A Stroke Transition of Care Intervention with Stroke Nurse Navigators and Early Stroke Clinic Follow-up Reduces Readmissions for Stroke at 12 Months

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Abstract

Background
One in four strokes occur in stroke victims, with hospital readmissions contributing to high-cost care. Transition of care programs have been successful in reducing hospital readmissions in other diseases, but the data on such programs for stroke are mixed. A transition of care program was implemented with the goal of reducing recurrent strokes and hospital readmissions.

Methods
We implemented a transition of care program using nurse navigators and early outpatient follow-up with a vascular neurologist. Data were obtained on: Rate of recurrent stroke admissions within one-year, all-cause readmission within one-year, all-cause readmission within 30 days, initial follow-up scheduled within 7-10 days, compliance with follow up, and compliance rates with provision of two-day post-hospital discharge phone calls.

Results
An improvement was seen in process measures reflecting adherence to the intervention across all 3 years. The rate of readmission for stroke at 12 months was 8.5%, 9.0%, 6.6%, and 4.2% for year 0, 1, 2, and 3, respectively, representing a 50% reduction from baseline year 0. All-cause readmission remained unchanged, at 38.9%, 42.6%, 36.6%, and 37.4% for year 0, 1, 2, and 3 respectively.

Conclusions
Our nurse navigator led stroke transition intervention was associated with significant reduction in readmissions for stroke but did not impact all cause readmission at one year or 30 days. Our focus on Centers for Medicare/Medicaid intervention compliance has produced a sustainable program capable of now expanding to support other important patient needs.

Key words: Stroke Transitions in Care; Nurse Navigator; Transitional Care Management; Readmissions.
INTRODUCTION

Out of the approximately 800,000 strokes that occur annually in the US, nearly 1 in 4 are recurrent strokes.\(^1\) Up to 50\% of stroke patients may be readmitted within 1 year. Those discharged to home have a greater chance of being readmitted compared to those discharged to rehabilitation.\(^2\) The transition from hospital to home is a vulnerable time for these patients.

To address this vulnerable period, transitional care programs have been developed to support patients and avoid poor outcomes. Transitional care occurs when a patient is moving from one setting of care to another, for example, hospital to home. Interventions are designed to ensure continuity, care coordination, and to avoid poor outcomes at a time of risk. Such programs have been shown to reduce readmissions for chronic disease.\(^3\) The stroke literature is mixed in showing the effectiveness of these approaches, but recently several studies have shown some benefit.\(^4\)–\(^7\)

The Centers for Medicare and Medicaid (CMS) has recognized the value of transitional care, and has incentivized this care by providing a higher level of reimbursement for transitional care compared to an outpatient visit.\(^8\) Required CMS elements include an interactive contact within 2 days of discharge, and a follow up visit within 7 or 14 calendar days. Interactive contact is usually made by a phone call that focuses on coordination of ongoing care with agencies, assessment of medication adherence, provision of education to support self-management, and assistance with resource access. When combined with the phone call, an in-person visit within 7 days of discharge that includes high complexity medical decision making (MDM) can be billed with CPT code 99496. Billing for in-person visits within 14 days of discharge with at least moderate complexity of MDM is billed with CPT code 99495. A transitional care approach that incorporates these elements contributes towards offsetting the costs of the intervention. We report our experience with implementation of a transition of care program that aimed to improve stroke prevention and reduce hospital readmission through aggressive modification of stroke risk factors and stroke education.

METHODS

Approval and subsequent grant funding was received from the Greater Rochester Health Foundation to hire/train nurse navigators for implementation of a quality improvement transitions of care project. The primary aim of the grant was to implement a stroke and transient ischemic attack (TIA) follow-up clinic at Rochester General Hospital aimed at improving stroke prevention and hospital readmission by aggressive modification of stroke risk factors and stroke education started before hospital discharge and spanning early recovery and the period of highest risk of recurrent stroke. Rochester General Hospital is a 528-bed comprehensive stroke center hospital with an on-site stroke clinic in Rochester, New York, USA. The project was deemed Institutional Review Board (ethics) exempt. As a grant deliverable, data on outcome measures were collected beginning a year prior to the start of the project, and then on a quarterly basis for the 3-year duration of the grant. Two stroke nurse navigators were hired and trained prior to the start of data collection.

The program’s interventions spanned four phases: 1) Inpatient; 2) an interactive phone call within two days post-hospital discharge; 3) stroke clinic follow up with a vascular neurologist; and, 4) ongoing follow-up for
one year. During the inpatient phase, stroke navigators met their patients, provided education on stroke, and inventoried as well as educated patients on their individual personal risk factors. A standardized educational booklet about stroke that included information on stroke mechanisms, risk factors, pathophysiology, and treatment was used to support nurse navigator inpatient education. Risk factors were documented on an educational template within the electronic medical record (EMR), printed out, and provided to the patient as supplemental educational information that was placed within the stroke education booklet. Patients and family members were also taught about the FAST acronym (Face drooping, Arm weakness, Speech difficulty, Time to call 911) for recognizing the symptoms of stroke.9

A stroke clinic appointment was made prior to hospital discharge with the goal of scheduling it within 7-10 business days of discharge to home. Within two days of discharge, the navigator called the patient, reviewed their medications, reviewed the FAST acronym for symptoms of stroke, and reminded them of their appointment. Navigators also identified any barriers, such as transportation needs or inability to fill or pick up prescriptions.

At the first stroke clinic visit, the nurse navigator met the patient again, performed medication reconciliation and reinforced stroke education, assessed knowledge of the FAST acronym, and reeducated patients about personal risk factor management. All nurse navigator assessments were documented using a standard template in the EMR. Navigators also assisted with coordination of care as needed, by calling home care agencies or rehabilitation centers to ensure follow up. Remaining aspects of the stroke diagnostic workup were completed by the vascular neurologist during the clinic visit along with reassessment and management of stroke risk factors for secondary stroke prevention. Following completion of the clinic visit, patients were made aware that their nurse navigators would continue to serve as a resource capable of answering questions, providing support, and coordinating additional health services over the next 12 months. Additional follow-up clinic visits were made at 3, 6, and 12 months, and patients were also encouraged to participate in a stroke support group.

Pre-specified metrics were collected to measure the success of the program. Process measures were assessed to determine standardization of the intervention, including compliance rates with post discharge phone calls within two business days, scheduling of the initial stroke clinic appointment within 7-10 business days, and whether the stroke clinic follow up appointment was completed by the patient. Process data were recorded by the nurse navigator using the Research Electronic Data Capture (REDCap) system hosted by Rochester Regional Health.10,11 Outcome measures included rates of all-cause readmissions within 30 days, all-cause readmissions within 12 months, and readmissions for stroke within 12 months. Outcome data were collected on patients discharged to home without hospice care and were assembled from Premier.

In keeping with the quality improvement approval for this project, patient numbers and demographics are not provided, with analyses strictly limited to the proposed process and outcome measures specified. Statistical analyses were performed using independent Student’s t-tests comparing baseline (Year 0) to Year 1, Year 2 and Year 3 of the nurse navigator intervention; p values ≤ 0.05 were considered significant. The SQUIRE 2.0 guidelines for reporting quality improvement studies were utilized to frame our article.12
RESULTS

Process Measures

Intervention compliance process measures demonstrated significantly improved rates for patient navigation. For two-day post-hospital discharge phone calls, no patients were called during the baseline year (year 0); however, once the transition intervention began, these calls were successfully sustained at a rate of 85% or higher ($p < 0.0001$) (Figure 1). Provision of stroke clinic appointments within 10 business days occurred rarely prior to program implementation, but increased during the intervention, reaching an average of 81% in year 3 ($p < 0.0001$) (Figure 2). Adherence to a stroke follow up appointment, regardless of timing, improved from 39% in year 0 to more than 85% in year 3 ($p < 0.0001$) (Figure 3).

Outcome Measures

The rate of readmission for stroke was 8.5% in year 0, and by year 3 was reduced to 4.2% ($p < 0.001$), representing a significant reduction of more than 50% for stroke-related hospital readmissions (Figure 4). All-cause readmission was 38.9% in year 0 and remained similar during the 3-year grant period (42.6%, 36.6%, and 37.4% for years 1, 2, and 3 respectively; p=ns) (Figure 5). Thirty-day all-cause readmissions also remained similar from baseline and over the 3-year grant period (13.6%, 17.2%, 15.3%, 15.9% for years 0, 1, 2, 3, respectively; p=ns) (Figure 6).

DISCUSSION

Our quality improvement project shows that dedicated nurse navigators were able to achieve a high rate of compliance with transition interventions, namely, completion of the two-day post-hospital discharge phone call and scheduling patients for early outpatient follow up in the stroke clinic. These interventions had a demonstrable impact on reduction of readmission for recurrent stroke within 12 months. We did not see a reduction in stroke readmissions in years 1 or 2 of the intervention, although by year 3 readmissions had been cut in half compared to baseline year 0. This improvement over the 3 years of the project likely reflects nurse navigators becoming familiar with and developing expertise in their roles, as well as improvements in project staffing, however we cannot rule out the contribution of actual patient characteristics that may have differed during these periods.

It should also be noted that the percentage of patients receiving an initial appointment within 7-10 business days, and the percentage of patients completing the first follow up visit was highest in year three, and it is likely that the early follow up visit in the vascular neurology clinic played an important role in the reduction of readmissions for stroke. These follow up visits serve to consolidate the education that patients received in the hospital and ensure that all secondary prevention measures are in place. Since behavioral changes are key to secondary stroke prevention (e.g. ensuring adherence to medications, smoking cessation, dietary changes, and exercise changes, etc.), it is likely that early follow up by nurse navigators and vascular neurologists in a stroke clinic supports improved patient adoption of preventative measures.

We did not find differences in all-cause readmissions at both three and twelve months when compared to baseline year 0. While it is unclear why the intervention did not impact all-cause readmission, this may be associated with patient characteristics that were not part of our approved quality improvement dataset. However, we also cannot rule out that the highly targeted nature of the secondary stroke prevention intervention was also associated...
Figure 1: Post Discharge Phone Calls. Nurse Navigators made phone calls to stroke patients within two business days of discharge. In the baseline year, no calls were made. In years 1, 2, and 3 the rate of patients receiving calls within 2 days was significantly higher compared to baseline, at 90.1% ($p < 0.0001$), 88.5% ($p < 0.0001$), and 94.3% ($p < 0.0001$) respectively. Key: *** = $p < 0.001$.

Figure 2: Percent Schedule Stroke Follow-up within 7-10 Business Days. Nurse Navigators attempted to schedule patients for stroke clinic follow-up within 10 business days of hospital discharge. This occurred in 7.3% in baseline year 0, but was significantly higher at 65.8% ($p < 0.01$), 64.9% ($p < 0.001$), and 80.7% ($p < 0.0001$) in years 1, 2, and 3 respectively. Key: ** = $p < 0.01$; *** = $p < 0.001$.

Figures 3: Adherence to Stroke Follow-Up Appointment. Percent of patients completing a first follow-up appointment in the stroke clinic after discharge was 39.4% in baseline year 0, but was significantly higher at 61.8% ($p < 0.01$), 74.0% ($p < 0.001$), and 86.4% ($p < 0.0001$) in years 1, 2, and 3 respectively. Key: ** = $p < 0.01$; *** = $p < 0.001$. 

DOI:10.59236/sc.v1i2.30  Stroke Clinician Volume 1, Issue 2, Spring 2024
Figure 4: **Stroke Readmissions at 12 Months.** Percentage of stroke patients who were readmitted within one year for a stroke diagnosis was 8.5% at baseline year 0. In comparison, readmission rates for a new stroke event within 12 months of discharge were 9.0% ($p = ns$), 6.6% ($p = ns$), and 4.2% ($p < 0.01$) for years 0, 1, 2, and 3, respectively. Key: ** = $p < 0.01$.

Figure 5: **All Cause Readmissions at 12 Months.** Percentage of patients discharged with a stroke diagnosis who were readmitted within one year for any cause remained similar at 38.9%, 42.6%, 36.6%, 37.4% for years 0, 1, 2, and 3, respectively.

Figure 6: **All Cause Readmissions at 30 Days.** Percentage of patients discharged with a stroke diagnosis who were readmitted within 30 days for any cause remained similar at 13.6%, 17.2%, 15.3%, 15.9% for years 0, 1, 2, and 3, respectively.
with this finding. Future work should include collection of important patient characteristics including co-morbidities and factors tied to social determinants of health to better enable understanding of how to further develop the navigator intervention to support patient needs.

The Comprehensive Post-Acute Stroke Services (COMPASS) study\textsuperscript{13} is the only published large randomized trial on stroke transitional care; investigators found that the intervention group showed no difference in functional outcomes at 90-days in patients discharged home after stroke, however they also found inconsistent incorporation of the COMPASS model into participating healthcare settings which may have affected study findings. Our interventions were similar to those used in COMPASS, with a two-day phone call and early outpatient follow up, but we focused intensively on nurse navigator compliance with process implementation in relation to readmission outcomes and did not include patient data. We were able to show that in a single hospital/clinic system, process metrics and readmission outcomes could be affected by a transitional care intervention. Others considering implementation of a transitions in care program should focus intently on the degree of process adherence to ensure that CMS criteria are met to a consistent degree.

Our study has limitations that must be acknowledged. First, unlike many programs including COMPASS, our project had the benefit of grant funding to support the hire, education, and training of dedicated nurse navigators whose role was tied exclusively to transitions of care. It is unknown whether programs without this level of support can successfully assist with stroke patient navigation. Second, we focused on the elements required to support CMS billing and are unable to report on how the program impacted other key patient-specific outcomes including complications, functional status, caregiver burden, and quality of life. However, by ensuring compliance with CMS requirements and reducing readmissions, our nurse navigator roles have become self-supporting, positioning us for success in examining how best to enlarge the role to impact these other important outcomes. Third, we were unable to understand whether patient characteristics may have contributed to our findings, and this information is key to fully understanding how best to develop and expand the nurse navigator role. Use of standard data fields may be important to support stroke navigation in the future, enabling comparisons between findings in different programs.

**CONCLUSION**

Stroke transition of care interventions supported by stroke nurse navigators and early vascular neurology follow up may play an important role in reducing admissions for recurrent stroke within the first 12 months after hospital discharge. Further exploration of the impact of transitional care interventions is warranted.

**Note:** This project was conducted at Rochester General Hospital, Rochester, NY, USA.

**Acknowledgements:** The authors wish to thank the Department of Neurology at Rochester General Hospital for their assistance and support of this project.

**Source of Funding:** Greater Rochester Health Foundation, Rochester, NY USA.

**Conflict of Interest:** The authors report no conflicts of interest related to this work.
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