Shock and Resuscitation
Applies a fundamental knowledge of the causes, pathophysiology, and management of shock, respiratory failure or arrest, cardiac failure or arrest, and post-resuscitation management.

Introduction
- The principles of basic life support (BLS) were introduced in 1960.
- Specific techniques have been revised every 5 to 6 years.
- Information here follows the 2005 guidelines.

Elements of BLS
- Noninvasive emergency lifesaving care
- Used to treat medical conditions including:
  - Airway obstruction
  - Respiratory arrest
  - Cardiac arrest

Focus is on the ABCs
- Airway (obstruction)
- Breathing (respiratory arrest)
- Circulation (cardiac arrest or severe bleeding)

BLS follows a specific sequence for adults, infants, and children.
Ideally, only seconds should pass between the time you recognize a patient needs BLS and the start of treatment.
Elements of BLS

- Cardiopulmonary resuscitation (CPR)
  - Used to establish artificial ventilation and circulation in a patient who is not breathing and has no pulse

CPR steps
- Open airway.
- Provide artificial respirations by rescue breathing.
  - Mouth-to-mouth
  - Mouth-to-nose
  - Use of mechanical devices
- Chest compressions to circulate blood.

BLS differs from advanced life support (ALS)
ALS involves:
- Cardiac monitoring
- Intravenous fluids and medications
- Advanced airway adjuncts
The System Components of CPR (2 of 2)

- AHA's chain of survival
  - Early access
  - Early CPR
  - Early defibrillation
  - Early advanced care
- If any one of the links in the chain is absent, the patient is more likely to die.

Automated External Defibrillation (1 of 3)

- Vital link in the chain of survival
- Automated external defibrillator (AED) should be applied to cardiac arrest patients as soon as available.
- Simple design of AED makes it easy for EMT and laypersons to use.

Automated External Defibrillation (2 of 3)

- If you witness cardiac arrest, begin CPR and apply the AED as soon as it is available.
- Children
  - Safe for children older than 1 year of age
  - Apply after first five cycles of CPR.
  - For child 1 to 8 years of age, use pediatric-sized pads and dose-attenuating system.

Automated External Defibrillation (3 of 3)

- Special situations
  - Pacemaker
  - Wet patients
  - Transdermal medication patches

Assessing the Need for BLS (1 of 3)

- Always begin by surveying the scene.
- Complete primary assessment as soon as possible.
  - Evaluate ABCs.
- Determine unresponsiveness.
  - Conscious patient does not need CPR.
- Protect spinal cord from further injury.

Assessing the Need for BLS (2 of 3)

- Basic principles of BLS are same for infants, children, and adults.
- Although cardiac arrest in adults usually occurs before respiratory arrest, the reverse is true for infants and children.
Assessing the Need for BLS

Positioning the Patient

- Position the patient so the airway is open.
- For CPR, patient must be supine on firm surface.
- Must be enough space for two rescuers to perform CPR *(Skill Drill 11-1)*
- Log roll patient onto backboard for easier access.

Assessing ABCs

- Two techniques of opening airway in adults
  - Head tilt–chin lift maneuver
  - Jaw-thrust maneuver

Once the airway is open, look, listen, and feel for signs of breathing.
Assessing ABCs (5 of 18)

If patient is breathing, and there are no signs of trauma, place the patient in the recovery position.
- Maintains clear airway
- Allows vomitus to drain from mouth
- Not for patients with potential head or spinal injuries

Assessing ABCs (6 of 18)

Recovery position

Assessing ABCs (7 of 18)

If patient is not breathing, ventilations can be given by one or two EMTs, by EMRs, or by trained bystanders.
- Use a barrier device.

Assessing ABCs (8 of 18)

Assessing ABCs (9 of 18)

Assessing ABCs (10 of 18)
For a patient with a stoma, place a bag-mask device or pocket mask directly over the stoma.
- Artificial ventilation may result in gastric distention.
  - The stomach becomes filled with air.

After determining that unresponsive patient is not breathing:
- Position the patient and give two rescue breaths.
- Check for pulse at carotid artery.

If pulse cannot be felt, begin CPR.

Administer chest compressions:
- Apply rhythmic pressure and relaxation to lower half of sternum.
- Heart is located slightly to left of middle between sternum and spine.
- Compressions squeeze heart, acting as a pump to circulate blood.

Administer chest compressions (cont’d)
- Place patient on firm, flat surface.
- Proper hand positioning is crucial.
- Injuries can be minimized by proper technique and hand placement.
- See Skill Drill 11-2.
One-Rescuer Adult CPR

- Single rescuer gives both artificial ventilations and chest compressions.
  - Ratio of compressions to ventilations is 30:2.
  - See Skill Drill 11-3.

Two-Rescuer Adult CPR

- Always preferable to one rescuer CPR.
  - Less tiring. Rescuer doing compressions can be switched.
  - Facilitates effective chest compressions
  - See Skill Drill 11-4.

Several devices are available to assist EMTs:
- Impedance threshold device (ITD)
  - Valve device placed between endotracheal tube and bag-mask device
  - Limits air entering lungs during recoil phase between chest compressions
Two-Rescuer Adult CPR Page

- Mechanical piston device
  - Depresses sternum via compressed gas-powered plunger
- Load-distributing band CPR or vest CPR
  - Composed of constricting band and backboard

Infant and Child CPR Page

- Heart is healthy in most children.
  - Therefore sudden cardiac arrest is rare.
- Cardiac arrest in children usually comes from respiratory or circulatory failure from illness or injury.
  - Airway and breathing are the focus of pediatric BLS.

Infant and Child CPR Page

- Causes of child respiratory problems:
  - Injury
  - Infections
  - Foreign body
  - Near drowning
  - Electrocut
  - Poisoning/overdose
  - SIDS

Infant and Child CPR Page

- Pediatric BLS can be divided into 4 steps:
  - Determining responsiveness
  - Airway
  - Breathing
  - Circulation (see Skill Drills 11-5 and 11-6)
Interrupting CPR (1 of 2)

- CPR is an important holding action.
- Patient receives definitive care afterwards:
  - Defibrillation
  - Further care at hospital

Interrupting CPR (2 of 2)

- If no ALS available at scene:
  - Provide transport per protocol.
  - ALS rendezvous en route to hospital
- Try not to interrupt CPR for more than a few seconds.
  - Necessary, for example, to move patient up and down stairs

When Not to Start BLS (1 of 3)

- If the patient has obvious signs of death
  - Rigor mortis (stiffening of body)
  - Dependent lividity (livor mortis)
  - Putrefaction or decomposition of body
  - Evidence of nonsurvivable injury:
    - Decapitation
    - Dismemberment
    - Burned beyond recognition
When Not to Start BLS (2 of 3)

• If the patient and physician have previously agreed on do not resuscitate (DNR) orders:
  – Can be complicated issue
  – Advanced directives expressing patient’s wishes may be hard to find.
  – When in doubt, begin CPR.

When Not to Start BLS (3 of 3)

When to Stop BLS (1 of 2)

• Once you begin CPR, continue until (STOP acronym):
  – **S** Patient Starts breathing and has a pulse
  – **T** Patient is Transferred to another trained responder
  – **O** You are Out of strength
  – **P** Physician directs to discontinue

When to Stop BLS (2 of 2)

• “Out of strength” does not just mean tired, but physically unable to continue.

Foreign Body Airway Obstruction in Adults (1 of 7)

• Airway obstruction may be caused by:
  – Relaxation of throat muscles
  – Vomited stomach contents
  – Blood
  – Damaged tissue
  – Dentures
  – Foreign bodies

Foreign Body Airway Obstruction in Adults (2 of 7)

• In adults, usually occurs during a meal.
• In children, usually occurs during a meal or at play.
• Patient with mild airway obstruction is able to exchange air but with signs of respiratory distress.
Foreign Body Airway Obstruction in Adults (3 of 7)

- Sudden, severe obstruction is usually easy to recognize in conscious patients.
- In unconscious patient, suspect obstruction if maneuvers to open airway and ventilate are ineffective.
- Abdominal-thrust maneuver (Heimlich) is recommended in conscious adults and children older than 1 year.

Foreign Body Airway Obstruction in Adults (4 of 7)

Foreign Body Airway Obstruction in Adults (5 of 7)

- Instead of abdominal-thrust maneuver (Heimlich), use chest thrusts in:
  - Women in advanced stages of pregnancy
  - Very obese patients

Foreign Body Airway Obstruction in Adults (6 of 7)

Foreign Body Airway Obstruction in Adults (7 of 7)

- When victim is found unconscious:
  - Determine unresponsiveness.
  - Open airway.
  - Attempt ventilation.
  - Perform 30 compressions, open airway, and look in mouth.
  - Attempt to carefully remove any visible object.

Foreign Body Airway Obstruction in Infants and Children (1 of 6)

- Common problem
- On conscious, standing or sitting child, perform Heimlich maneuver.
- On unconscious child older than 1 year, follow Skill Drill 11-7.
Foreign Body Airway Obstruction in Infants and Children

- Infants
  - Abdominal thrusts are not recommended for conscious infants.
  - Instead, perform back slaps and chest thrusts.

Foreign Body Airway Obstruction in Infants and Children

- In unconscious infants, begin CPR but include one extra step:
  - Look inside the infant's airway each time before ventilating.
  - Remove the object if seen.

Summary

- BLS is noninvasive emergency lifesaving care that is used to treat medical conditions, including airway obstruction, respiratory arrest, and cardiac arrest.
BLS care focuses on what is often termed the ABCs: airway (obstruction), breathing (respiratory arrest), and circulation (cardiac arrest or severe bleeding).

CPR is used to establish artificial ventilation and circulation in a patient who is not breathing and has no pulse.

The goal of CPR is to restore spontaneous breathing and circulation; however, advanced procedures such as medications and defibrillation are often necessary for this to occur.

ALS involves advanced lifesaving procedures, such as cardiac monitoring, administration of intravenous fluids and medications, and use of advanced airway adjuncts.

The four links in the chain of survival are early access, early CPR, early defibrillation, and early advanced care.

The AED should be applied to any nontrauma cardiac arrest patient older than 1 year of age as soon as it is available.
• When using an AED on a child between 1 and 8 years of age, you should use pediatric-sized pads and a dose-attenuating system (energy reducer). If these are not available, an adult AED should be used.

• Start CPR in virtually all patients in cardiac arrest. Two exceptions are if the patient has obvious signs of death or if the patient and physician previously agreed on DNR or no-CPR orders.

• Once you begin CPR in the field, you must continue until one of the following events: the patient starts breathing and has a pulse, the patient is transferred to another trained responder, you are out of strength, or a physician gives direction to discontinue CPR.

• An airway obstruction may be caused by various things, including relaxation of the throat muscles in an unconscious patient, vomited or regurgitated stomach contents, blood, damaged tissue after an injury, dentures, or foreign bodies such as food or small objects.

• The manual maneuver recommended for removing severe airway obstructions in the conscious adult and child is the abdominal-thrust maneuver (Heimlich maneuver).

1. Brain damage is very likely in a brain that does not receive oxygen for:
   A. 0–1 minutes.
   B. 0–4 minutes.
   C. 4–6 minutes.
   D. 6–10 minutes.
1. Brain damage is very likely in a brain that does not receive oxygen for:
   A. 0–1 minutes.
   Rationale: Cardiac irritability ensues at this stage.
   B. 0–4 minutes.
   Rationale: Brain damage is not likely at this stage.
   C. 4–6 minutes.
   Rationale: Brain damage is possible at this stage, but not likely.
   D. 6–10 minutes.
   Rationale: Correct answer

2. Which of the following sequences of events describes the AHA’s chain of survival?
   A. Early access, early advanced care, early CPR, early defibrillation
   Rationale: Early CPR and defibrillation come before advanced care.
   B. Early advanced care, early defibrillation, early CPR, early access
   Rationale: Chain is completely backwards.
   C. Early access, early CPR, early defibrillation, early advanced care
   Rationale: The AHA has determined an ideal sequence of events that if taken can improve the chance of successful resuscitation of a patient who has an occurrence of sudden cardiac arrest: early access, early CPR, early defibrillation, early advanced care. If any one of the links in the chain is absent, the patient is more likely to die.
   D. Early access, early riser, early CPR, early advanced care
   Rationale: Early riser is not in the chain of events.
3. For CPR to be effective, the patient must be on a firm surface, lying in the _________ position.
   A. Fowler's
   B. prone
   C. supine
   D. recovery

Answer: C  
Rationale: For CPR to be effective, the patient must be lying supine on a firm surface, with enough clear space around the patient for two rescuers to perform CPR. If the patient is crumpled up or lying face down, you will need to reposition him or her. The few seconds that you spend repositioning the patient properly will greatly improve the delivery and effectiveness of CPR.

3. For CPR to be effective, the patient must be on a firm surface, lying in the _________ position.
   A. Fowler's  
   Rationale: The patient is sitting up with knees bent in this position, making it nearly impossible to make effective chest compressions.
   B. prone  
   Rationale: The patient is lying face down in this position.
   C. supine  
   Rationale: Correct answer
   D. recovery  
   Rationale: The patient is lying face down with one knee bent and the head slightly tilted.

4. The look, listen, and feel technique should take:
   A. 1 second.
   B. at least 1 second but no more than 5 seconds.
   C. at least 10 seconds.
   D. at least 5 seconds but no more than 10 seconds.

Answer: D  
Rationale: The look, listen, and feel technique should take at least 5 seconds but no more than 10 seconds. If you see the chest and abdomen rise and fall and if you feel and hear air move during exhalation, the patient is breathing. If you do not feel any air movement, you must begin artificial ventilation.
4. The look, listen, and feel technique should take:
   A. 1 second.
      **Rationale:** One second is not long enough to hear an entire respiratory cycle.
   B. at least 1 second but no more than 5 seconds.
      **Rationale:** Five seconds may not be long enough to hear an entire respiratory cycle.

C. at least 10 seconds.
   **Rationale:** Ten seconds is a long time in this situation. The brain should not be deprived of oxygen for longer than 6 minutes. Every second counts.

D. at least 5 seconds but no more than 10 seconds.
   **Rationale:** Correct answer

5. Artificial ventilation may result in the stomach becoming filled with air, a condition called:
   A. gastric distention.
   B. vomitus.
   C. abdominal-thrust maneuver.
   D. acute abdomen.

   **Answer:** A
   **Rationale:** Artificial ventilation may result in the stomach becoming filled with air, a condition called gastric distention. Gastric distention is likely to occur if you ventilate too fast, if you give too much air, or if the airway is not opened adequately. Therefore, it is important for you to give slow, gentle breaths.

5. Artificial ventilation may result in the stomach becoming filled with air, a condition called:
   A. gastric distention.
      **Rationale:** Correct answer
   B. vomitus.
      **Rationale:** Gastric distention may lead to vomitus. Vomitus is vomited material.
   C. abdominal-thrust maneuver.
   D. acute abdomen.
   **Rationale:** Acute abdomen is a medical term referring to the sudden onset of abdominal pain, generally associated with severe, progressive problems that require medical attention.
6. The ______________ is a circumferential chest compression device composed of a constricting band and backboard.

A. mechanical piston device
B. load-distributing band
C. impedance threshold device
D. cardiopulmonary resuscitation

Answer: B
Rationale: The load-distributing band is a circumferential chest compression device composed of a constricting band and backboard. The device is either electronically or pneumatically driven to compress the heart by putting inward pressure on the thorax. As with the mechanical piston device, use of the device frees the rescuer to complete other tasks. It is lighter and easier to apply than the mechanical piston device.

6. The ______________ is a circumferential chest compression device composed of a constricting band and backboard.

A. mechanical piston device
B. load-distributing band
C. impedance threshold device
D. cardiopulmonary resuscitation

Rationale: This device depresses the sternum via a compressed gas-powered plunger mounted on a backboard.

C. impedance threshold device
Rationale: This valve device is placed between the endotracheal tube and a bag-mask device. It is designed to limit the air entering the lungs during the recoil phase.

D. cardiopulmonary resuscitation
Rationale: This procedure is used to establish artificial ventilation and circulation in a patient who is not breathing and has no pulse.

7. Which of the following scenarios would warrant an interruption in CPR procedures?

A. An hysterical family member trying to gain access to the unconscious patient
B. A vehicle honking its horn anxious to pass by the scene on a blocked road
C. A small set of steps leading to the exit of the building, on the way to the ambulance
D. Being tired from trying to resuscitate a patient

Answer: C
Rationale: Try not to interrupt CPR for more than a few seconds, except when it is absolutely necessary. For example, if you have to move a patient up or down stairs, you should continue CPR until you arrive at the head or foot of the stairs, interrupt CPR at an agreed-on signal, and move quickly to the next level where you can resume CPR.
7. Which of the following scenarios would warrant an interruption in CPR procedures?

A. An hysterical family member trying to gain access to the unconscious patient  
   **Rationale:** Family members should be calmed down and reassured that the patient is in good hands. A hysterical family member does not warrant a break in CPR.

B. A vehicle honking its horn anxious to pass by the scene on a blocked road  
   **Rationale:** Your primary focus should be on the patient. Let the on-scene police and/or traffic control deal with upset motorists and blocked roadways.

C. A small set of steps leading to the exit of the building, on the way to the ambulance  
   **Rationale:** Correct answer.

D. Being out of breath while trying to resuscitate a patient  
   **Rationale:** CPR should always be continued until the patient's care is transferred to a physician in a hospital setting. Being “out of breath” does not mean being physically incapable of performing more CPR.

8. Once you begin CPR in the field, you must continue until one of the following events occurs:

A. The patient stops breathing and has no pulse  
   **Rationale:** These are reasons to begin CPR.

B. The patient is transferred to another person who is trained in BLS, to ALS-trained personnel, or to another emergency medical responder  
   **Rationale:** Correct answer.

C. You are out of gas in the ambulance

D. A police officer assumes responsibility for the patient and gives direction to discontinue CPR

**Answer:** B  
**Rationale:** The “T” in the “STOP” mnemonic stands for patient transfer to another person who is trained in BLS, to ALS-trained personnel, or to another emergency medical responder.
8. Once you begin CPR in the field, you must continue until one of the following events occurs:
   C. You are out of gas in the ambulance
      Rationale: This is not a valid reason to stop CPR.
      You are out of strength or too tired to continue may also be a valid reason.
   D. A police officer assumes responsibility for the patient and gives direction to discontinue CPR
      Rationale: A physician who is present or providing online medical direction should assume responsibility for the patient and give direction to discontinue CPR.

9. Instead of the abdominal-thrust maneuver, use _________ for women in advanced stages of pregnancy and patients who are very obese.
   A. chest thrusts
   B. Sellick maneuver
   C. basic life support
   D. DNR orders

Answer: A
Rationale: You can perform the abdominal-thrust maneuver safely on all adults and children. However, for women in advanced stages of pregnancy and patients who are very obese, you should use chest thrusts.

10. In infants who have signs and symptoms of an airway infection, you should not waste time trying to dislodge a foreign body. You should intervene only if signs of (a) _________ develop, such as a weak, ineffective cough, cyanosis, stridor, absent air movement, or a decreasing level of consciousness.
    A. sudden infant death syndrome
    B. child abuse
    C. bronchitis
    D. severe airway obstruction
Answer: D
Rationale: With a mild airway obstruction, the patient can cough forcefully, although there may be wheezing between coughs. As long as the patient can breathe, cough, or talk, you should not interfere with his or her attempts to expel the foreign body. As with the adult, encourage the child to continue coughing. Administer 100% oxygen with a nonrebreathing mask and provide transport to the emergency department.

10. In infants who have signs and symptoms of an airway infection, you should not waste time trying to dislodge a foreign body. You should intervene only if signs of (a) develop, such as a weak, ineffective cough, cyanosis, stridor, absent air movement, or a decreasing level of consciousness.
   A. sudden infant death syndrome  
      Rationale: Death of an infant or young child that remains unexplained after a complete autopsy.
   B. child abuse  
      Rationale: The obstruction may be the result of child abuse, but these signs are those of a severe airway obstruction.
   C. bronchitis  
      Rationale: This is an inflammation of the lung. It is not the direct result of a foreign body lodged in the airway.
   D. severe airway obstruction  
      Rationale: Correct answer

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