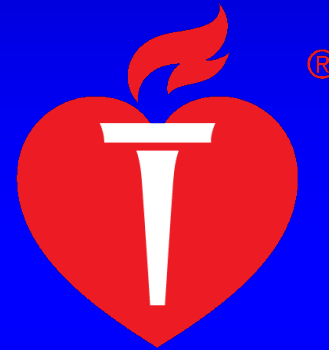


American Heart  
Association



*Learn and Live*

# **A Comprehensive Overview of Nursing and Interdisciplinary Care of the Acute Ischemic Stroke Patient, A Scientific Statement From the American Heart Association**

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**On behalf of the American Heart Association Council on Cardiovascular Nursing and the Stroke Council.**

**This slide set was developed and edited by Anne Leonard RN, MPH, and Debbie Summers, RN, MSN, APRN on behalf of the writing group.**

# Applying the Evidence

- **This writing panel applied the Rules of Evidence and formulation of strength of evidence (recommendations) used by other American Heart Association (AHA) writing groups (Table 1). We also cross-reference other AHA guidelines as appropriate.**

		“Size of Treatment Effect”			
	<b>Class I</b>  <i>Benefit &gt;&gt;&gt; Risk</i>  <b>Procedure/Treatment SHOULD be performed/administered</b>	<b>Class IIa</b>  <i>Benefit &gt;&gt; Risk</i> <i>Additional studies with focused objectives needed</i>  <b>IT IS REASONABLE to perform procedure/administer treatment</b>	<b>Class IIb</b>  <i>Benefit ≥ Risk</i> <i>Additional studies with broad objectives needed; Additional registry data would be helpful</i>  <b>Procedure/Treatment MAY BE CONSIDERED</b>	<b>Class III</b>  <i>Risk ≥ Benefit</i> <i>No additional studies needed</i>  <b>Procedure/Treatment should NOT be performed/administered SINCE IT IS NOT HELPFUL AND MAY BE HARMFUL</b>	
<b>Level A</b>  <i>Multiple (3-5) population risk strata evaluated*</i>  <i>General consistency of direction and magnitude of effect</i>	<ul style="list-style-type: none"><li>• Recommendation that procedure or treatment is useful/effective</li><li>• Sufficient evidence from multiple randomized trials or meta-analyses</li></ul>	<ul style="list-style-type: none"><li>• Recommendation in favor of treatment or procedure being useful/effective</li><li>• Some conflicting evidence from multiple randomized trials or meta-analyses</li></ul>	<ul style="list-style-type: none"><li>• Recommendation’s usefulness/efficacy less well established</li><li>• Greater conflicting evidence from multiple randomized trials or meta-analyses</li></ul>	<ul style="list-style-type: none"><li>• Recommendation that procedure or treatment not useful/effective and may be harmful</li><li>• Sufficient evidence from multiple randomized trials or meta-analyses</li></ul>	
<b>Level B</b>  <i>Limited (2-3) population risk strata evaluated*</i>	<ul style="list-style-type: none"><li>• Recommendation that procedure or treatment is useful/effective</li><li>• Limited evidence from single randomized trial or non-randomized studies</li></ul>	<ul style="list-style-type: none"><li>• Recommendation in favor of treatment or procedure being useful/ effective</li><li>• Some conflicting evidence from single randomized trial or non-randomized studies</li></ul>	<ul style="list-style-type: none"><li>• Recommendation’s usefulness/efficacy less well established</li><li>• Greater conflicting evidence from single randomized trial or non-randomized studies</li></ul>	<ul style="list-style-type: none"><li>• Recommendation that procedure or treatment not useful/effective and may be harmful</li><li>• Limited evidence from single randomized trial or non-randomized studies</li></ul>	
<b>Level C</b>  <i>Very limited (1-2) population risk strata evaluated*</i>	<ul style="list-style-type: none"><li>• Recommendation that procedure or treatment is useful/effective</li><li>• Only expert opinion, case studies, or standard-of-care</li></ul>	<ul style="list-style-type: none"><li>• Recommendation in favor of treatment or procedure being useful/ effective</li><li>• Only diverging expert opinion, case studies, or standard-of-care</li></ul>	<ul style="list-style-type: none"><li>• Recommendation’s usefulness/efficacy less well established</li><li>• Only diverging expert opinion, case studies, or standard-of-care</li></ul>	<ul style="list-style-type: none"><li>• Recommendation that procedure or treatment not useful/effective and may be harmful</li><li>• Only expert opinion, case studies, or standard-of-care</li></ul>	
<b>Suggested phrases for writing recommendations †</b>	should is recommended is indicated is useful/effective/beneficial	is reasonable can be useful/effective/ beneficial is probably recommended or indicated	may/might be considered may/might be reasonable usefulness/effectiveness is unknown /unclear/uncertain or not well established	is not recommended is not indicated should not is not useful/effective/beneficial may be harmful	

\*Data available from clinical trials or registries about the usefulness/efficacy in different sub-populations, such as gender, age, history of diabetes, history of prior MI, history of heart failure, and prior aspirin use. A recommendation with Level of Evidence B or C does not imply that the recommendation is weak. Many important clinical questions addressed in the guidelines do not lend themselves to clinical trials. Even though randomized trials are not available, there may be a very clear clinical consensus that a particular test or therapy is useful or effective.

†In 2003, the ACC/AHA Task Force on Practice Guidelines developed a list of suggested phrases to use when writing recommendations. All recommendations in this guideline have been written in full sentences that express a complete thought, such that a recommendation, even if separated and presented apart from the rest of the document (including headings above sets of recommendations), would still convey the full intent of the recommendation. It is hoped that this will increase readers’ comprehension of the guidelines and will allow queries at the individual recommendation level.

Figure. Applying classification of recommendations and level of evidence.

# Overview of Stroke – A major Public Health Problem

- About 85% of strokes are ischemic, and about 15% are hemorrhagic.
- Approximately 795,000 strokes occur each year.
- Stroke is the 3<sup>rd</sup> leading cause of death in the US, and the first cause of death worldwide.
- Stroke is a leading cause of adult disability.
- The cost of stroke in the US is over 68 billion dollars annually.

# Demographics of Stroke

- **Women have about 60,000 more strokes than men.**
- **Native Americans have the highest prevalence.**
- **African Americans have almost twice the rate compared to Caucasians.**
- **Hispanics have slightly higher rates compared to non-Hispanic whites.**
- **Modifiable risk factors must be addressed in our aging population with the propensity to stroke.**

# Nursing and Stroke

- **Nurses play a pivotal role in the care of stroke patients.**
- **This paper includes nursing care directed in two phases of the acute stroke experience:**
  - **The emergent or hyperacute phase**
  - **The acute phase**

# Nursing Care of the Stroke Patient

- **Stroke is a complex disease requiring the efforts and skills of the multidisciplinary team.**
- **Nurses are often responsible for the coordination of that care.**
- **Coordinated care can result in: improved outcomes, decreased LOS, translating to decrease costs.**

# Definition of Stroke

- **Ischemic stroke**
  - **Caused by a blocked blood vessel in the brain.**
- **Hemorrhagic Stroke**
  - **Caused by a ruptured blood vessel in the brain.**

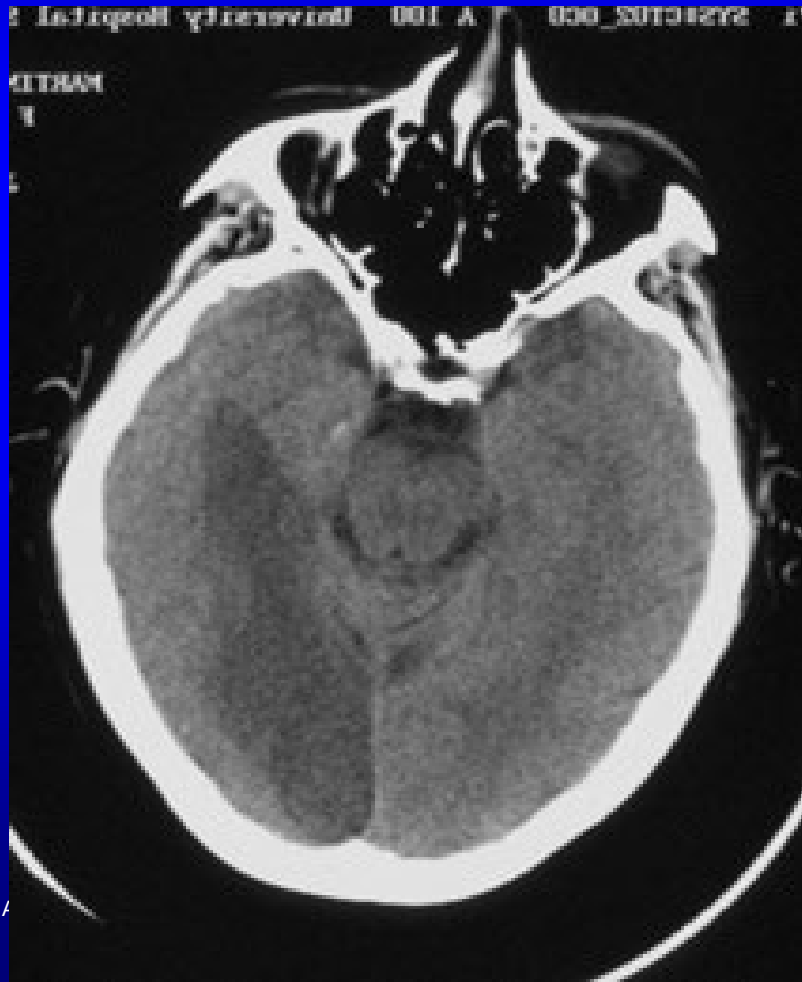
## **Etiology of Ischemic Strokes**

- **20% caused by large vessel atherothrombotic causes (intracranial or carotid artery).**
- **25% caused by small vessel disease (penetrating artery disease).**
- **20% caused by cardiac sources (cardioembolism)**
- **30% from unknown causes.**

# **Risk factors for Ischemic Stroke**

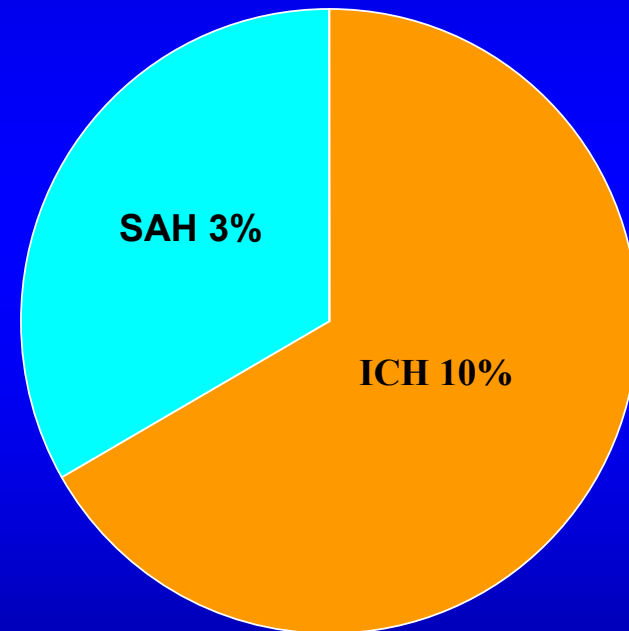
- **Hypertension**
- **Diabetes**
- **Heart Disease**
- **Smoking**
- **High Cholesterol**
- **Male gender**
- **Age**
- **Ethnicity/Race**

# CT Scan – Right Occipital/Parietal Infarction

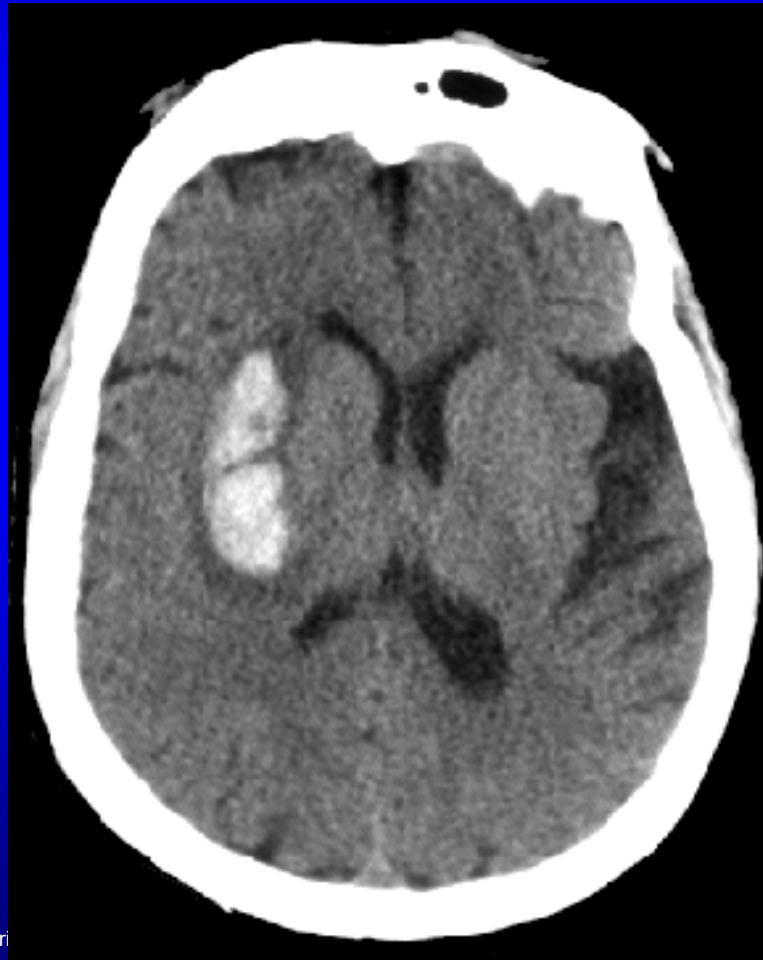


# Etiology of Hemorrhagic Stroke

- **Caused by a primary either intracerebral hemorrhage or subarachnoid hemorrhage.**



# CT Scan Right Subcortical Intracerebral Hemorrhage



# **Risk Factors for Hemorrhagic Stroke**

- **Hypertension**
- **Bleeding disorders**
- **African American race**
- **Vascular malformation**
- **Excessive alcohol use**
- **Liver dysfunction**

## Phase I of Stroke Care

- **Emergent care from the first 3 to 24 hours after the onset of stroke symptoms.**
  - **Prehospital call to EMS**
  - **Emergency Room**

# Nursing Role

## EMS Instruction

- In many community and academic institutions, education of EMS providers has become a function of the nurse educator.
- Before beginning an EMS stroke education program, the nurse educator should verify local policies and regulations governing acceptable practice for paramedics and EMTs in that region or state.

## Prehospital Collaboration

- Once a potential stroke is suspected, EMS personnel and nurses must determine the time at which the patient was last known to be well (last known well time). This time is the single most important determinant of treatment options during the hyperacute phase.
- Assessment includes:
  - ABC's, identifying the onset of symptoms ("last known well time"), oxygenation, blood glucose, "load and go", and delivering the patient to a center that can deliver acute stroke care according to evidence based protocols.

# Education of PreHospital Personnel

- Cincinnati Pre-Hospital Scale
- FAST
- LAPSS
- Emphasize “Load and Go” concept
- rt-PA only FDA approved drug for AIS

## **Class I Recommendations**

### **PreHospital Assessment**

- **To increase the number of stroke patients who receive timely treatment, educational programs for physicians, hospital personnel, and EMS personnel are recommended (Class I, Level of Evidence B).**
- **Stroke education of EMS personnel should be provided on a regular basis, perhaps as often as twice a year, to ensure proper recognition, field treatment, and delivery of patients to appropriate facilities (Class I, Level of Evidence C).**

## **Class I Recommendations**

### **From the Field to the ED: Stroke Patient Triage and Care**

- **EDs should establish standard operating procedures and protocols to triage stroke patients expeditiously (Class I, Level of Evidence B).**
- **Standard procedures and protocols should be established for benchmarking time to expeditiously evaluate and treat eligible stroke patients with rtPA (Class I, Level of Evidence B).**
- **Target treatment with rtPA should be within 1 hour of the patient's arrival in the ED (Class I, Level of Evidence A).**
- **Eligible patients can be treated between the 3-4.5 hour window when carefully evaluated carefully for exclusions to treatment. (Class I, Level of Evidence B)**

## **Class 1 Recommendations**

### **Education Priorities for Assessment and Treatment in the Field**

- **EMS personnel should be trained to administer a validated prehospital stroke assessment, such as the Cincinnati Prehospital Stroke Scale or the Los Angeles Prehospital Stroke Screen (Class I, Level of Evidence B).**
- **EMS personnel should be trained to determine the last known well time using standardized definitions to collect the most accurate information. (Class I, Level of Evidence B).**
- **EMS personnel should use the neurological/stroke assessment approach to gather basic physiological information about the patient and communicate the patient's condition to the receiving hospital (Class I, Level of Evidence B).**

## **EMERGENCY NURSING INTERVENTIONS IN THE EMERGENCY/HYPERACUTE PHASE OF STROKE: The First 24 Hours**

- **Stroke symptoms can evolve over minutes to hours.**
- **Nurses should be aware of unusual stroke presentations.**
- **ED assessments include: Neurological assessment, vital signs + temperature, and should be done not less than every 30 minutes.**

# **The 5 Key Stroke Syndromes: Classic Signs Referable to Different Cerebral Areas**

- **Left (Dominant Hemisphere)**
  - Left gaze preference
  - Right visual field deficit
  - Right hemiparesis
  - Right hemisensory loss
- **Right (Nondominant Hemisphere)**
  - Right gaze preference
  - Left visual field deficit
  - Left hemiparesis
  - Left hemisensory loss neglect (left hemi-inattention)

# **The 5 Key Stroke Syndromes: Classic Signs Referable to Different Cerebral Areas**

- **Brainstem**
  - Nausea and/or vomiting
  - Diplopia, dysconjugate gaze, gaze palsy
  - Dysarthria, dysphagia
  - Vertigo, tinnitus
  - Hemiparesis or quadriplegia
  - Sensory loss in hemibody or all 4 limbs
  - Decreased consciousness
  - Hiccups, abnormal respirations
- **Cerebellum**
  - Truncal/gait ataxia
  - Limb ataxia neck stiffness

# Hemorrhage Symptoms

- **Hemorrhage**
  - Focal neurological deficits as in AIS
  - Headache (especially in subarachnoid hemorrhage)
  - Neck pain
  - Light intolerance
  - Nausea, vomiting
  - Decreased level of consciousness

## Administration of Thrombolytic Treatment

- **Rt-PA is packaged as a crystalline powder and is reconstituted with sterile water.**
- **Dosing: calculate rt-PA at 0.9mg/kg**
  - Give a 10% bolus over 1 minute
  - Give the rest (90%) over 1 hour
  - Max dose for any patient is 90mg
- **To prevent accidental overdose, it is important to waste amount with another nurse before administering to patient.**
- **Prior to administering rt-PA make sure all invasive lines are in place (e.g., endotracheal and indwelling urinary catheter).**

## Nursing Assessment:

### Schedule of Neurological Assessment and Vital Signs and Other Acute Care Assessments in Thrombolysis-Treated and Nonthrombolysis-Treated Patients

Patients treated with Thrombolytics	Patients not treated with thrombolytics
<p data-bbox="112 596 948 782"><b>Neurological assessment and vital signs (except temp) q 15 min during rtPA infusion, then every 30 min for 6 h, then q 60 min for 16 hrs (total of 24 hrs)</b></p> <p data-bbox="112 846 923 1032"><b>Note:</b> Frequency of blood pressure assessments may need to be increased if systolic BP stays <math>\geq 180</math> mm Hg or diastolic BP stays <math>\geq 105</math> mm Hg.</p> <p data-bbox="112 1096 517 1139"><b>Temp q 4 hrs or prn</b></p> <p data-bbox="112 1203 948 1296"><b>Treat temps <math>&gt;99.6^{\circ}\text{F}</math> with acetaminophen as ordered</b></p> <p data-bbox="160 1346 701 1368">© 2009, American Heart Association. All rights reserved.</p>	<p data-bbox="981 596 1787 689"><b>In ICU, every hour with neurological checks or more frequently if necessary</b></p> <p data-bbox="981 753 1721 939"><b>In non-ICU setting, depending on patient's condition and neurological assessments, at a minimum check neurological and vital signs q 4 hrs</b></p>

# Schedule of Neurological Assessment and Vital Signs and Other Acute Care Assessments in Thrombolysis-Treated and Nonthrombolysis-Treated Patients

Patients treated with Thrombolytics	Patients not treated with thrombolytics
<p>Call physician if:</p> <p>Systolic BP &gt;185 or &lt;110 mm Hg Diastolic BP &gt;105 or &lt;60 mm Hg</p> <p>Pulse &lt;50/ or &gt;110/min Respirations &gt;24/min Temp &gt;99.6°F</p> <p>Worsening of stroke symptoms or other decline in neurological status</p>	<p>Call physician for further treatment based on clinician/institution guidelines:</p> <p>Systolic BP &gt;220 or &lt;110 mm Hg Diastolic BP &gt;120 or &lt;60 mm Hg</p> <p>Pulse &lt;50/ or &gt;110/min Respirations &gt;24/min Temp &gt;99.6°F</p> <p>Worsening of stroke symptoms or other decline in neurological status</p>



# Schedule of Neurological Assessment and Vital Signs and Other Acute Care Assessments in Thrombolysis-Treated and Nonthrombolysis-Treated Patients

Patients treated with thrombolytics	Patients not treated with thrombolytics
IV fluids NS at 75-100 mL/hr	IV fluids NS at 75-100 mL/hr
No heparin, warfarin, aspirin, clopidogrel or dipyridamole for 24 hrs, then start the antithrombotic as ordered	Antithrombotics should be ordered within first 24 hrs of hospital admission
Brain CT or MRI after rtPA therapy (at 24 hrs)	Repeat brain CT scan or MRI may be ordered 24-48 hrs after stroke or prn

# Schedule of Neurological Assessment and Vital Signs and Other Acute Care Assessments in Thrombolysis-Treated and Nonthrombolysis-Treated Patients

Patients treated with Thrombolytics	Patients not treated with thrombolytics
For O2 sat <92%, give O2 by cannula at 2-3 L/min	For O2 sat <92%, give O2 by cannula at 2-3 L/min
Monitor for major and minor bleeding complications	N/A
Continuous cardiac monitoring up to 72 hrs or more	Continuous cardiac monitoring for 24-48 hrs
Measure intake and output	Measure intake and output

# Emergent Stroke Workup

## All patients

- Non-contrast brain CT or brain MRI
- Blood glucose
- Serum electrolytes/renal function tests
- ECG
- Markers of cardiac ischemia
- Complete blood count, including platelet count
- Prothrombin time/INR
- aPTT
- Oxygen saturation

# Emergent Stroke Workup

## Selected patients

- Hepatic function tests
- Toxicology screen
- Blood alcohol level
- Pregnancy test
- Arterial blood gas tests (if hypoxia is suspected)
- Chest radiography (if lung disease is suspected)
- Lumbar puncture (if SAH is suspected and CT scan is negative for blood)
- EEG (if seizures are suspected)

## **Stroke/Medical History Questions**

- Time patient last known well (will be used as presumed time of onset)
- Time symptoms were first observed (if different from time last known well)
- Was anyone with patient when symptoms began? If so, who?
- History of diabetes?
- History of hypertension?
- History of seizures?
- History of trauma related to current event?
- History of myocardial infarction or angina?
- History of cardiac arrhythmias? Atrial fibrillation?
- History of prior stroke or TIA?
- What medications is patient currently taking? Is patient receiving anticoagulation therapy with warfarin?



# Recommendations for Treatment of Elevated Blood Pressure in Acute Ischemic Stroke: Nursing Knowledge

Blood Pressure Level Not eligible for thrombolytic therapy	Treatment
Systolic <220 mm Hg <i>or</i> Diastolic <120 mm Hg	Observe unless other end-organ involvement, e.g., aortic dissection, acute myocardial infarction, pulmonary edema, or hypertensive encephalopathy
	Treat other symptoms of stroke such as headache, pain, agitation, nausea, and vomiting  Treat other acute complications of stroke, including hypoxia, increased ICP, seizures, or hypoglycemia

# Recommendations for Treatment of Elevated Blood Pressure in Acute Ischemic Stroke: Nursing Knowledge

Blood Pressure Level Not eligible for thrombolytic therapy	Treatment
<p>Systolic &gt;220 mm Hg</p> <p><i>or</i></p> <p>Diastolic &lt;121–140 mm Hg</p>	<p>Labetalol 10–20 mg IV over 1–2 min May repeat</p> <p><i>or</i></p> <p>double every 10 min (maximum dose: 300 mg)</p>
	<p>Nicardipine 5 mg/h IV infusion as initial dose; titrate to desired effect by increasing 2.5 mg/h every 5 min to maximum of 15 mg/hr</p> <p>Aim for a 10% to 15% reduction of blood pressure</p>
<p>Diastolic &gt;140 mm Hg</p>	<p>Nitroprusside 0.5 µg/kg per min IV infusion as initial dose with continuous blood pressure monitoring. Aim for a 10% to 15% reduction of blood pressure</p>



# Recommendations for Treatment of Elevated Blood Pressure in Acute Ischemic Stroke: Nursing Knowledge

Blood Pressure Level Eligible for thrombolytic therapy	Treatment
<p><b>Pre-treatment</b>  <b>Systolic &gt;185 mm Hg or Diastolic &gt;110 mm Hg</b></p>	<p><b>Check blood pressure every 15 min for 2 h, then every 30 min for 6 hrs, and then every hour for 16 hrs</b></p> <p><b>Sodium nitroprusside 0.5 µg/kg per min IV infusion as initial dose and titrate to desired blood pressure level</b></p> <p><b>Labetalol 10–20 mg IV over 1–2 min.</b></p> <p><b>May repeat × 1 or nitropaste 1–2 in or</b></p> <p><b>Nicardipine drip, 5 mg/h, titrate up by 0.25 mg/h at 5- to 15-minute intervals; maximum dose: 15 mg/hr, if blood pressure is not reduced and maintained at desired levels (systolic 185 mm Hg and diastolic 110 mm Hg), do not administer rtPA</b></p>



# Recommendations for Treatment of Elevated Blood Pressure in Acute Ischemic Stroke: Nursing Knowledge

Blood Pressure Level Eligible for thrombolytic therapy	Treatment
<p><b>During and after treatment</b></p> <ol style="list-style-type: none"> <li>1. Monitor blood pressure</li> <li>2. Diastolic &gt;140 mm Hg</li> <li>3. Systolic &gt;230 mm Hg <i>or</i></li> </ol>	<p><b>Labetalol 10 mg IV over 1–2 min, may repeat every 10-20 min, maximum dose: 30 mg</b></p> <p><i>or</i></p> <p><b>Labetalol 10 mg IV followed by infusion at 2-8 mg/min</b></p> <p><i>or</i></p> <p><b>Nicardipine drip, 5 mg/h, titrate up to desired effect by increasing 2.5 mg/h every 5 min to maximum dose of 15 mg/hr</b></p>



# Recommendations for Treatment of Elevated Blood Pressure in Acute Ischemic Stroke: Nursing Knowledge

Blood Pressure Level Eligible for thrombolytic therapy	Treatment
<i>Diastolic 121–140 mm Hg</i>	<p>May repeat or double labetalol every 10 min to a maximum dose of 300 mg or give initial labetalol bolus and then start labetalol drip at 2 to 8 mg/min</p> <p><i>Or</i></p> <p>Nicardipine 5 mg/h IV drip as initial dose, titrate up to desired effect by increasing 2.5 mg/h every 5 min to maximum dose of 15 mg/hr</p> <p>Titrate to desired effect by increasing 2.5 mg/hr every 5 min to maximum dose of 15 mg/hr. If blood pressure is not controlled by labetalol, consider sodium nitroprusside but avoid if possible.</p>

# Recommendations for Treatment of Elevated Blood Pressure in Acute Ischemic Stroke: Nursing Knowledge

Blood Pressure Level Eligible for thrombolytic therapy	Treatment
4. Systolic 180–230 mm Hg <i>or Diastolic</i> 105–120 mm Hg	<p>Labetalol 10 mg IV over 1–2 min, may repeat every 10-20 minutes, maximum dose of 30 mg</p> <p>May repeat or double labetalol every 10-20 min to a maximum dose of 30 mg <i>or</i></p> <p>Give initial labetalol 10 mg IV followed by infusion at 2-8 mg/min bolus and then start a labetalol drip at 2-8 mg/min</p>

# Intensive Monitoring

- **30% of patients will deteriorate in the first 24 hours.**
- **Intensive monitoring by nurses trained in stroke is very important**
  - **Trained in neurological assessment (NIHSS)**
  - **Trained in monitoring of bleeding complications (major and minor)**
  - **Ongoing management of blood pressure, temperature, oxygenation, and blood glucose**

# Acute Care

- **Nursing focus on stabilization of the stroke patient through frequent evaluation of neurological status, BP management and prevention of complications**
- **Clinical pathways and stroke orders that address these issues and include consultations of multidisciplinary team should be developed**

# General Supportive Care of Stroke – Focus on prevention of complications

- **Dysphagia Screening to prevent risk of aspiration pneumonia and determine feeding mobility**
- **Early mobility to prevent DVT, pulmonary emboli**
- **Bowel and bladder care – best to avoid urinary catheter insertion but if necessary remove as soon as possible**
- **Other interventions include:**
  - Falls prevention
  - Skin Care

# NINDS rt-PA Stroke Study Group Hemorrhage Algorithm – Nursing Alert

Care Element	Suspect ICH or Systemic Bleed	2-24 h After ICH	2-24 h After ICH
Consultations	Neurosurgery if ICH suspected Hematology if ICH suspected General surgery if systemic bleed suspected	Same	Same 2-24 h After ICH
Same 2-24 h After ICH	Vital signs q 15 min Neuro exam, signs of ICP q 15 min Continuous ECG monitoring Look for other bleeding sites	Vital signs q 1 h and prn Signs of ICP, neuro exam GCS/pupil check q 1 hr and prn Monitor ECG Monitor SVO <sub>2</sub> , ICP	Advance vital signs prn Advance neuro exam Consider discontinuing ECG

# NINDS rt-PA Stroke Study Group Hemorrhage Algorithm - Nursing Alert

Care Element	Suspect ICH or Systemic Bleed	2-24 h After ICH	2-24 h After ICH
STAT diagnostics	<p>CT head, noncontrast or MRI with GRE sequence</p> <p>Labs: PT/aPTT/INR, fibrinogen, CBC with platelets, type and cross-match</p> <p>Pulse oximetry, consider SVO<sub>2</sub>, brain oximeter</p> <p>Consider ICP monitor</p> <p>Consider hemodynamic monitoring</p> <p>Check stool for occult blood</p>	<p>Labs:</p> <p>Na<sup>2+</sup>, osmolality (if on mannitol)</p> <p>Glucose q 6 h and prn (in patients with history of DM)</p> <p>ABGs CO<sub>2</sub> 30-35 (hyperventilation if ordered)</p> <p>Consider ICP monitor</p>	Consider discontinuing O <sub>2</sub> monitoring

# NINDS rt-PA Stroke Study Group Hemorrhage Algorithm – Nursing Alert

Care Element	Suspect ICH or Systemic Bleed	2-24 h After ICH	2-24 h After ICH
Treatments	<p>If receiving thrombolytics, <b>STOP INFUSION</b></p> <p>Consider hyperventilation</p> <p>Consider mannitol</p> <p>Consider blood products (cryoprecipitate, FFP, PLTs, PRBCs, other meds such as factor VIIa)</p> <p>Consider surgery. Apply pressure to compressible sites for major or minor systemic bleeds</p>	<p>Keep PO<sub>2</sub> &gt;90 mm Hg</p> <p>Consider hyperventilation</p> <p>Consider mannitol 25 g q 4-6 h</p> <p>Consider surgery; treat DKA/HOC with insulin drip prn.</p>	<p>Keep PO<sub>2</sub> &gt;90 mm Hg</p> <p>Wean hyperventilation</p> <p>Wean mannitol</p> <p>Wean blood pressure drips, add oral agent as tolerated</p>

# NINDS rt-PA Stroke Study Group Hemorrhage Algorithm – Nursing Alert

Care Element	Suspect ICH or Systemic Bleed	2-24 h After ICH	2-24 h After ICH
Activity	Bed rest Change position q 1-2 h as tolerated	Same	Advance as tolerated
Nutrition	Feed as soon as possible NPO. Consider enteral feedings with NGT or DHT	Same	Consider feeding as swallowing screen defines, consider TPN or other enteral feeding

# Nursing Alert – Assessing ICP

## Signs and symptoms of increasing ICP – a medical emergency

**Early signs:** decreased level of consciousness, deterioration in motor function, headache, visual disturbances, changes in blood pressure or heart rate, changes in respiratory pattern

**Late signs:** pupillary abnormalities, more persistent changes in vital signs, changes in respiratory pattern with changes in arterial blood gases

**Intervention:** thorough neurological assessment, notify physician immediately, emergency brain imaging, maintain ABCs

## General measures to prevent elevation of ICP

**HOB up 30° or as physician specifies, reverse Trendelenburg position may be used if blood pressure is stable. Head position may be one of the single most important nursing modalities for controlling increased ICP.**

**Good head and body alignment:** prevents increased intrathoracic pressure and allows venous drainage.

**Pain management:** provide good pain control on a consistent basis

**Keep patient normothermic.**

# Nursing Care and Secondary Prevention: Knowing and Practicing the Guidelines

## Hypertension

- Antihypertensive drugs are recommended for prevention of recurrent stroke and other vascular events in persons who have had an ischemic stroke and beyond the hyperacute period.
- This benefit extends to persons with and w/o a history of hypertension and should be considered for all ischemic stroke and TIA patients.
- An absolute target BP level and reduction are uncertain and should be individualized; benefit has been associated with an average reduction of less than 10/5 mm Hg, and normal BP levels have been defined as < 120/80 mm Hg by JNC-7
- Several lifestyle modifications have been associated with BP reductions and should be included as part of a comprehensive approach.
- Optimal drug regimen remains uncertain; however, available data support the use of diuretics and the combination of diuretics and an ACEI. Choice of specific drugs and targets should be individualized on the basis of reviewed data and consideration, as well as specific patient characteristics (e.g., extracranial cerebrovascular occlusive disease, renal impairment, cardiac disease, and DM).

# Nursing Care and Secondary Prevention: Knowing and Practicing the Guidelines

## Diabetes

- More rigorous control of blood pressure and lipids should be considered in patients with diabetes.
- Although all major classes of antihypertensives are suitable for the control of BP, most patients will require greater than 1 agent. ACEIs and ARBs are more effective in reducing the progression of renal disease and are recommended as first-choice medications for patients with DM.
- Glucose control is recommended to near-normoglycemic levels among diabetics with ischemic stroke or TIA to reduce microvascular complications.
- The goal for Hb A1c should be less than or equal to 7%.

# Nursing Care and Secondary Prevention: Knowing and Practicing the Guidelines

## Cholesterol Control

- Ischemic stroke or TIA patients with elevated cholesterol, comorbid CAD, or evidence of an atherosclerotic origin should be managed according to NCEP III guidelines, which include lifestyle modification, dietary guidelines, and medication recommendations.
- Statin agents are recommended, and the target goal for cholesterol lowering for those with CHD or symptomatic atherosclerotic disease is an LDL-C of less than 100 mg/dL and LDL-C less than 70 mg/dL for very-high-risk persons with multiple risk factors.
- Patients with ischemic stroke or TIA presumed to be due to an atherosclerotic origin but with no preexisting indications for statins (normal cholesterol levels, no comorbid CAD, or no evidence of atherosclerosis) are reasonable to consider for treatment with a statin agent to reduce the risk of vascular events.
- Ischemic stroke or TIA patients with low HDL-C may be considered for treatment with niacin or gemfibrozil.

# Nursing Care and Secondary Prevention: Knowing and Practicing the Guidelines

## Smoking Cessation

- All ischemic stroke or TIA patients who have smoked in the past year should be strongly encouraged not to smoke.
- Avoid environmental smoke.
- Counseling, nicotine products, and oral smoking cessation medications have been found to be effective for smokers.



# Nursing Care and Secondary Prevention: Knowing and Practicing the Guidelines

## Alcohol Use

- Patients with prior ischemic stroke or TIA who are heavy drinkers should eliminate or reduce their consumption of alcohol.
- Light to moderate levels of less than or equal 2 drinks per day for men and 1 drink per day for nonpregnant women may be considered.

## Obesity

Weight reduction may be considered for all overweight ischemic stroke or TIA patients to maintain the goal of a BMI of 18.5 to 24.9 kg/m<sup>2</sup> and a waist circumference of less than 35 in for women and less than 40 in for men. Clinicians should encourage weight management through an appropriate balance of caloric intake, physical activity, and behavioral counseling.



# Nursing Care and Secondary Prevention: Knowing and Practicing the Guidelines

## Physical activity

- For those with ischemic stroke or TIA who are capable of engaging in physical activity, at least 30 minutes of moderate-intensity physical exercise most days of the week may reduce risk factors and comorbid conditions that increase the likelihood of recurrence of stroke.
- For those with disability after ischemic stroke, a supervised therapeutic exercise regimen is recommended.



# Nursing Care and Secondary Prevention: Knowing and Practicing the Guidelines

## Extracranial Carotid Artery Disease

- For recent TIA or ischemic stroke within the last 6 mo and ipsilateral severe (70% to 99%) carotid artery stenosis, CEA is recommended by a surgeon with a perioperative morbidity and mortality < 6%.
- For recent TIA or ischemic stroke and ipsilateral moderate (50% to 69%) carotid stenosis, CEA is recommended, depending on patient-specific factors such as age, gender, comorbidities, and severity of initial symptoms.
- If stenosis is less than 50%, there is no indication for CEA.
- If CEA is indicated, surgery within 2 wks rather than delayed is suggested.
- Among patients with symptomatic severe stenosis (greater than 70%) in whom the stenosis is difficult to access surgically, medical conditions that greatly increase risk for surgery, or other circumstances exist (i.e., radiation-induced stenosis or restenosis after CEA; CAS is not inferior to endarterectomy.
- CAS is reasonable when performed by operators with periprocedural morbidity and mortality rates of 4% to 6%.
- For patients with symptomatic carotid occlusion, EC/IC bypass surgery is not recommended routinely.

# Nursing Care and Secondary Prevention: Knowing and Practicing the Guidelines

## Extracranial vertebrobasilar disease

- Endovascular treatment of patients with symptomatic extracranial vertebral stenosis may be considered when patients are having symptoms despite medical therapies (antithrombotics, statins, and other treatments for risk factors).

## Intracranial Disease

- The usefulness of endovascular therapy (angioplasty and/or stent placement) is uncertain for patients with hemodynamically significant intracranial stenosis who have symptoms despite medical therapies (antithrombotics, statins, and other treatments for risk factors) and is considered investigational.



# Nursing Care and Secondary Prevention: Knowing and Practicing the Guidelines

## Atrial Fibrillation

- For patients with ischemic stroke or TIA with persistent or paroxysmal (intermittent) AF, anticoagulation with adjusted-dose warfarin (target INR, 2.5; range, 2.0–3.0) is recommended.
- In patients unable to take oral anticoagulants, aspirin 325 mg/d is recommended.
- **Acute MI and LV thrombus** For patients with an ischemic stroke caused by an acute MI in whom LV mural thrombus is identified by echocardiography or another form of cardiac imaging, oral anticoagulation is reasonable, aiming for an INR of 2.0 to 3.0 for at least 3 mo and up to 1 year.
- Aspirin should be used concurrently for the ischemic CAD patient during oral anticoagulant therapy in doses up to 162 mg/d, preferably in the enteric-coated form.



# Nursing Care and Secondary Prevention: Knowing and Practicing the Guidelines

## Cardiomyopathy

- For patients with ischemic stroke or TIA who have dilated cardiomyopathy, either warfarin (INR, 2.0 to 3.0) or antiplatelet therapy may be considered for prevention of recurrent events.

## Valvular heart disease, Rheumatic mitral valve disease

- For patients with ischemic stroke or TIA who have rheumatic mitral valve disease, whether or not AF is present, long-term warfarin therapy is reasonable, with a target INR of 2.5 (range, 2.0–3.0).
- Anti-platelet agents should not be routinely added to warfarin in the interest of avoiding additional bleeding risk.
- For ischemic stroke or TIA patients with rheumatic mitral valve disease, whether or not AF is present, who have a recurrent embolism while receiving warfarin, adding aspirin (81 mg/d) may be indicated.

# Nursing Care and Secondary Prevention: Knowing and Practicing the Guidelines

## Mitral valve prolapse (MVP)

- For patients with MVP who have ischemic stroke or TIAs, long-term antiplatelet therapy is reasonable.

## Mitral Annular Calcification (MAC)

- For patients with ischemic stroke or TIA and MAC not documented to be calcific, antiplatelet therapy may be considered.
- Among patients with mitral regurgitation resulting from MAC without AF, antiplatelet or warfarin therapy may be considered.

# Nursing Care and Secondary Prevention: Knowing and Practicing the Guidelines

## Aortic Valve Disease

- For patients with ischemic stroke or TIA and aortic valve disease who do not have AF, antiplatelet therapy may be considered.

## Prosthetic Heart Valves

- For patients with ischemic stroke or TIA who have modern mechanical prosthetic heart valves, oral anticoagulants are recommended, with an INR target of 3.0 (range, 2.5–3.5).
- For patients with mechanical prosthetic heart valves who have an ischemic stroke or systemic embolism despite adequate therapy with oral anticoagulants, aspirin 75 to 100 mg/d, in addition to oral anticoagulants, and maintenance of the INR at a target of 3.0 (range, 2.5–3.5) is reasonable.
- For patients with ischemic stroke or TIA who have bioprosthetic heart valves with no other source of thromboembolism, anticoagulation with warfarin (INR, 2.0–3.0) may be considered.

# Stroke Educational Programs –AHA/ASA

- **Stroke: Patient Education Tool Kit**
- **Power to End Stroke**
- **African American Power to End Stroke**
- **Power to End Stroke — Family Reunion Toolkit**
- ***Stroke Connection* magazine**
- **How Stroke Affects Behavior: Our Guide to Physical and Emotional Changes**
- **Living with Atrial Fibrillation: Our Guide to Managing a Key Stroke Risk Factor**
- **Living with Disability After Stroke**
- **Sex After Stroke: Our Guide to Intimacy After Stroke**
- **Stroke: Are You at Risk? Our Guide to Stroke Risk Factors**
- **Understanding Stroke: Our Guide to Explaining Stroke and How to Reduce Your Risk**
- **Caring for Someone with Aphasia**
- **High Blood Pressure and Stroke**
- **Warning Signs of Stroke: Our Easy-reading Guide to Emergency Action**
- **Being a Stroke Family Caregiver**
- **Smoking and Your Risk of Stroke**
- **Just Move: Our Guide to Physical Activity**
- **Diabetes, Heart Disease and Stroke**

# Stroke Educational Programs - NINDS

- What You Need to Know About Stroke
- Stroke Risk Factors and Symptoms
- Brain Basics: Preventing Stroke
- Neurological Diagnostic Tests and Procedures
- Questions and Answers About Stroke
- Questions and Answers About Carotid Endarterectomy

## Stroke Educational Programs - NSA

- *Stroke Smart* magazine
- Stroke Fact Sheet
- African Americans and Stroke Brochure
- Cholesterol Brochure
- Explaining Stroke Brochure
- Intracranial Atherosclerosis Brochure
- Recurrent Stroke Prevention Brochure
- Reducing Risk and Recognizing Symptoms Brochure
- Transient Ischemic Attack Brochure
- Stroke Rapid Response EMS/Prehospital Education
- Hip Hop Stroke – Brainiac Kids Stroke Education

# Discharge Planning

- **Goal is to ensure a safe transition between the acute care facility, rehabilitation and outpatient settings.**
- **Nurses can work with discharge planners to optimally meet the discharge needs of the patient and family.**