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Stroke awareness among inpatient nursing staff at an academic medical center

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Abstract

Background and Purpose—Since 10% of strokes occur in hospitalized patients, we sought to evaluate stroke knowledge and predictors of stroke knowledge among inpatient and emergency department nursing staff.

Methods—Nursing staff completed an on-line stroke survey. The survey queried outcome expectations (the importance of rapid stroke identification), self-efficacy in recognizing stroke, and stroke knowledge (name three stroke warning signs/symptoms). Adequate stroke knowledge was defined as the ability to name two or more stroke warning signs. Logistic regression was used to identify the association between stroke symptom knowledge and staff characteristics (education, clinical experience, and nursing unit), stroke self-efficacy, and outcome expectations.

Results—A total of 875 respondents (84% response rate) completed the survey and most of the respondents were nurses. More than 85% of respondents correctly reported 2 or more stroke warning signs or symptoms. Greater self-efficacy in identifying stroke symptoms (OR 1.13, 95% CI 1.01–1.27) and higher ratings for the importance of rapid identification of stroke symptoms (OR 1.23, 95% CI 1.002–1.51) were associated with stroke knowledge. Clinical experience, educational experience, nursing unit, and personal knowledge of a stroke patient were not associated with stroke knowledge.

Conclusions—Stroke outcome expectations and self-efficacy are associated with stroke knowledge and should be included in nursing education about stroke.

Keywords

stroke nursing; stroke education; stroke diagnosis; inpatient stroke

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Disclosures:

The authors report no conflicts of interest related to this work.

Introduction

About 10% of all strokes occur among hospitalized patients¹, and nurses tend to be the first to identify stroke symptoms among inpatients.² Prior work has shown that stroke symptoms may not be recognized in hospitalized patients³ Additionally, many stroke code activations for inpatients are false positives.⁴ If inpatient providers do not promptly and appropriately activate a stroke code, opportunities for treatment with thrombolytics could be delayed or missed. The goal of this study was to evaluate the knowledge of stroke signs and symptoms among inpatient and emergency department (ED) nursing clinical staff, such as nurses, nursing aides, and technicians, at a large academic medical center. We also sought to identify predictors of adequate stroke knowledge.

Methods

Population

All ED and inpatient nursing staff complete mandatory yearly education modules both online and in person. An optional anonymous survey was embedded into the online portion of the module in January 2012. After completion of the survey, the clinical staff completed an online module that focused on stroke symptom recognition and response followed by a small group discussion about these same issues. A copy of the online module, survey, and details regarding a follow-up survey are available in the Online Supplement, see <http://stroke.ahajournals.org>.

Covariates

Covariates selection was guided by the theory of planned behavior which explores the belief that a desired outcome (outcome expectations), perceived capability of performing the behavior (self-efficacy), and social norms are associated with a given behavior⁵, which in this case would be initiation of a stroke code. Respondents were asked to rate their confidence in identifying stroke (self-efficacy) and the importance, in terms of stroke outcomes, of rapid identification of stroke symptoms (outcome expectation) on a 1–10 point Likert scale. Nursing units were categorized into neurology-specific, ED, non-neurology ICU, medical-surgical, and other nursing unit. We categorized nursing education into 2 year degree, 4 year degree, advanced degree, and other. We also divided clinical experience into less than 1 year, 1–3 years, 4–10 years and more than 11 years.

Outcome measure

The primary outcome was the ability to name acute stroke warning signs. Using free-text, the survey asked respondents to name three important signs or symptoms of stroke. Stroke signs or symptoms were defined according to published material from the AHA and NINDS. All responses were graded by a board-certified vascular neurologist (EEA). A random sample was independently graded by another board-certified vascular neurologist (LES) and there was near complete agreement.

In prior work in Michigan adults, adequate knowledge of stroke warning signs was defined as naming at least one.⁶ Because our participants have medical training, *a priori* we defined adequate knowledge of stroke warning signs as correctly naming two or more warning signs.

Statistical Analysis

Nursing staff characteristics and knowledge of stroke warning signs were calculated using descriptive statistics. A logistic regression model was used to explore the association between adequate stroke knowledge and respondent characteristics along with self-reported measures of self-efficacy and outcome expectations. All covariates were determined *a priori* and included in the final model. We performed a likelihood ratio test comparing the fully adjusted model with stroke self-efficacy and outcome expectations modeled linearly and a second model where they were modeled in tertiles. The log-likelihood ratio statistic was non-significant, indicating that the scales were better represented modeled continuously. Statistical analysis was performed using Stata 11.0 (StataCorp). This project was reviewed by the University of Michigan IRB and determined to be exempt.

Results

The response rate for the survey was 83.8% and responses from 875 of the subjects were available for analysis. Most of the respondents were medical-surgical nurses with more than a decade of clinical experience (Table 1).

Eighty-seven percent of respondents correctly reported two or more stroke warning signs while 31% identified three warning signs. Numbness or weakness was the most frequently reported symptom (Table 2). We found that greater self-efficacy in identifying stroke symptoms (OR 1.13, 95% CI 1.01–1.27) and a higher outcome expectations rating (OR 1.23, 95% CI 1.002–1.51) were associated with stroke knowledge. As shown in Table 3, clinical experience, educational experience, nursing unit, and personal knowledge of a stroke patient were not associated with stroke knowledge.

Discussion

More than 85% of ED and inpatient nursing staff at our medical center have adequate knowledge of stroke signs and symptoms. While educational level and clinical experience were not associated with knowledge of stroke symptoms, outcome expectations and self-efficacy were associated with stroke knowledge. Researchers have found that, while stroke knowledge is important, it is not the only factor motivating activation of emergency responses for stroke.⁷ Thus, efforts to increase stroke knowledge may also increase self-efficacy and outcome expectations and ultimately increase appropriate activation of a stroke code. For example, at our institution we have implemented mock stroke codes. During these sessions, a staff member evaluates the “patient” with assistance from other staff members while physicians on the stroke team provide education, feedback, and answer questions. These role-plays have the potential to not only increase knowledge but also self-efficacy and outcome expectations.

The lack of association between nursing unit and clinical experience with knowledge of stroke symptoms was unexpected. The lack of association between clinical experience and stroke knowledge may be attributable to tPA's approval more than 17 years ago; thus nursing staff have had the opportunity to learn about the benefits of tPA.

This work has limitations. Due to the design of the survey, respondents could have used outside sources, to identify stroke symptoms. The response rate to our survey was robust, however, non-respondents may have more or less knowledge about stroke symptoms and this could impact our results. As this survey was performed at an academic, tertiary care center, the results may not be generalizable to other institutions. Additionally, since the majority of respondents were nurses the results may not apply to other inpatient staff. Future educational efforts for nursing staff should emphasize the importance of outcomes expectations and stroke self-efficacy in addition to stroke knowledge.

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Table 1

Characteristics of the respondents.

| | N (% of responses) |
|---|--------------------|
| Clinical experience | |
| Less than 1 year | 81 (9.4%) |
| 1–3 years | 159 (18.4%) |
| 4–10 years | 235 (27.2%) |
| More than 11 years | 388 (45.0%) |
| <i>Missing=12 (1.4% of total)</i> | |
| Level of nursing training | |
| 2 year degree | 295 (33.8%) |
| 4 year degree | 367 (42.1%) |
| Advanced nursing degree | 64 (7.3%) |
| Other or not applicable | 146 (16.7%) |
| <i>Missing=3 (0.3% of total)</i> | |
| Work location | |
| Neurology unit | 71 (8.2%) |
| ED | 43 (5.0%) |
| ICU | 158 (18.3%) |
| Med-Surg unit | 351 (40.6%) |
| Other | 241 (27.9%) |
| <i>Missing=11 (1.3% of total)</i> | |
| Personal knowledge of a stroke patient | |
| 696 (80.5%) | |
| <i>Missing=10 (1.1% of total)</i> | |
| Self-efficacy in identifying that someone is having a stroke (from 1–10) | |
| Median (IQR) | 7 (5–9) |
| <i>Missing=7 (0.80% of total)</i> | |
| Importance of quickly identifying stroke symptoms (from 1–10) | |
| Median (IQR) | 9 (9–9) |
| <i>Missing=9 (1.0% of total)</i> | |

Table 2

Knowledge of stroke warning signs (n=875).

| <i>Correct answers</i> | Number with response (%) |
|--|---------------------------------|
| Numbness or weakness | 760 (86.9%) |
| Confusion, trouble speaking, or understanding | 725 (82.9%) |
| Trouble walking, dizziness, or loss of balance or coordination | 89 (10.2%) |
| Headache | 159 (18.2 %) |
| Trouble seeing | 126 (14.4%) |
| One or more warning signs correct | 820 (93.7%) |
| Two or more warning signs correct | 762 (87.1%) |
| Three or more warning signs correct | 270 (30.9%) |

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Table 3

Predictors of adequate knowledge of stroke warning signs (n=838).

| | Odds ratio (95% CI) |
|---|--------------------------|
| Clinical experience | |
| Less than 1 year | Reference |
| 1–3 years | 1.00 (0.43–2.34) |
| 4–10 years | 0.62 (0.28–1.36) |
| More than 11 years | 0.98 (0.44–2.18) |
| Level of nursing training | |
| 2 year degree | Reference |
| 4 year degree | 0.95 (0.58–1.57) |
| Advanced nursing degree | 2.56 (0.75–8.79) |
| Other or not applicable | 0.74 (0.40–1.38) |
| Work location | |
| Neurology unit or ED | 0.90 (0.41–1.97) |
| ICU, Med-Surg unit, or other | Reference |
| Personal knowledge of a stroke patient | 0.99 (0.58–1.68) |
| Self-efficacy in identifying that someone is having a stroke. | 1.13 (1.01–1.27) |
| Importance of quickly identifying stroke symptoms. | 1.23 (1.002–1.51) |