Preventing Rehabilitation Readmissions for Individuals with Stroke

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Capstone Project: Preventing Rehabilitation Readmissions for

Individuals with Stroke

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Abstract

Current post-acute care transitions are frequently fragmented, disorganized and can be confusing for patients and families. Through a coordinated and systematic approach to care transitions, readmissions to acute care may be reduced. Patients with stroke provide an excellent model for care transitions due to the complicated nature of the diagnoses, the prevalence of complications that occur and the potential to enter the healthcare system at any point along the continuum. Yet little evidence exists with respect to preventing stroke rehabilitation patients from being re-hospitalized to acute care. The purpose of this capstone project was to implement and evaluate a checklist targeted to improve the transition of care in stroke patients discharged home from inpatient rehabilitation. The findings of the project suggest the checklist was effective in reducing readmissions for the stroke rehabilitation population discharged home. Further evaluation and validation is indicated by using the checklist with other rehabilitation diagnoses as well as within other rehabilitation units and facilities.

Keywords: stroke, transition of care, rehabilitation, readmissions
Introduction and Background

Current transitions of care are frequently fragmented and disorganized. Transitions of care can be confusing for patients and families and failure to determine the appropriate level of care can contribute to a high level of hospital readmissions (Camicia et al., 2014). This places vulnerable patients at risk for both safety and quality concerns (Naylor, Aiken, Kurtzman, Olds & Hirschman, 2011; Camicia et al., 2014). There is an urgency to prevent readmissions as the impetus to provide quality, cost-effective, yet coordinated care is being mandated by policy makers such as the Centers for Medicare and Medicaid Services (CMS) (Chen et al., 2010; Kansagara et al., 2011).

Preventing readmissions, defined as an admission to a hospital within 30 days of discharge from the same or another hospital is a priority for the CMS (CMS, 2013). The Affordable Care Act (ACA) mandates Inpatient Rehabilitation Facilities (IRFs) report quality indicators with resulting reductions in payment for noncompliance; readmissions are part of the IRF Quality Reporting Program (QRP) and must be reported to CMS beginning in fiscal year 2016 (CMS, 2013). The Inpatient Rehabilitation Facility Quality Reporting System (IRF QRS) mandates that IRFs monitor and report readmission rates with potential penalties incurred as a result (CMS, 2013). In 2010, the readmission rate for rehabilitation patients discharged home and readmitted to acute care within 30 days was 12%. Thus, the financial impact and burden can be both costly and detrimental to IRFs if readmission rates are overlooked or ignored (Roberts et al., 2014). In addition, the National Quality Forum (NQF) has proposed an All-Cause Readmissions indicator for rehabilitation hospitals. This indicator will provide a measure of the effectiveness of the care transitions for the rehabilitation patient population (NQF, 2013, 2014).
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One in five Medicare patients is readmitted to a hospital within 30 days of discharge. This is related to a variety of factors including the lack of post discharge care coordination and follow through (Greenwald, Denham & Jack, 2007; Greenwald & Jack, 2009; Jencks, Williams & Coleman, 2009; James, 2013). Among Medicare fee-for-service patients, the cost of readmissions is estimated to account for approximately $12 billion of healthcare costs annually with approximately 75% of readmissions determined to be avoidable (Hansen, Young, Hinami, Leung & Williams, 2011).

Stroke accounts for a large portion of disability and utilization of health care services along the continuum of care. As such, stroke patients often enter and leave the health care system at multiple points along the continuum, leaving them particularly vulnerable for fragmented care (Kind, Smith, Frytak & Finch, 2007). Stroke is the fourth major cause of disease burden worldwide and the third leading cause of death in the United States (Go et al., 2013). Together, heart disease and stroke are among the most widespread and costly health problems facing the nation today, accounting for more than $500 billion in health care expenditures and related expenses in 2010 (Agency for Healthcare Research and Quality [AHRQ], 2010). Of the many individuals surviving a stroke, nearly 30% are admitted to an IRF after their acute hospital stay. IRFs provide intensive rehabilitation to patients recovering from illness or injury, delivering at least three hours of physical, occupational and speech therapy daily, along with 24 hour rehabilitation nursing care. It is estimated up to 35% of Medicare patients are discharged to a post acute care setting, such as an IRF, each year. In 2012, over 373,000 Medicare beneficiaries received care in IRFs resulting in almost $6.7 billion dollars in Medicare payments (Medicare Payment Advisory Commission [MedPAC], 2014).
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There is not a standard definition for transitions of care although the American Geriatrics Society’s Position Statement has defined it as “a set of actions designed to ensure the coordination and continuity of healthcare as patients transfer between different locations or different levels of care within the same location” (Coleman & Boult, 2003, p. 556) while Naylor et al. (2011) describes it as wide-ranging activities which are time-limited to promote continuity of care across settings.

The majority of the literature on transitions of care has focused on hospital readmissions following acute care hospitalization (Lichtman et al., 2010). Evidence suggests that by using a coordinated and systematic approach to care transitions, readmissions to acute care can be reduced (Coleman & Berenson, 2004; Huffman, 2005; Greenwald, Denham & Jack, 2007; Greenwald & Jack, 2009; Jencks, Williams & Coleman, 2009; Miller et al., 2010; Lavizzo-Mourey, 2013; Camicia et al., 2014). However, CMS and MedPAC have acknowledged that little evidence exists with respect to preventing stroke rehabilitation patients from being re-hospitalized to acute care (MedPAC, 2014).

**Problem Statement**

Current post-acute care transitions are frequently fragmented and disorganized. The problem of readmission to acute care among stroke patients discharged home from rehabilitation can be a result of poor transitions of care, lack of communication among caregivers, patients and families and complex and multiple patient comorbidities. This can be mediated by an assessment of discharge planning needs versus resources available, contributing to an organized, comprehensive, and coordinated discharge transition plan to home. The purpose of this capstone project was to implement and evaluate an evidence based checklist targeted to systematically
coordinate and improve the transition of care in stroke patients discharged home from inpatient rehabilitation.

Stroke is the fourth major cause of disease burden worldwide and the third leading cause of death in the United States (Go et al., 2013). Together, heart disease and stroke are among the most widespread and costly health problems facing the nation today, accounting for more than $500 billion in health care expenditures and related expenses in 2010 (Agency for Healthcare Research and Quality [AHRQ], 2010). Many individuals surviving a stroke, nearly 30 %, are in need of, and admitted to an inpatient rehabilitation facility (IRF). Yet current post-acute care transitions are frequently fragmented and disorganized and can be confusing for patients and families. Failure to determine the appropriate site of care has contributed to a high level of hospital readmissions (Camicia, et al., 2014). Preventing readmissions is a priority for the Centers for Medicare and Medicaid Services (CMS). The Affordable Care Act (ACA) mandates that IRFs report quality indicators with resulting reductions in payment for noncompliance; readmissions are part of the IRF Quality Reporting Program (QRP) and must be reported to CMS beginning in Fiscal Year 2016 (CMS, 2013).

Review of the Literature

Methods

A comprehensive review of the literature for stroke and transitions of care evidence was conducted. The databases utilized during the search included the Cumulative Index of Nursing and Allied Health (CINAHL), OVID and the PubMed of the National Library of Medicine.
For PubMed, the following Medical Subject Headings (MeSH) terms were used: stroke and continuity of patient care. Stroke is defined in the PubMed MeSH term as “a group of pathological conditions characterized by sudden, non-convulsive loss of neurological function due to brain ischemia or intracranial hemorrhage” (MeSH Browser, 2014). Continuity of patient care is defined in the PubMed MeSH term as “health care provided on a continuing basis from the initial contact, following the patient through all phases of medical care” (MeSH Browser, 2014). Using the terms stroke and continuity of patient care yielded 224 articles for the PubMed search. Case reports, letters to the editor, commentaries and editorials were excluded from the search. Inclusion criteria included: articles published in the last 10 years, English language, human subjects and full text available resulted in one hundred twenty one articles. Only those articles pertaining to the United States (US) health system were included due to the unique payment and regulatory policies (as well as incentives and penalties) of healthcare in the US. Each article was reviewed for relevancy in terms of topic and content. This resulted in a final count of approximately 3 dozen articles for review.

Using the CINAHL database “find any of my search terms” for stroke patients and continuity of care was used which resulted in thousands of articles. In further defining the topic the terms readmissions, discharge planning and rehabilitation were added. This resulted in 107 articles. Applying the same inclusion and exclusion criteria identified above resulted in 49 articles for consideration. The search strategy of “find all of my search terms” using the terms stroke patients and continuity of care resulted in 28 articles. Inclusion criteria of articles published within the last 10 years, human subjects only and those articles in English from the US were considered. Articles that were duplicative of the PubMed search or that did not meet the
inclusion criteria were eliminated. Each article was reviewed for relevancy in terms of topic and content which yielded 16 relevant articles. Discussion of the studies reviewed follows.

The research reviewed includes specific intervention components for the transition as well as discharge planning, referrals, follow-up, and community resources. Included are randomized, controlled trials of transitional care interventions compared with usual care (n = 6); prospective or retrospective observational studies (n = 7), systematic reviews (n = 2) and a clinical practice guideline (CPG).

Evidence suggests that a coordinated and systematic approach to transitions of care across health system providers and institutions can result in fewer readmissions (Coleman & Berenson, 2004; Huffman, 2005; Greenwald, Denham & Jack, 2007; Greenwald & Jack, 2009; Jencks, Williams & Coleman, 2009; Miller et al., 2010; Camicia et al., 2014). Lutz (2004) posits that discharge plans should consider caregiver resources and patient needs early in the rehabilitation process. Key elements identified in the literature as being essential to successful and efficient transitions include active patient engagement, coordination of care and services and education on medication, equipment and follow-up care (Coleman & Berenson, 2004; Lutz, 2004; Huffman, 2005; Greenwald, Denham & Jack, 2007; Balaban, Weissman, Samuel & Woolhandler, 2008; Jack et al., 2009; Greenwald & Jack, 2009; Jencks, Williams & Coleman, 2009; Miller et al., 2010). Parker et al. (2002) identified four themes of interventions to reduce readmissions which include: discharge planning protocols, comprehensive assessments, discharge support arrangements and educational interventions. However, little evidence exists regarding specific interventions targeted to prevent rehabilitation stroke patients discharged home from being readmitted to acute care.
Transition of Care Interventions

Several randomized controlled trials (RCT) demonstrate the critical role nurses have within transitions of care. Coleman, Parry, Chalmers and Min (2006) tested whether a care transitions intervention could reduce rates of rehospitalization among Medicare recipients. The intervention group (n=379) received the care transitions intervention which included medication management assistance, patient-centered personal health record, timely follow up with primary care and a list of “red flags” for patients to refer to. The control group (n=371) received usual care. The study determined using this care transitions intervention was both effective and low cost in reducing Medicare readmissions. The intervention group reported high levels of confidence in terms of understanding and proactively managing their health including medication administration. The rehospitalization rates of the intervention group versus the control group were lower at 30 days (8.3 versus 11.9, \( p = 0.048 \)) and at 90 days (16.7 versus 22.5, \( p = 0.04 \)).

The Coleman et al. (2006) findings are consistent with findings in a RCT study by Balaban, Weissman, Samuel and Woolhandler (2008). They evaluated a low-cost nurse-led intervention facilitating the transition of patients to their respective pre-existing medical care provider. The intervention group (n=47) received a 4-step intervention which included a 1) patient discharge form in one of 3 languages, 2) telephone call by a nurse to the patient, 3) transfer of the discharge form to the next setting, 4) review (with possible changes) of the discharge plan by the primary care provider. Concurrent (n=49) and historical control (n=100) groups received usual care and discharge instructions in English. For the intervention group, 25.5% had one or more undesirable outcomes. The intervention group had 55.1% of one or more
undesirable outcomes and the historical group had 55.0% of one or more undesirable outcomes. The intervention group was also more likely to follow up with a primary health care provider within 21 days of discharge and have less incomplete post discharge work ups versus concurrent \((p=0.005)\) and historical groups \((p=0.01)\).

Jack et al. (2009) describe a “re-engineered discharge” (RED) in their randomized controlled study. According to the authors, despite many readmissions identified as being preventable, hospital discharge procedures have not been standardized. In this study, nurses, as discharge advocates, organized follow-up appointments, medication reconciliation and patient education for the intervention group \((n=370)\) of stroke patients. Post discharge, a pharmacist contacted patients to reinforce information. Patients in the intervention group had a lower rate of hospital usage compared to the usual care group \((n=368)\) \((95\% \text{ Confidence Interval [CI] 0.515 – 0.937; } p = 0.009)\). While the intervention provided transitions of care services which were found to be effective, a limitation is the study was conducted within a single site.

In a randomized controlled study by Allen et al. (2008), control \((n=190)\) and intervention subjects \((n=190)\) with NIH stroke scores of equal to or greater than 1 (indicating the patient had a stroke) were discharged from a large community hospital in Ohio. The aim of the study was to test an interdisciplinary post-discharge stroke management intervention versus usual care of discharge planning. In home assessments were performed by a nurse, followed by development of an interdisciplinary plan of care which was managed by the nurse. The control group received usual care. Although the treatment effect was near zero for most outcomes, the stroke knowledge and lifestyle component demonstrated a significant effect \((p = 0.0003)\). This suggests that post discharge education was beneficial in filling a knowledge need for patients with a stroke. The
study was conducted in a teaching hospital in Ohio and included patients who 1) had an ischemic stroke (thus excluding hemorrhagic strokes), 2) could speak English and 3) lived within 25 miles of the medical center.

The aforementioned RCT studies are limited as they are focused on specific geographic areas (Colorado, Ohio and Boston) and results may not be generalizable to other geographic regions. The Balaban et al. (2008) study focused on a small community hospital with a culturally and ethnically diverse patient population of intervention (n=47), controls (n=49) and historical controls (n=100); while subjects in the Jack et al. (2009) study were English speaking and younger with an average age of 49.9 years (n=749), therefore results may not be generalizable.

Coleman, Smith, Frank, Min, Parry and Kramer (2004) conducted a quasi-experimental study in Colorado, measuring rates of post discharge hospital usage at 30, 90 and 180 days. Study participants had one of nine conditions determined to be high risk for hospital and emergency usage and included an intervention group (n=158) and controls (n=1234). The intervention included patient encouragement to take a more active role, with ongoing communication and guidance from a nurse transitions coach. The intervention group reported high levels of confidence in terms of understanding and proactively managing their health including medication administration. The adjusted odds ratio (OR) for re-hospitalization of intervention versus controls were 0.52 (95% CI 0.28-0.96) at 30 days; 0.43 (95% CI 0.25-0.72) at 90 days; and 0.57 (95% CI 0.36-0.92) at 180 days. Besides being geographically limited, another limitation of the study was the dependence on administrative data sources for data collection.
Predictors of Readmission

There are many clinical conditions, patient factors and system processes that may impact the risk for a hospital readmission (Jencks, Williams & Coleman, 2009). In general, risk adjustment models are poorly understood and often inconsistently applied when exploring transitions of care. Some models do not account for health system level factors or social determinants, which may contribute to the risk for readmission (Kansagara et al., 2011).

In a retrospective study, Kind, Smith, Frytak and Finch (2007) explored predictors of complicated transitions within 30 days after discharge for stroke patients. Subjects included 39,384 Medicare beneficiaries discharged with ischemic stroke over a 2 year period in the Southeastern United States. Twenty percent (20%) experienced at least one complicated transition of which 16% of this group experienced more than one complicated transition. Factors predictive of a complicated transition included older age, African American, Medicaid recipient, gastrostomy tube, length of stay, chronic disease, prior hospitalization and discharge site. It is unclear as to whether the findings from the Kind et al. (2007) study could be applied to patient diagnoses other than stroke. However, patients with stroke provide an excellent model for care transitions due to the complicated nature of the diagnoses, the prevalence of complications that occur and the potential to enter the healthcare system at any point along the continuum.

For rehabilitation patients in particular, several retrospective studies identify the primary factor predictive of readmission as lower functional status of the patient (Chung, Niewczyk, DiVita, Markello & Granger, 2012; Ottenbacher et al., 2012; Hoyer et al., 2013; Ottenbacher et al., 2014). Roberts et al. (2014) confirmed functional status and added the need for enteral feeding upon admission as being predictive for readmission.
While patients discharged to post-acute settings have often been omitted from research on readmissions, Ottenbacher et al. (2014) argues this patient population is important for three reasons: 1) patients at risk for readmission are often transitioned to post-acute settings from acute care 2) CMS now requires 30 day readmission as a national quality indicator and 3) CMS is exploring a bundled payment option to align performance incentives and costs.

Utilizing data from the Stroke Underserved Populations Recovery database, Ottenbacher et al. (2012) examined a cohort of patients with stroke (n = 674) who received rehabilitation services at 11 facilities located in eight states from 2005 through 2006. The primary outcome being measured was re-hospitalization within 3 months of discharge from rehabilitation. Results showed that 18% of patients were admitted to acute care during the target period. Key predictors, although somewhat variable, included functional motor status (OR = 0.98, 95% CI 0.96-0.99), depressive symptoms (OR = 1.80, 95% CI 1.06-3.05) and social support (OR = 2.28, 95% CI 1.29-4.03). Thus functional status, depressive symptoms and social support were important predictors for readmission for this sample stroke population. Limitations of the study include the researchers using Medicaid and educational level as a proxy for socioeconomic status, the occurrence of readmission being patient self-report and data obtained from 11 rehabilitation facilities which may not be representative of the industry nationally.

Chung et al. (2012) utilized a retrospective design to analyze cases in a rehabilitation database between 2008 and 2009. The sample included patients with the most severe case mix group (CMG) for stroke (n = 223). For patients having an unplanned discharge to acute care versus home, functional status was the lone predictor. After adjusting for severity of stroke,
comorbid conditions, demographic variables, payer, onset days, and admission to rehabilitation
day of week, patients discharged to acute care had a much lower functional motor score
\((p < 0.05)\). The study has limitations in that it included only the most severe category of stroke
patients and the determination of comorbid conditions relied upon accurate coding using the
International Classification of Diseases, 9th edition versus the actual review of the medical
record.

Using a retrospective design, Hoyer et al. (2013) explored functional status of patients as
a predictor for readmission. Patients admitted to a single rehabilitation hospital between January
2009 and June 2012 (\(n = 1515\)) were included. There were a total of 347 unplanned readmissions
(20%). Total readmission was significantly associated with functional status for the lowest (\(OR =
2.6, 95\% CI 1.9-3.7; p < 0.001\)) and middle tertiles (\(OR = 1.7, 95\% CI 1.2-2.4\)). Limitations of
the study included occurring at a single academic medical center, thus generalizability may be
limited. The study included a variety of rehabilitation diagnoses, not just patients with stroke.

Roberts et al. (2014) examined risk factors for readmission to acute care from inpatient
rehabilitation among stroke patients. Using a retrospective design, they examined stroke patients
(\(n = 783\)) admitted to a large academic center between 2008 and 2012. The researchers identified
two significant factors predictive for patients being readmitted to acute care from inpatient
rehabilitation. These were: admission motor functional status (\(OR = 0.97, 95\% CI 0.95-0.99\)) and
enteral feeding at admission to rehabilitation (\(OR = 2.87, 95\% CI 1.34 – 6.13\)). The findings of
this study confirm functional status and enteral feeding as predictors of readmission.

Ottenbacher et al. (2014) conducted a retrospective review of Medicare patients (\(n =
736,536\)) receiving rehabilitation between January 2006 and 2011. Adjusted readmission rates by
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state for rehabilitation patients ranged from 9.2% to 13.6% depending on the impairment, with an overall average adjusted readmission rate of 11.8%. For patients with stroke, among the ten case mix groups (CMGs) within that impairment, readmission rates varied from 9.0% (95% CI, 8.4% - 9.7%) to 16.7% (95% CI, 15.9% - 17.4%). In this same study, Ottenbacher et al. (2014) confirmed that rehabilitation patients with higher motor and cognitive scores (indicating better functional status) experienced lower readmission rate across all impairment groups. There are several limitations in the study: only patients discharged to the community from rehabilitation were included; differences between planned and unplanned readmissions were not analyzed and administrative (billing) data were utilized; therefore, a dependence on reliability, accuracy and completeness of data for billing is a potential limitation.

Because of the requirements of the Inpatient Rehabilitation Facility Prospective Payment System (IRF PPS) mandated by CMS, functional status is uniformly assessed and reported using the Inpatient Rehabilitation Facility Patient Assessment Instrument (IRF-PAI). Therefore, the consistency of study findings identifying lower functional status as a predictor for readmissions is insightful for clinicians caring for this patient population.

Role of the Nurse in Transitions of Care

Barriers to effective care transitions are often categorized into 3 domains, which include the patient, the clinician or provider, and the healthcare delivery system (Coleman, 2003; Greenwald & Jack, 2009; Greenwald, Denham & Jack, 2007). The nurse is often identified as a key contributor in facilitating transitions of care. Recommendations from a CPG of stroke care and coordination confirm the critical role nurses have in transitions of care (Miller et al., 2010).
Reducing readmissions to improve quality of care and reduce costs has gained the attention of a variety of stakeholders (Jencks, Williams & Coleman, 2009; Naylor, 2011; CMS, 2013; NQF, 2013).

In a systematic review of interventions to reduce 30-day rehospitalizations, Hansen, Young, Hinami, Leung and Williams (2011) developed a taxonomy of evidence-based interventions identified in the literature for transitions of care. They created three primary categories for interventions which included pre-discharge, post discharge and interventions which bridged the transition to home. For the pre-discharge interventions, patient education and discharge planning were most common evaluated interventions. For post discharge, follow up telephone calls, dedicated patient “hot lines”, home visits, timely outpatient visits and follow up with a provider were most common interventions. Finally interventions evaluated to help bridge the transition to home included a transition coach, patient centered instructions and continuity between inpatient and outpatient care. The researchers reported that the vast majority of studies they reviewed were observational in design and that no single intervention was effective in minimizing readmissions. Because of heterogeneity of study designs, along with inconsistent context utilized within the studies, limitations on the ability to complete a full meta analysis was identified by the researchers.

**Synthesis of the Evidence**

Based on this review of the literature, strong evidence suggests a coordinated transition intervention focusing on the patient and family, including specific discharge instructions and active patient engagement through coaching, can be cost effective while reducing the number of
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readmissions. Post discharge, follow up contact along with provider continuity is equally important. Miller et al. (2010) states the importance of the healthcare professional to arrange and perform follow up contact post discharge to the stroke rehabilitation patient and family. Camicia et al. (2014) suggest it is the nurse who is the healthcare professional “best able to coordinate, support and oversee the discharge transition process to promote quality outcomes and cost-effective care” (p. 13).

There is a multitude of clinical conditions, patient level factors and system processes which may impact the risk for a readmission (Jencks, Williams & Coleman, 2009). Key elements identified in the literature as being essential to successful and efficient transitions include active patient engagement, coordination of care and services and education on medication, equipment and follow-up care (Coleman & Berenson, 2004; Lutz, 2004; Huffman, 2005; Greenwald, Denham & Jack, 2007; Balaban, Weissman, Samuel & Woolhandler, 2008; Jack et al., 2009; Greenwald & Jack, 2009; Jencks, Williams & Coleman, 2009; Miller et al., 2010). Parker et al. (2002) identified four themes of interventions to reduce readmissions which include: discharge planning protocols, comprehensive assessments, discharge support arrangements and educational interventions.

There is an opportunity to enhance transitions of care by reducing readmissions for patients discharged home by coordinating the transition through nurse led and managed oversight (Camicia et al., 2014). This is especially true in rehabilitation settings where patients have experienced a traumatic event resulting in long term consequences of disabilities. In the IRF setting, functional status is traditionally measured by a uniform assessment tool, the IRF-PAI. By the early identification of patients most at risk for readmission post discharge (such as those
patients with lower functional status), proactive management will improve the transition of care and may ultimately reduce the risk of readmission back to acute care. Rehabilitation nurses must be skilled in facilitating transitions of care and advocating on behalf of patients and families (Camicia et al., 2014). The evidence based checklist utilized for this project can easily be incorporated as a standard of practice into rehabilitation facilities and hospitals throughout the United States to ultimately reduce readmissions to acute care for stroke rehabilitation patients discharged home.

**Theoretical Model**

It is essential for any change initiative to be successful one must first fully understand the current situation, need, or problem (Lehman, 2008). Planned change when purposeful and deliberate can bring about desired change(s). Lewin’s Theory of Change (Appendix B) was an appropriate theoretical framework for the proposed intervention for several reasons. Lewin’s Change theory (1951), sometimes referred as ‘force field analysis’, is built on the premise of 3 stages: Unfreezing, Moving, Refreezing. Restraining and driving forces impact change in the model.

This capstone project targeted using an evidence based transition of care checklist. In order to be successful, healthcare organizations and systems (including clinicians) had to change the way the discharge process occurred for stroke patients completing inpatient rehabilitation. Processes were changed to reflect use of the checklist; specifically, the case managers were required to engage and have buy in. This is equivalent to the ‘unfreezing’ stage. The ‘moving phase’ was when the change occurred – specifically implementation – of using and completing the intervention checklist for stroke rehabilitation patients discharged home. The ‘refreezing’
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stage was achieved when the checklist was adopted and utilized consistently during the trial period and ultimately became a standard of practice. The “maintenance” of any change is important in order to prevent regression or past practices from occurring (Mitchell, 2013).

Lewin’s Theory considers both restraining and driving forces to change (Lewin, 1951). While staff may exhibit restraining forces such as reluctance to change, an attitude of “this is the way we’ve always done things” or outright refusal, that was not the case for this project. Driving forces that were identified included the need to improve existing readmission rates for those stroke patients discharged home from the rehabilitation unit. In addition, the Director of Rehabilitation provided support, oversight and encouragement during the project.

The readmission rate for stroke patients discharged from rehabilitation program was 9.5% for 2013 and 6.4% for 2014. The stroke readmission rate for 2013 was higher than that for all patients discharged home from the rehabilitation unit, which was 4.96%. Nationally, the 30 day readmission in the MedTel Outcomes database in 2013 and 2014 for all stroke patients was 6.9% and 6.7%, respectively. However, the rehabilitation unit experienced a gradual increase in 30 day readmissions for stroke patients during the fourth quarter of 2014. This rate of 14.3% was significantly higher than the 30 readmission rate of 6.4% for the nation for similar cases.

Financial incentives from the Centers of Medicare and Medicaid (CMS), hospital policy and positive reinforcement, commitment and enthusiasm at the individual rehabilitation unit level served as driving forces to support the use of the intervention. According to Lehman, “When thinking of change, consider policies, processes, procedures, products, and personnel” (2008, p. 178). This is sound advice when implementing an intervention. Proactively planning
for change will lead to greater success than retroactively responding to unforeseen problems (Cork, 2005).

**Project Description and Implementation**

The capstone project was a quality improvement initiative to reduce readmissions for stroke patients discharged home from inpatient rehabilitation. A guided checklist completed upon discharge by the case managers and utilized for stroke rehabilitation patients discharged home served as the intervention. The checklist encompassed elements identified in the literature as being critical to successful transitions including active patient engagement, coordination of care and services and education on medication, equipment and follow-up care (Appendix A). The checklist contained critical elements such as: medication education/reconciliation with patient teach-back, issuing adaptive equipment, scheduling follow-up appointments, lab work, tests and services (such as home care), home evaluation results, a customized home exercise/activity program, provision of community resources such as support groups and family training and active patient and family engagement as necessary tasks to complete to ensure a safe, systematic and coordinated discharge.

The checklist was initiated upon admission and completed for all stroke rehabilitation patients discharged home from inpatient rehabilitation during the months of January and February 2015. The readmission rate for stroke patients discharged from rehabilitation program was 9.5% for 2013 and 6.4% in 2014. This rate is higher than that for all patients discharged home from the rehabilitation unit in 2013, which was 4.96%. In addition, the rehabilitation unit saw a significant increase in 30 day readmissions for stroke patients during the fourth quarter of
2014. The rehabilitation unit’s rate of 14.3% was much higher than the national rate of 6.4% for similar cases in the nation. These data indicated an opportunity for the unit to improve outcomes by reducing readmission rates for the stroke rehabilitation patient.

Training on the checklist was done via a power point presentation one on one with the Director of Rehabilitation. Training occurred during the last week of December 2014 at a mutually agreed upon date and time determined by the Director of Rehabilitation and the DNP student. Content included key elements on the topic of transitions of care along with the checklist and the plan for implementation. The Director of Rehabilitation reviewed the project with the two designated case managers on the rehabilitation unit. Regular telephone conversations as well as emails occurred between the Director of Rehabilitation and the DNP student to ensure smooth implementation and use of the checklist throughout the months of January and February. Supervision for the accurate and timely completion of the checklist for each patient by the case managers was conducted by the Director of Rehabilitation with final oversight by the DNP student.

At the completion of the data collection (February 28, 2015), the Director of Rehabilitation provided all completed checklists to the DNP student. The DNP student carefully reviewed each completed form with the Director of Rehabilitation. Each checklist had been accurately and completely filled out without any missing data. The DNP student then met with MedTel Outcomes staff to ensure follow up telephone calls were made to the discharged patients from the rehabilitation program per MedTel Outcomes protocols. After the follow up calls were been completed, the DNP student coordinated with the Data Coordinator regarding data entry.
After data entry and results of the follow up calls were completed, the DNP student met with the owner of MedTel Outcomes to run reports and evaluate readmissions data from the database for the participating facility as compared to national benchmarks for similar facilities. The process of making follow-up phone calls, data entry and running benchmarking reports was clearly specified in the policies and procedures of MedTel Outcomes. Adherence to the policies and procedures was maintained per protocol to ensure data validity and reliability.

**Setting**

The setting in which the intervention was implemented and evaluated was a large, not for profit tertiary 958 bed hospital and multi-specialty academic health center in the United States located in a metropolitan area. The precise setting for which the intervention was implemented was a 28 bed inpatient rehabilitation unit contained within the larger acute care facility. The unit has approximately 200 stroke discharges each year, with nearly 85% of those patients discharged home. In 2013, over 96% of rehabilitation patients were still living in the community 80 to 180 days after discharge compared to 93% of patients nationally. The readmission rate for stroke patients discharged from rehabilitation program was 9.5% for 2013 and 6.4% in 2014. This readmission rate was higher than that for all patients discharged home from the rehabilitation unit in 2013 which was 4.96%. However, the rehabilitation unit experienced an increase in 30 day readmissions for stroke patients during the fourth quarter of 2014. The rate of 14.3% was significantly higher than the 30 readmission rate of 6.4% for the nation for similar cases during the fourth quarter.
MedTel Outcomes compares characteristics of stroke patients (age, gender, demographics, severity and type of stroke) and benchmark outcomes of rehabilitation, including readmissions. The facility subscribes to MedTel Outcomes, which allows them to compare themselves in terms of rehabilitation outcomes to other facilities in the database. Regional and national benchmarks are provided to the facility for comparative purposes as a result of participating in the database. Data for the reports are risk-adjusted so that an accurate depiction of both patient characteristics and rehabilitation outcomes are represented.

Trained, credentialed registered nurses (RNs) at MedTel Outcomes made post-discharge follow-up phone calls. Call times were made to patients per protocol to determine the incidence of a readmission. The RNs attempted to contact each patient a minimum of three times. For patients who are not reached, the reason is tracked and trended and provided back to the facility. The RNs collected MedTel specific additional questions and customized facility specific questions, six days per week, both day and evening hours. MedTel Outcomes has an existing process in place for all follow-up phone calls; there was no change needed to this existing practice (Illig, 2004). There was no additional cost to the facility for these services and reports.

Population

The population was patients with stroke discharged to home from the rehabilitation unit; stroke patients were included regardless of race, gender, age or ethnicity. Inclusion criteria for the sample was all patients with stroke admitted and subsequently discharged home from the rehabilitation unit during the months of January and February 2015. There were a total of twenty (n = 20) patients with the majority being men (55%). The length of stay for the stroke patients was 14.7 days compared to the national average of 16 days. Overall average age of the stroke
population was 74 years compared to the national average of 68 years. The vast majority did not have a tiered comorbid condition (65%) as identified by the letter A preceding the case mix group (CMG). Thirty percent (30%) had a low tiered comorbidity as indicated by the letter D preceding the CMG. The comorbidity tier is calculated by the CMS payment system for inpatient rehabilitation facilities. No patients had the highest comorbidity tier (indicated by the letter B) and 5% had a medium tiered comorbidity as indicated by the letter C. All twenty patients completed inpatient rehabilitation and were discharged home. The vast majority (n = 11) went home with family. There were eight (n = 8) patients who went home with home health services and one (n = 1) patient went home with friends. All patients were considered a home / community discharge per CMS. See Table below for a summary of stroke patient characteristics.

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>11</td>
<td>55%</td>
</tr>
<tr>
<td>Female</td>
<td>9</td>
<td>45%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Average Age</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>74.8 years</td>
</tr>
<tr>
<td>Women</td>
<td>72.8 years</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Length of Stay (LOS)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>14.7 days</td>
</tr>
<tr>
<td>Men</td>
<td>19.18 days</td>
</tr>
<tr>
<td>Women</td>
<td>9.20 days</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Case Mix Group (CMG)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>0102</td>
<td>5</td>
<td>25%</td>
</tr>
<tr>
<td>0104</td>
<td>2</td>
<td>10%</td>
</tr>
<tr>
<td>0106</td>
<td>3</td>
<td>15%</td>
</tr>
<tr>
<td>0107</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>0109</td>
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<td>10%</td>
</tr>
<tr>
<td>0110</td>
<td>7</td>
<td>35%</td>
</tr>
</tbody>
</table>
STROKE CHECKLIST TO PREVENT READMISSIONS

<table>
<thead>
<tr>
<th>Comorbidity Tier</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>13</td>
<td>65%</td>
</tr>
<tr>
<td>B</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>C</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>D</td>
<td>6</td>
<td>30%</td>
</tr>
</tbody>
</table>

Key Stakeholders, Facilitators and Barriers

In order to achieve success of the capstone project, key stakeholders were engaged. The Director of Rehabilitation was the primary contact and served as facilitator. This individual worked closely with the DNP student throughout the duration of the project. Stakeholders also included MedTel Outcomes (since it is the data repository site), as well as the selected rehabilitation unit, the case managers and administration within the facility. One barrier noted in the use of the checklist was the existing workload of the two case managers. An additional challenge for implementation in other settings may be facilities that do not have an individual(s) responsible for the discharge process as this could present a barrier to the checklist being utilized and completed consistently.

Protection of Human Subjects

The intervention was a quality improvement initiative to reduce readmissions for stroke patients discharged home from inpatient rehabilitation. This quality improvement project was site specific. It was not research with generalizable results rather it was research translation; thus IRB approval was not needed (Department of Health and Human Services [HHS], 2009).

There were minimal risks identified for human subjects from the intervention. Proper data management ensured that data were collected, accurately and easily retrievable and confidentiality maintained. Data checks were in place to ensure missing data was nonexistent.
STROKE CHECKLIST TO PREVENT READMISSIONS

whenever possible. Information was kept on password protected computers. All data were de-identified, aggregated at the stroke population level and the checklist did not contain sensitive individual patient information. Both security and confidentiality of the information was maintained as indicated on either password protected computers or locked offices at the participating facility by the Director of Rehabilitation as well as by MedTel Outcomes.

Goals and Objectives

The project aimed to enhance transitions of care by coordinating discharge through an evidenced based checklist and consequently reducing readmissions for stroke patients discharged home from rehabilitation. Processes were modified to reflect the new intervention and case managers were engaged in the process with supervision and support provided by the Director of Rehabilitation and the DNP Student. This was equivalent to the “unfreezing” stage. The moving phase was when the change occurred – specifically implementing and using the checklist for patients with stroke who were admitted to the rehabilitation unit. The ‘refreezing’ stage was achieved when the intervention (checklist) was consistently adopted and utilized as part of the routine discharge process for the stroke patients.

The overarching goal of the proposed intervention was to reduce readmissions back to acute care for stroke rehabilitation patients by improving the transition from inpatient rehabilitation to home. Specifically, key results of the project included:

1. A care transitions checklist for stroke patients discharged was utilized by the case managers for stroke rehabilitation patients discharged home in the months of January and February 2015.
2. At the end of 1 month, 100% of stroke patients discharged from inpatient rehabilitation received individualized and customized discharge instructions as per the checklist.

3. At the end of 1 month, a post discharge telephone call was attempted on 100% of stroke patients discharged home to determine if a readmission had occurred within 30 days after discharge from rehabilitation.

4. At the end of 1 month, the readmission rate for stroke patients discharged home from the rehabilitation unit did decrease as evidenced by preliminary reports provided by MedTel Outcomes.

Budget

Budget considerations were estimated to the best of available information and included training material and resources and other miscellaneous expenses (Appendix G). Personnel costs included the project manager who also served as evaluator of the project. The DNP Student served as project manager and donated time for this endeavor therefore funding was not required for this individual. Because the aggregation of benchmarking reports is inherent in the services provided by MedTel Outcomes, there were no additional costs associated with this. The Data Coordinator, as part of her daily job, provided oversight to the data entry process on information collected by the follow up telephone calls made by the RNs. Because of the nature and desire of the participating unit wanting to improve its readmission rate for its stroke rehabilitation population, the Director of Rehabilitation saw the project as an opportunity for quality improvement. No extra staff time beyond scheduled shifts was required to complete the checklist; therefore, expenses to cover potential salary costs for training was not warranted.
Instead, gift cards were provided to the Director of Rehabilitation and staff as a thank you for participation in the project. Discussions and clarification throughout the project were done via email and telephone calls. Meeting space, when needed, was donated by MedTel Outcomes. Minor non-personnel expenses were anticipated for the project along with miscellaneous printing and project supplies. The majority of time was spent by the DNP student in preparing a power point presentation for education and resource to the participating rehabilitation site. In order to minimize costs, SPSS® software rented. The budget for the proposed project was initially anticipated for $700 but actual costs were significantly less as indicated in Appendix G.

Timeline

The project time frame spanned several months including initial training (completed the end of December 2014) with data collection occurring during January and February 2015. Follow up telephone calls were attempted in April with data analysis also occurring in April (see Appendix H).

Results

Sources of Data

The evaluation of this intervention targeted to improve care coordination and prevent readmissions of stroke patients discharged to home from rehabilitation provided valuable insight into meaningful outcomes at the population level. A national data base, MedTel Outcomes, exists for rehabilitation hospitals to compare characteristics of stroke patients (age, gender, demographics, severity and type of stroke) and benchmark outcomes of rehabilitation, including readmissions. The MedTel Outcomes data base served as the data repository for this intervention. The goal of MedTel Outcomes was, and is, to provide clients with a confidential
STROKE CHECKLIST TO PREVENT READMISSIONS

method to collect accurate data to evaluate, document and manage patient outcomes. MedTel Outcomes has nearly a 25 year history of providing data collection services to the healthcare industry and its clients. Trained, credentialed registered nurses (RNs) at MedTel Outcomes made post-discharge follow-up phone calls. Call times were made to patients per protocol to determine the incidence of a readmission. MedTel Outcomes has an existing process in place for all follow-up phone calls; thus there was no change needed to this existing practice (Illig, 2004).

Trained RNs from MedTel Outcomes collected data and numerous variables for the stroke patients discharged in January and February 2015. These data were collected on standard MedTel Outcomes form and served as the foundation for monitoring patient satisfaction and determination of readmission rates (Appendix C). The RNs collected MedTel specific additional questions and customized facility specific questions, six days per week, both day and evening hours. Data were then reported back to the rehabilitation facility in a variety of reports (Appendix D).

Data Analysis

MedTel Outcomes nurses attempted to contact eight (n = 8) patients as part of the follow-up as scheduled per policy and procedure during the month of April. One patient had an invalid telephone number which was not in service. Telephone calls have been made to the remaining seven (n = 7) patients by called by MedTel Outcomes nurses, but have not been reached. Based upon MedTel Outcomes’ policies and procedures, for patients not reached via telephone in a given month, these calls will be “carried over” to the next month. After three attempts of trying to contact the patient and / or family, these cases are categorized as “unobtainable” in the reports utilized for benchmarking and are considered lost to follow-up. The remaining twelve patients
STROKE CHECKLIST TO PREVENT READMISSIONS

(n = 12) have not been contacted per MedTel Outcomes but will be in May. At this time, they are considered “lost to follow up” for the purpose of this project.

All evidence based checklists were accurately and fully completed. There was no missing data from the transition checklist. Nearly all of the patients did not require any follow-up lab work; this was indicated on the checklist by the code of 1 = not applicable or not needed. In addition, the majority of patients (n = 14) did not have or require a home evaluation.

The Director of Rehabilitation received internal reports for any rehabilitation patient admitted back into the healthcare system. Preliminary data from the Director of Rehabilitation indicated none of the twenty patients experienced a readmission back into the hospital’s healthcare system within 30 days of discharge from rehabilitation to home. While this does not imply that a patient could not have been readmitted elsewhere, the data are encouraging that these patients discharged home from inpatient rehabilitation and who had the checklist completed, did not re-enter this particular facility’s healthcare system as a 30 day readmission.

Quality

Since nearly all rehabilitation hospitals have key personnel responsible for overseeing the discharge process, internal validity was maximized due to limiting multiple staff in using the checklist. The Director of Rehabilitation was the primary contact to work with the DNP Student to oversee the intervention. For the follow-up telephone calls by MedTel Outcomes, existing quality control checks were in place for the follow-up telephone services. This included data entry checks and validation as well as the monitoring the length of each call and completion rate by each RN. The RNs attempted to contact each patient as part of follow-up services offered by MedTel Outcomes. The number one reason for the past 8 years has been the phone number of the
patient being disconnected. Overall, MedTel Outcomes has an overall success rate of contacting and collecting follow-up data on 86% to 88% of patients discharged between 80-180 days post discharge.

For MedTel Outcomes, policies and procedures and quality control efforts existed with respect to data collection. All nurses completed an orientation period upon hire with additional training provided annually or more often, if indicated. After initial training, all RNs then completed telephone calls with supervision from the President/Owner of MedTel Outcomes. In addition, the RNs successfully completed initial training on functional assessment, passed the competency testing as indicated by educational records and logs and successfully completed supervised telephone calls. This process ensured data integrity, validity and reliability. Data were entered into the MedTel Outcomes database for the facility and aggregated via a computer program per internal protocols. The Data Coordinator had oversight of this as policies and procedures existed on the process of data entry. All data were de-identified at the patient level and aggregated by facility.

Evaluation of readmission data pre and post intervention was conducted to see if the intervention was associated with an improved transition of care for stroke patients as evidenced by a decrease in readmission rate. The evaluation was an outcomes documentation evaluation to determine if the goal of reaching the desired outcome was attained (Issel, 2014). The MedTel Outcomes database contains meaningful data reported at an aggregate level. Evaluation of the intervention through preliminary data determined there was a difference in the readmission rates before and after the intervention checklist for stroke patients. It was possible to determine population level data (stroke patients) for this rehabilitation facility pre-intervention (what the
rate of readmissions for stroke patients discharged to home from rehabilitation was) and compared the readmission rate after the intervention for that same facility. Individual facility and national baseline data for stroke readmissions from rehabilitation to acute care was used for comparison. National data indicate that there are variations among facilities and geographic regions as well as within severity adjusted stroke sub-groups (Hoyer et al., 2013).

**Discussion**

In order to be successful, healthcare organizations, systems and clinicians must change the way the transition process occurs for patients and ensure respectful and coordinated care is delivered in a manner compatible with a patient’s cultural health beliefs, practices and preferred language (Anderson, Scrimshaw, Fillilove, Fielding & Normand, 2003). In today’s healthcare environment, there is a need to improve transitions of care and identify patients most vulnerable at risk for readmission. This is becoming increasingly important for healthcare systems as a component for quality of care (Anderson et al., 2003). The ACA stipulates penalties for higher than expected readmission rates. This, along with increased scrutiny and possible consequences from CMS, are powerful reasons to improve transitions of care to reduce readmissions (Hansen et al., 2011; NQF, 2013, 2014).

Transitions of care are often complex (Camicia et al., 2014). Preliminary results from this project indicated successful transitions of care processes encompass critical elements that were included on the checklist: active patient engagement, coordination of care and services and education on medication, equipment and follow-up care. All evidence based checklists were accurately and fully completed. There was no missing data from any of the checklists. Almost
all of the patients did not require any follow-up lab work; in addition, the majority of patients did not have or require a home evaluation.

The Director of Rehabilitation received internal reports for rehabilitation patients admitted back into the healthcare system. Preliminary data from the Director of Rehabilitation indicated none of the twenty patients experienced a readmission back into the hospital’s healthcare system within 30 days of discharge from rehabilitation to home. While this does not imply that a patient could not have been readmitted elsewhere, the data are encouraging that these patients discharged home from inpatient rehabilitation and who had the checklist completed, did not re-enter this particular facility’s healthcare system.

Limitations

While preliminary internal reports from the rehabilitation facility indicated the evidence based checklist was successful in reducing readmissions for patients with stroke discharged home from inpatient rehabilitation, follow-up phone calls were attempted for only 40% of the patients during April. From these patients, one telephone number was not in service. Another 60% of the patients are placed on MedTel’s follow-up list with efforts to contact them in May before determining they are “unobtainable”. Thus efforts to contact and follow-up the remaining stroke rehabilitation patients discharged home will continue for the next few months.

Future Recommendations

There is an opportunity to enhance transitions of care by reducing readmissions for patients discharged home by coordinating the transition (Camicia et al., 2014). This is especially true in rehabilitation settings where patients have experienced a traumatic event resulting in long term consequences of disabilities. In the IRF setting, functional status is traditionally measured
by a uniform assessment tool, the IRF-PAI. By the early identification of patients most at risk for readmission post discharge (such as those patients with lower functional status), proactive management can improve the transition of care and may ultimately reduce the risk of readmission back to acute care. Nurses must be skilled in facilitating transitions of care and advocating on behalf of patients and families (Camicia et al., 2014). Future recommendations include completing the analysis of data from completed follow-up telephone calls from MedTel Outcomes over the next several months. In addition, further evaluation and validation is indicated by trialing the checklist with other rehabilitation diagnoses as well as within other rehabilitation units and facilities.

**Conclusion**

The purpose of this capstone project was to implement and evaluate a checklist targeted to improve the transition of care in stroke patients discharged home from inpatient rehabilitation. The preliminary findings of the project suggested the checklist was effective in reducing readmissions for the stroke rehabilitation population discharged home based on internal facility reports. This must be confirmed additionally by MedTel Outcomes as part of the ongoing follow-up services provided to the rehabilitation unit. Further evaluation and validation will need to occur by using the checklist with other rehabilitation diagnoses as well as within other rehabilitation units and facilities.
References


STROKE CHECKLIST TO PREVENT READMISSIONS


STROKE CHECKLIST TO PREVENT READMISSIONS


STROKE CHECKLIST TO PREVENT READMISSIONS


Appendix A. Discharge Transition Checklist for Stroke Patients

Checklist for Discharge Transition to Home

CMG _________

Date / Initials

_________ Review discharge instructions with patient

_________ Have patient complete “teach back” of discharge instructions

_________ Reconcile medications

_________ Obtain medication prescriptions for patient from provider

_________ Order all discharge equipment

_________ Arrange for follow-up services such as home care, Outpatient Therapy, etc.

_________ Schedule follow-up appointment with Primary Care Physician/Others as indicated

_________ Schedule follow-up lab work, if any

_________ Provide individualized Home Exercise/Activity program to patient, if applicable

_________ Provide listing of community resources such as Support Group, etc.

_________ Provide copy of Home Evaluation results with recommendations, if applicable

Reason Item(s) Not Done: MUST CODE EACH ABOVE ITEM NOT COMPLETED

1 ---- Not applicable or not needed

2 ---- Patient Refused

3 ---- Patient Preference (to complete task or appointment)

4 ---- Other (please explain)

DONE BY MEDTEL OUTCOMES ONLY:

_________ Conduct follow-up phone call: Follow-Up Phone Call Done by MedTel Outcomes

Appendix B. Lewin’s Change Theory

The situation

Forces driving change

Forces resisting change

(Lewin 1951)
Appendix C. MedTel Outcomes Sample Follow-Up Form

<table>
<thead>
<tr>
<th>Facility Number:</th>
<th>Patient Name:</th>
<th>Telephone:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facility Name:</td>
<td></td>
<td>Call Attempts</td>
</tr>
<tr>
<td>Patient ID:</td>
<td></td>
<td>Date</td>
</tr>
<tr>
<td>Admission Date:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discharge Date:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marital Status:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disc. Living Setting:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Follow-up Date:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initials:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Follow-up Living Setting**
- Home 1
- 2-3 Room and Care 2
- Trans. Living 4
- Home 6
- Skilled Nursing 8
- Acute Unit 7
- Acute Unit Another 7
- Chronic Hospital 9
- Rehab Facility 10
- Other 11
- Expired 13
- Alternate Care 13
- Subacute 13
- Assisted Living 14
- Other 15

**Follow-up Living With**
1. Alone 1
2. Family Member 3
3. Friends 4
4. w/ Paid Attendance 5
5. Other 6

**Follow-up Vocational Cnt.**
1. Employed 1
2. Sheltered 2
3. Student 3
4. Homemaker 4
5. Not Working 5
6. Retired - age 6
7. Retired - disability 7

**Follow-up Vocational Eff.**
1. Complete 1
2. Partial 2
3. None 3
4. Other 4

**Follow-up Information Source**
1. Patient 1
2. Family 3
3. Other 4
4. Unable to Reach 5

**Follow-up Health Maintenance**
1. Referral to FIM prior to scoring 1
2. Referral to FIM after scoring 2

**Follow-up Therapy (Current)**
1. None 1
2. Outpatient 2
3. Home-based 3
4. Both 4
5. Long Term Care 5
6. Other 6
7. Day Treatment 7

**Follow-up Therapy (Any)**

**Follow-up Hospitalization (Any)**
1. None 1
2. 2 Days 2
3. 3 Days 3
4. 4 Days 4

**Follow-up Hospitalization (30 Day)**
1. None 1
2. 2 Days 2
3. 3 Days 3
4. 4 Days 4

**Overall Satisfaction**
1. Very Dissatisfied 1
2. Somewhat Dissatisfied 2
3. Satisfied 3
4. Very Satisfied 4

**Rapid Response**

---

*Printed On: 11/2/2011 9:11 am*
STROKE CHECKLIST TO PREVENT READMISSIONS

Appendix D. MedTel Outcomes Sample Report

### Patients w/ 30-Day Post Discharge Hospitalization

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>01-Stroke</td>
<td>6.3</td>
</tr>
<tr>
<td>02-Brain</td>
<td>7.8</td>
</tr>
<tr>
<td>03-Neuro</td>
<td>12.2</td>
</tr>
<tr>
<td>04-Neural</td>
<td>8.6</td>
</tr>
<tr>
<td>05-Amp</td>
<td>24.0</td>
</tr>
<tr>
<td>06-Anth</td>
<td>5.0</td>
</tr>
<tr>
<td>07-Pains</td>
<td>6.8</td>
</tr>
<tr>
<td>08-Ortho</td>
<td>5.4</td>
</tr>
<tr>
<td>09-Card</td>
<td>6.7</td>
</tr>
<tr>
<td>10-Pulm</td>
<td>5.3</td>
</tr>
<tr>
<td>11-Burns</td>
<td>1.9</td>
</tr>
<tr>
<td>12-Const</td>
<td>15.7</td>
</tr>
<tr>
<td>13-Other</td>
<td>3.7</td>
</tr>
<tr>
<td>14-Mult</td>
<td>1.0</td>
</tr>
<tr>
<td>15-Dev.</td>
<td>1.0</td>
</tr>
<tr>
<td>16-Deb3</td>
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</tr>
<tr>
<td>17-Cmp</td>
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### 30-Day Post-Discharge Hospitalization

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>_gen</td>
<td>1.0</td>
</tr>
<tr>
<td>rehab</td>
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<tr>
<td>both</td>
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### Patients In Community

<table>
<thead>
<tr>
<th>Percent</th>
</tr>
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<tbody>
<tr>
<td>87.1%</td>
</tr>
</tbody>
</table>

### Average FIM Score

<table>
<thead>
<tr>
<th>Avg FIM</th>
<th>102</th>
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</table>

### Any Post-Discharge Hospitalization

<table>
<thead>
<tr>
<th>Hosp %</th>
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<table>
<thead>
<tr>
<th>Bench %</th>
<th>18</th>
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</table>

Printed On: 5/30/2013

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## Appendix E. Readmission Data

<table>
<thead>
<tr>
<th>Readmission (within 30 days of discharge) based on internal reports of facility</th>
<th>Yes</th>
<th>0</th>
<th>0%</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>20</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

### Telephone calls to patients attempted by MedTel Outcomes

<table>
<thead>
<tr>
<th>Month</th>
<th>Number</th>
<th>Attempted</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>April</td>
<td>8</td>
<td>20</td>
<td>40%</td>
</tr>
<tr>
<td>May</td>
<td>12</td>
<td>20</td>
<td>60%</td>
</tr>
</tbody>
</table>

### MedTel Outcomes Follow-Up Services Results

<table>
<thead>
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<th>Category</th>
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<th>Attempted</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Number Disconnected</td>
<td>1</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>In Process of Follow-Up</td>
<td>7</td>
<td>7</td>
<td>35%</td>
</tr>
<tr>
<td>Scheduled Call in May</td>
<td>12</td>
<td>12</td>
<td>60%</td>
</tr>
</tbody>
</table>
Appendix F. Budget

<table>
<thead>
<tr>
<th>Personnel</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Manager / Evaluator (T. Black)</td>
<td>Donated time</td>
</tr>
<tr>
<td>Programmer time (MedTel Outcomes)</td>
<td>Donated time</td>
</tr>
<tr>
<td>Data Coordinator (MedTel Outcomes)</td>
<td>Donated time</td>
</tr>
<tr>
<td>Initial training</td>
<td>Donated time</td>
</tr>
<tr>
<td>Thank you to participating facility (gift cards)</td>
<td>$200</td>
</tr>
</tbody>
</table>

**Non-Personnel**

| Training Supplies/Printing                          | $25             |
| SPSS (rental of software)                           | $75             |
| **Total**                                           | **$300**        |
### Appendix G. Time Line of Project

<table>
<thead>
<tr>
<th>Task Description</th>
<th>December</th>
<th>January</th>
<th>February</th>
<th>March</th>
<th>April</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finalize schedule / training date with rehabilitation facility</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Assess baseline readmission rate for participating facility</td>
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<tr>
<td>Training of intervention (Unfreezing Phase)</td>
<td></td>
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<tr>
<td>Implementation of checklist for stroke patients (Moving Phase)</td>
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<td></td>
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</tr>
<tr>
<td>Intervention checklist is utilized throughout the duration of the project for stroke patients (Refreezing Phase)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Data entry of follow-up data into MedTel Outcomes system</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Follow-up phone calls completed by MedTel Outcomes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Meet with MedTel to obtain reports</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Creation and running of reports by MedTel Outcomes</td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Data analysis (post intervention) of results / readmission rates</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completion of Capstone Project</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
STROKE CHECKLIST TO PREVENT READMISSIONS

Appendix H. Power Point Educational Presentation

4/18/2015

OVERVIEW

- The cost of readmissions is estimated to account for approximately $12 billion of healthcare costs annually.
- Approximately 75% of readmissions are determined to be avoidable (Aaronson, Young, Hansen, Leung & Williams, 2011).
- Evidence suggests that by using a coordinated and systematic approach to care transitions, readmissions to acute care can be reduced (Coleman & Semien, 2001; Huffman, 2001; Greenwood, Denham & Jack, 2007; Greenwood & Jack, 2009; Jacobs, Williams & Coleman, 2009; Kirsh et al., 2010; Leichter, 2010; Saha et al., 2014).

TRANSITIONS OF CARE

- May be fragmented, disorganized, guided by factors unrelated to quality of care or patient outcomes.
- Do not always promote utilization of clinicians skilled in advocating on behalf of the best interests of patients and their families.
- Can be confusing for patients and families.
- Failure to determine the appropriate site of care leads to higher hospital readmissions.

BARRIERS TO CARE TRANSITIONS

- Barriers to effective care transitions are often categorized into 3 domains:
  - The Clinician
  - The Patient
  - The Healthcare Delivery System


POST ACUTE CARE VENUES

"Successful post-acute care (PAC) transitions for individuals with disabling conditions must be facilitated by nurses with rehabilitation nursing training, knowledge, and experience." (Camacho et al., 2013)

KEY COMPONENTS

- Evidence suggests a coordinated transition intervention focusing on the patient and family, including specific discharge instructions and active patient engagement through coaching, can be cost effective while reducing the number of readmissions. Post discharge, follow up contact along with provider continuity is equally important.
- Key elements identified in the literature as being essential to successful and efficient transitions include active patient engagement, coordination of care and services and education on medication, equipment use, and self-care needs.
STROKE CHECKLIST TO PREVENT READMISSIONS

Appendix H. Power Point Educational Presentation (cont)

4/18/2015
### Appendix I. Matrix / Summary

<table>
<thead>
<tr>
<th>Citation</th>
<th>Sample and Location Study Performed</th>
<th>Design</th>
<th>Findings/Outcomes</th>
<th>Strength(s) and Weaknesses</th>
<th>Strength/Consistency of Evidence</th>
<th>Comments</th>
</tr>
</thead>
</table>
| Allen, K., Hazelett, S., Jarjoura, D., Hua, K., Wright, K., Weinhardt, J., Kropp, D. (2009). | Patients with ischemic stroke with NIH stroke scores of greater/equal to 1 discharged from a stroke unit in a large community hospital in Ohio. Sample size included n = 190 (controls) and n = 190 (intervention group). | Randomized trial. APNs performed in home assessments for the intervention group. An interdisciplinary team then developed a patient plan of care in which the APN then worked with the patient and the patient’s physician to implement the plan. | Outcomes were measured for the intervention and the control group and fell into 5 domains: Quality of life, neuromotor function, management of risk, stroke knowledge/lifestyle and institution time or death. Treatment effect was near zero for all but the stroke knowledge and lifestyle component which showed a significant effect (p = 0.0003) | Strengths: there was sufficient sampling for power, randomization occurred with control vs. intervention group. Limitations: there was missing data for one of the variable outcomes (neuromotor function). | Based on the Jacox Model (1994) for discerning levels of evidence, this research is considered Level II - a randomized controlled study. The strength and consistency is Level C strength/consistency (findings inconsistent with other studies). | *Although the findings were not significant for all outcomes, the intervention was determined to fill a post-discharge knowledge gap for patients with stroke.*  
*Patients with stroke have varying degrees of severity of their stroke and therefore have different recovery trajectories which must be taken into consideration.* |
| Balaban, R., Weissman, J., Samuel, P., & Woolhandler, S. | Small community hospital outside of | Randomized controlled. Concurrent and historical control groups received usual care and | Strengths: Sample was culturally and linguistically | Based on the Jacox Model (1994) for discerning | *Cost savings was not able to be determined with this study.* |
| Boston. Concurrent (n=49) and historical control (n =100) groups along with an intervention group (n =47) | Evaluation of a low-cost nurse-led intervention facilitating ease of transitioning patients to their respective pre-existing medical care provider. The intervention group received a 4-step intervention which included a 1) patient discharge form in one of 3 languages, 2) telephone call by a nurse to the patient, 3) transfer of the discharge instructions in English. The intervention group outcomes were more desirable with the group more likely to follow up within 21 days of discharge and have less incomplete post discharge work ups versus concurrent ($p = 0.005$) and historical groups ($p = 0.01$). | diverse. The intervention was shown to be effective and no additional personnel were required for the intervention. Limitations: The study was conducted in a single, small safety net hospital therefore results may not be generalizable. The hospital system in which the study was conducted primarily serves a lower socioeconomic patient population. | levels of evidence, this research is considered Level II - a randomized controlled study. The strength and consistency is Level A – where evidence is consistent with findings from multiple studies of types II, III, or IV levels. *Results may not be generalizable due to the unique setting in which the study was conducted.
<table>
<thead>
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<tbody>
<tr>
<td><strong>Sample</strong> included n=137 stroke patients discharged to community and n=86 stroke patients discharged to acute care from the Uniform Data System for Medical Rehabilitation database between 2008 and 2009 (national).</td>
</tr>
<tr>
<td><strong>Retrospective study.</strong> Study aimed to determine the predictors of discharge to acute care after inpatient rehabilitation in severely affected stroke patients. Inclusion criteria included Medicare patients (65-).</td>
</tr>
<tr>
<td><strong>There were no significant demographic differences between the two groups. There was a difference in admission Functional Independence Measure ratings, whereby patients discharged to acute care were significantly lower (<strong>p==0.05</strong>) on admission motor and cognitive function than were patients discharged to the community.</strong></td>
</tr>
<tr>
<td><strong>Strengths:</strong> The database contains national patient records – not just one area or facility. Limitations: Study only targeted severely affected stroke patients. Assumptions of comorbidities and medical conditions were based on.</td>
</tr>
<tr>
<td><strong>Based on the Jacox Model (1994) for discerning levels of evidence, this research is considered Jacox Type IV - non-experimental studies such as comparative and correlational descriptive studies; with Level B strength/consistency meaning it is generally.</strong></td>
</tr>
<tr>
<td><strong>Very few studies have explicitly examined the predictive factors for return to acute care from rehabilitation.</strong></td>
</tr>
<tr>
<td><strong>Demographic variables, function, comorbidities and stroke related conditions were all examined as predictors for this study.</strong></td>
</tr>
<tr>
<td><strong>Dependent variable was discharge outcome to acute care or community.</strong></td>
</tr>
<tr>
<td>Coleman, E., Smith, J., Frank, J., Min, S., Parry, C., &amp; Kramer, A. (2004). Preparing patients and caregivers to participate in care delivered across settings: The Care Transitions Intervention. <em>Journal of American Geriatrics Society</em>, 52: 1817-1825.</td>
</tr>
</tbody>
</table>
| Coleman, E., Parry, C., Chalmers, S., & Min, S. (2006). The Care Transitions Intervention: Results of a randomized controlled trial. Archives of Internal Medicine, 166: 1822-1828. | The sample included an intervention group (n = 379) and a control group (n = 371) all aged 65 years and older. Study was conducted in a large health system in Colorado. | Randomized controlled. The intervention group included the care transitions intervention which included medication management assistance, patient-centered personal health record, timely follow up. | Intervention patients had lower hospital readmission rates than control subjects as follows: The rehospitalization rates of the intervention group versus the control group were lower at 30 days (8.3 versus 11.9, \( p = 0.048 \)) and at 90 days (16.7 versus 22.5, \( p = 0.04 \)). | Strengths: The implications for healthcare practitioners, facilities and beneficiaries of the findings discussed. Further research was suggested to include additional strategies in successful, quality transitions of care. Limitations: There was a based on the Jacox Model (1994) for discerning levels of evidence, this research is considered Level II - a randomized controlled study. The strength and consistency is A – where evidence is consistent with findings from multiple studies of types II, III, or IV levels. The finding of *Findings of utilization were strongest at 30 and 90 days. *Secondary qualitative analysis found that for the intervention group, self-management knowledge and skills were most valuable to patients. *Incorporating the patient and family caregiver into the transition continuum may contribute to a greater sense of confidence and sense of investment by the patient.
**STROKE CHECKLIST TO PREVENT READMISSIONS**

| Hansen, L., Young, R., Hinami, K., Leung, A & Williams, M. (2011). Interventions to reduce 30-day rehospitalization: A systematic review | 43 articles reviewed published between January 1975 and January 2011. Studies reviewed included RCT, cohort | Systematic review of the literature | 43 articles reviewed; a taxonomy was created. Interventions were placed into 3 domains: Pre-discharge, post discharge and bridging transition to home. Within the 3 | Strengths: Review of the literature facilitated the domains to be created, with distinct activities identified. | Based on the Jacox Model (1994) for discerning levels of evidence, this research is considered Jacox Type 1 – Meta analysis | *Activities included Pre-discharge – patient education, discharge planning, medication reconciliation and appointment scheduled before discharge; Post discharge - follow-

- up with primary care and a list of “red flags” for patient to refer. The control group received usual care.
- secondary qualitative analysis conducted in which authors sought to determine which of the 4 components of the transitions intervention was most helpful to the intervention group. There were no details provided regarding this portion of the study, only the outcome.
- this study had similar findings in terms of effective interventions with respect to transitions of care and active patient engagement and coordination of services.

58
<table>
<thead>
<tr>
<th>Strokes Checklist to Prevent Readmissions</th>
</tr>
</thead>
</table>
| **Limitations:**
- There is heterogeneity of study design.
- Majority of designs were observational.
- Study was conducted in a single academic institution.

| Strengths: |
- Findings from this study have been supported by other prior studies in the rehabilitation setting.
- Study controlled for covariates associated with readmission.

| Limitations: |
- Study was conducted in a single academic institution.
- Based on the Jacox Model (1994) for discerning levels of evidence, this research is considered Jacox Type IV - non-experimental studies such as comparative and correlational descriptive studies; with Level B strength/consistency meaning it is generally

<table>
<thead>
<tr>
<th><strong>Functional status impairment is associated with unplanned readmissions.</strong></th>
</tr>
</thead>
</table>

**Archives of Physical Medicine and Rehabilitation, 94: 1951-1958.**

- Patients admitted during January 2009-2012 (n=1515).
- Of n= 1515 patients, there were n=347 readmissions.
- Total readmissions were significantly associated with FIM scores for lowest (OR 2.6; 95% CI 1.9-3.7; p <0.001) and middle tertiles (OR 1.7; 95% CI 1.2-2.4; p=0.002) respectively.

| Strengths: |
- Findings from this study have been supported by other prior studies in the rehabilitation setting.
- Study controlled for covariates associated with readmission.

| Limitations: |
- Study was conducted in a single academic institution.
- Based on the Jacox Model (1994) for discerning levels of evidence, this research is considered Jacox Type IV - non-experimental studies such as comparative and correlational descriptive studies; with Level B strength/consistency meaning it is generally

| **up, timely communication with provider, follow up phone call, patient hot line and home visit; Bridging – transition coach, patient centered instructions and provider continuity.** |

| **Hoyer, E., Needham, D., Miller, J., Deutschendorf, A., Friedman, M., and Brotman, D. (2013).** |

**Archives of Internal Medicine, 155: 520-528.**

- Inpatient rehabilitation hospital in academic medical center in Baltimore, MD.
- Patients admitted during January 2009-2012 (n=1515).
- Of n= 1515 patients, there were n=347 readmissions.
- Total readmissions were significantly associated with FIM scores for lowest (OR 2.6; 95% CI 1.9-3.7; p <0.001) and middle tertiles (OR 1.7; 95% CI 1.2-2.4; p=0.002) respectively.

| Strengths: |
- Findings from this study have been supported by other prior studies in the rehabilitation setting.
- Study controlled for covariates associated with readmission.

| Limitations: |
- Study was conducted in a single academic institution.
- Based on the Jacox Model (1994) for discerning levels of evidence, this research is considered Jacox Type IV - non-experimental studies such as comparative and correlational descriptive studies; with Level B strength/consistency meaning it is generally

*FIM motor scores were more strongly associated with readmissions than FIM cognitive scores.*
| Jack, B., Chetty, V., Anthony, D., Greenwald, J., Sanchez, G., Johnson, A., Forsythe, S., O’Donnell, J., Paasche-Orlow, M., Manasseh, C., Martin, S., and Culpepper, L. (2009). A  | General medical service in an urban academic, safety net hospital. Intervention group (n=370) and control group. | Randomized controlled | Patients in the intervention group had a lower rate of hospital usage compared to the usual care group (p=0.009). The intervention was most effective among participants with hospital utilization in the 6 months prior to discharge. | Strengths: Intervention was multi-pronged and included patient education, comprehensive discharge planning and post discharge reinforcement. Based on the model developed by Jacox (1994) for discerning levels of evidence, the research studies are considered Level II - randomized controlled. | *Intervention approach was practical yet low cost. *Cost savings was estimated to be about $412 per discharge. *Improved patient self-perceived perception of being prepared for discharge.

Although the postdischarge phone interview to collect readmission data was very high; it was not 100%. Thus there is the potential to have not captured all patients post discharge that may have had a readmission to acute care. consistent findings with other studies.
STROKE CHECKLIST TO PREVENT READMISSIONS

<p>| reengineered hospital discharge program to decrease rehospitalization: A randomized trial. <em>Annals of Internal Medicine</em>, 150: 178-187. | (n=368) for a total of n=749 English speaking adults. | months before the index hospitalization ($p=0.014$). | Equal number of intervention and controls were obtained. Limitations: Subjects were English speaking and younger with an average age of 49.9 years, therefore results may not be generalizable. This was a single site study. Not all participants could be enrolled due to volume, holidays and other constraints. Outcomes assessment studies with a strength and consistency of A, findings consistent from multiple studies. discharge was also identified. |
| Jack B, Greenwald J, Forsythe S, et al. Developing the Tools to Administer a Comprehensive Hospital Discharge Program: The ReEngineered Discharge (RED) Program. In: Henriksen K, Battles JB, Keyes MA, et al., editors. Advances in Patient Safety: New Directions and Alternative Approaches (Vol. 3: Performance and Tools). Rockville (MD): Agency for Healthcare | Intervention patients (n=289) and control patients (n=282) in a large urban area (Boston) on a general medical unit | Randomized controlled. To test 3 tools created as part of the ReEngineered Discharge (RED) Program: a training manual for nurses, an individualized patient friendly booklet and a workstation to integrate all discharge information to create the patient discharge booklet. | Using the RED intervention, 96% of intervention patients were discharged from the hospital with follow-up appointments with primary care. In 97% of intervention patients, their discharge plan was sent to their PCP prior to the appointment. In identifying patients who had a readmission, discharge over a weekend was a strong predictor for rehospitalization (30% more likely) versus other discharge days. Preliminary data | Strengths: Study identified about 1 hour of nursing time is needed for the creation and teach the discharge plan. Limitations: Study results are preliminary as it is ongoing. | Based on the model developed by Jacox (1994) for discerning levels of evidence, the research studies are considered Level II - randomized controlled studies with a strength and consistency of A, findings consistent from multiple studies. | *It is important to clearly identify who responsible for discharge transition as this was noted to be a barrier in this study. *Discharge planning and preparation may be a low priority for some clinicians. *Discharges may occur at various times throughout the day and various days of the week which may present potential problems for the patient. |</p>
<table>
<thead>
<tr>
<th>Research and Quality (US); 2008 Aug. Retrieved from: <a href="http://www.ncbi.nlm.nih.gov/books/NBK43688/">http://www.ncbi.nlm.nih.gov/books/NBK43688/</a></th>
<th>were provided as above, but statistical significance was not provided as the study is ongoing.</th>
</tr>
</thead>
<tbody>
<tr>
<td>7843 citations reviewed published from data inception through March 2011. Studies reviewed included RCT, retrospective and real time data in the studies.</td>
<td>286 articles were selected for full-text review. Of these, 30 articles met the inclusion criteria</td>
</tr>
<tr>
<td>Strengths: The authors found that most risk prediction models vary. Most risk models include variables such as medical comorbidities and prior use of medical services; however overall health and function and social determinants of health are not included in most of the studies/models.</td>
<td>Based on the Jacox Model (1994) for discerning levels of evidence, this research is considered Jacox Type 1 – Meta analysis with Level C strength/consistency (findings inconsistent with other studies).</td>
</tr>
<tr>
<td><em>Public reporting and financial penalties are causing hospitals to implement quality improvement programs to minimize readmissions.</em></td>
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<tr>
<td>Weaknesses: The authors included articles outside the US, but acknowledged that applicability may be limited.</td>
<td></td>
</tr>
<tr>
<td>Setting included 422 hospitals in the southern and eastern United States. Subjects included n = 39,384 Medicare beneficiaries (aged 65 and older) discharged with ischemic stroke between 1998 and 2003. Purpose of study was to determine predictors of complicated transitions within 30 days after discharge for stroke patients. A moderate amount of patients (20%) experienced at least one complicated transition of which 16% of these experienced more than one complicated transition. Factors predictive of any complicated transition included an older age, being African American, Medicaid recipients, gastrostomy tube, length of stay, chronic disease, and Medicare status.</td>
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<tr>
<td>Strengths: This study serves as a model for measuring complicated care transitions. Patient characteristics were identified predictive of Emergency Dept. use versus rehospitalization. Limitations: Some misclassification.</td>
<td></td>
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<tr>
<td>Based on the Jacox Model (1994) for discerning levels of evidence, this research is considered Jacox Type IV - non-experimental studies such as comparative and correlational descriptive studies; with Level B strength/consistency meaning it is based on evidence from multiple sources.</td>
<td></td>
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</tbody>
</table>

*By identifying predictors of patients at risk for “bouncing back” for a readmission, health systems can potentially be proactive in minimizing risks for patients.*

*Patients with stroke provide an excellent model due to the complicated nature of the diagnoses and the prevalence of complications that potentially occur in this patient.*
STROKE CHECKLIST TO PREVENT READMISSIONS

Specifically, the sample included $n = 4,816$ patients from a Medicare Plus Choice plan and $n = 34,568$ traditional Medicare (fee for service) cases.

For those who had multiple complicated transitions, patients were more likely to be African American OR = 1.38 (95% CI 1.13 – 1.68), male OR = 1.21 (95% CI 1.04-1.40), diagnosis of fluid/electrolyte imbalance OR = 1.23 (95% CI 1.07-1.43), prior hospitalization OR = 1.18 (95% CI 1.01 - 1.36), be initially discharged to a skilled or long term care facility OR = 1.22 (95% CI 1.04 – 1.44).

Lutz, B. (2004). Determinants of discharge destination for stroke patients. *Rehabilitation Nursing, 29* (5): Sample of stroke patients that were discharged January 1 – June 30, Mixed methods Qualitative data included field notes from patients Of the sample, the majority identified that family members either made or strongly influenced the discharge decision. Strengths: Study consistent with prior studies on the relationship between FIM motor and

Based on the Jacox Model (1994) for discerning levels of evidence, this research is

*Assessing caregiver resources early on during the rehab process may better assist with discharge planning.*

*Stroke is a common diagnosis and accounts for a large portion of disability and utilization of health care services along the continuum.*

*Stroke patients often enter and leave the health care system at multiple points along the continuum (acute, rehab, outpatient, skilled nursing).*
| 154-163. | 2001 (n=81) in a rehabilitation facility in the Midwest. | discharged from rehabilitation (10 interviews). Quantitative data came from medical records. Aim was to explore how FIM ratings were related to discharge destination. In addition, the researcher wanted to understand core concepts from the patient/family in terms of what influenced discharge destination. | Discharge included to home (n=48) or nursing home (n=33). In the quantitative regression analysis, motor and locomotion FIM on admission along with age, were significant for discharge destination (OR – 1.21; p=0.001) | discharge to home. Limitations: Study sample was small and from only one facility considered Jacox Type IV - non-experimental studies such as comparative and correlational descriptive studies; with Level B strength/consistency meaning it is generally consistent findings with other studies. | *Tailoring discharge needs to include a visit by a nurse or therapist may be advisable.* |
| Miller, E., Murray, L., Richards, L., Zorowitz, R., Bakas, T., Clark, P., & Billinger, S., on behalf of the American Heart Association Council on Cardiovascular Nursing and the Stroke Council. (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. | Not applicable | Clinical Practice Guideline | There is strong evidence that organized, interdisciplinary stroke care can reduce mortality rates and enhance recovery and increase independence. The majority of stroke survivors struggle with residual cognitive, social, communicative and coping deficits. | Uses an interdisciplinary approach to care of the patient with a stroke | Based on the Jacox Model (1994) for discerning levels of evidence, this CPG is considered Jacox Type VI - Panel consensus – practice recommendations based on the opinions of respected authorities or an expert committee with Level B strength/consistency meaning it is generally consistent findings. | *Uses the International Classification of Functioning (ICF) as the framework *Incorporates the entire continuum in the care of the patient with stroke including the acute, post acute and chronic phases or recovery. |
| Ottenbacher, K., Graham, J., Ottenbacher, A., Lee, J., Snih, S., Marmarkar, A., Reistetter, T. and Ostir, G. (2012). Hospital readmission in persons with stroke following postacute inpatient rehabilitation. *Journal of Gerontology*, 67 (8): 875-881. | Stroke patients (n=674) who received inpatient rehabilitation at 11 facilities located in 8 states and the District of Columbia between 2005 and 2006. | Prospective cohort Data from the Stroke Underserved Populations Recovery Database were analyzed to better understand factors associated with readmission in patients who receive post-acute rehabilitation following stroke. | Functional status (OR 0.98; 95% CI 0.96-0.98), depressive symptoms (OR 1.80; 95% CI 1.06-3.05) and social support (OR 2.28; 95% CI 1.29 -4.03) were important predictors of hospital readmissions. | Strengths: Diverse sample across multiple states. Well established tools were used (i.e. Duke Social Support Index, FIM instrument, CES-D) Limitations: The categorization of non-Hispanic white versus minority has limitations. The sample size was not large enough to obtain validation on subsets within the original sample. Self-reported. | Based on the Jacox Model (1994) for discerning levels of evidence, this research is considered Jacox Type IV - non-experimental studies such as comparative and correlational descriptive studies; with Level B strength/consistency meaning it is generally consistent findings with other studies. *The variables for the scales use are typically not included in administrative data sets which may be limiting.* *Replicating predictive model on larger sample would allow for greater generalizability.* |
readmission rates may not be accurate.

The study explored patients discharged to inpatient rehabilitation; however, patients with stroke may be discharged to other post-acute venues such as a skilled nursing facility, outpatient or home health.

Ottenbacher, K., Karmarkar, A., Graham, J., Kuo, Y., Deutsch, A., Reistetter, T., Soham Al Snih, S., & Granger, C. (2014). Thirty-day hospital Sample included 736, 536 Medicare fee-for-service beneficiaries discharged from 1365 Retrospective cohort study. Findings: 30-day readmission rates ranged from 5.8% to 18.8% for selected impairment groups. Adjusted readmission rates by state ranged from strengths: Large sample size of Medicare patients. Limitations: Data dependent on the reliability, based on the Jacox Model (1994) for discerning levels of evidence, this research is considered Jacox Type IV - *Findings indicate lower readmission rates in the mid-northern and northwestern states and higher rates in southern and some midwestern states.
<table>
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<tr>
<th>readmission following discharge from postacute rehabilitation in fee-for-service Medicare patients.</th>
<th>inpatient rehabilitation facilities to the community in 2006 through 2011.</th>
<th>9.2% to 13.6%. Approximately 50% of patients readmitted within the 30-day period were readmitted within 11 days of discharge.</th>
<th>accuracy and completeness of data collected for billing and administrative functions. Only patients discharged to the community were included. The authors did not differentiate between planned and unplanned readmissions.</th>
<th>non-experimental studies such as comparative and correlational descriptive studies; with Level B strength/consistency meaning it is generally consistent findings with other studies.</th>
<th>*Approximately 50% of patients rehospitalized within 30 days were readmitted within 11 days.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dysfunctional Stroke Patients</td>
<td>Retrospective Study Using Logistic Regression</td>
<td>After Adjustment, 2 Significant Factors Were Identified: Admission Motor FIM Score (OR .97, 95% CI 0.95-0.99) and Enteral Feeding at Admission to Rehab (OR 2.87, 95% CI 1.34-6.13).</td>
<td>Strengths: Findings Indicate Several Factors That May Impact the Risk of Stroke Patients Being Readmitted to Acute Care. Limitations: Study Was Conducted in One Academic Medical Center; Therefore, Results May Not Be Generalizable. In Addition, Admission Screening Processes May Vary Geographically, Based on the Jacox Model (1994) for Discerning Levels of Evidence, This Research Is Considered Jacox Type IV - Non-Experimental Studies Such as Comparative and Correlational Descriptive Studies; with Level B Strength/Consistency Meaning It Is Generally Consistent Findings with Other Studies.</td>
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<td>Stroke patients (N = 783) in a large academic medical center in Los Angeles, CA between 2008 and 2012. Sample (N = 60) were discharged to acute care; N = 723 were discharged to other settings.</td>
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<td><em>Early identification – perhaps through the prescreening process - and possible proactive management of certain conditions and factors may reduce the risk of readmission to acute care for the stroke patient.</em></td>
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</table>
STROKE CHECKLIST TO PREVENT READMISSIONS

thus limiting
generalizability
of findings.