Advanced Cardiac Life Support

Advanced Provider Overview

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References

- Currents in Emergency Cardiovascular Care(Winter 2005-2006)
- Circulation 2005;112:IV-1-IV-5) © American Heart Association

Basic Life Support

- Importance of Coronary Perfusion Pressure
- 30:2 Compression/Ventilation Ratio
- Complete Chest Recoil
- No Interruptions
- No Hyperventilation (6-8 without perfusion: 10-12 with perfusion)

Basic Cardiac Life Support

- Advanced Airway
  - 100 Compressions/min
  - 6-8 Ventilations/min
  - Push fast – push hard
- Switch Providers at 2 Minutes

Successful Resuscitation

- Survival to discharge from facility with near normal neurological function
  - 10 minute recommendation
  - 30 minute guideline
  - Excluding special circumstances
- Worked to pronouncement or ROSC – no transport with CPR

Primary Survey

- Airway
- Breathing
- Circulation
- Defibrillation

Secondary Survey

- Airway – Adequate/Obstructed
  - Determine if advanced airway needed
- Breathing – confirm airway placement
  - Pneumothorax, flail chest, open chest wound
  - Air movement - oxygenation

Secondary Survey

- Circulation
  - IV access
  - Monitor – determine rhythm and required treatment
  - Fluids – if indicated

Secondary Survey

- Differential Diagnosis
  - Determine cause of arrest or pre-arrest state
  - Institute definitive care based upon diagnosis

Secondary Survey - Advanced

- Disability
  - Mental status (glascow coma scale – stroke scale if indicated)
- Expose
  - Completely expose patient, check for injuries, lesions, temperature
  - Check extremity pulses

Secondary Survey - Advanced

- Fingers – Foley – Flip
  - Rectal, vaginal exam
  - Pelvic injuries
  - Flip patient to check back
  - Identify evidence of trauma, pregnancy, sources of bleeding

Secondary Survey - Advanced

- Gastric Tube
  - Check aspirate for blood, ingested tablets, toxins
- History
  - Document
  - Question family, friends, EMS personnel

Quadrad Three

- Oxygen – Monitor – IV – Fluids
  - Identify hypoxia, symptomatic arrhythmias, hypovolemia, treat and evaluate response to therapy

Quadrad Four

- Temperature – Heart Rate – Blood Pressure – Respirations
  - Support as needed, consider vasoactive therapy; evaluate response and adjust therapy

Quadrad Five

- Tank (volume)
- Tank (resistance)
- Pump (Failure)
- Rate

Ventricular Fibrillation

- Witnessed – immediate defibrillation
- Unwitnessed – CPR 2 minutes
- Defibrillation
  - 360 joules if monophasic
  - 200 joules – biphasic
    - One Defibrillation Only – NO MORE STACKED SHOCKS

Ventricular Fibrillation

- 2 minutes of CPR – no rhythm or pulse check
- Epinephrine 1mg q 3-5 minutes
- Vasopressin 40 units (single dose)
- Defibrillation

Ventricular Fibrillation

- Amiodarone 300mg IV (can be repeated once at ½ dose)
- If unavailable – Lidocaine 1 to 1.5mg/kg; then half dose up to a maximum of 3 doses
- Defibrillation

Ventricular Fibrillation

- Consider Magnesium 1 to 2 grams
  - If prolonged QT interval with Torsades de Pointe arrest
  - Not routine administration

Ventricular Fibrillation

- Precordial Thump – not indicated
- Sodium Bicarbonate – no longer considered until ROSC with gases or special circumstances
- No routine fluid bolus

PEA/Asystole

- Asystole – confirmation of death; absent special circumstances – not survivable
- Pulseless Electrical Activity
  - True EMD
  - Psuedo EMD

PEA/Asystole

- 2 Minutes of CPR
- Vasopressor
  - Epinephrine 1mg q 3-5 minutes
  - Vasopressin 40 units IV Push
- Atropine 1mg IVP if Asystole or Bradycardia
- Fluid Bolus if Tachycardia

PEA Differential

- Hypovolemia
- Hypoxia
- Hydrogen Ion (Acidosis)
- Hypo/Hyperkalemia
- Hypothermia

PEA Differential

- Toxins
- Tamponade
- Tension Pneumothorax
- Thrombosis (Coronary or Pulmonary)
- Trauma

Bradycardia

- Arrhythmias Don't Kill – Heart Rate Does
- Assess for Adequate Perfusion
  - If adequate – monitor
  - If inadequate – intervene
    - Goal is increase in heart rate
    - Conversion is secondary

Bradycardia

- Atropine 0.5mg (to total of 3mg)
  - Note change in dosage
- Trancutaneous pacing
  - First line for High Degree AV blocks (Mobitz II and Third Degree)
- Consider Epinephrine (2-10mcgms/min) or Dopamine (2-10mcgms/min)
  - As a Bridge to definitive intervention only

Tachycardia - Unstable

- Narrow or Wide Complex
  - Immediate Cardioversion

Tachycardia – Narrow Complex

- Stable
- Regular Rhythm
  - Attempt Vagal Maneuvers
  - Adenosine 6mg IVP, 12mg, 12mg
    - Stopcock method
    - Extremely short half life

Tachycardia – Narrow Complex – Regular Rhythm

- Conversion with Adenosine
  - Probable Reentry SVT
  - Observe for recurrence
  - Treat recurrence with Adenosine
  - Long acting AV nodal blocking agent
    - Diltiazem, Beta Blockers

Tachycardia – Narrow Complex

- Does not Convert with Adenosine
- Possible Atrial Flutter, Atrial Tachycardia or Junctional Tachycardia
  - Control Rate (Diltiazem, Betal Blcokers)
  - Treat underlying cause
  - Consider EP Consult

Tachycardia – Narrow Complex Irregular Rhythm

- Probable Atrial Fibrillation, Flutter or MAT
  - Consider EP consult
  - Control Rate with Diltiazem, Beta Blockers

Tachycardia – Wide Complex Stable

- Regular Rhythm
  - Probable Ventricular Tachycardia
  - Treat with Amioderone 150mg IV over 10 minutes (repeat as needed to maximum of 2.2 grams in 24 hours)
  - Prepare for elective cardioversion
  - If SVT with Aberrance – treat with Adenosine

Tachycardia – Wide Complex Irregular Rhythm

- Probable Atrial Fibrillation with Aberrancy
  - Treat as if narrow complex tachycardia
- If pre-excited Atrial Fibrillation (AF + WPW)
  - EP Consult Advised
  - Avoid AV Nodal Blockers (Adenosine, Verpamil, Diltiazem, Digoxin)

Tachycardia – Wide Complex Irregular Rhythm

- Consider Amiodarone 150mg IV over 10 minutes
- If Torsades de Pointe, consider Magnesium 1-2 grams over 5 – 60 minutes.

Acute Coronary Syndromes

- ST Segment Elevation or new LBBB with Symptoms of AMI
  - High specificity for evolving STEMI; assess for reperfusion candidacy
- ST Depression
  - Consistent with strong suggestion of ischemia; high risk subset of patients with unstable angina

Acute Coronary Syndromes

- Non-diagnostic ECG
  - Further assessment required
  - Serial enzymes; repeat ECG
  - Consider other causes of chest pain: aortic dissection, pericarditis/myocarditis, pulmonary embolism

AMI Reperfusion Guidelines

- ECG within 10 minutes
- Door to drug time less than 30 minutes
- Door to balloon time less than 90 minutes

AMI Protocol

- Oxygen – IV Access – Continuous ECG Monitoring
- Reperfusion Therapy (PCI or fibrinolytics) for STEMI
- Prompt Aspirin – 160mg to 325mg for all patients
- Beta blockade for all patients without contraindication
- IV NTG for initial 24-48 hours with AMI and CHF, large AWMI, persistent ischemia or hypertension

Potential Adjunctive Therapy

- Beta Blockers
  - Decreases myocardial oxygen consumption
  - Increases myocardial salvage in area of infarction
  - Can reduce VT and fibrillation
  - Benefits: 23% reduction in long term mortality

Heparin

- All patients undergoing PCI or surgical revascularization
- All patient receiving fibrinolytics
- IV or SQ low molecular weight in patients with NSTEMI
- IV unfractionated heparin for patients at increased risk of systemic emboli (atrial fib, large anterior MI, LV thrombus)

ACE Inhibitors

- Early oral therapy reduces mortality and CHF associated with AMI
- Helps prevent adverse LV remodeling
- Delays progression of heart failure
- Decreases sudden death
- Decreases recurrent MI

Cardiac Markers

- Myoglobin 1-2 hours
- Cardiac troponins 3-12 hours
- CK-MB 3-12 hours

NSTEMI – Adjunctive Therapy

- Low molecular Weight Heparin
  - Inhibits thrombin
  - Predictable results
- IIb/IIIa Inhibitors
  - Reduction in death and MI
  - Major benefits realized when PCI is planned

NSTEMI – Adjunctive Therapy

- Plavix
  - 300mg loading dose in addition to aspirin
  - Can substitute for ASA if true allergy
- Statins
  - Reduces incidence of reinfarction, recurrent angina, rehospitalization and stroke when administered within a few days of symptom onset

Airway Management

- Advanced airway (intubation) may be deferred until ROSC
  - Particularly if Anesthesia Personnel not available
  - Increased complication when intubated by non-anesthesia personnel
  - Complications directly related to number of intubations performed