HOSPITAL CARE AND REHABILITATION FOR

Adult Stroke and TIA Patients

This care process model (CPM) was created by the Neurosciences Clinical Program at Intermountain Healthcare. This group includes multidisciplinary representation from neurovascular medicine, interventional radiology, cardiology, physiatry, hospitalists, pharmacy, nutrition, and others. The CPM summarizes current medical literature and national practice guidelines and provides expert advice for the hospital care and rehabilitation for acute ischemic stroke and TIA patients. Intermountain's care management system for stroke also includes:

- **Education materials and programs** for providers and patients
- **Data systems** that help providers/facilities gauge their success in stroke management
- **Multidisciplinary coordination** of the care of stroke

WHY FOCUS ON STROKE HOSPITAL CARE AND REHAB?

- **Incidence and mortality.** In the U.S., about 795,000 strokes occur each year. A fatal stroke occurs approximately every four minutes.[MOZ]
- **Importance of secondary stroke prevention.** Of the estimated 795,000 strokes in the U.S. each year, 185,000 are recurrent strokes. The number of people with TIA, and therefore at risk for stroke, is estimated to be much greater.[KER]
- **Impairment.** Stroke is a leading cause of disability. Six months after a stroke, 26% of patients still need institutional care; 15% to 30% are permanently disabled.[ROG]
- **Cost.** The costs of stroke in the U.S. are expected to increase substantially by 2030. Estimates of annual direct costs related to stroke care in the U.S. (combined with indirect costs related to lost productivity) are projected to increase by 129% to over $240 billion.[OVB] Mean lifetime cost per patient is estimated to be over $140,000.[GOA]
- **Improved outcomes when key processes are followed.** Research indicates that patients suffering from stroke are more likely to have improved outcomes and fewer complications when hospitals use standardized care processes during admission and discharge.[JOI] Key processes related to hospitalization and rehabilitation include:
  - **Appropriate post-stroke care, preferably in a specialized stroke-care unit.** Care in a stroke unit can reduce acute complications and reduce rates of post-stroke mortality and morbidity. One study showed benefits comparable to IV rtPA.[JAU]
  - **Secondary prevention interventions and risk factor modification**. This includes patient/family education about risk factors and prescription of lifestyle changes, medications, and other therapies to reduce ongoing risk.

GOALS

Through this CPM, Intermountain seeks to ensure that every patient hospitalized following a stroke:

- Has mechanical or chemical VTE prophylaxis by end of day 2 in hospital
- Is discharged on appropriate anticoagulant or antiplatelet medication
- Receives written, personalized stroke education materials for the patient and family regarding risk factors and prevention, signs and symptoms, when to call 911, discharge medications, and follow-up care
- Receives physical, occupational, and speech therapy integrated with nursing care and personalized to their functional needs.

WHAT'S INSIDE?

ALGORITHMS

MEASUREMENTS

- Reduce 30-day mortality
- Prevent 30-day readmission
- Increase rates of defect-free care
- Improve length-of-stay measures
- Reduce cost per case

Intermountain® Healthcare

ALGORITHM: MANAGEMENT OF ADULT STROKE HOSPITAL CARE AND REHAB

ALGORITHM NOTES

(a) ICU admit criteria (if ANY)

- Treated with tPA therapy
- Treated with endovascular therapy
- Respiratory distress
- > 1/3 of hemisphere involved
- Malignant edema
- High-risk IV medication
- Clinically unstable

(b) Discharge Planning

Shared decision making for discharge planning involves:

- Patient and family
- Neurologists/hospitalists
- PM&R
- Nursing
- Case management
- PT/OT/SLP/RDN
- Receiving facility liaison

(c) Post-tPA/endovascular monitoring

Monitor vital signs and conduct neuro assessments (as per facility guideline):

Every 15 minutes for 2 hrs
- Then, every 30 minutes for 6 hrs
- Then, every hr for 16 hrs

(d) Monitoring frequency for other ICU admit criteria

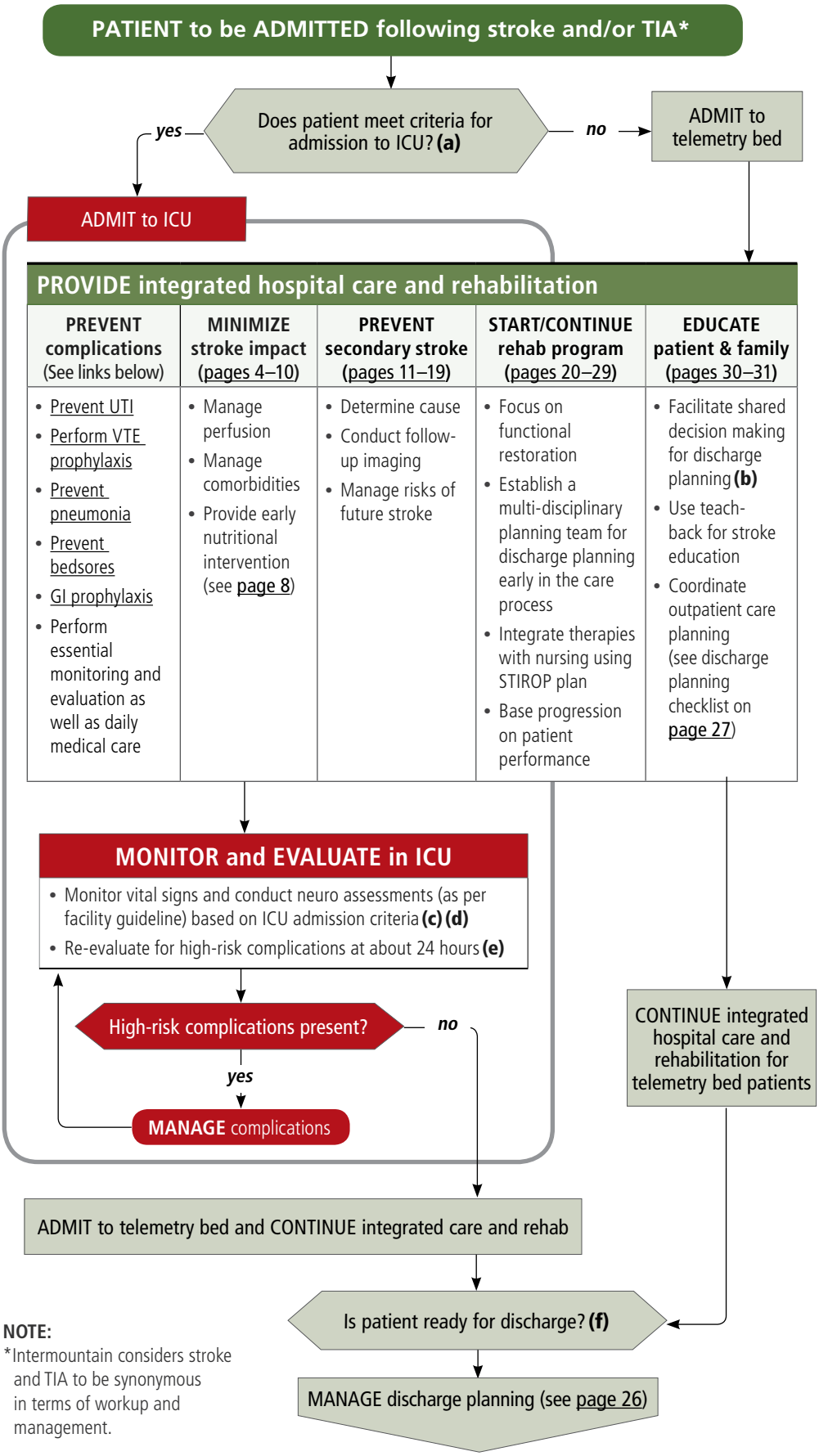
- First 6 hours:
  - Groin puncture with vital signs
  - Neurovascular checks of the leg or affected extremity with vital signs
- Limb rest

(e) High-risk complications

- Symptomatic hemorrhage
- Fluctuating deficits
- Cerebral edema/herniation
- Respiratory distress
- Unstable vital signs

(f) Discharge criteria (if ALL)

- No continuous IV medications
- Able to breathe independently
- Completed work-up/evaluation
- Physiologically/hemodynamically stable



NOTE:
*Intermountain considers stroke and TIA to be synonymous in terms of workup and management.

HOSPITAL CARE OVERVIEW

For improved outcomes, management of patients after hospital admission is as important as acutely administered therapies. Approximately 25 % of patients may have neurological worsening during the first 24 to 48 hours after stroke. Several studies demonstrate the benefit of comprehensive stroke units in lessening the rates of mortality and morbidity after stroke. In fact, **benefits from treatment in a stroke unit have been found to be comparable to the effects achieved with IV rtPA.**[JAU]

Use of standardized stroke order sets and protocols is recommended to improve general management of stroke and prevent complications. These should address how to:

- **Prevent complications through:**
  - **Essential monitoring and evaluation,** including close observation of changes in the patient's neurological status or medical status
  - **Essential daily medical care**
- **Minimize stroke impact (see pages 4–10)**
- **Prevent secondary stroke (see pages 11–19)**
- **Integrate rehabilitation in all aspects of daily care (see pages 20–25)**
- **Plan for discharge (see pages 26–29)**
- **Educate the patient and family for ongoing care management (see pages 30–31)**

PREVENT COMPLICATIONS

Essential monitoring and evaluation

☐ **Vital signs:** Frequent monitoring, especially in the first few hours after rtPA.

☐ **Disability assessment:** Can use scale such as the Modified Rankin Scale (MRS) to gauge disability and guide care plan. MRS is available here: www.strokecenter.org/wp-content/uploads/2011/08/modified_rankin.pdf and on Intermountain's Stroke topic page (see page 32).

☐ **Neurological status:** Frequent neurological assessment to identify changes that may indicate complications — most commonly, edema, hemorrhagic transformation, seizures, and stroke extension.

☐ **Oxygenation:** Monitor with pulse oximetry; keep O_2 saturation > 94 %.

☐ **Temperature:** Identify fever, which is associated with worse outcomes post stroke (hypothermia may be neuroprotective):[JAU]
- Identify and treat sources of hyperthermia (temperature greater than 38° C).
- Antipyretic medications should be administered to lower temperature.

☐ **Respiratory rate:** Identify causes of hyperventilation or hypoventilation.

☐ **Heart rate and rhythm:**
- Use telemetry to assess heart rate and rhythm.
- Screen for atrial fibrillation and other potentially serious cardiac arrhythmias.
- Identify causes of tachycardia.

NOTE:
If a patient has a **sudden change in neurological condition** or **new onset of stroke symptoms**, notify your hospital's medical emergency or rapid response team. Also consult with neurology as needed.

☐ **Blood pressure:**
- Only treat hypertension if severe and to prevent progression of stroke or worsening of symptoms. General targets are: tPA eligible < 185/110; non-tPA-eligible < 220/120; ICH < 180/105.
- Avoid hypotension. Keeping patients slightly hypertensive may increase chances for ischemic brain tissue to receive O_2 and nutrients.

☐ **Glucose:**
- Maintain normoglycemia.
- Treat hyperglycemia to achieve blood glucose levels in a range of 140 – 180 mg/dL.
- Initially, treat all patients with a sliding scale, even if not diabetic.

☐ **Labs:**
- BMP, CBC, magnesium, PO_4, PT-INR on admit and daily as needed; keep magnesium > 2; normalize PO_4
- Lipid panel, HbA1C

☐ **Skin:** Close surveillance of skin for pressure sore prevention (use the Braden Scale Adult Scoring Tool, available by password within the Intermountain firewall only, at kr.ihc.com/kr/Dcmnt?ncid=51062669)

ESSENTIAL DAILY MEDICAL CARE

☐ **Antithrombotic therapy:**
- Administer **NO** antiplatelets or anticoagulants within 24 hours of administration of rtPA.
- Begin antiplatelet therapy (aspirin) within 24 to 48 hours after stroke.
- See pages 18–19 for suggested therapy.

☐ **DVT prophylaxis:**
- Use subcutaneous heparin/Lovenox, mechanical methods, or a combination (depending on bleeding/clotting risks).
- Frequently turn patient, and use alternating pressure mattresses.
- Consider intermittent external compression devices (for patients who cannot receive anticoagulants).

☐ **Prevention of infection**

☐ **Early mobilization (>24 hrs):**
- Closely observe during transition to sitting or standing.
- Adopt fall-prevention measures.
- Ensure physical therapy and/or occupational therapy consult and treatment.

☐ **General precautions:**
- Unless clinical worsening suggests need for remaining flat or in Trendelenburg position, position head of bed at 25–30 degrees to help patient handle oral secretions, especially if dysphagia is present.[SUM]
- Avoid Foley catheter if possible; remove when ambulatory.
- Avoid IVs in affected limbs.

☐ **Nutrition and hydration:**
- Assess swallowing before starting eating or drinking; done by speech language pathologist (SLP) or using bedside nursing swallow evaluation.
- Avoid glucose-containing or hypotonic fluids or IVs.
- Use aggressive electrolyte replacement and GI prophylaxis.

☐ **Statin therapy post-ischemic stroke or TIA** (see page 5):
- Base on LDL-C levels.
- If on statin at admission, continue at discharge.

☐ **Advance Care Planning:**
- Discuss code status/advance directives with family.
- Prepare POLST (Physician Orders for Life Sustaining Treatment) as needed. (Advance planning resources available on the "Advance Care Planning" topic page at intermountain.net/clinicalprograms or intermountainphysician.org/clinicalprograms.)

✔ KEY RECOMMENDATIONS

- **Manage blood pressure and perfusion.**
- **Manage comorbidities, including diabetes, hypertension, hyperlipidemia, depression, obstructive sleep apnea (OSA), and atrial fibrillation.**
- **Provide early nutritional intervention (see pages 9–10).**

ALGORITHM NOTES

(a) Blood pressure goals after endovascular therapy

If patient had successful endovascular intervention, CONSIDER lower goal of < 160 / 105 and DISCUSS with neuro interventional radiology.

(b) Indications for higher blood pressure goal

- Pressure-dependent symptoms
- Large vessel occlusion or stenosis
- Fluctuating symptoms
- Hemispheric infarct
- Mid-line shift on imaging

(c) Recommended medications

Use short-acting IV agents as follows:

- Labetalol (10–20 mg IV over 1–2 minutes, may repeat 1 time). **Do NOT use if heart rate <60.**
- Nicardipine (5 mg / h IV, titrate to goal by 2.5 mg / h every 5–15 minutes, maximum; 15 mg / h).
- Hydralazine 5–10 mg IV over 1–2 minutes (may repeat 1 time) may be considered when labetalol is contraindicated.

(d) Approach to fluctuating symptoms

- Order STAT non-contrast head CT.
- Make head of bed flat **OR** in Trendelenburg position.
- Consider blood pressure augmentation:
  - Increase intravascular volume with isotonic fluids.
    - Bolus 0.9 % NaCL (500–1000 mL)
    - High-flow 0.9 % NaCL drip (150–200 mL / hour) as tolerated
  - Consider vasopressor therapy.

MINIMIZE STROKE IMPACT

Stroke care involves a complex set of processes to minimize the impact of the stroke. Functional recovery depends on preventing further neurological injury and reducing complication risks (e.g., malnutrition, hyperglycemia, cardiac arrest, depression) that can follow a stroke. In addition, minimizing stroke impact facilitates the patient's ability to more fully participate in functional rehabilitation (see pages 20–25).

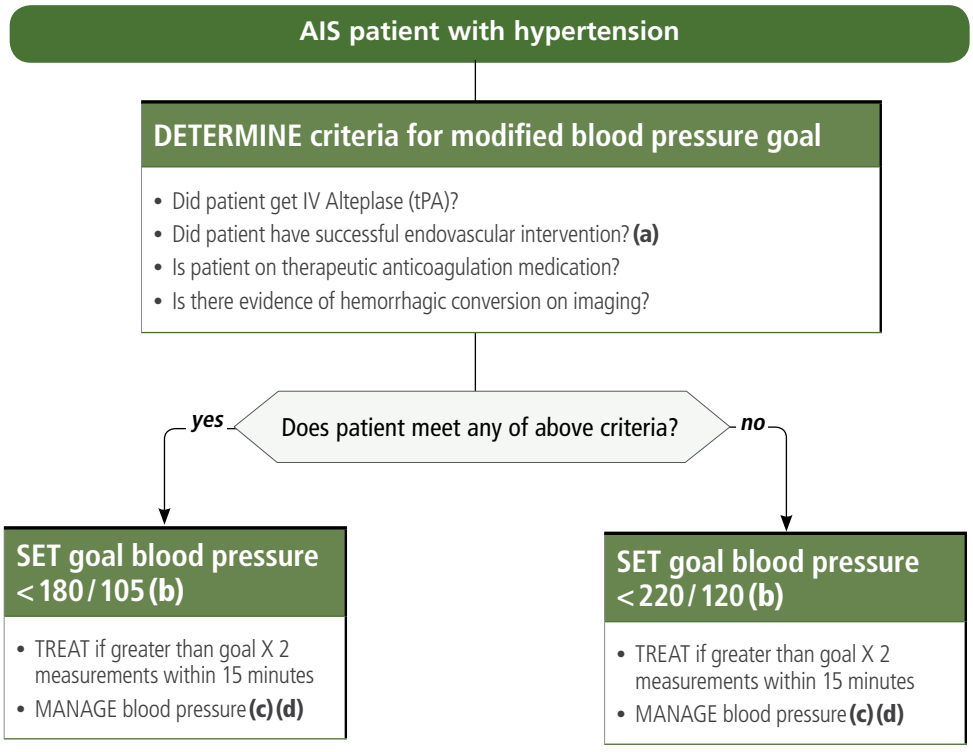
Manage blood pressure and perfusion (acute)

Permissive hypertension is a central part of managing perfusion in acute stroke patients. Blood pressure of < 220 / 120 is acceptable in most stroke patients.[KER] A blood pressure goal for patients who received thrombolysis should be < 180/105; if they undergo endovascular thrombectomy, a lower goal should be considered.[NIND]

Be particularly aware of fluctuations in neurological deficits or changes in severity that may be related to body position or changes in blood pressure. When clinical concerns for perfusion-related worsening arise, STAT head CT should be ordered to address hemorrhage, and attempts can be made to augment blood pressure. Initial strategies include lowering the head of the bed as well as the use of Trendelenburg position and high-flow isotonic IV fluids. In rare circumstances, patients may benefit from more aggressive approaches including the use of albumin and vasopressors.[JAU]

Labetalol or nicardipine are considered first-line agents to manage hypertension in acute ischemic stroke patients. Hydralazine, other beta blockers, and calcium channel blockers are also acceptable. **See algorithm notes at left for dosing information.**

ALGORITHM: BLOOD PRESSURE MANAGEMENT IN ACUTE ISCHEMIC STROKE (AIS)



Manage comorbidities

A number of comorbid conditions require careful monitoring and control to optimize stroke recovery including diabetes, hypertension, hyperlipidemia, obstructive sleep apnea (OSA), depression, and atrial fibrillation.

Diabetes

Diabetes is a well-known contributor to stroke risk, and those admitted with elevated blood glucose are less likely to do well. A number of trials have failed to show improved outcomes with tighter blood glucose control.[PII] Optimal management of diabetes and elevated blood glucose once a patient is admitted for an acute stroke is still unknown. However, the American Heart Association (AHA) recommends maintaining blood glucose levels in the 140–180 range.[KER]

Management recommendations include hemoglobin A1c screening for all ischemic stroke patients upon admission, controlling blood glucose range at 140–180, and educating and referring those newly diagnosed to a diabetes management service. If newly diagnosed, consider treatment with oral medications. Refer to *Adult Management of Diabetes CPM* for discharge medication planning.

Hyperlipidemia

The AHA/ASA recommends addressing hyperlipidemia in the acute setting by immediately beginning therapy to address risk.[KER] A fasting lipid level should be checked on all patients with TIA or stroke. Goal LDL level is dependent on patient factors, including suspected causes, presence of diabetes, etc.[AHA1] Intensive lipid management (atorvastatin 40 mg or greater and rosuvastatin 20 mg or greater) is recommended in all patients with stroke of atherosclerotic origin (large vessel or small vessel). It is also suggested in patients with cryptogenic stroke. In patients with known non-atherosclerotic cause, use of the ACC risk calculator is recommended, with therapy considered when 10-year risk is greater than 7.5 %.[STO, AHA2]

✔KEY RECOMMENDATIONS

Screen all patients admitted with ischemic stroke or TIA for:

- **Diabetes: HbA1c should be controlled at 140–180.**
- **Hyperlipidemia: LDL goal is <100 mg/dL, and treat to reduce secondary stroke risk.**
- **OSA: Evaluate CPAP compliance and control for those with comorbid OSA. Manage OSA for a goal AHI >5 to reduce risk of secondary stroke.**
- **Depression: Use the *Patient Health Questionnaire (PHQ-9)* to evaluate for and treat comorbid depression.**

SECONDARY RISK REDUCTION

Intensive lipid-lowering therapy is acceptable for patients with ischemic stroke of atherosclerotic origin. Some data suggest that combined lowering of LDL-C and triglycerides in conjunction with raising HDL to normal levels will further reduce the risk for secondary stroke.[KER]

TABLE 1. Lipid-modifying Agents[LEX, STO]

Class	Generic name*	Brand name*	Usual dosing	Pros	Cons
statins (HMG-CoA Reductase Inhibitor)	**atorvastatin** (Generic: Tier 3, $)	Lipitor (Tier 1, $)	10–80 mg once daily	• **Atorvastatin** 40 mg and above or **rosuvastatin** 20 mg and above are considered high potency • Can challenge with another statin if side effects occurs • Well tolerated • Take in the evening when most cholesterol production occurs	• Contraindicated in liver disease and pregnancy • **Simvastatin** has more drug-drug interactions • Muscle pain and weakness • Possible rhabdomyolysis
	rosuvastatin (No Generic)	Crestor (Tier 2, $$)	5–40 mg once daily		
	simvastatin (Generic: Tier 1, $)	Zocor (Tier 3, $$)	5–40 mg once daily		
	pravastatin (Generic: Tier 1, $)	Pravachol (Tier 3, $$)	10–80 mg once daily		
fibric acid derivatives	**fenofibrate** (Generic: Tier 1, $)	Lipofen/Tricor (Tier 3, $$)	43–200 mg once daily	• Good at lowering triglycerides • Preferred agent combined with a statin	• Muscle pain and weakness (rhabdomyolysis)

* Estimated Costs (SelectHealth commercial formulary status): Tier 1 = Generic; Tier 2 = Preferred Brand; Tier 3 = Non-Preferred Brand. Cost is based on 30-day actual cost (not copay), and on generic, when available: $=$1–25; $$=$26–75; $$$=$76–150; $$$$= > $150

ALGORITHM NOTES

(a) Recommended outpatient treatments based on inpatient compliance and control evaluation

Treatment options include:

- **PAP-NAP:** A daytime study for patients anxious about starting PAP therapy, claustrophobic, or have difficulty tolerating PAP therapy.
- **Split night:** An overnight study with a 2-hour baseline recording period, followed by a CPAP titration study if indicated
- **Titration study:** In-lab sleep study used to calibrate optimum CPAP therapy

Use the matrix below to determine recommended treatments. For example, if a patient has:

- **Poor control and poor compliance:** Recommend PAP-NAP or split-night study.
- **Good control but poor compliance:** Recommend PAP-NAP only.
- **Good compliance but poor control:** Recommend a titration study.
- **Good control AND good compliance:** Recommend follow-up visit with primary care provider.

Refer to the ***Management of Obstructive Sleep Apnea CPM*** for more information.

OSA MATRIX

	GOOD COMPLIANCE	POOR COMPLIANCE
GOOD CONTROL	Follow-up visit with primary care provider	PAP-NAP
POOR CONTROL	Titration Study	PAP-NAP OR Split-night study

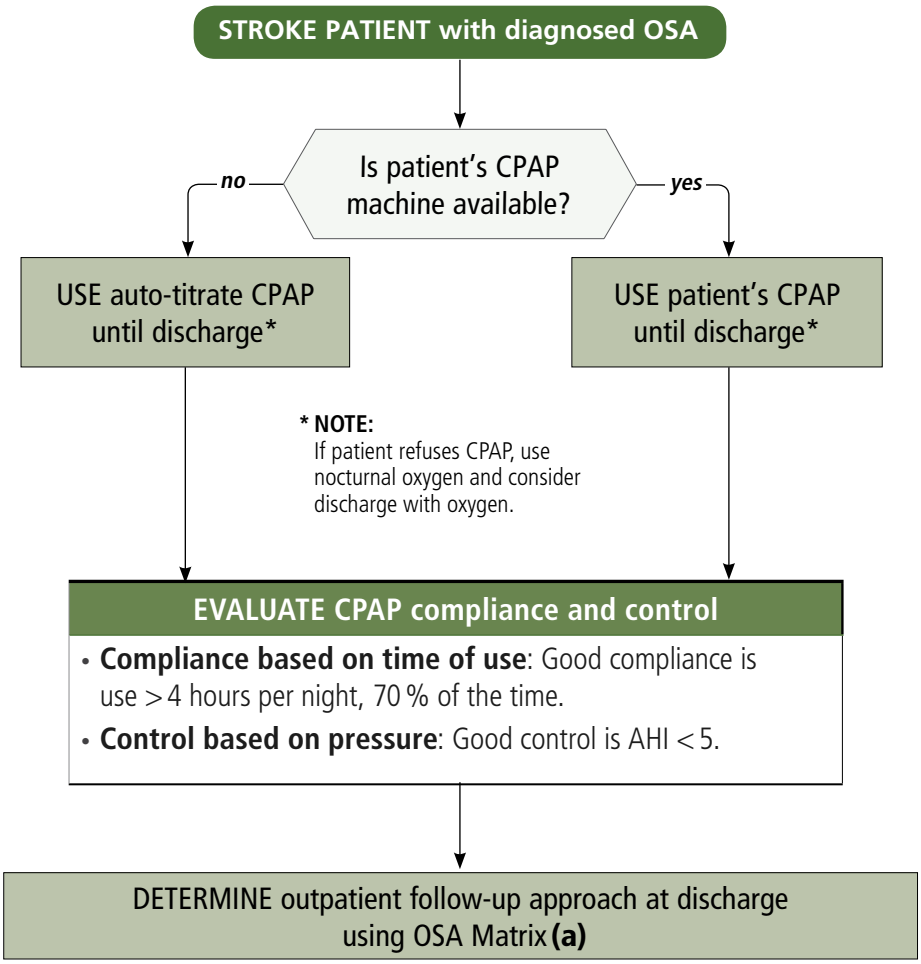
Obstructive sleep apnea (OSA)

There is a growing body of evidence describing the link between obstructive sleep apnea and stroke.[JOH] OSA likely contributes to a patient's overall secondary stroke risk. Management of OSA can lower a patient's risk of subsequent stroke.[JOH] All patients admitted with TIA/ischemic stroke should be evaluated for comorbid or incident OSA. This testing is best done with a formal overnight sleep study in a certified sleep lab.

For patients who carry the diagnosis of OSA at time of admission for stroke, their compliance and control should be evaluated either by bringing in the patient's home CPAP machine/device or by using a device provided by the hospital with regular review of the patients compliance and control (based on evaluation of the machine recordings).

Patients who are well-controlled and compliant with therapy should be referred back to primary care for further continued management. If patients are experiencing difficulties with compliance and/or control, they should be referred for additional testing to evaluate their management plan and receive counseling on potential treatment options (see algorithm and notes on this page for recommended testing). A sleep specialist should be consulted as an outpatient to ensure appropriate follow up and testing.

▶ALGORITHM: INPATIENT MANAGEMENT OF COMORBID OBSTRUCTIVE SLEEP APNEA (OSA)



Depression

Depression is a common complication of stroke, with the estimated prevalence of post-stroke depression (PSD) ranging from 5% to 67%. The most consistent risk factors are severe stroke and early or late physical disability.[KIM] A *Cochrane Review* on PSD treatment concludes that:[HAC1]

- Antidepressants seem to be effective, but the evidence is not robust.
- There is no evidence for effectiveness of psychological therapies alone.
- Recommended approach should be to continue antidepressant treatment for at least six months after initial recovery.

The FLAME trial concluded that the early prescription of fluoxetine 20 mg per day enhanced motor recovery after three months.[CHO] A *Cochrane Database System Review* of SSRIs for stroke recovery found promising evidence that SSRIs might reduce dependency and disability post stroke, even in patients who were not depressed.[GEL] However, AHA guidelines consider the benefits of this therapy as not well established.[KER]

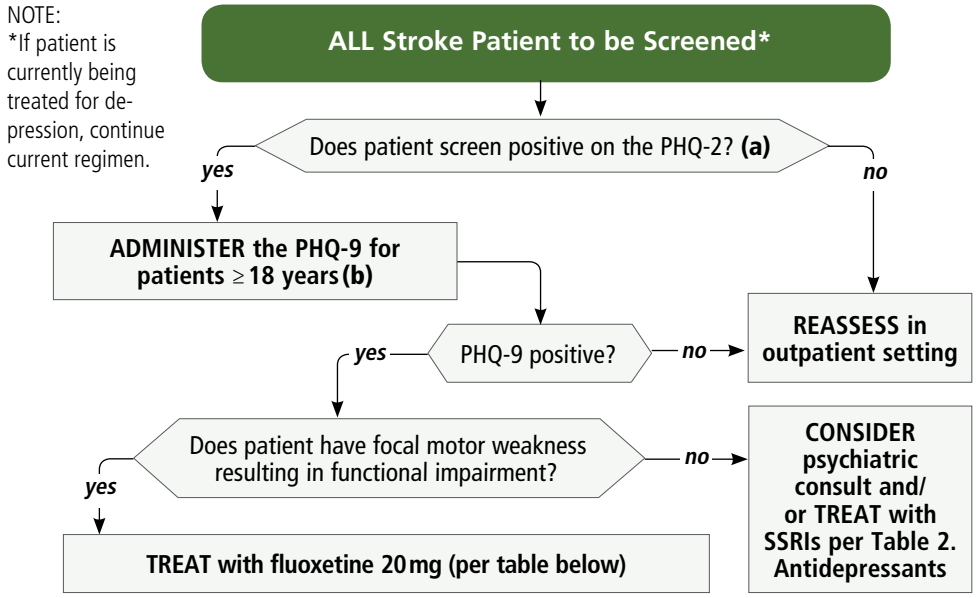
A recent AHA scientific statement found insufficient evidence to support routine pharmacological therapy to prevent development of depression after stroke.[TOW]

THE IMPORTANCE OF SCREENING FOR DEPRESSION

The Joint Commission recommends screening all stroke patients for depression prior to discharge.[MIT] No single tool has been endorsed for early screening for depression in post-stroke patients, although some have shown promising results.[TOW] Intermountain recommends the use of the ***Patient Health Questionnaire (PHQ-9)*** — a brief and clinically useful, validated scale — and its derivative, two-question screen (referred to as the PHQ-2) as a reasonable approach to screening in the inpatient setting.

Note: Items address symptoms present for the two weeks prior to the stroke.

ALGORITHM: SCREENING AND TREATMENT FOR DEPRESSION IN STROKE



ALGORITHM NOTES

(a) PHQ-2 Questions (Yes to EITHER = positive screen)

Over the last 2 weeks, have you experienced:

1. Little interest or pleasure in doing things?
2. Feeling down, depressed, or hopeless?

(a) PHQ-9 Use

- For scoring and interpretation instructions on the PHQ-9, refer to the ***Management of Depression CPM.***
- Note that question #9 is a key indicator for suicide risk and, if answered positively, launches a Discern Alert within iCentra for providers. See ***Behavioral Health iCentra Reference Guide.***

TABLE 2. Antidepressants[LEX, GEL, CHO]

Class	Generic name*	Brand name*	Usual dosing	Pros	Cons
selective serotonin reuptake inhibitors (SSRIs)	**fluoxetine** (Generic: Tier 1, $)	Prozac (Tier 3, $$)	10–40 mg once daily	• Well tolerated • Fluoxetine may help with weight loss and improve motor recovery • First-line choice for depression • Most side effects are transient • Extensive experience	• Slow onset; max effect at 8–12 weeks • Sexual dysfunctions • Increase risk of serotonin syndrome if taken with other serotonergic agents (TCA, tramadol, buspirone, St. John's wort, etc.) • Abrupt discontinuation may cause withdrawal • Can increase depression and suicidal thoughts, particularly early in therapy • Avoid paroxetine during pregnancy • Avoid citalopram in QT prolongation
	citalopram (Generic: Tier 1, $)	Celexa (Tier 3, $$)	10–40 mg once daily		
	sertraline (Generic: Tier 1, $)	Zoloft (Tier 3, $$)	25–100 mg once daily		
	paroxetine (Generic: Tier 1, $)	Paxil (Tier 3, $$)	10–40 mg once daily		

* Estimated Costs (SelectHealth commercial formulary status): Tier 1 = Generic; Tier 2 = Preferred Brand; Tier 3 = Non-Preferred Brand. Cost is based on 30-day actual cost (not copay), and on generic, when available: $=$1–25; $$=$26–75; $$$=$76–150; $$$$= > $150

Provide early nutritional intervention

Dysphagia is a common result of stroke and can affect more than 70 % of all stroke patients. Post-stroke, dysphagia is associated with an increased risk of aspiration, pneumonia, prolonged hospital stay, disability, and death.[MAR] To avoid these potential complications, it is vital to test the swallowing capability of an acute stroke patient. This can be done by the physician, nurse, or the SLP. Swallow screening is an essential first step in identifying risk of dysphagia and is a quick and minimally invasive procedure that expedites referral to speech pathology for evaluation and treatment.[DAN]

Dysphagia predisposes stroke patients to malnutrition and dehydration, increasing patient risks for reduced functional outcome and short-term mortality.[CARE] Studies suggest that dehydration and/or protein-energy malnutrition slows recovery after acute stroke and may be a risk factor for poor outcomes.[DAV, JAU, CHOI, GAR] Early enteral nutrition (see table 3 below) may improve the ultimate outcome for stroke patients, particularly those that become critically ill.[KHA]

Early tube feeding is appropriate for those who are unable to eat or cannot eat enough and provides energy and protein to maintain lean body mass and to support activity and immune function, thereby facilitating rehabilitation and recovery and preventing infectious complications. Tube feeding should continue until oral intake meets at least 65 % of energy and protein needs.

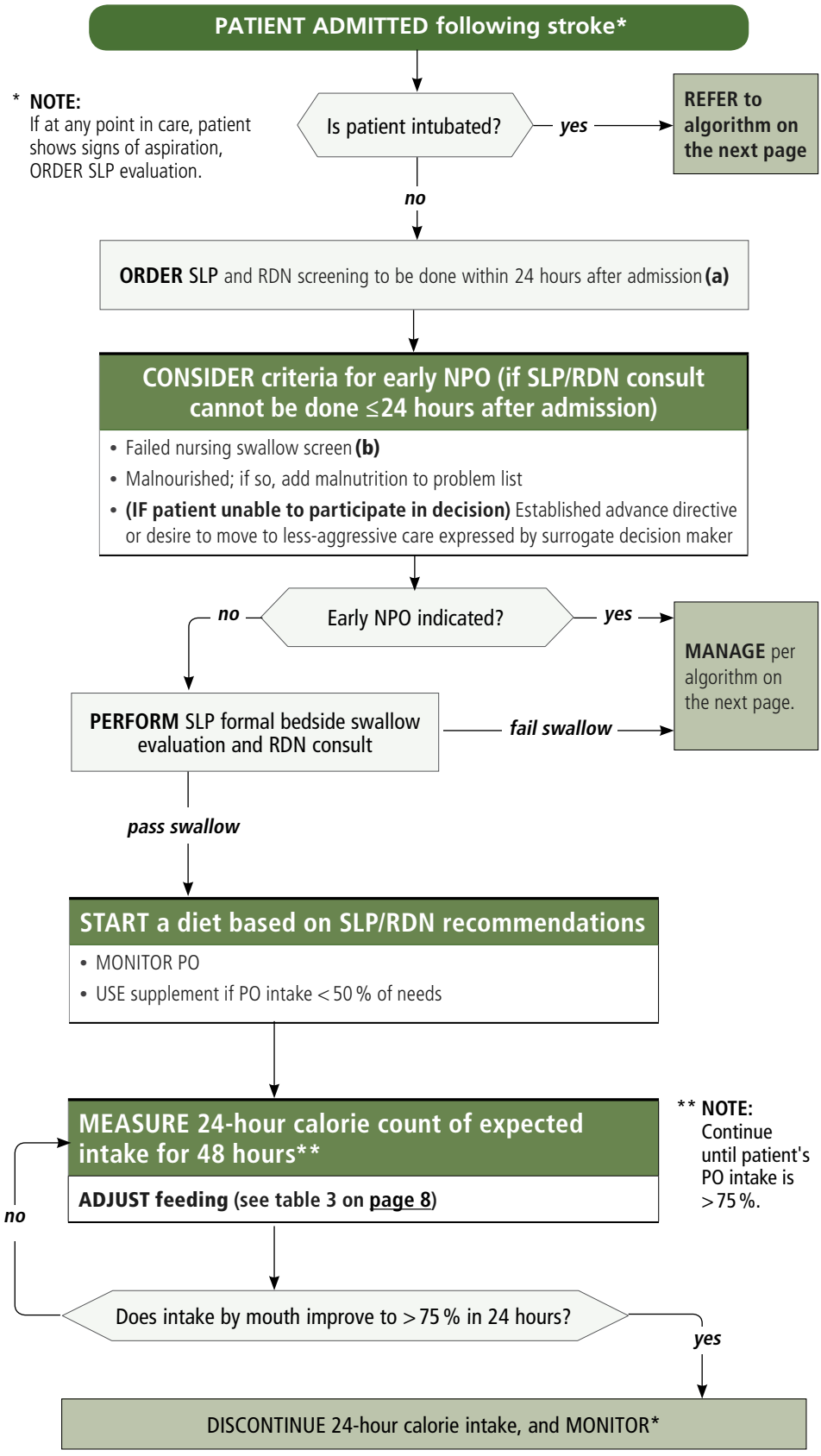
Feeding tube placement should be done after careful discussion with patient, next of kin, or other surrogate decision maker.

The algorithms on pages 9–10 detail recommendations for early nutritional intervention and management as well as feeding tube indications.

Table 3. Nutrition Transition Enteral to Oral Adult Table
Patient does not need to chronologically progress from clear liquid to solid diet.

PO Intake	25 % Consumed	50 % Consumed	65 % Consumed	Fluid Monitoring
Clear liquid	• Continue tube feeding full calories • Advance diet if appropriate	• Continue tube feeding full calories • Advance diet if appropriate		• Monitor: PO + IV + tube feedings meeting requirements • Bolus/flush water into tube to meet needs
Full liquid	• Continue tube feeding full calories • PO supplements	• Reduce tube feeding calories by half in one of the following ways: – Same rate for 12 hours only at night – Continual tube feeding at half rate (24 hours/day) • Add PO supplements • Advance diet as tolerated to soft/solid	• Advance diet as tolerated • Add PO supplements • Discontinue tube feeding after calorie count demonstrates energy needs have been met	
Soft or solid diet	• Continue tube feeding at 75 % of calories/protein • Change to nocturnal schedule • Add PO supplements	• Reduce tube feeding calories by half in one of the following ways: – Same rate for 12 hours only at night – Continual tube feeding at half rate (24 hours/day) • Add PO supplements	Discontinue tube feeding	

ALGORITHM: EARLY NUTRITIONAL INTERVENTION — INITIAL ASSESSMENT AND MANAGEMENT



ALGORITHM NOTES

(a) Focus for SLP and RDN evaluations

- **SLP:** Evaluate for swallowing safety and consistency of food that can be eaten.
- **RDN:** Evaluate and determine macronutrient and micronutrient goals and balance nutritional requirements and restrictions based on comorbidities.

(b) Nursing swallow screen

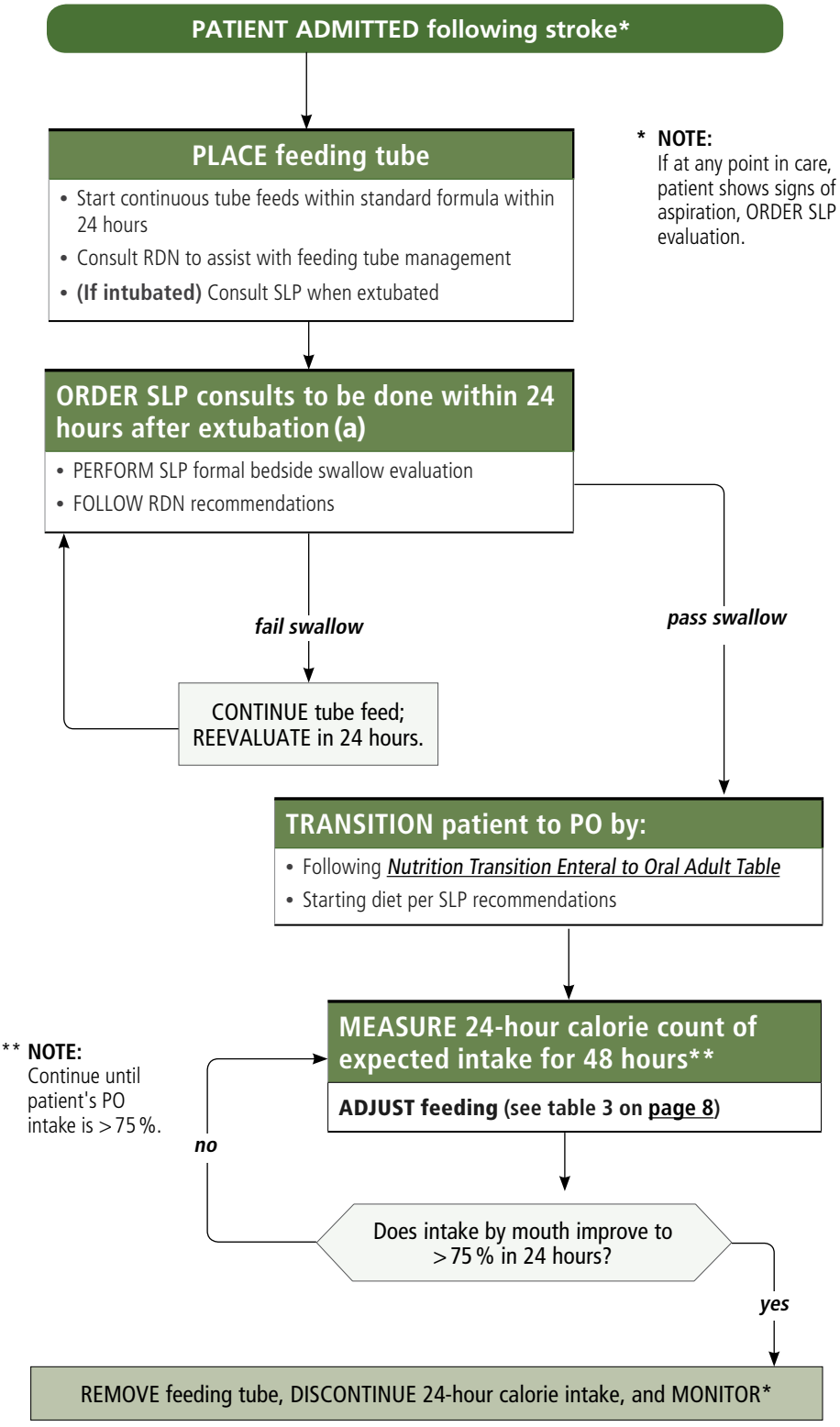
- **Pre-swallow screen criteria**: A patient fails the swallow screen if ANY of the following are answered with a "no" answer:
  - Stroke/TIA diagnosis
  - Able to sit up at least 60 degrees
  - Able to produce a strong cough
- **Sequential swallowing tasks:** Patient drinks 90 ml of water sequentially (with or without a straw) without stopping or pausing; passing the test requires that patient does not stop, pause, or in any other way fails to complete sequential swallows.

ALGORITHM: EARLY NUTRITIONAL INTERVENTION — FEEDING TUBE INDICATED

ALGORITHM NOTES

(a) Focus for SLP and RDN evaluations

- **SLP:** Evaluate for swallowing safety and consistency of food that can be eaten.
- **RDN:** Evaluate and determine macronutrient and micronutrient goals and balance nutritional requirements and restrictions based on comorbidities.



PREVENT SECONDARY STROKE

Patients with ischemic stroke are at higher risk of subsequent stroke; thus, reducing this risk is an integral part of inpatient management. Maximal medical therapy (MMT) can lower secondary stroke risk by up to 80% in some studies.[HAC2] MMT includes addressing and treating all risk factors for stroke applicable to each individual patient.

An individualized list of risk factors and plans to modify those risks should be reviewed and formulated with the patient and family. This includes medications, additional testing, nutrition counseling, exercise program development, and developing healthy habits while modifying unhealthy habits. It is critical that plans for follow up be developed and implemented prior to discharge.

The American Heart Association (AHA)/American Stroke Association (ASA) guidelines[KER] and other evidence-based recommendations for reducing recurrent stroke risk address both short- and long-term strategies. These strategies may also help reduce risk of other vascular outcomes after stroke, including myocardial infarction and vascular death.

Treatment decisions should consider:

- **Coexisting cardiovascular conditions** and/or presumed mechanisms of focal brain injury and type and localization of the vascular lesions
- **Cardiovascular and other risk factors** that may contribute to recurrent stroke in all patients with ischemic stroke or TIA

Prevention strategies may include interventional approaches for atherosclerotic disease, antithrombotic and/or antiplatelet therapy, and cardiovascular risk factor control (e.g., use of statins and/or antihypertensives). Recommendations vary based on the type and source of stroke, stroke complications, and the patient's unique risk factors. Pages 18 through 19 provide a detailed look at antithrombotic choice decisions and medications.

Table 4. Stroke Risk Factors

Modifiable, well documented	Partially modifiable and/or not as well documented
Cardiovascular conditions	☐ Alcohol or drug abuse
☐ Atrial fibrillation	☐ Hypercoagulability
☐ Carotid artery stenosis	☐ Hyperhomocysteinemia
☐ History of atherosclerotic vascular disease (coronary artery disease, heart failure, peripheral arterial disease)	☐ Infection
Cardiovascular risk factors	☐ Inflammation
☐ Hypertension	☐ Lipoprotein elevation or lipoprotein-associated phospholipase elevation
☐ Diabetes mellitus	☐ Metabolic syndrome
☐ Dyslipidemia	☐ Migraine headaches
☐ Cigarette exposure	☐ Oral contraceptive use
☐ Obesity and body fat distribution	**Non-modifiable**
☐ Physical inactivity	☐ Age (risk of stroke doubles for each successive decade after 55 years)[OVB]
☐ Poor diet	☐ Race (incidence is higher among African Americans and some Hispanic and Asian Americans)
Other	☐ Gender (overall prevalence is higher for men)
☐ Postmenopausal hormone therapy	☐ Low birth weight
☐ Sickle-cell disease	☐ Family history of stroke/TIA
☐ Sleep-disordered breathing, particularly obstructive sleep apnea	

✔ KEY RECOMMENDATIONS

- **Assess and manage secondary stroke risks:**
  - **Hypertension**
  - **Hyperlipidemia**
  - **Diabetes**
  - **Atrial fibrillation**
  - **Carotid stenosis**
  - **Tobacco use**
  - **OSA**
  - **Physical inactivity**
  - **Hypercoaguable states**
  - **Alcohol consumption**
  - **Artificial valves**
  - **PFO**
  - **Dissection**
  - **Cardiomyopathy**
- **Determine stroke cause**
- **Evaluate for all known risk factors**
- **Plan for further testing as indicated**
- **Treat modifiable risk factors**
- **Plan lifestyle modifications as needed (e.g., diet, exercise, family involvement)**
- **Arrange close outpatient follow up and monitoring**

IMPORTANCE OF SECONDARY PREVENTION

Of the estimated 795,000 strokes in the U.S. each year, 185,000 are recurrent strokes. The number of people with TIA, and therefore at risk for stroke, is estimated to be much greater.[MOZ, KER]

SMOKING AND RISK

Patients who use tobacco should be encouraged to stop, and tobacco cessation aids should be provided (including nicotine products, medications, and counseling).[KER] Key to smoking cessation is modification of the patient's home environment (including identifying and managing smoking triggers and household member tobacco use).

PATIENT EDUCATION RESOURCE

The booklet, ***Quitting Tobacco***, includes extensive guidance and resources for successfully ending tobacco use.

BUBBLE STUDIES

Routinely including a bubble study on initial cardiac imaging during the initial hospitalization **is not recommended**. PFO closure data has not shown a significant reduction in recurrent stroke with patients randomized to the closure device arm, and closure may lead to an increase in procedural complications.[FUR, MEI, CAR] The investigation for PFO should be reserved for patients where PFO discovery would change management; for example:

- Second cryptogenic stroke in a patient < 60
- A negative workup for embolic source including a negative, ambulatory arrhythmia monitoring (AAM)
- Otherwise strong clinical suspicion for paradoxical embolus

All patients should be seen in an outpatient stroke clinic, and if all other testing is negative, subsequent evaluation for PFO can be considered at this time.

Determining stroke cause

Prevention of secondary stroke begins with determining the cause of the current stroke by:

- Evaluating risk factors
- Screening and treating cardiac causes of stroke
- Obtaining large vessel imaging
- Evaluating lab work (serological evaluation) — see page 3

Evaluating risk factors

Hypertension — the most common risk factor for stroke — contributes the highest risk of recurrent stroke. Long-term management of hypertension in ischemic stroke should be started at the time of hospital discharge. There is evidence that ACE-I, diuretics, and ARB-I are most beneficial in reducing secondary stroke in hypertensive patients.[KER] There is also evidence that ACE-I may reduce the risk of secondary stroke in normotensive patients.[KER]

Treatment of hypertension should aim for a goal blood pressure of < 140 / 90 in most patients. In patients with diabetes and CV disease, it is reasonable to aim for a goal blood pressure < 130 / 80.[KER] Individual patient factors should be considered when setting blood pressure targets. Blood pressure goals should be clearly communicated to primary care physicians.

In addition to medications, lifestyle modifications play a vital role in managing hypertension. These include following a low-salt diet, quitting smoking, getting regular exercise, losing weight, managing OSA, and limiting alcohol consumption.

Other risk factors include comorbid conditions, such as diabetes, OSA, and hyperlipidemia (see previous section on managing the impact of stroke) as well as obesity, diet, activity levels, and smoking.

Screening and treating cardiac causes of stroke

All patients admitted with suspicion of an ischemic stroke should be screened for a cardiac source, beginning with an ECG in an emergency department or on admission (for direct admissions) to assess for atrial fibrillation, cardiac ischemia, or other arrhythmia. Unless the patient has had a recent echocardiogram (within the past three months), cardiac imaging should be obtained during the hospitalization to help identify possible mechanisms of stroke. Continuous cardiac monitoring is indicated for at least the first 24 hours (and ideally for the entire hospitalization) to assist with diagnosing atrial fibrillation, atrial flutter, or other serious arrhythmias after stroke.[JAU]

Imaging — A transthoracic echocardiogram (TTE) **without** bubble study should be obtained as the initial imaging study on most patients. It may be more appropriate to initially order a trans-esophageal echocardiogram (TEE) in some cases, such as when:

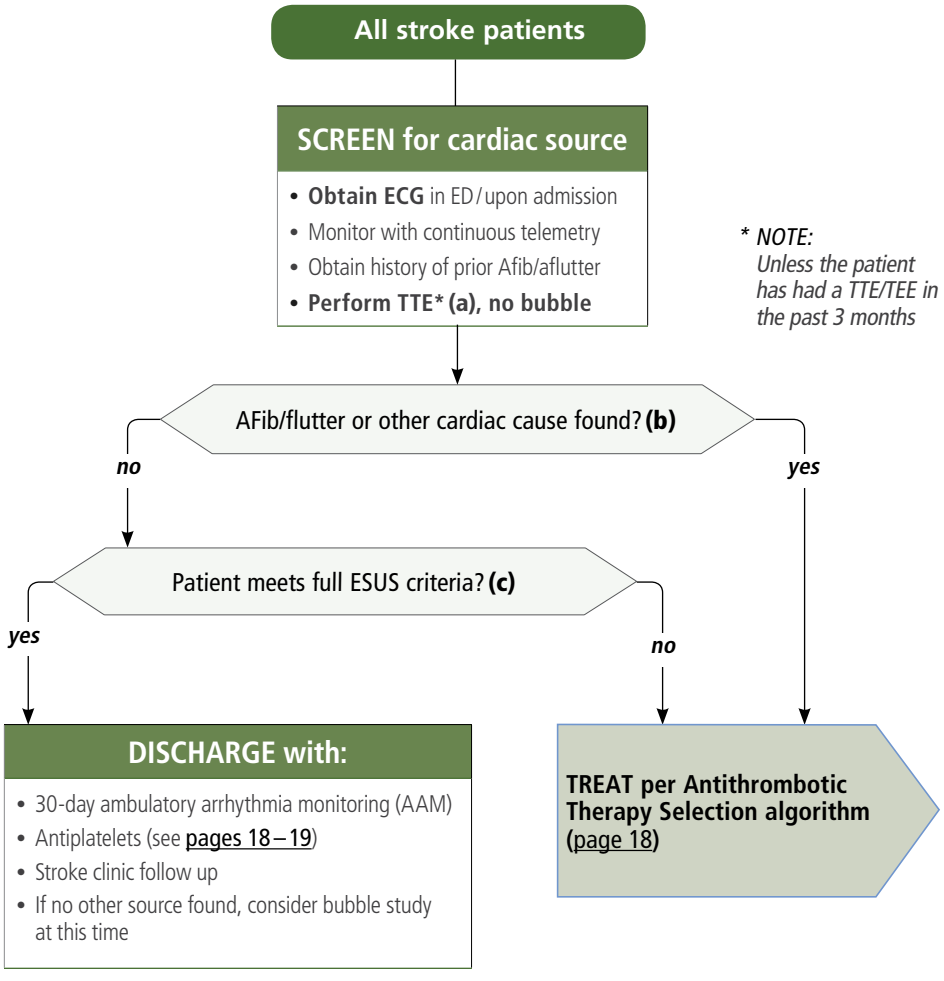
- The patient is < 45 with no known cardiac disease.
- There is a suspected left atrial thrombus, endocarditis, or aortic pathology.
- There is a need to better visualize a mechanical valve, particularly in the mitral or aortic position.

If the TTE fails to reveal a source and concern remains for a cardiac or aortic source, consider a TEE based on patient characteristics, individual risk assessment, and if the outcome would change clinical management.

Ambulatory Arrhythmia Monitoring (AAM)—If a cardiac source of stroke has not been determined with ECG, telemetry and cardiac imaging as outlined above, and if there is still a suspicion for an embolic stroke, utilize further AAM upon discharge. Recent studies have suggested that longer courses of telemetry monitoring have significantly higher detection rates of paroxysmal atrial fibrillation.[GLA, SAN] If a patient meets full embolic stroke of undetermined source (ESUS) criteria[HAR], discharge the patient with AAM, and follow up in stroke clinic.

Because care for stroke patients can be complicated, the algorithm below provides a general, evidence-based guide for initial workup for cardiac source. As always, clinicians should use their best clinical judgement when caring for stroke patients, which may at times require deviation from this algorithm.

ALGORITHM: EVALUATING AND TREATING CARDIAC CAUSE OF STROKE



ALGORITHM NOTES

(a) Consider TEE (if ANY)

- < 45 years old with no known cardiac disease
- Suspected left atrial thrombus
- Suspected aortic pathology
- Mechanical valve
- Suspected endocarditis

(b) Cardiac sources

- Intracardiac Thrombus
- Afib/Aflutter
- Prosthetic cardiac valve
- Atrial myxoma or other cardiac tumor
- Mitral Stenosis
- Valvular disease (endocarditis, vegetations)
- Recent (<4 wks) MI
- LV EF <30 %

(c) ESUS criteria

- Non-lacunar stroke seen on MRI or CT
- No intracranial/extracranial stenosis ≥50 %
- No major risk of cardioembolic source of embolism determined (refer to note above about cardiac sources)
- No other specific cause of stoke identified (e.g., arteritis, dissection, migraine/vasospasm, drug misuse)

Large vessel imaging

A significant portion of ischemic stroke can be attributed to large vessel atherosclerotic disease. Optimal imaging of the extra-cranial and intracranial vasculature is essential in identifying high-risk lesions that could require intervention to reduce secondary stroke risk (see algorithm below). Contrast-enhanced imaging is considered optimal for stroke work up, with CTA or MRA with gadolinium offering the best cost/risk options available. DSA is considered the "gold standard" to appropriately risk stratify large vessel lesions; however, it is an invasive procedure and often not warranted.

Because high-grade intracranial stenosis also carries increased risk of stroke recurrence and is considered a high-risk condition, it should be treated more aggressively when present.[KER] Due to this potential for more aggressive therapy, it is appropriate to evaluate intra-cranial stenosis using contrast-enhanced imaging as well. Non-enhanced MRA is a suitable alternative in those patients who cannot tolerate contrast; however, due to its higher incidence of motion-degradation and lower resolution, it should not be used routinely.

Because there is adequate indication to image intracranial and extracranial stenosis, carotid ultrasound should be considered insufficient for fully evaluating the cerebral vasculature in patients with ischemic stroke and TIA.

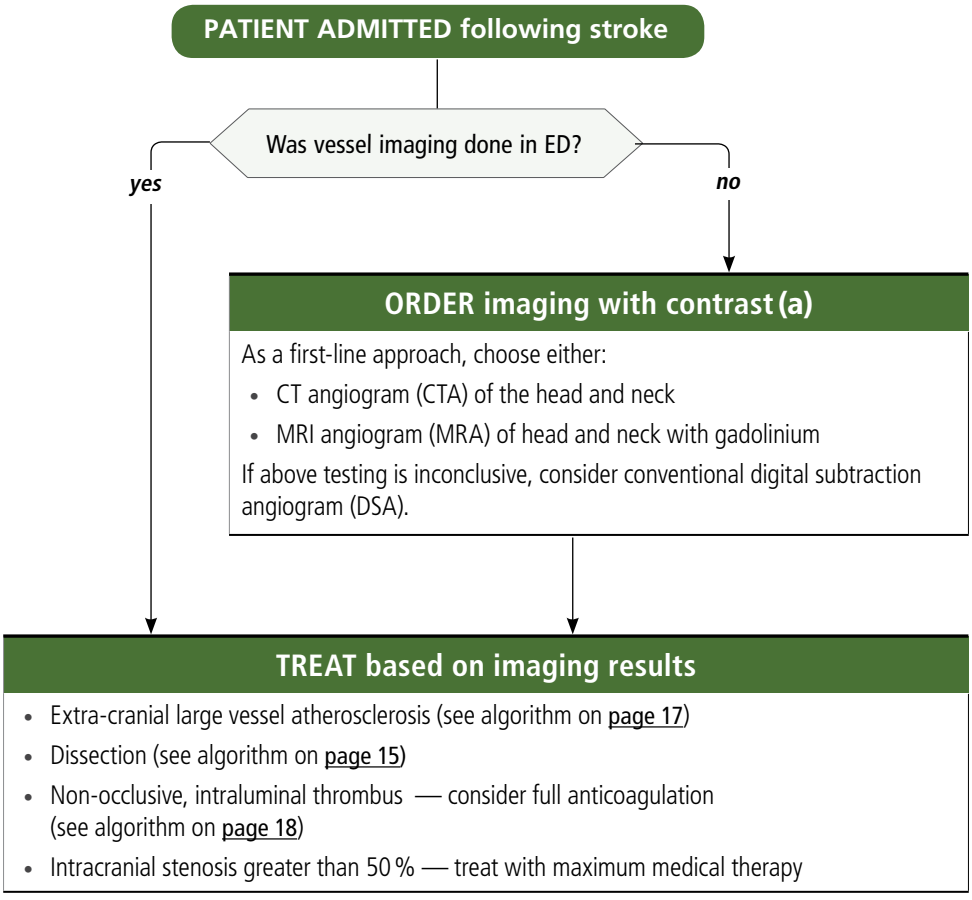
TCD can be added to carotid ultrasound in patients unable to tolerate CTA or MRA.

ALGORITHM NOTES

(a) Cautions for imaging

- If patient:
  - Has an eGFR < 30, use MRA (time of flight)
  - Is allergic to iodine, use MRA with gadolinium
  - Does not meet MRI screening requirements (use CTA or DSA)
  - Has contraindications to having MRA, CTA, or DSA, consider carotid ultrasound plus TCD as a less-preferred alternative
- When using CTA or DSA, consider pre-medication if patient has received contrast dye in last 24 hours or eGFR < 30.
- If there are questions about degree of stenosis, use DSA as considered "gold standard."

ALGORITHM: STROKE LARGE VESSEL IMAGING

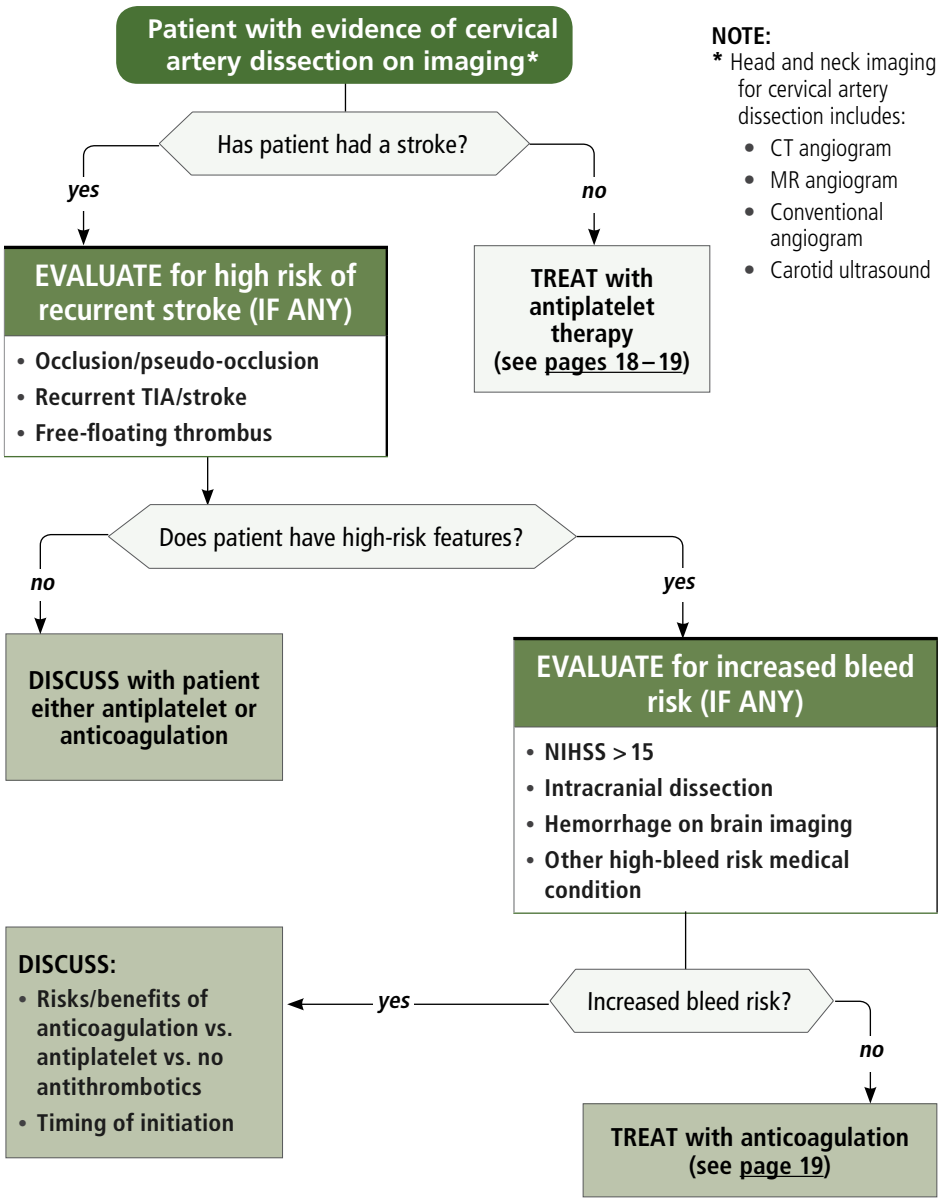


Management of key secondary stroke risk factors

Cervical artery dissection

The decision regarding antithrombotic selection should be individualized based on patient characteristics, size of stroke, severity of dissection, and bleeding risks. Of note, current data show no significant difference in recurrent stroke risk of dissection treated with antiplatelet agents versus anticoagulation.[CAD, LYR] There is a small, nonsignificant reduction in risk of recurrent stroke with anticoagulation, which might be offset by a slight nonsignificant increased risk of hemorrhage.[CAD]

ALGORITHM: MANAGEMENT OF COMORBID CERVICAL ARTERY DISSECTION



NOTE:
* Head and neck imaging for cervical artery dissection includes:
- CT angiogram
- MR angiogram
- Conventional angiogram
- Carotid ultrasound

WEIGHING RISKS/BENEFITS

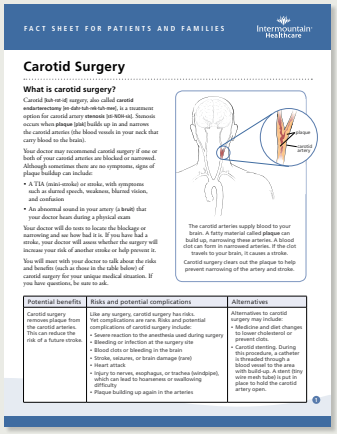
There are instances when patients appear at high risk for a recurrent stroke (such as vessel occlusion/pseudo-occlusion, recurrent TIAs/strokes, or free-floating thrombus). In these cases, it may be wise to favor anticoagulation initially.

However, when patients have a high risk of bleeding (large area of ischemia, NIHSS ≥ 15, intracranial dissection, hemorrhage on imaging), the risks and benefits of anticoagulation versus antiplatelet therapy have to be considered on an individual basis and discussed with the patient.[ENG]

Timing of anticoagulation initiation also needs to be individualized based on bleeding risks.

PATIENT EDUCATION RESOURCE

The fact sheet, ***Carotid Surgery***, can answer patient questions about CAE and CAS surgery.


FACT SHEET FOR PATIENTS AND FAMILIES

Carotid Surgery

What is carotid surgery?

Carotid (kuh-rot-id) surgery, also called carotid endarterectomy (ee-dahr-tuh-rek-tuh-mee), is a treatment option for carotid artery stenosis (st-NOH-sis). Stenosis occurs when plaque (plak) builds up in and narrows the carotid arteries (the blood vessels in your neck that carry blood to the brain).

Your doctor may recommend carotid surgery if one or both of your carotid arteries are blocked or narrowed. Although sometimes there are no symptoms, signs of plaque buildup can include:

- A TIA (mini-stroke) or stroke, with symptoms such as slurred speech, weakness, blurred vision, and confusion
- An abnormal sound in your artery (a bruit) that your doctor hears during a physical exam

Your doctor will do tests to locate the blockage or narrowing and see how bad it is. If you have had a stroke, your doctor will assess whether the surgery will increase your risk of another stroke or help prevent it.

You will meet with your doctor to talk about the risks and benefits (such as those in the table below) of carotid surgery for your unique medical situation. If you have questions, be sure to ask.

plaque
carotid artery

The carotid arteries supply blood to your brain. A fatty material called plaque can build up, narrowing these arteries. A blood clot can form in narrowed arteries. If the clot travels to your brain, it causes a stroke.

Carotid surgery clears out the plaque to help prevent narrowing of the artery and stroke.

Potential benefits	Risks and potential complications	Alternatives
Carotid surgery removes plaque from the carotid arteries. This can reduce the risk of a future stroke.	Like any surgery, carotid surgery has risks. Yet complications are rare. Risks and potential complications of carotid surgery include: • Severe reaction to the anesthesia used during surgery • Bleeding or infection at the surgery site • Blood clots or bleeding in the brain • Stroke, seizures, or brain damage (rare) • Heart attack • Injury to nerves, esophagus, or trachea (windpipe), which can lead to hoarseness or swallowing difficulty • Plaque building up again in the arteries	Alternatives to carotid surgery may include: • Medicine and diet changes to lower cholesterol or prevent clots. • Carotid stenting. During this procedure, a catheter is threaded through a blood vessel to the area with build-up. A stent (tiny mesh tube) is used in a place to hold the carotid artery open.

Extra-cranial large vessel atherosclerosis

Extra-cranial large vessel atherosclerosis refers to (non-intracranial) carotid artery stenosis caused by atherosclerosis. It is divided into two patient categories: symptomatic and asymptomatic.

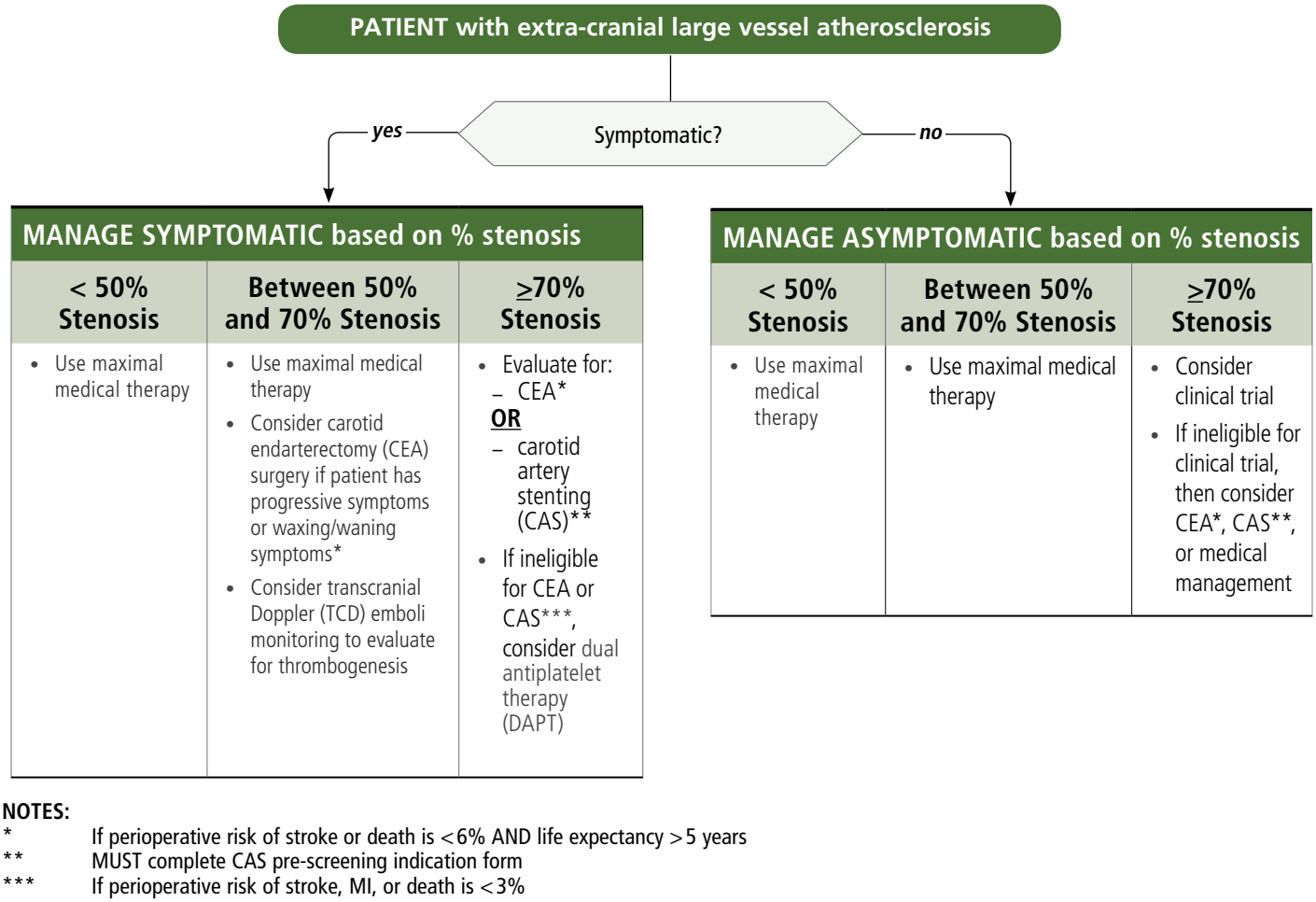
Symptomatic: This implies that a patient's neurologic symptoms (such as a stroke, TIA, or perfusion-related deficits) localize to a specific portion of the brain that is supplied by the affected vessel. In patients with symptomatic carotid artery stenosis, treatment is dictated by the percentage of vessel stenosis (% stenosis). Maximal medical management (optimal management of all cerebrovascular risk factors that apply to a given patient) should be initiated on those with symptomatic carotid artery stenosis. In symptomatic patients with:

- **Less than 50 % stenosis**—Carotid artery stenosis is not typically a cause of neurologic symptoms. Other etiologies should be investigated, maximal medical management initiated, and patients should follow up with their primary care physician.
- **Between 50 % and 70 % stenosis**—Carotid artery stenosis is less likely to be a cause of neurologic symptoms. Other etiologies should be investigated, maximal medical management initiated, and patients should follow up with their primary care physician for surveillance. If a patient has repeated neurologic events despite maximal medical management and extensive workup reveals no other source for the symptoms, treatment via a revascularization procedure may be indicated. Consultation between neurology and a treating physician (carotid surgeon) is recommended.
- **Greater than or equal to 70 % carotid artery stenosis**—Both maximal medical therapy and a revascularization procedure are indicated. Most patients will be referred for a surgical revascularization procedure called a **carotid endarterectomy (CEA)**. For patients who are not surgical candidates (due to medical conditions or location of stenosis) but meet the indication criteria, a nonsurgical procedure called **carotid artery stent angioplasty (CAS)** is an effective alternative.

Asymptomatic: Asymptomatic narrowing of a blood vessel implies that either a patient is NOT having neurologic symptoms or a patient's specific neurologic symptoms cannot be directly attributed to an affected vessel. In patients with asymptomatic carotid artery stenosis, treatment is also dictated by the percentage of vessel stenosis (% stenosis). For all asymptomatic patients, initiate medical management and have the patient follow up with their primary care physician; however, asymptomatic patients with:

- **Less than 50 % stenosis** are not high risk for stroke due to the involved vessel.
- **Greater than 50 % stenosis** may be candidates for ongoing clinical trials evaluating the efficacy of various treatment options for asymptomatic carotid artery stenosis (e.g., the CREST trial).
- **High-grade carotid artery stenosis (>70 %)** are at a higher risk for future stroke than those who don't have high-grade stenosis. For these patients who are not interested in participating in a clinical trial, CEA surgery can be considered.

ALGORITHM: EXTRA-CRANIAL LARGE VESSEL ATHEROSCLEROSIS



NOTES:

* If perioperative risk of stroke or death is < 6% AND life expectancy > 5 years

** MUST complete CAS pre-screening indication form

*** If perioperative risk of stroke, MI, or death is < 3%

▶ALGORITHM: ANTITHROMBOTIC THERAPY SELECTION

Stroke patient (TIA or AIS)

Patient has current or history of AF/Aflutter or other criteria for anticoagulant therapy? **(a)**

no

yes

NOTE: Selection and timing of antiplatelet or anticoagulant agents should be made on an individualized basis. See medication table on page 19 for usual dosing, issues/side effects, disease state recommendations, contraindications, and warnings.

ANTIPLATELET THERAPY (see also table 5 on page 19)

CONSIDER antiplatelets as follows:

- ***PREFER*** agent based on strength of evidence and patient characteristics:
  - Aspirin (Evidence IA).

  OR
  - Aspirin extended release/dipyridamole (Evidence IB).
  - Clopidogrel (Evidence IIaB); this is the only option for those with aspirin allergy.

  OR
  - Dual Antiplatelet Therapy (DAPT) (Evidence IIbB); consider DAPT (aspirin in combination with clopidogrel) for non-disabling stroke for time-limited duration.

ANTICOAGULANT THERAPY (see also table 5 on page 19)

CONSIDER anticoagulants as follows:

- **FOR NONVALVULAR AF:**
  - **DETERMINE** timing of anticoagulation based on bleeding risk as follows:
    - **Low risk (small infarct volume, TIA, no bleeding):** start < 1 week
    - **Medium risk (moderate infarct volume, petechial hemorrhage):** start ≥ 1–2 weeks
    - **High risk (large infarct volume, hemorrhagic conversion):** start ≥ 2–4 weeks
  - **PREFER** agent based on strength of evidence and patient characteristics:
    - Warfarin (Evidence IA) — INR 2.0–3.0
    - Apixaban (Evidence IA)

    OR
    - Dabigatran (Evidence IB)

    OR
    - Rivaroxaban (Evidence IIaB)

- **FOR MECHANICAL VALVE:**
  - **Warfarin:** Goal INR to be determined by valve manufacturer.
  - **Weigh risk/benefit ratio** on individual basis, and consider consult with neurology.
  - **Bridging therapy may be considered** based on individualized risk of thrombosis and/or bleeding.

- **FOR OTHER INDICATIONS:**

  Treat the following with warfarin/enoxaparin (goal INR of 2.0–3.0):
  - **Intracardiac thrombus.**
  - **Cervical artery dissection:** See algorithm on page 15.
  - **Patent foramen ovale (PFO) with venous thromboembolus (VTE).**
  - **Antiphospholipid antibody syndrome (APS):** Use indefinite warfarin therapy (goal INR 2.5–3.5); follow up with appropriate provider.
  - **STEMI showing apical akinesis or dyskinesis:** Use warfarin time-limited therapy (goal INR 2.0–3.0).

EVALUATE criteria for dose adjustments and contraindications (see medication chart on page 19)

ALGORITHM NOTES

(a) Indications for anticoagulant therapy

- **ANY** of the following:
  - Intracardiac thrombus
  - Cervical artery dissection (see discussion on page 15)
  - Patent foramen ovale (PFO) with venous thromboembolus
  - Mechanical heart valve
  - Antiphospholipid antibody syndrome (APS) or other known hypercoagulable state
  - Other medical condition requiring anticoagulation (e.g., deep vein thrombosis, pulmonary embolism, STEMI with apical akinesis or dyskinesis)

TABLE 5. Antithrombosis Medications[LEX, KER]

	Generic name (Brand Name)	Usual dosing	Estimated cost[1]	Potential issues/ side effects	Disease-state recommendations, contraindications[2], and warnings
antiplatelets[3]	**aspirin (Bayer Aspirin)**	Start with 325 mg PO or 300 mg PR; then, subsequent daily dosing of 81–325 mg PO	Generic: $ (Tier 1)	• Risk of Reye's syndrome in patients ≤ 18 years old • Slight increase in gastric ulcers and gastrointestinal bleeding	• **Withhold for 24 hours after administration of alteplase (Activase)** • **First-line agent for secondary prevention**
	aspirin extended release/ dipyridamole (Aggrenox)	25 mg / 200 mg twice daily	Brand: $$ (Tier 3)	• Higher bleeding risk than aspirin alone • High discontinuation rate due to side effects; mainly headaches	• **Withhold for 24 hours after administration of alteplase (Activase)** • Potentially more effective than aspirin alone
	clopidogrel (Plavix)	Loading dose 300 mg PO; then, subsequent daily dosing of 75 mg PO	Generic: $ (Tier 1) Brand: $$ (Tier 3)	• Increased bruising / bleeding • Use caution with those taking omeprazole	• **Withhold for 24 hours after administration of alteplase (Activase)** • Alternative for aspirin allergy / intolerance • Good for use with comorbid CAD and PAD
anticoagulants	**apixaban[4,5] (Eliquis)**	5 mg twice daily	Brand: $$ (Tier 2)	• No reversal agent at the time of publication	• Decrease dose to 2.5 mg twice daily if 2 of 3 criteria are met: ≥ 80 years old, ≤ 60 kg, SCr ≥ 1.5 • Abrupt discontinuation increases stroke risk • Dose adjust when combined with P-gp inducers and strong CYP3A4 inducers
	rivaroxaban[4,5] (Xarelto)	20 mg once daily	Brand: $$ (Tier 2)	• No reversal agent at the time of publication	**Contraindications:** • Concomitant use with P-gp inducers / inhibitors and strong CYP3A4 inducers / inhibitors • CrCl < 15 mL / min: Dose adjustment in renal impairment
	dabigatran[4] (Pradaxa)	• 150 mg twice daily • For nonvalvular AF, decrease dose to 75 mg twice daily if CrCl 30–50 mL / min with strong P-gp inhibitors	Brand: $$ (Tier 2)	• Bleeding reversal is more expensive; bleeding reversed by idarucizumab	**Contraindications:** • Mechanical heart valve (increased risk of thrombosis) • CrCL ≤ 30 mL / min: Dose adjustment in renal impairment
	warfarin (Coumadin)	• 1–12.5 mg once daily • Predictable dose adjustments made through INR testing	Generic: $ (Tier 1) Brand: $$ (Tier 2)	• Frequent monitoring necessary • Consistent diet and medication regimens necessary for ongoing efficacy/safety	• Multiple drug-drug and drug-food interactions • Not renally dosed
	enoxaparin[4] (Lovenox)	60–150 mg twice daily (weight based: 1 mg / kg twice daily for therapeutic anticoagulation)	Generic: $$$ (Tier 4) Brand: $$$ (Tier 4)	• Bleeding reversal is more challenging and expensive • Requires subcutaneous injections	• Consider dose reduction for high-bleeding-risk procedure, CrCl < 30 mL / min

1 Tier 1 = Generic; Tier 2 = Preferred Brand; Tier 3 = Non-Preferred Brand. Cost is based on 30-day actual cost (not copay), and on generic, when available: $=$1–25; $$=$26–75; $$$=$76–150; $$$$= > $150

2 **ABSOLUTE CONTRAINDICATIONS (for all DOACs):** end-stage liver disease
RELATIVE CONTRAINDICATIONS (for all oral anticoagulants): intracranial mass, HAS-BLED score ≥ 3, frequent falls

3 Dual antiplatelet therapy should be used for ≤ 90 days with either aspirin or clopidogrel monotherapy continued thereafter

4 No laboratory testing required

5 Few drug-drug or drug-food interactions

✔ KEY RECOMMENDATIONS

- **Focus on functional restoration**
- **When available, aggregate stroke patients to the same floor and the same rehab specialist assigned to that floor.**
- **Establish a multi-disciplinary planning team for discharge planning early in the care process (see pages 26–29).**
- **Integrate therapies with nursing using STIROP plan (see pages 20–25).**
- **Base progression on patient performance.**
- **Promote home- and community-based care options for stroke survivors when both setting and care support match patient's needs.**
- **Prefer IRF to SNF discharge when possible (see pages 28–29).**

INTEGRATE REHABILITATION IN ALL ASPECTS OF DAILY CARE

Interdisciplinary rehabilitation should begin in the acute care setting and continue after transfer to a rehab unit and/or discharge to home. Following are general recommendations to promote continuity of care in each major phase of rehabilitation.

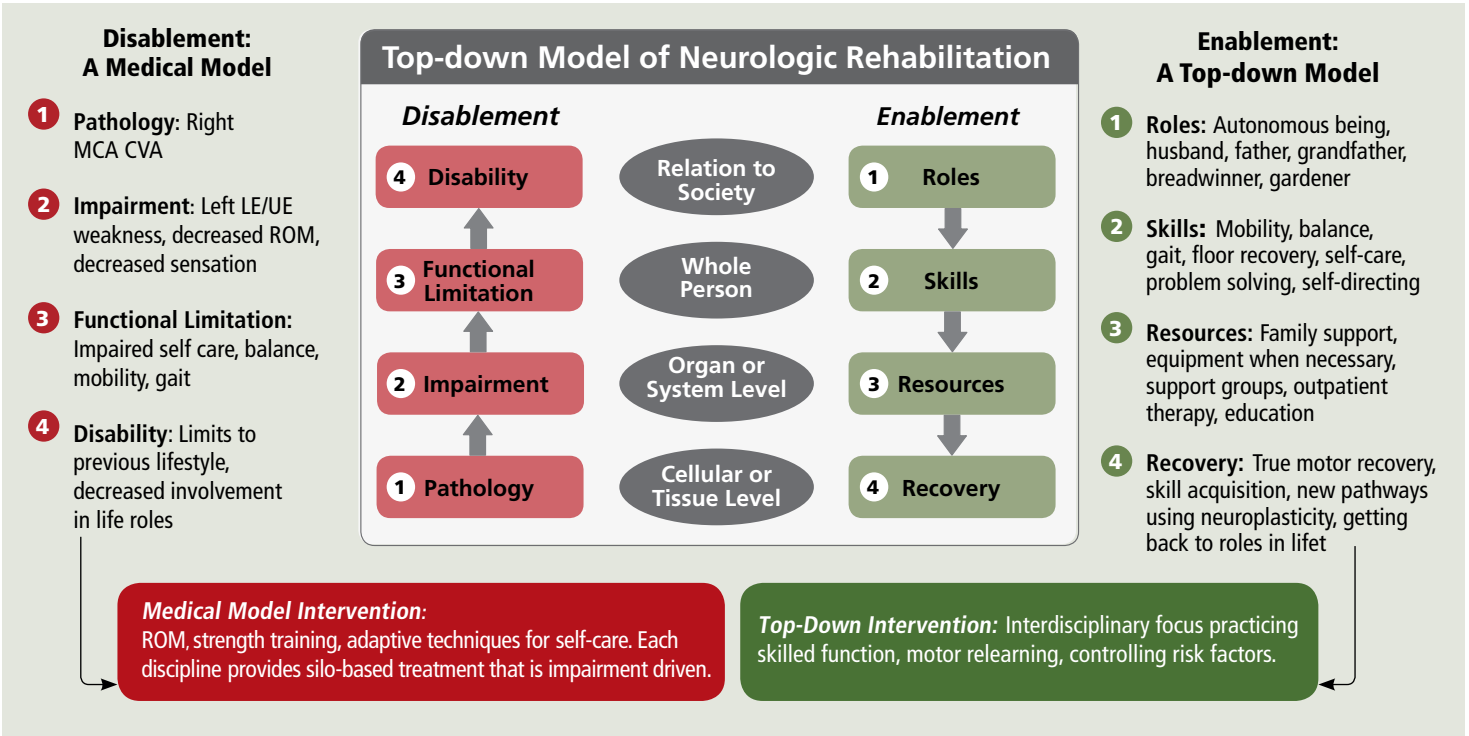
- Stabilization (acute hospital):
  - Rehab specialists (PTs, OTs, SLPs) should be included in interdisciplinary development and care planning teams for acute stroke patients.
  - For consistent care (ideally), stroke patients should be aggregated to the same floor and the same rehab specialist is assigned to that floor.
- Managing persistent symptoms (rehab unit where available):
  - Advanced Practice Clinicians or MDs should follow stroke patients from acute floor to rehab unit for continuity of care
  - Stroke patients should be seen for at least one or two visits post-discharge by a physiatrist and/or stroke neurologist.

Functional rehabilitation core concepts

Post-stroke rehabilitation has undergone a functional paradigm shift in recent years. This shift is reflected in the move from a "medical model" to the Top-down Model of Neurologic Rehabilitation advanced by Gordon in 2005 (see figure 1 below).[GOR] Thus, the cornerstone of Intermountain's approach to integrated stroke hospitalization and rehabilitation is to move from impairment-based thinking that addresses the pathology at the smallest level possible to functional-based thinking that addresses the patient's roles in life, skills they need, and resources available to gain those skills.

Key to establishing rehabilitation treatment goals is matching the patient's level and mode of mobility to their home setting and support system. Mobility is not the same thing as ambulation; it is more than ambulation. Mobility is related to the roles the patient strives to regain in the most supportive setting possible. For example, a patient whose home and care setting supports mobility in a motorized wheelchair may achieve their goal mobility but not ambulation as normally conceptualized.

Figure 1: Functional Rehab Model



Neuroplasticity is the proven concept that gives the potential for normal, integrated movement to be achieved. "It is widely accepted in the research community that the CNS comprises inherently plastic neural networks that are amenable to reorganization."[WOL] However, neuroplasticity can be a two-edged sword: Whatever we practice has the potential to become hard-wired as the brain reorganizes movement patterns. Using this approach, the care team should seek to minimize the use of inappropriate mechanics as the central nervous system re-establishes movement in the extremities.

Anyone providing care or practice has the potential to "contaminate"; for example, pulling the patient up and out of a chair can be thought of as one repetition of an exercise that draws the attention away from the affected side, which is contrary to restoring functional mobility.

Evaluating treatment needs

Evaluation should involve a formal assessment of ADLs, IADLs, communication abilities, functional mobility prior to discharge and as part of the care transition, and discharge planning. Key to this evaluation is how the patient's treatment needs relate to the setting to which they will be discharged.[WIN] Intermountain uses the FIM® terminology for identifying a patient's level of assist needs (see *Level of Assist Terminology Clinical Guideline*).

NOTE: Very early mobilization (within the first 24 hours of stroke onset) is not recommended because of poorer odds of a favorable outcome at three months.[AVER, WIN]

When considering patient treatment needs, it is important to focus on the patient's needs for physical activity to compensate for feeling alone and bored and to gain a sense of control and foster autonomy while hospitalized. Qualitative research on patient experience following stroke indicates that patients value patient-centered treatment that offers extended practice opportunities and collaborative goal setting.[LUK]

Initiating multi-disciplinary discharge planning

Evidence supports the value of team-based discharge planning for stroke patients.[WIN] Discharge planning should begin early and include a multidisciplinary team that includes:

- Patient, family, or other supportive caregivers
- Neurology, nursing, physiatry
- PT/OT/SLP
- Case management/social worker
- Inpatient rehab facility liaison
- Pharmacy

Discharge destination options should include realistic consideration of the patient's capacity for self-care, the availability and appropriateness of services and facilities, and patient and family preferences in terms of such considerations as proximity and bed availability.[MAG] Some research indicates that care managers view insurance as a major factor and central barrier to discharging a patient to the appropriate post-acute care level or specific facilities and that the pressure to discharge a patient rapidly may influence the destination chosen. Intermountain recommends using the algorithm on pages 28 through 29 to balance discharge considerations on a patient-by-patient basis. It is important to work with the patient and family to evaluate the care setting and caregiver support needed vs. available as part of the decision-making process. Mobility plays a major role in the admission criteria for rehab and for home care decisions.[MAG]

Key elements of discharge planning include:

- Neurological follow up within six to eight weeks based on etiology. For stroke in the young, schedule neurological follow-up, especially if a patient has not been seen by a neurologist at initial work up.
- Follow up with primary care provider within seven days.
- Medication regimen.
- Ambulatory telemetry if needed.

OTHER CONSULTATIONS

As part of interdisciplinary rehabilitation and care management, consider other consults as needed with:

- Physiatry
- Speech language therapy
- Recreational therapy
- Psychology
- Care management
- Pain service
- Behavioral medicine
- Pharmacy
- Nutrition support
- Vascular evaluation
- Home health
- Social services
- Palliative care
- Hospice
- Family support (Healing Connections)

✔ KEY RECOMMENDATIONS

Components of the STIROP plan reflect the 2016 evidence-based guidelines published by the American Heart Association/American Stroke Association and include:[WIN]

- Functional tasks should be repeatedly practiced and graded to challenge individual capabilities as well as frequently progressed in difficulty.
- ADL and IADL training should be tailored to individual needs and eventual discharge setting.
- SLP therapy is recommended for aphasia with treatment to include communication partner training.
- Balance training is indicated for those with poor balance, low balance confidence, fear of falls, or at risk for falls.
- Ataxia rehabilitation might include postural training and task-oriented therapy.
- The use of adaptive and assistive devices for safety and function is indicated **ONLY if other methods of performing the task/activity are unavailable or cannot be learned or if the patient's safety is of concern.**

MINI-COG™ AND MOCA COMPUTER-BASED TRAINING

Access the computer-based training via the My Learning Portal at https://m.intermountain.net/mylearning/Pages/home.aspx, and follow these instructions:

1. Log into TalentLink.
2. Click **Add** at the bottom of the "My Learning and Development Activities" window.
3. Choose **Learning and Development Activities from a Catalog**.
4. Type in "**MiniCog**" or "**MOCA**." As you type, the course name will appear.
5. Click on the course name.
6. Click on the course's lightning symbol under "Actions."
7. Select **Register and Launch.** (Or, just select **Register** to add the course now but complete it later.)

The training takes about 12 minutes, not including videos of screening delivery.

Developing the Stroke Treatment Integrated Recovery Optimization Pathway (STIROP) plan

The STIROP plan relies on four key principles:

1. **Establishing collaborative, patient-centered goals** for functional activities and mobility that form the basis of shared decision making with patients and families.[LUK] Patients focus on the roles that they feel they have lost, and the therapist works to break each of those roles into skill sets that can be taught and practiced.
2. **Implementing an interdisciplinary approach that teams therapy with nursing** such that all disciplines are focusing on the whole person. The benefits of this approach include promoting appropriate mechanics as part of full-time rehabilitative care, having all disciplines working towards the same goals, and removing the patient from a dependent environment. This approach supports the key patient experience themes for inpatient rehab, especially the need to foster autonomy.[LUK] It is recommended that all disciplines be concerned with and actively engaged in the patient's performance of functional tasks on a daily basis.
3. **Avoiding environmental contamination** that may interfere with the patient's ability to take an active role in self-care and functional mobility in the setting in which they will be functioning (see page 23 for a more on environmental contamination).
4. **Concurrently treating the motor deficit as well as the patient's perception** with coordinated and efficient movement to repetitively perform functional tasks. In the case of neurological patients, we cannot expect that they will gravitate toward the best motor patterns possible based on their perception. Movement disruption comes not only from the neuromotor insult but also from alteration in the patient's processing and interpreting of visual, vestibular, and somatosensory information.

Monitoring and recommending progression

Based on AHA/ASA guidelines, Intermountain uses standardized tools for balance and mobility assessment as well as to assess quality of life due to impairments.[WIN] These include validated tools as follows:

- *The Tinetti Gait and Balance Instrument* — an 8- to 10-minute assessment of an elder's risk for falls in the next year[MAK, TOP]
- *The PROMIS-10* — A self-report, quality-of-life measure for adults that addresses physical, mental, and social health[SAL]
- *Modified Rankin Scale* — Assessment of disability in patients who have suffered a stroke, providing a comparative measure over time that can be used to check for recovery and degree of continued disability[BAN]

Prior to discharge, it is also recommended that patients be screened for cognitive deficits.[WIN] Intermountain uses the Mini-Cog™ (a five-minute assessment for detecting possible moderate- to severe-stage dementia among well-appearing patients) and the Montreal Cognitive Assessment (MoCA). The MoCA is a 10-minute assessment for detecting and distinguishing among levels of cognitive impairment. (The sidebar at left provides directions for accessing Intermountain's computer-based Mini-Cog™ and MoCA training.)

Progression in difficulty of the patient-specific STIROP plan should involve task-specific training with tasks graded to challenge individual capabilities and repeated practice. ADL and IADL training should be tailored to individual needs and eventual discharge setting and evolve as the patient progresses. Qualitative patient experience research indicates that patients are motivated by opportunities to notice progress and recognize the links between rehabilitation and progress toward goal achievement.[LUK]

Understanding environmental impacts on functioning

The first consideration to any functional activity is the environment in which that person is functioning. Patients should be in an environment that supports a progressive expectation that they can manage all of their self-care and mobility tasks. These tasks would range from bowel and bladder control to medication management and from toileting and dressing to bed, walking, or wheelchair mobility.

Key to a supportive environment is for the patient to have a positive attitude about actively developing self-care and functional mobility skills. There are a number of "environmental contaminants" that can inadvertently derail this positive attitude by promoting a belief that hospitalization means acceptable and even expected debility and dependency. Furthermore, the false assumption that independence happens spontaneously or through exercise / strengthening further promotes passive attitudes about developing self-care and functional mobility skills.

Most common environmental contaminants include:

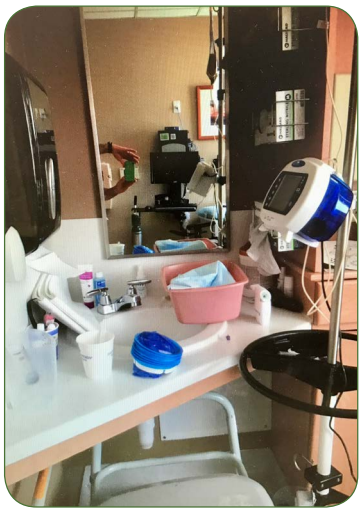
- Insufficient counter or desk space for tools related to hygiene or feeding
- Poor lighting
- The clutter of medical equipment in the working space (e.g., IV pumps, feeding pumps, wound dressing supplies, briefs, and linens)
- Typically performing ADLs in bed, which promotes passive participation in self-care

This last "contaminant" is critical as the supine and / or semi-reclined position in a hospital bed is not conducive to active postures, alertness, attention, or cognitive or motor coordination. "Decontaminating" this environment means that the person needs to be upright in either an unsupported or semi-supported posture, which sets the stage for active posture during function. Coordinated movement in the extremities starts with the core being active and dynamic in the positions that it assumes throughout any given task. Posture is not always upright and midline; however, this is the recommended starting point for most tasks. Then, it is recommended to move into many different alignments in the core as the patient engages in functional activity. Back rest and chairs with arms may work for feeding and grooming because posture here can be intermittently active.

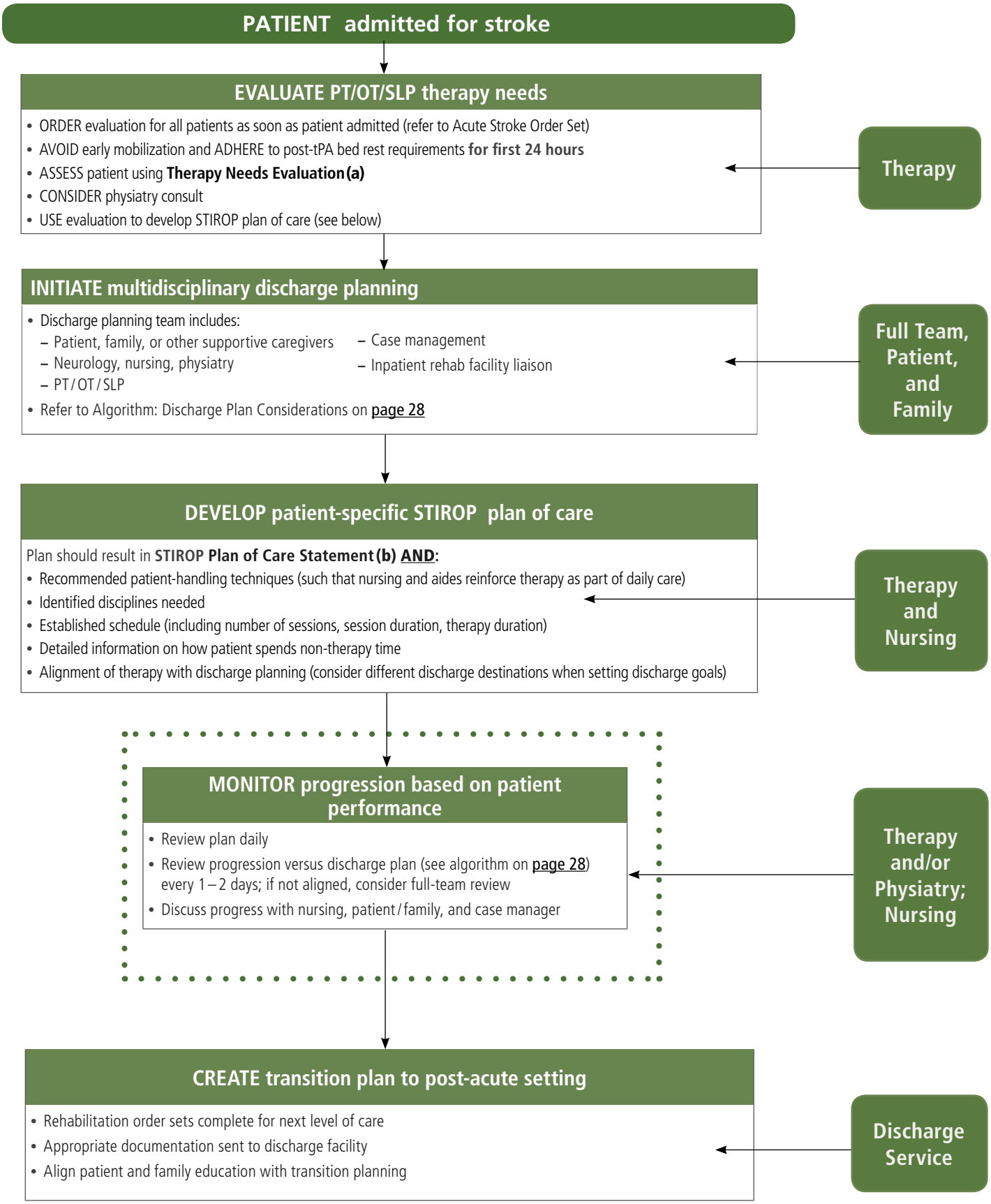
The physical environment can be thoughtfully tailored to facilitate appropriate perception and body mechanics. For example:

- Utilizing right- or left-facing rooms
- Placing alarms, pumps, and monitors on the side of neglect/inattention
- Positioning the patient in a side-lying manner

In addition to the physical environment, staff interventions / care (e.g., skilled transfer, ADLs, and facilitating mobility) should be geared towards correcting perceptual deficits and facilitating patient independence (with appropriate mechanics that mirror the home environment whenever possible) and at the level at which the patient is capable. Interventions that help correct perceptual deficits could include approaching patient from the side of neglect/inattention and considering NG or NJ on side of neglect.



ALGORITHM: STROKE INTEGRATED RECOVERY OPTIMIZATION PATHWAY (STIROP)™



ALGORITHM NOTES

(a) Therapy needs evaluation	
Guiding principles	**Recommended assessment elements**
Conditions of observation should mimic home set-up.	**Prior level of function and support system:** What is patient's baseline independence level with ADLs? Are they driving? Are they working? What type of assistance do they need for ADLs/IADLs? What are their meaningful occupations? Who do they live with? What can support system provide? **Barriers to function:** Are there specific skills that are missing that limit their ability to function at their prior level in a home environment. **Burden of care in home setting:** How can we tailor the environment to match the home conditions using standardized level-of-assist definitions?
Initial assessment should focus on performance without assistance or adaptation (what they CAN do rather than dwelling on what they can't).	**Required level of assist:** Based on FIM® terminology (see ***Level of Assist Terminology Clinical Guideline***, available by password within the Intermountain firewall only, at https://kr.ihc.co/kr/Dcmnt?ncid=529309276).
Assessment should be function based, not impairment driven (can I dress myself is more important than a motor score or joint ROM).	**Activities of daily living (ADLs):** Can they perform activities of daily living such as self-feeding, grooming/hygiene tasks, dressing, toileting, bathing, cooking, leisure activities, work-related responsibilities and tasks? **Mobility:** Determine if patient's level and mode of mobility fits the home setting and support system available.
Assess the interplay between multiple modes of function.	**Movement skills:** What is Tinetti balance score? What is level of assist for a given means of mobility? What are the patient's movement patterns? **Cognitive skills:** How does patient score using the MoCA assessment? What is patient's attention to task (including divided attention)? How much insight does patient have about deficits? What is status of patient's memory, safety awareness, problem solving skills, ability to sequence and follow directions? **Perceptual skills:** What is patient's level of neglect or inattention? What are patient's visual, sensation, or perception skills using other senses? **Psycho-social factors:** What is patient's overall emotional well-being? How stable is their support system? What are their coping mechanisms? Are coping deficits a barrier to therapy? **Spiritual/emotional support:** How can we meet the patient's spiritual and emotional needs to better facilitate coping mechanisms?
Do not let adaptations work against principles of neuroplasticity.	**Foster independence:** What are best ways to promote independence—rather than "traditional nursing care" for the patient—through instructions and aids nurses can use to facilitate therapy? These include: • **Positioning:** Is it possible to keep the bed flat? If the patient has neglect, can we position so that they are laying on their side with the effected side up? How should the affected limbs be positioned during functional activities and/or transfers? • **Transfers:** What is the appropriate nursing transfer technique to use for this patient? Is the patient safe to transfer without the assistance of skilled nursing? Are there special instructions for mechanics related to this patient? • **Mobility:** What is the appropriate means of mobility? What level of assist does the patient need? Would current mobility means fit this patient's home setting? Is the patient safe to use this means of mobility without the assistance of skilled nursing? • **Set-up of the environment:** How can we ensure that approach, bed positioning, and care targets the side of neglect? In what ways can I structure the hospital environment to mirror the home environment? • **Recommendations for discharge planning:** Does the level of support at home align with the level of assist needed? Is this patient a good candidate for discharge to inpatient rehab facility (see algorithm on pages 28–29)?

PLAN FOR DISCHARGE

Discharge destination considerations for stroke survivors must consider varied factors related to patient outcomes. Research indicates that inpatient rehabilitation facility (IRF) patients have higher rates of return to community living along with greater functional recovery and that those discharged to skilled nursing facilities / nursing homes experience increased rehospitalization and decreased survival.[WIN]

AHA / ASA guidelines recommend that:[WIN]

- Stroke patients have organized, coordinated, and interprofessional, postacute rehab care.
- Those who do not require daily nursing services, regular medical interventions, specialized equipment, or interprofessional expertise be considered candidates for community- or home-based rehabilitation.
- Caregivers and family members should be involved in training and education related directly to home-based rehabilitation programs and be included as active partners in planning and implementing treatment activities (with professional supervision).
- Those who qualify and have access should be treated at an IRF instead of at a SNF.

Research indicates that community interventions are important for maintaining and perhaps improving motor, cognitive, and psychological functional outcomes for chronic stroke patients.[FER,TEA] Therefore, AHA/ASA guidelines recommend that transition planning includes referral to community resources and:[WIN]

- Individual needs assessment (e.g., vocational counseling, psychological services, social services, driver evaluation, or home environment assessment)
- Education about available resources
- Connection to resources thorough referrals
- Follow up to ensure that patients and family members receive necessary services

It is also recommended that the patient be referred for an exercise program after rehabilitation, either at home or in the community.[WIN] A 2011 meta-analysis reported that exercise interventions for community-based stroke survivors have significant effects on health-related quality of life.[CHE] Additionally, patients who are candidates for aerobic exercise after stroke appear to have clinically meaningful physical and psychosocial health benefits (beyond those experienced for the cardiovascular system) on the:[WIN]

- Impairment level (e.g., bone health, fatigue, executive functioning and memory, depressive symptoms, and emotional well-being)
- Activity level (e.g., walking endurance, upper extremity function)
- Participation level (e.g., social participation, return to work)

Discharge planning checklist

The following stroke-specific patient criteria represent the transition of care tasks to be completed prior to discharge.

Home

- ☐ PCP appointment (including depression and cognitive screens)
- ☐ Stroke/neuro appointment (including mRS, depression screen (PHQ2 / 9), cognitive screen, FACIT screen)
- ☐ Medication reconciliation
- ☐ D/C medications
- ☐ Sleep study (as needed)
- ☐ Ambulatory telemetry (as needed)
- ☐ PT / OT / ST outpatient appointment (as needed)
- ☐ Driving evaluation (as needed)
- ☐ Home safety evaluation
- ☐ Caregiver assessment
- ☐ Community resources, including local / nearest stoke support group
- ☐ Who to call if I have questions
- ☐ Anticoagulation follow up (as needed)
- ☐ Patient / caregiver education
- ☐ Home Health appointment (**if home with Home Health**)

Skilled Nursing Facility

- ☐ Insurance verification
- ☐ Facility leveling

Acute Rehabilitation

- ☐ PT / OT / ST evaluation
- ☐ Rehab consult order
- ☐ Insurance verification
- ☐ Family discussion
- ☐ Med transfer sheet
- ☐ Stroke transfer plan
- ☐ Rehab facility prescreen completed and signed by MD (CMS requirement)

Hospice Consult

LTACH

Outcome Measurement

- ☐ mRS
- ☐ SIS-16$, EuroQoL 5d$, BI, SS QoL, WSO
- ☐ PHQ2 / 9
- ☐ FACIT — fatigue screen
- ☐ Morisky Scale — medication compliance

ALGORITHM: STROKE DISCHARGE CONSIDERATIONS

PATIENT medically cleared for discharge*

Patient meets criteria to go home **(a)**?

*no** →

yes → DISCHARGE TO HOME with home health or outpatient therapy as indicated **(b)**

NOTE:
* For any supported discharge, ensure consideration of patient/family choice.

EVALUATE if patient qualifies for Inpatient Rehab Facility (IRF)

For CMS reimbursement, the patient must (ALL apply):[CMS1]

- Require active and ongoing therapeutic intervention of multiple therapies (2 of 3 types: PT, OT, SLP)
- Require intensive and coordinated rehab therapy at least 3 hours/day at least 5 days/week on an individual basis
- Be reasonably expected to actively participate in, and benefit significantly from, intensive rehab therapy, resulting in measurable improvement of functional capacity or adaptation to impairments as compared to start of treatment**
- Require supervision by a rehabilitation physician in face-to-face visits at least 3 days per week throughout patient IRF stay

Additional system-wide requirements include that the patient:

- Is medically stable
- Requires daily nursing assessment, treatment, monitoring, or education
- Is unable to receive necessary medical/rehab at lower level of care

NOTE:
** CMS reimbursement would NEVER be denied if patient could not be expected to gain complete independence in the domain of self-care OR to return to prior level of functioning.

Patient meets the reimbursement criteria for discharge to inpatient rehab facility (IRF)?

yes → DISCHARGE TO IRF

no →

EVALUATE if patient qualifies for "authorized" skilled nursing facility (SNF)

Insurance-covered care requires skilled nursing (or rehabilitation staff) to manage, observe, and evaluate treatment plan (e.g., intravenous injections, physical therapy). **Medicare will only cover skilled care** when there is one of the following:[CMS2, 3]

- Therapy recommendation to discharge to SNF
- Required IV antibiotic therapy
- Level of assist **(c)** that exceeds available support in the home setting; defer to formal therapy evaluation for patient assist needs
- Therapy that is unavailable on an outpatient basis or transport to outpatient facility would be problematic

Patient meets criteria for **authorized discharge** to a skilled nursing facility (SNF)?

no → DISCHARGE to SNF as "self pay," **OR** use alternate transition planning strategies **(d)**

yes → DISCHARGE to SNF as "authorized"

OR

EVALUATE if patient qualifies for "authorized" long-term acute care hospital (LTACH)

ALL must apply:

- Needed level of assist **(c)** exceeds available support in the home setting; defer to formal therapy evaluation for patient assist needs
- Other skilled needs that require ≥6.5 hours of skilled care/day
- Daily medical practitioner assessment, treatment, monitoring, or education
- Patient needs LTACH care for >30 days

Patient meets criteria for **authorized discharge** to an LTACH?

no → DISCHARGE using alternate transition planning strategies **(d)**

yes → DISCHARGE to LTACH

ALGORITHM NOTES

(a) Criteria for discharge to home

- Patient has the ability to function at a level that matches their home environment and support system.
- If assistance or supervision is needed, a caregiver has been identified, trained, and passed-off on providing that care or supervision.
- Arrangements have been made for follow up at a stroke clinic or with primary care provider, physiatrist, or neurologist (ideally) ≤ 7 days post discharge.
- Home health or outpatient therapy needs have been identified and the initial appointments scheduled.
- The patient and/or caregiver has received stroke education, medication education, and any other teaching (e.g., diabetic education, smoking cessation, etc.) and is considered competent to implement skills taught.
- The need for durable medical equipment has been assessed and arrangements made for critical equipment to be available in the home in a reasonable amount of time post discharge.
- Medication teach-back performed indicates competency.

(b) Criteria for home health and outpatient physical therapy

- Home therapy has been ordered for patient deficits; consider physiatry follow up.
- Initial therapy or home health appointment has been scheduled prior to discharge.
- **For homebound patients** (those confined to home due to a medical condition, heavily dependent on another person to be able to leave the residence, or able leave home only occasionally for short durations or for necessary health care visits), consider home health. Ensure that:
  - Patient requires skilled nursing or physical therapy (OT and SLP do not stand alone).
  - Medicare patients have physician face-to-face encounter in place.
- Outpatient therapies have been ordered for any patient who does not meet above criteria but needs ongoing therapies.

(c) Level-of-assist

- Levels of assist should be:
  - Based on FIM® terminology (see ***Level of Assist Terminology Clinical Guideline***, available by password within the Intermountain firewall only, at https://kr.ihc.co/kr/Dcmnt?ncid=529309276)
  - Determined on a case-by-case basis following a formal therapy evaluation and considering the staff available at home or the receiving facility

(d) Alternate transition planning strategies

Explore other safe transitions that may or may not be covered by the patient's insurance, such as:

- 24/7 sitters
- Custodial care
- Assisted living/facility for non-skilled care

FACILITATE SHARED DECISION MAKING FOR DISCHARGE PLANNING

By definition, shared decision making is a conversation between experts: the care team as well as the patients and their caregivers. Only this latter group can address what matters most to the patient and the realities of their environment, support systems, and financial situation.

Use the booklet, *Life After Stroke and TIA*, to begin these discussions. Be sure to involve the patient and family with the full care team in discussing the discharge options and quality of life associated with those options.

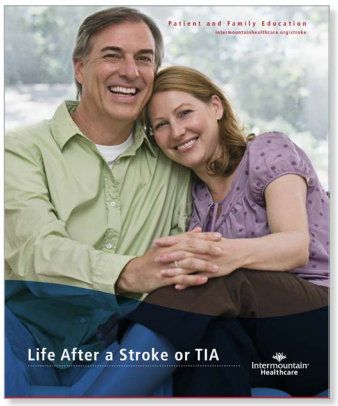
How clinicians can access and order these materials

- **Viewing online:** Open the appropriate topic pages via the **Clinical Programs** pages on intermountain.net or intermountainphysician.org.
- **Ordering:** Order from Intermountain's Online Library and Print Store at iprintstore.org. Click the link to open the website; then, search by key terms, or use the topic menu to browse.

EDUCATE PATIENT AND FAMILY

An essential element of care is patient / family education, which should include the following topics:

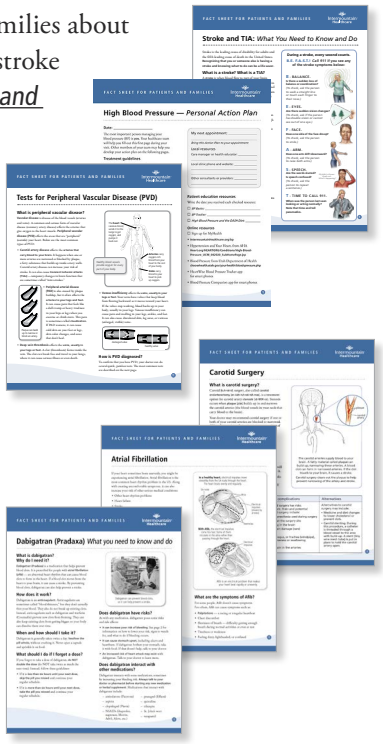
- **The type and location of the stroke** and any effects and deficits
- **Their risk factors** for stroke and how they can modify them
- **What to expect for recovery at home**, including follow-up appointments, medications, activity, diet, and return to work
- **Warning signs** for a stroke
- **Medications** and **follow-up appointments**
- **When to call the doctor**



Intermountain's booklet *Life After a Stroke or TIA* includes information on all of these topics and is a valuable tool to guide patient/family teaching. Provide this booklet (available in English and Spanish) to families upon hospital admission, and use it to guide discharge teaching.

Stroke-related fact sheets and other tools

Fact sheets and other tools help educate patients and families about stroke symptoms, stroke treatments and aftercare, and stroke prevention (e.g., *Stroke and TIA: What You Need to Know and Do*). Fact sheets topics also focus on:



- Preventing secondary stroke (e.g., *High Blood Pressure Personal Action Plan*, *Choose My Plate: Salt and Sodium*, or *Obstructive Sleep Apnea*)
- Diagnosis or treatment procedures (e.g., *Tests for Peripheral Vascular Disease (PVD)*, *Transcranial Doppler (TCD) and Bubble Studies*, or *Carotid Surgery*)
- Conditions associated with stroke (e.g., *Atrial Fibrillation*)
- Anticoagulation medications (e.g., *Dabigatran*, *Rivaroxaban*, or *Coumadin (warfarin) Anticoagulation Therapy: What you need to know and do*)

Patients and their families can find all of these materials and links to other reliable stroke resources in the Health Library at Intermountain's public website (intermountainhealthcare.org/stroke).

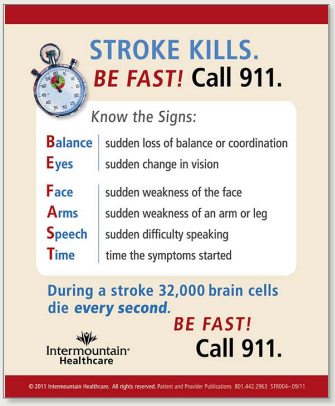
Use teach-back strategies for stroke education

Teach-back strategies enhance patient (and family) understanding and decision making. Using teach-back language might include saying something like, "I want to be sure we did a good job teaching you about preventing another stroke or mini-stroke (TIA). There's a lot of information, so I want to make sure we didn't miss anything." Use the checklist below with every patient (and/or family members/caregivers).

TABLE 6. Teach-Back Strategy	YES	NO
Patient has motivation and desire to learn.		
Patient is able to read and write.		
Patient given *Life After Stroke or TIA* booklet.		
Patient educated using teach-back method.		
Patient received additional stroke education from (check all that apply): ☐ MD or NP ☐ Pharmacy ☐ Respiratory ☐ Case Management or Social Worker ☐ Food & Nutrition		
Patient can explain in his/her own words what stroke or mini-stroke means: • Arteries carry blood and oxygen to the brain. • A stroke occurs when one of these arteries to the brain either is blocked by plaque or blood clot (ischemic) or bursts (hemorrhagic). • Mini-stroke occurs when an artery is blocked for a short period of time, temporarily slowing or stopping blood flow to the brain.		
Patient knows to call 911 right away for **BE FAST!** signs or symptoms of stroke (see below).		
Patient can name **BE FAST!** signs and symptoms of stroke (at right)		
Patient can name risk factors beyond his/her control: • Increasing age • Race—African American or Hispanic American at higher risk of stroke • Gender—more men have stroke but more women die from stroke • Family history of stroke		
Patient can name risk factors or medical conditions that can be managed or treated: • High blood pressure • Diabetes • Afib, heart disease • Prior stroke, TIA, or heart attack • Carotid artery disease • Sickle cell disease • High cholesterol		
Patient can name lifestyle choices that increase his/her risk of stroke: • Smoking or exposure to second-hand smoke • Obesity • Heavy alcohol use • Diet high in fat, cholesterol or sodium • Physical inactivity		
Patient knows importance of follow-up care after discharge.		
Patient knows importance of taking medications prescribed at discharge. Statins help lower cholesterol. Antithrombotics reduce the risk of blood clots.		

PATIENT EDUCATION RESOURCE

Refrigerator magnet: includes signs of stroke and reminder to call 9-1-1.



JOINT COMMISSION CORE MEASURES FOR STROKE

For Primary Stroke Center Certification, data collection and reporting is required for all eight measures listed below.[JOI, ALB]

- ***STK-1*** Venous thromboembolism (VTE) prophylaxis
- ***STK-2*** Discharged on antithrombotic therapy
- ***STK-3*** Anticoagulation therapy for patients with atrial fibrillation or flutter
- ***STK-4*** Thrombolytic therapy
- ***STK-5*** Antithrombotic therapy by end of hospital day two
- ***STK-6*** Discharged on statin medication
- ***STK-8*** Stroke education
- ***STK-10*** Assessment for rehabilitation

In 2010, two measures (activities 7 and 9 on the original list) were removed from the Joint Commission's original Core Measure set. These two measures — dysphagia screening and tobacco cessation advice/counseling — continue to be key stroke care activities at Intermountain.

CLINICIAN RESOURCES

This CPM, its references, and other stroke resources are available on the Stroke topic page for clinicians, accessible through the Clinical Programs home page on:

- intermountain.net
- intermountainphysician.org

Care process model references

For a full list of references used in this CPM, see: *Hospital Care and Rehabilitation for Stroke and TIA Patients CPM Reference List.*

Stroke scales

- Cincinnati Stroke Scale
- NIH Stroke Scale

Related care process models

- *Emergency Management of Acute Ischemic Stroke*
- *Guide to Outpatient Management of Atrial Fibrillation*
- *Outpatient Management of Adult Diabetes Mellitus*
- *Management of High Blood Pressure*
- *Assessing and Managing Cardiovascular Risk and Cholesterol*
- *Management of Depression*
- *Management of Obstructive Sleep Apnea (OSA) in the Primary Care Setting*
- *A Primary Care Guide to Lifestyle and Weight Management*

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This CPM presents a model of best care based on the best available scientific evidence at the time of publication. It is not a prescription for every physician or every patient, nor does it replace clinical judgment. All statements, protocols, and recommendations herein are viewed as transitory and iterative. Although physicians are encouraged to follow the CPM to help focus on and measure quality, deviations are a means for discovering improvements in patient care and expanding the knowledge base. Send feedback to Kevin Call, MD, Intermountain Healthcare, Neurosciences Clinical Program/Stroke Development Team (kevin.call@imail.org).

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  (Neurosciences Clinical Program review 01/17) Patient and Provider Publications