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STANDARD CARDIAC CARE

The following should be provided for all patients complaining of cardiac signs or symptoms, including but not limited to, chest pain, shortness of breath, dizziness, palpitations, indigestion or syncope:

**Assessment**
- Determine responsiveness.
- Perform Patient Assessment.
- Be alert for and treat for shock.
- Be alert for irregular pulse rhythm.
- Obtain and record vital signs every 5 minutes.
- Obtain pertinent medical history.
- SAMPLE - OPQRST
- Consider all other causes

<table>
<thead>
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<th>10 Step Cardiac Care</th>
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</thead>
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<tr>
<td>1 ABC’s</td>
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</tbody>
</table>

**Treatment:**
- **B Oxygen:** by cannula (2-6 L/min) or non-rebreather mask (10-15 L/min). Titrate to an SpO2 of ≥ 94%.
  - Position of comfort. Reassure patient.
  - Pulse oximetry.
  - Be prepared for AED use.
- **I85** Initiate IV of NS at TKO rate or saline lock.
- **A Cardiac Monitor.**
- **P**
  - If the patient has chest pain, use Guideline for Suspected Myocardial Infarction.
  - If the patient has a dysrhythmia, use the appropriate guideline.
  - Consider all other causes of the problem

ACUTE CARDIOVASCULAR EMERGENCIES

**General Definitions**
- **Stable:** Awake, alert, BP greater than 90 systolic, no chest pain, warm & dry skin.
- **Unstable:** Confused, sluggish, altered mental status, unconscious, BP below 90 systolic, chest pain, cool & clammy skin, dyspnea, and pulmonary edema.

**Defibrillations:** Unless otherwise noted, all manual and AED defibrillations programmed into the Zoll E-series monitors are as follows:
- Shock #1 = 120j
- Shock #2 = 150j
- Shock #3 = 200j
- Shock #4 and on = 360j

ACUTE PULMONARY EDEMA

The following should be provided for all patients complaining of cardiac signs or symptoms, including but not limited to, chest pain, shortness of breath, dizziness, palpitations, indigestion or syncope.

**Assessment:**
Assess respiratory status – assist ventilations as necessary.
- *Be prepared to aggressively manage airway if patient is initially lethargic with severe distress and/or change in Pulse oximetry.*

Initiating CPAP treatment is a first line treatment IF:
- Patients with inadequate ventilation not associated with asthma.
- Patients O2 sats below 94% unchanged by O2 via NRM
- Patients may have pulmonary edema, pneumonia, or COPD.

**Treatment:**
- **B Oxygen.**
  - Position of comfort, reassure patient.
  - Initiate CPAP treatment
- **I85** Initiate IV of NS at TKO rate or saline lock.
  - Cardiac Monitor.
- **A**
  - Admin via SVNeb.–
    - Albuterol or DuoNeb (Atrovent & Xopenex)
  - Furosemide 40-80 mg.
  - Morphine 2-10 mg in 2-4 mg increments.
- **P**
  - Admin - 0.4 mg Nitro SL every 3-5 minutes (X 3) as long as BP > 90mm/Hg systolic.
  - Additional Nitro PRN
  - Furosemide 40-80 mg.
**CARDIOGENIC SHOCK**

The following should be provided for all patients complaining of cardiac signs or symptoms, including but not limited to, chest pain, shortness of breath, dizziness, palpitations, indigestion or syncope. Cardiogenic Shock is further recognized by: blood pressure of <90 mmHg systolic, tachycardia, tachypnea, altered level of consciousness, pulmonary edema and dysrhythmias.

**Assessment:**
- Perform Patient assessment
- Observe the level of consciousness, skin condition and vital signs
- 12-Lead EKG
- Reassure patient.
- Consider all other causes.

*Beware* of Pulmonary Edema and potential cardiac arrest. *Transport as soon as possible.*

<table>
<thead>
<tr>
<th>Treatment:</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
</tr>
<tr>
<td>B</td>
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<tr>
<td>IES</td>
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<tr>
<td>P</td>
</tr>
</tbody>
</table>

**CARDIAC ARREST – AED USE**

**Assessment:**
- Alert dispatch and hospital of cardiac arrest as soon as possible
- Utilize appropriate body substance isolation
- Assess LOC and ABC’s; confirm absence of pulses/respirations
- Apply Lucas CPR Device as needed

**Treatment with AED (all levels):**
- Establish and maintain open airway. Use OPA or NPA. Suction airway as needed to clear
- Ventilate initially with 100% oxygen utilizing a bag valve mask and an oral airway.
- Perform CPR *(follow AHA BLS Guidelines)* until AED is available and applied to patient.
- Apply Defibrillator pads to patient’s chest (may need to prep. the patients’ chest first)
- **Turn on AED - Stop CPR,** ensure patient is motionless and all personnel are clear
- **Analyze** rhythm, if indicated, shock patient at pre-set level (120J -Zoll)
- After shock continue CPR for two minute
- Secure the airway with Combi-tube *(ET Tube - if paramedic is available)*
- After two minute, re- analyze rhythm, if indicated, shock patient at pre-set level (150J -Zoll)
- Continue CPR, secure patient to a long backboard and move patient to the ambulance and transport.
- In the ambulance (After two minute) re- analyze rhythm, if indicated, shock patient at pre-set level (200J -Zoll)
- If at any point a “No Shock Advised” message is received, check for pulse. If no pulse, continue CPR for two minute and re-analyze. If pulse is present, manage and support ABC’s
- If 3 consecutive “No Shock Advised” messages are received, check pulse. If no pulse, continue CPR and transport.
- If after a total of 9 shocks are given, contact medical control AND transport patient.

**CARDIOPULMONARY ARREST – DEFIBRILLATION WITH AICD’S**

- Confirm presence of AICD by observing for medical ID, incision scars, or palpating the device.
- Place pads in usual location. Pads should be 5 inches away from AICD, on left lateral chest wall.
- Analyze rhythm, if indicated, defibrillate patient at pre-set joule settings in the Zoll monitor.
- If initial defibrillation shocks fail to convert, change the pads to anteroposterior position.
- If tachycardia rhythm returns immediately deactivate the AICD. Place a magnet over the upper right-hand corner of the AICD and leave in place for at least 30 seconds. Inactivation is complete when signaled by a change from intermittent tones to a continuous tone.
SUSPECTED MYOCARDIAL INFARCTION

The following should be provided for all patients complaining of cardiac signs or symptoms, including but not limited to, chest pain, shortness of breath, dizziness, palpitations, indigestion or syncope. Refer to STEMI Alert Plan. If not already there, CALL for ALS immediately.

**Assessment**
- Determine responsiveness
- Perform Patient Assessment.
- Consider Need for ALS
- Be alert for and treat for shock.
- Be alert for irregular pulse rhythm.
- Obtain and record vital signs every 5 minutes.
- Obtain pertinent medical history.
- SAMPLE - OPQRST.
- Pulse Oximetry
- 12-Lead EKG & transmit to hospital
- Document pain scales, type of pain and response to treatment

**Administration of Nitroglycerin**

**Purpose:** To provide guidelines for the administration of nitroglycerine under direction of Medical Control when a Paramedic is not available

**Actions:** Nitroglycerin (Nitrostat, Nitro-bid, Nitro-Dur, Nitrol, NTG) is an antianginal, coronary & peripheral vasodilator

**Indications:** Chest pain of suspected cardiac origin, patient who has a cardiac history and prescribed NTG, Pulmonary edema, Hypertension (physician order ONLY)

**Actions:** Relaxes blood vessels, Decreases workload to the heart

**Contraindications:** Patients taking Viagra (sildenafil citrate), Lavitra or Cialis (tadalafil), Allergy or known hypersensitivity to nitroglycerin, Head trauma w/ increased Intracranial pressure, Hypovolemia, hypotension (BP<90mmHg systolic in adults), shock

**Adverse Reactions/Side Effects:** Headache, dizziness, weakness, Tachycardia, fainting, and hypotension

**Precautions:** May be administered only to patients for whom it is prescribed.

**Administration:** If available, the ALS crewmember should establish an IV prior to the administration of NTG. Following verification that the patient has chest pain of suspected cardiac origin, has no known contraindications and is greater than 12y/o with a systolic BP >100mmHg prior to NTG administration.

- If a patient BP is >100mmHg systolic, EMT-B/I may assist patient in taking their own NTG.
- If systolic BP drops <90mmHg systolic after a NTG, discontinue and place patient in Trendelenburg position.
- AEMT/Paramedic may administer 1 NTG tablets 3 – 5 minutes apart (times 3) provided BP is >100mmHg systolic after each tablet. If BP drops below 90mmHg, lay patient flat and elevate legs (may consider IV bolus)

**Treatment:**
- **B** Oxygen
  - Be prepared for AED use.
  - Do not allow patient to ambulate. Place patient in position of comfort and loosen clothing.
  - Unconscious patients should be placed in the recovery position.
  - After contacting Medical Control, the EMT may be given orders to assist the patient with self-administration of the patients own nitroglycerine, repeated at 5 minute intervals if systolic BP remains above 100 mmHg, to a maximum of 3 tablets or relief of pain.
  - Expedite transport and notify hospital as soon as possible of a possible STEMI Alert

- **I85**
  - Initiate IV of NS at TKO rate or saline lock
  - Cardiac Monitor – acquire 12-Lead EKG

- **A**
  - Administer Nitroglycerine SL if BP > 90 mmHg. Monitor B/P between each dose.
  - Administer 4 Low-dose ASA (324 mg) PO

- **P**
  - Cardiac Monitor – acquire 12-Lead EKG
  - Admin Morphine Sulfate 2-4 mg IV at 2 mg per dose if systolic BP < 90 mmHg
  - Consider Fentanyl for pain control in ALL inferior / R ventricular MI.
  - Contact Med Control for further orders:
    - Additional NTG
    - Additional Morphine
STEMI ALERT PLAN

The following document details the responsibilities of the Health Care Providers (EMS, emergency physicians, cardiologists and support staff) in managing ST Elevation acute Myocardial Infarction patients presenting in Spearfish area, when transport to a STEMI facility (Rapid City Regional) is planned for acute coronary intervention.

PARAMEDIC RESPONSIBILITY

- Establishment of STEMI Diagnosis
  - Clinical presentation; Chest pain characteristics
  - Associated symptoms (diaphoresis, dyspnea, nausea/vomiting)
  - Onset of symptoms
  - Associated arrhythmia
  - Evidence for hemodynamic compromise (exam and vital signs)
  - EKG findings; ST elevation of at least 2 mm in 2 or more contiguous leads, New left bundle branch block
  - Presence or absence of paced rhythm
  - New ventricular ectopy or atrial fibrillation
  - Vital signs; Presence of hypotension (BP <100 mmHg), or hypertension (BP >140/90), Presence of tachycardia (HR>100), or bradycardia (HR<60)
  - Objective evidence of CHF (pulmonary rales, dyspnea)
  - Adequacy of ventilation (intubated or not); Capnography if intubated
  - Color, responsiveness, respiratory rate, alertness
  - Adequacy of oxygenation/ O2 Saturation, Pulse Oximetry; Oxygen required to maintain saturation > 90%

NOTIFICATION OF MEDICAL CONTROL

- Transmit 12-lead EKG to Spearfish Regional
- Paramedic will call Medical Control with STEMI ALERT
- Medical Control will contact Rapid City Regional cardiologist
- Secure name and phone number of receiving cardiologist
- Notify Spearfish Regional of STEMI Alert Activation
- Transport Patient to Spearfish Regional Hospital
- Draw labs (rainbow) – if time allows.

REASONS TO POSSIBLY ABORT STEMI ALERT PLAN

- Patient is unstable and is either in cardiac arrest, or it appears imminent; Rhythm not adequately perfusing: VT/VF, High grade AV block, PEA, Asystole, severe bradycardia
- Pulse is <50 and patient is symptomatic
- Blood pressure is below 80 and patient is symptomatic
- Airway is not secure and ventilation is inadequate
- Call Medical Control and discuss alternatives
- Immediate transfer to nearest facility for stabilization

MEDICAL CONTROL RESPONSIBILITY

- Take STEMI Alert Call from Medic; Confirm diagnosis of STEMI from clinical history, Receive copy of EKG, print and review
- Record patient identifying information
- Discuss appropriateness of ground vs. Air Medical Transport
- Contact STEMI Plan Facility (Rapid City Regional)
- Provide patient data to Rapid City Regional ER (605-719-8222)
- Call Rapid City Regional Hospital Coordinator (605-719-1000) as alternate of ER # is busy
- Request bed availability, cath lab activation, and ED notification
- Forward 12-lead EKG to STEMI group: Rapid City Regional ED and cardiologists
- Forward receiving cardiologist’s name and cell phone number to EMS
• Contact On-call Interventional Cardiologist
• Notify cardiologist of STEMI Alert activation
• Provide initial clinical details and ETA
• Verify 12-lead EKG received by cardiologist
• Notify cardiologist to expect a call from Paramedic directly for further clinical orders and management

DIGITAL COMMUNICATIONS
Digital EKG Transmissions and Printing
Sending patient EKGs over encrypted lines from EMS to physician, or physician to physician will be HIPPA compliant
EKGs will be identified with HIPPA compliant technique and include date, time, age and a patient number (last three on EKG), but no names.
EKGs will be printed in the emergency rooms, a patient label will be applied, and it will become part of the patient’s permanent medical record
The original 12-lead EKG will go into the Paramedic’s Patient Care Report (PCR).
EKG print to be given to EMS team directly as they pass through ED

STEMI PATIENTS PRESENTING INITIALLY AT SPEARFISH REGIONAL HOSP.
Emergency Room Evaluation
Patients with STEMI frequently arrive by private car or have been hospitalized when they develop ST elevation.
Call to Spearfish 911 Dispatch to request STEMI transport
Rapid evaluation and initiation of treatment:
- EKG done and labs sent
- IV access and IV narcotic pain relief
- IV heparin 50 Units/kg, maximal dose 4,000 units OR Lovenox.
- Patient evaluation and treatment target- 15 minutes.
- Patient loaded by Spearfish EMS for transport.
ED Physician calls Cardiologist at Rapid City Regional with details
ED Huc calls STEMI alert to Rapid City Hospital Coordinator (605-719-1000)
Protocols also applies to patients presenting at urgent or immediate care clinic

EMS Response
Response to STEMI alert with on duty ALS team
Paramedic to transmit EKG and send to STEMI Alert Group.
Complete STEMI Evaluation Tool
Contact cardiologist for further orders: Clopidigrel and or Eptifibatide may be given en-route if ordered.

QA:
100% review of scene times, scene to facility times, and scene to balloon times (EMS arrival on scene to balloon inflation, catheter thrombectomy or stent placement, whichever comes first to open artery and establish flow) with a goal of scene to balloon times of < 120 minutes in 90% of STEMI Alert runs, and target of 90 minutes for EMS to PCI time.
STEMI – 12-LEAD PLACEMENT

**Lead Placement**

*Table 1.1: Lead Placement for STEMI 12-Lead Placement*

<table>
<thead>
<tr>
<th>Patient Position</th>
<th>Lead</th>
<th>Lead</th>
<th>Lead</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lateral</td>
<td>ECG</td>
<td>V1</td>
<td>V4</td>
</tr>
<tr>
<td>Anterior/Wall</td>
<td>aVR</td>
<td>V2</td>
<td>V5</td>
</tr>
<tr>
<td>Inferior/Lateral</td>
<td>aVL</td>
<td>V3</td>
<td>V6</td>
</tr>
</tbody>
</table>

**RAPID 12-LEAD ECG ASSESSMENT & AXIS DEVIATION**

Verify that aVR is Negative
Assess rate and rhythm
Determine the axis (leads I and aVF; also determined by the monitor’s internal diagnostic program and printed on 12-Lead ECG)

**Possible Causes of Axis Deviation**

- R Ventricular hypertrophy
- L posterior hemiblock
- COPD
- Dextrocardia
- Ectopic beats and rhythm
- Normal in children

**Left Axis Deviation**
- L anterior hemiblock
- L Ventricular hypertrophy
- Inferior wall MI
- Ectopic beats and rhythm
- Obesity
- Pregnancy

**Identify conduction abnormalities**
- Left bundle branch block
- Hypertrophy
- Aneurysm
- Pericarditis
- Drug or electrolyte imbalance effects
- Early repolarization

**Find signs of ischemia, injury, and infarction**
- T-wave inversions
- ST-segment elevation
- Significant Q wave (>0.04 sec. wide & >1/3 the size of the R wave)

**Identify acute MI patterns**

**Anterior**
- ST-elevation in V1, V2, V3, V4
- ST depression in leads II, III, aVF

**Inferior**
- ST elevation in II, III, aVF
- ST depression in V1, V2, V3, or I, aVL

**Lateral**
- ST elevation in I, aVL, V5, V6
- ST depression in II, III, aVF

**Septal**
- ST elevation in I, aVL, V1, V2

**Posterior**
- Tall, wide R waves and reciprocal ST depression in V1, V2
- T-wave inversion and ST elevation in posterior leads V7, V8, V9

**Right Ventricle**
- ST elevation in V4R, V5R, V6R
ELECTROLYTES IN CARDIAC FUNCTION

**Sodium (Na⁺138-146 mEq/L)**

<table>
<thead>
<tr>
<th>Hypotremia symptoms</th>
<th>Hypernatremia symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lethargy, confusion, coma</td>
<td>Lethargy, confusion, coma</td>
</tr>
<tr>
<td>Muscle twitches and irritability, seizures</td>
<td>Muscle twitches and irritability, seizures</td>
</tr>
<tr>
<td>Hyperreflexia</td>
<td>Hyperreflexia</td>
</tr>
<tr>
<td>Nausea, vomiting</td>
<td></td>
</tr>
</tbody>
</table>

**TREATMENT:**

(Evaluate – HR, BP, orthostatic VS, edema, skin turgor)

If signs of hypovolemia – IV NS bolus’ frequently assessing for pulmonary edema

**Potassium (K⁺ 3.5-5.1 mEq/L [mmol/L])**

<table>
<thead>
<tr>
<th>Hypokalemia symptoms</th>
<th>Hyperkalemia symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muscle weakness, cramps, tetany</td>
<td>Weakness, flaccid paralysis, confusion</td>
</tr>
<tr>
<td>Polyuria, polydipsia</td>
<td>Hyperactive deep tendon reflexes, decreased strength</td>
</tr>
<tr>
<td>Decreased strength, orthostatic hypotension</td>
<td>ECG: peaked T, wide QRS, loss of P wave, asystole</td>
</tr>
<tr>
<td>ECG: flattening T waves, obvious ‘U’ wave</td>
<td>Hyperkalemia &gt;7 mEq/L</td>
</tr>
</tbody>
</table>

**TREATMENT:** IV NS TKO

**Calcium (Ca²⁺ 8.5-10.1 mg/dL)**

<table>
<thead>
<tr>
<th>Hypocalcemia signs/symptoms</th>
<th>Hypercalcemia signs/symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECG: prolonged ST &amp; QTc interval</td>
<td>ECG: changes are subtle (prolonged PR, QRS lengthen, T waves flat or inverted)</td>
</tr>
<tr>
<td>Wheezing, stridor, pulmonary crackles (rales)</td>
<td>Treatment: ABC’s, IV NS bolus, Lasix 0.5 mg/kg (slow)</td>
</tr>
<tr>
<td>Bradycardia, S3 heart sound</td>
<td></td>
</tr>
<tr>
<td>Ventricular arrhythmias (torsade de pointes)</td>
<td>Treatment: IV NS TKO, O2, monitor VS &amp; ECG, consider Calcium 500 mg SLOW IVPush, Consider Magnesium Sulf. 1 G SLOW IVPush to prevent Torsades</td>
</tr>
</tbody>
</table>

**TREATMENT:**

IV NS TKO, O2, monitor VS & ECG, consider

**CARDIAC LABS/MARKERS**

<table>
<thead>
<tr>
<th>Spearfish Hospital Lab Values</th>
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<tbody>
<tr>
<td>CK</td>
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<tr>
<td>CK-MB</td>
</tr>
<tr>
<td>Troponin I</td>
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<tr>
<td>Troponin T</td>
</tr>
<tr>
<td>Lactate</td>
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<tr>
<td>SGOT</td>
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<tr>
<td>AST</td>
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<td>LDH</td>
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<tr>
<td>PT</td>
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<tr>
<td>PTT</td>
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<tr>
<td>INR</td>
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</table>

**CARDIAC MARKERS PANEL**

*(The above values are guidelines. Individual markers may vary depending on the size of the infarct, onset of symptoms, the lab or methods used, etc.)*
# Cardiac Toxic Drug Effects

## Cardiac Glycoside (Digoxin)
- Heart blocks; low potassium can potentiate toxicity
- Nausea, vomiting, headache, fatigue, visual disturbances (halo around lights), arrhythmias

## Class I antiarrhythmics
- Lengthened QRS and QTc intervals
- Possible AV blocks
- Slowed or complete blocked SA node
- Arrhythmias

## Calcium Channel Blockers
- Blocked AV node primarily, but extent of block varies among different drugs in this class

## Beta-blockers
- Slowed automaticity in SA node and Purkinje system
- Blocked AV node

## Amiodarone (Cordarone)
- Slowed conduction everywhere: the SA node, atrium, AV node, Purkinje system and ventricles

## Phenothiazines & tricyclic antidepressants
- Widened QRS and QTc interval
- T wave abnormalities
- Arrhythmias common in overdoses

## Long QT Syndrome

Congenital disorder that can be worsened by physical exertion, female sex, electrolyte disturbances, hypothermia, abnormal thyroid function, heart disease, bradycardia, medications and drug overdose.

Long QT syndrome can deteriorate into V-tach & torsade de pointes.

**Common Symptom:** syncope/vasovagal or seizure during exercise.

**Evaluate:** history of loss of consciousness events from preteen to 40’s.

**USE CAUTION:** Use of Zofran has been associated with prolongation of the QT interval, which can lead to torsades de pointes.

**QTc value:**
- **Men**: 300-440 milliseconds
- **Women**: 300-450 milliseconds

**QTc >500:** watch for V-Tach/Torsades

## Drug Classes that worsen QT Syndrome

<table>
<thead>
<tr>
<th>Class</th>
<th>Examples</th>
</tr>
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<tbody>
<tr>
<td>Antianginal</td>
<td>Antimalarial</td>
</tr>
<tr>
<td>Antiarrhythmic</td>
<td>Antinausea</td>
</tr>
<tr>
<td>Antibiotics</td>
<td>Antipsychotic</td>
</tr>
<tr>
<td>Anticancer</td>
<td>GI stimulants</td>
</tr>
<tr>
<td>Antihistamine</td>
<td>Opiate agonists</td>
</tr>
<tr>
<td>Anti-infectives</td>
<td>Sedatives</td>
</tr>
<tr>
<td>Antimalarial</td>
<td></td>
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<tr>
<td>Antinausea</td>
<td></td>
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<tr>
<td>Antipsychotic</td>
<td></td>
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<tr>
<td>GI stimulants</td>
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<tr>
<td>Opiate agonists</td>
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<tr>
<td>Sedatives</td>
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</tbody>
</table>

## Ventricular Ectopy

The following should be provided for all patients complaining of cardiac signs or symptoms, including but not limited to, chest pain, shortness of breath, dizziness, palpitations, indigestion or syncope.

**Assessment:**
- Perform Patient assessment
- Observe the level of consciousness, skin condition
- Pulse oximetry.
- Monitor Vital Signs

**Acquire 12-lead EKG & transmit**
- Position of comfort. Reassure patient.
- Consider all other causes

**Treatment:**

<table>
<thead>
<tr>
<th><strong>B</strong></th>
<th>Oxygen</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I</strong></td>
<td>Initiate IV of NS at TKO rate</td>
</tr>
<tr>
<td><strong>A</strong></td>
<td>Cardiac Monitor &amp; acquire 12-Lead EKG</td>
</tr>
<tr>
<td><strong>P</strong></td>
<td>Observe ECG for PVC’s; &gt; 6/min, coupling or multi-focal, runs of V-tach</td>
</tr>
<tr>
<td></td>
<td>Refer to appropriate ACLS guidelines based on assessment and EKG analysis.</td>
</tr>
<tr>
<td></td>
<td>Consider administration of Lidocaine for runs of V-Tach.</td>
</tr>
</tbody>
</table>
ATRIAL FIBRILLATION / FLUTTER

The following should be provided for all patients complaining of cardiac signs or symptoms, including but not limited to, chest pain, shortness of breath, dizziness, palpitations, indigestion or syncope.

Assessment:
- Perform Patient assessment
- Observe the level of consciousness, skin condition
- Position of comfort. Reassure patient.
- Monitor Vital Signs

Acquire 12-lead EKG & transmit
  - Consider all other causes.

Treatment:

<p>| | |</p>
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<tr>
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</thead>
<tbody>
<tr>
<td>B</td>
<td>Oxygen</td>
</tr>
<tr>
<td></td>
<td>Prepare to transport as soon as possible</td>
</tr>
<tr>
<td>I85</td>
<td>Initiate IV of NS at TKO rate</td>
</tr>
<tr>
<td>A</td>
<td>Cardiac Monitor &amp; acquire 12-Lead EKG</td>
</tr>
<tr>
<td>P</td>
<td>Confirm Atrial Fib/Flutter</td>
</tr>
<tr>
<td></td>
<td>Refer to appropriate ACLS guidelines based on assessment and EKG analysis.</td>
</tr>
</tbody>
</table>

BRADYCARDIA WITH PULSE

The following should be provided for all patients complaining of cardiac signs or symptoms, including but not limited to, chest pain, shortness of breath, dizziness, palpitations, indigestion or syncope.

Assessment:
- Perform Patient assessment
- Observe the level of consciousness, skin condition
- Position of comfort. Reassure patient.
- Monitor Vital Signs

Acquire 12-lead EKG & transmit
  - Consider all other causes.

Treatment:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Oxygen</td>
</tr>
<tr>
<td></td>
<td>Prepare to transport as soon as possible</td>
</tr>
<tr>
<td>I85</td>
<td>Initiate IV of NS at TKO rate</td>
</tr>
<tr>
<td>A</td>
<td>Cardiac Monitor &amp; acquire 12-Lead EKG</td>
</tr>
<tr>
<td>P</td>
<td>Confirm Bradycardia</td>
</tr>
<tr>
<td></td>
<td>Refer to appropriate ACLS guidelines based on assessment and EKG analysis.</td>
</tr>
</tbody>
</table>

SUPRAVENTRICULAR TACHYCARDIA

The following should be provided for all patients complaining of cardiac signs or symptoms, including but not limited to, chest pain, shortness of breath, dizziness, palpitations, indigestion or syncope.

Assessment:
- Perform Patient assessment
- Observe the level of consciousness, skin condition
- Position of comfort. Reassure patient.
- Monitor Vital Signs

Acquire 12-lead EKG & transmit
  - Consider all other causes.
## WIDE COMPLEX TACHYCARDIA WITH PULSE

The following should be provided for all patients complaining of cardiac signs or symptoms, including but not limited to, chest pain, shortness of breath, dizziness, palpitations, indigestion or syncope.

### Assessment:
- Perform Patient assessment
- Observe the level of consciousness, skin condition
- Check peripheral pulses vs. carotid
- Position of comfort - Reassure patient.
- Monitor Vital Signs

### Acquire 12-lead EKG & transmit
  - Consider all other causes.
  - History of WPW should be investigated and if present avoid use of any medications that have AV nodal blocking actions.

### Treatment:

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Oxygen</td>
</tr>
<tr>
<td>I85</td>
<td>Initiate IV of NS at TKO rate</td>
</tr>
<tr>
<td>A</td>
<td>Cardiac Monitor &amp; acquire <strong>12-Lead EKG</strong></td>
</tr>
<tr>
<td>P</td>
<td>Confirm tachycardia &amp; QRS duration</td>
</tr>
<tr>
<td></td>
<td>Prepare for cardioversion</td>
</tr>
<tr>
<td></td>
<td>Refer to appropriate <strong>ACLS guidelines</strong> based on assessment and EKG analysis.</td>
</tr>
</tbody>
</table>

## VENTRICULAR FIBRILLATION / PULSELESS VENTRICULAR TACHYCARDIA

The following should be provided for all patients complaining of cardiac signs or symptoms, including but not limited to, chest pain, shortness of breath, dizziness, palpitations, indigestion or syncope.

### Assessment:
- Perform Patient assessment
- Check for absence of pulse and breathing
- Attach AED/Manual Defibrillator per protocol
- Initiate ‘Code Blue’ procedures
- Attach Lucas CPR Device
- Monitor ETCO2 via ET Tube or Combi-Tube
- Consider causes

### Treatment:

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Initiate <strong>CPR procedures</strong> as per AHA Guidelines</td>
</tr>
<tr>
<td>I85</td>
<td>Secure Airway with BVM/Combi-Tube</td>
</tr>
<tr>
<td>A</td>
<td>Initiate IV of NS at TKO rate</td>
</tr>
<tr>
<td>A</td>
<td>Attach AED &amp; Cardiac Monitor</td>
</tr>
<tr>
<td>P</td>
<td>Confirm V-Fib/pulseless V-Tach</td>
</tr>
<tr>
<td></td>
<td>Refer to appropriate <strong>ACLS guidelines</strong> based on assessment and EKG analysis.</td>
</tr>
</tbody>
</table>

## PULSELESS ELECTRICAL ACTIVITY

### Assessment
- Confirm patient is pulseless and apneic.
- Monitor ETCO2 via ET Tube or Combi-Tube

### Consider causes: H’s & T’s
  - Hypovolemia
  - Hypoxia
  - Hydrogen Ion (Acidosis)
  - Hypo/Hyperkalemia
  - Hypothermia
  - Tension pneumothorax
  - Tamponade, Cardiac
  - Toxins
  - Thrombosis, myocardial infarction
  - Thrombosis, pulmonary embolism

### Treatment:

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Initiate <strong>CPR procedures</strong> as per AHA Guidelines</td>
</tr>
<tr>
<td>I85</td>
<td>Secure Airway with BVM/Combi-Tube</td>
</tr>
<tr>
<td>A</td>
<td>Initiate IV/IO of NS at TKO rate</td>
</tr>
<tr>
<td>A</td>
<td>Attach AED &amp; Cardiac Monitor</td>
</tr>
<tr>
<td>P</td>
<td>Confirm PEA</td>
</tr>
<tr>
<td></td>
<td>Refer to appropriate <strong>ACLS guidelines</strong> based on assessment and EKG analysis.</td>
</tr>
</tbody>
</table>
## ASYSTOLE

**Assessment:**
Confirm pulseless and apneic. *(If arrest was unwitnessed and prolonged “down-time” (>30 minute) contact Medical Control and request pronouncement of death)*

Assess patient for mottling, rigor mortis, pupil size and reactivity.

### Treatment:

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Initiate CPR procedures as per AHA Guidelines</td>
</tr>
<tr>
<td></td>
<td>Prepare to transport as soon as possible</td>
</tr>
<tr>
<td></td>
<td>Attach Lucas CPR Device</td>
</tr>
<tr>
<td>IAs</td>
<td>Secure Airway with BVM/Combi-Tube</td>
</tr>
<tr>
<td>A</td>
<td>Initiate IV/IO of NS at TKO rate</td>
</tr>
<tr>
<td></td>
<td>Attach AED &amp; Cardiac Monitor</td>
</tr>
<tr>
<td>P</td>
<td>Confirm Asystole in 2 leads</td>
</tr>
<tr>
<td></td>
<td>Refer to appropriate ACLS guidelines based on assessment and EKG analysis</td>
</tr>
</tbody>
</table>

---

## POST RESUSCITATION CARE

**PROCEDURE:**
For ALL ROSC (return of spontaneous circulation) patients who remain neurologically compromised, initiate hypothermic treatment. Apply cold packs to patients axillary areas, groin and sides of the neck.

Lidocaine 1 to 1.5mg/kg post arrest if the patient was a V-fib or V-Tach arrest and anti-arrhythmic not previously given followed by a maintenance drip.

**Post Ventricular Fibrillation /Ventricular Tachycardia**
If Lidocaine is the conversion medication, continue lidocaine boluses in accordance with ACLS Guidelines. If the patient converted with any other anti-arrhythmic agent, contact medical control.

**Post Asystole**
Ensuring of stable vital signs is the primary concern. Supporting the B/P may require using Inotropic agents at a rate prescribed by medical control.

**Post PEA**
Ensuring stable vital signs is the primary concern. Finding the underlying cause and treating that properly will help in the patients’ outcome. Constant reassessment of the patients is needed for these patients.

### ROSC Treatment:
Maintain O2 saturations ≥ 94%
Consider reversible causes;
- Hypovolemia
- Hypoxia
- Hydrogen Ion (Acidosis)
- Hypo/Hyperkalemia
- Hypothermia
- Tension pneumothorax
- Tamponade, Cardiac
- Toxins
- Thrombosis, coronary
- Thrombosis, PE

Acquire 12-lead EKG
### ECG Rhythm Reference Chart

<table>
<thead>
<tr>
<th>Rhythms</th>
<th>Regularity</th>
<th>Rate</th>
<th>P Waves</th>
<th>PRI</th>
<th>QRS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sinus</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal Sinus Rhythm</td>
<td>Regular</td>
<td>60 - 100</td>
<td>normal and upright</td>
<td>0.12 - 0.20</td>
<td>&lt; 0.12</td>
</tr>
<tr>
<td>Sinus Bradycardia</td>
<td>Regular</td>
<td>&lt; 60</td>
<td>normal and upright</td>
<td>0.12 - 0.20</td>
<td>&lt; 0.12</td>
</tr>
<tr>
<td>Sinus Tachycardia</td>
<td>Regular</td>
<td>&gt; 100</td>
<td>normal and upright</td>
<td>0.12 - 0.20</td>
<td>&lt; 0.12</td>
</tr>
<tr>
<td>Sinus Arrhythmia</td>
<td>Irregular</td>
<td>60 - 100</td>
<td>normal and upright</td>
<td>0.12 - 0.20</td>
<td>&lt; 0.12</td>
</tr>
<tr>
<td><strong>Atrial</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PAC</td>
<td>depends upon rhythm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WAP</td>
<td>Slightly irregular</td>
<td>&gt; 100</td>
<td>morphology changes beat to beat</td>
<td>&lt; 0.20, may vary</td>
<td>&lt; 0.12</td>
</tr>
<tr>
<td>Atrial Tachycardia</td>
<td>Regular</td>
<td>150 - 250</td>
<td>can be lost in preceding T wave</td>
<td>0.12 - 0.20</td>
<td>&lt; 0.12</td>
</tr>
<tr>
<td>Atrial Flutter / F Wave</td>
<td>A=reg., V=Irreg. or Reg.</td>
<td>A= 250 - 350</td>
<td>saw-toothed F waves (pretty)</td>
<td>not determinable</td>
<td>&lt; 0.12</td>
</tr>
<tr>
<td>Atrial Fibrillation</td>
<td>Irregularly, Irregular</td>
<td>A= &gt; 350</td>
<td>F waves, NO P waves</td>
<td>not determinable</td>
<td>&lt; 0.12</td>
</tr>
<tr>
<td><strong>Junctional</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PVC</td>
<td>depends upon rhythm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Idioventricular (IVR)</td>
<td>Normally Irregular</td>
<td>20 - 40</td>
<td>NONE</td>
<td>NO PRI</td>
<td>&gt;= 0.12</td>
</tr>
<tr>
<td>Accelerated IVR</td>
<td>Normally Irregular</td>
<td>40 - 100</td>
<td>NONE</td>
<td>NO PRI</td>
<td>&gt;= 0.12</td>
</tr>
<tr>
<td>Slow Vent. Tachycardia</td>
<td>Regular / Slightly Irreg.</td>
<td>100 - 150</td>
<td>NONE</td>
<td>NO PRI</td>
<td>&gt;= 0.12</td>
</tr>
<tr>
<td>Ventricular Tachycardia</td>
<td>Regular / Slightly Irreg.</td>
<td>150 - 250</td>
<td>No P wave, possible dissociated P's</td>
<td>NO PRI</td>
<td>&gt;= 0.12</td>
</tr>
<tr>
<td>Ventricular Flutter</td>
<td>Regular / Slightly Irreg.</td>
<td>&gt; 250</td>
<td>NONE</td>
<td>NO PRI</td>
<td>&gt;= 0.12</td>
</tr>
<tr>
<td>Ventricular Fibrillation</td>
<td>Chaotic</td>
<td>Unknown</td>
<td>Chaotic</td>
<td>Chaotic</td>
<td>NONE</td>
</tr>
<tr>
<td><strong>Ventricular</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PVC</td>
<td>depends upon rhythm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Idioventricular (IVR)</td>
<td>Normally Irregular</td>
<td>20 - 40</td>
<td>NONE</td>
<td>NO PRI</td>
<td>&gt;= 0.12</td>
</tr>
<tr>
<td>Accelerated IVR</td>
<td>Normally Irregular</td>
<td>40 - 100</td>
<td>NONE</td>
<td>NO PRI</td>
<td>&gt;= 0.12</td>
</tr>
<tr>
<td>Slow Vent. Tachycardia</td>
<td>Regular / Slightly Irreg.</td>
<td>100 - 150</td>
<td>NONE</td>
<td>NO PRI</td>
<td>&gt;= 0.12</td>
</tr>
<tr>
<td>Ventricular Tachycardia</td>
<td>Regular / Slightly Irreg.</td>
<td>150 - 250</td>
<td>No P wave, possible dissociated P's</td>
<td>NO PRI</td>
<td>&gt;= 0.12</td>
</tr>
<tr>
<td>Ventricular Flutter</td>
<td>Regular / Slightly Irreg.</td>
<td>&gt; 250</td>
<td>NONE</td>
<td>NO PRI</td>
<td>&gt;= 0.12</td>
</tr>
<tr>
<td>Ventricular Fibrillation</td>
<td>Chaotic</td>
<td>Unknown</td>
<td>Chaotic</td>
<td>Chaotic</td>
<td>NONE</td>
</tr>
<tr>
<td><strong>Heart Blocks</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st Degree</td>
<td>depends upon rhythm</td>
<td></td>
<td>normal, P's are followed by QRS</td>
<td>&gt; 0.20, constant</td>
<td>&lt; 0.12</td>
</tr>
<tr>
<td>2nd Degree, Type I - Wenckebach</td>
<td>Irregular</td>
<td>&lt; normal</td>
<td>normal, some P's have no QRS</td>
<td>progressively lengthening</td>
<td>&lt; 0.12</td>
</tr>
<tr>
<td>2nd Degree, Type II</td>
<td>Regular to Irregular</td>
<td>&lt; normal</td>
<td>normal, more P's per QRS</td>
<td>Constant</td>
<td>&lt; 0.12</td>
</tr>
<tr>
<td>3rd Degree (CHB)</td>
<td>Regular</td>
<td>40 - 60 Junctional</td>
<td>normal, more P's per QRS</td>
<td>No relationship between P's &amp; QRS's</td>
<td>&lt; 0.12</td>
</tr>
</tbody>
</table>

**Unifocal** - PVC's all originate from a single ventricular focus and thus have similar configurations.

**Multifocal** - PVC's originate from different foci, therefore having a variety of configurations.

**Compensatory Pause** - PVC falls before QRS, overshadowing the QRS, and disrupts the rhythm.

"R on T" - PVC falls on downslope of T wave, during the relative refractory period.

**Interpolated** - PVC falls between QRS, does not disrupt the rhythm.

**Couplets** - PVC's that occur in pairs.

**Triplets** - PVC's that occur three in a row together.

**Runs of V-Tach** - Four or more PVC's in a row.

**Bigeminy** - Every other beat is a PVC or PAC.

**Trigeminy** - Every third beat is a PVC or PAC.

**Quadgeminy** - Every fourth beat is a PVC or PAC.
BLS Healthcare Provider
Adult Cardiac Arrest Algorithm—2015 Update

Verify scene safety.

Victim is unresponsive. Shout for nearby help. Activate emergency response system via mobile device (if appropriate). Get AED and emergency equipment (or send someone to do so).

Provide rescue breathing: 1 breath every 5-6 seconds, or about 10-12 breaths/min.
• Activate emergency response system (if not already done) after 2 minutes.
• Continue rescue breathing: check pulse about every 2 minutes. If no pulse, begin CPR (go to “CPR” box).
• If possible opioid overdose, administer naloxone if available per protocol.

Monitor until emergency responders arrive.

Normal breathing, has pulse

Look for no breathing or only gasping and check pulse (simultaneously). Is pulse definitely felt within 10 seconds?

No normal breathing, has pulse

No breathing or only gasping, no pulse

By this time in all scenarios, emergency response system or backup is activated, and AED and emergency equipment are retrieved or someone is retrieving them.

CPR

Begin cycles of 30 compressions and 2 breaths. Use AED as soon as it is available.

AED arrives.

Check rhythm. Shockable rhythm?

Yes, shockable

Give 1 shock. Resume CPR immediately for about 2 minutes (until prompted by AED to allow rhythm check). Continue until ALS providers take over or victim starts to move.

No, nonshockable

Resume CPR immediately for about 2 minutes (until prompted by AED to allow rhythm check). Continue until ALS providers take over or victim starts to move.

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BLS Healthcare Provider
Pediatric Cardiac Arrest Algorithm for the Single Rescuer—2015 Update

Verify scene safety.

Victim is unresponsive, shout for nearby help. Activate emergency response system via mobile device (if appropriate).

- Normal breathing, has pulse
  - Look for no breathing or only gasping and check pulse (simultaneously). Is pulse definitely felt within 10 seconds?
  - Provide rescue breathing: 1 breath every 3-5 seconds, or about 12-20 breaths/min.
    - Add compressions if pulse remains ≤60/min with signs of poor perfusion.
    - Activate emergency response system (if not already done) after 2 minutes.
    - Continue rescue breathing; check pulse about every 2 minutes. If no pulse, begin CPR (go to "CPR" box).

- No breathing or only gasping, no pulse
  - Witnessed sudden collapse?
    - Yes: Activate emergency response system (if not already done), and retrieve AED/defibrillator.
    - No: CPR
      - 1 rescuer: Begin cycles of 30 compressions and 2 breaths. (Use 15:2 ratio if second rescuer arrives.) Use AED as soon as it is available.
      - After about 2 minutes, if still alone, activate emergency response system and retrieve AED (if not already done).
      - AED analyzes rhythm. Shockable rhythm?
        - Yes, shockable: Give 1 shock. Resume CPR immediately for about 2 minutes (until prompted by AED to allow rhythm check). Continue until ALS providers take over or victim starts to move.
        - No, nonshockable: Resume CPR immediately for about 2 minutes (until prompted by AED to allow rhythm check). Continue until ALS providers take over or victim starts to move.
**ACLS – ADVANCED CARDIAC LIFE SUPPORT**

### Adult Cardiac Arrest Algorithm—2015 Update

1. **Start CPR**
   - Give oxygen
   - Attach monitor/defibrillator

2. **VF/pVT**

3. **Shock**

4. **CPR 2 min**
   - IV/IO access

5. **Rhythm shockable?**

6. **CPR 2 min**
   - Epinephrine every 3-5 min
   - Consider advanced airway, capnography

7. **Shock**

8. **CPR 2 min**
   - Amiodarone
   - Treat reversible causes

9. **Asystole/PEA**

10. **CPR 2 min**
    - IV/IO access
    - Epinephrine every 3-5 min
    - Consider advanced airway, capnography

11. **CPR 2 min**
    - Treat reversible causes

12. **Rhythm shockable?**
    - If no signs of return of spontaneous circulation (ROSC), go to 10 or 11
    - If ROSC, go to Post–Cardiac Arrest Care

---

**CPR Quality**
- Push hard (at least 2 inches [5 cm]) and fast (100-120/min) and allow complete chest recoil.
- Minimize interruptions in compressions.
- Avoid excessive ventilation.
- Rotate compressor every 2 minutes, or sooner if fatigued.
- If no advanced airway, 30:2 compression-ventilation ratio.
- Quantitative waveform capnography
  - If PETCO₂ <10 mm Hg, attempt to improve CPR quality.
- Intra-arterial pressure
  - If relaxation phase (diastolic) pressure <20 mm Hg, attempt to improve CPR quality.

**Shock Energy for Defibrillation**
- 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
- Lidocaine: IV/IO dose:
  - 1⁰ dose 1.5 mg/kg, Second dose ½ first.

**Advanced Airway**
- Endotracheal intubation or supraglottic advanced airway
- Waveform capnography or capnometry to confirm and monitor ET tube placement
- Once advanced airway in place, give 1 breath every 6 seconds (10 breaths/min) with continuous chest compressions

**Return of Spontaneous Circulation (ROSC)**
- Pulse and blood pressure
- Abrupt sustained increase in PETCO₂ (typically ≥40 mm Hg)
- Spontaneous arterial pressure waves with intra-arterial monitoring

**Reversible Causes**
- Hypovolemia
- Hypoxia
- Hydrogen ion (acidosis)
- Hypo-/hyperkalemia
- Hypothermia
- Tension pneumothorax
- Tamponade, cardiac
- Toxins
- Thrombosis, pulmonary
- Thrombosis, coronary
PALS – PEDIATRIC ADVANCED LIFE SUPPORT

Pediatric Cardiac Arrest Algorithm—2015 Update

1. Start CPR
   - Give oxygen
   - Attach monitor/defibrillator

2. Rhythm shockable?
   - VF/pVT

3. Shock

4. CPR 2 min
   - IO/IV access

5. Rhythm shockable?
   - Yes

6. CPR 2 min
   - Epinephrine every 3-5 min
   - Consider advanced airway

7. Shock

8. CPR 2 min
   - Amiodarone or lidocaine
   - Treat reversible causes

9. Asystole/PEA

10. CPR 2 min
    - IO/IV access
    - Epinephrine every 3-5 min
    - Consider advanced airway

11. CPR 2 min
    - Treat reversible causes

12. Asystole/PEA
    - Check pulse
    - Organized rhythm
    - Post-cardiac arrest care

CPR Quality
- Push hard (≥1/3 of anteroposterior diameter of chest) and fast (100-120/min) and allow complete chest recoil.
- Minimize interruptions in compressions.
- Avoid excessive ventilation.
- Rotate compressor every 2 minutes, or sooner if fatigued.
- If no advanced airway, 15:2 compression-ventilation ratio.

Shock Energy for Defibrillation
- First shock 2 J/kg, second shock 4 J/kg, subsequent shocks ≥4 J/kg, maximum 10 J/kg or adult dose.

Drug Therapy
- Epinephrine IO/IV dose: 0.01 mg/kg (0.1 mL/kg of 1:10,000 concentration). Repeat every 3-5 minutes.
  If no IO/IV access, may give endotracheal dose: 0.1 mg/kg (0.1 mL/kg of 1:1000 concentration).
- Amiodarone IO/IV dose:
  - 5 mg/kg bolus during cardiac arrest. May repeat up to 2 times for refractory VF/pulseless VT.
- Lidocaine IO/IV dose:
  - Initial: 1 mg/kg loading dose. Maintenance: 20-50 mcg/kg per minute infusion (repeat bolus dose if infuson initiated >15 minutes after initial bolus therapy).

Advanced Airway
- Endotracheal intubation or supraglottic advanced airway.
- Waveform capnography or capnometry to confirm and monitor ET tube placement.
- Once advanced airway in place, give 1 breath every 6 seconds (10 breaths/min) with continuous chest compressions.

Return of Spontaneous Circulation (ROSC)
- Pulse and blood pressure
- Spontaneous arterial pressure waves with intra-arterial monitoring

Reversible Causes
- Hypovolemia
- Hypoxia
- Hyperkalemia
- Hypothermia
- Tension pneumothorax
- Tamponade, cardiac
- Toxins
- Thrombosis, pulmonary
- Thrombosis, coronary
NALS – NEONATAL ADVANCED LIFE SUPPORT

Neonatal Resuscitation Algorithm—2015 Update

1 minute

- Antenatal counseling
  Team briefing and equipment check

Birth

Term gestation?
  Good tone?
  Breathing or crying?

Yes

Infant stays with mother for routine care: warm and maintain normal temperature, position airway, clear secretions if needed, dry. Ongoing evaluation

No

Warm and maintain normal temperature, position airway, clear secretions if needed, dry, stimulate

Apnea or gasping?
  HR below 100/min?

Yes

PPV
  Spo₂ monitor
  Consider ECG monitor

No

Labored breathing or persistent cyanosis?

Yes

Position and clear airway
  Spo₂ monitor
  Supplementary O₂ as needed
  Consider CPAP

No

Postresuscitation care
  Team debriefing

HR below 100/min?

Yes

Check chest movement
  Ventilation corrective steps if needed
  ETT or laryngeal mask if needed

No

HR below 60/min?

Yes

Intubate if not already done
  Chest compressions
  Coordinate with PPV
  100% O₂
  ECG monitor
  Consider emergency UVC

No

HR below 60/min?

Yes

IV epinephrine
  If HR persistently below 60/min
  Consider hypovolemia
  Consider pneumothorax

Targeted Preductal Spo₂ After Birth

<table>
<thead>
<tr>
<th>Time (min)</th>
<th>Targeted Preductal Spo₂ (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>60%-65%</td>
</tr>
<tr>
<td>2</td>
<td>65%-70%</td>
</tr>
<tr>
<td>3</td>
<td>70%-75%</td>
</tr>
<tr>
<td>4</td>
<td>75%-80%</td>
</tr>
<tr>
<td>5</td>
<td>80%-85%</td>
</tr>
<tr>
<td>10</td>
<td>85%-95%</td>
</tr>
</tbody>
</table>

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Opioid-Associated Life-Threatening Emergency (Adult) Algorithm—New 2015

Assess and activate.
Check for unresponsiveness and call for nearby help. Send someone to call 9-1-1 and get AED and naloxone. Observe for breathing vs no breathing or only gasping.

Begin CPR.
If victim is unresponsive with no breathing or only gasping, begin CPR.*
If alone, perform CPR for about 2 minutes before leaving to phone 9-1-1 and get naloxone and AED.

Administer naloxone.
Give naloxone as soon as it is available. 2 mg intranasal or 0.4 mg intramuscular. May repeat after 4 minutes.

Does the person respond?
At any time, does the person move purposefully, breathe regularly, moan, or otherwise respond?

Yes
Stimulate and reassess.
Continue to check responsiveness and breathing until advanced help arrives. If the person stops responding, begin CPR and repeat naloxone.

No
Continue CPR and use AED as soon as it is available.
Continue until the person responds or until advanced help arrives.

*CPR technique based on rescuer’s level of training.
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