Essential Medical Training, LLC

Providing Quality, Professional Training"

Advanced Cardiac Life Support
ACLS

Course Study Guide and Agenda

www.EssentialMedicalTraining.com

772-781-9249 office | 772-382-0607 fax | Email: treasurecoastcpr@gmail.com

Course Outline and General Information

Today's course is provided by:

Essential Medical Training, LLC

772-781-9249 office | 772-382-0607 fax

Email: treasurecoastcpr@gmail.com

www.EssentialMedicalTraining.com

Course:

Advanced Cardiac Life Support (ACLS)

Topics Include:

- System of care
- Effective High-Performance Team Dynamics
- System Approach
- Airway Support ACS, Stroke
- Cardiac Arrest: VF/pVT, PEA, Asystole, Bradycardia, SVT, & Post Cardiac Arrest Care

Course time: Approximately 7.0 hours

Curriculum: American Heart Association (2015 Edition)

Course book: Advanced Cardiac Life Support 2016 (ISBN: 978-1-61669-400-5)

The following information is a guide and basic course outline. The information within this packet is limited and maybe incomplete. Students should refer to their course books and American Heart Association's Emergency Cardiovascular Care handbook for complete and accurate information.

Upon completion of the course you will receive a course completion card. You will receive your card within 30 days after the class. Recommended renewal is every two years.

Lost Cards: If you lose your card you can obtain a duplicate by contacting us. The cost for a duplicate card is currently $25 and subject to change without notice.

Thank you for choosing Essential Medical Training, LLC for your training needs.

ENJOY YOUR CLASS!

SYSTEM OF CARE

Effective resuscitation requires a systematic approach using the American Heart Association (AHA) chain of survival. The AHA has created a visual system-specific chain of survival for both the IHCA (In-hospital Cardiac Arrest) and the OHCA (Out-of-Hospital Cardiac Arrest).

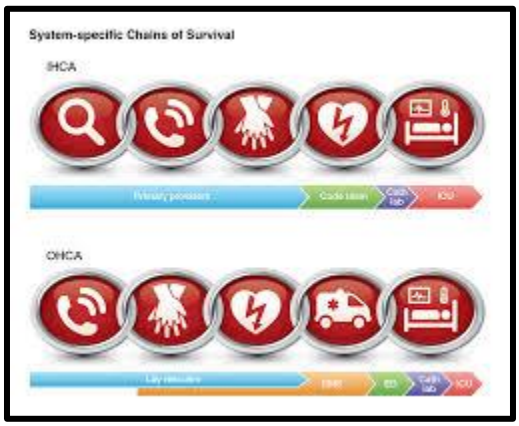


Figure 1: System-Specific Chain of Survival

Rapid Response Teams (RRT) and Medical Emergency Teams (MET)

In recent studies, 80% IHCA patients had documented abnormal vital signs for up to 8 hours prior to cardiac arrest. The purpose of these teams are to identify and treat early clinical deterioration of a patient, thereby improving patient overall outcome.

Mortality rates remains high with an average survival rate of approximately 24% for IHCA even with advanced care. There are published studies that report a 17%-65% drop in cardiac arrest with early recognition and intervention.

Acute Coronary Syndrome (ACS)

The primary goals of therapy for patients with ACS are:

1. Reducing the amount of myocardial necrosis that occurs from an acute myocardial infarction. In doing so, you help prevent heart failure and other cardiovascular complications.
2. Prevent major adverse cardiac events
3. Treat acute, life-threatening complications such as VF, pulseless VT (pVT) and other serious rhythms.

Prompt diagnosis and treatment offers the greatest potential benefit for myocardial salvage.

Acute Stroke

There has been significant improvement in stroke care in the past 5 years. Community and professional education is the key to recognition and treatment of stroke patients. EMS has become an integral part of the system with increased training for EMS personnel in recognition and transportation to a stroke center who are prepared to treat such emergencies.

Post-Cardiac Arrest Care

Patients who achieve a return of spontaneous circulation (ROSC) after cardiac arrest need specialized care to reduce the chance of mortality.

Healthcare providers should consider targeted temperature management (TTM) for adult patients who achieve ROSC and remain comatose. The recommended temperature is 32°C and 36°C (89.6°F and 95.2°F) for at least 24 hours.

Providers should use 100% oxygen during resuscitation but should titrate inspired oxygen to the lowest level needed to achieve an arterial oxygen saturation of 94% or greater after ROSC.

Providers should avoid excessive ventilations because of possible increased intrathoracic pressure and decreased cerebral flow. Ventilations should start at a rate of 10/min to maintain $PETCO_2$ of 30-40 mm Hg.

EMS should consider transportation to a facility capable of providing coronary reperfusion for patients who have ROSC but are suspected of having a coronary artery occlusion.

Effective High-Performance Team Dynamics

Successful resuscitation requires a team of healthcare professionals that perform a variety of interventions. High-performance teams are not only comprised of healthcare providers who can perform advanced skills but also requires a demonstration of clear communications and team work.

Team Leader

Every high performing team needs a leader that can keep order and rhythm during the resuscitation. The leader is responsible for ensuring that each intervention is completed on time and in the correct sequence. It is important that the team leader demonstrates excellent team behavior in their leadership of the resuscitation team. Occasionally, the team leader will need to act as a coach or teacher to help train future team leaders. After the resuscitation, the team leader should facilitate a review of the team's performance with the intent of looking for areas to improve in the resuscitative attempt.

Team Member

The team member must be proficient in their skills and clearly understand their roles and responsibilities. A team member committed to success will be knowledgeable about the algorithms.

Eight Elements of Effective Team Dynamics

1. **Clear roles and responsibilities-** Each team member should know their limitations. Team leaders should delegate tasks for efficiency.
2. **Knowing your limitations-** Team members that are given a task outside of their scope of training should immediately notify the team leader.
3. **Constructive interventions**- Both team members and team leaders are responsible to "speak up" if they see another team member that is about to make a mistake.
4. **Knowledge sharing**- team members should share information with each other and to their team leader. Likewise, team leaders should communicate information to the entire team.

5. **Summarizing and reevaluating**- it is good for team members to repeat or summarize the status of the resuscitation so that the team knows the progress or next step in the resuscitation.
6. **Closed-Loop communications**- When the team leader gives an order, the team member should make eye contact and confirm the order. The team leader listens to the repeated order to confirm it was received correctly.
7. **Clear message**- Repeating the order allows both to ensure that the order was received correctly. If the team member thinks that the order is incorrect, they should question the order, respectfully, to avoid a possible mistake.
8. **Mutual respect**- teams must work together.

Systematic Approach

Healthcare providers should use a systematic approach when caring for acutely ill patients. A systematic approach using the BSL assessment includes:

- **Primary Assessment**
    - Check for responsiveness
    - Call for help
    - Check breathing and pulse
        - Agonal gasps are not normal breathing and is a sign of cardiac arrest
        - Pulse checks should last no longer than 5 to 10 seconds
        - Respiratory arrest patients should be ventilated every 5 to 6 seconds
        - Cardiac arrest patients with advanced airway should be ventilated every 6 seconds
        - Excessive ventilations increase intrathoracic pressure, decreasing venous return to the heart and diminishes cardiac output
    - Chest compressions should be started if no pulse is present.
        - Compressions are at least 2 inches' deep
        - Compression rate is 100 to 120 per minute
        - Compressions should not be interrupted for longer than 10 seconds
        - Compressors should change every 2 minutes to prevent fatigue
    - Defibrillation should occur as soon as possible. CPR starting with chest compressions should be started immediately following each shock
- **Secondary Assessment**
    - More in-depth head to toe assessment
    - H's and T's should be considered for cause of cardiac arrest

Acute Coronary Syndrome (ACS)

ACLS providers must be able to assess and stabilize patients with ACS. The 12-lead ECG is used to classify the patients in one of three categories. The categories are ST-segment elevation (acute, ongoing injury), ST-segment depression (ischemia), and normal ECG. Sudden cardiac arrest and hypotensive bradyarrhythmia's can occur with acute ischemia. Including VF and pulseless VT.

The most common symptom of myocardial ischemia and infarction is retrosternal chest discomfort. The patient may explain this as a pressure like discomfort or tightness. This discomfort can radiate to the shoulders, neck, one or both arms, or jaw. They may present with nausea, sweating, dizziness, or short of breath.

Assessment and treatment include administering oxygen to patients with an oxygen saturation less than 90%. A dose of 160 to 325 mg of non-enteric coated aspirin prevents additional thrombus formation. Administering a dose of aspirin can be beneficial provided the patient has not taken aspirin, does not have a true aspirin allergy, and not recent GI bleeding. The patient should chew the aspirin.

Nitroglycerin is effective in reducing ischemic chest discomfort. Nitroglycerin reduces LV and RV preload through peripheral arterial and venous dilation. Administer 1 sublingual nitroglycerin (tab or spray) every 3 to 5 minutes. Nitroglycerin should not be given to patients with systolic pressures below 90 mm Hg. Nitroglycerin should be administered cautiously or not at all in patients with inferior wall MI or recent use of phosphodiesterase inhibitor (Cialis, Viagra).

Morphine can be used to relieve chest discomfort unresponsive to nitroglycerin. Morphine causes vasodilation so give in small increments. Fluids should be the first line therapy for hypotension.

A 12-lead ECG should be obtained as soon as possible. A 12-lead ECG is the only way to identify a STEMI. Reperfusion is the goal of a STEMI patient. Administering fibrinolytic within 30 minutes of arrival or perform a PCI within 90 minutes of arrival.

Acute Stroke

Stroke is a general term used to refer to a neurological impairment caused by a disruption in blood flow to a part of the brain. There are two major types of strokes which are ischemic and hemorrhagic. Ischemic is caused by an occlusion in a particular part of the brain. Ischemic strokes account for 87% of all strokes. Hemorrhagic is a rupture of a blood vessel in the brain and this type of stroke accounts for 13% of all strokes. Fibrinolytic therapy is contraindicated in hemorrhagic strokes. Ischemic stroke patients have a small window of opportunity (<3 hours or 4.5 hours for selected patients) to receive valuable fibrinolytic therapy.

Signs and symptoms associated with a stoke are:

- Sudden weakness or numbness of the face, arm, or leg, particularly to one side of the body
- Sudden onset of confusion
- Trouble speaking
- Vision problem
- Trouble with walking or maintaining balance
- Severe headache

Activating the EMS system quickly is crucial to managing the stroke patient. The EMS crew can perform a neurological evaluation such as the Cincinnati Prehospital Stroke Scale. This scale is based on 3 findings and can be performed quickly:

- Facial droop
- Arm drift
- Abnormal speech

It is important that EMS crews identify acute strokes and relay the information to the emergency department. The ED will need to quickly perform a CT in order to identify whether it is an ischemic stroke or a hemorrhagic stroke. It is recommended that a CT be performed within 25 minutes of arriving at the hospital and read within 45 of arriving at the hospital. The window of fibrinolytic treatment must be initiated within 3 hours of the initial symptoms.

Cardiac Arrest

The cardiac arrest algorithm consists of two pathways:

- Shockable rhythm (VF/Pulseless VT) Left side
- Non-shockable rhythm (Asystole, PEA) Right side

Treatment of Ventricular fibrillation (VF) is most effective with CPR and a shock from a defibrillator. If a defibrillator is not immediately available, CPR should be started until one becomes available. Chest compressions should be continued while the defibrillator is charging. Before the shock is delivered, the team member will call for "all clear". The chance of survival decreases by 10 percent for every minute that passes that CPR and a defibrillator isn't used on a patient in a shockable rhythm.

The first drug of choice is Epinephrine. This drug is used mainly because of its β- adrenergic effects of vasoconstriction. Vasoconstriction increases cerebral and coronary blood blow. Epinephrine is given after the second shock at a dose of 1mg IV/IO every 3 to 5 minutes. Vasopressin has been REMOVED from the algorithm.

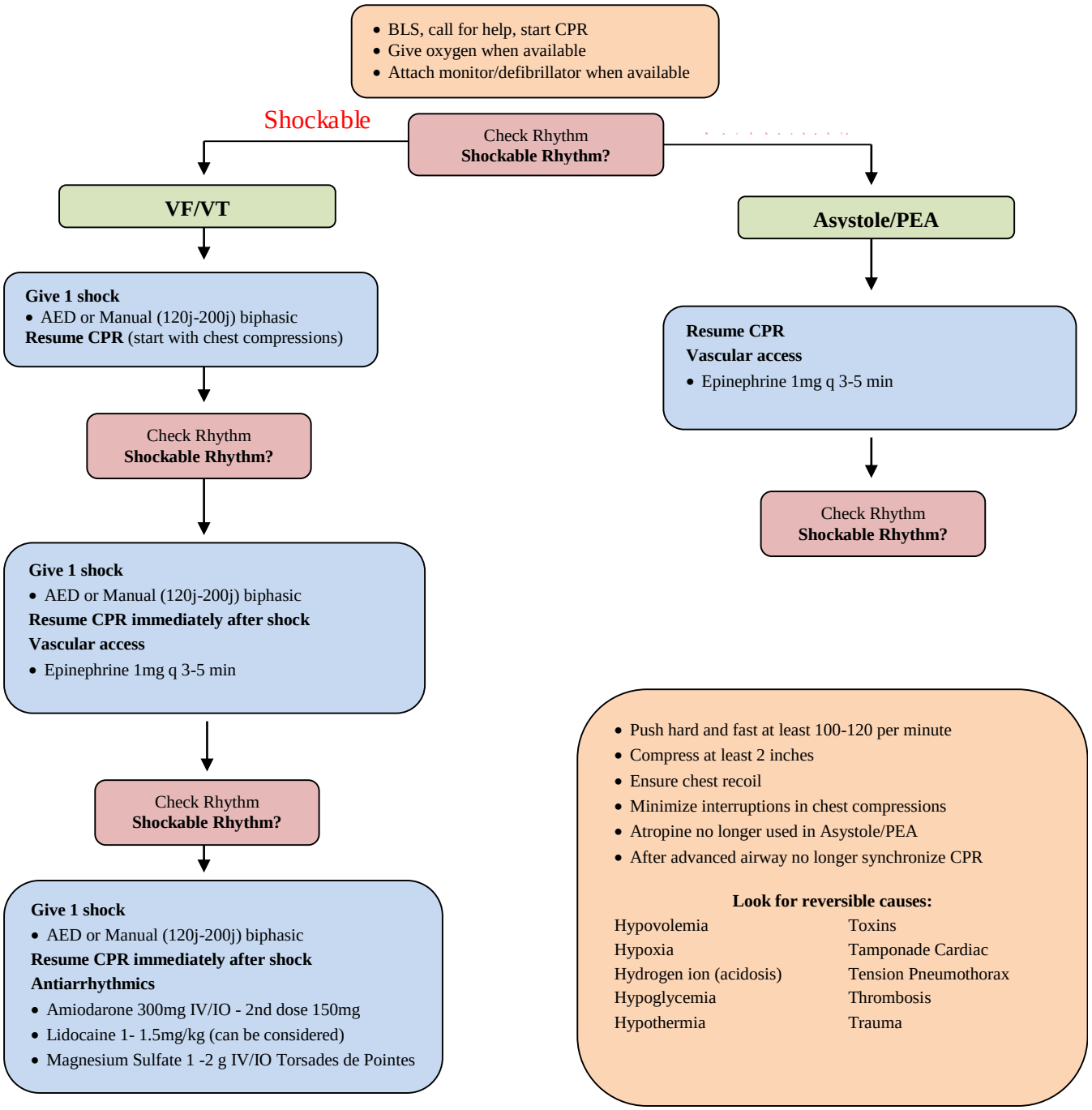
The first drug of choice for antiarrhythmic is Amiodarone at a dose of 300mg IV/IO followed by one additional dose of 150mg IV/IO. Lidocaine can still be used if Amiodarone is not available. Lidocaine is given in the first dose of 1 to 1.5 mg/kg with repeat dose of half the initial dose every 5-10 minutes to a max dose of 3mg/kg.

Magnesium Sulfate should be used for torsades de pointes with a loading dose of 1 to 2 g IV/IO diluted in 10 ml of saline given over 5 to 20 minutes.

It is recommended that quantitative capnography be used with intubated patients. This allows recognition of ROSC and monitoring of effective chest compressions. A $PETCO_2$ that falls below 10 mm Hg will indicate a need to improve the quality of chest compressions.

The right side of the algorithm is asystole and PEA. This side has one main drug of Epinephrine along with high quality CPR. Identifying underlying conditions using the H's and T's.

Pulseless Arrest Algorithm



- Push hard and fast at least 100-120 per minute
- Compress at least 2 inches
- Ensure chest recoil
- Minimize interruptions in chest compressions
- Atropine no longer used in Asystole/PEA
- After advanced airway no longer synchronize CPR

Look for reversible causes:

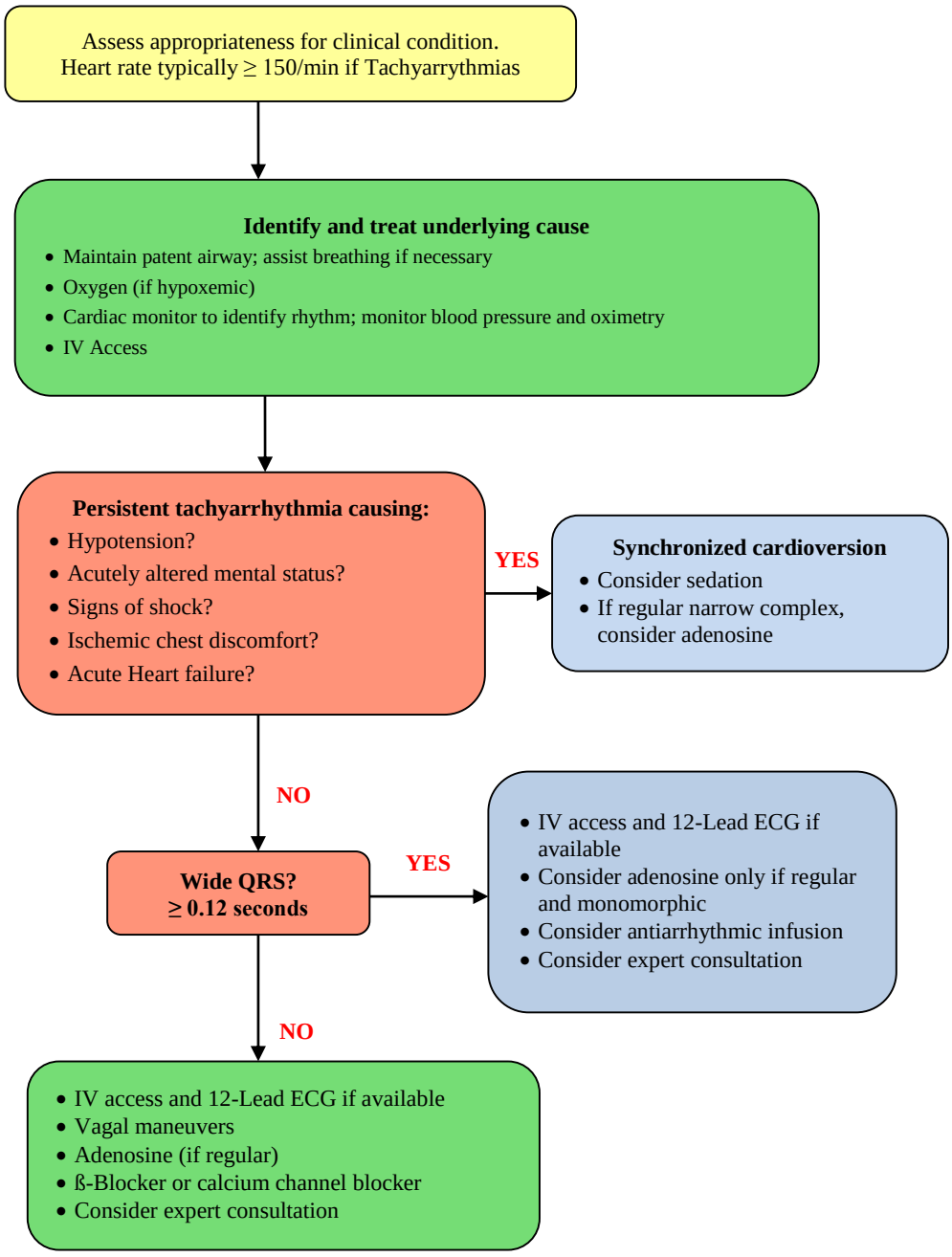
Hypovolemia	Toxins
Hypoxia	Tamponade Cardiac
Hydrogen ion (acidosis)	Tension Pneumothorax
Hypoglycemia	Thrombosis
Hypothermia	Trauma

This algorithm is a summary and should be used only as a guide in conjunction with the course book.

Bradycardia with a Pulse Algorithm

This algorithm is a summary and should be used only as a guide in conjunction with the course book.

Tachycardia with a Pulse Algorithm



Dose/Details

Synchronized Cardioversion

Initial recommended doses:

- Narrow regular: 50-100 J
- Narrow irregular: 120-200 J biphasic or 200 J monophasic
- Wide regular: 100 J
- Wide irregular: defibrillation does (NOT synchronized)

Adenosine IV Dose:

First dose: 6 mg rapid IV push; follow with NS flush.

Second dose: 12 mg if required.

Antiarrhythmic Infusion for Stable Wide-QRS Tachycardia

Procainamide IV Dose:
20-50 mg/min until arrhythmia suppressed, hypotension ensures, QRS duration increases >50%, or maximum dose 17 mg/kg given. Maintenance infusion: 1-4 mg/min. Avoid if prolonged QT or CHF.

Amiodarone IV dose:
First dose: 150 mg over 10 min. Repeat as needed if VT recurs. Follow by maintenance infusion of 1 mg/min for first 6 hours.

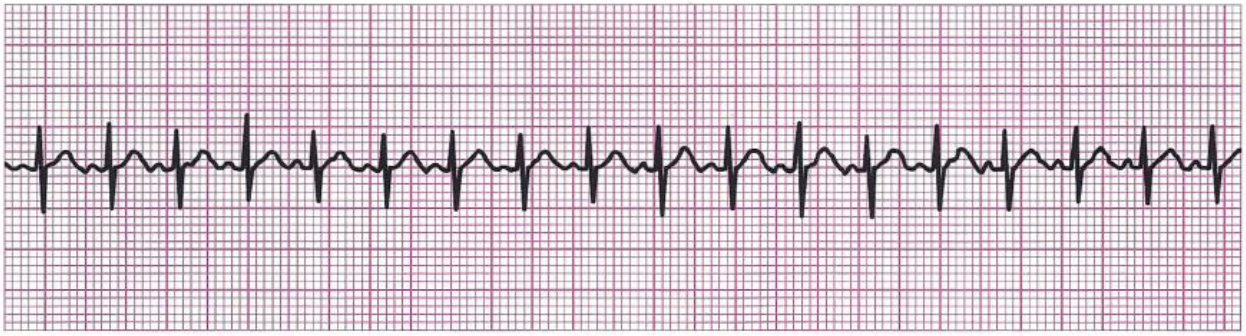
Sotalol IV Dose:
100 mg (1.5mg/kg) over 5 minutes. Avoid if prolonged QT.

This algorithm is a summary and should be used only as a guide in conjunction with the course book.

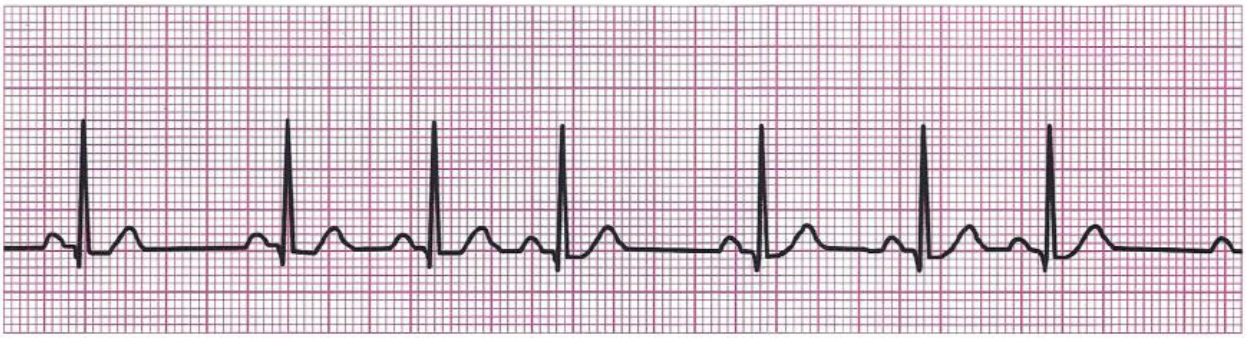
ECG Rhythms

A

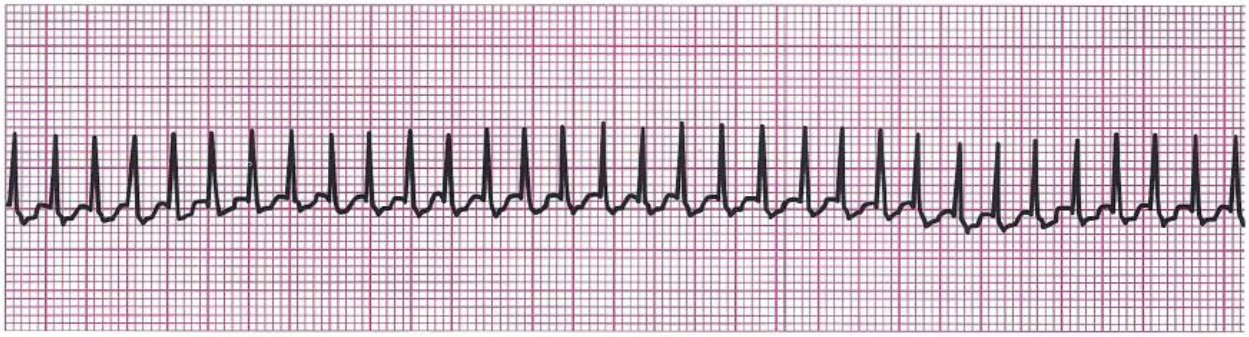
B



C

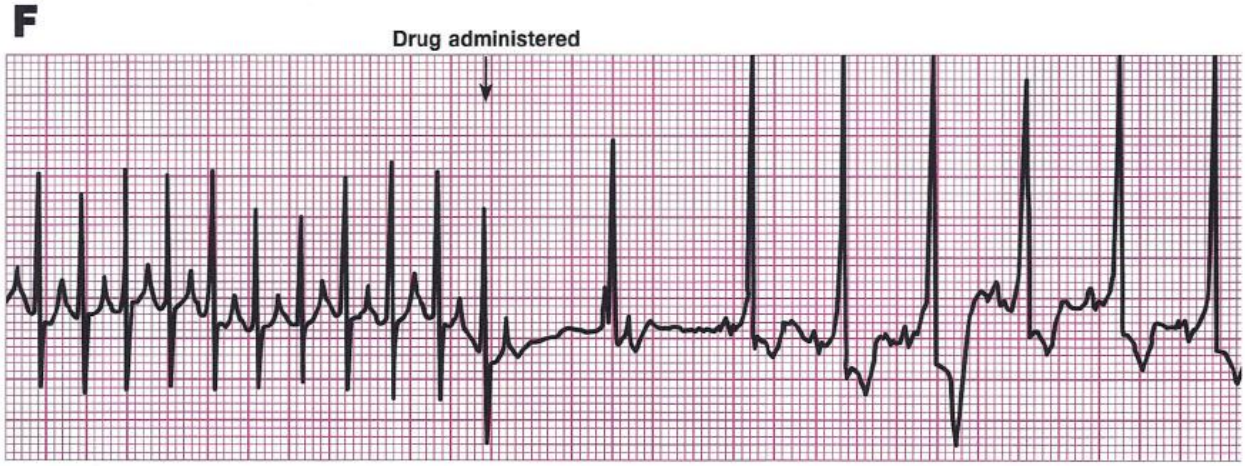


D

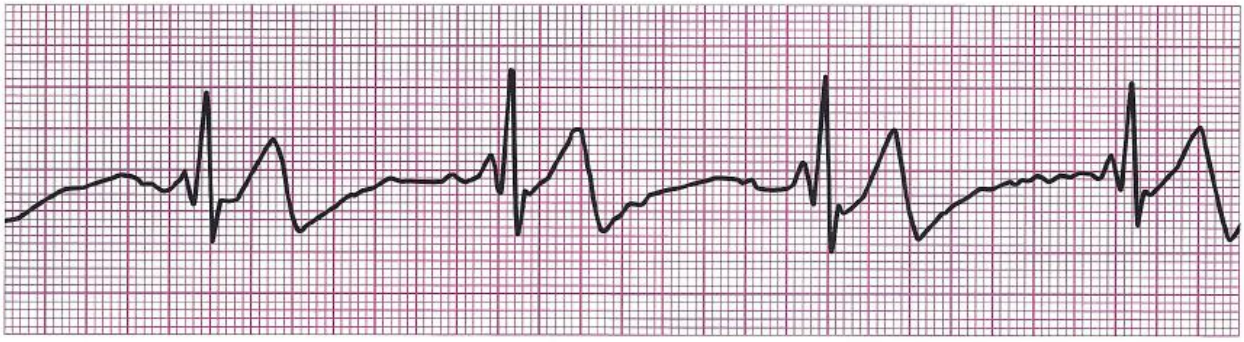


E

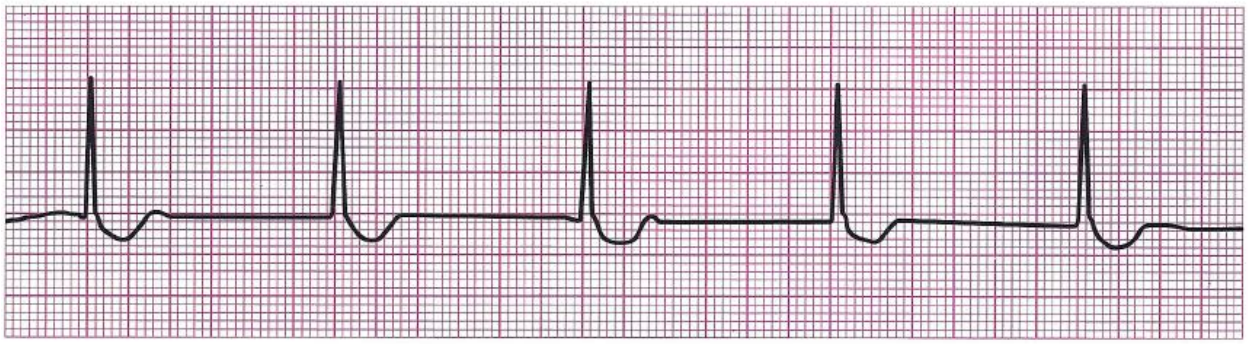
F



G



H



I

J

Answers to Rhythms

A. Sinus Rhythm
B. Sinus Tachycardia
C. Sinus Arrhythmia
D. Narrow-complex Tachycardia
E. Wide-complex Tachycardia
F. SVT converting to sinus rhythm with adenosine administration
G. Sinus bradycardia
H. Junctional bradycardia
I. Complete heart block with ventricular escape rhythm (3rd degree)
J. Agonal rhythm progressing to asystole