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The Impact of Stroke Nurse Navigation on Patient Compliance Postdischarge

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Abstract

Purpose: The purpose of this study was to describe the impact a stroke nurse navigation program has on concurrent chart reviews and patient compliance postdischarge.

Design: Phase I: Concurrent chart review of The Joint Commission Primary Stroke Center core measures for ischemic stroke patients. Phase II: Longitudinal study of 100 ischemic stroke patients discharged to home.

Methods: Telephone surveys were conducted at prescribed intervals posthospital discharge (Phase II). Surveys focused on medication compliance, follow-up medical appointment compliance, and neurovascular emergency department (ED) visits/readmissions.

Findings: Phase I trends included increased stroke performance measures compliance. Phase II favorable trends included increased medication compliance (>98%), increased follow-up appointments (100%), decreased rate of neurovascular ED visits/rehospitalizations (3%), and improvement in activities of daily living and quality of life measures through 12 months postdischarge.

Conclusions: Stroke nurse navigation increased conformity of stroke performance measures and stroke patient discharge compliance through 12 months postdischarge.

Keywords: Stroke; patient navigation; discharge planning.

Introduction

The Institute of Medicine (IOM) calls for the development of heightened organization and systems of care. Despite multiple successful initiatives to improve stroke care during acute hospitalization, gaps in transitions of care have received further scrutiny in the U.S. health system tied to improved patient outcomes and financial incentives for organizations. Approximately, 795,000 people experience a new or recurrent stroke each year, of which 610,000 are estimated as first events and 185,000 as recurrent ones (Go et al., 2013). Furthermore, an estimated 30% of acute stroke patients will experience at least one readmission within 90 days of discharge, setting the stage for well-executed transitions of care from the acute stroke hospitalization stage through discharge and early outpatient follow-up or rehabilitation (Olson et al., 2011).

The Centers for Medicare & Medicaid Services, the National Quality Forum, and the IOM have called for an improvement in such transitions, stressing that "health systems must develop and implement sustainable transition of care models in collaboration with primary care, other postacute healthcare systems, community-based services, and patients and their families" (Olson et al., 2011, p. ES-2). Further supporting this call for improvement in transitions, The Joint Commission (TJC) launched Comprehensive Stroke Center (CSC) certification in September 2012, which is based on two consensus statements including Recommendations for CSCs (Alberts et al., 2005) and Comprehensive Overview of Nursing and Interdisciplinary Rehabilitation Care of the Stroke Patient (Miller et al., 2010). A large component of CSC certification is support for patient self-management through discharge planning and family readiness, clearly calling for healthcare organizations to strengthen and improve transitions of care for the complex stroke patient (TJC, 2012).

In review of recent literature, there are several high-risk areas related to stroke transitional care: medication compliance, risk factor modification, discharge education, and family support (Alberts & Ovbiagele, 2007; Bushnell et al., 2009; Johnson, Lane, Barber, & Charleston, 2012;

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Romano & Sacco, 2008; West et al., 2012). These vulnerabilities often lead to transition of care complications with preventable hospital readmission and unnecessary emergency department (ED) visits, ultimately compounded by poor functional outcomes and quality of life (Olson et al., 2011). The challenge for healthcare providers is to adapt resources for the patient and their care partners to avert recurrent stroke by curtailing modifiable risk factors (West et al., 2012). The success of recurrent stroke prevention is dependent not only on discharge preparedness of the patient by the providing institution but also on patient-driven factors once the patient is integrated into his or her social environment. These can include, but are not limited to, preconceived notions on health care and medications, ability to afford posthospital care, family/societal support systems, as well as educational or emotional barriers to care (Bushnell et al., 2009). Patient and care partner compliance is a precursory fundamental to ensuring positive patient progress poststroke. Despite multiple studies emphasizing initiatives to improve stroke care during acute hospitalizations, fragmented care is apparent in our current healthcare landscape. Optimal management of patient care should entail a multitiered approach across multiple settings, including lifestyle interventions and pharmacological therapies (Alberts & Ovbiagele, 2007). Telephone follow-up calls provide an effective means to help bridge the gap between acute care and outpatient settings (Harrison, Auerbach, Quinn, Kynoch, & Mourad, 2014; Kripalani, Jackson, Schnipper, & Coleman, 2007). Postdischarge conact not only fosters patient satisfaction but also increases medication adherence and decreases ED visits and readmissions.

The term "patient navigator" has become the healthcare term *du jour* as we strive to reduce systematic insufficiencies created by fractured health systems. In an attempt to streamline care and optimize patient outcomes, many centers have adopted patient navigators. Patient navigators are supportive guides that link patients to a health system. To bridge gaps in care and ensure a smooth transition from acute care to home or other care, a stroke nurse navigation program (SNNP) was developed in 2009 at a 400-bed community hospital and primary stroke center. Stroke survivors and their care partners often have unanswered questions after discharge about medications, prognosis, and follow-up care. The SNNP aimed to identify and address the needs of stroke survivors and their care partners after discharge, highlighting nursing in one of their most traditional roles as patient advocate.

Conceptual Model

The Cancer Navigation Model and Dorothea Orem's Self-Care Deficit Nursing Theory (SCDNT) influenced the evolution of the navigation program. Patient navigation was first introduced in 1990 by prominent surgical oncologist and former president of the American Cancer Society, Dr. Harold P. Freeman, as an attempt to reduce barriers to care in vulnerable oncology populations (Pederson & Hack, 2010; Schwaderer & Itano, 2007). Since then, there has been a precipitous increase in the number of navigation programs in cancer as well as other disease entities. Guided in part by the Cancer Navigation Model (Freeman, 2004) and the Adherence eValuation After Ischemic Stroke Longitudinal (AVAIL) Registry (Bushnell et al., 2009), two part-time nurse navigators introduced the SNNP as a catalyst to facilitate transitions from the acute hospital phase to the community. The SNNP is founded on Dorothea Orem's SCDNT. Orem's SCDNT emphasizes that alterations in both the internal and external environment of an individual associated with disruptions in one's health status results in limitations in self-care (Parker, 2006). Orem's theory utilizes a three-step process to predict expected outcomes. The first step utilizes nursing diagnosis to identify the self-care deficit and develop prescriptive actions. The second step formulates a plan of care with the patient, clearly defining expected outcomes. The third step involves the application, with concurrent evaluation in conjunction with the patient and making modifications as appropriate (George, 2002). Through application of empirical and antecedent knowledge, the SNNP nursing process was defined in conjunction with Orem's SCDNT. Nursing interventions were developed in response to identification of patient-specific self-care demands that surpassed self-care abilities. Chosen for its pragmatic application to the nursing process, SCDNT-based critical thinking operationalizes the goals of the SNNP model. Overall, the SCDNT provided a basis for a patient-specific nursing plan for each enrollee in the SNNP.

Methods

The concept of an SNNP was designed in 2009 for (a) sustainability of TJC certification as a primary stroke center, (b) improving patient care, (c) improving individualized recurrent stroke prevention through nurse navigation resources and education, and (d) a visionary key role for future CSC certification.

The SNNP was conducted in two phases. Phase I consisted of monitoring success of TJC stroke performance measures. Phase II consisted of the institutional review board (IRB)-approved study exploring the impact that SNNPs have on postdischarge medication compliance, follow-up medical appointment compliance, ED visits, hospital readmissions, EuroQol EQ-5D Quality

of Life (QOL), and Barthel Index (BI) through 1 year postdischarge.

Phase I—Concurrent Chart Review

Study Design and Variables

Sustainability of TJC certification as a primary stroke center is a discernible concern for any institution intent on maximizing clinical outcomes as well as patient satisfaction. Two part-time stroke nurse navigators conducted concurrent medical record review in the acute hospital stay as part of a stroke quality improvement initiative before the inception of the IRB-approved SNNP. An observational research design provided insight into SNNP concurrent chart review and compliance with TJC performance measures. Three primary outcomes were analyzed to measure TJC compliance: dysphagia screening completed before oral intake, discharge on a statin medication, and patient-specific stroke education provided to patient before discharge. The dysphagia screen was conducted by an RN using a simple six-question non-evidence-based screening tool; if the screen was positive, then a speech language pathologist (SLP) would conduct an evidence-based Massey swallow study or video fluoroscopy swallow study as appropriate. Compliance was noted on discharge on a statin if a physician ordered the statin and the medication was found on the discharge medication reconciliation form. Last, stroke education included warning signs/symptoms of stroke, stroke risk factors, importance of activating 911, prescribed medication education, and instructions for follow-up after discharge. Analysis of Group A measured TJC compliance prior to the inception of the SNNP, from January through June of 2008. Evaluation of Group B measured compliance postprogram initiation, from January through June 2009.

Phase II—Implementation of Postdischarge Navigation

Study Design and Variables

Two stroke nurse navigators submitted an observational longitudinal study, which was approved by the local IRB. Inclusion criteria included all ischemic stroke patients between the ages of 18 and 90 years old who were discharged to home or to an acute rehabilitation hospital. Patients excluded from participation included: any patient concurrently undergoing cancer treatment or dialysis, patients discharged to a skilled or extended nursing facility, and patients residing out of the hospital service area. The enrollment goal was 100 patients during the time period between November 2009 and September 2011; all study subjects provided written informed consent.

Phase II consisted of initial interaction between the patient and/or care partner and the stroke nurse navigator during the acute hospitalization. Baseline data included a self-reported prestroke/preadmission BI and QOL assessment. The patient intake assessment occurred in the acute care setting and was the baseline for all future follow-up calls. A thorough review of medical, psychosocial, and psychological history was obtained at intake to assess patient and family preparedness to provide posthospital care. Inpatient cognitive evaluations by SLP were conducted on all stroke patients to appraise appropriate enrollment participation. If cognitive functioning had declined, then family/significant others would assist with answering study questions. Detailed patient education was provided in conjunction with the staff nurse and ancillary disciplines. Additional discharge data included five follow-up phone calls at specific intervals: 7 days, 30 days, 3 months, 6 months, and 12 months (±3 days). Stroke nurse navigator contact information was provided along with the follow-up call schedule.

Additional contact was encouraged outside of scheduled calls as patients and/or care partners deemed necessary. Interval telephone targeted questions included medication adherence, physician follow-up, return ED visits and/or subsequent hospital admissions, and smoking. In addition, QOL and BI parameters were assessed as well. Referrals for health psychology were made when appropriate. Each call addressed patients' needs to promote medical regime compliance. Patients who were nonadherent with medicine regimes due to financial burden were provided prescription resources and given lists of no/low-cost clinics. Coordination with prescribing physicians was also established, and affordable alternatives were recommended, as needed. Reinforcement of patient-specific stroke education was provided along with community resources and support groups.

Patient Navigation Tool. Each phone interview consisted of subjective and objective inquiries. The stroke nurse navigator relied on patient self-reporting for medication adherence, physician follow-up appointments, return ED visits/rehospitalizations, and smoking. Medication adherence was defined as taking medications as directed per the discharge instructions or per instruction of an outpatient physician visit poststroke. Physician follow-up appointment adherence was defined as "a scheduled or completed follow-up appointment with either the primary care provider or neurologist based on discharge order instructions." Subjective responses to patient-perceived recovery process were recorded along with objective indicators on current functional outcomes using the QOL and BI tools. Contact with significant others, children, or patient-appointed designees was established with patient permission if needed. Questions reflecting lifestyle changes were consistently reviewed including smoking cessation, home monitoring of blood pressure and/or blood glucose, diet

modifications, as well as incorporation of a physical exercise regime. Patient-specific education was reviewed along with the warning signs and symptoms of stroke and importance of calling 911.

EQ-5D Quality of Life Scale. Patient perception of current health status was assessed through the descriptive quality of life scale. Permission was obtained from the EuroQol Executive Office for use of the EQ-5D tool. The five dimensions of the scale include mobility, self-care, usual activities, pain/discomfort, and anxiety/depression (Rabin, Oemar, & Oppe, 2011). Stroke survivors received a 1 indicating no problems, a 2 indicating some problems, and a 3 indicating extreme problems. In general, the higher the descriptive QOL scale, the lower the patient's perception of their current health status. Repeated-measures ANOVA were conducted for each of the EQ-5D variables across time points for the 61 individuals who completed the entire 12-month study.

Barthel Index. Patient participation in activities of daily living (ADLs) and mobility were assessed using the 10-item BI. The BI monitored progression over the course of the 12 months in participation of ADLs such as feeding, dressing, grooming, bathing, bladder and bowel ability, toileting assistance, maneuvering in and out of a bed and chair, walking distance, and ability to navigate stairs. The maximum calculated score achievable is 100, indicating patient independence. A lower score indicates assistance is required to perform routine ADLs (Mahoney & Barthel, 1965).

Readmission Rates. Readmission rates were divided between all cause events and neurovascular-related events, with neurovascular-related admissions including recurrent ischemic or hemorrhagic stroke and transient ischemic attack (TIA). Data were analyzed from the 61 patients that completed 12-month study follow-ups, compared to all non-navigated ischemic stroke patients at the primary stroke center, as well as a peer group most closely matching our research population using Premier/Quality Advisor, utilizing the QUEST peer group of nonteaching hospitals with greater than 175 beds. Launched in 2007, QUEST evolved from Premier's pay-for-performance demonstration. It is a collaboration between over 300 hospitals to design and implement projects using data to drive improvements across six domains: harm, mortality, evidence-based care, patient experience, readmissions, and cost of care (Premier, 2016).

Findings

Phase I—Concurrent Chart Review Results

Results of Phase I, pre-SNNP (January through June 2008, Group A) as compared to post-SNNP (January through June 2009, Group B) were favorable (Supplemental Digital Content [SDC] Table S1, http://links.lww.com/RNJ/A4). Demographics for Group A = 53% male, 47% female, and average age 69.8 years. Demographics for Group B = 49% male, 51% female, and average age 71.2 years. Chi-square analysis was conducted on dysphagia screening, discharged on statin, and stroke education at discharge. Overall analysis indicated that concurrent chart review with interventions by the stroke nurse navigator led to statistically significantly differences between Group A and Group B for dysphagia screening and stroke education.

Dysphagia Screening

For Group A, 50 of 73 eligible patients (68%) had a dysphagia screening prior to their first oral intake, whereas Group B had 66 of 69 (96%) patients screened ($\chi^2 = 17.94$, $p < .001$).

Discharged on Statin

Group A revealed that 43 of the 51 patients (84%) received a statin order upon discharge. In Group B, 45 of 50 patients (90%) were discharged on a statin medication ($\chi^2 = 0.73$, $p = .394$). Although statistical significance was not demonstrated, stroke nurse interventions led to higher performance measure compliance.

Stroke Education Before Discharge

Group A had 40 of 68 patients (59%) receive stroke education, and Group B had 58 out of 68 patients (85%) ($\chi^2 = 11.38$, $p = .001$).

Phase II—Implementation of Postdischarge Navigation Results

A total of 100 ischemic stroke patients with a mean National Institute of Health Stroke Scale (NIHSS) of 5.3 enrolled into the study. Over half of study participants were men ($n = 65$). The mean age was 65.3, ranging from 31 to 86 years old. The subjects were predominantly Caucasian ($n = 98$). In all, 61 of 100 patients (61%) completed the 12-month follow-up study. Of the 39 patients who did not complete the study, five patients died and 34 disenrolled (no longer wished to be called or unable to be contacted despite multiple attempts). The causes of death included myocardial infarction, end-stage chronic obstructive pulmonary disease, lung cancer, end-stage renal disease, and basilar artery occlusion. Of note, the patients who died had a higher baseline NIHSS (7.4) and a lower baseline BI (93). By 3 months, there was a decline in patient participation. This trend in attrition continued through the 6-month follow-up and into the final 12-month follow-up call.

Several significant transitions of care issues were evaluated within the 61 patients, completing the 12-month

navigation program. These transitions of care issues included medication adherence, physician follow-up appointment adherence, ED visits, smoking, overall daily functioning using the BI, and patient's self-perceived quality of life using the QOL. Readmission rates were analyzed at the following intervals: 30-day all cause, 30-day neurovascular causes, 12-month all cause, and 12-month neurovascular cause.

Medication Adherence

The SNNP evaluated patient medication compliance through one 12 months poststroke by self-report. At 7 days, patients reported the lowest compliance rate of 93.4% (n = 57). By 30 days, self-reported compliance increased to 96.7% (n = 59). The two most common reasons for noncompliance with medications were inability to understand or retain their stroke medication instructions given in the hospital and financial constraints. To help rectify the former limitation, navigators would review each medication then provide education with the patient and care partner. Financial assistance was provided for those in need through drug prescription assistance programs, community resource centers, and low-cost health clinics in the area. By the 3-month follow-up call, medication compliance was 95.1% (n = 58). The medication review and education continued, and at 6 months and 12 months, the compliance was 98.4% (n = 60) (SDC Table S2, http://links.lww.com/RNJ/A4).

Physician Follow-up Adherence

At 7 days, 98.4% (n = 60) of patients had seen a physician (primary care, neurologist, or cardiologist). By the 3-month follow-up call, 100% (n = 61) of patients had followed up with a least one physician (SDC Table S2, http://links.lww.com/RNJ/A4).

ED Visits

Returning to the ED was specifically captured for a diagnosis of recurrent stroke (either ischemic or hemorrhagic). All cases were confirmed by the stroke nurse navigator since the patients returned to the same hospital. The highest number of stroke visits occurred within the first 3 months and then tapered off over the next 9 months, reaffirming a strong need for transition of care to reduce ED visits and/or hospitalizations (SDC Table S2, http://links.lww.com/RNJ/A4).

Smoking

At baseline (prestroke event), 21.3% (n = 13) of the study patients smoked. This is slightly higher than the national average of 19% (Centers for Disease Control and Prevention [CDC], 2011). For study purposes, a patient was considered a smoker if the patient used one tobacco-like product during the follow-up period. At 7 days, 1.6% (n = 1) of patients reported continued use of tobacco products. This extremely low number continued at the 30-day follow-up call. By 3 months, there was a small increase (3.3%, n = 2) in smoking. At the end of the 12 months, 4.9% (n = 3) reported continued use of tobacco products (SDC Table S2, http://links.lww.com/RNJ/A4).

Functional Status

Regaining functional status after stroke is paramount to overall recovery. Performing one's own ADLs can be the difference between home and institutionalization after discharge from acute care or rehabilitation. The BI followed a similar pattern as the QOL outcomes with significant changes across time points (F = 8.12, p < .001). Specifically, from baseline (prestroke) to 7 days, there was a significant decrease in overall ADL functioning, followed by an increase in ADL functions with improvement to near baseline levels by 3 months and relatively stable functions between 3 and 12 months (SDC Table S2, http://links.lww.com/RNJ/A4). There were five deaths within the 12-month timeframe. The prestroke BI of the patients who died (93) was significantly lower than the rest of the study patients (98), suggesting that premorbid ADL functioning may impact stroke recovery.

Quality of Life

Upon analysis, there were statistically significant changes in mobility (F = 4.91, p < .001), self-care (F = 6.53, p < .001), and usual activities (F = 3.21, p < .001) as measured by the QOL scale across time points. In general, all of these variables showed a pattern of significant decline from baseline to 7 days poststroke. Mobility and self-care showed improvement near baseline levels by 3-month poststroke with relative stability at 6 and 12 months. Usual activities also improved significantly between 7 days and 3 months poststroke and were stable thereafter but did not return to baseline levels. No significant changes were noted in pain (F = 0.76, p = .58) or anxiety/depression (F = 1.29, p = .27) across time points. However, it was noted that patients who disenrolled had significantly higher baseline rates of anxiety/depression (F = 2.54, p = .013). No other significant differences in demographics or prestroke ratings were noted between those who disenrolled and those who completed the 12-month program (SDC Table S3, http://links.lww.com/RNJ/A4).

Readmissions

A prior history of stroke or TIA increases the risk for readmissions, most specifically during the first 3-month poststroke discharge, leaving the patient and healthcare

organization vulnerable if transitions of care are not addressed appropriately. Of the 61 patients navigated through 12-month postdischarge, there was a 7% all cause 30-day readmission rate, compared to 9% in non-navigated patients and 10% in the Premier peer group. Continuing to compare the 30-day neurovascular readmission, 12-month all cause readmission, and 12-month neurovascular readmission (SDC Table S4, http://links.lww.com/RNJ/A4), there appears to be an incremental decrease in readmissions, although not statistically significant. The positive trend in reduced readmissions could be due to multiple reasons including a small navigation sample size, unmatched groups regarding stroke severity, cerebrovascular risk factors, age, and gender. It is difficult to determine if navigation directly impacted all cause and neurovascular cause readmissions without a matched control group.

Conclusions

Phase I of the study demonstrated that concurrent chart auditing and coaching may improve compliance with TJC stroke performance measures, specifically with regard to dysphagia screening and stroke education. Phase II of the study identified that the SNNP interventions can promote medication compliance and physician follow-up, impact smoking cessation, and potentially decrease ED visits/rehospitalizations for stroke through 12-month poststroke in up to 90%.

The largest impact on QOL subscales occurred between 7 and 30 days, with mobility, self-care, and performance of usual activities being the most significant. Of note, anxiety and depression subscales did not increase throughout the study; however, review of the disenrolled group revealed higher initial anxiety/depression scores. Functional outcomes using the BI followed a similar pattern as QOL, with the largest functional decrease occurring between baseline (prestroke) to 7 days and gradually increasing over the 1-year study period. The study also demonstrated a decrease in the readmission rate at 30 days and 12 months, although not statistically significant.

Limitations of this study include a small, convenience sample of relatively homogenous Caucasians from an affluent suburban community, which may not be generalizable to the community-at-large. Also, there was relatively high attrition between 6 and 12 months (only 61 patients completing the entire program). This may have been attributed to study fatigue or patient perception that the need for navigation was greatest in the first 3–6 months poststroke, diminishing as patients assimilated back to baseline ADLs. Also, it is important to note that this was an observational longitudinal study in which the study subjects did not receive any compensation for participation, which may further account for attrition. Another limitation was that no data were collected for the average length of time of each call. Although the same questions were asked of each individual at each call, often patients would have questions that further lengthened the phone survey. Length of each call time would be helpful for replication of study and resource management. It would be of interest to compare the outcomes of an SNNP when patients are discharged home from an acute rehabilitation facility instead of directly home from acute care as in this study. In addition, the study lacked concurrent stroke controls for comparison. Although this study does provide the framework for a controlled study of nurse navigation in stroke, it would be prudent to conduct a randomized controlled trial of an SNNP compared to usual care to augment the statistical significance of the findings. Duration of navigation may be tailored based on this experience, with ischemic strokes being navigated for 6 months only as a result of the aforementioned analysis, allowing for more patients to benefit from the current resources. A detailed cost analysis should also be completed to further justify such nursing roles and resources. These encouraging findings should be tested in a clinical trial setting to study the influence of an SNNP among nurse-navigated patients versus those who receive usual stroke care.

Clinical Relevance

Concurrent chart auditing and coaching may improve compliance with TJC stroke performance measures ensuring quality standards of stroke care. Medication compliance, physician follow-up appointment compliance, and smoking cessation may improve with an SNNP model and subsequent follow-up phone calls. Together, risk factor modifications, medication compliance, and timely, periodic physician follow-up care can significantly reduce hospital ED visits and rehospitalizations, thereby reducing costs. Multiple comorbidities affect baseline ability to perform ADLs. This same population is at higher risk for depression. Baseline depression screenings in the acute care stroke population can lead to early detection and subsequent treatment. By identifying and treating depression early, compliance with personal health initiatives may increase. The QOL functional scale reveals patients are most vulnerable during the first 30 days; important as reimbursement rates for readmissions are dwindling during this postdischarge time frame.

Discussion

The potential for self-care deficits is a ubiquitous theme among all patients, especially noted within the stroke population. According to Dorothea Orem, a self-care

Key Practice Points

- Nurse navigation in stroke holds the potential to impact transition of care challenges (e.g., risk factor modifications, medication compliance, physician follow-up, readmissions) and improve patient outcomes.
- Nurse navigation frequent telephone support may increase patient's accountability to assist with smoking cessation.
- Concurrent chart auditing with education and mentoring of nursing staff and physicians increases compliance with The Joint Commission stroke performance measures.
- Further formal testing of stroke nurse navigation in a clinical trial setting may be justified.

deficit specifies when nursing intervention is required. Common self-care requisites are prevalent throughout the life cycle and are integral to basic human functioning (Parker, 2006). Deviations in self-care requisites are often noted after life-altering events such as stroke. As a result, nursing intervention is often required when an individual is incapable of providing effective self-care. The SNNP can be an effective tool to assist in the return of functional status of stroke patients. Analytical review of the SNNP revealed a high rate of medication compliance and follow-up visits similar to that of the AVAIL study (Bushnell et al., 2011). The high attrition rate between 6 and 12 months warrants a much closer look at the duration of the navigation period as it relates to resources. A shorter follow-up time period that is tailored based on the individual stroke patient's needs may be the answer, but a formal clinical trial could help determine appropriate resource allocations. It is clear that, with the changes in the medical landscape, the SNNP provides a viable solution to improve medication compliance, increase follow-up medical appointment compliance, reduce stroke readmissions, and promote the overall well-being of stroke patients.

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References

Alberts, M. J., Latchaw, R. E., Selman, W. R., Shephard, T., Hadley, M. N., Brass, L. M., … Walker, M. D. (2005). Recommendations for comprehensive stroke centers. A consensus statement from the Brain Attack Coalition. *Stroke*, *36*, 1597–1616.

Alberts, M. J., & Ovbiagele, B. (2007). Current strategies for ischemic stroke preventing: Role of multimodal combination therapies. *Journal of Neurology*, *254*(10), 1414–1426.

Bushnell, C., Olson, D. M., Zhao, X., Pan, W., Zimmer, L. O., Goldstein, L. B., & Peterson, E. D. (2011). Secondary preventive medication persistence and adherence 1 year after stroke. *Neurology*, *77*, 1182–1190.

Bushnell, C., Zimmer, L., Schwamm, L., Goldstein, L.B., Clapp-Channing, N., Harding, T., … AVAIL Registry (2009). The adherence evaluation after ischemic stroke longitudinal (AVAIL) registry: Design, rational, and baseline patient characteristics. *American Heart Journal*, *157*(3), 428–435.

Centers for Disease Control and Prevention (2011). *Summary health statistics for U.S. adults: National health interview survey*. Retrieved from http://www.cdc.gov/nchs/data/series/sr_10/sr10_256.pdf

Freeman, H. P. (2004). A model patient navigation program. *Oncology Issues*, Sept/Oct(19), 44–46.

George, J. B. (2002). *Nursing theories* (5th ed.). Upper Saddle River, NJ: Prentice Hall.

Go, A. S., Mozaffarian, D., Roger, V. L., Benjamin, E. J., Berry, J. D., Borden, W. B., … Turner, M. B. (2013). Heart disease and stroke statistics–2013 update: A report from the American Heart Association. *Circulation*, *127*, e6–e245.

Harrison, J. D., Auerbach, A. D., Quinn, K., Kynoch, E., & Mourad, M. (2014). Assessing the impact of nurse post-discharge telephone calls on 30-day admission rates. *Journal of General Internal Medicine*, *29*(11), 1519–1525.

Johnson, C., Lane, H., Barber, P. A., & Charleston, A. (2012). Medication compliance in ischemic stroke patients. *Internal Medicine Journal*, *42*(4), e47–e52.

Kripalani, S., Jackson, A. T., Schnipper, J. L., & Coleman, E. A. (2007). Promoting effective transitions of care at hospital discharge: A review of key issues for hospitalists. *Journal of Hospital Medicine*, *2*(5), 314–323.

Mahoney, F. I., & Barthel, D. W. (1965). Functional evaluation: The Barthel index. *Maryland State Medical Journal*, *14*, 61–65.

Miller, E. L., Murray, L., Richards, L., Zorowitz, R. D., Bakas, T., Clark, P., & Billinger, S. A. (2010). Comprehensive overview of nursing and interdisciplinary rehabilitation care of the stroke patient: A scientific statement from the American Heart Association. *Stroke*, *41*, 2402–2448.

Olson, D. M., Prvu Bettger, J., Alexander, K. P., Kendrick, A. S., Irvine, J. R., Wind, L., … Graffagnino, C. (2011). *Transition of care for acute stroke and myocardial infarction patients: From hospitalization to rehabilitation, recovery, and secondary prevention*. Evidence Report No. 202. AHRQ Publication no. 11 (12). Rockville, MD: Agency for Healthcare Research and Quality.

Parker, M. E. (2006). Dorthea E. Orem's self-care deficit nursing theory. In M.E. Parker (Ed.), *Nursing theories and nursing practice* (2nd ed., pp. 141–155). Philadelphia, PA: F.A. Davis.

Pederson, A., & Hack, T. (2010). Pilots of oncology health care: A concept analysis of the patient navigation role. *Oncology Nursing Forum*, *37*(1), 55–60.

Premier. (2016). *Improve quality of care with accurate, robust data*. Retrieved from https://www.premierinc.com/transforming-healthcare/healthcare-performance-improvement/quality-improvement/qualityadvisor/

Rabin, R., Oemar, M., & Oppe, M. (2011). *EQ-5D-3 L UserGuide: Basic information on How to use the E-5D-3 L Instrument*. Retrieved from http://www.euroqol.org

Romano, J. G., & Sacco, R. L. (2008). Progress in secondary stroke prevention. *Annals of Neurology*, *63*(4), 418–427.

Schwaderer, K., & Itano, J. (2007). Bridging the healthcare divide with patient navigation: Development of a research program to address disparities. *Clinical Journal of Oncology Nursing*, *11*(5), 633–639.

The Joint Commission. (2012). The Joint Commission launches new comprehensive stroke center certification program. *The Joint Commission Perspectives*, *32*(10), 6–7.

West, A., Cox, M., Zimmer, L. O., Fedder, W., Weber, C., Drew, L., & Olson, D. M. (2012). An evaluation of stroke education in AVAIL registry hospitals. *Journal of Neuroscience Nursing*, *44*(3), 115–123.

Instructions:

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The authors and planners have disclosed that they have no financial relationships related to this article.

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