



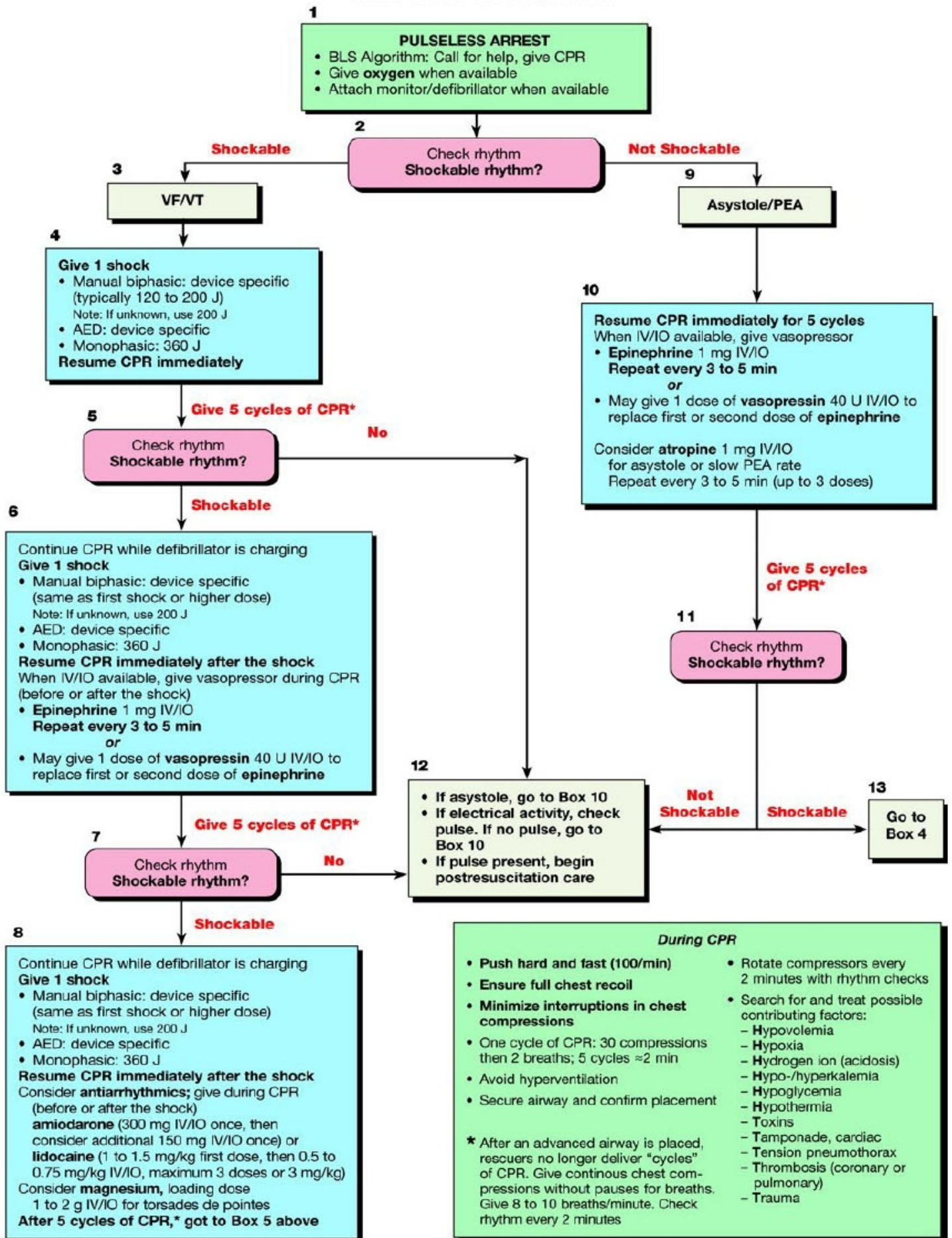
## **ACLS 2006 REVIEW PACKET**

This packet is intended for review only.  
Textbooks are available for purchase.

### **RCPALS**

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# ACLS 2006 ALGORITHMS



# ACLS 2006 ALGORITHMS

1

**BRADYCARDIA**  
Heart rate <60 bpm and  
inadequate for clinical condition

2

- Maintain patent **airway**; assist **breathing** as needed
- Give **oxygen**
- Monitor ECG (identify rhythm), blood pressure, oximetry
- Establish IV access

3

**Signs or symptoms of poor perfusion caused by the bradycardia?**  
(eg, acute altered mental status, ongoing chest pain, hypotension or other signs of shock)

4A

Observe/Monitor

**Adequate  
Perfusion**

**Poor  
Perfusion**

4

- Prepare for **transcutaneous pacing**; use without delay for high-degree block (type II second-degree block or third-degree AV block)
- Consider **atropine** 0.5 mg IV while awaiting pacer. May repeat to a total dose of 3 mg. If ineffective, begin pacing
- Consider **epinephrine** (2 to 10 µg/min) or **dopamine** (2 to 10 µg/kg per minute) infusion while awaiting pacer or if pacing ineffective

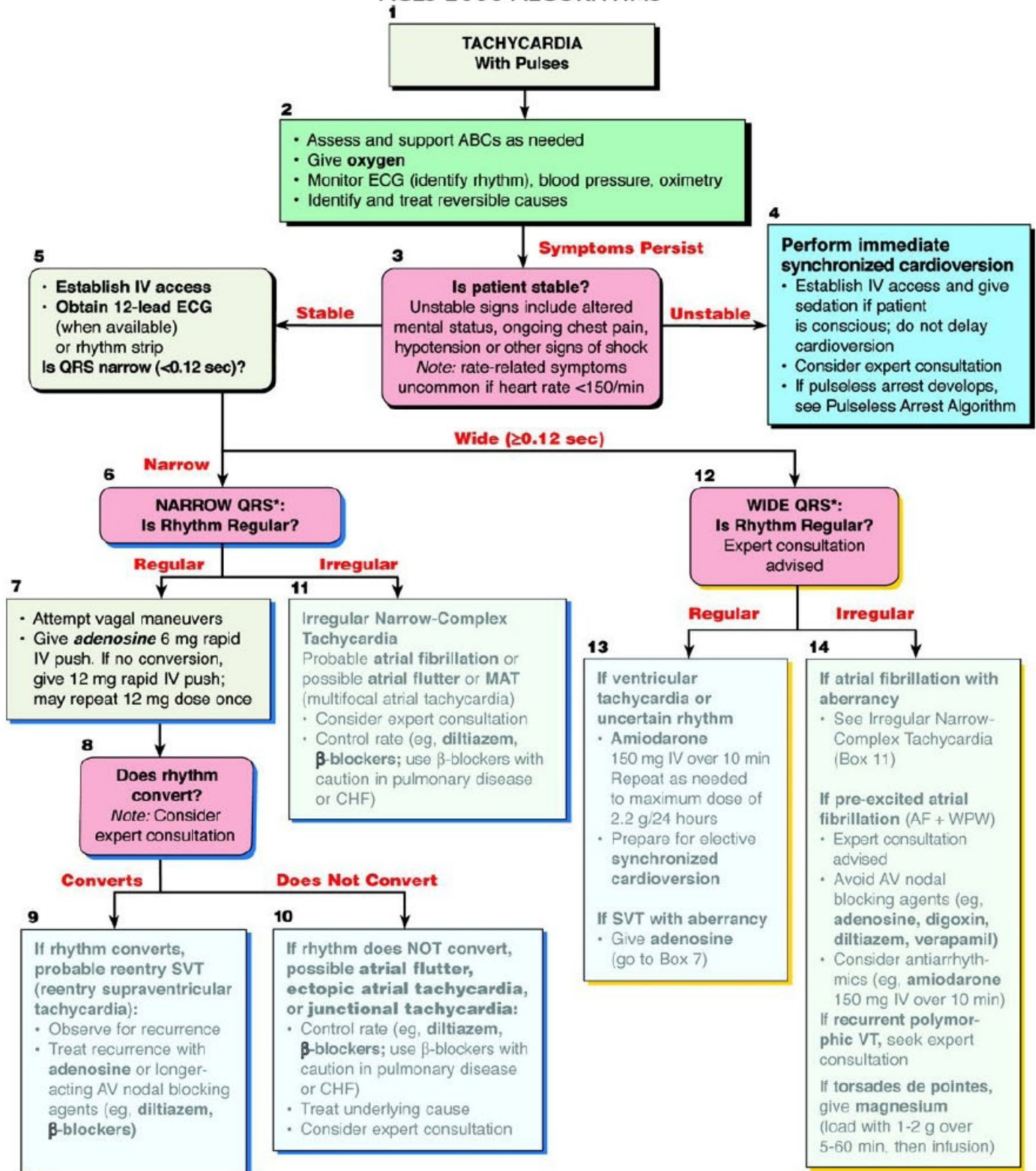
5

- Prepare for **transvenous pacing**
- Treat contributing causes
- Consider expert consultation

## Reminders

- If pulseless arrest develops, go to Pulseless Arrest Algorithm
- Search for and treat possible contributing factors:
  - Hypovolemia
  - Hypoxia
  - Hydrogen ion (acidosis)
  - Hypo-/hyperkalemia
  - Hypoglycemia
  - Hypothermia
  - Toxins
  - Tamponade, cardiac
  - Tension pneumothorax
  - Thrombosis (coronary or pulmonary)
  - Trauma (hypovolemia, increased ICP)

# ACLS 2006 ALGORITHMS



**\*Note:** If patient becomes unstable, go to Box 4.

### During Evaluation

- Secure, verify airway and vascular access when possible
- Consider expert consultation
- Prepare for cardioversion

### Treat contributing factors:

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

# ACLS 2006 ALGORITHMS

1

**Chest discomfort suggestive of ischemia**

2

**EMS assessment and care and hospital preparation:**

- Monitor, support ABCs. Be prepared to provide CPR and defibrillation
- Administer **oxygen, aspirin, nitroglycerin, and morphine** if needed
- If available, obtain 12-lead ECG; if ST-elevation:
  - Notify receiving hospital with transmission or interpretation
  - Begin fibrinolytic checklist (Figure 2)
- Notified hospital should mobilize hospital resources to respond to STEMI

3

<p><b>Immediate ED assessment (&lt;10 min)</b></p> <ul style="list-style-type: none"> <li>• Check vital signs; evaluate oxygen saturation</li> <li>• Establish IV access</li> <li>• Obtain/review 12-lead ECG</li> <li>• Perform brief, targeted history, physical exam</li> <li>• Review/complete fibrinolytic checklist (Figure 2); check contraindications (Table 1)</li> <li>• Obtain initial cardiac marker levels, initial electrolyte and coagulation studies</li> <li>• Obtain portable chest x-ray (&lt;30 min)</li> </ul>	<p><b>Immediate ED general treatment</b></p> <ul style="list-style-type: none"> <li>• Start <b>oxygen</b> at 4 L/min; maintain O<sub>2</sub> sat &gt;90%</li> <li>• <b>Aspirin</b> 160 to 325 mg (if not given by EMS)</li> <li>• <b>Nitroglycerin</b> sublingual, spray, or IV</li> <li>• <b>Morphine</b> IV if pain not relieved by nitroglycerin</li> </ul>
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4

**Review initial 12-lead ECG**

5

**ST elevation or new or presumably new LBBB; strongly suspicious for injury**  
**ST-Elevation MI (STEMI)**

6

**Start adjunctive treatments as indicated (see text for contraindications)**  
Do not delay reperfusion

- **β-Adrenergic receptor blockers**
- **Clopidogrel**
- **Heparin** (UFH or LMWH)

7

**Time from onset of symptoms ≤12 hours?**

≤12 hours

8

**Reperfusion strategy:**  
Therapy defined by patient and center criteria (Table 2)

- **Be aware of reperfusion goals:**
  - **Door-to-balloon inflation (PCI)** goal of 90 min
  - **Door-to-needle (fibrinolysis)** goal of 30 min
- **Continue adjunctive therapies and:**
  - **ACE inhibitors/angiotensin receptor blocker (ARB)** within 24 hours of symptom onset
  - **HMG CoA reductase inhibitor** (statin therapy)

9

**ST depression or dynamic T-wave inversion; strongly suspicious for ischemia**  
**High-Risk Unstable Angina/ Non-ST-Elevation MI (UA/NSTEMI)**

10

**Start adjunctive treatments as indicated (see text for contraindications)**

- **Nitroglycerin**
- **β-Adrenergic receptor blockers**
- **Clopidogrel**
- **Heparin** (UFH or LMWH)
- **Glycoprotein IIb/IIIa inhibitor**

11

**Admit to monitored bed**  
**Assess risk status (Tables 3, 4)**

12

**High-risk patient (Tables 3, 4 for risk stratification):**

- Refractory ischemic chest pain
- Recurrent/persistent ST deviation
- Ventricular tachycardia
- Hemodynamic instability
- Signs of pump failure
- **Early invasive strategy**, including catheterization and revascularization for shock within 48 hours of an AMI

**Continue ASA, heparin, and other therapies as indicated.**

- **ACE inhibitor/ARB**
- **HMG CoA reductase inhibitor** (statin therapy)

Not at high risk: cardiology to risk-stratify

13

**Normal or nondiagnostic changes in ST segment or T wave**  
**Intermediate/Low-Risk UA**

14

**Develops high or intermediate risk criteria (Tables 3, 4) OR troponin-positive?**

Yes

15

**Consider admission to ED chest pain unit or to monitored bed in ED**  
**Follow:**

- Serial cardiac markers (including troponin)
- Repeat ECG/continuous ST segment monitoring
- Consider stress test

16

**Develops high or intermediate risk criteria (Tables 3, 4) OR troponin-positive?**

Yes

17

**If no evidence of ischemia or infarction, can discharge with follow-up**

# ACLS 2006 ALGORITHMS

## CHEST PAIN CHECKLIST FOR STEMI FIBRINOLYTIC THERAPY

**Step One:**

Has patient experienced chest discomfort for greater than 15 minutes and less than 12 hours?

YES

NO

Does ECG show STEMI or new or presumably new LBBB?

YES

NO

STOP

**Step Two:**

Are there contraindications to fibrinolysis?  
If **ANY** of the following is CHECKED **YES**, fibrinolysis **MAY** be contraindicated.

Systolic BP greater than 180 mm Hg	<input type="radio"/> YES	NO
Diastolic BP greater than 110 mm Hg	<input type="radio"/> YES	NO
Right vs. left arm systolic BP difference greater than 15 mm Hg	<input type="radio"/> YES	NO
History of structural central nervous system disease	<input type="radio"/> YES	NO
Significant closed head/facial trauma within the previous 3 months	<input type="radio"/> YES	NO
Recent (within 6 wks) major trauma, surgery (including laser eye surgery), GI/GU bleed	<input type="radio"/> YES	NO
Bleeding or clotting problem or on blood thinners	<input type="radio"/> YES	NO
CPR greater than 10 minutes	<input type="radio"/> YES	NO
Pregnant female	<input type="radio"/> YES	NO
Serious systemic disease (eg, advanced/terminal cancer, severe liver or kidney disease)	<input type="radio"/> YES	NO

**Step Three:**

Is patient at high risk?  
If **ANY** of the following is CHECKED **YES**, CONSIDER Transport/ Transfer to PCI Facility

Heart rate greater than or equal to 100 bpm <b>AND</b> systolic BP less than 100 mm Hg	<input type="radio"/> YES	NO
Pulmonary edema (rales)	<input type="radio"/> YES	NO
Signs of shock (cool, clammy)	<input type="radio"/> YES	NO
Contraindications to fibrinolytic therapy	<input type="radio"/> YES	NO

**TABLE 1. Fibrinolytic Therapy: Contraindications and Cautions for Fibrinolytic Use in STEMI From ACC/AHA 2004 Guideline Update\***

**Absolute Contraindications**

- Any prior intracranial hemorrhage
- Known structural cerebral vascular lesion (eg, AVM)
- 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)<sup>†</sup>
- 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

AVM indicates arteriovenous malformation; SBP, systolic blood pressure; DBP, diastolic blood pressure; and INR, International Normalized Ratio.

\*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.

## ACLS 2006 ALGORITHMS

**TABLE 2. ST-Segment Elevation or New or Presumably New LBBB: Evaluation for Reperfusion**

**Step 1: Assess time and risk**

Time since onset of symptoms

Risk of STEMI

Risk of fibrinolysis

Time required to transport to skilled PCI catheterization suite

**Step 2: Select reperfusion (fibrinolysis or invasive) strategy**

*Note:* If presentation <3 hours and no delay for PCI, then no preference for either strategy.

**Fibrinolysis is generally preferred if:**

- Early presentation ( $\leq 3$  hours from symptom onset)
- Invasive strategy is not an option (eg, lack of access to skilled PCI facility or difficult vascular access) or would be delayed
  - Medical contact-to-balloon or door-balloon >90 min
  - (Door-to-balloon) minus (door-to-needle) is >1 hour
- No contraindications to fibrinolysis

**An invasive strategy is generally preferred if:**

- Late presentation (symptom onset >3 hours ago)
- Skilled PCI facility available with surgical backup
  - Medical contact-to-balloon or door-balloon <90 min
  - (Door-to-balloon) minus (door-to-needle) is <1 hour
- Contraindications to fibrinolysis, including increased risk of bleeding and ICH
  - High risk from STEMI (CHF, Killip class is  $\geq 3$ )
  - Diagnosis of STEMI is in doubt

Modified from ACC/AHA 2004 Update Recommendations.<sup>112</sup>



# ACLS 2006 ALGORITHMS

1

Identify signs of possible stroke

2

## Critical EMS assessments and actions

- Support ABCs; give **oxygen** if needed
- Perform prehospital stroke assessment (Tables 1 and 2)
- Establish time when patient last known normal (*Note:* therapies may be available beyond 3 hours from onset)
- Transport; consider triage to a center with a stroke unit if appropriate; consider bringing a witness, family member, or caregiver
- Alert hospital
- Check glucose if possible

NINDS  
TIME  
GOALS



3

## Immediate general assessment and stabilization

- Assess ABCs, vital signs
- Provide **oxygen** if hypoxemic
- Obtain IV access and blood samples
- Check glucose; treat if indicated
- Perform neurologic screening assessment
- Activate stroke team
- Order emergent CT scan of brain
- Obtain 12-lead ECG



4

## Immediate neurologic assessment by stroke team or designee

- Review patient history
- Establish symptom onset
- Perform neurologic examination (NIH Stroke Scale or Canadian Neurologic Scale)



5

Does CT scan show any hemorrhage?

No Hemorrhage

Hemorrhage

6

## Probable acute ischemic stroke; consider fibrinolytic therapy

- Check for fibrinolytic exclusions (Table 3)
- Repeat neurologic exam: are deficits rapidly improving to normal?

7

Consult neurologist or neurosurgeon; consider transfer if not available

8

Patient remains candidate for fibrinolytic therapy?

Not a Candidate

9

Administer aspirin

ED Arrival  
60 min

10

## Review risks/benefits with patient and family: If acceptable —

- Give **tPA**
- No anticoagulants or antiplatelet treatment for 24 hours

11

- Begin stroke pathway
- Admit to stroke unit if available
- Monitor BP; treat if indicated (Table 4)
- Monitor neurologic status; emergent CT if deterioration
- Monitor blood glucose; treat if needed
- Initiate supportive therapy; treat comorbidities