2011

ACLS Study Guide

Critical Care Training Center

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Course Overview

This study guide is an outline of content that will be taught in the American Heart Association Accredited Advance Cardiac Life Support (ACLS) Course. It is intended to summarize important content, but since all ACLS content cannot possibly be absorbed in a class given every two years, it is expected that the student will have the 2010 Updated ECC Handbook readily available for review as a reference. The student is also required to have the AHA ACLS Textbook available for reference and study for more in depth content.

Critical Concepts – High Quality CPR

- Compress the chest hard and fast
- Allow complete chest recoil after each compression
- Minimize interruptions in compressions (10 seconds or less)
- Switch providers about every 2 minutes to avoid fatigue
- Avoid excessive ventilation

Evidence Based Updates

Approximately every 5 years the AHA updates the guidelines for CPR and Emergency Cardiovascular Care. These updates are necessary to ensure that all AHA courses contain the best information and recommendations that can be supported by current scientific evidence experts from outside the United States and outside the AHA. The guidelines were then classified as to the strength of evidence that supports the recommendation.

The BLS Survey

C – A - B

	Assess	Assessment Technique and Action
1	Check Responsiveness	• Tap and shout, "Are you all right?" • Check for absent or abnormal breathing (no breathing or only gasping) by looking at or scanning the chest for movement (about 5 to 10 seconds)
2	Activate the Emergency Response System /get AED	• Activate the emergency response system and get an AED if one is available or send someone to activate the emergency response system and get an AED or defibrillator

3	Circulation	• Check the carotid pulse for 5 to 10 seconds
		• If no pulse within 10 seconds, start CPR (30:2) beginning with chest compressions
		  • Compress the center of the chest (lower half of the sternum) hard and fast with at least 100 compressions per minute at a depth of at least 2 inches
		  • Allow complete chest recoil after each compression
		  • Minimize interruptions in compressions (10 seconds or less)
		  • Switch providers about every 2 minutes to avoid fatigue
		  • Avoid excessive ventilation
		• If there is a pulse, start rescue breathing at 1 breath every 5 to 6 seconds (10 to 12 breaths per minute). Check pulse about every 2 minutes.

4	Defibrillation	• If no pulse, check for a shockable rhythm with an AED/defibrillator as soon as it arrives • Provide shocks immediately with CPR, beginning with compressions

The ACLS Survey

For unconscious patients in arrest (cardiac or respiratory):

- Healthcare providers should conduct the ACLS Survey after completing the BLS survey.

For conscious patients who may need more advanced assessment and management technique:

- Health providers should conduct the ACLS Survey first.

An important component of this survey is the differential diagnosis, where identification and treatment of the underlying causes may be critical to patient outcome.

Effective Resuscitation Team Dynamics

Role of the Team Leader – is multifaceted. The team leader

- Organizes the group
- Monitors individual performance of team members
- Back up team members
- Models excellent team behavior
- Trains and coaches
- Facilitates understanding
- Focuses on comprehensive patient care

Role of Team Member – must be proficient in performing the skills authorized by their scope of practice.

- Clear about role assignment
- Prepared to fulfill their role responsibilities
- Well practiced in resuscitation skills
- Knowledgeable about the algorithms
- Committed to success

- **Closed – Loop Communications** – When communicating with resuscitation team members, the team leader should use closed – loop communication by taking these steps
  - The team leader gives a message, order, or assignment to a team member
  - By receiving a clear response and eye contact, the team leader confirms that the team member heard and understood the message
  - The team leader listens for confirmation of task performance from the team before assigning another task.
- **Clear Messages** – Clear messages consist of concise communication spoke with distinctive speech in a controlled tone of voice. All healthcare providers should deliver messages and order in a calm and direct manner without yelling or shouting. Unclear communication can lead to unnecessary delays in treatment or to medication errors.
- **Clear Roles and Responsibilities** – Every member of the team should know his or her role and responsibilities. Just as different shaped pieces make up a jigsaw puzzle, each team member's role is unique and critical to the effective performance of the team. When roles are unclear, team performance suffers. Signs of unclear roles include:
  - Performing the same task more than once
  - Missing essential tasks
  - Freelancing of team members

- **Knowing One's Limitations** – Not only should everyone on the team know his or her own limitations and capabilities, but the team leader should also be aware of them. This allows the team leader to evaluate team resources and call for backup of team members when assistance is needed.
- **Knowledge Sharing** – Sharing information is a critical component of effective team performance. Team leaders may become trapped in a specific treatment of diagnostic approach; this common human error is called a fixation error.
- **Constructive Intervention** – During a resuscitation attempt the team leader or a team member may need to intervene if an action that is about to occur may be inappropriate at the time. Although constructive intervention is necessary, it should be tactful.
- **Reevaluation and Summarizing** – An essential role of the team leader is monitoring and reevaluating
    - The patient's status
    - Interventions that have been performed
    - Assessment findings.
- **Mutual Respect** - The best teams are composed of members who share a mutual respect for each other and work together in a collegial, supportive manner. To have a high-performing team, everyone must abandon ego and respect each other during the resuscitation attempt, regardless of any additional training or experience that the team leader or specific team member may have.

System of Care

Medical Emergency Teams (METs) and Rapid Response Teams (RRTs)

- Many hospitals have implemented the use of METs or RRTs. The purpose of these teams is to improve patient outcomes by identifying and treating early clinical deterioration. In-hospital cardiac arrest is commonly preceded by physiologic changes. In one study nearly 80% of hospitalized patients with cardiorespiratory arrest had abnormal vital signs documented for up to 8 hours before the actual arrest. Many of these changes can be recognized by monitoring routine vital signs. Intervention before clinical deterioration or cardiac arrest may be possible.
- Consider this question: "Would you have done anything differently if you knew 15 minutes before the arrest that ….?"

Immediate Coronary Reperfusion with PCI

- Following ROSC, rescuers should transport the patient to a facility capable of reliably providing coronary reperfusion and other goal directed postarrest care therapies. The decision to perform PCI can be made irrespective of the presence of coma or the decision to induce hypothermia, because concurrent PCI and hypothermia are reported to be feasible and safe and have good outcomes.

The ACLS Survey

Airway Management in Respiratory Arrest – If bag-mask ventilation is adequate, providers may defer insertion of an advanced airway Healthcare providers should make the decision to place an advanced airway during the ACLS Survey.

Advanced airway equipment includes the laryngeal mask airway, the laryngeal tube, the esophageal-tracheal tube and the ET tube. If it is within your scope of practice, you may use advanced airway equipment in the course when appropriate and available.

Basic Airway Adjuncts: Oropharyngeal Airway

The OPA is used in patients who are at risk for developing airway obstruction from the tongue or from relaxed upper airway muscle. This J-shaped device fits over the tongue to hold it and the soft hypopharyngeal structures away from the posterior wall of the pharynx.

The OPA is used in unconscious patients if procedures to open the airway fail to provide and maintain a clear, unobstructed airway. An OPA should not be used in a conscious or semiconscious patient because it may stimulate gagging and vomiting. The key assessment is to check whether the patient has an intact cough and gag reflex. If so, do not use an OPA.

Selecting the proper size OPA

Place the OPA against the side of the face. When the tip of the OPA is at the corner of the mouth, the flange is at the angle of the mandible. A properly sized and inserted OPA results in proper alignment with the glottis opening.

Basic Airway Adjuncts: Nasopharyngeal Airway

The NPA is used as an alternative to an OPA in patients who need a basic airway management adjunct. The NPA is a soft rubber or plastic uncuffed tube that provides a conduit for airflow between the nares and the pharynx.

Unlike oral airway, NPAs may be used in conscious or semiconscious patients (patients with an intact cough and gag reflex). The NPA is indicated when insertion of an OPA is technically difficult or dangerous.

Suctioning

Suctioning is an essential component of maintaining a patient's airway. Providers should suction the airway immediately if there are copious secretions, blood, or vomit.

Quantitative waveform capnography (if PETCO2 is <10mm Hg, attempt to improve CPR quality)

Monitor the patient's heart rate, pulse oxygen saturation, and clinical appearance during suctioning. If bradycardia develops, oxygen saturation crops, or clinical appearance deteriorates, interrupt suctioning at once. Administer high-

flow oxygen until the heart rate return to normal and clinical condition improves. Assist ventilation as needed.

Suctioning attempted should not exceed 10 seconds. To avoid hypoxemia, precede and follow suctioning attempts with a short period of administration of 100% oxygen.

Cricoid pressure in nonarrest patients may offer some measure of protection to the airway from aspiration and gastric insufflation during bag-mask ventilation. However, it also may impede ventilation and interfere with placement of a supraglottic airway or intubation.

Cricoid Pressure is NOT recommended

Providing Ventilation with an Advanced Airway

Selection of an advanced airway device depends on the training, scope of practice, and equipment of the providers on the resuscitation team. Advanced Airway includes:

- **Laryngeal mask airway** – is an advanced airway alternative to endotracheal intubation and provides comparable ventilation. It is acceptable to use the laryngeal ask airway as an alternative to an ET tube for airway management in cardiac arrest.
- **Laryngeal tube** – The advantages of the laryngeal tube are similar to those of the esophageal-tracheal tube; however, the laryngeal tube is more compact and less complicated to insert.
- **Esophageal-tracheal tube** – The esophageal-tracheal tube is an advanced airway alternative to endotracheal intubation. This device provides adequate ventilation comparable to an ET tube.
- **Endotracheal tube** – A brief summary of the basic steps for performing endotracheal intubation is given here to familiarize the ACLS provider who may assist with the procedure.
  - Prepare for intubation by assembling the necessary equipment
  - Perform endotracheal intubation
  - Inflate cuff or cuffs on the tube
  - Attach the ventilation bag
  - Confirm correct placement by physical examination of a confirmation device. Continues waveform capnography is recommended (in addition to clinical assessment) as the most reliable method of confirming and monitoring correct placement of an ET tube.
  - Secure the tube in place
  - Monitor for displacement

If the AED does not promptly analyze the rhythm, do the following:

- Resume high-quality chest compressions and ventilations
- Check all connections between the AED and the patient to make sure that they are intact.
- NEVER delay chest compressions to troubleshoot the AED

Purpose of Defibrillation

Defibrillation does not restart the heart. Defibrillation stuns the heart and briefly terminates all electrical activity, including VF and VT. If the heart is still viable, its normal pacemaker may eventually resume electrical activity (return of spontaneous rhythm) that ultimately results in a perfusing rhythm (ROSC).

Principle of Early Defibrillation

The earlier defibrillation occurs, the higher the survival rate. When VF is present, CPR can provide a small amount of blood flow to the heart and brain but cannot directly restore an organized rhythm. The likelihood of restoring a perfusing rhythm is optimized with immediate CPR and defibrillation within a few minutes of the initial arrest.

Restoration of a perfusing rhythm requires immediate CPR and defibrillation within a few minutes of the initial arrest.

Delivering Shock

The appropriate energy dose is determined by the identity of the defibrillator – monophasic or biphasic.

If you are using a monophasic defibrillator, give a single 360-J shock. Use the same energy dose of subsequent shocks.

Biphasic defibrillators use a variety of waveforms, each of which is effective for terminating VF over a specific dose range. When using biphasic defibrillators, providers should use the manufacturer's recommended energy dose (eg, initial dose of 120 to 200 J). Many biphasic defibrillator manufacturers display the effective energy dose range on the face of the device.

To minimize interruptions in chest compressions during CPR, continue CPR while the defibrillator is charging. Immediately after the shock, resume CPR, beginning with chest compressions. Give 2 minutes (about 5 cycles) of CPR. A cycle consists of 30 compressions followed by 2 ventilations in the patient without an advanced airway.

Synchronized vs. Unsynchronized Shocks

Synchronized

- cardioversion uses a sensor to deliver a shock that is synchronized with a peak of the QRS complex
- Synchronized cardioversion uses a lower energy level than attempted defibrillation.
- When to use synchronized shock
  - Unstable SVT
  - Unstable Atrial Fibrillation
  - Unstable Atrial Flutter
  - Unstable regular monomorphic tachycardia with pulse

Foundational Facts:

- Be sure oxygen is not flowing across the patients' chest when delivering shock

The pause in chest compressions to check the rhythm should not exceed 10 seconds

- Perform a pulse check – preferably during rhythm analysis – only if an organized rhythm is present.

After you have completed your first 2 minute period of CPR, have a team member attempt to palpate a carotid pulse.

- If the PETCO2 is <10 mm Hg during CPR, it is reasonable to try to improve chest compressions and vasopressor

Unsynchronized

- Means that the electrical shock will be delivered as soon as the operator pushes the SHOCK button to discharge the device.
- May fall randomly anywhere within the cardiac cycle.
- When to use Unsynchronized Shocks
    - For a patient who is pulseless
    - For a patient demonstrating clinical deterioration (in prearrest), such as those with severe shock or polymorphine VT, you think a delay in converting the rhythm will result in cardiac arrest.
    - When you are unsure whether monomorphic or polymorphic VT is present in the unstable patient.

Routes of Access for Drugs

Historically in ACLS, providers have administered drugs via either the IV or endotracheal route. Endotracheal absorption of drugs is poor and optimal drug dosing is not known. For this reason, the IO route is preferred when IV access is not available. Priorities for vascular access are:

- IV Route – A peripheral IV is preferred for drug and fluid administration unless central line access is already available. Central line access is not necessary during most resuscitation attempts.
- IO Route – Drugs and fluids during resuscitation can be delivered safely and effectively via the IO route if IV access is not available. Important points about IO access are:

ACLS Algorithm Review

Always start with the **Primary ABCD** survey!

Acute Coronary Syndromes (ACS) (pg. 91)

1. Remember **MONA** for patients with suspected ACS (angina or AMI)…but in the order Oxygen, Aspirin, Nitroglycerine, Morphine.
2. Assess patient's hemodynamic status…*IV- O_2 - Monitor*

   Morphine – give 1 - 5 mg IV only if symptoms not relieved by nitrates or if symptoms recur.

   Oxygen – 4L/min nasal cannula, titrate as needed.

   Nitroglycerine – Use SL or spray form 0.3 – 0.4 mg x 2 at 3 – 5 minute intervals. Contraindicated if SBP <90 mm Hg. Contraindicated in patients who have used phosphodiesterase inhibitor for erectile dysfunction (e.g. sildenafil and vardenafil within 24 hours; tadalafil within 48 hours).

   Aspirin – give 160 – 325 mg to chew if no known true aspirin allergy. Avoid enteric coated aspirin

Bradycardia (HR <60/min symptomatic) (pg. 104)

1. Remember **A**ll **T**rained **D**ogs **E**at. for patients with suspected ACS (angina or AMI)…but in the order Oxygen, Aspirin, Nitro, Morphine.
2. Assess patient's hemodynamic status…*IV, O_2, Monitor*

   Atropine – give 0.5 mg IVP for Sinus Bradycardia and 1°, 2° Type I AV Block.

   Transcutaneous Pacing – preferred for 2° Type II and 3° HB. DO NOT DELAY pacing in symptomatic patients!

   Dopamine – give 2 – 10 mcg/kg/min if patient unresponsive to atropine/pacing.

   Epinephrine drip – give 2 – 20 mcg/min if patient unresponsive to atropine/pacing.

   NOTE: Atropine is not indicated for 2° Type II and 3° HB. Proceed directly to pacing.

Tachycardia with Pulses (HR >100/min symptomatic) (pg. 124)

1. Remember if the patient is **unstable**, provide **immediate synchronized cardioversion**. *Is the patient's tachycardia producing hemodynamic instability and serious signs and symptoms? or are the signs and symptoms (e.g., pain and distress of an AMI) producing the tachycardia?*
2. Assess patient's hemodynamic status…*IV, O_2, Monitor*
   - **Heart rates between 100 -130/min** are usually the result of an underlying process and often represent sinus tachycardia. In sinus tachycardia the goal is to identify and treat the underlying systemic cause.
   - **Heart rates >150/min** may be symptomatic; the higher the rate the more likely symptoms are due to the tachycardia.

   Regular Narrow Complex Tachycardia (probable SVT)

   - Attempt vagal maneuvers.
   - Obtain 12-Lead ECG; consider expert consultation.
   - Adenosine 6 mg rapid IVP. If no conversion, give 12 mg IVP (2nd dose). May attempt 12 mg IVP once. (Adenosine may cause bronchospasm; therefore, adenosine should not be given to patients with asthma).

   Irregular Narrow Complex Tachycardia (probable A-Fib)

   - Obtain 12-Lead ECG; consider expert consultation.
   - Control rate with Diltiazem (15 – 20 mg (0.25 mg/kg) IV over 2 mins.) or B-blockers.

   NOTE: Concurrent IV administration with IV B-blockers can cause severe hypotension.

   Regular Wide Complex Tachycardia (probable V-Tach)

   - Obtain 12-Lead ECG; consider expert consultation.
   - Convert rhythm using Amiodarone 150 mg over 10 minutes.
   - Elective cardioversion.

> If at any point you become uncertain or uncomfortable during the treatment of a stable patient, seek expert consultation. The treatment of stable patients may awake expert consultation because treatment has the potential for harm.

Irregular Wide Complex Tachycardia

- Obtain 12-Lead ECG; consider expert consultation.
- Consider anti-arrhythmic
- If Torsades de pointes, give Magnesium Sulfate (1 – 2 mg IV over 5-60 mins.)

NOTE: Synchronized cardioversion is appropriate for treating wide-complex tachycardia of unknown type. Prepare for synchronized cardioversion as soon as a side-complex tachycardia is detected.

Ventricular Fibrillation/Pulseless Ventricular Tachycardia

(Pulseless Arrest - Shockable) (pg. 49)

1. Remember good ACLS starts with good BLS!
2. Assess patient's hemodynamic status…ABCD, *IV, O_2, Monitor*
3. Start **CPR** immediately ***"Push Hard and Push Fast!"*** (*at least 100 compressions per minute at a depth of at least 2 inches)*
4. Analyze rhythm, **SHOCK** if in VF/Pulseless VT. *(When VF is presents, CPR can provide a small amount of blood flow to the heart and brain but cannot directly restore an organize rhythm).*
5. Resume **CPR** immediately after shock – DO NOT Delay to check pulse or analyze rhythm! Provide 5 cycles/2 minutes of CPR.
6. **Prepare Vasopressor** – Epinephrine 1 mg q 3 – 5 mins. Or Vasopressin 40 units (can replace 1st or 2nd dose of Epi with 40 u of Vasopressin x1).
7. Reanalyze rhythm, **SHOCK** if in VF/Pulseless VT.
8. Resume **CPR** immediately! Continue for 5 cycles/2 minutes. **Give Vasopressor** as soon as possible after resuming CPR, circulates with chest compressions. **Prepare Antiarrhythmic** (Amiodarone 300 mg or Lidocaine 1 – 1.5 mg/kg).
9. Reanalyze rhythm, **SHOCK** if in VF/Pulseless VT.
10. Resume **CPR** immediately! Continue for 5 cycles/2 minutes. **Give Antiarrhythmic** – Amiodarone 300 mg IV/IO or Lidocaine 1 – 1.5 mg/kg up to 3 mg/kg.
11. Reanalyze rhythm, **SHOCK** if in VF/Pulseless VT.
12. Resume **CPR** immediately! Continue for 5 cycles/2 minutes.

NOTE: *Minimize interruptions to chest compressions to less than 10 seconds*! DO NOT check pulse or analyze heart rhythm after a shock. *Resume CPR immediately after a shock and continue for 5 cycles prior to rhythm analysis and pulse check.* After a second dose of Epinephrine (or 1x dose Vasopressin), a second antiarrhythmic dose (Amiodarone 150 mg or Lidocaine 0.5 – 0.75 mg/kg) may be given after the rhythm check.

If the AED does not promptly analyze the rhythm resume high-quality chest compression and ventilations.

End-Tidal CO_2

- If the $PETCO_2$ is <10mm Hg during CPR, it is reasonable to try to improve chest compressions and vasopressor therapy.
- If the $PETCO_2$ abruptly increases to a normal value of 35 to 40 mm Hg, it is reasonable to consider this an indicator of ROSC.

Ventilation

- Avoid excessive ventilation of the patient (do not ventilate too fast or too much). Providers may begin ventilations at 10 to 12 breaths per minute and titrate to achieve a $PETCO_2$ of 35 to 40 mm Hg or a $PACO_2$ of 40 to 45 Hg.
- Excessive ventilation may potentially lead to adverse hemodynamic effects when intrathoracic pressures are increased and because of potential decreases in cerebral blood flow when $PACO_2$ decreases.
- The use of quantitative capnography in intubated patients allows for monitoring of CPR quality.

Pulseless Electrical Activity (Pulseless Arrest – Not Shockable) (pg. 78)

- Remember **PEA**
  - **P**roblems – consider the possible causes (H's & T's)
  - **E**pinephrine – 1 mg q 3 – 5 mins (can replace 1st or 2nd dose of Epi with Vasopressin 40 units x1)

NOTE: In PEA the electrical system of the heart is functioning, but there is a problem with the pump, pipe, or volume – a mechanical part of the system is not working. Consider the 6 H's and 5 T's as the most common reversible causes.

- **IV/IO** access is a priority over advanced airway management unless bag-mask ventilation is ineffective or the arrest is caused by hypoxia
-

Asystole (Pulseless Arrest – Not Shockable) (pg. 86)

DNR? – determine whether to initiate resuscitation.

- During the BLS survey and ACLS Survey, you should be aware of reasons to stop or withhold resuscitative efforts. Some of these are:
  - Rigor Mortis
  - Indicators of DNR status (eg. Bracelet, anklet, written documentation)

Epinephrine – 1 mg q 3 – 5 mins (can replace 1st or 2nd dose of Epi with Vasopressin 40 units x1)

Differential Diagnosis or Discontinue resuscitation – Consider the H's and T's, check blood glucose, core temperature, Naloxone, etc…

FYI 2010 Guidelines

NO ATROPINE DURING ASYSTOLE or PEA

Although there is no evidence that atropine has a detrimental effect during bradycaradic or asystolic cardiac arrest, routine use of atropine during PEA or asystole is unlikely to have a therapeutic benefit. The AHA removed atropine from the Cardiac Arrest Algorithm.

Interruption of chest compression to conduct a rhythm check should not exceed 10 seconds.

Available scientific studies demonstrate that in the absence of mitigating factors, prolonged resuscitative efforts are unlikely to be successful. The final decision to stop resuscitative efforts can never be as simple as an isolated time interval.

Confirming Asystole

- Give priority to IV/IO access. Do not routinely insert an advanced airway unless ventilations with a bag mask are ineffective. Do not interrupt CPR while establishing IV or IO access.

Application of the Immediate Post-Cardiac Arrest Care Algorithm

To protect the brain and other organs, the resuscitation team should induce therapeutic hypothermia in adult patients who remain comatose (lack of meaningful response to verbal commands) with ROSC after out-of-hospital VF Cardiac Arrest.

- Healthcare provider should cool patients to a target temperature of 32C to 34 C for a period of 12 to 24 hours.
- In comatose patients who spontaneously develop a mild degree of hypothermia (>32C) after resuscitation from cardiac arrest, avoid active rewarming during the first 12 to 24 hours after ROSC.
- Therapeutic hypothermia is the only intervention demonstrated to improve neurologic recovery after cardiac arrest.
- Induced hypothermia should not affect the decision to perform PCI, because concurrent PCI and hypothermia are reported to be feasible and safe.

ACUTE STROKE

It refers to acute neurologic impairment that follows interruption in blood supply to a specific area of the brain.

Two types of Strokes

- Ischemic Stroke – accounts for 87% of all strokes and is usually caused by an occlusion of an artery to a region of the brain
- Hemorrhagic Stroke – accounts for 13% of all strokes and occurs when a blood vessel in the brain suddenly raptures into the surrounding tissue.

ALL PATIENTS ARE CONSIDERED NPO

Before giving anything (medication or food) by mouth, you **MUST** perform bedside swallow screening.

The goal of stroke care is to minimize brain injury and maximize the patient's recovery.

- Rapid Recognition and reaction to stroke warning signs
- Rapid EMS dispatch
- Rapid EMS system transport and prearrival notification to the receiving hospital
- Rapid diagnosis and treatment in the hospital

Foundational Facts The 8D's of Stroke Care	The 8 D's of Stroke Care highlight the major steps of diagnosis and treatment of stroke and key points at which delays can occur: • **Detection:** Rapid recognition of stroke systems • **Dispatch:** Early activation and dispatch of EMS by 911 • **Delivery:** Rapid EMS identification, management, and transport • **Door:** Appropriate triage to stroke center • **Data:** Rapid triage, evaluation, and management within the ED • **Decision:** Stroke expertise and therapy selection • **Drug:** Fibrinolytic therapy, intra-arterial strategies • **Disposition:** Rapid admission to the stroke unit or critical Care Unit

Patients with stroke who require hospitalization should be admitted to a stroke unit when a stroke unit with a multidisciplinary team experienced in managing stroke is available within a reasonable transport interval.

The goal of the stroke team, emergency physician, or other experts should be to assess the patient with suspected stroke within 10 minutes of arrival in the ED: "TIME IS BRAIN"

The CT scan should be completed within 25 minutes of the patient's arrival in the ED and should be read within 45 minutes from performance: "TIME IS BRAIN"

Cincinnati Prehospital Stroke Scale

Test	Findings
Facial Droop: Have patient show teeth or smile	**Normal –** Both sides of face move equal **Abnormal –** one side of face does not move as well as the other side
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.
Abnormal Speech: Have 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%. The presence of all 3 findings indicate that the probability of stroke is >85%.	

Credits:

All diagram and lingo taken from American Heart Association textbooks: ACLS for Healthcare Providers 2010)