

ADVANCED CARDIAC LIFE SUPPORT

PARTICIPANT PREPARATION PACKET 2023

This information is derived from the 2020-23 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-

The AHA requires pre-course work to be completed before entering an advanced program described on page 2 of their MANDATORY textbook. Participants must arrive with a current edition textbook & a certificate showing completion of both the self-assessment & pre-course work (video lessons). The AHA will not allow attendance without. Please refer to your email confirmation for step-by-step instructions.

★If you are attending the BLS section following ACLS, refer to page 60 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

Refer to pg. 2 of your ACLS textbook to access the MANDATORY AHA Online Pre-Course Work AND Self-Assessment located at (eLearning.heart.org). This contains information regarding pharmacology, EKG and relevant information to prepare for the exam.

******TWO CERTIFICATES will be provided upon completion: (1) Pre-course video quiz cert AND (1) for self-assessment test in AHA text. 70% must be obtained. You may retake if needed******

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

Resuscitation Concepts and Teams

Break

Pharmacology I and II

Lunch

Small group interactive teaching stations:

- Airway Management, AED, and BLS
- Perfusing Patient Algorithms (includes post arrest)
- Non-Perfusing Patient Algorithms

DAY TWO

Key Points Review

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

BLS Completion Video/Skills for those doing both certs

ACLS COURSE AGENDA 1-DAY REFRESHER PROGRAM

Introduction to ACLS, Overview of the ACLS Program

New Science Review / Key Points

Overview of Rhythms and Algorithm

Break

Airway Management, AED, and BLS

Begin Patient Management Scenarios

Lunch

Patient Management Evaluation Stations / Written Exam

BLS Completion Video/Skills for those doing both certs

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

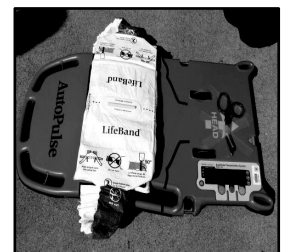
– Always treat in this order: *Rate*, then *Rhythm*, then *Blood Pressure*

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.
 - Example: 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

2020 Outcome Driven Notes



Rapid Response teams are essential to improve patient outcomes by identifying and treating early clinical deterioration.

CPR Coach- helps the resuscitation team perform high quality CPR

Provides interactive feedback about the rate, depth, and recoil of compressions.
Monitors ventilatory performance & minimizes pauses in CPR. Optimizes CCF.

The following efforts increase the **chest compression fraction (CCF)**, which ideally minimizes the hands-off time during CPR.

- ✓ Pre-charge the defibrillator 15 sec before rhythm check/shock is due
- ✓ Compressor hovers over, but off, the chest during defibrillation
- ✓ Intubate without delay in compressions
- ✓ Try to keep other stops at 5 sec or less (10 is still acceptable)
- ✓ Administer meds during compressions

ACLS & BLS 2020 Updates:

1. Chain of Survival (6 links): Activate code team. Hi quality CPR, Defib, ALS Care, Post Resus Care, -Added addressing Recovery needs for team and family.
2. O₂ sat in general should be 92-98%. Emphasizes monitoring CO₂ when using BVM or advanced airway. -Stroke or general cardiac: admin O₂ if below 94%. ACS: administer if below 90%
3. BP should be maintained above 90 systolic or MAP greater than 65.
4. Early PCI- indicated for STEMI or cardiogenic shock, or if mechanical circulatory support is required
5. New algorithm for TTM- 32-36' for at least 24hrs. Plus ICE care recommendations = (surface cooling devices, endovascular catheters, rapid ice-cold isotonic infusions)
6. Atropine for Brady to 1mg q 3-5 min (up to 3mg total)
7. Epi infusion for Brady 2-10 mcg/min. Dopamine (if used) 5-20 mcg/ min)
-Look for Brady causes: Hyper K⁺, Beta or Ca²⁺ blocker OD, Hypoxia, Myocardial ischemia.
8. Epinephrine during arrest- give early in non-shockable rhythms (repeat q 4min to fit CPR sequences)
9. OB code: give Calcium if any Magnesium had been given prior.
10. OB code causes: (ABCDEFGH):
A-anesthetic, B-bleeding, C-cardio vascular, D-drugs, E- embolic, F- fever, G- general cause, H-hypertension
11. Pregnant female needing CPR: move fetus to the Left. If resuscitated lay patient on left side.
12. No need to remove jewelry to defibrillate unless it is directly where the pads belong (just move pad if so)
13. Stress recognizing stroke. FAST (**f**ace droop, **a**rm weak, **s**peech issue, **t**ime to call stroke tx team)
14. Stroke- Use vessel specific scale to determine lg. vessel occlusion. Bypass stopping in ER go direct to scan.
-Mechanical removal can be up to 24 hrs post sx. Consider direct transport or transfer to invasive facility.
15. Prognostication: (New 24-72 hr recommendations) TTM, Electro physiology, Serum NSG and
-Brain imaging including EEG,
16. Opioids- GIVE Naloxone for Resp. Arrest. CONSIDER for Cardiac Arrest or still breathing adequately.

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. Ensure the pause in compressions is as brief as possible, no more than 10 seconds.

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.

Skills Review for Healthcare Providers The CAB's of CPR

Simultaneously Determine unresponsiveness and check for effective breathing

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

	Adults (> puberty)	Children (1 - puberty)	Infants (< 1yr)
Rescue breathing, Victim definitely has a pulse	10 breaths/min recheck pulse every 2 minutes	20-30 breaths/min recheck pulse every 2 minutes	20-30 breaths/min recheck pulse every 2 minutes
Compression landmark No pulse (or pulse <60 in infant or child with poor perfusion)	Middle of the chest, between the nipples	Middle of the chest, between the nipples	1 finger below nipple line
Compressions are performed with	Heel of 2 hands	Heel of 1 or 2 hands	2 fingers OR 2 thumbs when using encircling hands technique
Rate of compressions per minute	100-120/min	100-120/min	100-120/min
Compression depth	At least 2 inches ↑ 2 inches	At least 1/3 depth of chest 2 inches	At least 1/3 depth of chest 1 ½ inches
Ratio of compressions to breaths <i>*Once an advanced airway is placed ventilations will be 1 every 6 sec. with continual compressions.</i>	30:2 Change compressors and reevaluate every 2 min	30:2 15:2 if 2 rescuer Change compressors and reevaluate every 2 min	30:2 15:2 if 2 rescuer Change compressors and reevaluate every 2 min

Foreign Body Airway Obstruction

** If not rapidly removed call Emergency Medical Service **

Conscious choking

Adult	Child	Infant
Abdominal Thrusts <i>(Red Cross Class – 5 Back Blows)</i>	Abdominal Thrusts <i>(Red Cross Class – 5 Back Blows)</i>	5 Back Blows/5 Chest Thrusts

Unconscious choking

Adult	Child	Infant
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	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	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

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

Evaluates differential diagnosis

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. Follow ICE recommendations= (rapid ice-cold isotonic infusions, surface cooling devices or endovascular catheters)

For Perfusing Patients (people with pulses)

Begin with the basics of all patient care:

- Assess and maintain **C**irculation, **A**irway, and **B**reathing
- 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 < 92 % or (90%, ACS)
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.

PHARMACOLOGY

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

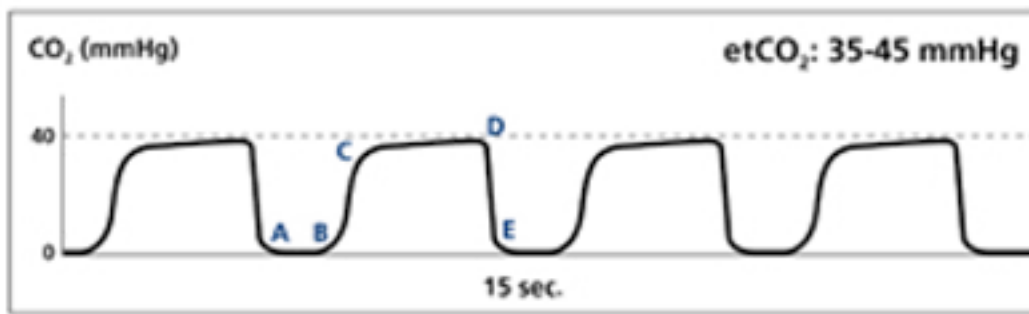


Humeral Head IO Tibial IO

ENDOTRACHEAL ADMINISTRATION

The LEAST effective route
(Epinephrine, Vasopressin & Lidocaine))

- Administer 2 - 2.5 times the IV dose
- Dilute in 5-10mL's total (dilute in NS or sterile water)
- Stop compressions briefly so the medication does not "regurgitate" up the ET tube
- Ventilate several times
- Resume CPR



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 reliable evaluation of respiratory function than pulse oximetry
- Most reliable indicator of CPR quality and ET tube placement
- 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.

OXYGEN

Indications:

- Cardiac patients with signs of hypoxia (dyspnea, rales,)
- Suspected hypoxia of any cause
- Cardiac arrest

Administer oxygen to maintain O₂ sat as follows:

ACS: 90%

Stroke: 95-98%

Post arrest: 92-98%

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 sat as per designated parameters of diagnosis.
- 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 *Give early in non-shockable rhythms. (Q4 min fits into CPR sequence)
- 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 to HR greater than 60
- For Hypotension 2-10mcg/min; titrate to SBP above 90 or MAP above 65 mmHg

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 1.0 mg IV. Repeat at 3 - 5 minute intervals, not to exceed approximately 3mg

Route:

- IV/IO, ET

Side effects:

- Tachycardia, dilated pupils, angina. Doses < 0.5 mg may cause bradycardia

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

Xylocaine

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

Pronestyl

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)

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:

- 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:

- Overdosage: 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:

- Hyponatremia, 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.

DOPAMINE

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

Indications:

- Symptomatic hypotension (SBP 70 -100 mmHg with signs of shock)
- Refractory bradycardia (administer 5-20mcg/min)

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:

- 5- 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

Initial drip rate to infuse 5mcg/kg/min = 10% of patient's weight in pounds

Example: 150 lb. patient: Rate = 15mL/hr, 90 lb. patient: Rate = 9mL/hr

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".

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

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

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

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:

- 162 - 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

P2Y₁₂ INHIBITORS

Clopidogrel (

Clopidogrel (Plavix), Prasugrel (Effient), Ticagrelor (Brilinta)
--

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:

- Specific to agent

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

rtPA (Alteplase), Reteplase (Retavase), Tenecteplase (TNK)

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:

- Tenecteplase (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

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

BIVALIRUDIN (Angiomax)

Classification:

Anticoagulant

- Newer (2020) direct thrombin inhibitor anticoagulant
- Effective alternative to heparin, in certain instances
- Used to prevent blood clots in patients with severe chest pain
- May be used in angioplasty to prevent clot formation
- Quick onset & short half life
- Able to overcome many of the shortcomings of heparin

Dosage: 0.75 mg/kg bolus.

1.75 mg/kg/hr infusion, during the procedure.

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

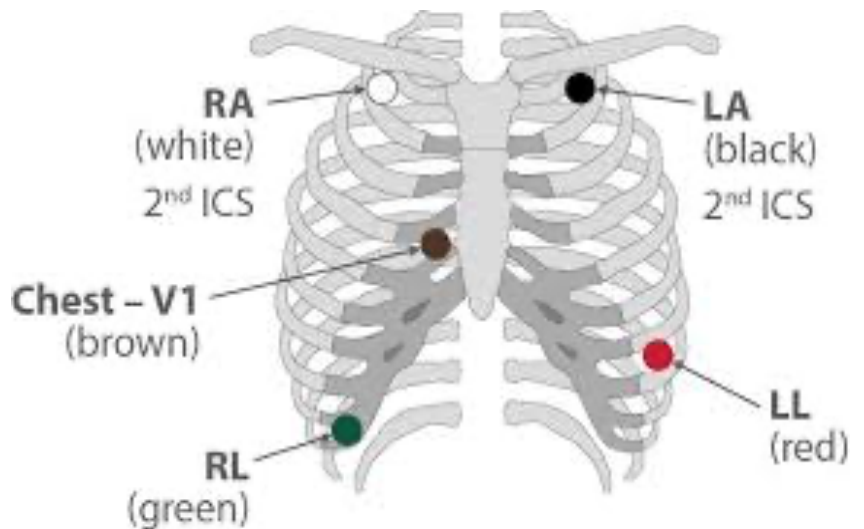
Route:

- 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 without ST-segment elevation (NSTEMI), 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:

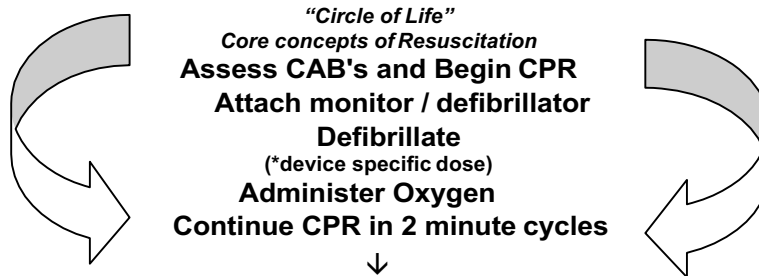
Left Ventricular Failure: hyper or hypotension, crackles, weak peripheral pulses

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 (q4 min)
Repeat Amiodarone 150mg 1x
OR
Lidocaine 0.5 - 0.75mg/kg up to 3mg/kg max

*Device specific dose relates to the type and brand of defibrillator used and may range from 120 joules to 360 joules depending on your specific machine.

***Biphasic** 120 -200J (initial)
*Subsequent dose=to or greater than first dose
***Monophasic** 360J
*If unknown, use max dose

*Subsequent shocks may be at the same or higher dose.

*Become familiar with the recommendations of your specific defibrillator

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
 - Charge defib prior to 2 min stop

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

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

AAAYSTOLE 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



Given 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**



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



To work on Asystole or PEA:

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

Think **PEA** (for both PEA and Asystole) **P**ush **E**pi **A**nd... Consider the cause

POST ARREST CARE

Return of spontaneous circulation (ROSC)



Optimize Ventilation and Oxygenation

Secure airway as appropriate

Maintain respiratory rate approximately 10/min

Titrate oxygen saturation 92-98%

Maintain PaCO₂ 35-45mmhg

Maintain exhaled ETCO₂ 35 - 45 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



Consider PCI Center:
STEMI
Cardiogenic Shock
Mechanical Support required



**Inappropriate Neurological
Response**
(not following commands)



**Induce Targeted
Temperature Management**
(32–36°C at least 24 hrs)
ICU: Neuro Eval, EEG etc.



Monitor, Address, and Maintain All:

Hypoxia	Toxins (overdose)
Hypovolemia	Thrombosis - Pulmonary
Hydrogen ion (Acidosis)	Thrombosis - Coronary
Hyper/Hypokalemia	Tamponade (Cardiac)
Hypothermia	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**

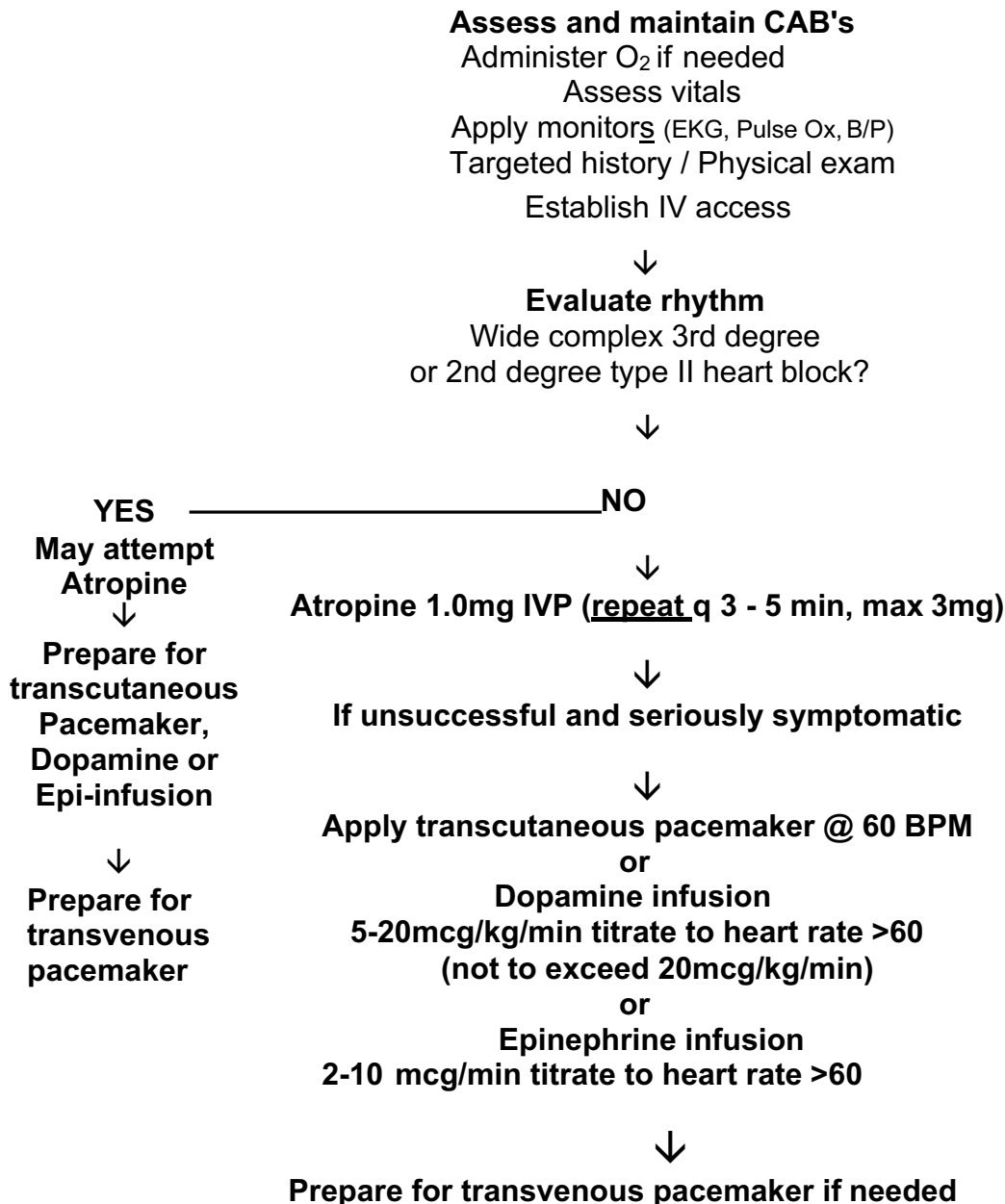
Excessive Ventilation

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 92-98%. **Hyper-oxygenation** may cause cellular toxicity

SYMPTOMATIC BRADYCARDIA (HR < 50)

(hypotension, ventricular ectopy)



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

Consider Causes:
MI
Hypoxia

(Meds):
Ca channel blockers
Beta blockers
Digoxin
Electrolytes
(ie hyperkalemia)

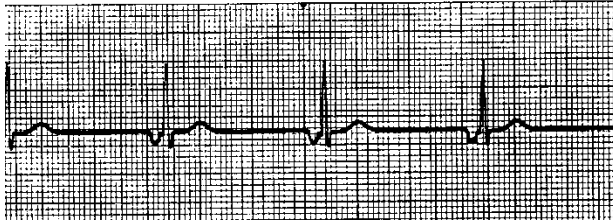
Quick Tip

For symptomatic bradycardia's:

After Ien Don't Eat: Atropine, Transcutaneous Pacemaker, Dopamine Infusion, Epinephrine Infusion

Bradycardias

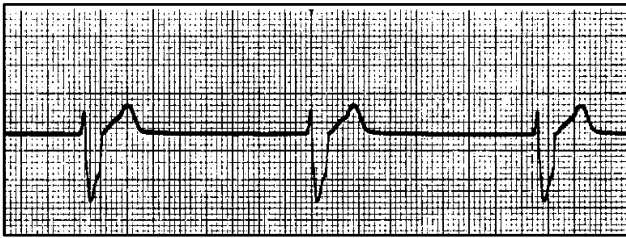
Bradycardias are treated if the patient is symptomatic. ie, - has signs of poor perfusion or PVC's



Junctional Escape Rhythm

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

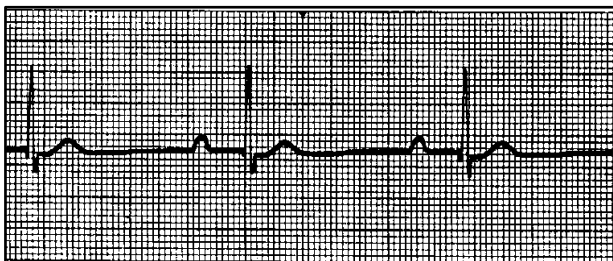
REGULARITY: The rhythm is regular
RATE: Usually 40 - 60
P-WAVES: The P-wave can come before or after the QRS complex, or it can be lost entirely within the QRS



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



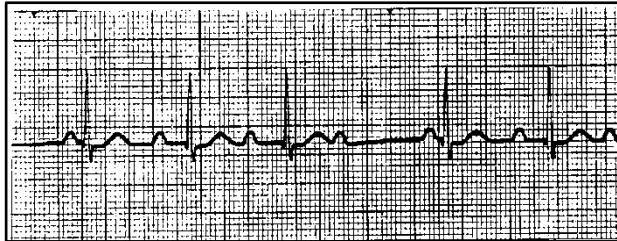
First Degree Heart Block

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

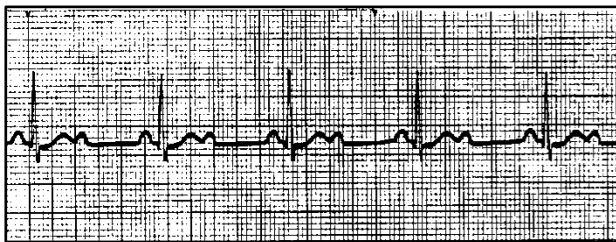
In the acute setting, heart blocks are treated as bradycardias. However, there is some controversy over whether to use Atropine in the MI setting. Also, for wide 3° blocks and 2° type II blocks, some experts choose to avoid Atropine and apply the pacemaker or chronotropic infusions.



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.

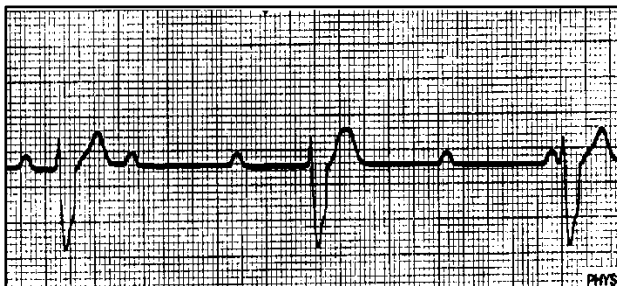
- REGULARITY: Irregular in a pattern of grouped beating.
 RATE: Since some beats are not conducted, the ventricular rate is usually slightly slower. The atrial rate is normal.
 P WAVES: Upright and uniform. Some P waves are not followed by QRS complexes.
 PRI: Get progressively longer, until on P wave 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 (3°) 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 bolus 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



← Reassess BP →
If still low



Dopamine drip 5-20 mcg/kg/min

(not used as often)

(generally start at 5mcg/kg/min)

(not to exceed 20mcg/kg/min)

May Consider:

Norepinephrine:

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

May Consider:

Epinephrine infusion

2-10 mcg/min

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



Quick tip:

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

Blood Pressure

GOAL:

SBP >90 mmHg

Or MAP >65 mmHg

- 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 algorithm (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

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)

OR

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



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

↓
>48 hrs



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)



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

*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)



← **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

For Atrial fibrillation:

Start with 120-200J biphasic,
**synchronized, but same energy as defibrillation*



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 (SVT)

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

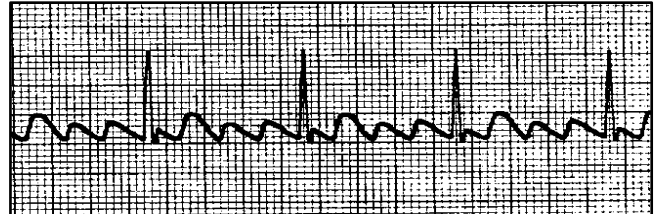
REGULARITY: Regular

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. (May increase stroke risk)

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)



****Note: could try adenosine if regular and rhythm isn't diagnosed**

← 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



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

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~

Sotalolol 100 mg over 5 min
~Or~

Lidocaine bolus 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



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 chestpain)

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

(wide irregular rhythm)

*use unsynchronized countershock
at defibrillation doses*



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

If unsuccessful: follow 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

ED or Cath Lab: electrolytes, enzymes, troponin, coags

Chest X Ray



Perform simultaneously with initial assessment

Oxygen- (if sat < 90, or dyspnea)

Aspirin-162-325 mg PO

Nitroglycerine- SL or spray

Morphine IV if pain not relieved by 3 NTG. Only recommended if STEMI

P2Y₁₂ inhibitors- considered ex: clopidogrel



STEMI:

ECG + for AMI <12 hrs

(ST elevation in 2 or more related leads or new LBB)



Immediate: Prepare pt for PCI

(Percutaneous Coronary intervention) stent or CABG

Ideal contact to procedure=90 min



Adjunctive options:

-IV Nitroglycerine (continued ischemia, HTN, PE)

-Heparin or LMWH

-Bivalirudin

-P2Y₁₂ Inhibitors

-Ace inhibitors (once stable)

- βBlockers (once stable)

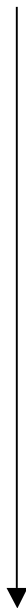


Fibrinolytics (if PCI unavailable)

Ideal door or EMS to drug time=30min



CABG



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



High Risk Acute Coronary Syndromes

Non STEMI:

-ST depression/T wave inversion

-High risk unstable angina (female, rales Hx MI, diabetes, hypotension, tachycardia, v tach runs, atrial fib)

-AMI >12 hrs



Adjunctive options:

- IV Nitroglycerine (continued ischemia, HTN, PE)

- Heparin or LMWH

- Bivalirudin

- P2Y₁₂ Inhibitors

- Ace inhibitors (once stable)

- βBlockers (once stable)



NSTEMI: who may receive urgent PCI

- continued symptoms-despite tx

- elevated troponin

- unstable vital signs

- runs of VT

- experienced cardiac arrest



CABG



Tips for successfully managing this case:

☞ Don't forget to:

- Use a pain scale to help your patient rate the pain
- Perform PQRST assessment to determine if the cause of pain is likely myocardial ischemia or injury
- Determine time of onset early
- History/physical should include screening for Fibrinolytic contraindications
- Assess vital signs before and after administering Nitrates
- Obtain 12 lead EKG early
- Administer Morphine only if Nitro fails to relieve the pain
- EMS-notify ER
- ER-notify cath lab

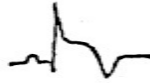
THE 12 LEAD ECG

ST Elevation



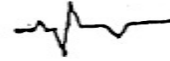
In 2 or more related leads
Arouses suspicion for injury

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

STEMI: look for-

1 mm ST elevation (in 2 or more contiguous leads), or
2 mm elevation in V2 V3, or
1.5 mm elevation in *all* women V2 V3
New, or presumed new, LBB

“The Imposters non AMI causes of ST and QRS changes

Left Bundle branch block	QRS > 0.12 sec, QRS inverted in V1, upright in V6, S-T elevation, depression, and T wave inversion seen throughout. Cannot accurately diagnose MI
Right bundle branch block	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
Other causes of Wide QRS	Ventricular rhythms, (PVCs, VT), electronic pacemakers, medications, (Quinidine, Pronestyl), any depolarization abnormality can cause repolarization abnormalities
Left Ventricular hypertrophy	Strain pattern of depressed S-T segments, large QRS complexes in chest leads
Digitalis	ST segment “sags”. May also be seen with calcium ingestion
Pericarditis	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
Angina Pectoris	Flat (plane) depressions of S-T segment. Inverted T waves possible. ECG changes may improve with pain relief.
Prinzmetal's angina	Slope elevation of S-T, especially in V4-V6. Changes may resolve with pain relief.
Early repolarization	Normal variant. S-T slightly elevated with normal concave slope in most leads. J point is elevated, possibly with “fishhook” appearance.

SUSPECTED STROKE

Immediate assessment - Stroke scales / scores

Notify Hospital-Alert Stroke Team

Assess and maintain ABC's

Administer O₂ to 95-98% sat

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 for Endovascular Treatment-EVT)

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

Level of consciousness

Visual function

Motor function

Sensation and neglect

Cerebellar function

& Language deficits

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

(2020) Current practices advises direct transport to a designated stroke center for best outcomes.

*Report directly to imaging area.

Consult Neuro Team/ICU

Noncontrast: CT or MRI scan of the brain within 20 minutes of the patient's arrival. *Bypass ER-direct to CT scan*
Results should be read within 45 min.
Goal: door to treatment time= 60 min.

Don't forget:

- Administer O₂ to 95-98% sat
- 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
- Reassess neurologic status frequently

**Endovascular therapy may be considered up to 24 hours. (EVT)*

Rapid Arterial Occlusion Evaluation Scale (RACE)

*Scores 5 areas-to screen for possible large vessel occlusion, which is best treated w/ Endovascular Therapy

INCLUSION CRITERIA FOR FIBRINOLYTIC THERAPY

CARDIAC	STROKE
<p><u>Inclusion criteria:</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Chest pain &/or symptoms of acute MI <input type="checkbox"/> QRS duration <120 ms (.12 sec) <input type="checkbox"/> ST segment elevation >1mV (1mm) in 2 or more related leads <ul style="list-style-type: none"> <input type="checkbox"/> II, III, aVF <input type="checkbox"/> V1, V2, V3, V4, V5, V6 <input type="checkbox"/> I, aVL <p><u>Exclusion criteria:</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Active internal bleeding <input type="checkbox"/> History of CVA/TIA <p><u>Recent (< 2 months)</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Intracranial/intraspinal surgery, trauma <input type="checkbox"/> Brain tumor, aneurism <input type="checkbox"/> Arteriovenous malformation <input type="checkbox"/> Bleeding disorder/anticoagulant <p><u>Recent (<2 weeks)</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Major surgery <input type="checkbox"/> Trauma <input type="checkbox"/> Organ biopsy <input type="checkbox"/> GI or GU bleeding <input type="checkbox"/> Severe uncontrolled HTN (200/120) <input type="checkbox"/> Pregnancy/ Menses <input type="checkbox"/> Diabetic eye problems &/or other hemorrhagic ophthalmic condition <input type="checkbox"/> Disoriented, uncooperative <input type="checkbox"/> Prolonged/traumatic CPR <input type="checkbox"/> Aortic dissection <input type="checkbox"/> Allergy to streptokinase 	<p><u>Inclusion criteria:</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Diagnosis of ischemic stroke causing measurable neurologic deficit <input type="checkbox"/> Onset of symptoms <3 hours before beginning treatment <input type="checkbox"/> Age ≥ 18 years <p><u>Exclusion criteria:</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Head trauma or prior stroke in previous 3 months <input type="checkbox"/> Symptoms suggest subarachnoid hemorrhage <input type="checkbox"/> Arterial puncture at noncompressible site in previous 7 days <input type="checkbox"/> History of previous intracranial hemorrhage <input type="checkbox"/> Elevated blood pressure (systolic >185 mm Hg or diastolic >110 mm Hg) <input type="checkbox"/> Evidence of active bleeding on examination <input type="checkbox"/> Acute bleeding diathesis, including but not limited to <ul style="list-style-type: none"> -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 <input type="checkbox"/> Blood glucose concentration <50 mg/dl (2.7 mmol/L) <input type="checkbox"/> CT demonstrates multilobar infarction (hypodensity>1/3 cerebral hemisphere) <p><u>Relative Exclusion Criteria</u></p> <p>Patients <u>may</u> receive rtPA but risk/benefit must be carefully weighed if presented with the following:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Only minor or rapidly improving stroke symptoms (clearing spontaneously) <input type="checkbox"/> Seizure at onset with postictal residual neurologic impairments <input type="checkbox"/> Major surgery or serious trauma within previous 14 days <input type="checkbox"/> Recent gastrointestinal or urinary tract hemorrhage (within previous 21 days) <input type="checkbox"/> 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



For CHF with hypotension consider:

- * Dopamine 2.5-20mcg/kg/min (if shocky)
- * NorEpinephrine 0.5-30mcg/min (if B/P < 70 systolic)
- * Dobutamine 2-20mcg/kg/min (with no other signs of shock)

For CHF with systolic > 100 consider:

- * Nitroglycerin 10-20mcg/min
- * Nitroprusside 0.5-8mcg/kg/min

☛ Tips for successfully
managing this case:

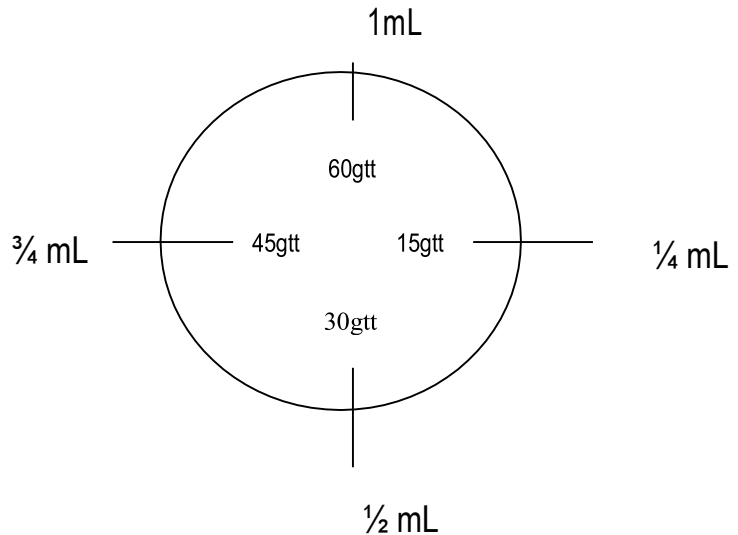
- ☞ Don't forget:
- Administer O₂
 - Start/upgrade IV
 - Monitor oxygenation,
 - Reassess airway status frequently
 - Administer dilators and diuretics
 - Keep an eye on BP

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, $\frac{1}{2}$ of it at the 30, $\frac{1}{4}$ of it at the 15 and $\frac{3}{4}$ 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).

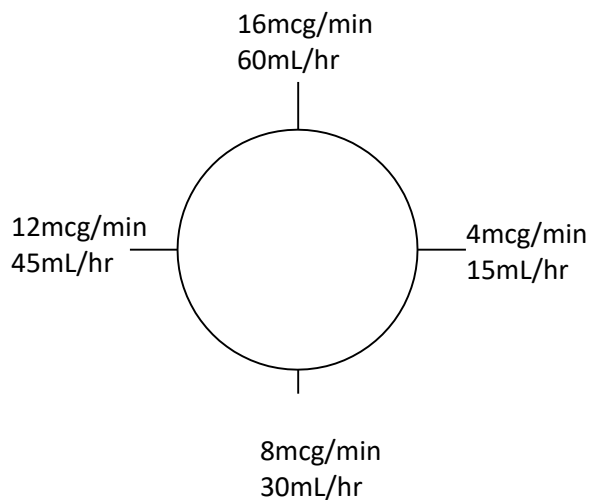
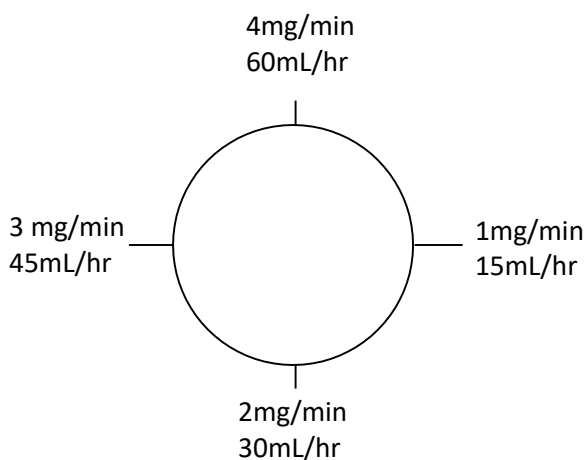
FOR EXAMPLE:

Antidysrhythmic: mix 2gm in 500mL

Cardiac stimulants: Mix 4mg in 250mL

$$2000\text{mg}/500\text{mL}=4\text{mg/mL}$$

$$4000\text{mcg}/250\text{mL}=16\text{mcg/mL}$$



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 cause 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, Alkalosis, 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 Pneumothoraxes.
- 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:
 - **D**islodged ET Tube
 - **O**bstructed ET Tube
 - **P**neumothorax
 - **E**quipment 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. $<86^{\circ}\text{F}(30^{\circ}\text{C})$ =Severe, $>86^{\circ}\text{F}(30^{\circ}\text{C})$ =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 $>86^{\circ}\text{F}(30^{\circ}\text{C})$.
 - 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.

Obesity

- Be prepared for a difficult airway and a smaller glottic opening
- If Pulmonary Embolism is suspected, consider Emergent Fibrinolytics (for obesity)

Pregnancy

- Do not change the standard ACLS protocols
- Manually, shift fetus to the left.
- 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 higher on the chest due to the larger abdomen
- Consider potential causes of arrest (ABCDEFGH):

A-anesthetic **B**-bleeding **C**-cardiovascular **D**-drugs **E**-emboli **F**-fever **G**-general cause **H**-hypertension

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

- **Always initiate & follow the standard BLS and ACLS regime, without delay, while searching for and treating reversible causes.**

The following will outline considerations in specific overdoses:

Cocaine - tachyarrhythmias, vasoconstriction, pulmonary edema, seizures, HTN, & hyperthermia

- **SVT**: may be short-lived, not requiring therapy

Hemodynamically stable VT: If persistent, administer Lidocaine:

→ (Lidocaine reverses cocaine induced QRS prolongation)

Reasonable to follow with Sodium Bicarbonate 1 mEq/kg IV

- **Hyperthermia**: Can be rapidly life threatening → Cool with evaporative or immersive cooling techniques. *Faster* than cooling blankets, ice packs or endovascular cooling.

Arrests Related to Cocaine Overdoes (Continued)

- **Hypertension**- Treat initially with benzodiazepines. Follow with vasodilator such as phentolamine, nitrates or verapamil. (Nitroglycerine preferred if concurrent chest pain)

Use of β blockers – Refractory ischemia has been successfully treated with phentolamine, however ongoing studies have shown both benefit & harm. (*controversial results*)

- **Pulmonary edema** - Standard medical management including + pressure ventilation
- **Acute Coronary Syndromes** - With cocaine use, more often due to spasm rather than thrombus. Use O₂ if indicated, ASA, Vasodilators, titrated doses of benzodiazepine.

Sodium Channel Blockers/Tricyclic Antidepressants (Elavil, Tofranil, Amitriptyline, etc.)

- Cardiotoxic when overdosed. Symptoms = 3 C's – Convulsions, Coma, Cardiac dysrhythmia
 - then Acidosis and Hypotension

Expect mental status changes. Interventions include:

- Consider activated charcoal in non-cardiac arrest within 1 hour of ingestion
- Treat seizures with benzodiazepines
- Cardiovascular collapse with widened QRS?
 - Administer sodium bicarbonate, consider fluid bolus NaCl, as needed.
- Lidocaine is the antidysrhythmic of choice for ventricular arrhythmias.
- VA-ECMO -for refractory cardiogenic shock.
- Consider intravenous lipid emulsion (ILE) for poisoning refractory to other treatments.

Digitalis - Overdose may cause bradyarrhythmias and heart failure, ventricular arrhythmias, and hyperkalemia. Pre or post arrest cardio-toxicity treatment should include:

- Activated charcoal within 1 hour of ingestion
- Fab fragment therapy (digoxin-Fab) ** Studies report a 50-90% dysrhythmia resolution rate within 30-45 min, in most cases!
- Use standard ACLS treatment for critical bradycardias. Atropine is preferred medication.
- Treat ventricular dysrhythmias with lidocaine or phenytoin while waiting for digoxin-Fab to take effect.
- Use of transvenous pacemakers may be effective while waiting for digoxin-Fab to take effect.
- Patients with highly elevated K⁺ levels have a poor prognosis.

Calcium Channel Blocker and β Blocker toxicity –

May cause hypotension, decreased contractility, bradycardias, decreased LOC, seizures, hypoglycemia & hyperkalemia. With β blockers, hyperglycemia with Ca^+ Channel Blockers, rapid progression to severe shock may occur.

Initial treatment for both includes:

- O_2 , ECG, monitor BP, establish vascular access
- Volume for hypotension- NS bolus 500-100 ml.
- Check blood glucose
- Activated charcoal within 1 hour of ingestion, if alert.

For Life Threatening Calcium Channel Blocker overdose,

- High dose insulin in conjunction with vasopressors for hypotension.
- May use calcium gluconate to help increase heart rate & blood pressure
- Atropine for bradycardia. May try pacing, if indicated.
- VA-ECMO for refractory cardiogenic shock.
- IV Lipid therapy is not considered to be useful.

For Life Threatening β blocker overdose

- High dose insulin in conjunction with vasopressors for hypotension.
- IV Glucagon 3-10mg IV bolus followed by continuous drip may increase contractility
- Atropine for bradycardia. May attempt pacing, if indicated.
- VA-ECMO for persistent cardiogenic shock.
- Consider hemodialysis if toxicity is due to atenolol or sotalol.
- IV Lipid therapy is not considered to be useful in β blocker toxicity

Narcotics or Benzodiazepines - Generally cause CNS and respiratory depression.

Narcotic (Opioid) Overdose:

Do NOT delay calling EMS/Rapid Response while waiting for naloxone to work.

- With pulse-(resp depression) support ABC's and *give* Naloxone
- With pulse-(still breathing) *consider* Naloxone to prevent deterioration
- No pulse- CPR/ACLS protocol, *consider* Naloxone

*Naloxone may be administered IV, IM or nasally for the most rapid response (1-2 min) in emergency situations.
Warning—patient may be combative upon rapid opioid reversal.*

Benzodiazepines: (frequently in combo with other CNS depressants)

- **No** indication to treat during cardiac arrest
- May try naloxone if 'opioid combo' suspected.
- May treat respiratory depression secondary to overdose only in known nonhabitual users (i.e.: overdoes given during a procedure)
- Consider Flumazenil 0.2mg increments up to 1mg for respiratory depression/arrest.

Cyanide Poisoning→ do not wait for confirmatory testing. **Treat Immediately.**

- Found in industry and jewelry cleaners & very common in smoke inhalation from fires
- Causes CNS depression, metabolic acidosis, seizures, and cardiovascular collapse
- → 100% Oxygen administration is useful ←
- Along with standard BLS and ACLS resuscitation regimes:
Administer Cyanide poison kit- ASAP

Cyano kit-*Hydroxocobalamin IV- for any cyanide, including toxic smoke. (recommended)
IV Sodium Nitrate, alternative to above. (if carbon monoxide poisoning is not a concern)
Sodium thiosulfate may be used in combo with Hydroxocobalamin or sodium nitrate.

Local Anesthetic Systemic Toxicity (LAST)

- Excessive administration of anesthetics such as Lidocaine and Bupivacaine may cause toxicity, seizures, agitation, syncope, and cardiovascular collapse.
- Early administration of 20% ILE (IV lipid emulsion) with standard ALS resuscitation is advised.
- Utilize benzodiazepines to treat seizures.
- Administer sodium bicarb for life threatening wide complex tachycardia.
- Atropine for life threatening bradycardia.
- VA-ECMO may be useful for refractory cardiogenic shock.

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.

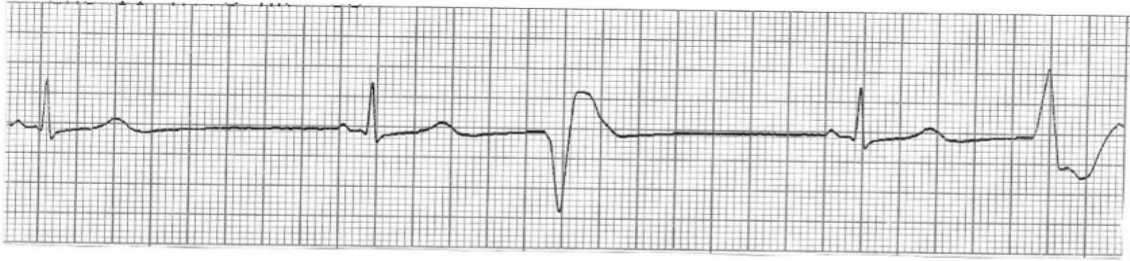
Tidal volume - The amount of air taken into the lungs in one breath or ventilation.

Vasopressor- Medication which causes vascular constriction.

EKG Practice Exam

EKG Practice Exam

1.



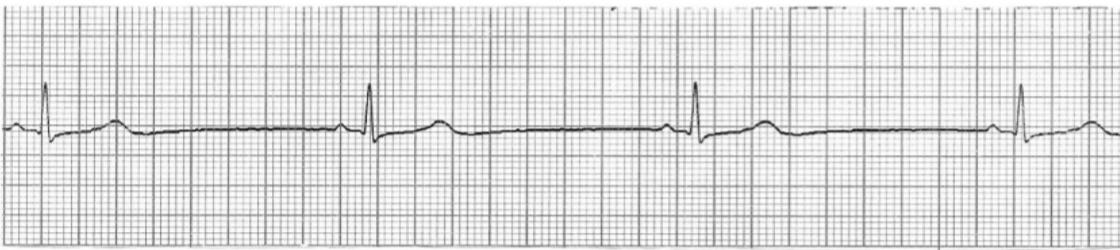
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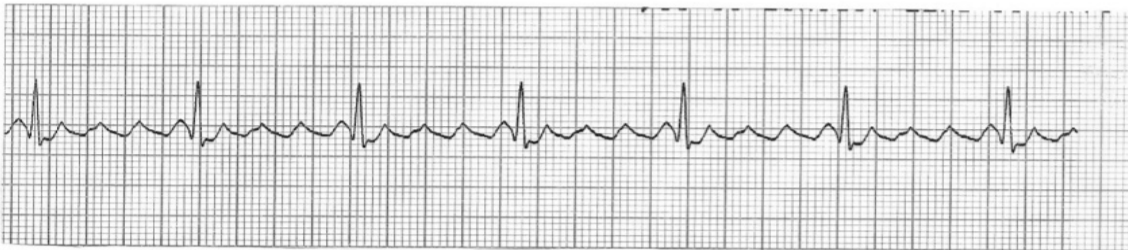
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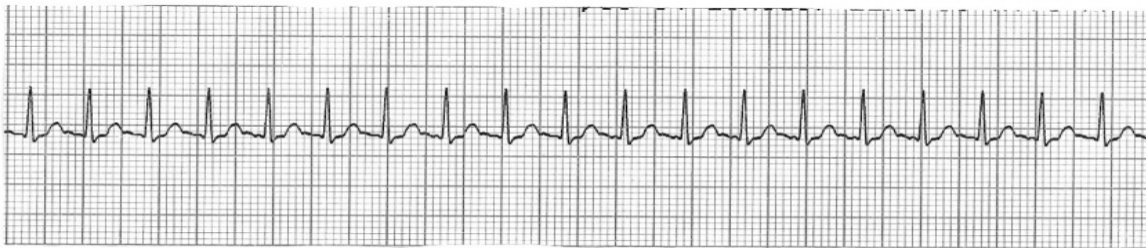
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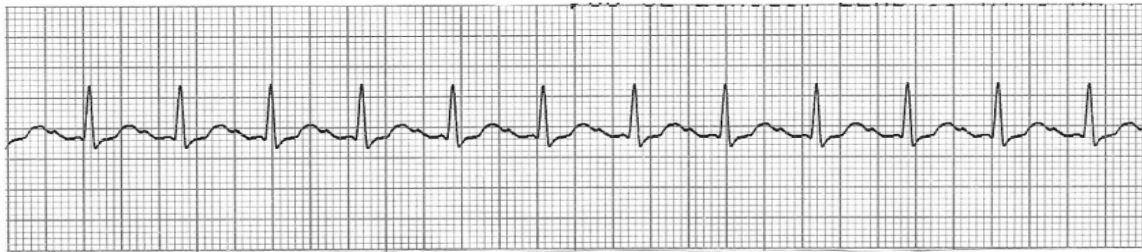
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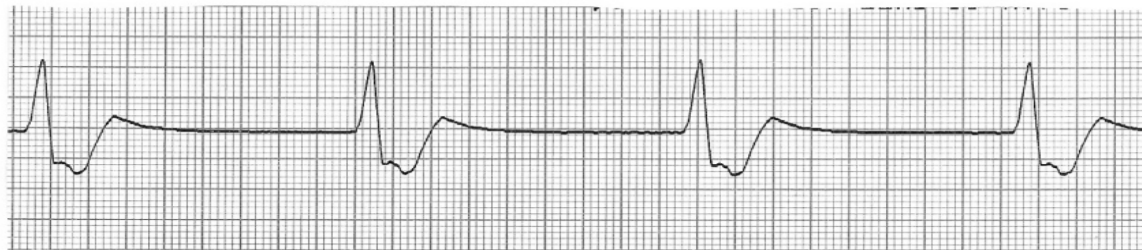
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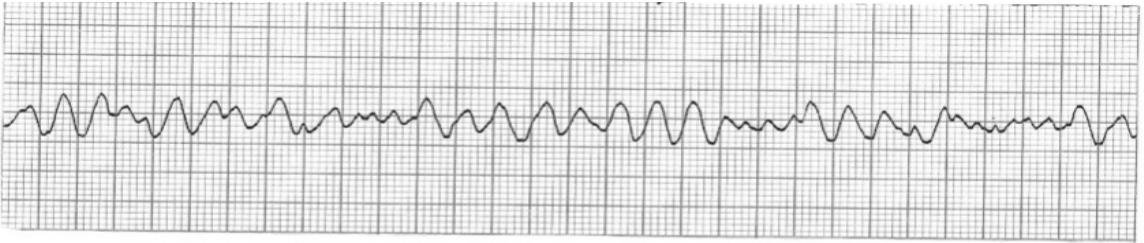
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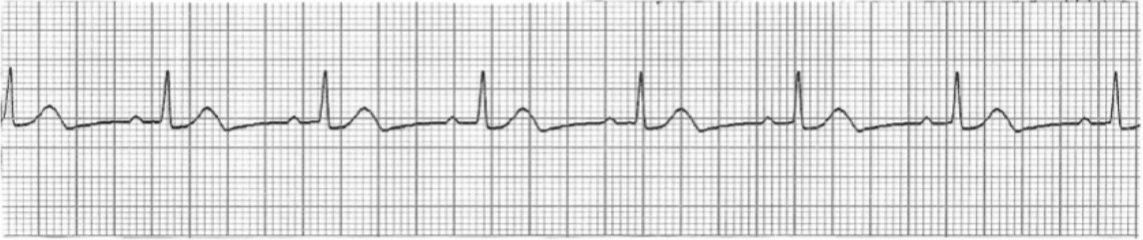
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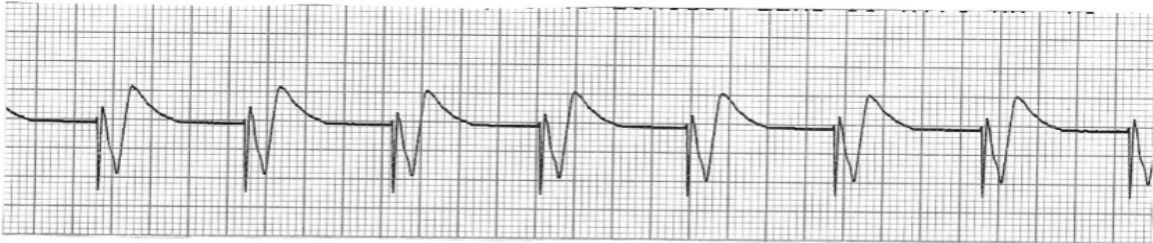
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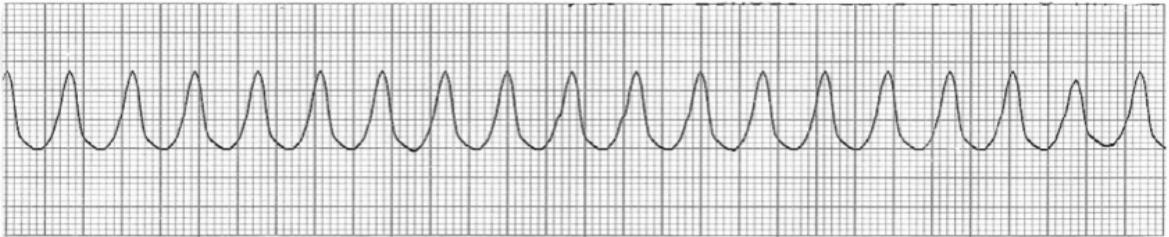
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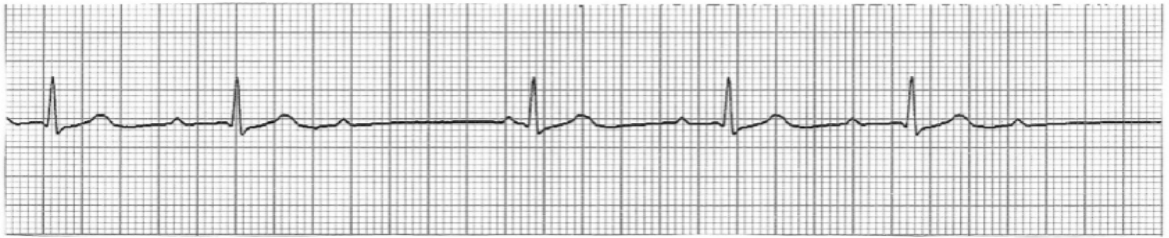
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EKG Practice Exam - Key

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, 3rd Degree AVB
10. Mobitz II, 2nd Degree AVB type II
11. Ventricular Fibrillation
12. Normal Sinus Rhythm
13. Ventricular Pacer, 100% capture
14. Ventricular Tachycardia (monomorphic)
15. Mobitz 1, 2nd degree AVB type 1, Wenkebach

The following pages contain a Pretest for anyone choosing to complete the BLS course after ACLS.

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

You must score an 84% (-5)
In order to take this program

Completing these test questions prior to the course is mandatory if you plan on attending the CPR section after the ACLS program.



Emergency Medical Consultants

772-878-3085 www.EMCmedicaltraining.com

Skills Review for Healthcare Providers The CAB's of CPR

Simultaneously Determine unresponsiveness and check for effective breathing

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

	Adults (> puberty)	Children (1 - puberty)	Infants (< 1yr)
Rescue breathing, Victim definitely has a pulse	10 breaths/min recheck pulse every 2 minutes	20-30 breaths/min recheck pulse every 2 minutes	20-30 breaths/min recheck pulse every 2 minutes
Compression landmark No pulse (or pulse <60 in infant or child with poor perfusion)	Middle of the chest, between the nipples	Middle of the chest, between the nipples	1 finger below nipple line
Compressions are performed with	Heel of 2 hands	Heel of 1 or 2 hands	2 fingers OR 2 thumbs when using encircling hands technique
Rate of compressions per minute	100-120/min	100-120/min	100-120/min
Compression depth	At least 2 inches ↑ 2 inches	At least 1/3 depth of chest 2 inches	At least 1/3 depth of chest 1 ½ inches
Ratio of compressions to breaths <i>*Once an advanced airway is placed ventilations will be 1 every 6 sec. with continual compressions.</i>	30:2 Change compressors and reevaluate every 2 min	30:2 15:2 if 2 rescuer Change compressors and reevaluate every 2 min	30:2 15:2 if 2 rescuer Change compressors and reevaluate every 2 min

Foreign Body Airway Obstruction

** If not rapidly removed call Emergency Medical Service **

Conscious choking

Adult	Child	Infant
Abdominal Thrusts (Red Cross Class – 5 Back Blows)	Abdominal Thrusts (Red Cross Class – 5 Back Blows)	5 Back Blows/5 Chest Thrusts

Unconscious choking

Adult	Child	Infant
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	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	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

2020 Outcome Driven Notes



Rapid Response teams are essential to improve patient outcomes by identifying and treating early clinical deterioration.

CPR Coach- helps the resuscitation team perform high quality CPR
Provides interactive feedback about the rate, depth, and recoil of compressions.
Monitors ventilatory performance & minimizes pauses in CPR. Optimizes CCF.

The following efforts increase the **chest compression fraction (CCF)**, which ideally minimizes the hands-off time during CPR.

- ✓ Pre-charge the defibrillator 15 sec before rhythm check/shock is due
- ✓ Compressor hovers over, but off, the chest during defibrillation
- ✓ Intubate without delay in compressions
- ✓ Try to keep other stops at 5 sec or less (10 is still acceptable)
- ✓ Administer meds during compressions

Immediate Actions for a Suspected Heart Attack Victim: (Chest or arm pain/pressure, short of breath, anxious)

Considered a time critical emergency. Take the following actions immediately:

1. Have the victim sit down & remain calm
2. Activate the EMS system- get the AED, if available.
3. Suggest that alert adults chew and swallow an aspirin. This is contraindicated if known allergy or advised to avoid aspirin by a healthcare provider.
4. If the patient loses consciousness and is not breathing, or only gasping---START CPR

Suspected Stroke? Act Fast!

Every 40 seconds, someone in the United States suffers a stroke. Know the signs: (FAST)

1. **F**ace Drooping
2. **A**rm Weakness
3. **S**peech difficulty
4. **T**ime to phone

There are possibly other signs so consider this also a critical emergency!

1. Quickly evaluate for obvious signs
2. Activate the EMS system
3. Find out when symptoms first appeared
4. Stay with the individual, until help arrives
5. Loss of consciousness & not breathing or only gasping? = START CPR

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 spineally 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
17. Know that in Opioid OD's CPR is still most important for no breathing or pulse, but Naloxone can be administered along with CPR.
18. Know that in late pregnancy, during CPR the fetus should be shifted to the left if possible. If resuscitated, lay patient on the left side.
19. No need to remove jewelry to defib—just relocate the defib pad.

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. (mouth to mouth rapid is best)
 - B. Go grab the defibrillator off the wall in the hallway.
 - C. Yell out/ call for help while simultaneously assessing for pulse and respirations. (carotid or femoral is best)
 - D. Check for a carotid or radial 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 a birthday party when an infant suddenly starts choking on a hotdog. What should you do if he is not breathing and cannot breathe?
 - A. Administer 2 rescue breaths using a barrier device.
 - B. Perform a blind sweep of the victim's mouth using a soft cloth to keep him from biting.
 - C. Deliver 2 back-slaps followed by looking into the mouth.
 - D. Perform back slaps and chest thrusts.
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. While the first and most important step is to perform CPR, 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.
 - E. The patient being in late-stage pregnancy.
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 or perform any procedure on an adult, infant or child in cardiac arrest is?
- A. 15 seconds
 - B. 10 seconds
 - C. 30 seconds
 - D. 5 seconds
11. You are watching a resuscitation attempt at a medical facility. You observe the hand placement of the person who is providing compressions to be incorrect. Your next step as a team member should be?
- A. Wait 10 seconds to see if the team leader notices.
 - B. Tell the person doing compressions that you will take over.
 - C. Alert the team leader for him/her to address.
 - D. Tell another team member to take over.
12. While providing CPR to a child or adult, an AED becomes available and a shock is indicated and administered. (Since it is OK to shock children with adult AED pads if necessary), 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 at least 2 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. When 2 or more personnel are available during a resuscitation, the team should

- A. Have the strongest person continue compressions.
- B. Ventilate slightly faster.
- C. Perform 1 minute of rapid compressions, then slightly slower.
- D. Change compressions every 2 minutes.

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 if following the concepts of resuscitation?

- A. Give the patient oxygen. (Airway, Revive, Care)
- B. Check a pulse, and begin compressions if indicated. (Assess, Recognize, Care)
- C. Do nothing, the patient is asleep. (Accept, Care, Revive)
- D. Begin the Heimlich maneuver. (Assess, Airway, Complete)

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

- A. During infant CPR (if your hands are big enough).
- 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, your team leader assigns you 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. A person is found lying next to an electrical line, unresponsive. You assure that the power is disconnected before you attempt resuscitation. In this case, you identified the information you saw, and took appropriate action. This concept of taking action based on information gathered is called?
- A. Critical thinking.
 - B. Unified team approach.
 - C. Problem identification.
 - D. Solving issues.
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. 35 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 surgi- 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 affect that contact?
- A. Water on the patient's chest
 - B. Suntan oil on the skin
 - C. Hair on the chest
 - D. All of the above

NAME: _____

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 84% to be eligible
for the BLS Completion section
after ACLS or PALS**