ORIGINAL RESEARCH

Nurses knowledge, awareness and confidence level to recognize stroke symptoms specific to women: A cross-sectional study

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ABSTRACT

Background: Stroke remains the third-leading cause of death and a major cause of disability in women. Men and women share common stroke symptoms. However, women can also experience "specific," or "atypical" stroke symptoms. Early recognition of stroke and recognizing sex race-ethnic differences in stroke symptoms is crucial to better outcomes. Nurses play a crucial role in identifying stroke symptoms and activating care early. However, the general nurse's knowledge and confidence level to recognize stroke in women is unknown. This study aimed to provide insight into nurse's awareness, knowledge and confidence to recognize women's specific stroke symptoms.

Methods: A cross-sectional study was conducted over four months. 129 nurses were recruited via targeted social media platforms to complete an online survey. Data were analyzed using descriptive statistics, independent t-tests, and one-way ANOVA.

Results: Nurses were 86% women, and 55% held advanced degrees. Over 80% identified the common stroke symptoms; over 70% identified the additional stroke symptoms. Less than 25% could identify specific stroke symptoms in women. A majority of the nurses (76%) lacked the confidence to recognize stroke symptoms in women, with confidence scores statistically lower in advanced level trained nurses.

Conclusions: The majority of nurses know and feel confident that they could identify the most common and additional stroke symptoms. However, there are knowledge deficits, and nurses lack confidence in recognizing stroke symptoms in women. Education targeted at nurses should include strategies to enhance their awareness, knowledge and confidence level in recognizing stroke symptoms specific to women.

Key Words: Nurse, Women, Stroke, Symptom, Atypical, Specific, Unique, Confidence, Knowledge, Social media

1. INTRODUCTION

Early recognition of stroke is critical to seek medical attention right away. Immediate stroke treatment may minimize the long-term effects and potentially prevent death.[1] Despite how recent advances in stroke treatments have increased survival rates over the last decade, in the U.S. stroke continues to kill twice as many women as breast cancer each year, making stroke the third leading cause of death for women.[2] Also, after a stroke, women have a 59% disability rate compared to 26% for men in the acute phase.[2,3] Studies have shown that 4%-17% of acute ischemic strokes occur in patients hospitalized for another condition.[4] Prior studies have shown that nurses play a crucial role in identifying stroke symptoms and activating emergency services early.[5,6] Unfortunately, when

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nurses or other health care professionals do not recognize stroke symptoms in women, activation of emergency services and thus early treatment can be delayed.[5,6] Therefore, it is important to examine the knowledge and confidence level of nurses from different practice areas to recognize stroke in women.

1.1 Background

1.1.1 *Common and women's specfic symptoms of stroke*

Men and women share common stroke symptoms. However, women can also experience "specific", "atypical", or "unique" stroke symptoms.[1,7–9] Furthermore, women fare worse in quality of care effectiveness and stroke measures. Women have poorer stroke outcomes than men; women experience more severe strokes, have longer hospital stays, and have a higher stroke-related mortality and disability rates when compared with men.[2,3,8,10,11] The literature recognizes three most common stroke symptoms (FAST) and eight additional stroke symptoms for women and men. Although the literature varies and indicates no consensus in describing women's specific stroke symptoms, 13 specific stroke symptoms in women have been identified (see Table 3). Some of these specific symptoms in women overlap, however, literature recognizes that women distinctly experience general weakness, nausea/vomiting, headache, fatigue, dizziness, and cognitive dysfunction more often than men.[7,12,13] Also, gaps exist in understanding sex differences in race-ethnic groups and interventions to increase awareness and knowledge of stroke symptom differences.[6,8] Younger married women from non-white ethnic groups are at an increased risk of delayed stroke symptom recognition and stroke code activation.[6] Recognizing sex race-ethnic differences in stroke symptoms is crucial to timely treatment and better outcomes.

1.1.2 *Nursing role in recognizing stroke symptoms*

Studies have identified that treatment is delayed when nurses or other healthcare professionals do not recognize stroke symptoms or attribute the stroke symptoms to another condition.[5,6] The use of stroke tools continues to be a standard for early stroke detection, triage, diagnosis, and treatment.[14] Also, targeted nurse education and training to call a "Code Stroke" has increased time to recognition, code activation, and treatment.[15] Nevertheless, variations in terminology for describing stroke symptoms specific to women exist. Current stroke tools are designed explicitly to recognize common stroke symptoms in women and men; they are not sensitive to recognizing specific stroke symptoms in women.[7] Sex, race as a biological variable, and social determinants must be considered in developing and implementing stroke tools if we want to improve stroke outcomes in women. See table 1 for case example.

Table 1. Case study example

An overall healthy 42-year-old female arrived at 0800 for a same day tonsillectomy. Surgery went well. However, during recovery she experienced onset of nausea and vomiting which the nurse attributed to a post-surgical side effect. Several hours later she experienced fatigue, shortness of breath. She was admitted to a bed on the surgical floor. At 1900, she woke from a nap, and the new shift nurse called a stroke code/alert because she now had arm weakness and sudden confusion. Last known well time was set as 1900, the time of arm weakness and sudden confusion onset. Imaging was completed; however, imaging indicated that the stroke duration was 11 hours, at 0800 when nausea and vomiting onset. She had no contraindications to IV t-PA except for time of stroke onset being past the 3-4-hour window. Therefore, she received routine care and now has complications with judgement and memory.

1.1.3 *Social media*

Social media internet-based surveys can elicit high response rates at national levels and cost less than traditional recruitment methods.[16,17] Also, social media provides a unique point of contact to reach nurses at national and international levels compared to traditional recruitment methods.

1.2 Research questions

This study aimed to use social media online surveys to provide insight into nurse's awareness, knowledge and confidence to recognize women's specific stroke symptoms. Additionally, this study aimed to bring awareness to nurses that women can experience symptoms of stroke that are specific to them. Study research questions included: 1) What is this nurse population's ability to identify common and additional stroke symptoms? 2) What is this nurse population's ability to identify women's specific stroke symptoms? 3) What is the difference between the nurse's years of experience, practice and level of training and stroke knowledge? 4) What is this nurse population's confidence level to recognize stroke in women? 5) Are there differences between the nurse's years of experience, practice and level of training in their confidence levels to recognize stroke in women? 6) What is the response rate and cost of utilizing a social media strategy compared to traditional methods?

2. METHOD

2.1 Ethics

The university institutional review board (IRB) approved this study as exempt. Participants were given the study consent

form on the initial survey page, and implied consent was obtained when the participant proceeded to the next page and self-declared that they met the eligibility criteria. The data from the Qualtrics survey was anonymous, and confidentiality was maintained to the degree permitted by the survey technology used.

2.2 Study design

A cross-sectional study was conducted over four months, December 2020 and concluded March 2021. Online social media strategies were used for recruitment. A multipronged strategy guided the recruitment of this study to maximize responses.[18] Recruitment took place following IRB approval. An initial social media post message of the study survey consent with survey link occurred on day 1 with additional posts at two weeks, four weeks, eight weeks, then 16 weeks, for 5 social media posts. Qualtrics was used to create and link the anonymous survey to each social media post. Social media sites included private and public nursing networking groups within LinkedIn, Pinterest, and Facebook. Facebook and Pinterest for a fee offer means for you to advertise maximizing views. However, no charge was accrued for this study since only private pages and groups were used. Study results followed the EQUATOR STROBE reporting guideline.

2.3 Setting and participants

Convenience sampling was used to survey United States and international nurses through social media platforms. Participants had to be between the ages of 20 to 70 and identify as a nurse. A nurse was defined as an individual who holds a license and is legally permitted to practice and hold the title of Registered Nurse, Advanced Practice Nurse (e.g., masters or doctorate), or Licensed Practical Nurse. Those who were non-English-speaking nurses or did not identify as a nurse were excluded.

2.4 Data collection tools

Descriptive data included 8 items: sex/gender (dropdown), age (dropdown), race/ethnicity (dropdown), country of residence (self-report), state or province of residence (self-report), level of nursing training (dropdown), years of professional nursing experience (dropdown), and current nursing practice area (dropdown and self-report other). The Women and Stroke, Knowledge, Awareness, and Confidence level Survey (WASKACS) included 8-items: Confidence level questions (2 before and 2 after stroke symptom questions) were measured on a 5-point Likert scale (not confident to extremely confident), common stroke symptoms (randomized, dropdown and select all that apply), additional stroke symptoms (randomized, dropdown and select all that apply), women's specific or more subtle stroke symptoms (randomized, dropdown and select all that apply), and awareness to women's specific stroke symptoms (yes/no).

2.5 Validity and inter-observer reliability

The researcher created the WASKACS survey from five different valid and reliable survey instruments. The WASKACS stroke awareness and knowledge questions were adopted from the Centers for Disease Control and Prevention Behavioral Risk Factor Surveillance System survey (BRFSS)[13] and surveys from other studies.[19,20] The WASKACS self-confidence questions were adapted from Bandura's[21] self-efficacy theory and Schwarzer and Jerusalem's[22] general self-efficacy scale. Bandura[21] developed the self-efficacy theory within the framework of the social cognitive theory. He postulated "self-confidence as a common cognitive mechanism for mediating people's motivation, thought patterns, emotional reactions, and behavior. Self-confidence beliefs, defined as people's judgments of their capability to perform specific tasks, are a product of a complex process of self-persuasion that relies on cognitive processing of diverse sources of confidence information".[21] For an individual who has experienced successes, self-confidence will increase, and if failures are experienced, this will decrease self-confidence; thus, mastery of experiences encourages greater confidence. Performance accomplishments are supposed to provide the most dependable confidence information because they are based on one's own mastery experiences. One's mastery experiences affect self-confidence beliefs through cognitive processing of such information.[21] A panel of three stroke sex differences medical experts and six nurses at varying levels, experience, and practice evaluated the WASKACS for construct and content validity. Modifications based on recommendation by rewording some items for clarity was completed. In the current study, the Cronbach's alpha for the scale confidence level survey was α = .89.

2.6 Study size

The sample size was estimated at 119 to achieve a 95% confidence level and accepted margin of error of 9% considering a 50% response distribution.

2.7 Analysis

Descriptive statistics were used to describe mean scores and individual items on the WASKACS. Independent *t*-tests were used to identify differences in the mean WASKACS scores by years of experience and knowledge of common, additional, and women's specific stroke symptoms. One-way analysis of variance was used to identify differences by years of experience, practice area, level of training, and before/after confidence level in identifying common, additional, and women's specific stroke symptoms. Data was analyzed using the Statis-

tical package for the social sciences (SPSS) version 27.0.1.0. The statistical level was set at $p < .05$.

3. RESULTS

3.1 Participants, social media response rate

A total of 129 participants completed the survey. Facebook yielded 179 views, LinkedIn yielded 268 views, and Pinterest yielded five views. Following the four months, 154 surveys were completed with 129 surveys completed in its entirety, therefore 25 surveys removed due to missing data. With four surveys completed week 1, 1 survey during week 2, 54 surveys during weeks 3-6, 50 surveys completed during weeks 7-14, then 20 completed during the last two weeks.

3.2 Descriptive data

Table 2 presents the demographics of nurse participants. The participants were 86% women, 76% White, with 28% from the Midwest United States, and 24% of the nurses being International. Age ranged from 20 to 75 years, with 46% of the nurse's age ranging between 46-60 years. The nurse participants were well educated, with 55% holding advanced degrees, 21% had 30-39 years of experience, and 64% practiced in other areas such as clinics, research, or long-term care.

3.2.1 *Knowledge of common, additional and women's specific stroke symptoms*

Table 3 presents the results of the nurse's knowledge in correctly identifying the most common, additional "sudden," and women's specific stroke symptoms. Over 80% of the nurses recognized all 3, face drooping, arm weakness, and speech difficulty, as the most common stroke symptoms. However, 10% also identified neck pain as a common stroke symptom. Over 70% of the nurses recognized all 7, numbness or weakness, confusion, trouble speaking or understanding, trouble seeing, trouble walking, dizziness, loss of balance or coordination, and severe headaches as additional stroke symptoms. Prior to this survey, only 58% of the nurses indicated that they were aware that women could experience specific or more subtle symptoms compared to men. Only one-quarter of the nurses knew that difficulty breathing or shortness of breath (7%), hallucination (11%), pain (11%), seizures (11%), hiccups (14%), loss of consciousness (24%), and agitation (28%) were specific symptoms of stroke in women. Under half of the nurses did not know that nausea and vomiting (37%), sudden behavioral change (43%), general weakness (44%), disorientation (46%), fatigue (46%), and that confusion or memory problems (49%) were specific symptoms of stroke in women.

Table 2. Participant demographics (N = 129)

Demographic Characteristic	Number	%
Sex/Gender Identification		
Man	13	10
Woman	109	86
Cisgender	1	1
Non-Binary	1	1
Other	5	2
Age		
20-45	45	34
46-60	59	46
61-75	20	14
Did not answer	5	6
Race/Ethnicity		
American Indian or Alaska Native	1	1
East Asian	1	1
Filipina/o/x	6	4
South Asian	3	2
Other Asian	1	1
Black	3	2
Caribbean	2	1
Hispanic/Latina/o/x	1	1
Mexican American/Chicana/o/x	3	2
Middle Eastern	3	2
White (European; Other White)	95	76
Other	10	7
State of Residence		
West	13	11
Midwest	36	28
South	27	21
Northeast	21	16
International (Canada, UK, Europe, Middle East, Asia)	32	24
Level of Nursing Training		
2-year degree	4	3
4-year degree	41	34
Advanced degree (MS, NP, DNP, PhD)	65	55
Other (diploma or licensed vocational nurse)	19	8
Years of Nursing Experience		
< 1 year	1	1
1-9	22	17
10-19	27	20
20-29	27	20
30-39	28	21
40+	11	9
Did not indicate	13	12
Current Nursing Practice		
Acute Care	34	28
Community/Public health	5	4
Mental health	1	1
Nurse educator/instructor	38	32
Other (long-term care, clinic, research, etc.)	51	64

3.2.2 *Confidence level in recognizing stroke in women*

Table 4 presents the nurse's knowledge and confidence level in recognizing stroke symptoms comparisons. Before the survey, less than half, 44%, of the nurse participants were fairly confident, and only 37% were extremely confident that they could identify a stroke. Also, less than half, 49%, were fairly confident and only 23% indicated that they could rapidly identify stroke symptoms in women. After the sur-

vey, the nurse participant's confidence level dropped to 37%, indicating that they were fairly confident, and only 28% felt extremely confident in identifying stroke symptoms. Also, their confidence level dropped to 35% felt fairly confident, and only 15% of the nurse participants were extremely confident to rapidly identify stroke symptoms in women.

Table 3. Nurses knowledge of most common, additional, and women's specific stroke symptoms (N = 129)

Variable	Number	%
Common Stroke Symptom		
Face drooping	108	83
Arm weakness	109	84
Speech difficulty	112	86
Not a common symptom		
Back pain	5	1
Neck pain	13	10
Chest pain	5	3
Additional Stroke Symptom		
Numbness or weakness	106	82
Confusion	98	75
Trouble speaking or understanding	112	86
Trouble seeing	97	75
Trouble walking	106	82
Dizziness	93	72
Loss of balance or coordination	108	83
Severe headache	95	73
Women's Specific Stroke Symptoms		
Symptoms of Altered Mental Status		
Loss of consciousness or fainting	31	24
Disorientation	60	46
Confusion or memory problems	64	49
Sudden behavioral change	56	43
Agitation	37	28
Hallucination	15	11
Specific Symptoms		
General weakness	58	44
Difficulty breathing or shortness of breath	10	7
Fatigue	60	46
Nausea or vomiting	49	37
Pain	15	11
Seizures	15	11
Hiccups	19	14

Note. More than one option has been selected by participants.

3.2.3 *Knowledge and confidence level in recognizing stroke comparisons*

This study found that nurses with > 20 years' experience had statistically significantly common stroke symptoms knowledge compared to nurses with < 20 years' experience (p = .01). Also, there was a statistically significant difference between the advanced level trained nurse compared to the 2-year level trained nurse (p = .019) and (p = .004). There was no significant difference between nurse practice area.

Nurses who did not identify the most common stroke symptoms correctly had statistically lower before the survey confidence level scores in identifying stroke symptoms in women (p = .005), lower after the survey confidence level scores in identifying stroke symptoms (p <.001), and lower scores in identifying stroke symptoms in women (p = .018).

Nurses who did not identify the additional stroke symptoms correctly had statistically lower before the survey confidence level scores in identifying stroke symptoms (p = .019), lower scores in identifying stroke symptoms in women (p = .007), lower after the survey confidence level scores in identifying stroke symptoms (p <.001), and lower scores in identifying stroke symptoms in women (p = .019).

Nurses with < 20 years of experience had statistically lower before the survey confidence level scores in identifying common and additional stroke symptoms (p = .01). Also, there was a statistically significant difference between groups level of training determined by one-way ANOVA (p = .019). A Tukey post hoc test revealed that the before the survey confidence level scores in identifying stroke symptoms were statistically significantly lower in the advanced level trained nurse (p = .43) than the 2-year level trained nurse. There was no statistically significant difference between the four-year and two-year, nor the other and 2-year groups.

Nurses with < 20 years of experience had statistically lower before the survey confidence level scores in identifying specific stroke symptoms in women (p = .05). Also, there was a statistically significant difference between groups level of training determined by one-way ANOVA (p = .004). A Tukey post hoc test revealed that the before the survey confidence level scores in identifying stroke symptoms were statistically significantly lower in the advanced level trained nurse (p = .033) than the 2-year level trained nurse. There was no statistically significant difference between the four-year and two-year, nor the other and 2-year groups.

3.3 Rate and cost of social media as recruitment strategy

Over four months, at no cost, this study successfully recruited 129 nurses for an online survey using Facebook, LinkedIn, and Pinterest platforms. Specifically, the majority, 104 surveys were completed during weeks 3-14. This study survey obtained national and international results. Similarly, other studies have successfully used social media platforms to meet recruitment needs.[16,23] However, some of these studies had paid social media advertisements which could have contributed to increased recruitment. Studies that have used targeted advertising features within social media reduced costs associated with advertising and costs in identifying eligible participants.[16,23]

Table 4. Knowledge and confidence level in recognizing stroke comparisons, independent *t*-tests and one-way ANOVA results (N = 129)

Variable	M	SD	95% CI	*p*
Knowledge of Most Common Stroke Symptoms				
Years of experience < 20	.23	.09	[.05, .40]	.01*
Practice area (acute, pH, MH, educator, other)	1.4	.49	[1.3, 1.5]	.67*
Level of training (2, 4, advanced, other)	1.4	.50	[1.3, 1.5]	.88*
Confidence Level in Identifying Stroke Symptoms (Before) (Yes)	.09	.14	[.19, .37]	.52*
Confidence Level in Identifying Stroke Symptoms in Women (Before) (Yes)	.46	.16	[.15, .78]	.005†
Confidence Level in Identifying Stroke Symptoms (After) (Yes)	.69	.16	[.37, 1.0]	< .001†
Confidence Level in Identifying Stroke Symptoms in Women (After) (Yes)	.42	.18	[.07, .77]	.018†
Knowledge of Additional Symptoms of Stroke				
Years of experience < 20	.03	.09	[.15, .21]	.76*
Practice area (acute, pH, MH, educator, other)	1.4	.50	[1.3, 1.5]	.31*
Level of training (2, 4, advanced, other)	1.4	.50	[1.3, 1.5]	.43*
Confidence Level in Identifying Stroke Symptoms (Before) (Yes)	.32	.14	[.05, .60]	.019†
Confidence Level in Identifying Stroke Symptoms in Women (Before) (Yes)	.44	.16	[.12, .75]	.007†
Confidence Level in Identifying Stroke Symptoms (After) (Yes)	.62	.16	[.30, .94]	< .001†
Confidence Level in Identifying Stroke Symptoms in Women (After) (Yes)	.41	.17	[.07, .76]	.019†
Knowledge of Specific Stroke Symptoms in Women				
Years of experience < 20	.01	.02	[.02, .04]	.42*
Practice area (acute, pH, MH, educator, other)	1.9	.09	[1.9, 2.0]	.67*
Level of training (2, 4, advanced, other)	1.9	.09	[1.9, 2.0]	.74*
Confidence Level in Identifying Stroke Symptoms (Before) (Yes)	.15	.79	[1.7, 1.4]	.85†
Confidence Level in Identifying Stroke Symptoms in Women (Before) (Yes)	.22	.93	[1.6, 2.0]	.82†
Confidence Level in Identifying Stroke Symptoms (After) (Yes)	.31	.97	[1.6, 2.2]	.75†
Confidence Level in Identifying Stroke Symptoms in Women (After) (Yes)	.66	1.0	[1.3, 2.6]	.51†
Confidence Level in Identifying Common and Additional Stroke Symptoms (Before)				
Years of experience < 20	.34	.14	[.07, .61]	.01†
Practice area (acute, pH, MH, educator, other)	4.15	.78	[4.0, 4.3]	.45†
Level of training (2, 4, advanced, other)	4.1	.78	[4.0, 4.3]	.019†
Confidence Level in Identifying Stroke Symptoms in Women (Before)				
Years of experience < 20	.32	.17	[.005, .65]	.05†
Practice area (acute, pH, MH, educator, other)	3.8	.81	[3.5, 4.0]	.12†
Level of training (2, 4, advanced, other)	3.8	.93	[3.6, 3.9]	.004†
Confidence Level in Identifying Common and Additional Stroke Symptoms (After)				
Years of experience < 20	.10	.17	[.24, .45]	.56†
Practice area (acute, pH, MH, educator, other)	3.7	.82	[3.4, 3.9]	.79†
Level of training (2, 4, advanced, other)	3.7	.97	[3.5, 3.9]	.36†
Confidence Level in Identifying Stroke Symptoms in Women (After)				
Years of experience < 20	.17	.18	[.18, .53]	.33†
Practice area (acute, pH, MH, educator, other)	3.4	.80	[3.2, 3.7]	.23†
Level of training (2, 4, advanced, other)	3.3	.99	[3.2, 3.5]	.32†

Note. PH = public health; MH = mental health; *Independent *t*-tests; †One-Way ANOVA

4. DISCUSSION

This study findings indicate that the majority of nurses have the knowledge and felt confident that they could identify the most common and additional stroke symptoms. However, there are knowledge deficits on women's specific stroke symptoms, and nurses lack confidence in recognizing stroke symptoms in women. This finding provides evidence that there is a need to develop and provide educational interventions to increase nurse's awareness and knowledge of women's specific stroke symptoms. Educating nurses will increase their confidence in the early identification of stroke in women and thus early care and treatment.

4.1 Common, additional, and women's specific stroke symptom knowledge

Recognition of stroke symptoms is associated with early in-hospital stroke code activation, treatment, and better outcomes.[6, 24–26] For this study, the most common stroke symptoms of face drooping, arm weakness, and speech difficulty were recognized by most nurses (83%-86%). Also, the additional "sudden" symptoms of numbness or weakness, confusion, trouble speaking or understanding, trouble seeing, trou-

ble walking, dizziness, loss of balance or coordination, and severe headache were recognized by most nurses (72%-86%). However, the additional symptoms of dizziness, headache, confusion, and trouble seeing were the least recognized (72%-75%). Likewise, in a multidisciplinary team study (medical, nursing, and allied health professionals), stroke symptom knowledge of the most common symptoms was about 92% accuracy.[26]

Nurses from this study did not recognize that loss of consciousness (24%), disorientation (46%), and that confusion or memory problems (49%) are women's specific stroke symptoms. Similarly, 68% of the surgical nurses did not correctly identify cognitive impairment as a stroke symptom.[27] Also, similar to this study, out of 331 Chongqing urban community nurses and general practitioners, only 7.3% correctly identified all five "sudden" stroke symptoms.[28] This data indicates a lack of awareness and knowledge on women's specific stroke symptoms among all nurses.

Early recognition of stroke is crucial to better outcomes, and nurses play a crucial role in identifying stroke symptoms and activating care early. Nurse's knowledge and adherence to stroke guidelines improve with stroke competency education programs.[29] Educational interventions to increase nurse's knowledge of stroke symptoms must also include women's specific stroke symptoms.

4.2 Confidence level in recognizing stroke in women

Self-confidence level can affect all aspects of a nurse's professional performance, including relationships with clients, and the interdisciplinary healthcare team, all of which influence the quality of patient care. Nurses experience increased knowledge and confidence level with years of experience.[30] In this study, nurses with > 20 years' experience scored higher in common stroke symptom knowledge. Like other studies, nurses with greater experience, age, or held certification credentialing scored higher on stroke knowledge assessments.[27–29]

During the middle years of professional work and middle years of education, nurses experience a higher confidence level.[30] This study found that nurses who did not correctly identify common or additional stroke symptoms had decreased confidence scores in identifying common, additional, and women's specific stroke symptoms. Also, confidence scores were lower in advanced level trained nurses compared to the 2-year level trained nurse. This decreased confidence level and decreased knowledge of stroke symptoms align with the literature. Decreased knowledge equals decreased confidence, and vice versa.[21,30] Reasons for the decreased confidence scores in these nurses may be directly related to their prior education, the difference between what they have been taught, where, and what they have seen and practiced thus far during their professional practice. Also, the level of support by their institutional environment and educational initiatives may have influenced their knowledge of stroke. Standardized nurse-driven stroke protocols and simulation-based education opportunities have improved nurses' confidence and knowledge levels among nurses in the emergency department.[31,32] This data indicates that nurses with fewer years of experience have decreased confidence and stroke symptom knowledge than nurses with greater years of experience. Lastly, in this study, nurse's confidence level slightly decreased after survey completion. This change in confidence level may be related to second guessing one's self after taking the stroke symptoms portion of the survey. Bandura[21] coined the term self-efficacy and confidence as believing in one's ability and not second guessing one's self. Therefore, with greater confidence one should not second guess themselves, thus confidence level should remain the same or increase.

Supportive work environments create opportunities for growth in knowledge, experience, and self-confidence in skills.[30] Opportunities for nurses to build confidence and solidify knowledge on stroke should be implemented with a focus and scope on delineating women's specific stroke symptoms. Future investigation is needed on the development and impact of nurse's professional self-confidence levels.

4.3 Limitations

Limitations include that survey responses were self-reported over the Internet, which may be subject to overreporting or underreporting. There is no failproof method to ensure that participants did not take the survey more than once, thus ensuring each response was unique. Also, the use of social media convenience sampling may have missed nurses who do not participate or utilize social media platforms. Additionally, the high educational level of half the nurse population may have influenced responses. The type of study design and lack of a control group is another limitation. Observational studies are more prone to bias and confounding compared to experimental studies. Furthermore, the literature varies and indicates no consensus in describing women's specific stroke symptoms, therefore, nurse's awareness and knowledge of these symptoms was dependent on resources available to them. Lastly, if feasible, paid advertising could have increased recruitment rates and allow for targeted recruitment. Also, having more researchers on the study using private and group social media pages could have increased recruitment rates.

5. Conclusion

This study successfully recruited national and international participants using social media platforms at no cost. Overall, the findings of this study are encouraging in that nurse's knowledge of the most common and additional stroke symptoms was high. However, nurse's awareness and knowledge of women's specific stroke symptoms is suboptimal. The advanced level trained nurses lacked the confidence in recognizing women's specific stroke symptoms. Stroke educational interventions should include the range of stroke symptoms and focus on delineating women's specific symptoms. Future studies are needed to investigate the development of nurse's professional self-confidence. Also, future studies should include factors independently related to an excellent awareness and knowledge of stroke symptoms in women.

Generalizability/relevance to clinical practice

Implications for clinical practice include raising nurse's awareness and knowledge of women's specific stroke symptoms. Education on stroke symptoms specific to women should start at the textbook and nursing school level. Additionally, quality improvement educational programs should be designed to increase practicing nurse's knowledge and confidence on recognizing stroke symptoms specific to women. Increasing nurses understanding of sex race-ethnic stroke differences and that women can display symptoms of stroke that are different from men can improve their ability to be prepared and be ready to recognize and respond early when a woman has a stroke. Nurses make up a significant portion of our society, which situates them in positions to lead and create opportunities for change. Nurses can bring awareness of women's specific stroke differences within their communities and the need to recognize symptoms early for immediate treatment and thus potential better patient outcomes.

Conflicts of Interest Disclosure

The author declares that there is no conflict of interest.

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