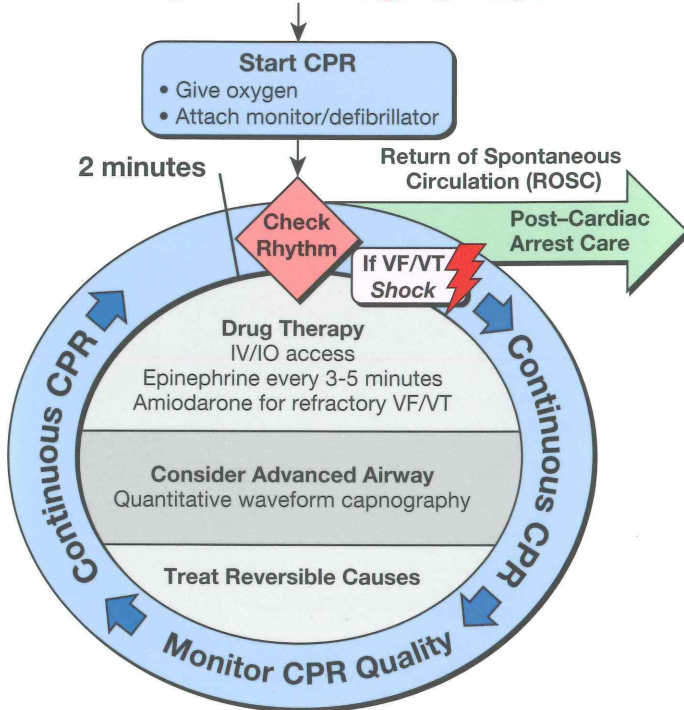


ACLS Cardiac Arrest, Arrhythmias, and Their Treatment

Cardiac Arrest Circular Algorithm

Shout for Help/Activate Emergency Response



Doses/Details for the Cardiac Arrest Algorithms

CPR Quality

- Push hard (≥ 2 inches [5 cm]) and fast (≥ 100 /min) and allow complete chest recoil
- Minimize interruptions in compressions
- Avoid excessive ventilation
- Rotate compressor every 2 minutes
- If no advanced airway, 30:2 compression-ventilation ratio
- Quantitative waveform capnography
 - If $PETCO_2 < 10$ mm Hg, attempt to improve CPR quality
- Intra-arterial pressure
 - If relaxation phase (diastolic) pressure < 20 mm Hg, attempt to improve CPR quality

Return of Spontaneous Circulation (ROSC)

- Pulse and blood pressure
- Abrupt sustained increase in $PETCO_2$ (typically ≥ 40 mm Hg)
- Spontaneous arterial pressure waves with intra-arterial monitoring

Shock Energy

- **Biphasic:** Manufacturer recommendation (eg, initial dose of 120-200 J); if unknown, use maximum available. Second and subsequent doses should be equivalent, and higher doses may be considered.
- **Monophasic:** 360 J

Drug Therapy

- **Epinephrine IV/IO Dose:** 1 mg every 3-5 minutes
- **Vasopressin IV/IO Dose:** 40 units can replace first or second dose of epinephrine
- **Amiodarone IV/IO Dose:** First dose: 300 mg bolus. Second dose: 150 mg.

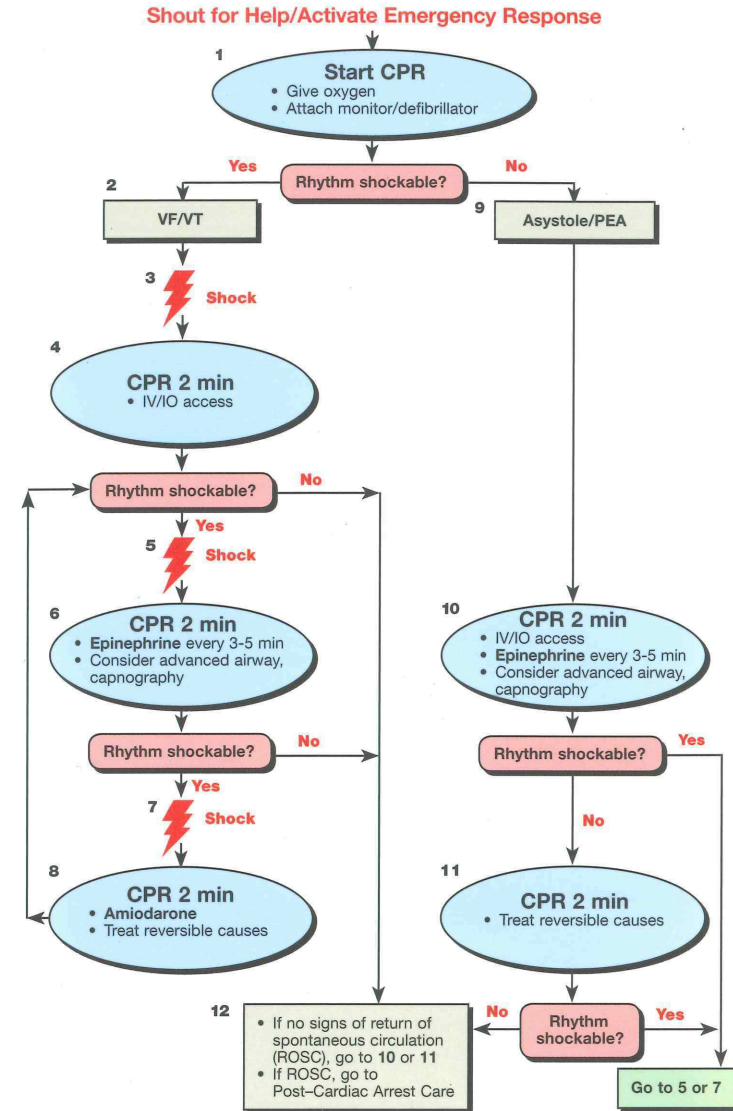
Advanced Airway

- Supraglottic advanced airway or endotracheal intubation
- Waveform capnography to confirm and monitor ET tube placement
- 8-10 breaths per minute with continuous chest compressions

Reversible Causes

- Hypovolemia
- Hypoxia
- Hydrogen ion (acidosis)
- Hypo-/hyperkalemia
- Hypothermia
- Tension pneumothorax
- Tamponade, cardiac
- Toxins
- Thrombosis, pulmonary
- Thrombosis, coronary

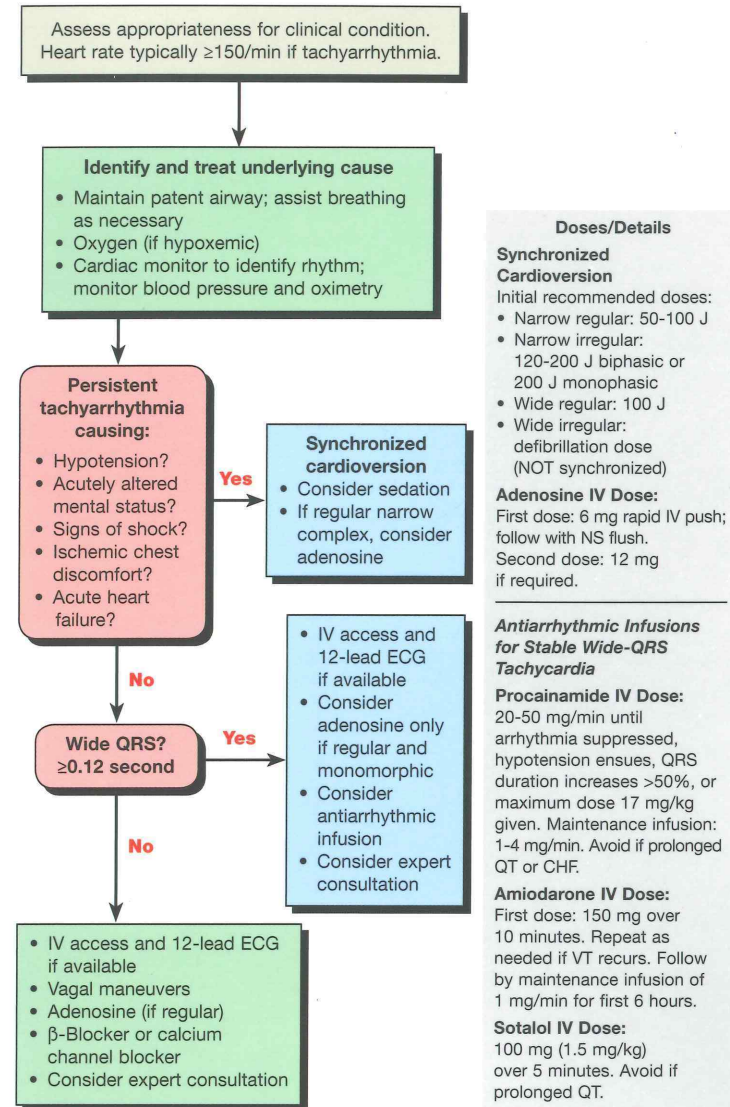
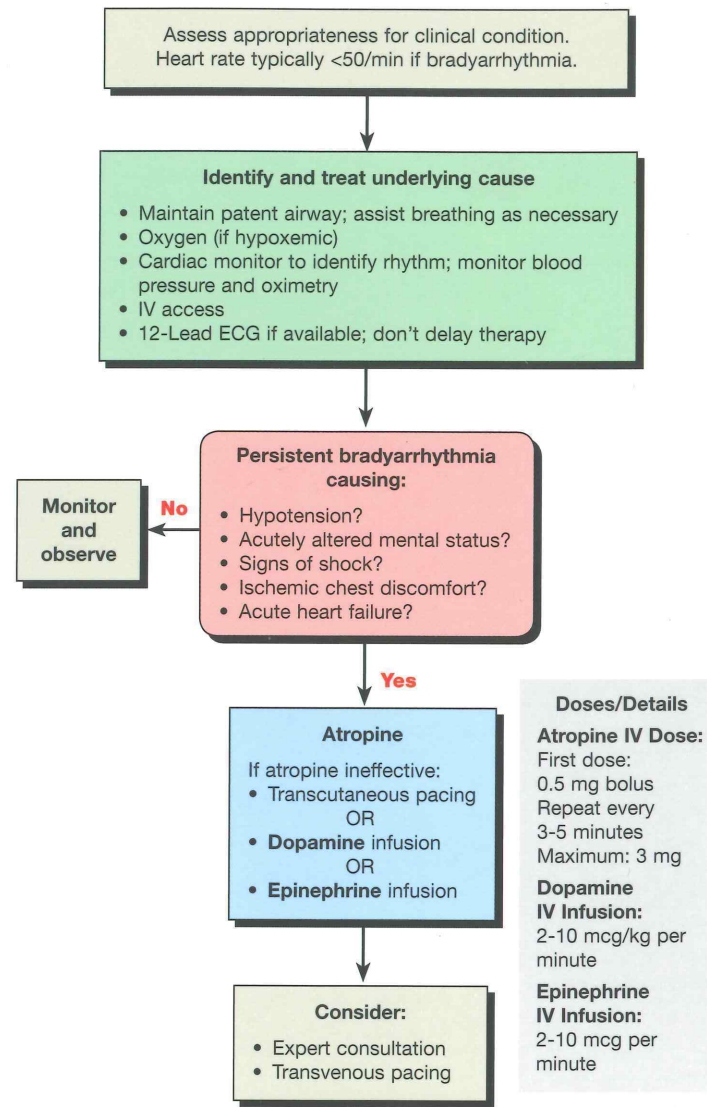
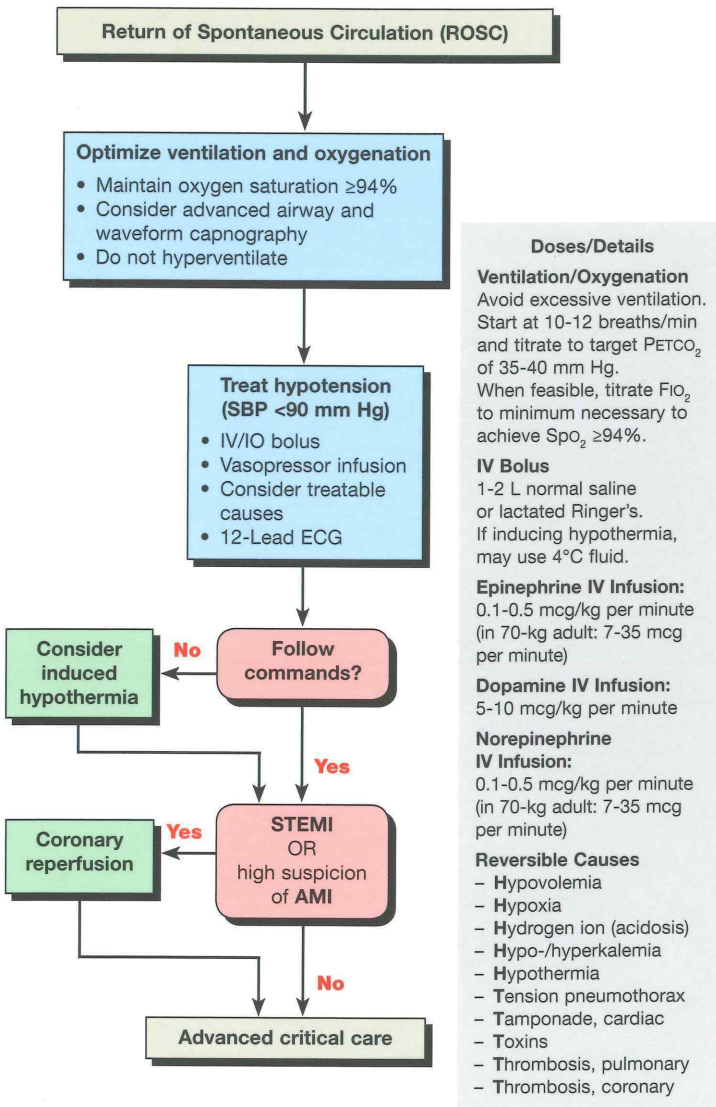
Cardiac Arrest Algorithm



Immediate Post-Cardiac Arrest Care Algorithm

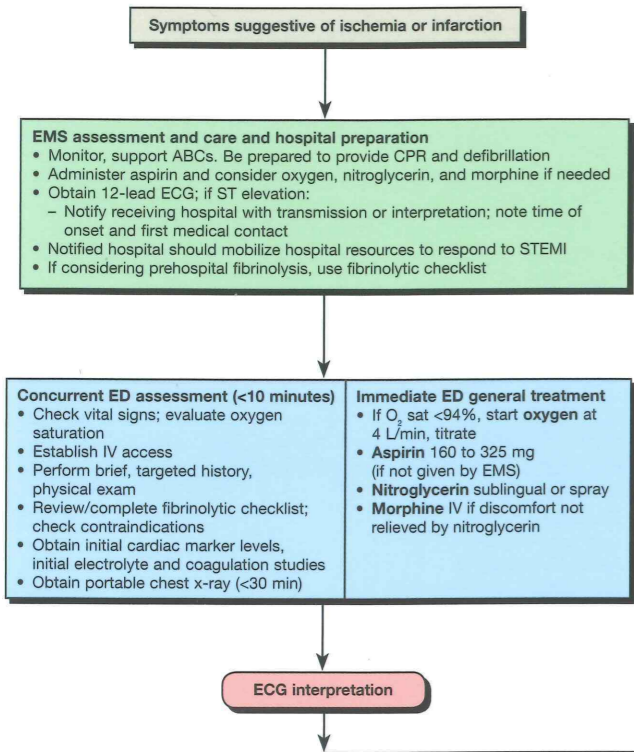
Bradycardia With a Pulse Algorithm

Tachycardia With a Pulse Algorithm

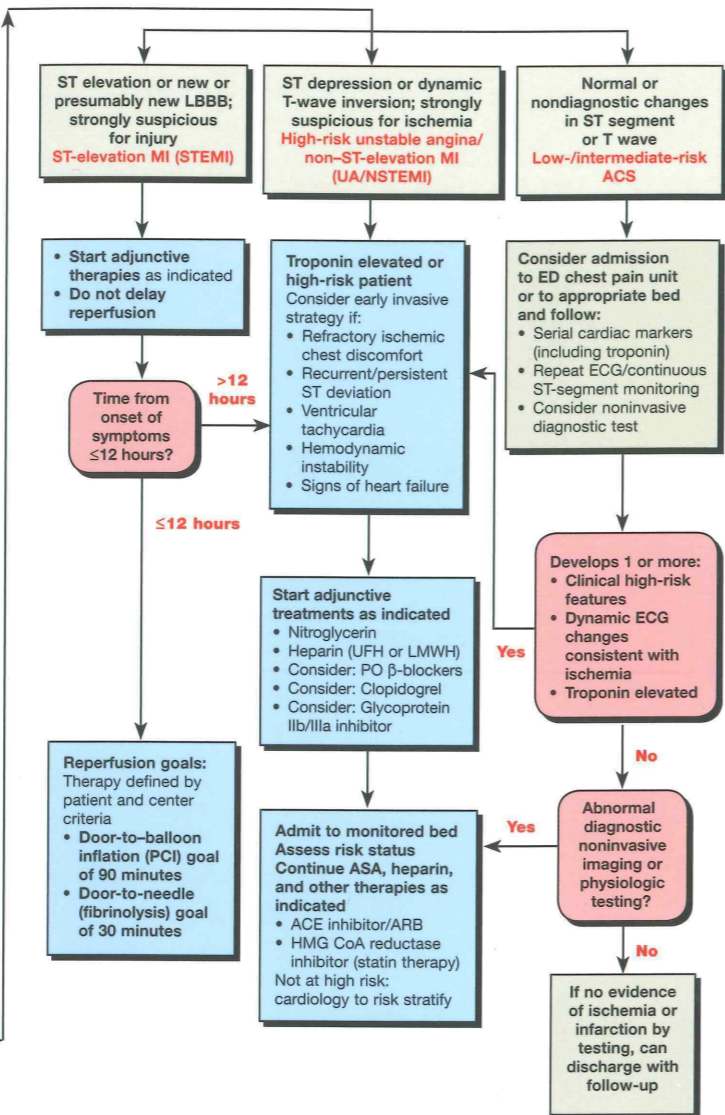


ACLS Acute Coronary Syndromes and Stroke

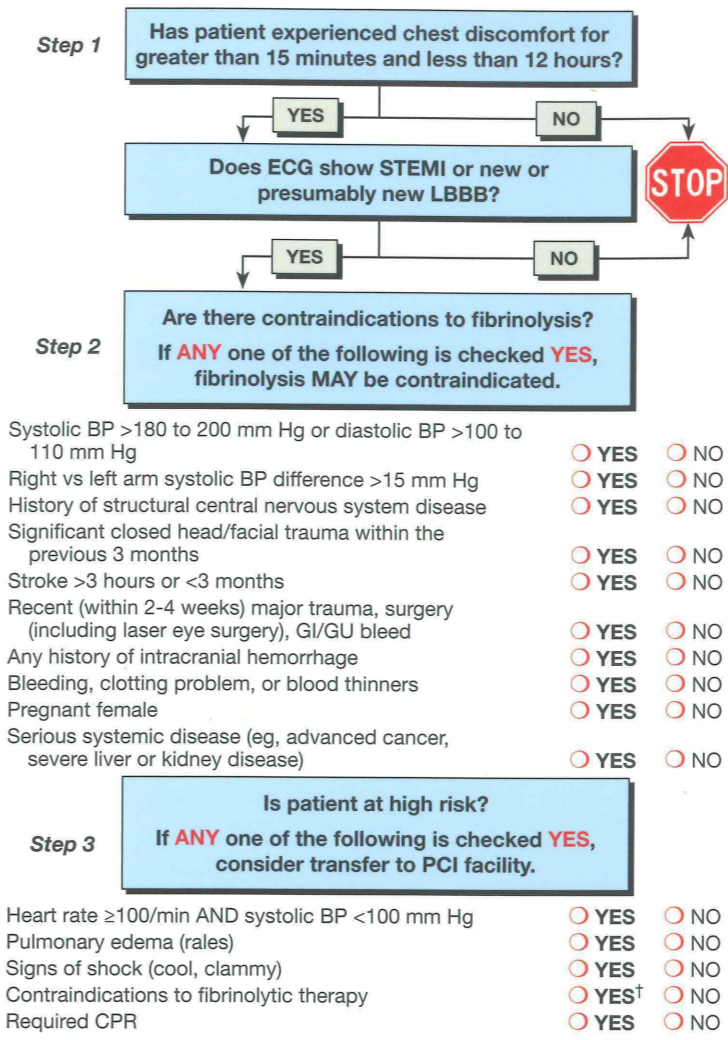
Acute Coronary Syndromes Algorithm



Acute Coronary Syndromes Algorithm (continued)



Fibrinolytic Checklist for STEMI*



*Contraindications for fibrinolytic use in STEMI are viewed as advisory for clinical decision making and may not be all-inclusive or definitive. These contraindications are consistent with the 2004 ACC/AHA Guidelines for the Management of Patients With ST-Elevation Myocardial Infarction. †Consider transport to primary PCI facility as destination hospital.

Fibrinolytic Therapy for STEMI

Contraindications for fibrinolytic use in STEMI consistent with ACC/AHA 2007 Focused Update*

Absolute Contraindications

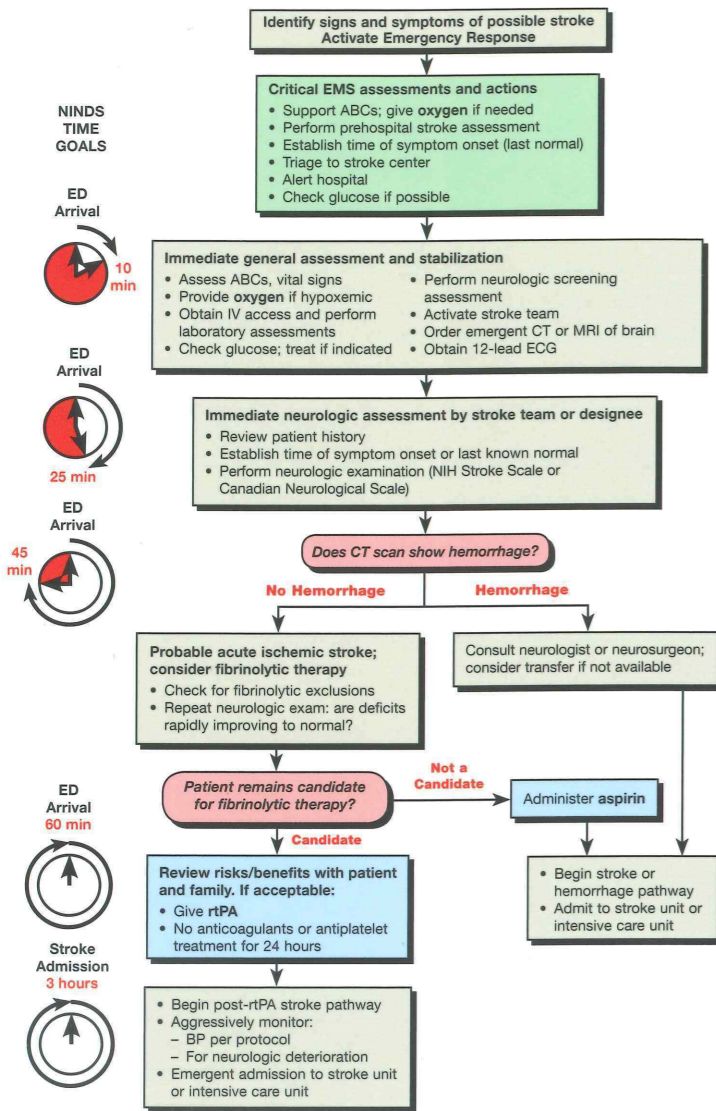
- Any prior intracranial hemorrhage
- Known structural cerebral vascular lesion (eg, arteriovenous malformation)
- Known malignant intracranial neoplasm (primary or metastatic)
- Ischemic stroke within 3 months EXCEPT acute ischemic stroke within 3 hours
- Suspected aortic dissection
- Active bleeding or bleeding diathesis (excluding menses)
- Significant closed head trauma or facial trauma within 3 months

Relative Contraindications

- History of chronic, severe, poorly controlled hypertension
- Severe uncontrolled hypertension on presentation (SBP >180 mm Hg or DBP >110 mm Hg)†
- History of prior ischemic stroke >3 months, dementia, or known intracranial pathology not covered in contraindications
- Traumatic or prolonged (>10 minutes) CPR or major surgery (<3 weeks)
- Recent (within 2 to 4 weeks) internal bleeding
- Noncompressible vascular punctures
- For streptokinase/anistreplase: prior exposure (>5 days ago) or prior allergic reaction to these agents
- Pregnancy
- Active peptic ulcer
- Current use of anticoagulants: the higher the INR, the higher the risk of bleeding

*Viewed as advisory for clinical decision making and may not be all-inclusive or definitive. †Could be an absolute contraindication in low-risk patients with myocardial infarction.

Suspected Stroke Algorithm: Goals for Management of Stroke

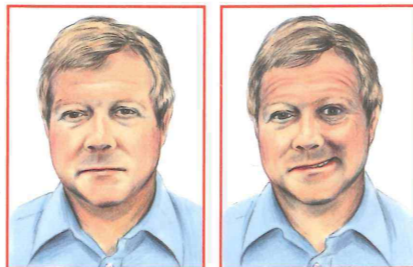


Stroke Assessment

The Cincinnati Prehospital Stroke Scale

Facial Droop (have patient show teeth or smile):

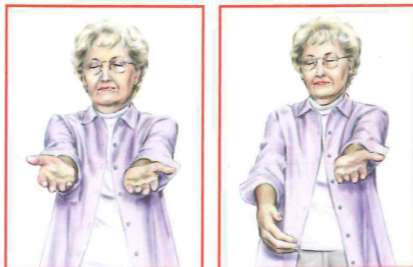
- Normal—both sides of face move equally
- Abnormal—one side of face does not move as well as the other side



Left: Normal. Right: Stroke patient with facial droop (right side of face).

Arm Drift (patient closes eyes and extends both arms straight out, with palms up, for 10 seconds):

- Normal—both arms move the same or both arms do not move at all (other findings, such as pronator drift, may be helpful)
- Abnormal—one arm does not move or one arm drifts down compared with the other



Left: Normal. Right: One-sided motor weakness (right arm).

Abnormal Speech (have the patient say “you can’t teach an old dog new tricks”):

- Normal—patient uses correct words with no slurring
- Abnormal—patient slurs words, uses the wrong words, or is unable to speak

Interpretation: If any 1 of these 3 signs is abnormal, the probability of a stroke is 72%.

Modified from Kothari RU, Pancioli A, Liu T, Brott T, Broderick J. Cincinnati Prehospital Stroke Scale: reproducibility and validity. *Ann Emerg Med.* 1999;33:373-378. With permission from Elsevier.

Use of IV rTPA for Acute Ischemic Stroke: Inclusion and Exclusion Characteristics

Patients Who Could Be Treated With rTPA Within 3 Hours From Symptom Onset*

Inclusion Criteria

- Diagnosis of ischemic stroke causing measurable neurologic deficit
- Onset of symptoms <3 hours before beginning treatment
- Age ≥18 years

Exclusion Criteria

- Head trauma or prior stroke in previous 3 months
- Symptoms suggest subarachnoid hemorrhage
- Arterial puncture at noncompressible site in previous 7 days
- History of previous intracranial hemorrhage
- Elevated blood pressure (systolic >185 mm Hg or diastolic >110 mm Hg)
- Evidence of active bleeding on examination
- Acute bleeding diathesis, including but not limited to
 - Platelet count <100 000/mm³
 - Heparin received within 48 hours, resulting in aPTT >upper limit of normal
 - Current use of anticoagulant with INR >1.7 or PT >15 seconds
- Blood glucose concentration <50 mg/dL (2.7 mmol/L)
- CT demonstrates multilobar infarction (hypodensity >1/3 cerebral hemisphere)

Relative Exclusion Criteria

- Recent experience suggests that under some circumstances—with careful consideration and weighing of risk to benefit—patients may receive fibrinolytic therapy despite 1 or more relative contraindications. Consider risk to benefit of rTPA administration carefully if any one of these relative contraindications is present:
- Only minor or rapidly improving stroke symptoms (clearing spontaneously)
 - Seizure at onset with postictal residual neurologic impairments
 - Major surgery or serious trauma within previous 14 days
 - Recent gastrointestinal or urinary tract hemorrhage (within previous 21 days)
 - Recent acute myocardial infarction (within previous 3 months)

Patients Who Could Be Treated With rTPA From 3 to 4.5 Hours From Symptom Onset†

Inclusion Criteria

- Diagnosis of ischemic stroke causing measurable neurologic deficit
- Onset of symptoms 3 to 4.5 hours before beginning treatment

Exclusion Criteria

- Age >80 years
- Severe stroke (NIHSS >25)
- Taking an oral anticoagulant regardless of INR
- History of both diabetes and prior ischemic stroke

Notes

- The checklist includes some US FDA–approved indications and contraindications for administration of rTPA for acute ischemic stroke. Recent AHA/ASA guideline revisions may differ slightly from FDA criteria. A physician with expertise in acute stroke care may modify this list.
- Onset time is either witnessed or last known normal.
- In patients without recent use of oral anticoagulants or heparin, treatment with rTPA can be initiated before availability of coagulation study results but should be discontinued if INR is >1.7 or PT is elevated by local laboratory standards.
- In patients without history of thrombocytopenia, treatment with rTPA can be initiated before availability of platelet count but should be discontinued if platelet count is <100 000/mm³.

Abbreviations: aPTT, activated partial thromboplastin time; FDA, Food and Drug Administration; INR, international normalized ratio; NIHSS, National Institutes of Health Stroke Scale; PT, prothrombin time; rTPA, recombinant tissue plasminogen activator.

Stroke: Treatment of Hypertension

Potential Approaches to Arterial Hypertension in Acute Ischemic Stroke Patients Who Are Potential Candidates for Acute Reperfusion Therapy*

Patient otherwise eligible for acute reperfusion therapy except that blood pressure is >185/110 mm Hg:

- Labetalol 10-20 mg IV over 1-2 minutes, may repeat × 1, or
 - Nicardipine IV 5 mg per hour, titrate up by 2.5 mg per hour every 5-15 minutes, maximum 15 mg per hour; when desired blood pressure is reached, lower to 3 mg per hour, or
 - Other agents (hydralazine, enalaprilat, etc) may be considered when appropriate
- If blood pressure is not maintained at or below 185/110 mm Hg, do not administer rTPA.

Management of blood pressure during and after rTPA or other acute reperfusion therapy:

Monitor blood pressure every 15 minutes for 2 hours from the start of rTPA therapy, then every 30 minutes for 6 hours, and then every hour for 16 hours.

If systolic blood pressure 180-230 mm Hg or diastolic blood pressure 105-120 mm Hg:

- Labetalol 10 mg IV followed by continuous IV infusion 2-8 mg per minute, or
- Nicardipine IV 5 mg per hour, titrate up to desired effect by 2.5 mg per hour every 5-15 minutes, maximum 15 mg per hour

If blood pressure not controlled or diastolic blood pressure >140 mm Hg, consider sodium nitroprusside.

Approach to Arterial Hypertension in Acute Ischemic Stroke Patients Who Are Not Potential Candidates for Acute Reperfusion Therapy*

Consider lowering blood pressure in patients with acute ischemic stroke if systolic blood pressure >220 mm Hg or diastolic blood pressure >120 mm Hg.

Consider blood pressure reduction as indicated for other concomitant organ system injury:

- Acute myocardial infarction
- Congestive heart failure
- Acute aortic dissection

A reasonable target is to lower blood pressure by 15% to 25% within the first day.

*Adams HP Jr, del Zoppo G, Alberts MJ, Bhatt DL, Brass L, Furlan A, Grubb RL, Higashida RT, Jauch EC, Kidwell C, Lyden PD, Morgenstern LB, Qureshi AI, Rosenwasser RH, Scott PA, Wijdicks EFM. Guidelines for the early management of adults with ischemic stroke: a guideline from the American Heart Association/American Stroke Association Stroke Council, Clinical Cardiology Council, Cardiovascular Radiology and Intervention Council, and the Atherosclerotic Peripheral Vascular Disease and Quality of Care Outcomes in Research Interdisciplinary Working Groups. *Stroke.* 2007;38:1655-1711.

†del Zoppo GJ, Saver JL, Jauch EC, Adams HP Jr, on behalf of the American Heart Association Stroke Council. Expansion of the time window for treatment of acute ischemic stroke with intravenous tissue plasminogen activator: a science advisory from the American Heart Association/American Stroke Association. *Stroke.* 2009;40:2945-2948.