

In the name of God



Cardiac Arrest in Pregnancy

Basic Life Support

Dr. Samaneh Ghazanfar Tehran

Assistant Professor of Anesthesiology

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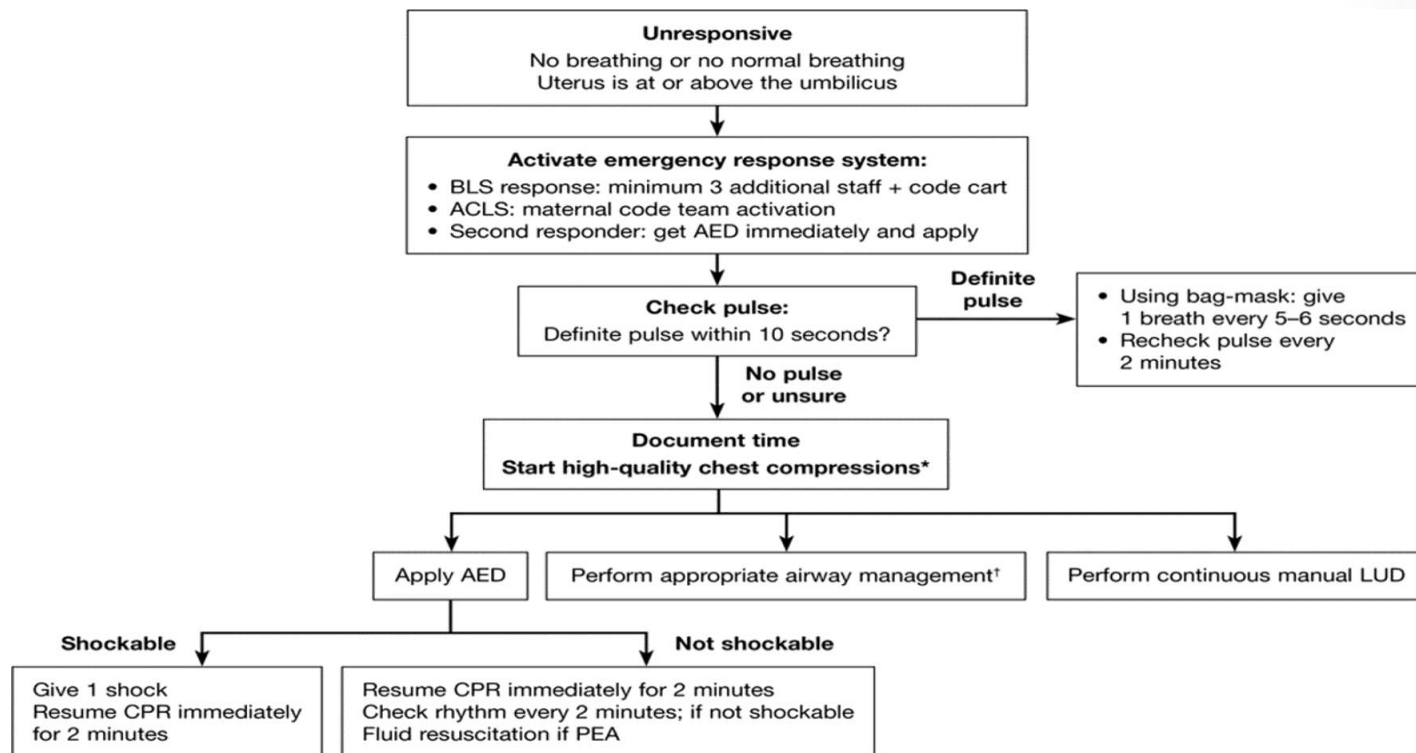
- Maternal mortality is defined as the death of a woman during pregnancy and up to 42 days after delivery or termination of pregnancy.
- US data suggest that cardiac arrest occurs in 1:12,000 admissions for delivery. Globally, 800 maternal deaths occur daily.

- Resuscitation for pregnant women is in large part similar to standard adult resuscitation; several aspects and considerations are uniquely different:
- The most obvious difference is that there are 2 patients, the mother and the fetus
- Also, physiologic effects of pregnancy require modification of resuscitation efforts. Increases in maternal blood volume and reduced pulmonary functional residual capacity are some of the physiologic changes occurring with pregnancy.

Differential Diagnosis

- 1-**AFE** most frequently presents during labor but can also manifest at the time of delivery.
- 2-**Pulmonary embolism** is an important cause of cardiac arrest in women at all stages of pregnancy and into the postpartum period.
- 3-**Aortic dissection** is another major cause of cardiac death, particularly in the context of connective tissue abnormalities such as Marfan syndrome
- 4-**Myocardial infarction (AMI)**, increasing risk 3- to 4fold in comparison with the non pregnant state
- 5-**Drug Error**

Cardiac arrest in pregnancy in-hospital basic life support (BLS) algorithm: simultaneous C-A-B-U (chest compressions/current-airway-breathing-uterine displacement).



*Chest compressions in pregnancy:

- Use a firm backboard
- Place patient supine
- Place hands in center of chest (as in nonpregnant patient)
- Compress at a rate of at least 100/min
- Compress at a depth of at least 2 inches (5 cm)
- Perishock pause <10 seconds
- Allow complete chest recoil after each compression
- Minimize interruptions
- Perform continuous manual LUD

†Appropriate airway management for pregnancy:

- Open airway by using head tilt–chin lift maneuver (if not a trauma victim)
- Administer 100% O₂ at ≥15 L/min
- When available, perform bag-mask ventilation
 - Seal mask, ensure no leak around mask; 2-handed technique preferred
 - Deliver each rescue breath over 1 second
 - Give 2 breaths for every 30 compressions
 - Give a sufficient tidal volume to produce visible chest rise or fog within face mask. If not seen, reopen airway and improve seal. Consider using oral airway.
- Avoid excessive ventilation

Chest Compressions in Pregnancy

- Chest compressions should be performed at a rate of at least 100 per minute at a depth of at least 2 in (5 cm), allowing full recoil before the next compression, with minimal interruptions, and at a compression-ventilation ratio of 30:2
- Interruptions should be minimized and limited to 10 seconds except for specific interventions such as insertion of an advanced airway or use of a defibrillator
- The patient should be placed supine for chest compressions
- There is no literature examining the use of mechanical chest compressions in pregnancy, and this is not advised at this time.

Factors Affecting Chest Compressions in the Pregnant Patient

Aortocaval Compression

- Historically, tilt has been used as an option to relieve aortocaval compression during resuscitation
- Manually displace the uterus leftward
- Place intravenous bags or rolled up towels under the right flank and hip.
- Place the knees of a second rescuer under the right flank and hip.

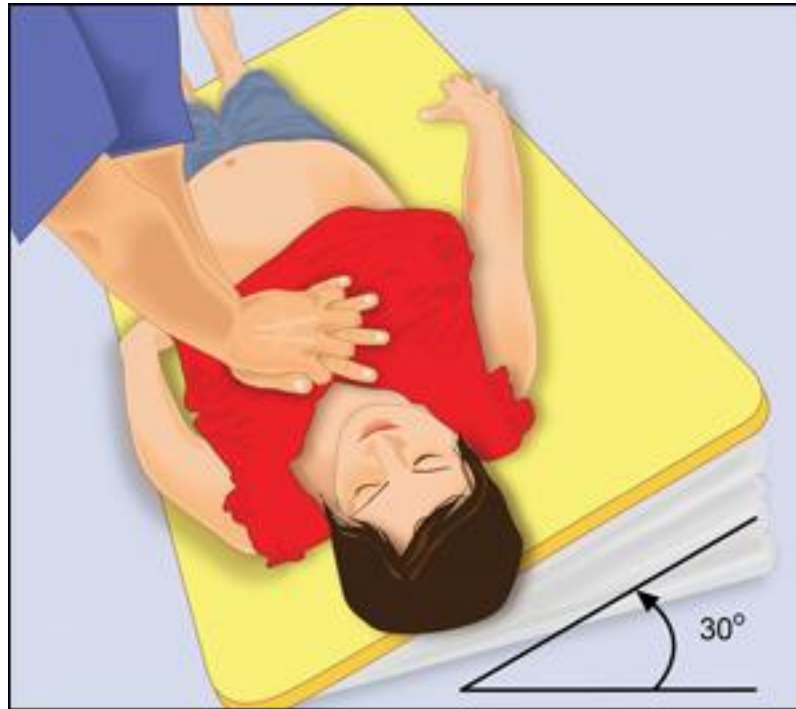
Manual left uterine displacement by the 1-handed technique from the right of the patient during adult resuscitation.



Manual left uterine displacement by the 2-handed technique from the left of the patient



What is your idea about this picture?



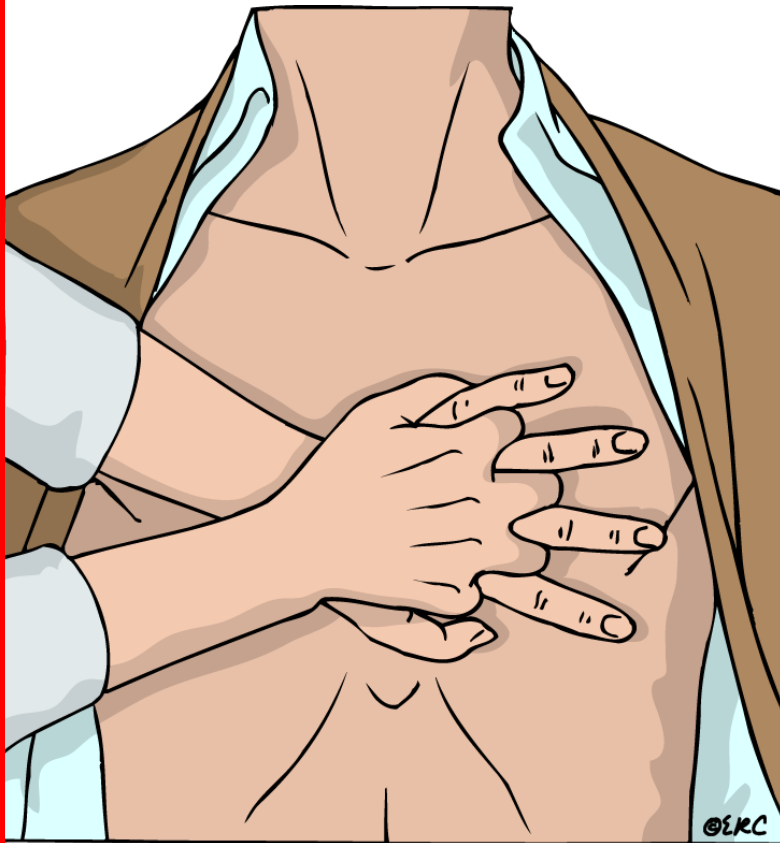
NO Patient Tilt!!

- The heart has been shown to shift laterally
- Therefore, chest compressions is significantly less effective

Positioning of Hands During Chest Compressions

- There is no scientific evidence to support changing the recommendation for hand placement for chest compressions in the pregnant patient compared with the nonpregnant patient
- The rescuer should place the heel of 1 hand on the center (middle) of the victim's chest (the lower half of the sternum) and the heel of the other hand on top of the first so that the hands overlap and are parallel

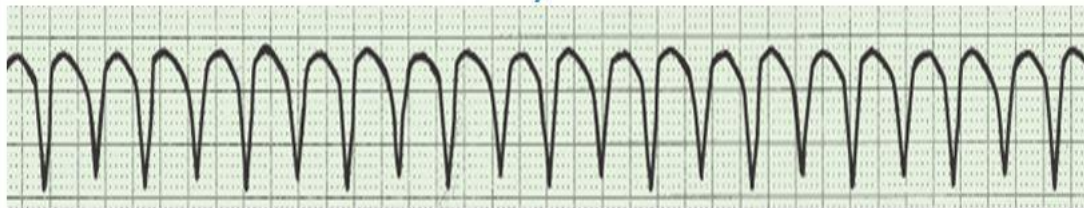
CHEST COMPRESSIONS



- Place the heel of one hand in the centre of the chest
- Place other hand on top
- Interlock fingers
- Compress the chest
 - Rate 100 min⁻¹
 - Depth 5 cm
 - Equal compression : relaxation
- When possible change CPR operator every 2 min

Is The Rhythm Shockable?

Ventricular Tachycardia

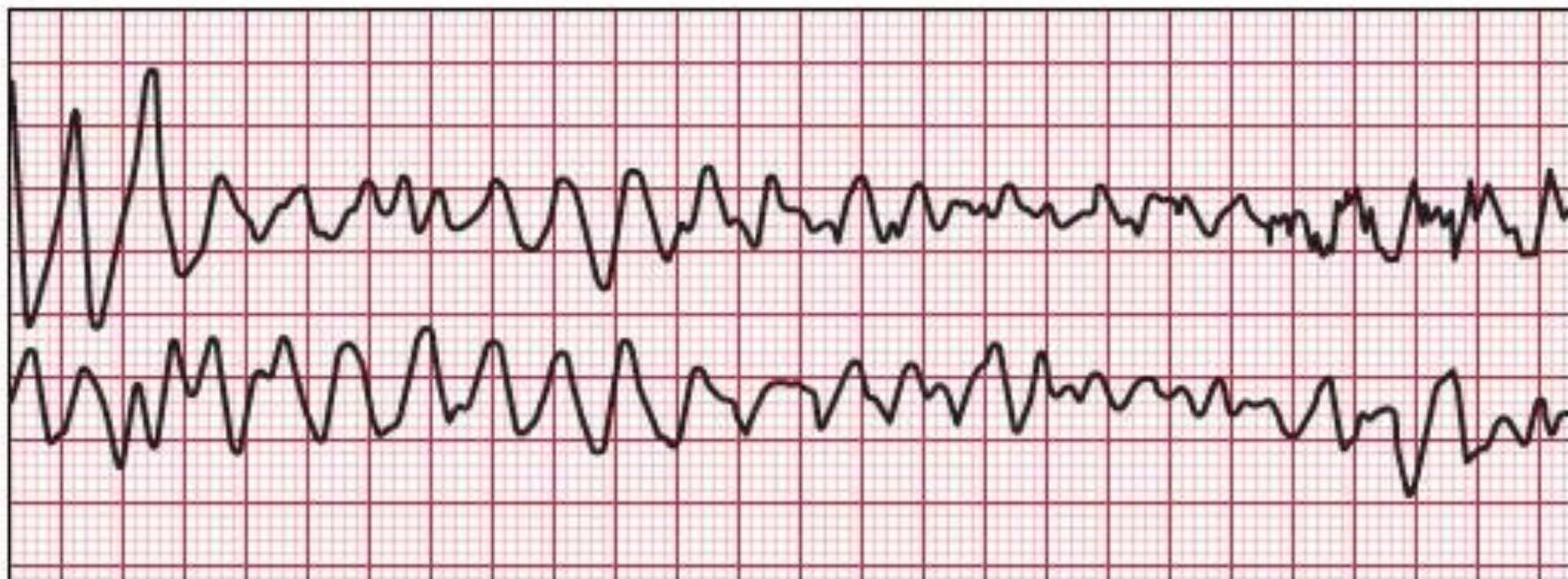


- ECG characteristics
 - Rhythm
 - Regular R to R
 - Rate
 - Ventricular rate 150-250
 - P wave
 - none
 - PR interval
 - none
 - QRS complex
 - Wide, bizarre, > 0.12

Ventricular Tachycardia



Ventricular Fibrillation



Heart Rate	Rhythm	P Wave	PR interval (in seconds)	QRS (in seconds)
300-600	Extremely irregular	Absent	N/A	Fibrillatory baseline

What We Need to Know:

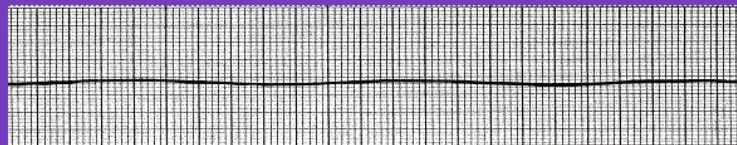
- V-Fib



- V-Tach



- Asystole

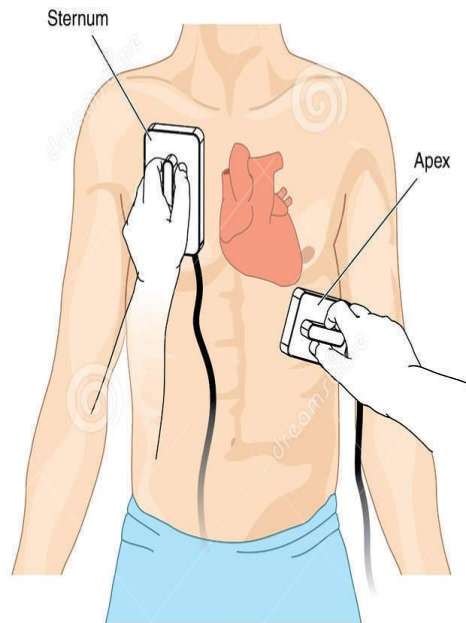


Defibrillation Issues During Pregnancy

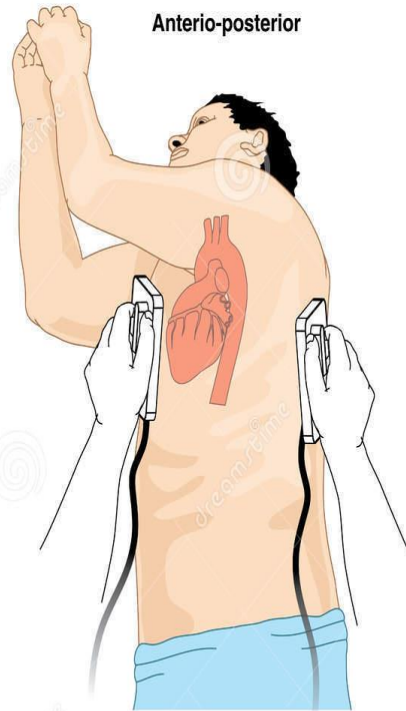
- The same currently recommended defibrillation protocol should be used in the pregnant patient as in the nonpregnant patient. There is no modification of the recommended application of electric shock during pregnancy
- The patient should be defibrillated with biphasic shock energy of **120 to 200 J** with subsequent escalation of energy output if the first shock is not effective and the device allows this option.
- Compressions should be resumed immediately delivery of the electric shock
- For in-hospital settings where staff have no ECG rhythm recognition skills or where defibrillators are used infrequently such as in an obstetric unit, the use of an **automated external defibrillator** may be considered

- Anterolateral defibrillator pad placement is recommended as a reasonable default . The lateral pad/paddle should be placed under the breast tissue, an important consideration in the pregnant patient.
- The use of adhesive shock electrodes is recommended to allow consistent electrode placement

Sterno-apical



Anterio-posterior



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Air Way

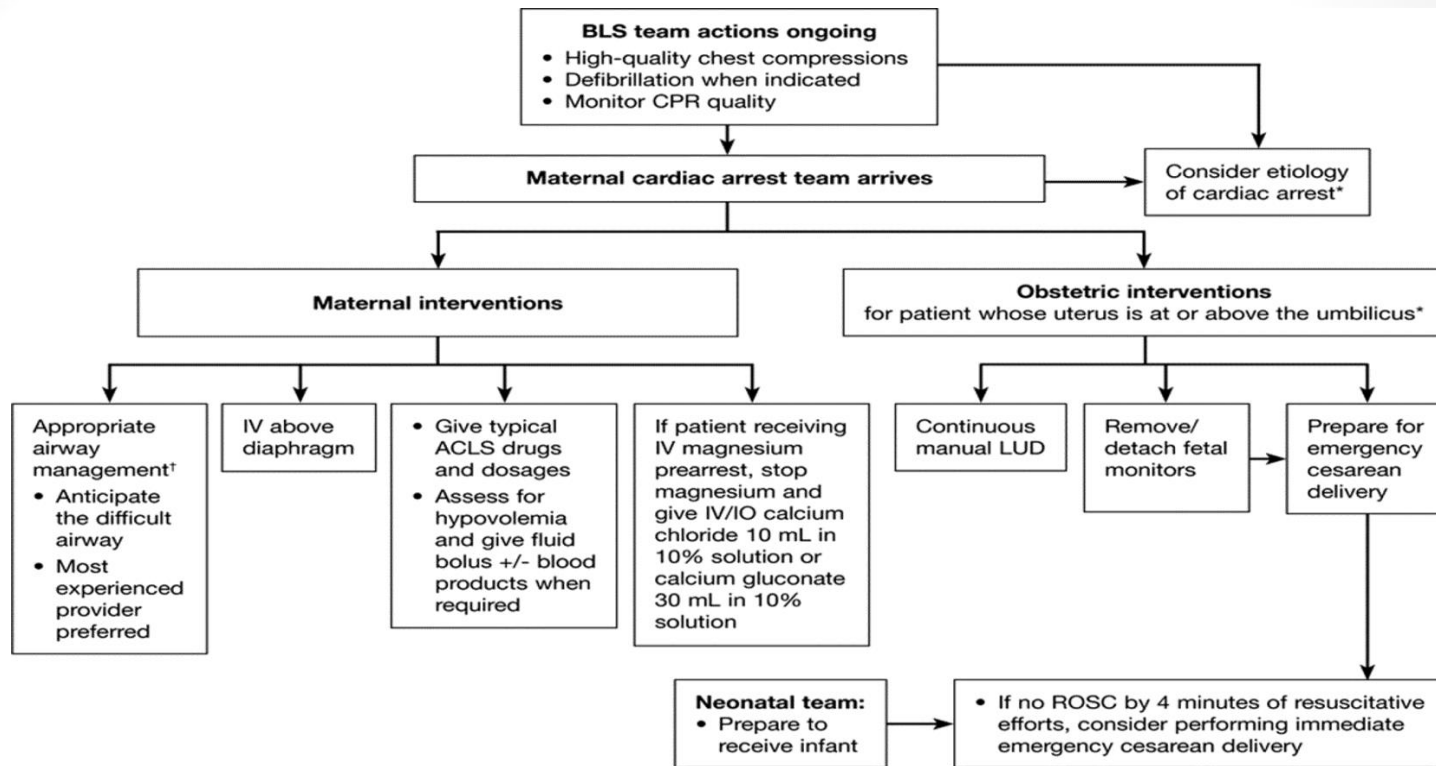
- Hypoxemia develops more rapidly in the pregnant patient compared with the nonpregnant patient.
- Rapid, high-quality, and effective airway and breathing interventions are essential
- the recommendations for management of cardiac arrest in pregnancy note the importance of early bag-mask ventilation with 100% oxygen
- If attempts at mask ventilation do not produce visible chest rise or fog within the face mask, An oral airway may help relieve airway obstruction in the hypopharynx.

BLS Recommendations (Actions Are Simultaneous, Not Sequential)

- 1. Rapid notification should be provided to the maternal cardiac arrest response team
- 2. The time when pulselessness was confirmed should be documented
- 3. CPR should be paired with uterine displacement, and a firm backboard should be used
- 4. Rapid automated defibrillation should be provided whenever it is indicated as appropriate by rhythm analysis

- 5. Appropriate BLS airway management should be initiated.
 - a. A member of the first responder team should perform bag-mask ventilation with 100% oxygen flowing to the bag at a rate of at least 15 L/min.
 - b. Two-handed bag-mask ventilation is preferred
- 6. Hospitals need to establish first-responder roles that satisfy all of the requirements for BLS, including modifications recommended during pregnancy. A minimum of 4 staff members should respond for BLS resuscitation of the pregnant patient. All hospital staff should be able to fulfill first-responder roles

- **Advanced Cardiovascular Life Support**



*Potential etiology of maternal cardiac arrest:

- A Anesthetic complications/accidents
- B Bleeding
- C Cardiovascular
- D Drugs
- E Embolic
- F Fever
- G General nonobstetric causes of cardiac arrest (H's and T's)
- H Hypertension

†Appropriate airway management for pregnancy:

- 100% oxygen at ≥ 15 L/min and continue BLS airway strategies
- Optimally 2 attempts per technique:
 - First intubation attempt—if failed go to
 - Second intubation attempt—if failed go to
 - First supraglottic airway attempt—if failed go to
 - Second supraglottic airway attempt—if failed go to mask ventilation
 - If mask ventilation inadequate—attempt cricothyrotomy
- Avoid airway trauma
- Ventilate with 8–10 breaths/min
- Monitor capnography
- Minimize interruptions in chest compressions during advanced airway placement
- Recommend 6.0- to 7.0-mm inner diameter ETT

- **Endotracheal intubation should be performed by an experienced laryngoscopist**

- a. Starting with an ETT with a 6.0- to 7.0-mm inner diameter is recommended

- b. Optimally no more than 2 laryngoscopy attempts should be made

- c. Supraglottic airway placement is the preferred rescue strategy for failed intubation

- d. If attempts at airway control fail and mask ventilation is not possible, current guidelines for emergency invasive airway access should be followed (call for help, obtain equipment).

- Prolonged intubation attempts should be avoided to prevent deoxygenation, prolonged interruption in chest compressions, airway trauma, and bleeding.
- Cricoid pressure is not routinely recommended.
- Continuous capnography should be used if available to assess correct placement of the ETT, the quality of chest compressions, and ROSC. Findings suggestive of adequate chest compressions, ROSC, or both include a rising PETCO₂ level or levels >10 mm Hg
- Interruptions in chest compressions should be minimized during advanced airway placement

Arrhythmia-Specific Therapy During Cardiac Arrest

- Medical therapy during cardiac arrest is no different in the pregnant patient than in the nonpregnant patient.
- For refractory (shock-resistant) ventricular fibrillation and tachycardia, amiodarone 300 mg rapid infusion should be administered with 150-mg doses repeated as needed
- Medication doses do not require alteration to accommodate the physiological changes of pregnancy

Other Drugs Used During ACLS

- **Administering 1 mg epinephrine IV/IO every 3 to 5 minutes during adult cardiac arrest should be considered.**
- **In view of the effects of vasopressin on the uterus and because both agents are considered equivalent, epinephrine should be the preferred agent**
- **It is recommended that current ACLS drugs at recommended doses be used without modifications**

Fetal Assessment During Cardiac Arrest

- **Fetal assessment should not be performed during resuscitation**
- **Fetal monitors should be removed or detached as soon as possible to facilitate PMCD without delay or hindrance**

defibrillation protocol

- The same currently recommended defibrillation protocol should be used in the pregnant patient as in the nonpregnant patient.
- **Safe for Fetus**



Caesarean section in maternal resuscitation in late pregnancy

- Continue maternal CPR throughout
- Incision
- Equipment (scalpel, artery forceps)
- Potentially good fetal outcome if delivery occurs by 5 minutes of cardiac arrest.

Thanks