**NK2**

Provide a synopsis of one completed nursing research study conducted in the applicant organization that is institutional review board-approved (IRB-approved) or determined exempt by organizational review.

**Study overview**

*Title of study*

- Acute Care Nurses' Knowledge of In-Hospital Strokes and Predictors of Knowledge

*IRB approval date and type of review (i.e., full board, expedited, exempt). If applicable, include date of exempt determination, exclusive of the IRB.*

- Exempt determination; October 18, 2022

*Study start date*

- October 26, 2022

*Study completed date*

- March 1, 2023

**Research team**

*Nurses employed at the applicant organization who is (are) the principal investigator(s) (PI), co-PI, or the site PI involved in the conduct of the study.*

- PI: Catherine Taylor, BSN, RN, CCRN, PhD(c), Clinical Nurse II, Neuro Intensive Care Unit, WakeMed Health & Hospitals
- Co-Investigator (Co-I): Patricia Woltz, PhD, RN, Director, Nursing Research and Evidence-Based Practice, WakeMed Health & Hospitals

*Other key personnel on research team.*

- Co-I: Linda Bolin, PhD, RN, ANP, BCB, FAHA, Associate Professor, East Carolina University College of Nursing
- Co-I: Melvin Swanson, PhD, Statistician, East Carolina University College of Nursing
- Co-I: Ashley Burch, PhD, Assistant Professor, East Carolina University

**Study aim(s)**

*Study purpose, what new knowledge will be generated, or both*

- The purpose of this study was to determine acute care nurses' level of stroke knowledge and to identify nurse characteristics that may be predictors of stroke knowledge.

**Significance of the literature review (two pages maximum)**

*Key references to support the significance*

- Albart, S. A., Yusof Khan, A., Abdul Rashid, A., Wan Zaidi, W. A., Bidin, M. Z., Looi, I., & Hoo, F. K. (2022). Knowledge of acute stroke management and the predictors among Malaysian healthcare professionals. *PeerJ, 10*, e13310. https://doi.org/10.7717/peerj.13310
- American Heart Association. (2019). Phase III target: Stroke. 85 https://www.heart.org/-/media/files/professional/quality-improvement/target-

stroke/target-stroke-phase-iii/9-17-update/ds14860-time-interval-one-pager_v2.pdf?la=en&hash=5C2DA5A38EE4F69D3C445D803AD04DA3D5B8BED3

- Centers for Disease Control and Prevention. (2022). *Stroke facts.* Stroke. https://www.cdc.gov/stroke/facts.htm.
- Chen, S., Singh, R. J., Kamal, N., & Hill, M. D. (2018). Improving care for acute in-hospital ischemic strokes: A narrative review. *International Journal of Stroke, 13*(9), 905–912. https://doi.org/10.1177/1747493018790029
- Kawano, H., Ebisawa, S., Ayano, M., Kono, Y., Saito, M., Johno, T., Maruoka, H., Ryoji, N., Yamashita, H., Nakanishi, K., Honda, Y., Amano, T., Unno, Y., Komatsu, Y., Ogawa, 89 Y., Shiokawa, Y., & Hirano, T. (2021). Improving acute in-hospital stroke care by reorganization of an in-hospital stroke code protocol. *Journal of Stroke and Cerebrovascular Diseases, 30*(1), 105433. https://doi.org/10.1016/j.jstrokecerebrovasdis.2020.105433
- Manners, J., Khandker, N., Barron, A., Aziz, Y., Desai, S. M., Morrow, B., Delfyett, W. T., Martin-Gill, C., Shutter, L., Jovin, T. G., & Jadhav, A. P. (2019). An interdisciplinary approach to in-hospital stroke improves stroke detection and treatment time. *Journal of Neurointerventional Surgery, 11*(11), 1080–1084. https://doi.org/10.1136/neurintsurg-2019-014890
- Mellon L, Hasan H, Lee S, et al. Knowledge of thrombolytic therapy amongst hospital staff: Preliminary results and treatment implications. Stroke. 2015;46(12):3551-3553.doi:10.1161/STROKEAHA.115.010327
- Sim, C. Y., Wan Zaidi, W. A., Shah, S. A., Wan Yahya, W., & Tan, H. J. (2021). Knowledge of acute stroke management among healthcare professionals: Development and validation of acute stroke management questionnaire (ASMaQ). *Journal of Stroke and Cerebrovascular Diseases, 30*(1), 105421. https://doi.org/10.1016/j.jstrokecerebrovasdis.2020.105421
- Yang, S. J., Franco, T., Wallace, N., Williams, B., & Blackmore, C. (2019). Effectiveness of an interdisciplinary, nurse driven in-hospital code stroke protocol on in-patient ischemic stroke recognition and management. *Journal of Stroke and Cerebrovascular Diseases, 28*(12), 104398. https://doi.org/10.1016/j.jstrokecerebrovasdis.2019.104398
- Yoo, J., Song, D., Baek, J. H., Lee, K., Jung, Y., Cho, H. J., Yang, J. H., Cho, H. J., Choi, H. Y., Kxim, Y. D., Nam, H. S., & Heo, J. H. (2016). Comprehensive code stroke program to reduce reperfusion delay for in-hospital stroke patients. *International Journal of Stroke, 11*(6), 656–662. https://doi.org/10.1177/1747493016641724

*Why the study is important to nursing (e.g., the patient experience of care, patient or health outcomes, cost of care, nursing practice).*
- One in five strokes occur while a patient is in the hospital (Chen et al., 2018). The American Heart Association (AHA) developed benchmark timeframes to guide hospital response time and treatment for IHS to optimize patient outcomes. Hospital systems have initiated a "code stroke" response system to improve these benchmark times for stroke treatment and improve patient outcomes. A code stroke is a systematic response to an acute stroke that includes a team of

professionals who have expertise in stroke care (Yang et al., 2019; Manners et al., 2019; Kawano et al., 2021).

- In the in-hospital setting, a code stroke is activated when stroke symptoms are identified; the activation of the code notifies the trained team members, who then respond (Yang et al., 2019; Manners et al., 2019; Kawano et al., 2021). The literature has shown that the implementation of a code stroke process decreases the time from the recognition of stroke symptoms to assessment by neurology and radiologic imaging (Kawano et al., 2021; Yoo et al., 2016). Code stroke processes also decreased the rate of stroke mimics, or false alarms (Manners et al., 2019).
- Despite code stroke initiatives, in-hospital stroke (IHS) patients have been shown to have longer time to treatment than community-occurring stroke (COS) patients (Chen et al., 2018). This finding is startling, as IHS patients do not require the time for transportation to the hospital and the need for initial workup and medical history (Chen et al., 2018). Once a stroke is recognized in the hospital, there should be no delay to assessment and time to order radiologic scan and intervention. However, COS patients are still receiving treatment more quickly than their hospitalized counterparts.

*What is currently known about the topic; if an intervention study, what evidence supports the intervention or innovation.*

- The lack of knowledge among nurses may contribute to delays in treatment of IHS (Mellon et al., 2015). The Acute Stroke Management Questionnaire (ASMaQ) (Sim et al., 2021) was developed to test the stroke knowledge of healthcare professionals, but it has never been tested on a United States population or a nursing-exclusive population.

*Summarize the gap in current knowledge about the topic being addressed by the study.*

- The literature has no clear recommendations for IHS education for nurses. The literature also does not emphasize education for code stroke processes for nurses. Although many nurses may have received education during their schooling and initial job training, stroke guidelines and practices are constantly evolving. This, in addition to the time-sensitive component, results in unrealistic expectations for nurses to stay current with the guidelines without proper continuing education.
- The purpose of this study was to address the gap in the literature by: (a) determining acute care nurses' knowledge level about in-hospital strokes using the ASMaQ and (b) identifying nurse characteristics that may be predictors of stroke knowledge.

**Innovation**
*How the study will produce actionable information for nursing*

- Addressing the gap in knowledge of predictors of nurse stroke knowledge.
- Providing predictors of stroke knowledge to increase nurse leaders and educators' understanding of nurses' educational needs.
- Provides evidence of a quick, effective measure of nurses' stroke knowledge.

**Study design**
*Describe the study design: Qualitative, quantitative (descriptive, correlational, quasi-experimental, experimental, or both).*

- A non-experimental, descriptive correlational study sampling nurses caring for adult, hospitalized patients was completed via online survey assessing demographics, stroke education, and experience, and the Acute Stroke Management Questionnaire (ASMaQ) to test stroke knowledge.

*Research questions(s), hypothesis, or both*

1. To examine acute stroke knowledge among acute care nurses.
   - Question (RQ) 1. What is the level of acute stroke knowledge among study participants as measured with the Acute Stroke Management Questionnaire (ASMaQ)?
      - Question (RQ) 2. What is the relationship of ASMaQ total scores, domain scores, and individual item scores with (a) acute nurse demographics including age, education, current practice setting, employment status, and work experience and (b) professional and personal stroke experience, specific stroke education and training, and self-perception of stroke knowledge?
2. To examine the predictability of categorical and quantitative study variables of acute stroke knowledge among study participants.
      - Question (RQ) 3. How well do the study variables of education, employment status, work experience, current practice setting, personal stroke experience, professional stroke experience, specialized stroke education and training, and self-perception of stroke knowledge predict the ASMaQ total acute stroke score and which of the study variables are the best predictors of acute stroke knowledge?

**Sample description**
*Type of sample (e.g., convenience, cohort, random)*

- A convenience sample of registered nurses (RN) who provide direct patient care as their primary role at WakeMed Raleigh, Cary, or North hospitals were invited to participate.

*Inclusion and exclusion criteria*

- In addition to providing direct patient care and working at one or more of the included hospitals, inclusion criteria included having an active RN license, completion of orientation and working independently without a preceptor, and caring for hospitalized patients. Nurses were not included if they were still on orientation and working with a preceptor as these nurses had not completed all provided training and education and had the potential to provide skewed results. Nurses who cared for non-hospitalized patients were excluded, as this study focuses on stroke knowledge specific to in-hospital strokes. Exclusion criteria included nurses working in the Neuro Intensive Care Unit (ICU), rehabilitation, pediatric units, labor and delivery and/or mother/baby units, and primarily in

managerial roles. Neuro ICU nurses were excluded as it is believed their responses would provide skewed results as they are the hospitals neurological and stroke experts for nursing. Nurses working in the rehabilitation were excluded as this is technically not an acute care setting, and there are many confounding variables for stroke symptom awareness and recognition in the rehabilitation setting. Nurses caring for pediatric, labor and delivery, and/or mother/baby populations were excluded as this study focuses on the knowledge level of stroke treatment, management, and protocols for adult patients. Nurses in managerial roles were excluded, as their primary role in the hospital is not to provide direct care for patients.

- Sample size
  - $N = 196$

## Location of study (within the applicant organization)
*Hospital, units(s) ambulatory care setting(s) that apply*
- WakeMed Raleigh Campus, WakeMed Cary Hospital, WakeMed North Hospital

## Study procedures
*Procedures from initial screening through end of contact with subjects*
- The convenience sample of nurses was recruited for participation via email. The email included a secured link to a one-time online survey for confidentiality, a flyer advertising the study, as well as pertinent information related to the study purpose and procedures.
- Data collection methods
  - All data were collected via online survey. Data included demographic information, stroke education and experience, and the Acute Stroke Management Questionnaire to test stroke knowledge.

## Results
*Results of data analysis (description of sample characteristics and analysis for research question or hypotheses)*
- The sample (n=196) was mostly female (n=180; 92%), baccalaureate-prepared nurses (n=131; 67%). They had good overall stroke knowledge ($M = 117.4$; $SD = 8.1$), and six predictor variables were significantly correlated with stroke knowledge (practice setting, code stroke awareness, activation comfort, and confidence in understanding, self-identified knowledge of acute stroke management, and self-perception of stroke knowledge). The regression model explains 30.7% of the variance in the ASMaQ total scores, $F (6, 189) = 13.93$, $p < .001$.
- Independent-samples t-tests were conducted to compare the stroke knowledge scores of nurses working in the Emergency Department (ED) and Intensive Care Unit (ICU) compared to nurses working in all other practice settings. There was a statistically significant difference in general stroke knowledge scores (domain 1 of ASMaQ) for ED and ICU nurses ($M = 42.49$, $SD = 2.81$) compared to all other practice settings ($M = 41.31$, $SD = 3.5$; $t(195) = 2.36$, $p = .019$). The eta squared was small at .03. There was a statistically significant difference in advanced stroke management scores (domain 3 of ASMaQ) for ED and ICU nurses ($M =$

42.82, *SD* = 3.84) compared to all other practice settings (*M* = 39.33, *SD* = 4.51; *t*(195) = 5.35, *p* <.001). The eta squared showed a medium effect size at .13. There was also statistically significant difference in total ASMaQ scores for ED and ICU nurses (*M* = 120.97, *SD* = 7.18) compared to all other practice settings (*M* = 115.55, *SD* = 8.02; *t*(195) = 4.61, *p* <.001). The eta squared showed a medium effect size at .10.

- An independent-samples t-test was used to compare the mean ASMaQ scores amongst participants who reported one or two post-licensure education methods versus those who reported three or more. There were strong statistically significant differences between the two groups (*t*(195) = 5.07, *p* <.001).

**Discussion**
*Discussion and interpretation of the findings*
- Although it is important that ED and ICU nurses have a high level of stroke knowledge, half of IHSs occur in cardiology/cardiovascular surgery practice areas (Yoo et al., 2016). It is therefore important that educational initiatives be provided to nurses caring for these patient populations. Nurses who reported experiences with three or more modalities of post-licensure stroke education were found to have higher levels of stroke knowledge than those who only received one or two education methods. This shows that various methods of training, and reinforcement of learning using various teaching styles and methods, are effective in increasing nurses' knowledge among this population.

*Implications of the findings and recommendations to the applicant organization*
- The ASMaQ is a short survey that takes less than five minutes to complete. Of the survey participants who began the ASMaQ portion of the survey, 94% finished the 29-item questionnaire. This showed very low attrition and respondent fatigue. WakeMed nurse managers and educators in all departments could use the ASMaQ to assess baseline stroke knowledge at hire to create a tailored stroke orientation experience to ensure clinical nurses are offered continuing education classes focused on stroke knowledge. This has the potential to be a cost-saving initiative, as nurses would only be receiving the stroke education that is filling the gaps of what is not already known.
- WakeMed continues to reassess and revise the stroke-specific courses offered to nurses at hire. The results of this study will help guide the content of these courses and the targeted audience.