

Spanish Version of the National Institutes of Health Stroke Scale: Awareness and Use in United States. a Survey Study

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Abstract

Objective—To investigate the awareness and the use of Spanish version of National Institutes of Health Stroke Scale (NIHSS) throughout the United States (US) by regions using a web-based survey.

Methods—A survey targeting physicians from two specialties that regularly manage acute stroke patients was conducted from February to August of 2015. Academic centers from the Accreditation Council for Graduate Medical Education online directory belonging to emergency medicine (EM) and neurology residency programs were identified. The questionnaire was composed of ten questions separated into three different groups. The responses received from the programs were separated by specialty and grouped into different regions in the US for comparison.

Results—Out of 230 residency-invited programs, we received a total of 73 responses, 35 from EM and 26 responses from neurology residency programs. In addition, 12 respondents were categorized as unknown recipients. The South region had the highest response rate with 30.3%. There was no significant difference in the responses by region if Puerto Rico was not analyzed. Interviewees reported a substantial percentage of Spanish-speaking patients reported across the regions and more than 75% of the programs report lack of knowledge of the Spanish version of the NIHSS and/or the use of it.

Conclusion—There may be a need to increase awareness and to promote the use of the Spanish version of the NIHSS. Spanish-speaking population in the US may be inaccurately assessed for acute stroke and could impact the outcomes. Larger population studies should be conducted to confirm our findings.

Author contributions—Dr. Villalobos and Dr. Barnes are involved in formulating the study concept and design; Dr. Rodriguez and Dr. Maud are involved in manuscript writing; Dr. Qureshi is involved in statistical analysis of the data; Dr. Cruz-Flores is involved in critical revision of the manuscript.

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Keywords

Stroke; National Institutes of Health Stroke Scale (NIHSS); Spanish; regions; emergency medicine (EM); neurology

Introduction

The National Institutes of Health Stroke Scale (NIHSS) was developed in the mid-1980s as a research instrument for the evaluation of patients with acute ischemic

strokes [1]. Today, it is the standard instrument utilized for the assessment of patients with possible ischemic stroke, and has been widely validated [2–5]. It is used to

Table 1. Spanish language knowledge and utilization in the management of acute stroke patients by EM physicians and Neurologists (responses were grouped by the US regions, PR, and overall results)

Questions:		Midwest n(%)	West n(%)	North-east n(%)	South n(%)	PR n(%)	Total n(%)	p-value
1) Are you able to maintain a conversation in Spanish?	Yes	3(20%)	1(17%)	8(44%)	4(20%)	3(100%)	19(31%)	0.02*
	No	12(80%)	5(83%)	9(50%)	16(80%)	0(0%)	42(69%)	
2) Are you aware of a Spanish certification?	Yes	3(20%)	4(67%)	5(28%)	7(35%)	1(33%)	20(32.7%)	0.35
	No	12(80%)	2(33%)	12(67%)	13(65%)	2(67%)	41(67.3%)	
3) What percentage of the physicians in your department is certified in Spanish (by any agency)?	0%–5%	12(80%)	5(83%)	15(83%)	15(75%)	0(0%)	47(77%)	*0.0001
	5%–25%	3(20%)	1(17%)	2(11%)	4(20%)	0(0%)	10(16.3%)	
	25%–50%	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	
	>50%	0(0%)	0(0%)	0(0%)	1(5%)	3(100%)	4(6.5%)	

estimate the severity or size of the ischemic lesion, and to determine eligibility for various treatment modalities and further monitor the clinical course.

Language is an important component of the NIHSS. The scale uses verbal questions and commands to obtain information from the patient regarding level of consciousness, motor function, and sensation. It also directly tests language function and speech by asking the patient to verbalize descriptions and read aloud certain words and phrases. Misinterpretation on the part of the examiner or patient due to language differences or cross-cultural barriers could skew the results of the test. Underscore or overscoring of the NIHSS may conceivably have consequences in treatment decisions and outcomes.

The NIHSS scale has a Spanish version since 2006, and it has been validated by different groups in Spanish-speaking patients [6,7]. This is of concern in the United States (US) since as of July 1, 2013, it is the country that has the second largest Hispanic population in the world after

Mexico and about (40 million) 74% speak Spanish at home, which is an increase of 120% from 1990 [8,9]. The use of Spanish is not homogenous and varies across the US region, being the highest proportion in Puerto Rico (PR) at 85%. Based on the American Community Survey (2009–2013), this percentage is as follows: 21% in the West, 10.5% in the Northeast, 13% in the South, and 5.5% in the Midwest. We sought to investigate the awareness and the use of the Spanish version of the NIHSS throughout the US by regions using a web-based survey.

Methodology

A 10-question survey directed to emergency medicine (EM) and neurology teaching residency programs in the US territory was developed. These two specialties regularly manage acute stroke patients. Academic centers

were selected from the Accreditation Council for Graduate Medical Education online directory [10] by searching for “EM” and “Neurology.” The survey was sent to the listed email address of each program director available in the directory. In the case, an email address was not listed, the program was contacted by phone, and an attempt to obtain a program director's email address was made so that the survey could be directed.

The survey active sent from February to August of 2015. Questions and responses were sent and collected using SurveyMonkey [11]. The questionnaire was composed of ten questions separated in three separate categories (Tables 1–3): 1) questions 1–3, category I (Spanish language knowledge and utilization in the management of acute stroke patients by EM physicians and neurologists), 2) questions 4–7, category II (utilization of the NIHSS by EM physicians and neurologists in the management of acute stroke patients), 3) and questions 8–10, category III (Spanish-speaking stroke population managed by EM physicians and neurologists). Overall responses, then, were obtained and analyzed. Respondents had the option of anonymizing their responses. Response rates were presented (Table 4). The responses were, then, grouped based on the two specialties, and overall results were compared. Programs were further separated into the different regions in the US (West, Midwest, South, Northeast, PR, and others). “Others” group was used for those whose answers were anonymized. Responses among the different regions were compared and analyzed.

Statistical Analysis

Descriptive analysis was performed to calculate response rates between specialties and regions in the US. Head-to-head responses were compared between the two specialties. All the variables of each question were compared by cross-tabulations between the question posed and the different regions. The “others” group was not included in the final analysis. The differences between

Table 3. Spanish-speaking stroke population managed by EM physicians and neurologists (responses were grouped by the US regions, PR, and overall results)

Questions:	Midwest n(%)	West n(%)	North-east n(%)	South n(%)	PR n(%)	Total n(%)	p-value
8) What percentage of your patients are only Spanish speakers?							
0%–5%	7(47%)	3(50%)	11(61%)	8(40%)	0(0%)	29(47%)	
5%–25%	0(0%)	2(33%)	1(6%)	3(15%)	0(0%)	6(10%)	
25%–50%	0(0%)	0(0%)	0(0%)	0(0%)	3(100%)	3(5%)	
>50%	8(53%)	1(17%)	6(33%)	9(45%)	0(0%)	24(39%)	*0.0001
9) Are there readily available services in your translating department?							
Yes	14(93%)	6(100%)	17(94%)	20(100%)	2(67%)	59(97%)	0.03*
No	1(7%)	0(0%)	0(0%)	0(0%)	1(33%)	2(3%)	
10) If not fluent in Spanish, what does most of your staff do when encountering a Spanish-speaking patient and evaluating possible stroke?							
Perform a standard clinical evaluation with the help of the patient family member to translate	2(13%)	0(0%)	0(0%)	5(25%)	0(0%)	7(11%)	
Perform a standard clinical evaluation with the help of medical staff to translate	1(7%)	1(7%)	2(11%)	1(5%)	0(0%)	5(8%)	
Perform a standard clinical evaluation with the help of Certified translator	10(67%)	5(83%)	14(78%)	13(65%)	0(0%)	42(68%)	
Unsure Other	2(13%)0(0%)	0(0%)0(0%)	1(6%)1(6%)	0(0%)1(5%)	0(0%)3(100%)	3(4%)5(8%)	*<0.05

Table 4. Response rates among those groups who responded and those who did not (responses were grouped by the US regions, PR, and overall results)

Response	Midwest	West	Northeast	South	Puerto Rico	Total	p-value
Yes	16	6	16	19	4	61	0.019
No	38	26	45	47	0	156	

* Statistically Significant.

the groups were assessed using chi-square test for categorical variables. A p-value of ≤0.05 was considered to be significant. All the statistical analyses were performed using IBM SPSS 19.0 Version Software.

Results

We found 300 Accreditation Council for Graduate Medical Education accredited residency programs in the US and PR (167 EM and 133 neurology), of which we were able to find valid email addresses and sent email survey invitations to 230 programs. A total of 73 responses were received from all programs, 31.7% response rate. Of which 35/125 responses came from EM residency programs (28%) and 26/91 responses came from neurology residency programs (28.5%). There were 12 respondents categorized as unknown recipients, anonymized. The rate of responses was also calculated by region (Table 5). We found that the South region had the highest response rate (30.3%), followed by the Midwest (28.3%), and the lowest response rate was for the West region (18.7%).

There was no significant difference when comparisons were made between physicians of the two specialties, across all questions. More than 70% of the physicians who manage acute stroke patients are not able to main-

Table 5. Percentage of responses based on the specialties and regions across US and PR

SPECIALITY	% of Responses
EM	28
Neurology	28.5
REGION	
West	18.7
South	30.3
Northeast	27.4
Midwest	28.3
PR	100

West Region includes States Oregon, Arizona, Colorado, California, New Mexico, Utah, Washington, and Nevada.

South Region includes States Maryland, Kentucky, Oklahoma, North Carolina, South Carolina, Texas, Florida, District of Columbia, Los Angeles, Georgia, Alabama, Delaware, Virginia, West Virginia, and Tennessee.

Northeast Region includes States Pennsylvania, New Hampshire, New York, Rhode Island, Massachusetts, New Jersey, Vermont, Connecticut, and Maine.

Midwest includes States Michigan, Illinois, Ohio, Wisconsin, Missouri, Minnesota, Indiana, and Kansas.

tain a conversation in Spanish and are unaware of a Spanish certification for healthcare providers. Most programs (78%) acknowledge that only a small percentage of their physician staff (0%–5%) is certified in Spanish (Table 1). In terms of the NIHSS utilization, most programs are using the English version of the NIHSS (90%), and 40% of the programs report that more than 50% of their staff are certified in the NIHSS by the

Table 2. Utilization of the NIHSS by EM physicians and neurologists in the management of acute stroke patients (responses were grouped by the US regions, PR, and overall results)

Questions:		Midwest n(%)	West n(%)	North-east n(%)	South n(%)	PR n(%)	Total n(%)	p-value
4) Is your department using the English version of the NIHSS?	Yes	13(87%)	6(100%)	16(89%)	18(90%)	3(100%)	56(92%)	0.83
	No	2(13%)	0(0%)	1(5%)	2(10%)	0(0%)	5(8%)	
5) What percentage of your staff is NIHSS certified by the American Heart/Stroke Association?	None	2(13%)	1(17%)	1(6%)	2(10%)	1(33%)	7(11%)	0.07
	0%–5%	0(0%)	0(0%)	0(0%)	2(10%)	0(0%)	2(3%)	
	5%–25%	2(13%)	0(0%)	4(24%)	3(15%)	2(67%)	11(18%)	
	25%–50%	1(7%)	2(33%)	1(6%)	1(5%)	0(0%)	5(8%)	
	50%–75%	0(0%)	0(0%)	1(6%)	4(20%)	0(0%)	5(8%)	
	75%–100%	5(33%)	2(33%)	9(53%)	7(35%)	0(0%)	23(37%)	
	Unsure	5(33%)	1(17%)	2(12%)	1(5%)	0(0%)	9(14.5%)	
6) Are you familiar with the Spanish version of the NIHSS?	Yes	3(20%)	3(50%)	3(17%)	5(25%)	0(0%)	14(23%)	0.45
	No	12(80%)	3(50%)	14(78%)	15(75%)	3(100%)	47(77%)	
7) Is your department using the Spanish version of the NIHSS?	Yes	3(20%)	3(50%)	2(11%)	3(15%)	0(0%)	14(19.5%)	0.43
	No	12(80%)	3(50%)	15(83%)	17(85%)	3(100%)	58(80.5%)	

American Heart Association/American Stroke Association. However, more than 75% of the programs report lack of knowledge of the Spanish version of the NIHSS, and/or they are not using it (Table 2).

About 40% of the programs report that more than 50% of their patient population are only Spanish speaking, but 95% of the programs have readily available translating services, and 68% of the programs report the use of those services to manage Spanish-speaking acute stroke patients (Table 3). Responses from the different regions were compared. There were differences in the following questions: 1, 3, and 8–10. However, when we removed PR from the analysis, there was no difference in any of the responses by regions. There is a statistically significant difference among groups who responded in comparison with those who did not (Table 4).

Discussion

In our survey, we have found that the majority of the physicians, managing acute stroke in academic centers in the US territory, evaluate a substantial number of Spanish-speaking patients but are not aware and are not using the Spanish version of the NIHSS. Most physicians use the English version, and they have readily available translation services at their institutions to manage Spanish-speaking patients. We believe that this practice may bring inaccuracy in the initial evaluation of Spanish-speaking stroke patients with resultant outcome consequences.

Few programs responding to our survey were aware of standardized and validated Spanish version of the NIHSS (25%), and fewer are implementing them in clinical practice (19%). This finding seems to be true also for respondents from PR, with a predominantly Spanish-speaking population.

The NIHSS was designed as a research tool, but has been validated to assess stroke severity, and is a predictor of outcome [12]. It has been criticized for being biased toward the dominant hemisphere and especially the language function. In fact 7 out of the 42 possible points in the 15 items of the NIHSS are accounted for language [13,14]. Although some programs administer the English version of the NIHSS through someone fluent in Spanish (a physician or an interpreter), it is not clear that how the sections “Best Language” and “Dysarthria” of the NIHSS are being assessed. In these sections, the examiner asks the patient to read specific sentences and words aloud, such as “mama,” “huckleberry,” “tip-top,” or “down to earth.” While some words like “mama” cross languages and cultures quite well, others such as “huckleberry” can be difficult to pronounce and “tip-top” or “down to earth” are idiomatic and can be confusing to the patient, which could be misinterpreted as difficulty with comprehension, word production, or articulation. These cross-language or cross-cultural misinterpretations have the potential to falsely alter the final NIHSS score and, therefore, treatment decisions.

Similarly, only 34% of the respondents reported that 75% or more of their physicians are certified in the English version of NIHSS by the American Heart Association/American Stroke Association. In addition, a substantial number of respondents (32%) answered that they were unsure or that there were no certified physicians to administer the NIHSS. In a similar way, lack of formal training in NIHSS can result in large variances of scores, leading to lack of standardization of treatments [15]. The inaccurate assessment of stroke patients who are only Spanish speaking may lead to lack of proper provision of recanalization therapies. The Spanish version of the NIHSS has been validated to assess stroke patients who are Spanish speaking. Its use in Spanish-speaking patients either by physicians who are certified in Span-

ish or through rapidly available translation services may be a more accurate approach for their evaluation and treatment decision.

Many groups have researched the effects of race and ethnicity on stroke outcomes, but there are no data on the effect of the language as a barrier when the English version of the NIHSS scale is administered to a non-English-speaking patient [16–20]. Our findings are of concern since according to the US Census Bureau, the Hispanic population accounts for approximately 54 million citizens in the US, 17% of the population. Of these, nearly 74% speak Spanish at home, implying proficiency in the language. It is projected that by 2060, the Hispanic population will continue to increase and constitute up to 31% of the US population and so the Spanish-speaking population [8].

Further work in this area may involve validation of NIHSS scoring obtained by the use of the Spanish version by Spanish interpreters. Interpreters may need additional training, since interpreters may not have been trained in the proper administration of the NIHSS, and could “coach” the patients into giving answers that the examiner wishes to hear.

There are several limitations in our study. First, the response rate was low; however, low response rates have been noted in previous stroke trials using the SurveyMonkey, and as low as 5% [21], [22], however, we had respondents from all regions in the US territory. Second, the topic of the survey may induce a bias and those who chose to respond may be more interested in the field related to stroke and or be more likely to speak Spanish or have Spanish-speaking patients, as it probably has occurred with PR, which has a large Spanish-speaking population, and in which we achieved 100% of response rate in this survey. Interestingly, the West region had the lowest response rate despite having the second largest Spanish-speaking population in the US territory. Third, this study was limited to academic centers and may not reflect the reality in areas covered by community hospitals, and academic centers may have a different socio-cultural population. In addition, we had several respondents that decided to anonymize their responses, making it impossible to assign them into a geographical region.

Conclusion

There may be a need to increase the awareness and to promote the use of the Spanish version of the NIHSS. Spanish-speaking population may be inaccurately managed during acute stroke care. Larger population studies should be conducted to confirm our findings.

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