01$ ). MAs had less education on average ( $p<0.01$ ) and greater median 90-day NIHSS (2 vs 1,  $p=0.02$ ) than NHWs.

Forty-nine (40%) stroke survivors who were working at the time of their stroke returned to work. All but one stroke survivor who returned to work returned to their pre-stroke job. MAs were less likely to return to work (31% vs 50%,  $p=0.03$ , OR= 0.45, 95%CI 0.22–0.94) than

NHWs (Table 2). This difference remained after accounting for age and sex (OR=0.45, 95%CI 0.21–0.94). The ethnic difference was attenuated and became non-significant after adjusting for 90-day NIHSS (OR=0.59, 95% CI 0.24–1.44) and further attenuated after accounting for education (OR=0.85, 95%CI 0.32–2.22). Lower 90-day NIHSS and higher education were associated with returning to work.

Table 3 shows ethnic differences in post-stroke finances. MAs were more likely to report that their family's ability to pay for expenses was less than adequate compared with NHWs ( $p=0.06$ ). A high proportion of both ethnic groups (>44%) anticipated a decrease in their family's annual income after stroke.

## Discussion

This is the first population-based US stroke study to report the prevalence of return to work following stroke. We found that 40% of stroke survivors who worked at the time of their stroke returned to work within 90 days of their stroke. Overall, stroke has a large economic impact, with about 45% of stroke survivors who worked at the time of their stroke expecting a decrease in their family's income in the year after their stroke. Ethnic disparities in return to work among stroke survivors were observed. We found that MAs were 55% less likely to return to work after stroke compared with NHWs. This ethnic difference was explained by greater 90-day neurologic deficits and lower educational attainment in MAs as compared with NHWs. Despite the absence of ethnic differences in anticipated change in income after stroke, MAs reported a greater frequency of inability to pay for their expenses after their stroke than NHWs, which may reflect ethnic differences in absolute income and wealth.[15]

Previous studies have estimated that the proportion of stroke survivors returning to work ranges from 18–69%.[12] Two other population based stroke studies conducted outside of the US explored return to work. The South London Stroke Register found that 35% of stroke survivors returned to paid work 1 year after their stroke, while 53% of stroke survivors in the Auckland Regional community stroke study returned to work at 6 months.[16, 17] Racial differences in return to work were found in the South London Stroke Register with Black stroke survivors less likely to return to work after accounting for comorbidities, stroke severity and hospital admission.[16] In the US, data from stroke survivors admitted to 4 hospitals showed that 53% of stroke survivors returned to work 1 year after their stroke. There was a trend toward NHWs more likely to return to work than African Americans ( $p=0.09$ ).[18] Differences between our study and the previous US study in the proportion of stroke survivors who returned to work may be due to the longer duration of follow up in the earlier study or changes over time as there is a difference of almost 20 years between the studies. Other more recent data on US stroke survivors is limited to only those admitted to rehabilitation,[10] a single hospital[19] or with a specific infarct location.[20]

MAs had greater neurologic deficits at 90 days and less education than NHWs, which accounted for the ethnic difference in return to work. We found no ethnic difference in baseline neurologic deficits suggesting that compared to NHWs, MAs may have poorer post-stroke recovery. Thus, strategies to improve post-stroke recovery such as increased thrombolysis use and post-stroke rehabilitation, particularly among MAs, may increase the

proportion of stroke survivors who return to work. Socioeconomic factors were also important. Employment policies may increase opportunities to return to work.[21] The US is one of the only wealthy nations that does not guarantee paid sick leave for its employees. The Family Medical Leave Act (FMLA) guarantees 12 weeks of unpaid sick leave for employees of large companies. However, Hispanics are more likely to work for smaller companies and in turn are less likely to be eligible for FMLA compared to NHWs, which may lead to increased employment vulnerability for MA stroke survivors.[22] In Denmark, legislative changes to disability benefits and services were associated with an increase in the proportion of stroke patients who returned to work, suggesting policy interventions may help increase return to work and lessen ethnic disparities.[21]

This study has limitations. Return to work after 90 days and exact post-stroke income were not captured in our data. Employment status was based on self-report. Data are not nationally representative.

In conclusion, efforts to reduce post-stroke neurologic deficits and optimize employment policies may reduce ethnic disparities in returning to work after a stroke. Future studies should include return to work as part of their patient-centered outcomes to gain a better understanding of the broader medical, psychosocial and family implications of not returning to work following stroke.

## Acknowledgments

Funding: This study was funded by NIH grant R01NS38916 and K23 NS073685 (Skolarus)

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**Table 1**

Baseline sociodemographics, co-morbidities and stroke severity among stroke survivors working at the time of their stroke

Characteristic	Mexican Americans (N=71) N (%)	non-Hispanic whites (N=54) N (%)	p-value
Working Age (<65)	22 (31)	18 (33.3)	0.79
Female	29 (40.8)	18 (33.3)	0.39
Insurance	20 (28.6)	12 (22.6)	0.46
Less than High School Education	25 (35.2)	2 (3.7)	<0.01
Baseline 90 day NIHSS Median (Q1–Q3)	4 (1–8)	3.5 (1–7)	0.53
90 day NIHSS Median (Q1–Q3)	2 (0–6)	1 (0–3)	0.02
Pre-stroke work status			
Part time	22 (31)	11 (20.4)	0.18
Full time	49 (69)	43 (79.6)	
Co-Morbidities			
Atrial Fibrillation	2 (2.8)	5 (9.3)	0.12
Cancer	4 (5.6)	7 (13)	0.15
COPD	2 (2.8)	5 (9.3)	0.12
Congestive heart failure	3 (4.2)	2 (3.7)	0.88
Coronary Artery Disease	18 (25.4)	18 (33.3)	0.32
Diabetes Mellitus	42 (59.2)	13 (24.1)	<0.01
End Stage Renal Disease	4 (5.6)	2 (3.7)	0.62
High Cholesterol	31 (43.7)	24 (44.4)	0.93
Hypertension	54 (76.1)	38 (70.4)	0.48
Stroke	18 (25.4)	9 (16.7)	0.24
Smoking Status			
Never	42 (59.2)	22 (40.7)	0.12
Former	12 (16.9)	13 (24.1)	
Current	17 (23.9)	19 (35.2)	

**Table 2** Ethnic differences in return to work among stroke survivors working at the time of their stroke

	Crude Model			Model 1			Model 2			Model 3			Model 4		
	OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value
Mexican Americans	0.45	(0.22, 0.94)	0.03	0.44	(0.21, 0.92)	0.03	0.45	(0.21, 0.94)	0.03	0.59	(0.24, 1.44)	0.25	0.85	(0.32, 2.22)	0.73
Age < 65				1.88	(0.83, 4.27)	0.13	1.96	(0.86, 4.47)	0.11	1.61	(0.61, 4.26)	0.34	1.44	(0.52, 3.98)	0.49
Female							0.69	(0.32, 1.51)	0.36	0.77	(0.30, 1.92)	0.57	0.65	(0.25, 1.70)	0.38
90-day NIHSS										0.57	(0.44, 0.75)	<0.01	0.61	(0.47, 0.79)	<0.01
> High School Education													3.17	(1.20, 8.41)	0.02



**Table 3**

Post-stroke anticipated financial impact among stroke survivors working at the time of their stroke

Variable	Mexican Americans (N=71) N (%)	Non-Hispanic Whites (N=54) N (%)	p-value
Family's ability to pay expenses since stroke			0.06
Less than adequate	28 (39.4)	17 (31.5)	
Adequate	40 (56.3)	28 (51.9)	
More than adequate	3 (4.2)	9 (16.7)	
Anticipated annual family income after stroke			0.52
Decreased	34 (47.9)	24 (44.4)	
Remained the same	29 (40.9)	20 (37.0)	
Increased	8 (11.3)	10 (18.5)	

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