

Reducing readmissions in stroke patients

Recognizing those at risk and exploring evidence-based strategies

By Kristen M. Poston, DNP, NP-C



STROKE is a leading cause of long-term disability and mortality and its impact is far-reaching. (See *Stroke by the numbers.*) Stroke death rates in the United States are on the decline, but projections suggest that because of the aging population, prevalence will continue to increase. By 2030, an additional 3.4 million U.S. adults will have had a stroke, a 20.5% increase in prevalence from 2012. Stroke disproportionately affects Blacks (this population is two times more likely to suffer from first-time stroke when compared to Whites), and death rates among Hispanics has been increasing since 2013.

Stroke survivors number in the hundreds of thousands each

year, many of whom suffer from a variety of poststroke disorders, which can lead to readmission. With approximately 12% of ischemic stroke patients readmitted within 30 days after discharge, readmissions have become a popular targetable outcome measure, and readmission prevention has become a topic of national discussion. Understanding stroke and its etiologies and risk factors can help you identify patients at risk for readmission before they even leave the hospital.

Stroke defined

A stroke, defined as the sudden onset of neurologic deficit due to a vascular cause, can be classified as *hemorrhagic* (rupture



LEARNING OBJECTIVES

1. Identify factors that increase the risk of readmission after stroke.
2. Discuss three initiatives designed to reduce readmission after stroke.
3. Describe the nurse's role in preventing readmission after stroke.

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Stroke by the numbers

Stroke and associated patient care are costly to individuals and to society.

795,000	Number of people who experience a stroke in the United States each year
\$34 billion	Estimated annual cost of stroke care (including health-care services, medicines, and missed work productivity) in the United States
\$18,963–\$21,454	Estimated cost of a single ischemic stroke hospitalization
238%	American Heart Association forecasted increase in direct cost of stroke from 2010 to 2030

Sources: Centers for Disease Control and Prevention 2017 and Wang 2014

of a vessel within the brain) or *ischemic* (acute obstruction of an intracranial vessel); 87% of strokes are ischemic. The blockage or rupture causes reduced blood flow to a brain region. If blood flow interruption persists, brain tissue within that region dies. Clinical manifestations vary, but can include loss of sensory or motor function on one side of the body; change in vision, gait, or ability to speak; or a sudden severe headache. Rapid evaluation of stroke is essential for medical treatment, including recanalization with clot dissolution via tissue plasminogen activator (tPA) or clot removal via thrombectomy. Risk factors for stroke include age, smoking, hypertension, diabetes, and history of high cholesterol.

Knowing a stroke's etiology—atrial fibrillation, hypertension, atherosclerosis—can aid in establishing secondary prevention strategies. These strategies, such as treatment with a statin, antihypertensive, or appropriate antithrombotic, are essential to the patient's discharge plan. They also are vital quality indicators. The etiology of nearly 30% of strokes remains unexplained, regardless of extensive workup.

Stroke and 30-day readmission rates

The Centers for Medicare & Medicaid Services (CMS) reports 30-day risk-standardized readmission rates for patients discharged from the hospital with a diagnosis of ischemic stroke. The outcome, defined as any unplanned hospital readmission within 30 days of discharge, is a vital target for quality measures and improvement initiatives. This measure has been prioritized at the national level because of the high risk for readmission in this population. In some cases, readmission after stroke may be due to disease progression, but it also may be an indicator of poor quality inpatient and/or outpatient care. The Medicare Access and CHIP (Children's Health Insurance Program) Reauthorization Act of 2015 addresses this by requiring hospitals to provide care coordination, care plans, patient engagement for self-management, and shared decision-making for medically complex individuals.

Many stroke patients are discharged to settings that require ongoing care, and evidence suggests high rates of potentially preventable complications, such as urinary

tract and respiratory infections. CMS recognizes that both of these complications can lead to readmission. Fortunately, opportunity exists to reduce readmission through appropriate intervention. Research indicates that improved care coordination can reduce readmission rates and healthcare costs in a variety of diseases, and it's reasonable to assume this can be achieved in stroke patients as well.

The American Stroke Association and American Heart Association also have examined using 30-day all-cause readmissions as a measure of hospital care quality. Although they recognize some strengths associated with this measure, they have identified limitations. Specifically, not all readmissions are preventable (so planned or elective readmissions should be excluded from the measure), hospitals may have little control of care after discharge, and readmission measures could create incentives to deny patients hospital admission, further contributing to the nation's access to care issues.

Ultimately, this readmission measure may best be used when combined with metrics of post-stroke functional status and mortality. And defining modifiable aspects of stroke care that can improve patient outcomes, including focusing on preventable causes of readmissions, deserve additional research.

Readmission factors

Identifying predictors of readmission after ischemic stroke may play an essential role in preventing them. Several studies have attempted to assess risk factors and etiologies of readmission in this population. An examination of the 2013 Nationwide Readmission Database representing all U.S. hospitalizations provides perhaps the broadest view. It determined that 12.1% of ischemic stroke patients were readmitted within 30 days of discharge, 89.6% of those readmissions were unplanned, and 12.9% were considered potentially

preventable. Those readmitted had Medicare coverage, a lower household income, were older, and had a higher proportion of individual comorbidities. Patients receiving recanalization therapy had lower odds of readmission.

Several retrospective analyses have assessed risk factors for and causes of readmissions.

Statins

One retrospective analysis identified that individuals taking statins had lower readmission rates than those not taking statins. Likewise, individuals less than 80 years old had lower readmission rates compared to those 80 years or older. And all-cause readmissions were affected by statin use. This information highlights the role statins play in secondary prevention.

Causes for readmission: The study showed that after recurrent stroke, respiratory diseases, such as pneumonia and influenza, are the most common cause of readmissions.

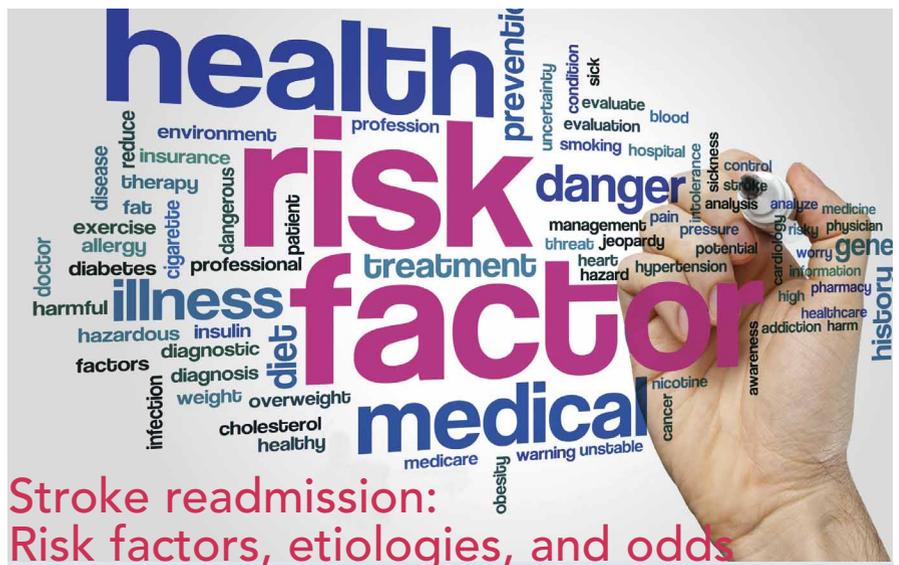
30-day readmission

A retrospective analysis examining mortality in 30-day readmissions after stroke found that mortality is 2.5 times higher in stroke than in other admissions, and in those readmitted for recurrent stroke, mortality is greatest. Risk factors associated with 30-day readmission included age more than 75 years; living in a facility prior to stroke; comorbidities, such as previous stroke, diabetes, heart failure, and atrial fibrillation; and admission to a non-neurology service.

Causes for readmission: This study found that the most common reason for readmission was urinary tract or respiratory infection, followed by recurrent stroke or transient ischemic attack.

Long-term care

Up to one-third of patients who've had a stroke require long-term care placement after they're discharged, which may mean that care in these



Stroke readmission: Risk factors, etiologies, and odds

Identifying the most common risk factors and etiologies for readmission can help nurses recognize patients likely to be readmitted before they're discharged.

Risk factors	Etiologies	Lower odds of readmission
<ul style="list-style-type: none"> • Medicare coverage • Lower household income • Increased age • High number of individual comorbidities • Living in a facility prior to stroke • Admission to non-neurology service • NIHSS admission score > 5 • Poor medication adherence 	<ul style="list-style-type: none"> • Respiratory diseases/infections (e.g., pneumonia, influenza) • Urinary tract infections • Recurrent stroke/transient ischemic attack 	<ul style="list-style-type: none"> • Recanalization therapy (e.g., tPA) • Statin use • High level of social engagement in postdischarge nursing home • Lower comorbidity scores

NIHSS = National Institutes of Health Stroke Scale, tPA = tissue plasminogen activator

settings and readmission characteristics from them should be considered. Assessment of the CMS Minimum Data Set in nursing home residents was scrutinized in an attempt to generate models for readmission prediction.

Causes for readmission: Although these particular models didn't significantly improve prediction accuracy, progressively lower odds of readmission were associated with certain patient characteristics, including lower comorbidity scores on formalized comorbidity indexes and higher levels of social engagement in the nursing home after hospital discharge.

Demographics

A retrospective analysis of the demographic characteristics from an

urban primary stroke center supports the findings of the literature mentioned above.

Causes for readmission: This analysis determined that most 30-day readmissions after stroke are for noncerebrovascular complications attributed to a variety of factors, including respiratory infections, GI complications, and injury.

All of these studies highlight the multifaceted risk factors and etiologies that affect stroke readmissions. (See *Stroke readmission: Risk factors, etiologies, and odds.*) And with as many as 70% of stroke survivors requiring assistance with activities of daily living, medication adherence can be particularly challenging. In addition to barriers related to medication cost and access, stroke survivors often suffer from mild,



Intervention comparison

Transitional care models—frameworks to transition patients from one healthcare setting to another—may reduce costs, improve patient outcomes, and reduce readmissions. Developing standardized transitional care models in stroke patients is currently being examined.

TRACS

- Discharge education materials
- 2-day follow-up call
- Clinic visit with stroke nurse practitioner within 2 weeks after discharge including:
 - Exam
 - Assessment of risk factors, depression, cognition, communication, Rankin scale
 - Interdisciplinary referrals
 - Communication with primary providers and specialists
- 3-month follow-up call

COMPASS (TRACS expansions in bold) MISTT

- Discharge educational materials (**blood pressure log and COMPASS fridge magnet**)
- 2-day follow-up call (**transportation to appointments, assessment**)
- Clinic visit with advanced practice provider within 2 weeks of discharge including:
 - Exam
 - Assessment of risk factors, depression, cognition, communication, Rankin scale, **lifestyle, activity, function, caregivers**
 - **COMPASS-CP (web-based application generating individualized care plan including interdisciplinary referrals)**
 - Primary provider communication (**cover letter in EHR, and COMPASS-CP website access**)
 - **Informational documents for patient/caregiver at visit via COMPASS**
- **30- and 60-day follow-up phone calls**
- Home-based social worker stroke case management OR home-based social worker stroke case management plus access to online support resource (MISTT website)
- Social worker stroke case management includes:
 - Biopsychosocial assessment
 - Review of discharge paperwork
 - Ensure patient is seen by provider (preferably within 7 days)
 - Referral to community agencies
 - Promote medication adherence
 - Facilitate patient/caregiver activation/engagement
- Website includes:
 - Stroke education materials
 - Medication information
 - Provider contact list
 - Hospital portal access
 - Community resources
 - Stroke support group access
 - Caregiver resources

EHR = electronic health record, COMPASS = Comprehensive Post-Acute Stroke Services, MISTT = Michigan Stroke Transitions Trial, TRACS = Transition Coaching for Stroke
Sources: Bushnell et al. 2014, Bushnell et al. 2018, Condon et al. 2016, Reeves et al. 2017

unrecognized physical and cognitive deficits that affect their ability to take medications as prescribed, and family caregivers may be ill-prepared to manage the medications.

Interventions to reduce readmissions

Little research exists about successful interventions for posthospital transitions in patients who've expe-

rienced a stroke. In most of the studies that do include stroke patients, few have demonstrated a significant degree of positive benefit from transitional care models, which is surprising since these models have been effective when tested with other diagnoses. However, researchers continue to scrutinize various transitional care frameworks because multicomponent

interventions can reduce healthcare costs, provide patient-centered care, and positively impact readmissions. Several promising programs have begun to emerge, including the Transition Coaching for Stroke (TRACS) model, the Comprehensive Post-Acute Stroke Services (COMPASS) trial, and the Michigan Stroke Transitions Trial (MISTT). (See *Intervention comparison*.)

Nursing and stroke care transitions

Using multifaceted interventions, nurses can improve stroke transition outcomes in a variety of care settings. They can:

- assist in determining the appropriate postacute level of care through biological and psychosocial assessments of patients and caregivers
- develop and evaluate transition plans with the interprofessional team
- engage patients and caregivers as active partners and advocates in the transition plan
- identify and document transition issues and barriers early, implement strategies to address concerns, and communicate the transition plan effectively
- use knowledge about readmission risk factors, etiologies, and successful transitional models to:
 - individually risk-stratify patients
 - educate patients about relevant self-care management
- advocate for stroke care transitions and quality improvement.

TRACS

The TRACS model is one of the most encouraging frameworks to date and serves as a foundation for additional clinical trials developing stroke transition evidence. TRACS addressed the immediate needs of stroke patients recently discharged home by providing coaching through a nurse practitioner–led transitional stroke clinic. Participants received medication education, as well as follow-up phone calls from an RN, who reviewed medications, assessed new problems after arriving home, and confirmed appointments. Nurse practitioners saw each patient after discharge and performed a standardized assessment that included evaluating medication use (persistence), missed medication doses (adherence), and addressed any medication access or side-effect issues.

Patients received a telephone call 2 days after discharge for medication reconciliation, assessment of functional markers, and confirmation of the transitional stroke clinic appointment. TRACS demonstrated an overall medication regimen persistence (medications the same from discharge to follow-up) of 80.3%. Additionally, those who received a follow-up call were more likely to attend the transitional stroke clinic visit, and this visit resulted in a 48% reduction in 30-day readmission rates.

TRACS' role in medication persistence and adherence may help address secondary prevention of recurrent stroke. Stratifying risk factors (such as atrial fibrillation and hyperlipidemia) allows medications to be prescribed to modify them. For example, measuring a lipid profile and subsequent treatment with a statin is a reported core performance measure. However, appropriate medication is only the first step in secondary prevention; medications must be taken to be effective, making interventions like TRACS promising.

The TRACS model provides a solid foundation of existing evidence for a stroke transitional model, but more evidence is needed because the United States has no established standard for using this type of model after discharge. This is inconsistent with care currently provided in Canada and the United Kingdom, where early supported discharge has been widely tested and adopted in stroke transition management. The COMPASS and MISTT trials are attempting to address this gap.

COMPASS

The COMPASS model, an extensive trial taking place across 41 hospital sites involving more than 6,000 participants, uses the TRACS model as its foundation and expands on several key components to more comprehensively address stroke patients'

medical, psychosocial, and practical discharge needs. Highlights of the COMPASS expansion include telephone follow-up at 2, 30, and 60 days after discharge to address medication reconciliation, transportation to appointments, functional status, and referrals; clinic visit including a standardized assessment conducted by a nurse and provider within 14 days after discharge; a community resources directory based on patient address and needs; and self-reported functional and social determinants of health via a web-based application (COMPASS-CP). This application, considered one of the highlights of the COMPASS expansion, uses algorithms that look at various assessments—poststroke limitations, medication reconciliation, and lifestyle information—to generate an individualized care plan with suggestions for self-management and referrals.

MISTT

MISTT aims to add valuable evidence by establishing a standard of care to address psychosocial and health-related challenges facing stroke survivors and their caregivers during the postdischarge transition. The trial plans to improve stroke survivor and caregiver outcomes by concentrating on patient activation and quality of life. Primary goals focus on home-based case management by social workers that includes a visit within a week of returning home, a second visit about 30 days later, and weekly follow-up phone calls. A patient-centered online information resource will be added in a second intervention group to provide stroke and medication information and support group access.

The ultimate goal of MISTT is to actively engage stroke patients and caregivers in decision-making and self-management after returning home by incorporating social work principles, healthcare technology, and aspects of the chronic care model. Highlights of the trial in-

clude reviewing discharge paperwork and incorporating identified discharge activities; promoting medication adherence through education, lists, and pill organizers; individualizing education to emphasize the importance of stroke prevention and recovery; and facilitating access to community services.

Nursing and stroke readmission prevention

As many as 60% of stroke survivors require postacute care services in a variety of settings, including rehabilitation facilities, skilled nursing centers, outpatient rehabilitation, and home health. This means that you have an opportunity to help transform healthcare transitions for these patients by identifying and documenting suspected transition issues early, implementing strategies to address them, and communicating the transition plan effectively. (See *Nursing and stroke care transitions*.)

You must work as part of the interprofessional care team to develop and evaluate the transitional care plan. A key component to ensuring optimal outcomes for stroke survivors starts with determining the appropriate level of care they need after discharge. You can add vital input through your assessments and close patient and family interactions, which can provide insight into circumstances that may affect transitional care planning.

Help patients and caregivers be engaged as active partners and advocates in their postdischarge care by educating them about what they should expect. For example, patients should expect to be routinely assessed for medical needs, pre-stroke function, rehabilitation tolerance, community support needs and options, financial barriers, and family caregiver dynamics. Additional support includes providing information, education, and resources on care needs; stroke prevention and recovery; strategies to manage emotional, financial, and family needs;

medication management, adherence, and access; and follow-up care.

Use your knowledge

Whether or not you work in an organization that has an established stroke transitional care model, use your knowledge about readmission risk factors, etiologies, and successful components of existing and emerging models to focus patient education. And use this knowledge to stratify individualized risk during a patient's hospital stay and throughout various levels of care and create actionable targets for intervention. For example, stratification can be used to reduce postdischarge infection, screen for and recognize barriers to medication adherence, provide medication education, and reconcile medications.

Taken together, this knowledge provides nurses with a platform to advocate for adopting successful transitional models in various practice settings by championing quality improvement initiatives and insisting on the use of evidence-based transitional care. ★

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Please mark the correct answer online.**1. Which of the following facts about the incidence and prevalence of stroke is correct?**

- Stroke death rates in the United States are increasing.
- Prevalence of stroke will continue to decrease.
- Stroke disproportionately affects blacks.
- Stroke disproportionately affects whites.

2. Which statement about stroke types is correct?

- Etiologies of nearly 30% of strokes remain unexplained, regardless of extensive workup.
- Etiologies of nearly 50% of strokes remain unexplained, regardless of extensive workup.
- About 85% of strokes are hemorrhagic.
- About 45% of strokes are ischemic.

3. A factor that may increase the readmission risk for patients who have had a stroke is

- admission to a neurology service on admission to the hospital.
- higher household income.
- a score < 5 on the National Institutes of Health Stroke Scale (NIHSS).
- Medicare coverage.

4. Which of the following lowers the likelihood that a patient who has had a stroke will be readmitted?

- Avoidance of recanalization therapy
- Limiting social engagement
- Higher comorbidity scores
- Use of statins

5. Which of the following is part of the Transition Coaching for Stroke (TRACS) model for preventing readmission?

- A nurse practitioner (NP) leads a transitional stroke clinic.
- A physician assistant (PA) leads a transitional stroke clinic.
- Patients are seen by an NP in the clinic 1 month after hospital discharge.
- Patients are seen by a PA in the clinic 1 month after hospital discharge.

6. One outcome of TRACS was

- a 62% reduction in 30-day readmission rates.
- a 25% reduction in 30-day readmission rates.
- a medication regimen persistence rate of about 80%.
- a medication regimen persistence rate of about 50%.

7. Which of the following was included in the Comprehensive Post-Acute Stroke Services (COMPASS) trial?

- Telephone follow-up at 1, 15, and 30 days after discharge
- Telephone follow-up at 2, 30, and 60 days after discharge
- Standardized assessment by a physician within 14 days of discharge
- Standardized assessment by a nurse within 21 days of discharge

8. Which statement about COMPASS-CP is not correct?

- It is a web-based application.
- It incorporates self-reported functional and social determinants of health.
- It incorporates provider-reported functional and social determinants of health.
- It generates an individualized care plan.

9. The goal of the Michigan Stroke Transitions Trial (MISTT) is to

- actively engage stroke patients and caregivers in self-management.
- examine the effects of innovation medications on readmission rates.
- provide weekly visits by a home health nurse skilled in stroke assessment.
- develop generic care plans that can be widely distributed to patients.

10. Nurses can help reduce readmission rates for patients who have had a stroke by

- collaborating only with other nurse colleagues to evaluate the transitional care plan.
- explaining to patients that routine assessments will not be needed after discharge.
- working as part of an interprofessional care team to develop the transitional care plan.
- understanding that as many as 30% of stroke survivors require postacute care services.