Improving Ischemic Stroke Patient Care through Bedside Assessment

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**Abstract**

**BACKGROUND:** A significant element of stroke management is to prevent deterioration and medical complications, with nurses’ assessments focused on frequent evaluation of neurological status. A change in management strategy and standardizing nurse communication with assessment during bedside report can help identify progression of stroke symptoms and lead to quicker interventions, and decreased length of stay (LOS) and improved discharge disposition (DD). The aim of this project was to improve bedside nurses’ competence and confidence in performing bedside neurological assessment (BNA), with the goal to maintain or improve neurological status in hospitalized stroke patients. **METHODS:** The quality improvement project was a quasi-experimental pre- and post-implementation of a stroke bundle to compare ischemic stroke patient LOS and DD. Sixteen staff nurses completed an educational presentation to increase their confidence and competence of NIHSS and BNA survey was used to evaluate the nurse perceptions prior to and after the educational presentation. A retrospective chart review was undertaken for 3 months on 43 patients admitted for stroke or transient ischemic attack prior to the project. Data on 32 patient’s post-implementation was collected for three months. **RESULTS:** Scores in nursing confidence and competence each improved from 3 to 4.5/5. Nursing use of bedside report and use of bedside assessment increased after education. Patient LOS decreased in the post implementation stroke patient group z = -2.77, p < 0.006, r =-0.32. The pre-implementation patients’ group rank was 43.77; the post- implementation patients’ rank was 30.25. DD was not impacted by the project. **CONCLUSION:** Nursing confidence and competence was improved through the educational presentation. LOS was shortened in the post implementation group; further evaluation would be necessary to support our findings. DD was not found to be impacted. Further studies of bedside report with assessment could strengthen the understanding of this approach to patient care.

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**Introduction**

Stroke patients are at considerable risk for further deterioration or emergence of new stroke symptoms during the acute phase of hospitalization, with half experiencing neurologic deterioration in the first 24 to 48 hours.1,2 During the acute phase of stroke care, the nurses’ assessment should focus on frequent evaluations of neurological status and blood pressure management to aid in prevention of further deterioration.3 Establishing the patient’s baseline neurological assessment during the shift report is important to identify further neurological change and the need for added interventions.4

Insufficient hand-off communication is a contributing aspect to adverse events.5 Researchers found bedside report (BSR) decreases medical errors and improves patient safety.6,7 The Joint Commission identified potential harm with inaccurate and incomplete shift handoff during BSR.8 Therefore, assessment of the patient with stroke is an important part of nurse-to-nurse communication at shift change.

Presently, nursing reports take place in hallways, the medication room, and the nurse’s station for stroke patients on the target neurology unit. The purpose of this quality improvement (QI) project was to improve nurses’ competence and confidence in performing a bedside neurological assessment in patients with acute stroke to prevent further deterioration. The nurse’s prompt recognition and provider notification of an increase in stroke symptoms through the implementation of a stroke assessment bundle may help meet this goal. The project objectives were to improve the nurses’ competence and confidence in performing, scoring, and reporting the National Institute of Health Stroke Scale (NIHSS) score with bedside report at change of shift. The project question was: Does the implementation of a stroke care bundle versus current patient care practices improve the nurses’ competence and confidence with completion, scoring, and reporting of changes in the NIHSS to decrease patient length of stay and improve discharge disposition?

**Background**

The American Heart Association/American Stroke Association stroke care guidelines include the NIHSS assessment as part of the standard of care for acute stroke patients.9 Saber and Saver10, reported use of the NIHSS, a valid tool, potentially aids in the quality assessment in stroke patients. Farooque et al.11, concluded the NIHSS assessment has a strong positive correlation with decision making for treatments and rehabilitation of stroke patients.

Researchers reported BSR enabled nurses to clarify and confirm patient information is correct and concise.7, 12-15 Schirm et al.15 showed improved communication allowed for increased transparency during the transition of patient care with BSR. Elgin and Poston7 reported the exchange of information with BSR supports continuity of care and prevents communication errors.

Several researchers concluded standardization of nursing BSR with the use of a tool or checklist improves communication.6, 7,12 Martini and Resek16 generated an institutional assessment tool for neurological units in which part of the report was in private and the second half was at the bedside. The project included a bedside neurological assessment checklist with the NIHSS during shift change.16 These authors reported 60% of nursing staff perceived an increase in communication between nurses with the BSR with checklist. The advantage of using any of these tools was increased quality of care through standardizing the shift handover process and improving communication.6, 7, 12

Nursing perceptions of how BSR affects patient care were studied by multiple researchers.13, 15,17 Bigani and Correia13 found nurses preferred a BSR communication platform over the previous shift report process. The researchers noted improvement in nurse-patient communication at the beginning and end of the shift. Jimmerson et al.18 found 55% of nurses and 42% of supervisors supported a focused assessment during BSR allowing better understanding of the patient condition.

Nursing staff found visualization of the patient during the report key to improving patient care.6, 13, 15, 19 Visualization allows nursing staff to evaluate the patient’s condition and predict the patient's needs.6 Bigani and Correia13 identified the ability to perform safety checks and quick assessment of the patient at BSR. Patient assessment during BSR at shift change improved patient safety with nurses’ evaluation of the patient condition, medication discrepancies, placement of tubes or drains, and infusions.12,15,19 The assessment during BSR can aid the on-coming nurse in identifying a change in the patient.15

 Nurses gain improved knowledge through education on NIHSS/ neurological assessment participation.20 Therefore, this project implemented BSR with an NIHSS assessment with a stroke bundle to improve neurological outcomes in the hospitalized stroke patient.

 **Methods**

The QI approach was used with a pre- and post-implementation patient chart review, to compare ischemic stroke patient LOS and DD. The project was conducted on the orthopedic-neurological unit in a midwestern medical center. The medical center is a 149-bed, Level II trauma center and serves as a primary stroke center. Approval was obtained from the Institutional Review Board of the medical center and deemed to be QI.

Retrospective patient data was collected three months prior to implementation of the project. Post implementation data (prospective) was collected from February to April 2023. A power analysis was conducted to determine the minimum sample size. Sample size for both the retrospective and prospective patient groups were estimated at 33 patients for those who met inclusion criteria to achieve 80% power. Eligibility criteria included adult patients admitted to the chosen orthopedic neurological unit for ischemic stroke (IS) or transient ischemic attack (TIA) with an NIHSS score of 0 to 15. Hemorrhagic stroke patients were excluded from the project. IBM-SPSS was used to analyze retrospective and prospective data. The demographic data was analyzed using descriptive statistics and Chi-Square test. Length of stay was analyzed using a Mann-Whitney test. Discharge disposition was evaluated using a Chi-square test.

Thirty nurses were available to participate in the educational process. No nursing staff were excluded from attending or viewing the educational presentation. Nursing staff who completed both a pre and post intervention survey were included in the final evaluation. Sample size was calculated to be 26 nurses to achieve 80% power.

The project lead provided a paper copy of the NIHSS for nurses as a guide and checklist after attending the presentations; this was used during the baseline assessment and during shift changes at 7 A.M. and 7 P.M in patients who met criteria. The on-coming and off-going nurses were present for the bedside assessment using the NIHSS. The on-coming nursing staff performed the NIHSS and transferred the score to the electronic medical record (EMR) at the 8 A.M. or 8 P.M. assessments. Nursing champions were recruited for day and night shifts to support the implementation of the stroke bundle and education process. Nurse champions and managers assisted with questions and gave reminders for BSA during this implementation process. The charge nurse highlighted the daily assignment sheet to denote the stroke patients on the unit during the start of shift huddle after stroke bundle implementation.

The stroke bundle required nursing staff to: Establish a baseline assessment with the NIHSS upon patient arrival to the unit; document NIHSS in the EMR; and perform regular assessments as ordered by Hospitalist stroke admission orders. The on-coming nurse performed follow up shift assessments as ordered in the EMR. Nursing staff reported any new or increasing neurological deficit to the Hospitalist if assessed at shift change or during daily assessment periods.

A pre/post survey was developed by the project team to evaluate nurses’ perceptions of confidence and competence using the NIHSS tool for evaluation of the IS and TIA patients. The survey used a 5-point Likert scale, with 1 being no confidence/competence and 5 being completely confident/competent. Nursing staff completed the survey prior to attending the education presentation and again three months after implementation of the stroke bundle. Questions included a) how confident the nurse feels using the NIHSS for assessment of the IS and TIA patients and b) how competent the nurse feels with their ability to perform the NIHSS. Nurses were also asked about their use of BSR, use of BSR with assessment, anxiety with using NIHSS, and comfort in speaking with Hospitalist/ Neurologist. The nursing surveys (n = 16) were analyzed using Wilcoxon signed-rank test. Bonferroni’s adjustment for Type I error was used to account for multiple comparisons and control the Type I error rate. The level of significance of less than .007 indicated statistical significances.

After project implementation, patients’ NIHSS scores were collected on admission and at discharge to compare with the retrospective patient data. LOS was measured from floor admission to discharge. Patient demographics were collected to identify gender and age for descriptive purposes.

**Results**

*Nursing Population*

Sixteen of the total unit nursing (53%) participated in the education on the NIHSS. The nurses consisted of 15 females and 1 male. All 16 nurses were baccalaureate prepared. The ages ranged between 21 and 35 years old.

*Nursing Impact*

 The nurse’s confidence level was significantly increased post presentation (M = 4.5) than pre (M = 3.0), z = -3.42, p = <.001, r = -0.85 (Table 2). The nursing competence level was higher post presentation (M = 4.5) than pre (M = 3.0), z = -3.42, p= <.001, r = -0.85. Scores for nursing anxiety level (z = -2.65, p = .008, r = -.66), use of bedside report (z = -2.81, p = .005, r = -.070), use of bedside assessment (z = -3.15, p = .002, r = -.79), unsure of patient assessment (z = -3.15, p = .002, r = -.78) and comfort with reporting to provider (z = -1.73, p = .008 , r = -.43) did not show significant differences at the conclusion of the project.

*Patient Population*

 Demographic information was collected for each patient group including age and sex (Table 1). The pre-intervention group was older than the post-intervention group by 3.1 years. A Chi-square was conducted to evaluate sex in the two groups χ₂ (1) = .056, P= .81, with no significant differences. Age was evaluated using a Mann-Whitney Test, U = 607.0, z = -.868, p = .04, r = -.10. The age differed slightly in the pre-intervention group (M = 39.88) when compared to the post-intervention group (M = 35.47).

*Patient Outcomes*

For the 3 months prior to the implementation process 43 patients were identified who met inclusion criteria. The pre-intervention group admitting diagnosis consisted of TIA (n=13) and CVA (n=30). For the 3 months post-implementation 32 patients were eligible for the project. The post-intervention group (n = 32) did not reach the calculated sample size of 33 and was made up of TIA (n=13) and CVA of (n=19). Patient sampling was impacted by admission rates and convenance sampling which did not meet the estimated minimum sample size of 33 patients.

Patients with TIA and IS were evaluated for LOS and DD. In the pre-intervention group, the mean LOS for TIA patients (n = 13) was 2.38 days, while the post-intervention group (n = 13) mean LOS was 1.86. The mean LOS for the IS patients in the pre-implementation group (n=30) was 4.43 days compared to 1.36 in the post-implementation group of patients (n = 20). A Manning -Whitney U test was conducted to evaluate LOS in the post-intervention group compared to the pre-intervention group. The results were significant at z = -2.77, p < 0.006, r =-0.32. The pre-intervention group had a rank sum of 43.77 whereas the post-intervention group was 30.25. In comparing the difference between the rank sum of the two groups LOS was longer for the pre-intervention group. A Chi-square evaluated the association in discharge disposition between the two groups, χ₂ (3) = 8.85, p = 0.03, with no significant difference found.

**Discussion**

The QI project results were significant in improving both the nursing staff’s competence and confidence. Significant improvements were also identified in nursing staff use of bedside report post-intervention, with a 20% increase noted. Improving the nurse’s knowledge has been shown to improve patient safety.13 The increase in nurses’ confidence and competence in and use of BSA may improve nurses’ knowledge while establishing a more accurate patient neurologic baseline assessment, leading to improved patient safety and care.

 Patient length of stay was shown to be shorter in the post-implementation patient group in this population. The correlation between the LOS and the BSA may have been due to many extraneous circumstances including age, stroke severity or previous functionality. A larger and more regionally diverse study may shed greater light on the use of BSA.

*Limitations*

Just over 50% of the nursing staff participated in the education presentation and survey. Providing greater access to the education program and survey may have increased the participation by the staff. The nursing surveys were paired by participants for comparison. Use of a nonpaired test would have increased the presurvey numbers. Nursing turnover reduced the number of post-survey responses.

Patient sample size was impacted by the brief study period and single hospital location in which the QI evaluation was conducted. Expanding the number of participating hospitals and the time of the evaluation would increase the sample size. A multi-facility study in different geographical medical centers would give greater insight into the use of and importance of BSA. A longer project may result in a deeper understanding of the importance of the use of this stroke bundle including BSR with real time assessments, which may improve the reliability of the findings. Further studies may give additional insight into the use of BSA.

**Conclusion**

Patient assessment during BSR can have a positive impact on outcomes. Nursing staff benefit from additional education in the care of stroke patients to improve their confidence and competence and support the overall care of this hospitalized patient population. QI projects and evaluation of nursing care allows nursing staff to target processes to improve patient outcomes The implementation of BSR with assessment established a baseline neurological foundation the nurse could use to further evaluate the patient’s condition during hospitalization. A change in management strategy and standardizing nurse communication with assessment during bedside report may help identify progression of stroke symptoms and lead to quicker interventions, potentially leading to decreased length of stay and improved discharge disposition. Further studies and evaluation of this bedside report with assessment could strengthen the understanding of this approach to patient care.

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**Table** 1. **S**troke Patient Demographic Information (N=75)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variable  | Pre-intervention (N = 43) | Mean Rank/ Group p value | Post-intervention (N = 32) | Mean Rank/Group p value |
| Sex N (%) |  |  |  |  |
|  Male | 20 (47%) | p = .81 | 14 (44%) | p = .81 |
|  Female | 23 (53%) | 18 (56%) |
| Mean Age in years  | 71.2 | 39.88, p =.04 | 68.1  | 35.47, p =.04 |

Abbreviation: N, Total Number of Cases; %, Percent.

**Table 2.** Nursing Survey Results

|  |  |  |  |
| --- | --- | --- | --- |
| Variables | Pre-Intervention (N=16)  | Post-Interventions (N=16) | Wilcoxon signed-rank test with Bonferroni's correction α=.007 |
| How confident do you feel using the NIHSS for assessment of the Ischemic Stroke patient and transient ischemic attack patients? (Mdn) | 3.0 | 4.5 | z = -3.42, **p = <.001**,r = -0.85 |
| How competent do you feel with your ability to perform the NIHSS? (Mdn) | 3.0 | 4.5 | z = -3.42, **p= <.001**, r = -0.85 |
| Does assessment of the stroke or TIA diagnosis cause you anxiety? (Mdn) | 2 | 2 | z = -2.65, p = .008, r = -.66 |
| Are you currently conducting bedside report for stroke patients? (Mdn) | 4 | 4.5 | z = -2.81, **p = .005**, r = -.070 |
| Do you currently assess the stroke patient with off going nurse for stroke patients at shift report? (Mdn) | 3 | 4 | z = -3.15, **p = .002**, r = -.79 |
| How often would you say you are unsure if the stroke patient you are caring for is having an increase in their stroke symptoms? (Mdn) | 2 | 2 | z = -3.15, p = .109, r = -.78  |
| Are you comfortable with reporting increased stroke symptoms to the provider (Doctor, APN, PA) on duty? (Mdn) | 4 | 4.25 | z = -1.73, p = .008, r = -.43  |

Abbreviation: N, Total Number of Cases; Mdn, Median.