This information is derived from the 2015 ECC Guidelines.

This packet contains prep information for the ACLS Course as well as EKG and BLS reviews. We strongly recommend completing the EKG practice exam prior to the course.

-MANDATORY REQUIREMENTS-

You must bring the AHA ACLS textbook to class with your completed online AHA Self Assessment. Instructions can be found on page ii of your red ACLS textbook. Passing Score = 70%
(If a score of 70% is not achieved in each section, please review the text and retest the section.)

★If you are attending the BLS section following ACLS, refer to page 61 for additional instructions.
(There is a mandatory pretest if you are choosing to do BLS)

COURSE DATE / TIME: ___________________________ LOCATION: ___________________________

NAME: ______________________________________

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This copyrighted prep packet is a supplement for those students taking an ACLS program with EMC.

Welcome to Emergency Medical Consultants’ Stress Free ACLS Course. We are pleased that you have chosen us to provide you with this outstanding course and are sure that this will be a worthwhile learning experience for you as a medical professional. Please remember you will need to be able to perform the AHA CPR skills and must be familiar with basic dysrhythmia recognition and pharmacology before the course.

In order to keep our program “stress free” and to assure that all participants meet the AHA requirements for ACLS proficiency, preparation is required prior to the actual class. We will be using the latest Emergency Cardiac Care Standards for BLS and ACLS.

The American Heart Association mandates that each participant have a textbook to review prior to the course. Currently there is a Textbook and a Resource Text available. The resource text provides a more in depth and detailed prospective of the AHA guidelines. The Text can be purchased through an AHA vendor or borrowed from your hospital or departments’ Education Center if your facility provides a library.

Enclosed you will find information to help you prepare for the required skills stations and ACLS didactic evaluation. Please take the time to look through this information, begin to learn drug uses and doses, review the algorithm and EKG sections, and take the EKG practice exam-the answer key is included. This will ensure a stress free day! It is important to prepare for the day by reviewing information prior to class for optimal success.

For more EKG practice, log onto www.Skillstat.com

Also refer to pg. ii of your ACLS text to access the MANDATORY AHA online pretest located at www.heart.org/eccstudent. This contains information regarding pharmacology, EKG and relevant to the exam is available for review. A score will be provided upon completion, 70% must be obtained prior to the class.

We strive to make our program realistic and relevant, thus, the scenarios that you will be required to manage will relate to the work that you do.

All information is based on the American Heart Association ACLS standards at the time of printing and thought to be correct. Providers are encouraged to review the ACLS textbook and their specific policies prior to implementing any procedures or administering any medication based on this study packet.

We look forward to meeting you at the course and will be happy to answer any questions you may have - just call our office at 772-878-3085.

Sincerely,
Shaun Fix and the ACLS Staff
Emergency Medical Consultants, Inc
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ACLS COURSE AGENDA
2-DAY TRAINING PROGRAM
(You will be advised of class start times when you enroll)

DAY ONE

Introduction to ACLS, Overview of the ACLS Program
AHA Videos: Science and Prep
Break
Pharmacology I and II
Acute Coronary Syndromes and Stroke
Lunch
Small group interactive teaching stations:
  - Airway Management, AED, and BLS
  - Perfusing Patient Algorithms
  - Non-perfusing Patient Algorithms

DAY TWO

AHA Megacode and Team Videos
Overview of rhythms and algorithms / Code team concept
Break
Small group Patient Management Scenario Practice
Lunch
ACLS evaluation stations
  - Multiple choice exam
  - Patient Management Simulation

ACLS COURSE AGENDA
1-DAY REFRESHER PROGRAM

New Science Review / Key Points
Overview of Rhythms and Algorithm
Resuscitation Team Concept / Putting it all together
Break
Airway Management, AED, and BLS
Begin Patient Management Scenarios
Lunch
Patient Management Evaluation Stations continued as needed
Written Exam
Rules for Keeping Yourself out of Trouble…
In ACLS and in Life!

Be Nice - “Good professionals get into trouble, bad professionals get into trouble… Nice professionals don’t get into as much trouble.”

Rule #1 - Treat the patient, not the monitor, (check pulses and vital signs)
Rule #2 - Always remember rule #1
Rule #3 - If you ARE treating the patient for an arrhythmia
– Always treat in this order: Rate, then Rhythm, then Blood Pressure

TEAM CONCEPT

- Realize that resuscitation involves professionals of various levels throughout the code then following through to post resuscitation management.
- Team leader needs to clearly define each person’s role. If you are assigned a role that you are not skilled to do immediately notify the team leader and offer to function in another capacity.
- Each team member performs a specific task: ventilations, compressions, medications, vascular access, defibrillation, and documentation / timing. The team must work together under the guidance of a Team Leader to coordinate the combined resuscitation attempt.
- The team must work together and understand what “the next step” is going to be in order to be prepared to carry out skills quickly and efficiently during “pause for evaluation” phase every 2 minutes.
- There should be a closed-loop communication from the team leader to the team and back. i.e. as the team leader requests the next procedure the team member should repeat back what they understood the direction to be. This makes for a clearer understanding and reduces mistakes. Keep in mind the team leader could make a mistake in an order and constructive intervention from other team members may be appropriate to maintain consistency within the ACLS Guidelines.

The Core Concepts of ACLS

- Coronary perfusion! The myocardium needs to receive adequate blood flow - poorly perfused hearts don’t convert electrically
- Cerebral perfusion (restore, improve, maintain)
- Treat patients - not algorithms
- Crawl before you walk (BLS before ACLS)
- Time is of the essence
- Look for a cause after the basics are done
- Consider circulatory enhancing devices

CPR Compression Devices
Basic Life Support (CPR) - A critical component of ACLS

The most current research available suggests that quality CPR is a crucial variable in survival from resuscitation attempts - even more important than previously thought. Every participant in an ACLS class must correctly demonstrate adult CPR skills and use of an AED.

Follow these guidelines when performing Basic Life Support skills:

**PUSH HARD**: Compress the chest of an adult at least 2 inches, allowing for complete recoil of the chest between compressions. 2.4 inches is the maximum depth. Do not lean on the chest in between compressions.

**PUSH FAST**: Compress the chest at a rate of at 100-120 compressions per minute. (30 compressions delivered between 15-18 seconds)

**USE CORRECT RATIOS**: Deliver 30 compressions and 2 ventilations, in 2-minute blocks. Change compressors every two minutes during pauses in compressions. At that time, also check rhythm and pulses if indicated if the viewed rhythm is one that could produce a pulse. Patients with an advanced airway in place should receive continual compressions.

**MINIMIZE INTERRUPTIONS IN COMPRESSIONS**: Stop CPR only for essential procedures, such as rotating compressors, rhythm checks and pulse check if indicated, no more frequently than every 2 minutes. Make the pause in compressions as brief as possible.

**VENTILATE CAUTIOUSLY**: Deliver breaths over 1 second, using just enough volume to produce visible chest rise. With an advanced airway in place, deliver 1 breath every 6 seconds (10 breaths per minute) while continuous compressions are being performed. For rescue breathing in a perfusing patient, deliver 10-12 breaths per minute. This equates to one breath approximately every 5-6 seconds.

**DEFIBRILLATE APPROPRIATELY**: Deliver one shock, as soon as possible, and then immediately resume chest compressions. Check the rhythm and pulse if indicated after 2 minutes of CPR. At the end of each 2 minute cycle, have the defibrillator charged and ready, if needed.
Review for Healthcare Providers
The CAB's of CPR

**Rapid Assessment:** quick visual survey: be sure you’re in a safe area. (shake-shout & tap)
Recognize unresponsiveness, call for help. briefly check breathing and pulse simultaneously.
If unresponsive: call a “code” or 911

**C = Circulation** - Check for a pulse Max - 10 seconds. If pulse is not definite, begin compressions.
**A = Airway** - Open airway (head tilt/chin lift)
**B = Breaths** - Give 2 breaths then back to compressions
**D = Defibrillator** - Attach a manual defibrillator or AED

<table>
<thead>
<tr>
<th>CPR Reference</th>
<th>Adults (&gt; puberty)</th>
<th>Children (1 - puberty)</th>
<th>Infants (&lt; 1 yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rescue breathing, Victim definitely has a pulse</td>
<td>10-12 breaths/min recheck pulse every 2 minutes</td>
<td>12-20 breaths/min recheck pulse every 2 minutes</td>
<td>12-20 breaths/min recheck pulse every 2 minutes</td>
</tr>
<tr>
<td>Compression landmark</td>
<td>Middle of the chest, between the nipples</td>
<td>Middle of the chest, between the nipples</td>
<td>1 finger below nipple line</td>
</tr>
<tr>
<td>Compression depth</td>
<td>2-2.4 inches</td>
<td>Approx 1/3 depth of chest 2 inches</td>
<td>Approx 1/3 depth of chest 1 ½ inches</td>
</tr>
<tr>
<td>Rate of compressions per minute</td>
<td>100-120/min</td>
<td>100-120/min</td>
<td>100-120/min</td>
</tr>
<tr>
<td>Ratio of compressions to breaths</td>
<td>30:2 Change compressors and reevaluate every 2 min</td>
<td>30:2 15:2 if 2 rescuer Change compressors and reevaluate every 2 min</td>
<td>30:2 15:2 if 2 rescuer Change compressors and reevaluate every 2 min</td>
</tr>
</tbody>
</table>

*Once an advanced airway is placed ventilations will be 1 every 6 sec. with continual compressions.

**Foreign Body Airway Obstruction**
* If not rapidly removed call Emergency Medical Service*

**Conscious Choking**

<table>
<thead>
<tr>
<th>Adult</th>
<th>Child</th>
<th>Infant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal Thrusts</td>
<td>Abdominal Thrusts</td>
<td>5 Back Blows/5 Chest Thrusts</td>
</tr>
</tbody>
</table>

**Unconscious Choking (FBOA)**

<table>
<thead>
<tr>
<th>Adult</th>
<th>Child</th>
<th>Infant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Call a “code” or call 911 Begin CAB’s of CPR Before giving breaths: look in mouth for foreign body, remove object if it is seen. Repeat cycles of CPR if needed</td>
<td>Begin the CAB’s of CPR If second rescuer is present, send them to call “code” or 911, otherwise, call after 2 min of CPR Before giving breaths: look in mouth for foreign body, remove object if it is seen. Repeat cycles of CPR if needed</td>
<td>Begin the CAB’s of CPR If second rescuer is present, send them to call “code” or 911, otherwise, call after 2 min of CPR Before giving breaths: look in mouth for foreign body, remove object if it is seen. Repeat cycles of CPR if needed</td>
</tr>
</tbody>
</table>
Ideally, all medications are given through a large bore IV of NS or LR in the antecubital or external jugular. *If an IV site is unavailable the next choice is Intraosseous (IO).* In reality use “what ya got.”

**For Patients in Cardiac Arrest:**
- Give meds rapidly early in sequence during compressions
- Flush all meds with 20mL’s of fluid
- Circulate meds with 2 minutes of CPR

**ENDOTRACHEAL ADMINISTRATION**  
*The LEAST effective route*  
*(Lidocaine, Epinephrine, Atropine, Narcan)*

- 2 - 2.5 times the IV dose
- Stop compressions
- Use at least 10mL’s total (dilute in NS or sterile water)
- Ventilate several times
- Resume CPR

**For Patients in cardiac arrest:**

**BLS ASSESSMENT (C.A.B.(D))**

Determine unresponsiveness and briefly check for effective breathing. If unresponsive, call a “code” or 911.

**C(1) = Circulation:** evaluate for signs of a pulse (10 seconds max). If pulse is absent: begin and maintain compressions, 30 rapid, deep compressions at 100-120 per min

**A(2) = Airway:** open it with a head tilt / chin lift or jaw thrust if neck trauma is suspected

**B(3) = Breathing:** administer 2 breaths after the 30 compressions. If an advanced airway device is placed, ventilate once each 6 seconds while compressions continue.

**D(4) = Defibrillation:** bring and attach a monitor/defibrillator or an AED to the patient shock as soon as appropriate
PRIMARY ASSESSMENT (A.B.C.D)

A (1) - Advanced airway procedures: Reserved for those skilled at these procedures: Tracheal (intubation), or Perilaryngeal tube (LMA, King, I-gel, etc)

B (2) - Breathing: assessed, assured, and secured. Be sure whichever tube is placed is causing chest rise, apply supplemental O₂, then secure the device. Monitor CO₂ once intubated. Exhaled CO₂ is an effective means for measuring ET placement and the quality of CPR.

C (3) - Circulatory interventions: Establish or confirm vascular access and begin cardiac pharmacology. What is the cardiac rhythm? Hint: in cardiac arrest the first medication is always a vasopressor such as Epinephrine. Then Epi may be administered every 3-5 minutes.

D (4) - Disability: check for neurologic function: Assess for responsiveness, level of consciousness and pupil dialation.
-- AVPU: Alert, Voice, Painful, Unresponsive

E (5) – Exposure: remove necessary clothing to perform a physical exam, look for obvious signs of injury, unusual marking, or medic alert bracelets.

SECONDARY ASSESSMENT

Sign and symptoms
Allergies
Medications
Past medical history (especially relating to the current illness)
Last oral intake
Events

Potential reversible causes of cardiac arrest: 5 H’s & 5 T’s:

- Hypoxia
- Hypovolemia
- Hyper/Hypokalemia
- Hypothermia
- Hydrogen ion (acidosis)

- Toxins (overdose)
- Thromboemboli - Pulmonary
- Thromboemboli - Coronary
- Tension Pneumothorax
- Tamponade (cardiac)

Post Cardiac Arrest Induced Hypothermia: Targeted Temperature Mgmt.
Numerous studies show improved neurological recovery for post arrest patients who are cooled to the low 90’s F° (32-36°C) following a successful resuscitation if the patient has no appropriate neurological response. The hypothermic state is maintained for 24+ hours.

For Perfusing Patients (people with pulses)

Begin with the basics of all patient care:
- Assess and maintain Circulation, Airway, and Breathing
- Evaluate the patient’s symptoms and related (targeted) history, begin a physical exam

Things to do:
1. Administer oxygen - only if needed (Dyspnea, Hypoxia - O₂ sat < 94 % or 90%, CHF)
2. Assess and monitor vital and diagnostic signs (Pulse, Respirations, BP, O₂ sat, EKG rhythm)
3. Establish vascular access
4. Obtain 12 lead ECG and Chest X-ray
5. Obtain Labs-bleeding times, cardiac enzymes, etc.
OXYGEN

Indications:
- Cardiac patients with signs of hypoxia (dyspnea, rales, O2 sat <94% generally. BUT <90% specifically in ACS)
- Suspected hypoxia of any cause
- Cardiac arrest

Actions:
- Reverses hypoxia

Dosage:
- Nasal cannula @ 2 - 6 Lpm = 24 - 44% FiO2
- Simple plastic face mask @ 6 - 10 Lpm = 40 - 60% FiO2
- Non-rebreather mask @ 10 - 15 Lpm = 90 - 100% FiO2
- Patients with inadequate rate or depth of respirations:
  - Bag-valve mask @ 10 - 15 Lpm with an oxygen reservoir = 90 - 100% FiO2

Side effects:
- High % for extended periods = O2 toxicity
- Rare: Possible respiratory depression in a hypoxic drive patient
- NEVER withhold O2 in patients who need it

Quick tip:
  Let the patient’s need be your guide. In general:
- Ideally maintain oxygen levels at 94 - 99% SaO2
- Monitor closely; high O2 may cause oxygen toxicity and impede cellular healing
- Administer low flow oxygen for patients with chest pain or stroke.
- Ventilate 10 -12 breaths per minute for the apneic patient with a pulse, 10 breaths per minute for the pulseless patient with an advanced airway in place
- Deliver just enough volume to see the chest rise, around 500 - 600mL

EPINEPHRINE

Classification:
Adrenergic (sympathetic) stimulator

Indications:
- Cardiac arrest
- Symptomatic bradycardia refractory to Atropine & transcutaneous pacing (drip only)
- Severe hypotension where fluids are contraindicated or unsuccessful

Actions:
- Positive β effects, including increased heart rate, contractility, and automaticity
- Positive α effects, including peripheral vasoconstriction.

Dosage:
- Bolus: 1mg IV repeat at 3 - 5 minute intervals

Infusion:
- 4mg/250mL’s (16 mcg/mL) D5W or NS.
- For Bradycardia: Infuse 2 -10mcg/min (14-70 mL/hr) titrate
- For Hypotension 0.1-0.5 mcg/kg/min (8-40 mcg/min)(30-150 mL/hr) titrate to SBP above 90

Route:
- IV/IO, ET, IV infusion

Side effects:
- Tachycardia, hypertension, increased O2 demand, PVC’s, tachyarrhythmias
ATROPINE

Classification:
Parasympatholytic (blocks acetylcholine from the parasympathetic nervous system)

Indications:
- Symptomatic bradycardia

Actions:
- Increases heart rate and conduction through the AV node.

Dosage:
- Bolus 0.5mg IV. Repeat at 3 - 5 minute intervals, not to exceed approximately 3mg

Route:
- IV/IO, ET

Side effects:
- Tachycardia, dilated pupils, angina. Smaller doses may cause bradycardia
- Note: Give 0.5 if alive. To minimize the possibility of tachycardia in perfusing patients

AMIODARONE
Cordarone

Classification:
Antidysrhythmic

Indications:
- VT or VF
- Rapid atrial arrhythmias (Usually not as an initial agent)

Actions:
- Prolongs the recovery period of cardiac cells after they have carried an impulse
- Effects sodium, potassium, and calcium channels and α and β channels

Dosage:
- VF/VT-Cardiac arrest: 300mg IV, may repeat 150mg in 3 - 5min X 1
- Perfusing patients (VT some SVT's): 150mg IV/IO over 10 minutes
  - May repeat in 10 minutes IF NEEDED
- Use infusion (below) for continued stabilization of a converted rhythm

Infusion:
- 900mg/500mL (1.8mg/mL) / Infuse @ 1mg/min (33mL/hr) x 6hrs then 0.5mg/min (17mL/hr)
  Max combined daily dose 2.2grams in any 24 hour period

Side effects:
- Hypotension, bradycardia (can be minimized by slowing drug infusion)
- Sinus bradycardia, atrioventricular block
- Congestive heart failure
- Ventricular proarrhythmias (especially if used in conjunction with Procainamide)

Contraindications:
- Marked sinus bradycardia due to severe sinus node dysfunction
- Second- or third-degree AV block
- Cardiogenic shock
AMIODARONE (Continued)

- **Note:** Early Amiodarone was diluted by some manufacturers in a carrier solution that foams when agitated. Draw up slowly and avoid shaking the drug vial.

- **Note:** Don’t give antidysrhythmic drugs to bradycardic patients. Premature beats still deliver blood. *Remember to stabilize rate, then rhythm, then blood pressure.*

LIDOCAINE

**Classification:**
Antidysrhythmic

**Indications:**
- VF, VT, PVC’s

**Actions:**
- Sodium channel blocker
- Depresses ventricular irritability and automaticity
- Increases fibrillation threshold

**Dosage:**
- VF & Pulseless VT = 1.0 - 1.5mg/kg. Repeat at half dose if necessary. Max: 3mg/kg
- VT or PVC’s = 0.5 - 0.75 mg/kg up to 1 - 1.5mg/kg
  - then 0.5 - 0.75mg/kg every 5 - 10 minutes IF NEEDED, not to exceed 3mg/kg

**Infusion:**
- Maintenance Infusion: Mix 2gm/500mL D5W (4mg/mL)
  - Infuse @ 1 - 4mg/min (15 - 60 mL/hr)

**Route:**
- IV/IO, ET

**Side effects:**
- Muscle tremors, paresthesias, CNS symptoms – seizures

PROCAINAMIDE

**Classification:**
Antidysrhythmic

**Indications:**
- Stable monomorphic VT with normal QT interval
- Supraventricular arrhythmias especially A-fib and A-flutter
- Control of rapid ventricular rate due to accessory pathway in pre-excited atrial rhythms
- PSVT not controlled by Adenosine

**Actions:**
- Depresses atrial and ventricular automaticity
- Slows down conduction through all the pacemakers

**Dosage:**
- 20 - 50mg/min bolus (1gm/50mL @ 60 - 90mL/hr) not to exceed 17mg/kg

**Infusion:**
- Maint. Infusion: Mix 2gm/500mL D5W (4mg/mL). Infuse @ 1 - 4mg/min (15 - 60 mL/hr)

**Side effects:**
- Hypotension (especially with rapid injection), widening of QRS complex. Avoid use in patients with preexisting prolonged QT interval and Torsades de Points

**End points of administration:**
Arrhythmia suppressed, Hypotension develops, QRS widens by 50%, Max dose is (17mg/kg)
**ADENOCARD**  
Adenosine

**Classification:**  
Antidysrhythmic

**Indications:**  
- Supraventricular Tachycardia (specifically Atrial Tachycardia)  
  - may try in regular wide tach (aberrant SVT)

**Actions:**  
- Abolishes reentry, slows AV conduction

**Dosage:**  
- 6mg IV/IO rapidly, followed by saline flush. May be repeated at 12mg rapid IV if needed.  
  Decrease dose to half for patients taking Persantine (Dipyridamole) or Tegretol (Carbamazepine)

**Route:**  
- IV/IO push-rapid (Adenosine has less than 10 second half life)

**Side effects:**  
- Transient reentry dysrhythmias, chest pain, palpitations, flushing, headache  
- Warn the patient that he may not feel well and push the monitor’s record button before pushing the drug. Push...flush...fast!!

**CARDIZEM**  
Diltiazem HCl

**Classification:**  
Antidysrhythmic (Calcium channel antagonists)

**Indications:**  
- Supraventricular tachydysrhythmias (Especially A-fib and A-flutter)

**Actions:**  
- Calcium channel antagonist  
- Slows conduction  
- Smooth muscle dilation

**Dosage:**  
- 15 - 20mg (0.25 mg/kg) over 2 minutes, may repeat with 25mg (0.35mg/kg) IVP in 15 minutes if needed  
- Infusion: Mix 1:1 (eg: 125mg/100mL) (1 mg/mL) infuse at 5 - 15mg/hr

**Route:**  
- IV push slowly and IV infusion

**Side effects:**  
- Bradycardia, hypotension (Do not use in patient with WPW history)  
  **Note:** Reverse calcium channel blocker adverse effects with calcium administration
**VERAPAMIL**
Isoptin, Calan

**Classification:**
Antidysrhythmic (calcium channel antagonist)

**Indications:**
• Supraventricular tachydysrhythmias (Especially Afib and Aflutter)

**Actions:**
• Calcium channel antagonist
• Slows conduction
• Smooth muscle dilation

**Dosage:**
• 2.5 - 5mg IVP over 1 - 2 minutes
• May repeat at 5 - 10mg after 15 - 30 minutes

**Route:**
• IV push slowly

**Side effects:**
• Bradycardia, hypotension (do not use in patient with WPW history)

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**DIGITALIS**
Lanoxin, Digoxin

**Classification:**
Cardiac glycoside

**Indications:**
• CHF (Better for chronic management than acute)
• Chronic Atrial fibrillation

**Actions:**
• Increases stroke volume by increasing force of contraction
• Slows conduction through the AV node

**Dosage:**
• Loading Dosage: 10 - 15mcg/kg lean body weight (usually 0.5 - 1mg)
• Maintenance Dosage: is determined by patient’s size, renal function, and blood levels
MAGNESIUM SULFATE

Classification:
Antidysrhythmic (electrolyte)
(Electrolyte, which has antidysrhythmic properties if ectopy is due to hypomagnesemia)

Indications:
- Refractory ventricular dysrhythmias, Torsades de Pointes, hypomagnesemia

Actions:
- Stabilizes tissue membranes (including myocardial cells), elevates Magnesium levels

Dosage:
- VT with a pulse: 1 - 2gm diluted in 10mL over 1 - 2 minutes (if thought to be Torsades)
- Refractory VF or pulseless VT (if potentially Torsades ): 1 - 2gm IV push
- Hypomagnesemia without ectopy: 0.5 - 1gm/hr infusion

Route:
- IV Push or IV infusion

Side effects:
- Mild bradycardia, hypotension

Caution:
- Overdose: diarrhea, paralysis, circulatory collapse

SODIUM BICARBONATE

Classification:
Alkalinizer, buffer

Indications:
- Metabolic acidosis from any cause (arrest, shock, renal failure, ketoacidosis)
- Tricyclic antidepressant overdose
- Hyperkalemia

Actions:
- Increases pH, reverses acidosis

Dosage:
- 1mEq/kg IV push, followed by 0.5mEq/kg every 10 minutes based on ABG’s
- (may be given as a slow infusion in overdoses where bicarb is indicated)

Route:
- IV push or IV infusion

Side effects:
- Hypernatremia, hyperosmolality, metabolic alkalosis
- Note: The “Give one amp of bicarb” routine only works on TV. Unless the patient weighs 50kg, one amp is under-dosing. Pay attention to weight based dosing.
**CALCIUM**  
Calcium Chloride, Calcium Gluconate

**Classification:** Electrolyte (calcium ion)

**Indications:** *(Should not be administered unless these conditions exist)*
- Hypocalcemia
- Hyperkalemia
- Calcium Channel Blocker or Magnesium overdose

**Actions:**
- Increased inotropic effect, increased automaticity

**Dosage:**
- *Calcium Chloride:* 2 - 4mg/kg of a 10% solution repeated in 10 minutes if necessary. Usual dose 500mg - 1gm

**Route:**
- IV/IO

**Side effects:**
- Hypercalcemia, VF, exacerbates digitalis toxicity

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**NOREPINEPHRINE**  
Levophed

**Classification:** Adrenergic stimulator (sympathetic nervous system). Vasopressor

**Indications:**
- Hypotension refractory to Dopamine
- SBP < 70 mmHg and low peripheral resistance

**Actions:**
- Primarily alpha effects causing an increase in systemic vascular resistance through vasoconstriction

**Dosage:**
- Mix 4mg/250ml D5W or NS = 16mcg/mL
- Begin infusion at 0.1 - 0.5mcg/kg/min (8-40mg=30-150mL/hr)

**Route:**
- IV infusion only

**Side Effects:**
- Increased myocardial work and oxygen consumption. May cause tachycardia and myocardial ischemia. Severe tissue necrosis if infiltrated
**DOPAMINE**

**Classification:** Adrenergic stimulator (sympathetic nervous system), inotrope, and chronotrope

**Indications:**
- Symptomatic hypotension (SBP 70 -100 mmHg with signs of shock)
- Refractory bradycardia

**Actions:**
- Beta effects (2 - 10mcg/kg/min): Primarily increased HR & force increasing cardiac output
- Alpha effects (10 - 20mcg/kg/min): Peripheral vasoconstriction, increasing afterload

**Dosage:**
- 2 - 20mcg/kg/min (usual cardiac starting dose 5mcg/kg/min)
- Mix 800mg/500mL D5W = 1600mcg/mL. Begin @ 5mcg/kg/min & titrate to a systolic BP of 90

<table>
<thead>
<tr>
<th>Initial drip rate to infuse 5mcg/kg/min = 10% of patient’s weight in pounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example: 150 lb. patient: Rate = 15mL/hr, 90 lb. patient: Rate = 9mL/hr</td>
</tr>
</tbody>
</table>

**Route:**
- IV infusion only

**Side effects:**
- Chest pain, tachydysrhythmias, hypertension, PVC’s
- Note: Consider adding fluid volume when administering an inotropic agent if the patient may be hypovolemic.
- Remember Starling’s law: “You need stretch of the muscle before you get squeeze”.

**NITROPRUSSIDE**

**Nipride**

**Classification:**
Antianginal, antihypertensive

**Indications:**
- Hypertension
- CHF with PE

**Actions:**
- Smooth muscle dilator causing a decrease in preload, afterload, and a resulting increase in venous pooling. Works more on the arterial side than nitroglycerine

**Dosage:**
- Infusion: Mix 50mg/250mL D5W (200mcg/mL) and start at 0.5 – 8 mcg/kg/min (start at: 15mL/hr)

**Route:**
- IV infusion only

**Side effects:**
- Hypotension, headache, thiocyanate toxicity possible when metabolized
**FUROSEMIDE**
*Lasix*

**Classification:**
Loop diuretic

**Indications:**
- Pulmonary edema

**Actions:**
- Venodilation: causing reduced central venous pressure
- Inhibits the reabsorption of sodium in the kidneys, causing diuresis

**Dosage:**
- Generally given in 20mg increments (or double the patients PO dose).

**Route:**
- IV Push slowly

**Side effects:**
- Dehydration, Tinnitus, Hypokalemia

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**NITROGLYCERIN**
*Nitrostat, Tridil*

**Classification:**
Antianginal, Antihypertensive

**Indications:**
- Angina, MI, CHF (provided patient has SBP > 90 mmHg)

**Actions:**
- Smooth muscle dilator causing a decrease in preload, afterload, and a resulting increase in venous pooling, thus reducing the workload of the myocardium
- May also reduce coronary artery vasospasm

**Dosage:**
- Tablet or metered spray: 1 SL (0.3 - 0.4mg dose) every 5 minutes
- Infusion: 10 mcg/min to start (Mix 50mg/250mL = 200mcg/mL. Start at approx. 3mL/hr & titrate)

**Route:**
- SL, IV infusion

**Side effects:**
- Hypotension, headache, tachycardia following hypotension

**Caution / Avoid:**
- Erectile Dysfunction Drugs ex: Viagra & Levitra (24hrs), Cialis (48hrs), Right Ventricular Infarct, Brady or Tachy (without CHF), Hypotension
Morphine

Classification:
Narcotic analgesic

Indications:
- Chest pain during STEMI not relieved by 3 doses of NTG
- Pulmonary edema

Actions:
- Potent analgesic
- Promotes venous pooling causing a decrease in preload
- Reduces anxiety

Dosage:
- 2 - 4mg increments

Route:
- IV push slowly

Side effects:
- Respiratory depression, Hypotension, Nausea
- Use with caution in unstable angina / Non ST elevated patients (mortality increase noted)

ASPRIN

Classifications:
Anticoagulant, antipyretic, analgesic

Indications:
- Chest discomfort of cardiac nature
- Unstable angina

Actions:
- Blocks formation of thromboxin A2 which is responsible for platelet aggregation and vasoconstriction, thus keeping platelets from becoming lodged in partially occluded coronary vessels.

Route:
- Oral

Dosage:
- 160 - 325mg chewable tablets
**BETA BLOCKERS**

Metoprolol (Lopressor), Sotolol (Betapace), Esmolol (Breviblock)

**Classification:**
Beta Adrenergic Blocker

**Indications:**
- Secondary management ACS after patient is stable; usually 6-8 hours
- Supraventricular tachydysrhythmias, refractory to other therapies

**Actions:**
- Decreases heart rate, stroke volume, automaticity, and conductivity

**Dosage:**
- Metoprolol (Lopressor): 5mg; may repeat in 5 minutes to max of 15mg
- Sotolol (Betapace): 100mg over 5 minutes (for VT)
- Esmolol (Brevibloc): Load with 500mcg/kg over 1 min, then maintenance = 50mcg/kg over 4 min, (may repeat loading and increase maintenance if unsuccessful)

**Route:**
- Depends on the drug
  *Oral doses are generally used unless acutely hypertensive

**Contraindications:**
- CHF, Hypotension, Asthma, Bradycardia, Heart Blocks

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**CLOPIDOGREL**

Plavix

**Classification:**
Anticoagulant

**Indications:**
- ST segment elevation MI (STEMI)
- High risk ST depression or T wave inversion
- Patients with planned PCI
- Antiplatelet therapy in patients who cannot take Aspirin (especially during ACS)

**Actions:**
- Blocks ADP which inhibits glycoprotein and the effectiveness of the clotting process

**Dosage:**
- 300mg po initially, followed by 75mg po daily (reduce initial dose for elderly)

**Considerations:**
- Caution in patients with hx of bleeding. Contraindicated in patients actively bleeding
- Metabolized by the liver - caution in patients with impaired hepatic function
- Do not administer if cardiac surgery planned in the near future
**FIBRINOLYTICS**

**Classification:** Fibrinolytic

**Indications:**
- AMI less than 12 hours old with 12 lead EKG showing ST elevation in 2 related leads
- Acute ischemic stroke of less than 3 hours with no bleed on CT scan

**Actions:**
- Lysis of fibrin, which holds together thrombi blocking coronary or cerebral arteries.
- Decrease in thrombus size allows enhanced blood flow distal to the clot and decreases the size of the infarct.

**Dosage:**
- Tenectaplas (TNK): Single bolus 30 - 50mg (depending on weight) IVP over 5 seconds
- Reteplase (Retavase): 10 Units IV followed by a 10 unit bolus 30 minutes apart
- Alteplase (Activase-tPA): 15mg IV bolus, then 0.75mg/kg over 30 minutes, then 0.5 mg/kg over 60 min
  *Activase for stroke: 0.9mg/kg (max. 90mg) 10% as bolus and remaining over 60 minutes

**Side effects:**
- Bleeding, allergic reaction, reperfusion arrhythmias

**Contraindications:**
- Active bleeding, hemorrhagic stroke, intracranial neoplasm, aortic dissection
- There are also numerous relative contraindications for physician consideration

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**HEPARIN**

**Classification:** Anticoagulant

**Indications:**
- Patients undergoing angioplasty
- Selected patients receiving fibrinolytic therapy
- In MI patients for pulmonary embolism prophylaxis until fully ambulatory

**Actions:**
- Prevents conversion of fibrinogen to fibrin and prothrombin to thrombin to inhibit clotting

**Dosage:**
- Bolus dose of 60U/kg followed by infusion of 12U/kg/hr

**Side effects:**
- Hemorrhage, thrombocytopenia

**Contraindications:**
- Active bleeding, peptic ulcer disease, severe hepatic disease, hemophilia
LOW MOLECULAR WEIGHT HEPARIN  
(FRACTIONATED HEPARINS)  
Enoxaparin (Lovenox), Dalteparin (Fragmin)  

Classification:  
Anticoagulant  

Indications:  
- Chest pain with ST depression or positive cardiac markers  

Actions:  
- Inhibit clotting factor Xa. Only slightly effects thrombin, PT and PTT  

Dosage:  
- Enoxaparin (Lovenox): 30mg IV bolus in STEMI, then 1mg/kg SQ every 12 hrs  
- Dalteparin (Fragmin): 120U/kg SQ every 12 hrs x 5 - 8 days  

Contraindications:  
1. Sensitivity to Heparin or pork products  
2. Caution in patients with heparin induced thrombocytopenia, elderly, renal insufficiency  

Adverse reactions:  
- Bleeding, ecchymosis  
- Spinal column hematomas in patient’s post spinal or epidural anesthesia  

GLYCOPROTEIN IIb/IIIa INHIBITORS  
ReoPro (Abciximab), Aggrastat (Tirofiban), Integrilin (Eptifabide)  

Indications:  
- Chest pain with ST segment depression  
- Non Q wave MI  
- Unstable Angina  

Action:  
- Blocks enzyme glycoprotein IIb/IIIa, which is essential for platelet aggregation  

Dosage:  
- Eptifabide (Integrelin): 180mcg/kg IV over 1 - 2 min followed by infusion of 2mcg/kg/min (decrease to 0.5mcg/min pre cardiac cath). Drug available in 100mL bolus vials and 100mL infusion vials, which can be spiked directly for administration.  
- Tirofiban (Aggrastat): Infuse 0.4mcg/kg/min x 30 min and then 0.1mcg/kg/min for 18 - 24 hrs  
- Abciximab (ReoPro): 0.25mg/kg IV followed by infusion of 1mcg/min for 18 - 24 hrs  

Side effects:  
- Bleeding (more likely in females, pt < 75 lbs, > 65yr, hx of GI disease, or receiving fibrinolytics)  
- Nausea, vomiting, hypotension, bradycardia  
- Further risk of bleeding when used in combination with Aspirin and Heparin  

Contraindications:  
- Active internal bleeding / bleeding in past 30 days. Platelets < 100,000  
- B/P Systolic >180, Diastolic >100
ACE INHIBITORS
Enalapril (Vasotec), Captopril (Capoten), Lisinopril (Prinivil)

Classification:
Antihypertensive

Action:
- Selectively suppresses the renin-angiotensin-aldosterone system
- Inhibits conversion of angiotensin I to angiotensin II, resulting in dilation of arterial & venous vessels
- Attenuates cardiac remodeling post MI

Indications:
- Hypertension, CHF
- Post MI (first 24 hours then long term)

Dosage:
- Vasotec: 5 - 40mg po Q day, 0.625 - 1.25mg IV over 5 min every 6hr
- Capoten: 12.5 - 50mg po BID/TID
- Prinivil: 10 - 40mg po Q day

Route:
- IV, PO

Side effects:
- Hypotension, chest pain, tachycardia, dysrhythmias
EKG Points:

**EKG Rhythm Strip:**
Utilizes 3-5 leads to record the electrical signals in the heart. Specifically measuring rate, regularity and origin of the activity. Proper lead placement is required to obtain a clear and accurate image.

**12 Lead EKG** evaluates for evidence of decreased coronary artery blood flow (STEMI).
Requires a specific 12 lead EKG unit with 10 electrode cables properly placed to obtain an accurate image.

**STEMI:** or ST-segment elevation myocardial infarction, is characterized by new ST-segment elevation in 2 related leads that suggests myocardial infarction.

**OR**

**NSTE-ACS,** or non–ST-segment elevation ACS, is characterized by ST-segment depression, T-wave inversion or transient T-wave elevation. May be indicative of unstable angina (UA) as well. Cardiac enzyme evaluation (Troponin) is utilized to diagnose myocardial injury, which is considered NSTEMI.

**Unstable angina**—often presents with complaints of chest pain, but displays no ST-segment elevation (NSTE-ACS), and normal cardiac serum markers. This patient will require further cardiology assessment and monitoring, as serum markers (cardiac enzyme test) could later become elevated and denote a high risk indicator for further progression.

**Common physical signs of hemodynamic imbalance:**

**Left Ventricular Failure:** hyper or hypotension, crackles, weak peripheral pulses

**Cardiogenic Shock:** hypotension, cool clammy skin

**12 Lead ECG Management Goals:**
- Identify patients with STEMI and determine their options for early intervention
- Relieve the ischemic chest pain
- Assess and manage complications
VENTRICULAR FIBRILLATION
or
PULSELESS VENTRICULAR TACHYCARDIA

“Circle of Life”
Core concepts of Resuscitation
Assess CAB’s and Begin CPR
Attach monitor / defibrillator
Defibrillate (*device specific dose)
Administer Oxygen
Continue CPR in 2 minute cycles

[Secondary procedures]
Secure Airway and Establish IV or IO with
NS or LR during CPR
⇓
Defibrillate @ device specific dose
Continue CPR 2 minutes
⇓
Given during CPR
Epinephrine 1mg
(Continue Epinephrine Q 3-5 min.)
⇓
*Defibrillate @ device specific dose
Continue CPR 2 minutes
⇓
Antidysrhythmic of choice
Given during CPR
Amiodarone 300mg OR
Lidocaine 1-1.5 mg/kg
⇓
*Defibrillate @ device specific dose
Continue CPR 2 minutes

Repeat Sequence of CPR 2 min-Defibrillate-1 Medication
Repeat Epinephrine Q 3-5 minutes
Repeat Amiodarone 150mg 1x
OR
Lidocaine 0.5 - 0.75mg/kg up to 3mg/kg max

Evaluate for & treat reversible causes anytime during the sequence
Hypoxia
Hypovolemia
Hydrogen ion (Acidosis)
Hyper/Hypokalemia
Hypothermia
Toxins (overdose)
Thrombosis - Pulmonary
Thrombosis - Coronary
Tamponade - (Cardiac)
Tension Pneumothorax

Quick tip
The sequence should be:
CPR → Drug → Shock → CPR

Tips for successfully managing this case:

* Don’t forget:
  ▪ Continue CPR
  ▪ Throughout and for 2min between shocks
  ▪ Monitor for effective CPR - Use ETCO₂
  ▪ 2° compression
  ▪ Full recoil
  ▪ No rush to intubate
  ▪ Start/upgrade IV or IO
  ▪ Gather focused history

Primary goal: continue effective CPR followed by rotating medications.

*Verbalize appropriate drug, dose, route, flush, and reevaluate patient every 2 minutes.

Once a rhythm is restored, maintain ventilations as appropriate then stabilize in order:
1. rate
2. rhythm
3. blood pressure
ASYSTOLE
or
PULSELESS ELECTRICAL ACTIVITY (PEA)

Assess CAB’s and Begin CPR
Attach monitor / defibrillator
Administer Oxygen
Continue CPR in 2 minute cycles
Stop briefly every 2 min to assess

[Secondary procedures]

Secure Airway & Establish IV or IO with NS or LR during CPR

Epinephrine 1mg (as soon as possible)
Continue CPR

Give Epinephrine Q 3 - 5 min
Continue CPR

While searching for reversible causes:

Evaluate for & treat reversible causes anytime during the sequence

Hypoxia
Hypovolemia
Hydrogen ion (acidosis)
Hyper/Hypokalemia
Hypothermia

Toxins (overdose)
Thrombosis - Pulmonary
Thrombosis – Coronary
Tamponade - (Cardiac)
Tension Pneumothorax

*If patient remains in asystole or other agonal rhythms after successful airway control and initial medications and no reversible causes are identified, for over 20 minutes, consider termination of resuscitative efforts

To work on Asystole or PEA:

Think **DEAD**: **D**o **CPR**, **Epi**, **A**nd, **D**o it again or

Think **PEA** (for both PEA and Asystole) **P**ush **Epi** And… **C**onsider the cause

Tips for successfully managing this case:

- Don’t forget:
  - Continue CPR throughout
  - Monitor for effective CPR - Use ETCO₂
  - 2" compression
  - Full recoil
  - No rush to intubate
  - Start/upgrade IV or IO
  - Gather focused history

Primary goal: continue effective CPR followed by rotating medications.

*Verbalize appropriate drug, dose, route, flush, and reevaluate patient every 2 minutes.

Once a rhythm is restored, maintain ventilations as appropriate then stabilize in order:
1. Rate
2. Rhythm
3. Blood pressure
POST ARREST CARE

Return of spontaneous circulation (ROSC)

Optimize Ventilation and Oxygenation
- Secure airway as appropriate
- Maintain respiratory rate approximately 10/min
- Maintain oxygen saturation 94 - 99%
- Maintain PaCO2 40-45mmhg
- Maintain exhaled CO2 35 - 40 mmhg

Optimize Cardiac Function

Stabilize Heart Rate (above 60 BPM)

Only if needed: Stabilize Rhythm
- Antiarrhythmic Infusion
  or (bolus and infusion for serious ectopy)

Stabilize Blood Pressure
- Fluids up to 1-2 liters
- Vasoactive Infusions

Advanced Critical Care

12 Lead for STEMI
- Consider PCI Center

Inappropriate Neurological Response
- (not following commands)

Induce Targeted Temperature Management
- (32 – 36°C)

Monitor, Address, and Maintain All:
- Hypoxia
- Hypovolemia
- Hydrogen ion (Acidosis)
- Hyper/Hypokalemia
- Hypothermia
- Toxins (overdose)
- Thrombosis - Pulmonary
- Thrombosis - Coronary
- Tamponade (Cardiac)
- Tension Pneumothorax

While much of this is done simultaneously, the general mode of treatment is:

Stabilize the Rate → Stabilize the Rhythm → Stabilize the Blood Pressure

Excessive Ventilation

Although the delivery of oxygen is important to support breathing after ROSC some tips to keep in mind:

- Avoid hyperventilation due to potential for increased intrathoracic pressure, decreased cardiac output and decreased blood flow to the brain
- Titrate oxygen to achieve O2 sat ≥94-99%. Hyper-oxygenation may cause cellular toxicity
**SYMPTOMATIC BRADYCARDIA**
(hypotension, ventricular ectopy)

**Assess and maintain CAB’s**
Administer O₂ if needed
Assess vitals
Apply monitors (EKG, Pulse Ox, B/P)
Targeted history / Physical exam
Establish IV access

**Evaluate rhythm**
Wide complex 3rd degree
or 2nd degree type II heart block?

**YES**
May attempt Atropine
Prepare for transcutaneous Pacemaker,
Dopamine or Epi-infusion

**NO**

- Atropine 0.5mg IVP (repeat q 3 - 5 min, max 3mg)

- If unsuccessful and seriously symptomatic

- Apply transcutaneous pacemaker @ 60 BPM
  or
  Dopamine infusion
  2-10mcg/kg/min titrate to heart rate >60
  (not to exceed 20mcg/kg/min)
  or
  Epinephrine infusion
  2-10 mcg/min titrate to heart rate >60

**Prepare for transvenous pacemaker** if needed

---

**Quick Tip**

For symptomatic bradycardia’s:

**After Ten Don’t Eat** : Atropine, Transcutaneous Pacemaker, Dopamine Infusion, Epinephrine Infusion

---

Tips for successfully managing this case:

- Don’t forget:
  - Administer O₂ if needed
  - Start/upgrade IV

* Determine whether patient is stable or unstable
  - Gather data
  - Get vital signs
  - Attach monitor(s)
  - EKG
  - Pulse oximeter
  - BP

Start with:
  - Level of consciousness
  - Blood pressure
  - Lung sounds
  - Presence/absence of chest pain
  - Gather problem focused history

*Your goal:
Control the rate,
improve perfusion
and maintain a normal rhythm

* Verbalize appropriate drug,
dose, route flush,
and reevaluate patient after each intervention
Bradycardias

Bradycardias are treated if the patient is symptomatic. i.e., has signs of poor perfusion or PVC’s

**Junctional Escape Rhythm**

When higher pacemaker sites fail, the AV JUNCTION takes over. The atria are depolarized via retrograde conduction. Ventricular conduction is normal.

- **REGULARITY:** The rhythm is regular
- **RATE:** Usually 40 - 60
- **P-WAVES:** The P-wave can come before or after the QRS complex, or it can be lost entirely within the QRS

**Idioventricular Rhythm**

In the absence of a higher pacemaker, the VENTRICLES initiate a regular impulse at their inherent rate of 20 - 40 beats/minute.

- **REGULARITY:** Is usually regular
- **RATE:** Is usually 20 - 40 beats per minute
- **P-WAVES:** No P-waves in this arrhythmia
- **PRI:** There is no PRI
- **QRS:** The QRS complex is wide and bizarre

**First Degree Heart Block**

The AV NODE holds each sinus impulse longer than normal before conducting it through the ventricles. Each impulse is eventually conducted. Once into the ventricles, conduction proceeds normally.

- **REGULARITY:** This will depend on the regularity of the underlying rhythm
- **RATE:** Will depend on the rate of the underlying rhythm
- **P-WAVES:** The P-waves will be upright and uniform. Each P-wave will be followed by a QRS complex.
- **PRI:** The PRI will be constant across the entire strip, but it will always be greater than .20 seconds.
- **QRS:** The QRS complex measurement will be less than 0.12 seconds
Heart Blocks
In the acute setting, heart blocks are treated as bradycardias. However, there is some controversy over whether to use Atropine in the MI setting. Also, for wide 3º blocks and 2º type II blocks, some experts choose to avoid Atropine and apply the pacemaker or chronotropic infusions.

**Wenckebach (Mobitz Type I)**
As the sinus node initiates impulses, each one is delayed in the AV NODE a little longer than the preceding one, until one is eventually blocked completely. Those impulses that are conducted travel normally through the ventricles.
- **REGULARITY:** Irregular in a pattern of grouped beating.
- **RATE:** Since some beats are not conducted, the ventricular rate is usually slightly slower. The atrial rate is normal.
- **P WAVES:** Upright and uniform. Some P waves are not followed by QRS complexes.
- **PRI:** Get progressively longer, until on P wave is not followed by a QRS complex. After the blocked beat, the cycle starts again.
- **QRS:** The QRS complex measurement will be normal

**Classic Second Degree Heart Block (Mobitz Type II)**
The AV NODE selectively conducts some beats while blocking others. Those that are not blocked are conducted through to the ventricles. Once in the ventricles, conduction proceeds normally.
- **REGULARITY:** If the conduction ratio is consistent, the rhythm will be regular. If the conduction ratio varies, the rhythm will be irregular.
- **RATE:** The atrial rate is usually normal. Since many of the atrial impulses are blocked, the ventricular rate will usually be in the bradycardia range.
- **P WAVES:** Upright and uniform. There are more P waves than QRS complexes.
- **PRI:** Conducted beats will be constant.
- **QRS:** The QRS complex measurement will be normal

**Complete (3º) Heart Block**
The block between the atria and the ventricles is complete. The sinus beats are not conducted through to the ventricles. An escape mechanism from either the junction (if the block is high in the AV node) or the ventricles (if the block is in the bundle branches) will take over to pace the ventricles. The atria and the ventricles function in a totally dissociated fashion.
- **REGULARITY:** Both the atria and the ventricles are firing so the P-P intervals and the R-R intervals are regular.
- **RATE:** The atrial rate will usually be in a normal range. The ventricular rate may be 20-60.
- **P WAVES:** More P waves than QRS complexes.
- **PRI:** No atrial impulses conducted to the ventricles. The P-waves have no relationship to the QRS complexes. May occasionally see a P-wave on or near a QRS complex.
- **QRS:** If the ventricles are being controlled by a junctional focus, the QRS complex will measure less than .12 sec. If the focus is ventricular the QRS will be wide.
For Stabilization of Rhythm after VF or VT Conversion
Evidence recommends treating the underlying cause rather than treating the PVC’s unless the PVC’s occur frequently or in groups (i.e. Salvos or VT). “Routine use not recommended”.

Assess and maintain CAB’s
Administer O₂ if needed
Assess vitals
Apply monitors (EKG, B/P, Resp Pulse Ox)
Targeted history/ Physical exam
Establish IV access
Look for underlying causes and consider whether pharmacologic intervention is appropriate. If indicated:

↓
Antidysrhythmic of choice
May bolus if not already done
Otherwise, move to infusion section below

Amiodarone 150mg over 10 min
OR
Lidocaine 0.5-1.5mg/kg

↓
Repeat antidysrhythmic if needed

↓
If effective, consider an antidysrhythmic infusion of the agent used in the bolus

Infusions:
Amiodarone 1mg/min for 6 hours (900mg in 500mLs @ 33mLs/hr)
Then 0.5mg/min for 18 hours (17mLs/hr)
OR
Lidocaine or Procainamide 1-4mg/min (2grams in 500mLs @ 15mLs/hr)

Quick tip
Generally choose only 1 antidysrhythmic until expert consult:
Amiodarone bolus can be given 1x then repeated every 10 minutes (max 2.2 grams in 24 hrs bolus & infusion)
Lidocaine bolus 1 - 1.5mg/kg then repeated @ half doses to max of 3mg/kg
Procainamide 20 - 50mg/min to max of 17mg/kg
Magnesium 1 - 2 grams over several minutes (ok to mix with others if needed)
HYPOTENSION
(Symptomatic with systolic < 90 mmHg)

Assess and maintain CAB’s
Administer O2 if needed
Assess vitals
Apply monitors (EKG, B/P, Resp Pulse Ox)
Review history/ Physical exam
Establish IV access

↓
Administer fluid bolus’ (1-2 liters)
(If lung sounds are clear)

↓
If needed and lung sounds are still clear
Repeat fluid bolus

May Consider:
Norepinephrine:
If SBP <70 and patient has signs of shock
0.1-0.5 mcg/kg/min

May Consider:
Epinephrine infusion
0.1-0.5 mcg/kg/min

Dopamine drip 2-10mcg/kg/min
(not used as often)
(generally start at 5mcg/kg/min)
(not to exceed 20mcg/kg/min)

*Reminder: Treat the rate, then the rhythm, then the blood pressure

Quick tip:
If hypotension is caused by a dysrhythmia, FIX THE RHYTHM:

- Try to identify cause of hypotension (hypovolemia, pump failure, profound vasodilation) to help identify the most effective treatment

- Watch for unwanted cardiac symptoms such as tachycardia or ectopy when using Norepinephrine, Dopamine, or Epinephrine.
SUPRAVENTRICULAR TACHYCARDIA STABLE

Narrow complex, rate over 150- no signs of Afib or A Fluttter
(Maintaining adequate mentation, blood pressure, respiratory status & absence of serious chest pain)

Assess and maintain CAB’s
Administer O2 if needed
Assess vitals
Apply monitors (EKG, B/P, Resp, Pulse Ox)
Targeted history/ Physical exam
Establish IV access
RULE OUT NON CARDIAC CAUSES

Consider ordering:
Atrial fib/flutter? See AF algorhythm (next page)
(12 lead ECG, Cardiac enzymes, CXR)
(Expert cardiology consult)

Vagal Maneuvers

Adenosine 6mg IVP rapidly followed by flush
If unsuccessful
Adenosine 12mg IVP rapidly followed by flush
If rhythm fails to convert
Choose 1:

Calcium Channel Blocker (one)
Diltiazem 15 - 20mg may repeat 20 - 25 mg in 15 minutes
OR

Beta Blocker (one)
Metoprolol (Lopressor) 5mg over 5 minutes may repeat Q 5 minutes X 2
Atenolol (Tenormin) 5mg over 5 minutes may repeat in 10 minutes
If rhythm still fails to convert
May choose sedation and elective cardioversion or other medications based on a more definitive diagnosis

Tips for successfully managing this case:

Don’t forget:
- Administer O2 if needed
- Start/upgrade IV
* Determine whether patient is stable or unstable
- Gather data
- Get vital signs
- Attach monitor(s)
- EKG
- Pulse oximeter
- BP

Start with:
- Level of consciousness
- Blood pressure
- Lung sounds
- Presence/absence of chest pain
- Gather problem focused history

*Your goal:
Control the rate, improve perfusion and maintain a normal rhythm

*Verbalize appropriate drug, dose, route, flush, and reevaluate patient after each intervention.
ATRIAL FIBRILLATION STABLE
WITH RAPID VENTRICULAR RESPONSE
Sustained rate over 150
(maintaining adequate mentation, blood pressure, respiratory status, & absence of chest pain)

Assess and maintain CAB’s
Administer O₂ if needed
Assess vitals
Apply monitors (EKG, B/P, Resp Pulse Ox)
Targeted history/ Physical exam
Establish IV access
→
Consider ordering:
(12 lead ECG, Cardiac enzymes, CXR) (Expert cardiology consult)
→
Control rate with: Choose 1:
Calcium Channel Blocker
Diltiazem 15 - 20mg may repeat 20 - 25mg in 15 minutes
(consider infusion)
QR
Beta Blocker
Metoprolol (Lopressor) 5mg over 5 minutes
may repeat Q 5 minutes X 2
May choose other Beta blockers: Atenolol, Esmolol

Convert rhythm after expert cardiology consult?
Duration of fib?
→
<48 hrs
→
>48 hrs

Convert rhythm by the same means as the patient who had emboli ruled out

Delay rhythm conversion unless unstable:
R/O emboli or Anticoagulation up to 4 weeks
*Once emboli R/O, May consider any of the following:
1. Elective cardioversion.
   ~ Start: 120 - 200J Biphasic / 200J Monophasic
2. Amiodarone 150mg over 10min then infusion
3. Digitalis 10 - 15mcg/kg (0.5 - 1.0mg)

*Be cautious with medications that may convert A-fib prior to cardiac consult (Amiodarone)
SUPRAVENTRICULAR TACHYCARDIA UNSTABLE
(Any SVT with a rate over 150 with decreased LOC, hypotension, pulmonary edema, or chest pain)

Assess and maintain CAB’s

Administer O₂ if needed
Assess vitals
Apply monitors
(EKG, Pulse Ox, B/P)

RULE OUT NON CARDIAC CAUSES

↓
Brief history
IV/IO access
(do not delay cardioversion)

↓
Immediate management

Sedation
(if conscious and B/P allows)

For Atrial fibrillation:
Start with 120-200J biphasic,
*synchirized, but same energy as defibrillation

Senator synchronized cardioversion
Start at 50-100j
(based on machine - could increase stepwise between 120-360J)

If unsuccessful: medication sequence for stable

Tips for successfully managing this case:

• Don’t forget:
  • Administer O₂ if needed
  • Start/upgrade IV
  • Determine whether patient is stable or unstable
  • Gather data
  • Get vital signs
  • Attach monitor(s)
  • EKG
  • Pulse Oximeter
  • BP

Start with:
  • Level of consciousness
  • Blood pressure
  • Lung sounds
  • Presence/absence of chest pain
  • Gather problem focused history

*Your goal:
Control the rate; improve perfusion and maintain a normal rhythm

*Verbalize appropriate drug, dose, route, flush, and reevaluate patient after each intervention

Quick tip:
If tachycardic and awake (or otherwise stable) first we try to medicate
If tachycardic with a nap (or otherwise unstable) then the treatment is Zap Zap Zap!
**Tachycardias**

Tachycardias fall into one of two categories. Wide or Narrow and Stable or Unstable

- Consider wide rhythms to be Ventricular in origin
- Consider narrow rhythms to be Supraventricular in origin

Unstable Tachycardias are those with decreased LOC, hypotension, pulmonary edema, or chest pain. These patients require synchronized cardioversion.

---

### Atrial Tachycardia

The pacemaker is a single irritable site within the ATRIUM which fires repetitively at a very rapid rate. Conduction through the ventricles is normal.

**REGULARITY:** Regular
**RATE:** Usually 150-250
**P-WAVES:** There is one P-wave for every QRS but it is usually hidden in the T-wave. As P-wave & T-wave come together they make a peak between complexes
**PRI:** Normal, but P-wave is hidden in the T-wave.
**QRS:** Should be normal width

---

### Atrial Flutter

A single irritable focus within the ATRIA issues an impulse that is conducted in a rapid, repetitive fashion. To protect the ventricles from receiving too many impulses, the AV node blocks some of the impulses from being conducted through to the ventricles.

**REGULARITY:** May be regular or irregular
**RATE:** Atrial rate is 250-350 beats/min
**P-WAVES:** Ventricular rate may range from normal to tachy
In atrial flutter produce a saw tooth appearance.
**PRI:** Because of the unusual configuration of the Flutter and the proximity of the wave to the QRS complex, it is often impossible to determine a PRI.
**QRS:** Should be normal width

---

### Atrial Fibrillation

The ATRIA are so irritable that they rapidly initiate impulses, causing the atria to depolarize repeatedly in a fibrillatory manner. The AV node blocks most impulses, allowing only a limited number through to the ventricles.

**REGULARITY:** The ventricular rate is grossly irregular
**RATE:** The atrial rate cannot be measured because it is over 300. The ventricular rate may range from bradycardia to severe tachycardia.
**P-wave:** The atria are fibrillating. No distinct P’s
**PRI:** No PRI can be measured.
**QRS:** Usually normal.

---

### Ventricular Tachycardia

An irritable focus in the VENTRICLES fires regularly at a rate of 150-250 to override higher sites for control of the heart.

**REGULARITY:** Usually regular
**RATE:** Atrial rate cannot be determined.
Ventricular rate range is 150-250.
**P-WAVES:** None of the QRS complexes will be preceded by P-waves. You may see dissociated P-waves intermittently.
**PRI:** Since the rhythm originates in the ventricles, there will be no PRI.
**QRS:** Wide and bizarre.
VENTRICULAR TACHYCARDIA STABLE
(Maintaining adequate mentation, blood pressure, respiratory status, and absence of chest pain)
Wide complex, rate over 150, regular with no P waves or signs of A-fib or flutter

Assess and maintain CAB’s
Administer O₂ if needed
Assess vitals
Apply monitors
(EKG, Pulse Ox, B/P)
Targeted history/ Physical exam
Establish IV access
(Consider ordering)
(12 lead ECG, Cardiac enzymes, CXR)
(Cardiology consult)

Preferred Antidysrhythmic

Consider the following at any time

Sedation and synchronized cardioversion
Begin at 100j, and increase PRN.
(based on machine – could increase stepwise between 120-360J)

Prepare an infusion of the antidysrhythmic medication used if conversion is successful

May use: (generally only one)
Procainamide 20-50 mg/min
~Or~
Amiodarone 150 mg IV drip over 10 min
May repeat 150 mg IV
~Or~
Sotalol 100 mg over 5 min
~Or~
Lidocaine 0.5-1.5 mg/kg
½ initial dose for repeat dose May repeat to max total 3mg/kg
~Or~
Magnesium 1 - 2 gm IV for Torsades or suspected hypomagnesemia

Tips for successfully managing this case:

Don’t forget:
• Administer O₂ if needed
• Start/upgrade IV
• Determine whether patient is stable or unstable
• Gather data
• Get vital signs
• Attach monitor(s)
• EKG
• Pulse oximeter
• BP

Start with:
• Level of consciousness
• Blood pressure
• Lung sounds
• Presence/absence of chest pain
• Gather problem focused history

*Your goal:
Control the rate, improve perfusion and maintain a normal rhythm

*Verbalize appropriate drug, dose, route, flush, and reevaluate patient after each intervention

Quick tip
Find the cause:
Patients don’t have Ventricular Tach because they are low on Amiodarone (or any other antidysrhythmic). Medications are a temporary “Band-Aid” for ventricular irritability, but it is likely to recur if the cause is not diagnosed and treated.
VENTRICULAR TACHYCARDIA UNSTABLE
(Rate over 150 with decreased LOC, hypotension, pulmonary edema, or chest pain)

Assess and maintain CABs
Administer O₂ if needed
Assess vitals
Apply monitors
(EKG, Pulse Ox, B/P)

↓
Targeted history IV/IO access
(do not delay cardioversion for IV)

↓
Immediate management

↓
Sedation
(if conscious and B/P allows)

↓
Synchronized cardioversion
Start @100j;
(based on machine-
could increase stepwise between 120-360j)

If Torsades de Pointes use
(wide irregular rhythm)
unstimulated countershock
at defibrillation doses

If unsuccessful: medication sequence for stable

Quick tip
If tachycardic and awake (or otherwise stable) first we try to medicate
If tachycardic with a nap (or otherwise unstable) then the treatment is Zap Zap Zap!

Unstable = CASH, which gets Joules (“Those with CASH get Joules”)
(Chest pain, Altered LOC, SOB w/ Pulm. Edema/ Hypotension)
ACUTE CORONARY SYNDROMES

Assess and maintain CAB's
Administer O₂ only if needed
Assess vitals
Apply monitors (EKG, Pulse Ox, B/P)
Targeted history / Physical exam
Establish IV access
Perform 12 LEAD ECG
(electrolytes, enzymes-troponin, coags)

Perform simultaneously with initial assessment

**Oxygen** (to maintain saturation *90 - 99%)
**Nitroglycerine** SL or spray
**Aspirin**
**Morphine** IV if pain not relieved by 3 NTG. Only recommended if STEMI

ECG + for AMI <12 hrs
(ST elevation in 2 or more related leads)
-IV Nitroglycerine (continuing ischemia, HTN, PE)
-Heparin or LMWH
-Ace inhibitors (after 6 hrs)
-B Blockers (after stable)

**Immediate:** Prepare patient for:
PCI (Percutaneous Coronary intervention)
#1 choice for pt, <75 yrs old;
Cath, Stent, CABG
Ideal first contact to cath time 90 min

Fibrinolytics
Ideal door or EMS to drug time 30 min

High risk Acute Coronary Syndromes
- ST depression/T wave inversion
- High risk unstable angina
  (female, rales Hx MI, diabetes,
   hypotension, tachy, atrial fib)
  - AMI >12 hrs
- -IV Nitroglycerine
- -Heparin or LMWH
- -Antiplatelets (GPIIb/IIIa inhibitors)
- -Ace inhibitors (after 6 hours)
- -B Blockers (after stable)

**As Available:** Cardiac cath to evaluate OR

Nondiagnostic ECG
or enzymes,
Admit to ED/
chest pain unit
Serial ECgs, Serial
cardiac markers

If suitable for revascularization
PCI
CABG
THE 12 LEAD ECG

**ST Elevation**

- In 2 or more related leads
- Arouses suspicion for injury

**T-Wave Inversion**

- Arouses suspicion for ischemia (may be Angina or early MI)

**Q Wave**

- Small Q wave may be normal > 0.04 sec wide or > 1/3 depth of QRS
- Represents infarction (old MI)

---

Related leads on the ECG:

- S – Septal: V1, V2
- A – Anterior: V3, V4
- L – Lateral: V5, V6, I, AVL
- I – Inferior: II, III, AVF

---

**“The Imposters”**

non AMI causes of ST and QRS changes

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left Bundle branch block</td>
<td>QRS &gt; 0.12 sec, QRS inverted in V1, upright in V6, S-T elevation, depression, and T wave inversion seen throughout. Cannot accurately diagnose MI</td>
</tr>
<tr>
<td>Right bundle branch block</td>
<td>QRS 0.12 sec or wider, rSR pattern in V1, (QRS upright in V1), S-T elevation, depression, and T wave inversion may be seen throughout. May be able to detect MI, especially if comparison ECG available</td>
</tr>
<tr>
<td>Other causes of Wide QRS</td>
<td>Ventricular rhythms, (PVCs, VT), electronic pacemakers, medications, (Quinidine, Pronestyl), any depolarization abnormality can cause repolarization abnormalities</td>
</tr>
<tr>
<td>Left Ventricular hypertrophy</td>
<td>Strain pattern of depressed S-T segments, large QRS complexes in chest leads</td>
</tr>
<tr>
<td>Digitalis</td>
<td>ST segment “sags”. May also be seen with calcium ingestion</td>
</tr>
<tr>
<td>Pericarditis</td>
<td>Widespread ST elevation, T waves upright, no pathological Q waves, Possible PR interval depression in V6. Clinical correlation is necessary. Look for viral syndrome: fever, malaise. Patient will prefer to lean forward, obtaining some relief</td>
</tr>
<tr>
<td>Angina Pectoris</td>
<td>Flat (plane) depressions of S-T segment. Inverted T waves possible. ECG changes may improve with pain relief.</td>
</tr>
<tr>
<td>Prinzmetal’s angina</td>
<td>Slope elevation of S-T, especially in V4-V6. Changes may resolve with pain relief.</td>
</tr>
<tr>
<td>Early repolarization</td>
<td>Normal variant. S-T slightly elevated with normal concave slope in most leads. J point is elevated, possibly with “fishhook” appearance.</td>
</tr>
</tbody>
</table>
ACUTE STROKE

Immediate assessment - Stroke scales / scores

Assess and maintain ABC’s
Administer O₂ only if needed
Assess vitals

Apply monitors (EKG, Pulse Ox, B/P)

Review history / Physical exam

Establish IV access

Conservative IV sticks and blood draws. Blood sugar/Rule out other non-stroke causes

Establish onset Time
Rapid Noncontrast CT

↓

No ---- CT positive for stroke? (hemorrhagic) ---- Yes

↓

Repeat Neuro Exam:
Symptoms improving?
No, to all of the above

↓

• Consult Neurology
• Consider Fibrinolytics if <3 hours since onset of symptoms
• Since 2010 this has been extended to 4.5 hours for certain patients
• Consider Interventional Facility (Comprehensive Stroke Center)

Consult Neurosurgeon

Noncontrast CT or MRI scan of the brain within 10 minutes of the patient’s arrival.

Results should be obtained within 20 minutes and interpreted within 45 minutes.

Goal: door to needle time = 1 hr.

Don’t forget:
• Administer O₂ if hypoxic
• Establish IV access
• Assess for subtle signs of stroke
• Determine time of onset
• Rule out non-stroke causes of deficits
• Alert receiving facility of stroke alert if pre-hospital

Various tools such as the National Institutes of Health Stroke Scale (NIHSS) effectively evaluate:

<table>
<thead>
<tr>
<th>Level of consciousness</th>
<th>Visual function</th>
<th>Motor function</th>
<th>Sensation and neglect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cerebellar function</td>
<td></td>
<td></td>
<td>&amp; Language deficits</td>
</tr>
</tbody>
</table>

Cincinnati PreHospital Stroke Scale (CPSS)
*Rapid Stroke Assessment Tool*
Screens for 3 indicators only:
  ➢ Facial droop
  ➢ Arm drift
  ➢ Abnormal speech
1 abnormal finding = 72% probability of stroke

Rapid Arterial Occlusion Evaluation Scale (RACE)
*Scores 5 areas to screen for possible large vessel occlusion*
# Inclusion Criteria for Fibrinolytic Therapy

## Cardiac

**Inclusion criteria:**
- Chest pain &/or symptoms of acute MI
- QRS duration <120 ms (.12 sec)
- ST segment elevation >1mV (1mm) in 2 or more related leads
  - II, II, aVF
  - V1, V2, V3, V4, V5, V6
  - I, aVL

**Exclusion criteria:**
- Active internal bleeding
- History of CVA/TIA

### Recent (<2 months)
- Intracranial/intraspinal surgery, trauma
- Brain tumor, aneurism
- Arteriovenous malformation
- Bleeding disorder/anticoagulant

### Recent (<2 weeks)
- Major surgery
- Trauma
- Organ biopsy
- GI or GU bleeding
- Severe uncontrolled HTN (200/120)
- Pregnancy/Menses
- Diabetic eye problems &/or other hemorrhagic ophthalmic condition
- Disoriented, uncooperative
- Prolonged/traumatic CPR
- Aortic dissection
- Allergy to steptokinase

## Stroke

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

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

**Relative Exclusion Criteria**
Patients may receive rtPA but risk/benefit must be carefully weighed if presented with the following:
- Only minor or rapidly improving stroke symptoms (clearing spontaneously)
- Seizure at onset with postictal residual neurologic impairments
- Major surgery or serious trauma within previous 14 days
- Recent gastrointestinal or urinary tract hemorrhage (within previous 21 days)
- Recent acute myocardial infarction (within previous 3 months)
# PULMONARY EDEMA

**Assess and maintain CAB’s**
- Administer O₂
- Assess vitals
- Apply monitors (EKG, Pulse Ox, B/P)

**Targeted history/ Physical exam**
- Establish IV access
- Fowler’s position
- Consider positive pressure (CPAP/BIPAP)

**Nitroglycerine** 0.4mg SL may repeat or begin paste or infusion (if systolic BP above 100 mmhg)

Note: Lasix and Morphine are used less frequently in areas that utilize BiPAP/CPAP initially

**Morphine** 2-4mg slow IVP

**Lasix** up to 0.5 to 1mg/kg slow IVP (generally given in 20mg increments) (contraindicated if systolic BP < 100 mmhg)

Reassess pulmonary status. Consider positive pressure ventilation

<table>
<thead>
<tr>
<th><strong>For CHF with hypotension consider:</strong></th>
<th><strong>For CHF with systolic &gt; 100 consider:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Dopamine 2.5-20mcg/kg/min (if shocky)</em></td>
<td><em>Nitroglycerin 10-20mcg/min</em></td>
</tr>
<tr>
<td><em>NorEpinephrine 0.5-30mcg/min (if B/P &lt; 70 systolic)</em></td>
<td><em>Nitroprusside 0.5-8mcg/kg/min</em></td>
</tr>
<tr>
<td><em>Dobutamine 2-20mcg/kg/min (with no other signs of shock)</em></td>
<td></td>
</tr>
</tbody>
</table>

Tips for successfully managing this case:
- Don’t forget:
  - Administer O₂
  - Start/upgrade IV
  - Monitor oxygenation,
  - Reassess airway status frequently
  - Administer dilators and diuretics
  - Keep an eye on BP
TIPS FOR DRIPS

The following is merely one of the methods for calculating drip medications. It should not be considered “the only way” or “the ACLS way” to mix and administer infusions. If you are familiar with another method, use what works for you. Many IV pumps will provide dose calculations.

Clock Method:

Think of a mini drip chamber or IV pump as a clock. A clock has 60 seconds in 1 minute. A drip chamber has 60 drops in 1mL.

To use the clock method to calculate your drip rate you must figure the mixed concentration (the amount of drug per mL). This is done by dividing the amount of the fluid volume in the IV bag (500mL, etc) into the supplied drug amount. This number gives you the amount of medication administered per mL. Then, insert this number in the “60” slot on your clock, ½ of it at the 30. ⅛ of it at the 15 and ¾ of it at the 45. Remember, when drugs are diluted for infusions, the concentration becomes the next lowest unit (for example, add a gram of drug to a bag and the concentration becomes mg/mL).

**FOR EXAMPLE:**

- **Antidysrhythmic:** mix 2gm in 500mL
  - 2000mg/500mL = 4mg/mL
  - 4mg/min 60mL/hr
- **Cardiac stimulants:** Mix 4mg in 250mL
  - 4000mcg/250mL = 16mcg/mL
  - 16mcg/min 60mL/hr
Capnography: Waveform

Phase I (A–B): Beginning of exhalation; (respiratory baseline)

Phase II (B–C): Respiratory upstroke

Phase III (C–D): Expiratory plateau; (*D is the ETCO2 measurement point)

Phase IV (D–E): Inspiratory downslope

Continual Exhaled CO2 Monitoring
(Continuous Waveform Capnography, PETCO2, ETCO2)

- Specifically evaluates perfusion at the alveoli level (evaluates ventilation)
- CO2 waveforms provide a more sensitive and rapid evaluation of respiratory function than pulse oximetry
- Good indicator of CPR quality
- Normal CO2 is 35-45 mmHg
- High CO2 denotes respiratory acidosis (ineffective breathing) = ventilate more effectively and more frequently
- Low CO2 indicates low perfusion (could be hyperventilation in normally perfused pt) = may be common during arrest due to CPR being the only perfusion
- In a code, attempt to maintain CO2 above 10 mmHg (ideally higher)

**Respiratory Distress**: earliest stage of respiratory compromise. ETCO2 may start low; increases as compensatory mechanisms fail.

**Respiratory Failure**: SaO2 less than 90% + ETCO2 greater than 50mmHg

**Respiratory Arrest**: complete cessation of breathing.
Special Arrest Situations
Other Considerations in ACLS Management

In general, Critical Care Personnel are quite good at performing ACLS skills-intubations, defibrillation, vascular access, and appropriate medical treatment according to ACLS type protocols. However, in our haste to rapidly treat patients, we may miss clues as to why this person arrested and why he is not responding to your best ACLS treatment.

Occasionally, the provider may need to pull some “tricks” out of their drug box based on history labs, bystander information, the scene, and the fact that the patient is not responding to the standard ACLS treatment.

PLEASE NOTE: These are merely recommendations from the AHA guidelines and should not be construed as the only standard. All treatment should be approved by the supervising physician.

Some interesting facts to keep in mind:

These things will cause PEA:
Pulmonary emboli, Acidosis, AMI, Tension Pneumothorax, Cardiac Tamponade, Hypoxia, Hypovolemia, Hyperkalemia, Drug overdose.

These things will case Asystole:
Hypoxia, hypothermia, hypokalemia, hyperkalemia, acidosis, drug overdose, and death.

V-Fib or pulseless VT can be caused by anything.

**Electrolyte Imbalances**

Certainly, if labs have been "drawn" or if values are rapidly available this information can be utilized to guide treatment.

Since providers do not all have the ability to rapidly obtain and evaluate ABG’s or blood work, here are a few clues for patients not responding to your routine regime; consider these early:

**Renal dialysis patients**
- May have Pre dialysis Acidosis, Hyperkalemia, Hypoglycemia, or Post dialysis Hypokalemia & Hypovolemia.

**Diabetics**
- May have Acidosis, Hypoglycemia, Hypovolemia, Hyperkalemia, Hypokalemia.

**Alcoholics**
- May have Hypokalemia, Hypoglycemia, Hypomagnesemia.

**Prolonged Vomiting**
- May have Dehydration, Metabolic, Alkaolsis, Hypokalemia.

**Prolonged Diarrhea**
- May have Dehydration, Acidosis, Hypokalemia, Hypomagnesemia.

**Ventricular Tachycardia?** Suspect Hypocalcemia, Hypomagnesemia & Hypokalemia.
Management of Electrolyte Related Arrests, **In Addition To Standard ACLS**, could Include:

**Hyperkalemia** (>6.5 mmol/L) (One of the most potentially life threatening):
- Most Commonly occurs in renal failure patients, though other conditions can cause “release” from the cells.

**While Performing Standard ACLS:**
1. Administer Calcium Chloride 500mg-1gram to stabilize myocardial cells
2. Administer Sodium Bicarbonate 50 mEq to shift potassium into the cells
3. A mix of Glucose (25g) and Insulin 10u may be infused over 15 minutes

**Hypomagnesemia** (< 1.3 mEq/L)
- Most commonly occurs in the malnourished, chronic alcoholic, or chronic diarrhea
- May cause VT, Polymorphic VT (Torsades de point)
- Administer 1-2g magnesium IV bolus

**Metabolic Acidosis** (Ph < 7.35)
- Occurs during an extended period of arrest or in a patient who is without CPR for an extended period of time initially
- May occur with medical conditions (Ketoacidosis) or overdoses
- Initially provide adequate CPR and ventilations
- Ideally use ABG’s to guide treatment, but may be given based on history
- Administer Sodium Bicarbonate 1mEq/kg, repeat at half dose

**Unique Respiratory Conditions**
- COPD and asthma have caused arrests in the old and the young from respiratory failure and acidosis. There have also been numerous cases of Tension Pneumothoraces.
- The Pneumothorax patient may require pleural decompression if they fail to respond to standard ACLS, have poor BVM compliance, absent lung sounds, and other TPT signs.
- Lateral pressure applied to the chest during exhalation may help expel trapped air and reduce intrathoracic pressure and the incidence of barotrauma during resuscitation.
- Intubated asthma patients in arrest should be ventilated slower and with less tidal volume.
Unique Respiratory Conditions (Continued)

- Any intubated patient who deteriorates after stabilization, along with managing cardiac dysfunction, should be evaluated for the following:
  - Dislodged ET Tube
  - Obstructed ET Tube
  - Pneumothorax
  - Equipment Failure (ventricular)

Drowning

- Hypoxia and Acidosis are the initial causes.
- Consider Spinal Motion Restriction, if indicated.
- Consider sodium bicarbonate (for extended down time)
- Hypothermia BLS management
  - Protect from heat loss; cover victim.
  - Begin CPR without delay (even though pulse may be difficult to detect).
  - Check rectal or tympanic temperature. <86°F(30°C)=Severe, >86°F(30°C)=mild to moderate.
- Hypothermia ALS management
  - Perform ALS skills (ET) gently especially in severe hypothermia.
  - Move towards aggressive core warming (warm lavages, bypass, etc.) as primary.
  - Withhold antiarrhythmics until core temp is >86°F(30°C).
  - Perform all other ACLS procedures.
- Do not terminate efforts until temperature is near normal.

Trauma Arrests

- Though survivability rates are low, scene management should include Spinal Motion Restriction, airway control, bleeding control, and a rapid search for reversible conditions such as Tension Pneumothorax, and V-Fib. IV fluids, and medication should take place enroute to a trauma facility.
- Utilize the H’s and T’s to rapidly evaluate reversible causes.
- Some areas may choose not to resuscitate trauma arrests due to poor prognosis.
Pregnancy and Obesity
- Be prepared for a difficult airway and a smaller glottic opening
- If Pulmonary Embolism is suspected, consider Emergent Fibrinolytics (for obesity)
- Do not change the standard ACLS protocols
- Manually, shift fetus to the left. (as effective as tilting and easier to perform CPR).
- Consider C-Section if there is no response to 5 minutes of ACLS
- If the pregnant female was receiving Magnesium, administer 1 gram Calcium Chloride
- Compressions may need to be performed slightly higher on the chest due to the larger abdomen

Anaphylaxis
- Allergic reactions, while usually easily reversible, may progress to cardiovascular collapse due to profound vasodilation and hypoperfusion
- For patients in near arrest or arrest states, administer Epinephrine IV .05-0.1mg IV ~ rather than SQ or IM, then follow standard ACLS to manage arrhythmias
- Emphasis should be placed on securing an appropriate airway early on
- In severe shock, administer large fluid boluses – 1 liter at a time (4-8 liters)
- Norepinephrine or Vasopressin can be considered in profound hypotension if Epi and fluids have failed.
- Glucagon 1-5mg can be given if treatment is unsuccessful on a patient who takes beta blockers.

Arrests Related to Overdose
- The initial management for drug induced arrests is basically unchanged. Follow the standard BLS and ACLS regime while searching for reversible causes.

The following will outline consideration in specific overdoses:

Cocaine - Tachyarrhythmias, vasoconstriction, pulmonary edema, seizures, HTN, & hypothermia
- **SVT:** Often short-lived, not requiring therapy
  - However, for sustained SVT consider administering benzodiazepines (Valium, Ativan, etc.)
- **Hemodynamically stable VT:** Consider benzodiazepines. If persistent, administer standard antidysrhythmics. Follow with Sodium Bicarbonate 1 mEq/kg IV
Arrests Related to Overdoes (Continued)

- **Hypertension** - Treat initially with benzodiazepine. Follow with vasodilator such as Nitroglycerine or Nitroprusside. (Nitroglycerine preferred if concurrent chest pain)
- **Do not use β blockers** – blocking β stimulus may allow the α blocking properties of cocaine to function unopposed, potentially increasing blood pressure
  ~A pure α-blocker such as Phentolamine (1mg q 2-3 min up to 10mg) may be used
- **Pulmonary edema** - Standard medical management including + pressure ventilation
- **Acute Coronary Syndromes** - With cocaine use, more often due to spasm rather than thrombus. Use O₂, ASA, NTG, titrated doses of benzodiazepine

**Tricyclic Antidepressants (Elavil, Tofranil, Amitryptyline, etc.)** - Cardiotoxic when overdosed. Expect mental status changes, Tachycardias, Prolonged QT intervals, and anticholinergic effects. Interventions include:

- Symptoms = 3 C’s – Convulsions, Coma, Cardiac dysrhythmia
  ➢ then Acidosis and Hypotension
- Consider activated charcoal in non cardiac arrest within 1 hour of ingestion
- Terminate seizures with benzodiazepines
- During arrest consider sodium bicarbonate 1mcg/kg
- Pre arrest or post arrest cardiovascular collapse with widened RS
  o Administer sodium barcarbonate, consider fluid bolus NaCL as needed

**Digitalis** - Overdose may cause bradyarrhythmias and heart failure, ventricular arrhythmias, and hyperkalemia. There is no evidence to support antidotes during cardiac arrest. Pre or post arrest cardio-toxicity treatment should include:

- Activated charcoal within 1 hour of ingestion
- Use standard ACLS treatment for critical bradycardias
- Cautious use of transvenous pacemakers due to pacemaker induced dysrhythmias.
- K+ >5mEq/L patients have a poor prognosis
- Fab fragment therapy (digibind):
  o 2 vials per mg of drug ingested
  o 10-20 vials for unknown amount ingestion
Calcium Channel Blocker and \( \beta \) Blocker toxicity - May cause hypotension, decreased contractility, bradycardias, decreased LOC, seizures, hypoglycemia & hyperkalemia. With \( \beta \) blockers, hyperglycemia with Ca+ Channel Blockers, rapid progression to shock.

There is no evidence to support antidotes during cardiac arrest. Cardiovascular Toxicity (collapse) pre or post cardiac arrest could include:

- \( \text{O}_2 \), ECG, monitor BP, establish vascular access
- Volume for hypotension
- Check blood glucose
- Activated charcoal within 1 hour of ingestion with mild hemodynamic effects
- A mix of high dose Insulin 1u/kg + 0.5g/kg dextrose may improve hemodynamic ability by improving myocardial energy utilization

For Calcium Channel Blocker overdose, to treat myocardial dysfunction

~ (not cardiac arrest):
1. NS boluses 500 - 1000mL
2. Epinephrine infusion 2 - 100 mcg/min
3. Calcium chloride 0.2mL/kg if shock refractory to fluids and Epinephrine
4. May use calcium gluconate 10% (0.3mEq/kg)
5. Pacing for bradycardia

For \( \beta \) blocker overdose, to treat myocardial dysfunction (not cardiac arrest):

- NS boluses
- Epinephrine infusion 2-100 mcg/min
- Calcium chloride 0.2 mL/kg
  - May use calcium gluconate 10% (0.3mEq/kg)
- Glucagon 3 - 10mg IV
Narcotics or Benzodiazepines - Generally cause CNS and respiratory depression. There is no indication for treating these conditions during cardiac arrest.

Narcotic (Opioid) Overdose:
- Little value treating during cardiac arrest (though often attempted)
- May treat respiratory depression secondary to overdose
- Naloxone 0.4mg q4 min, PRN

Benzodiazepines:
- No indication to treat during cardiac arrest
- May treat respiratory depression secondary to overdose only in known nonhabitual users (i.e.: overdoses given during a procedure)
- Flumazenil 0.2mg increments up to 1mg

Cyanide Poisoning
- Found in industry and jewelry cleaners
- Very common in smoke inhalation from fires
- Causes CNS depression, metabolic acidosis, and cardiovascular collapse
- Along with standard BLS and ACLS resuscitation regimes:
  - Administer Cyanide poison kit-
    - IV Sodium Nitrate, IV Sodium Thiosulfate (for cyanide not from toxic smoke)
  - Cyano kit-Hydroxocobalamin IV- for any cyanide including toxic smoke.
    (most common/popular kit)

Local Anesthetic Toxicity
- Accidental IV administration of anesthetics such as Lidocaine and Mepivacaine may cause toxicity, seizures and cardiovascular collapse
- A rapid IV of 20% long chain fatty acid emulsion (LipidRescue™) may redistribute the toxin or stabilize the myocardial cells
- Studies document 1.5 mL/kg repeated Q5 may be more effective than epinephrine in these cases
Glossary
(Guide to ACLS abbreviations and terms)

ACLS - Advanced Cardiac Life Support

ACS (Acute coronary syndrome) - A range of cardiac conditions involving decreased oxygen delivery to myocardial tissue. Includes; myocardial ischemia, angina, unstable angina, and acute myocardial infarction.

Bolus - IV push, or administration of moderate or high volume of fluid over a relatively short period of time.

Cardiac output - The amount of blood ejected from the left ventricle in 1 minute. Expressed by the equation: Cardiac output = Heart rate x stroke volume.

Chronotropic effect - Pharmacologic effect causing increase in heart rate.

Code - A semi slang term denoting cardiac arrest or the management of cardiac arrest. (i.e., The patient “coded” or we’re “coding” the patient)

Combitube or King Airway - Two Peri-laryngeal type airway devices used as an alternative to intubation. These require less time and skill than placing an ET tube.

Ejection fraction - The percentage of blood in the ventricle that is ejected each time the ventricle contracts.

Hypothermia - Low body temperature. For ACLS, defined as core body temperature <94°F.

Inotropic effect - Pharmacologic effect causing increase in force of contraction of the ventricle.

Infarction - Death of tissue, in the case of myocardial infarction; due to lack of oxygen, most often occlusion of coronary artery.

IO (Intraosseous) - an alternative route for administration of medications and fluids when intravenous access is not available. Utilizes a marrow aspirating type needle placed in the marrow cavity of the lower leg, upper arm or sternum.

Ischemia - A state of low oxygenation in myocardial cells.

LMA (Laryngeal mask airway) - a noninvasive airway, used as a BLS airway device, when intubation is delayed or not possible. Occludes the supraglottic area and facilitates oxygen flow to the trachea.

PCI (Percutaneous cardiac intervention) - Invasive cardiac procedures, such as angioplasty or stenting.

Perfusion - Delivery of oxygenated blood to tissues.

Perfusing - A state where oxygenated blood is delivered to tissues. (i.e., a patient with a pulse)

Stroke volume - The amount of blood ejected from the ventricle in 1 contraction.

Tidal volume - The amount of air taken into the lungs in one breath or ventilation.

Vasopressor - Medication which causes vascular constriction.
EKG Practice Exam

1. [ECG trace image]

Interpretation: ________________________________

2. [ECG trace image]

Interpretation: ________________________________

3. [ECG trace image]

Interpretation: ________________________________

4. [ECG trace image]

Interpretation: ________________________________

5. [ECG trace image]

Interpretation: ________________________________
1. Sinus Bradycardia with Multifocal PVC's

2. Junctional Rhythm

3. Sinus Bradycardia

4. Atrial Flutter

5. Supraventricular Tachycardia, A-Tach

6. Sinus Tachycardia

7. Atrial Fibrillation

8. Idioventricular Rhythm

9. Complete Heart Block, 3\textsuperscript{rd} Degree AVB

10. Mobitz II, 2\textsuperscript{nd} Degree AVB type II

11. Ventricular Fibrillation

12. Normal Sinus Rhythm

13. Ventricular Pacer, 100\% capture

14. Ventricular Tachycardia (monomorphic)

15. Mobitz 1, 2\textsuperscript{nd} degree AVB type 1, Wenkebach
The following pages contain a Pretest for anyone choosing to complete the BLS course \textit{after} ACLS or PALS.

This information in this packet comes from the current BLS textbook; Please use the book to review.

You must score a 76\% (-7)

In order to take this program

Completing these test questions \textbf{prior to the course} is mandatory if you plan on attending the CPR section \textit{after} the ACLS program.
Skills Review for Healthcare Providers
The CAB’s of CPR

Rapid Assessment: quick visual survey: be sure you’re in a safe area. (shake-shout & tap)
Recognize unresponsiveness, call for help and briefly check for breathing and pulse simultaneously, and if unresponsive: call a “code” or 911

C = Circulation- Check for a pulse Max - 10 seconds. If pulse is not definite, begin compressions.
A = Airway- Open airway (head tilt/chin lift)
B = Breaths- Give 2 breaths then back to compressions
D = Defibrillator- Attach a manual defibrillator or AED

CPR Reference

<table>
<thead>
<tr>
<th></th>
<th>Adults (&gt; puberty)</th>
<th>Children (1 - puberty)</th>
<th>Infants (&lt; 1yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rescue breathing, Victim definitely has a pulse</td>
<td>10-12 breaths/min recheck pulse every 2 minutes</td>
<td>12-20 breaths/min recheck pulse every 2 minutes</td>
<td>12-20 breaths/min recheck pulse every 2 minutes</td>
</tr>
<tr>
<td>Compression landmark</td>
<td>No pulse, Middle of the chest, between the nipples</td>
<td>No pulse, Middle of the chest, between the nipples</td>
<td>1 finger below nipple line</td>
</tr>
<tr>
<td>Compressions are performed with</td>
<td>Heel of 2 hands</td>
<td>Heel of 1 or 2 hands</td>
<td>2 fingers OR 2 thumbs when using encircling hands technique</td>
</tr>
<tr>
<td>Rate of compressions per minute</td>
<td>100-120/min</td>
<td>100-120/min</td>
<td>100-120/min</td>
</tr>
<tr>
<td>Compression depth</td>
<td>2-2.4 inches</td>
<td>At least 1/3 depth of chest 2 inches</td>
<td>At least 1/3 depth of chest 1 ½ inches</td>
</tr>
<tr>
<td>Ratio of compressions to breaths</td>
<td>30:2 Change compressors and reevaluate every 2 min</td>
<td>30:2 Change compressors and reevaluate every 2 min</td>
<td>30:2 Change compressors and reevaluate every 2 min</td>
</tr>
</tbody>
</table>

*Once an advanced airway is placed ventilations will be 1 every 6 sec. with continual compressions.

Foreign Body Airway Obstruction
* If not rapidly removed call Emergency Medical Service *

Conscious choking

<table>
<thead>
<tr>
<th>Adult</th>
<th>Child</th>
<th>Infant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal Thrusts</td>
<td>Abdominal Thrusts</td>
<td>5 Back Blows/5 Chest Thrusts</td>
</tr>
</tbody>
</table>

Unconscious choking

<table>
<thead>
<tr>
<th>Adult</th>
<th>Child</th>
<th>Infant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Call a “code” or call 911. Begin CAB’s of CPR. Before giving breaths: look in mouth for foreign body, remove object if it is seen. Repeat cycles of CPR if needed</td>
<td>Begin CPR. If second rescuer is present, send them to call a “code” or 911, otherwise, call after 2 min of CPR. Before giving breaths: look in mouth for foreign body, remove object if it is seen. Repeat cycles of CPR if needed</td>
<td>Begin CPR. If second rescuer is present, send them to call a “code” or 911, otherwise, call after 2 min of CPR. Before giving breaths: look in mouth for foreign body, remove object if it is seen. Repeat cycles of CPR if needed</td>
</tr>
</tbody>
</table>
INFORMATION TO KEEP IN MIND:

1. Know the maximum time that should be spent checking for the presence of a pulse.

2. Know the preferred techniques/devices for providing ventilations if you are a single rescuer versus having multiple resources in the professional setting.

3. Know the concept of scene safety/awareness before providing care.

4. Know which patients require ventilations and which require ventilations plus compressions.

5. Know the best way to open the airway for an Adult, Child, Infant or spinally injured patient.

6. Know the location, depth and rate of compressions for an Adult, Child and Infant.

7. Know when to start compressions for an Adult, Child and Infant, be able to explain chest recoil (release) and high quality CPR.

8. Know the compression to ventilation ratio for both 1 and 2-rescuer for Adult, Child and Infant.

9. Know how to reduce the incidence of air being introduced into the patient’s stomach versus their lungs.

10. Understand how an AED affects the heart (shock to organize the rhythm), and know the steps for using an AED on an Adult, Child or Infant; pediatric use and placement.

11. Know how to incorporate CPR before, during and after AED use.

12. Know the changes in CPR, which are incorporated once a victim has an advanced airway “tube” placed by a medical professional.

13. Know the sequence, procedures and roles for 1 rescuer versus 2-rescuer CPR.

14. Know the procedures for conscious and unconscious choking for Adult, Child and Infant.

15. Know how to determine effectiveness of ventilations and compressions being provided during CPR.

16. Know the elements of effective team dynamics and communicating during an emergency.
MANDATORY BLS Pre-Course Exam

1. An elderly woman collapses to the floor in a bingo hall. Your first action should be:
   
   A. Open the airway and give 2 breaths.
   B. Go grab the defibrillator off the wall in the hallway.
   C. Yell out/ call for help while simultaneously assessing for pulse and respirations.
   D. Check for a carotid pulse.

2. You are performing 1 rescuer CPR on a 75-year-old female with a history of chest pain and diabetes. An AED has just been made available to you. What is the first action that you should take at this time?
   
   A. Finish the 5 cycles of chest compressions that you have started.
   B. Place the AED pads on the chest.
   C. Secure an electrical outlet to plug the AED into.
   D. Turn the AED on.

3. You are attending your nephew’s birthday party when a 5 year old child suddenly starts choking on a hotdog. What should you do?
   
   A. Administer 2 rescue breaths.
   B. Perform a blind sweep of the victim’s mouth.
   C. Deliver 5 back-slaps.
   D. Position yourself behind the child and administer abdominal thrusts (Heimlich Maneuver).

4. Opioids are medications that are used to treat pain but have a high potential for abuse. Addiction rate to the medications is a growing problem and they can cause respiratory and or cardiac arrests. Currently, more adults die every year from opioid overdoses than car accidents. What is the name of the medication that is utilized to reverse the effects of respiratory depression?
   
   A. Naloxone.
   B. Ativan.
   C. Lasix.
   D. Magnesium Sulfate.

5. Your middle age neighbor is mowing his grass when he clutches his chest and drops to the ground. He has no pulse or respirations. Your son calls 911 while you initiate chest CPR. How fast should the compression rate be?
   
   A. 100 compressions per minute.
   B. 100-120 compressions per minute.
   C. 80-100 compressions per minute
   D. 120-150 compressions per minute.

6. Bystanders have pulled a young woman with a pulse but no respirations out of a lake. One of them is administering rescue breaths at a rate of one every 5-6 seconds while waiting for EMS to arrive. Which of the following is true about rescue breaths?
   
   A. Each breath should result in visible chest rise.
   B. Give each breath over 1 second.
   C. The pulse should be checked every 2 minutes.
   D. All of the above.
7. Which of the following situations will slightly delay AED usage while the situation is made safe for AED application?

A. A person found lying on a metal floor inside a meat cooler.
B. A person found submerged in a bathtub.
C. A person who collapsed in snow.
D. A person who has a transdermal nitro patch on their arm.

8. When utilizing a bag valve mask device it is important to remember:

A. That this device requires training and is best suited for a 2-rescuer situation.
B. The E-C clamp technique should be used while lifting the jaw to provide a good seal.
C. To squeeze the bag for 1 second while watching the chest rise.
D. All of the above.

9. What is the correct ratio for compressions to ventilations in infant CPR with 2 rescuers present?

A. 20 compressions to 4 breaths.
B. 15 compressions to 2 breaths.
C. The rate remains 30 compressions to 2 breaths.
D. 15 compressions to 1 breath.

10. The maximum amount of time that should be taken to check for a pulse on an adult, infant or child is:

A. 15 seconds
B. 10 seconds
C. 30 seconds
D. 5 seconds

11. You are the second rescuer providing ventilations to an adult victim in cardiac arrest. You observe the hand placement of the person who is providing compressions to be incorrect. You advise them to reposition their hands. This is an example of what type of team dynamic communication?

A. Knowledge Sharing.
B. Closed Loop Communication.
C. Constructive Intervention.
D. Open Communication

12. While providing CPR to a victim, an AED becomes available and a shock is indicated and administered. What should you do next?

A. Administer 2 more shocks; to total 3.
B. Immediately restart CPR, starting with compressions.
C. Give 2 breaths first then resume CPR.
D. Check the carotid pulse for no longer than 10 seconds.

13. What is the purpose of defibrillation?

A. To stop a chaotic rhythm and restore the heart’s normal rhythm.
B. To increase the rate of complete heart block.
C. To provide a blood pressure.
D. To treat cardiac standstill.
14. Current guidelines suggest that adult compressions should be administered at a depth of 2-2.4 inches. Which of the following is not true regarding chest compression depth?

A. Compressions are often delivered too hard rather than too shallow.
B. It may be difficult to accurately judge compression depth without the use of a feedback device.
C. Consistent compression depth of at least 2 inches is associated with better outcomes.
D. Potential complications can occur at depths of greater than 2.4 inches.

15. What is the correct rate of ventilations to provide when an advanced airway is in place?

A. 1 breath every 3-5 seconds.
B. 1 breath every 6-8 seconds.
C. 1 breath every 10 seconds.
D. 1 breath every 6 seconds.

16. You begin your shift on the med/surg floor. You begin your rounds and when you walk into a patient’s room, you notice the patient has agonal respirations. What should you do first?

A. Give the patient oxygen
B. Check a pulse, and begin compressions if indicated
C. Do nothing, the patient is asleep
D. Begin the Heimlich maneuver

17. When is the two thumb encircling technique is used?

A. On an infant when two rescuers are available
B. When the infant is choking
C. When performing CPR on a pediatric victim
D. When performing one rescuer CPR on an infant and you become tired

18. At the beginning of your work shift, you are assigned the role of compressor during a cardiac arrest. This is known as:

A. Mutual respect
B. Closed loop communications
C. Clear roles and responsibilities
D. Constructive intervention

19. While assisting with a cardiac arrest, you are instructed to take over bag valve mask ventilations. You repeat back “you would like for me to take over bag valve mask ventilations.” In team dynamics, what is this called?

A. Closed loop communications
B. Knowing your limitations
C. Knowledge sharing
D. Mutual respect

20. In relation to the “Team concept” of resuscitation, if adequate medical staff is available, in order to reduce fatigue and increase effectiveness of compressions the team should?

A. Assign several people to switch off on compressions every 2 min
B. Have each compressor work until they state they need relief
C. Put a rescuer on each side of the victim and rotate each set of 30 compressions
D. Always assign the largest, strongest person to compressions
21. You arrive to find a hospital maintenance worker lying on the ground, next to a ladder. He appears unconscious, your first action should be?

A. Check for breathing and a pulse  
B. Shake and shout, check unresponsiveness  
C. Begin compressions at 30:2  
D. Assure the area is safe for you to be in

22. After performing the choking procedure for a conscious victim who becomes unconscious, the next procedure is to?

A. Perform a finger sweep  
B. Attempt ventilations  
C. Straddle the victim  
D. Begin CPR compressions

23. High quality CPR is the critical component to resuscitation, especially compressions; which concept is correct?

A. Compression depth has a higher priority than recoil or relaxation  
B. Compression and recoil (refill) are equally important  
C. Ventilation is the priority for all victims  
D. 30 ventilations per minute are optimum for the best outcome

24. When performing compressions on a child for CPR or unconscious foreign body airway procedures the proper depth is?

A. ½" or ½ the depth of the chest  
B. 1 ½ " to 2 1 ½ " inches  
C. Varies based on age and weight  
D. 2" or 1/3 the depth of the chest

25. While at a school event, a teacher chokes on gum. He runs towards the office before falling unconscious. Immediately after performing 30 compressions, the next step is?

A. Open the airway and look into the mouth before ventilating  
B. Perform a finger sweep and attempt breaths  
C. Readjust the airway with a jaw thrust maneuver  
D. Check pulse for no more than 10 seconds

26. The resuscitation team is made up of various professionals with different levels of license and skill sets. In order to function efficiently the team members must?

A. Wait for a physician to order CPR and defibrillation  
B. Always be prepared to perform any skills, even if not licensed to  
C. Realize their strengths, abilities and limitations  
D. Decide if they feel CPR is worth the physical effort
27. A victim begins to choke, and you find them grabbing their throat and coughing uncontrollably, you should?

A. Perform the Heimlich maneuver
B. Perform the modified Heimlich maneuver
C. Perform chest thrust if they are pregnant or obese
D. Allow them to continue coughing

28. You are assisting with a cardiac arrest at a surgery center. Someone brings in an AED that you are not familiar with, in relation to utilizing this:

A. Have an overhead page put out for someone familiar with the unit
B. Perform 2 minutes of CPR, then apply the pads
C. Wait for EMS or someone familiar with the AED before using
D. Turn on the unit and follow the directions

29. The accepted ratio of compressions to ventilations for a 6 year old drowning victim when only 1 rescuer is available is?

A. 15:1
B. 30:1
C. 30:2
D. 15:2

30. AED Pads require firm contact to the skin to be most effective, which of the following will negatively effect that contact?

A. Water on the patients chest
B. Suntan oil on the skin
C. Hair on the chest
D. All of the above
COURSE: Mandatory Pre Test Questions for those completing BLS after ACLS or PALS

# MISSED: ____________    GRADE: ______________

1. A  B  C  D
2. A  B  C  D
3. A  B  C  D
4. A  B  C  D
5. A  B  C  D
6. A  B  C  D
7. A  B  C  D
8. A  B  C  D
9. A  B  C  D
10. A  B  C  D
11. A  B  C  D
12. A  B  C  D
13. A  B  C  D
14. A  B  C  D
15. A  B  C  D
16. A  B  C  D
17. A  B  C  D
18. A  B  C  D
19. A  B  C  D
20. A  B  C  D
21. A  B  C  D
22. A  B  C  D
23. A  B  C  D
24. A  B  C  D
25. A  B  C  D
26. A  B  C  D
27. A  B  C  D
28. A  B  C  D
29. A  B  C  D
30. A  B  C  D

REMINDER:

You must score a 76% to be eligible for the BLS Completion section after ACLS or PALS