LESSON PLAN

07

BASIC LIFE SUPPORT (BLS) AND CARDIOPULMONARY RESUSCITATION (CPR)

Duration 22 Periods
(Lecture-04 Periods and Practical-18 Periods)

Preparation	• Participants should read Brady's Emergency Medical Responder (chapter on circulation provided with the prework). • Check on legalities in the region of who has authority to pronounce a person officially dead. • Make sure all participants view the CPR training video from the American Heart Association. • Review handout at the end of the Participant's Workbook.	
Lesson Materials:	• CPR training video	
Station Materials:	• Latex gloves • CPR adult and infant mannequins • CPR face shields • Goggles	• Disinfectant • Dressings • One blanket per mannequin

LESSON OBJECTIVES

Upon completion of this lesson, you will be able to:

1. Demonstrate rescue breathing for adults, children and infants using a mannequin, with and without foreign body airway obstruction.
2. Describe and demonstrate CPR in adults, children, and infants using a mannequin.
3. Describe and demonstrate two-rescuer CPR for adults.
4. List two causes of partial or total upper airway obstruction.

	Visual Aids and Other Materials	Time Elapsed

1. INTRODUCTION

1) Introduce instructors and co-instructor.
2) Introduce the lesson.
3) Present lesson objectives. Ask a participant to read aloud from the workbook.

▶ *PPT 7-1 to 7-3*

2. DEVELOPMENT

1 Heart and Lung Function and Anatomy

1.1 The Cardiovascular System

The cardiovascular system consists of the *heart, blood ,arteries, capillaries* and *veins*. The heart is a muscular organ, approximately the size of a fist, and is located in the thoracic cavity behind the sternum and between the lungs. The coronary arteries are special arteries that supply blood to the heart muscles themselves.

▶ *PPT 7-4*

The function of the heart is to *pump blood*. The *left* side receives oxygenated blood from the lungs and pumps it to the body through the arteries. The *right* side receives, through the veins, the blood that has circulated through the body and pumps it to the lungs to be oxygenated once again.

▶ *PPT 7-5*

A system of one-way valves keeps the blood flowing in the right direction and prevents it from flowing backwards.

1 Heart and Lung Function and Anatomy (Cont.)

Visual Aids and Other Materials | **Time Elapsed**

1.2 The Respiratory System

The respiratory system is made up of four components:

▶ *PPT 7-6*

- an **airway** (upper and lower)
- a **neuromuscular system** (includes the respiratory centre in the brain, respiratory muscles, and the nerves that connect the two)
- **alveoli** – tiny airs sacs surrounded by capillaries

▶ *PPT 7-7*

- **arteries, capillaries and veins**

The alveoli are surrounded by the *capillaries*.The brain sends nerve signals to muscles in the thorax and diaphragm, causing us to breathe. With each inhalation, air is carried through the airways to the alveoli in the lungs, where oxygen and carbon dioxide are exchanged.

▶ *PPT 7-8*

In combination with the respiratory system, the circulatory system supplies the oxygen necessary for life, and eliminates carbon dioxide from the body.

2 Breathing

To assess the presence of breathing, we look, listen and feel.

Adequate breathing is characterized by:

▶ *FC 7-1*

- Chest and abdomen rise and fall with each breath
- Air can be heard and felt exiting the mouth or nose.
- Ease of breathing (effortlessness)
- Adequate rate

Inadequate breathing is characterized by:

▶ *FC 7-2*

- Inadequate rise and fall of the chest.
- Noisy breathing: bubbles, rales, stridor, whistling, etc.
- Increased respiratory effort
- Cyanosis

▶ *FC 7-3*

- Inadequate rate
- Altered mental status

Absent breathing is characterized by:

▶ *FC 7-4*

- No chest or abdominal movement
- Air cannot be heard or felt exiting the mouth or nose

3 Cyanosis

Visual Aids and Other Materials

Time Elapsed

> **Definition:** a bluish coloration of the skin and mucous membranes caused by a lack of oxygen in the blood and tissues.

This condition can be the result of the patient breathing in an environment poor in oxygen, suffering from illness or respiratory injury, or airway obstruction.

Cyanosis can be more easily noticed on the lips, ears and nostrils or nail beds. In patients with dark pigmentation, it is necessary to inspect the nostrils, palms and nail beds, and the mouth and tongue.

4 Clinical and Biological Death

The respiratory and circulatory system are *interdependent* — if either one stops, the other will do the same in a very short time. The brain is the first organ to suffer the effects of a lack of oxygen. Shortly after oxygen supply is cut off, brain cells begin to die, causing irreversible damage.

> **Clinical death:** Occurs when a patient is in respiratory arrest (not breathing) or in cardiac arrest (heart not beating). The patient has a period of 4 to 6 minutes to be resuscitated without brain damage. Clinical death **can** be reversed.

▶ *PPT 7-9*

> **Biological death:** The moment the brain cells begin to die. Biological death **cannot** be reversed.

▶ *PPT 7-10*

EXCEPTION: Cold-Water Drownings. There have been cases of persons resuscitated one hour or more after cold-water drowning. In these cases, victims should receive prolonged resuscitative efforts. Prolonged resuscitation efforts can be effective when drowning occur in cold water or circumstances suggest that hypothermia preceded asphyxia. (coverd in lesson burn and environmental emergencies) In a cold environment, a person should not be considered dead until the victim's body is warmed.

5 Signs of Certain Death

- **Lividity:** The pooling of blood in the lower areas of the body. Shows as a purple to bluish color. A few hours after death, blood will settle in the lowest areas of the body due to gravity.
- **Rigor mortis:** stiffening of the body and limbs that occurs after death, usually within 4–10 hours.
- **Decomposition:** A decomposing body always produces a fetid odour. The rate of decomposition depends on a number of factors, primarily ambient temperature.
- **Other signs:** mortal wounds such as decapitation, dismemberment, incineration, severe crushing injuries, etc.

Only a medical doctor can pronounce a person officially dead.

Visual Aids and Other Materials

Time Elapsed

6 Techniques for Opening the Airway

Visual Aids and Other Materials

Time Elapsed

6.1 Head-Tilt Chin-Lift

This is the method of choice for opening the airway.

Do not use this method if you suspect head, neck or spinal injury.

<Conduct demonstration.>

▶ *NOTE*

1) Position the patient *lying face up*.

2) Kneel by the patient's shoulders towards the head.

3) Place one hand on the *forehead* and place the fingertips of your other hand under the *bony* part of the patient's jaw.

4) Lift up on the chin, supporting the jaw, and at the same time, tilt the head back as far as possible.

   For infants and children: Place in the "sniffing" position — do not over-extend.

Important precautions:

- Always keep the patient's mouth slightly open – use your thumb to hold down the patient's lower lip.
- Never dig into the soft tissue under the patient's chin.

Once the airway is open, check breathing. Look, listen and feel. If patient is not breathing, start artificial ventilations. If unable to ventilate, assume the airway is obstructed.

6 Techniques for Opening the Airway (Cont.)

	Visual Aids and Other Materials	Time Elapsed

6.2 Jaw Thrust

The jaw thrust is manoeuvre recommended on an unconscious patient with suspected head, neck or spinal injury.

<Conduct demonstration.>

▶ *NOTE*

1) Position the patient lying face up.

2) Kneel above the patient's head. Place your elbows next to the patient's head on the surface where the patient is lying. Place both hands on either side of the patient's head.

3) Grasp the angle of the patient's jaw on both sides. For an infant or child use two or three fingers.

4) Use a lifting motion to move the jaw forward (up) with both hands.

5) Keep the patient's mouth slightly open by using your thumbs if needed.

<Emphasize the need to reattempt if airway does not open. Reposition and reassess. If unsuccessful, consider using airway adjunct.>

▶ *NOTE*

7

Artificial Ventilation (Rescue Breathing)

Visual Aids and Other Materials

Time Elapsed

Once the patient has an open airway, health care providers can provide artificial ventilation for a patient breathing inadequately or not at all.

How is it possible to maintain a patient alive with exhaled air? Natural air contains approximately 21% oxygen and the body only utilises about 5%. Therefore, exhaled air contains 16% oxygen. This exhaled air can resuscitate a person who is not breathing, until a high-concentration oxygen source is available.

There are many techniques for artificial ventilation. You should become competent in three. Fill in the blanks below in proper order of preference:

1. Mouth-to-*mask*
2. Mouth-to-*barrier device*
3. Mouth-to-*mouth (Not recommended in covid 19 situation)*

Breathing Rates and Duration

Adults	10–12 breaths per minute lasting 1.5–2 seconds.
Children and infants	20 breaths per minute lasting 1–1.5 seconds.
Newborns:	40 breaths per minute lasting 1–1.5 seconds.

Look for proper chest rise. With infants and newborns, use puffs from the mouth so as not to over-ventilate.

Hazards to Rescuers

- Diseases: Blood-borne and/or airborne. Mask, gloves, and eye protection should be worn. Use BVM (Bag Valve Mask) or pocket mask. These items will be discussed in Lesson 8.
- Chemicals: Exposure from a contaminated patient. Patient should be decontaminated first.
- Vomitus: One-way valve on a pocket mask or BVM should be used.

7

Artificial Ventilation (Rescue Breathing) – Cont.

Visual Aids and Other Materials

Time Elapsed

Gastric Distention

This problem can occur during rescue breathing, which can force some into the patient's stomach, causing the stomach to become inflated, or distended. This can result in two serious problems:

- **Reduced lung volume** – the lungs become upwardly displaced by the diaphragm.
- **Vomiting** – Explosive expulsion of fluids or partially digested foods from the stomach into the throat, resulting in airway obstruction, aspiration of vomit into lungs, possible causing lung damage and/or a lethal form of pneumonia.

Prevention:
Avoid or minimize gastric distention by positioning the patient's head properly and by avoiding giving ventilations that are *too forceful* or *too quick*. Volume should be limited to that which causes the chest to *rise adequately*.

When gastric distention presents, be prepared for vomiting. If the patient does vomit, roll the patient (entire body) onto his or her side, manually stabilising the head and neck. Be prepared to clear the patient's mouth and throat with gauze and gloved fingers. Apply suction per local protocol. Place the patient in the recovery position, as discussed next.

7

Artificial Ventilation (Rescue Breathing) – Cont.

Visual Aids and Other Materials

Time Elapsed

Recovery Position:

For a patient with a pulse and adequate breathing, place the patient in the recovery position. This position uses gravity to keep the airway clear, allowing fluids to drain out of the mouth instead of into the airway. The recovery position should be used on an unresponsive, uninjured patient who is breathing adequately. Keep the patient in that position until transportation arrives.

Do not move the patient into the recovery position if you suspect trauma or C-spine (cervical spine) injury.

Placing the patient in the recovery position

1) Lift the patient's left arm above his head and cross his right leg over the left leg.
2) Support the patient's face as you grasp his right shoulder.
3) Roll the patient toward you onto his side (preferably the left side). Then place his right hand under the side of his face. If possible, move the patient's head, shoulders, and torso simultaneously as a unit without twisting. The head should be in as close to a midline position as possible.
4) Flex the patient's top leg slightly at the knee.

▶ *NOTE*

<For all ventilation procedures discussed below, if you are unable to ventilate the patient adequately, reposition and try again. If the second try fails, assume the airway is blocked by a foreign body. Follow the guidelines in the next section for removing a foreign body airway obstruction. Demonstrate each procedure below on a mannequin.>

7

Artificial Ventilation (Rescue Breathing) – Cont.

Visual Aids and Other Materials

Time Elapsed

7.1 Mouth-to-Mask Ventilation Procedure

This method uses a pocket face mask with a one-way valve to form a seal around the patient's nose and mouth. It is the preferred method because it eliminates *direct contact* with the patient and prevents exposure.

1) Place the mask around the patient's mouth and nose. The narrower top portion of the mask should be seated on the *bridge of the nose*. The broader portion should fit the chin.

2) Seal the mask by placing heel and thumb of each hand along the border of the mask and compressing firmly to provide a tight seal around the edges of the mask.

3) Open the patient's airway, using the appropriate manoeuvre.

4) Give breaths at the appropriate rate and depth, observing *chest rise* and *fall*. Listen for patient exhalation.

7.2 Mouth-to-Barrier Device Ventilation Procedure

There are two broad categories of barrier devices: *mask* and *shields*. Most have a one-way valve but have no exhalation port. The patient's exhaled air will leak out around the barrier device.

1) Position the barrier device around the patient's mouth and nose, providing *an adequate seal.*

2) Open the patient's airway, using the appropriate manoeuvre.

3) Deliver breaths at the appropriate rate and depth, observing chest rise and fall. Listen for patient exhalation.

7

Artificial Ventilation (Rescue Breathing) – Cont.

Visual Aids and Other Materials

Time Elapsed

7.3 Mouth-to-Mouth Ventilation Procedure

The risk of contacting infectious diseases makes mouth-to-mouth ventilation very risky for use in the field and not recommended in COVID 19 situation. The decision to use this method is a personal one. Use barrier devices whenever possible.

1) Open the patient's airway, using the appropriate manoeuvre.

2) Gently pinch the patient's nose closed with your thumb and index finger (of the hand on the forehead), to prevent *air from escaping.*

3) Take a deep breath and seal your lips around the patient's mouth, providing an adequate seal. If ventilating an infant or small child, cover both the mouth and nose with your mouth.

4) Deliver breaths at the adequate rate and depth.

Stoma Patients: Occasionally, you may encounter a patient who has undergone a laryngectomy. This person will have a "stoma," a permanent opening from the trachea to the front of the neck. Perform mouth-to-barrier device to stoma ventilation.

8 Chain of Survival

Visual Aids and Other Materials

Time Elapsed

<These are survival and risk factors according to the American Heart Association.>

▶ *NOTE*

Cardiopulmonary resuscitation (CPR) can save the lives of victims in cardiac arrest. Two-thirds of heart attack victims (due to heart disease) die outside the hospital, most within two hours of the onset of symptoms. Though CPR itself is not enough to save the life of a victim of heart attack, it is a vital link in the chain of survival.

The "Chain of Survival" has five links (2015 Guidelines), and the patient's chances for surviving are the greatest when all the links come together. The five links are as follows:

1) **Early access:** Recognize the signs and symptoms of cardiac and respiratory emergencies early and notify Emergency Medical Services.
2) **Early CPR:** Perform effective CPR. Starting CPR early greatly increases the patient's chances for survival.
3) **Early defibrillation:** If trained on and equipped with an automated external defibrillator (AED), use it as soon as possible. This link is the most likely to improve survival rates.
4) **Early advanced care:** It is important that advanced medical care (ACLS) be available rapidly for a positive outcome.
5) **Integrated post-cardiac arrest care:** To improve survival for victims of cardiac arrest, a comprehensive, structured, integrated, multi-disciplinary system of post-cardiac arrest care should be implemented in a consistent manner. Treatment should include cardiopulmonary and neurologic support.

The need for these interventions should not be limited to victims of heart disease. Many victims of drowning, trauma, electrocution, suffocation, airway obstruction, allergic reaction, etc., may be saved by prompt intervention.

<Emphasize to the student the importance of knowing the local emergency phone number. Ask if there is a "universal emergency number" in their area.>

▶ *NOTE*

9

Heart Attack Risk Factors

<Explain risk factors and how they relate to cardiac disease.>

An association has been found to exist between specific conditions and behaviors, and the development of blood vessel disease. The “risk factors” concept was developed to create an awareness of these associations.

- Factors that cannot be changed
  - Family history
  - Sex
  - Ethnic background
  - Age

- Risk factors that can be changed
  - Smoking
  - High blood pressure
  - Highcholesterol
  - Physical activity

- Contributing factors
  - Obesity
  - Diabetes
  - Excessive stress

The greater the prevalence of risk factors, the greater the likelihood of heart disease or other blood vessel disease.

Visual Aids and Other Materials

▶ *NOTE*

Time Elapsed

10 Cardiopulmonary Resuscitation (CPR)

Visual Aids and Other Materials

Time Elapsed

During respiratory arrest, the heart can continue to pump for several minutes and circulate oxygen. Without early intervention, respiratory arrest may lead to cardiac arrest. Once cardiac arrest occurs, circulation ceases and vital organs are deprived of oxygen.

When respiratory and cardiac arrest occur together, the patient is considered *clinically dead*. Within 4 to 6 minutes without circulation, brain damage will begin, and after 8 to 10 minutes, the damage is irreversible.

CPR involves a combination of chest compressions and artificial ventilations designed to revive a person and prevent biological death by mechanically keeping a person's heart and lungs working.

CPR must begin as soon as possible.

10.1 Preparing for CPR

No patient should undergo CPR until the need for resuscitation has been established by appropriate assessment. Before providing CPR you must determine unresponsiveness and Pulselessness. On establishing pulselessness in a patient immediately CPR will be started (Latest guidelines of AHA)

▶ *NOTE*

Follow these steps:

<Give participants time to copy steps below.>

1) **Establish unresponsiveness.** Ask the patient, *"Are you okay?" ,"What is your name?"* or shake/ tap the patient. If unresponsive, position the patient properly (must be supine with arms along the body on a firm, flat surface, or blood flow will be compromised).

2) **Activate the EMS system.** (Ask someone else to activate when available).

3) **Perform C-A-B.**
(circulation - airway - breathing).

10 Cardiopulmonary Resuscitation (CPR) - Cont.

Visual Aids and Other Materials

Time Elapsed

Circulation: Check pulselessness. On an adult and child, check the carotid pulse for not more than 10 seconds. On an infant, check brachial pulse. **If you detect no pulse, begin CPR immediately with chest compressions.**

Elimination of look, listen and feel for breathing in 2015 AHA Guidelines for CPR. AHA recommends initiating chest compressions before giving rescue breaths (C-A-B rather than A-B-C). Beginning CPR with 30 compressions than 2 ventilations leads to a shorter delay to first compression.

Airway: After the first set of chest compressions, open airway. Use appropriate method to open airway.

Breathing: The MFR delivers two ventilations. Use small puffs on infants.

<Review each of these points with reference to initial assessment and physical exam.>

▶ *NOTE*

10.2 CPR Chest Compressions for Adults

<The specific steps for 1-rescuer and 2-rescuer CPR will be covered in the stations. Advise participants to review Skill Checklists for specific performance guidelines.>

Chest compressions consist of rhythmic, repeated pressure over the lower half of the sternum. When combined with artificial ventilation, it provides enough blood circulation to sustain Life. Follow these steps:

1) **Position the patient.** Must be supine on firm, flat surface, with arms *along sides*.
2) **Expose the patient's chest.** Remove the patient's or blouse, providing for patient's privacy as much as possible.
3) **Get in position.** Kneel close to the patient's side, with your knees about as wide apart as your shoulders.
4) **Locate the compression site.** Place the heel of the dominant hand at the center of the patient's chest (between the nipples, along the axis of the sternum).
5) **Position your hands.** Put your free hand on top of your first hand. Extend or interlace your fingers (do not rest them on the chest wall).
6) **Position your shoulders.** They should be directly over your hands.
7) **Perform chest compressions.** Keeping your arms *straight* and your elbows *locked*, thrust straight downward from your shoulders. Release pressure **completely** after each compression. However, do not lift or move your hands, or you will lose proper position. Count as you perform compressions.

Visual Aids and Other Materials

▶ *NOTE*

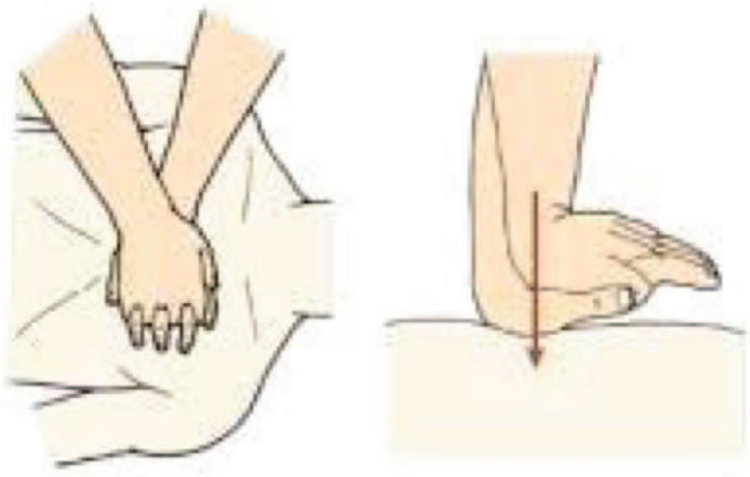
Time Elapsed

ADULT CPR SUMMARY:

Older than 9 years

- **Compression depth:** at least 2 inches (5 cm)
- **Compression rate:** at least 100 per minute
- **Each ventilation:** 1 second
- **Pulse location:** carotid artery
- **One-rescuer cycle:** 30 compressions, 2 breaths
- **Two-rescuer cycle:** 30 compressions, 2 breaths
- **5 cycles:** (about 2 minutes)

▼ *Hand positioning for adult chest compressions*



Visual Aids and Other Materials

Time Elapsed

10.3 CPR Chest Compressions for Children and Infants

▶ *NOTE*

<The specific steps for infant CPR will be covered in the stations.>

Cardiac arrest in infants is rarely caused by heart problems. Usually the cause is too little oxygen (hypoxia) due to injuries, suffocation, smoke inhalation, etc.
For this reason, you should resuscitate an infant for two minute before activating the EMS system (if you are alone).

1) **Position the patient.** Must be supine on firm, flat surface, with arms along sides. If an infant, place him or her on your forearm, using your palm to support the head. If the infant is on his/her back, maintain head in a neutral position. It may be necessary to provide support under the shoulder with a folded blanket or towel.

2) **Expose the patient's chest.** Remove the patient's shirt or blouse.

3) **Locate the compression site.** In a child, use the same location as an adult. In infants, use one finger width below an imaginary line between the nipples.

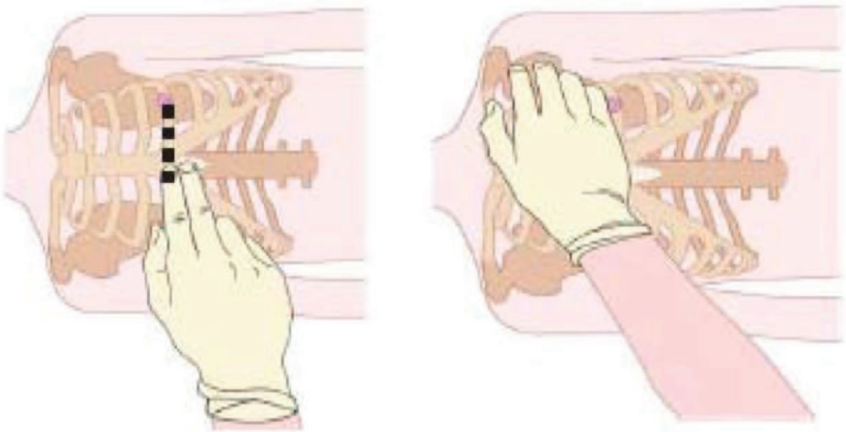
4) **Perform chest compressions.** For an infant, use the flat part of your middle and ring fingers to compress the sternum. For a child, use the heel of one hand. Release pressure completely after each compression. However, do not lift or move your hands, or you will lose proper position. Count as you perform compressions.

CHILD CPR SUMMARY:

1-9 years of age (AHA)

- **Compression depth:** at least 1/3 anterior-posterior diameter or about 2 inches (5 cm)
- **Compression rate:** 100 - 120 per minute
- **Each ventilation:** 1 second
- **Pulse location:** carotid artery
- **One-rescuer cycle:** 30 compressions, 2 breaths
- **Two-rescuer cycle:** 15 compressions, 2 breaths
- **5 cycles**

▼ *Hand positioning for child chest compressions*

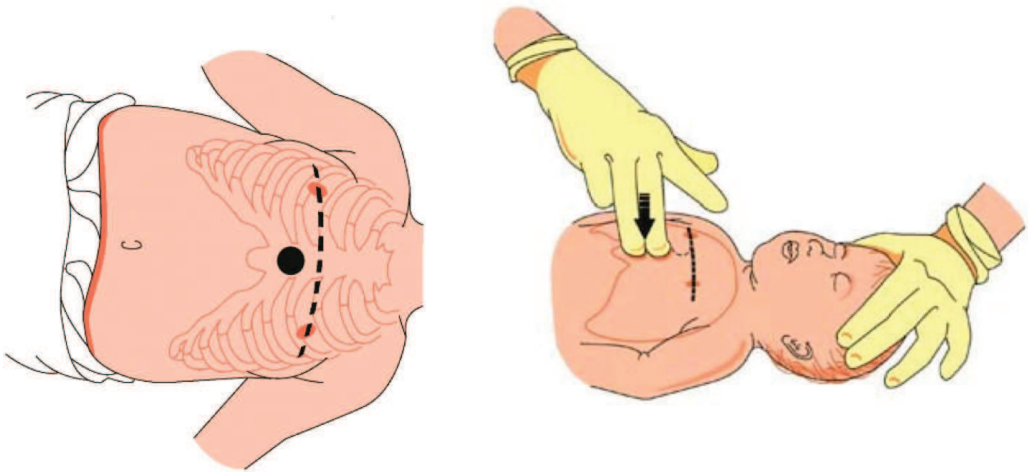


INFANT CPR SUMMARY:

Birth to 01 year of age (AHA)

- **Compression depth:** at least 1/3 anterior-posterior diameter or abourt 1 1/2 inches (4 cm)
- **Compression rate:** 100 per minute or more
- **Each ventilation:** 1 second
- **Pulse location:** brachial artery
- **One-rescuer cycle:** 30 compressions, 2 breaths
- **Two-rescuer cycle:** 15 compressions, 2 breaths
- **5 cycles** (about minutes)

▼ *Finger positioning for infant chest compressions*



11

Special Considerations Regarding CPR

Visual Aids and Other Materials

Time Elapsed

11.1 Signs of Successful CPR

"Successful" CPR does not mean that the patient survives – it only means that you performed it correctly. Very few patients will survive if they do not receive advanced cardiac life support (ACLS). The goal of CPR is to prevent the death of cells and organs for a few crucial minutes. The patient's condition needs to be monitored throughout CPR to determine if CPR is effective.

- Have someone feel for a pulse during compressions. A pulse should be palpable with every compression.
- The chest should rise and fall with each ventilation.
- The pupils may begin to react normally.
- Patient's skin colour may improve.
- Patient may attempt to move and try to swallow.
- Heartbeat may return.

11.2 When Not to Begin CPR

Usually, you perform CPR when the patient has no pulse. However, there are special circumstances under which CPR should not be initiated even when the patient has no pulse. CPR should not be initiated when any of the signs of certain death, mentioned earlier, are present. These include:

- Obvious mortal wounds
- Rigor mortis
- Decomposition
- Lividity
- Stillbirth
- Other

11

Special Considerations Regarding CPR (Cont.)

Visual Aids and Other Materials

Time Elapsed

11.3 Complications Caused by CPR

Even properly performed CPR can cause injuries, including:

- Fracture of the sternum and ribs
- Pneumothorax
- Haemothorax
- Cuts and bruises to the lungs
- Lacerations to the live

Most of these complications are rare. Take care to use proper technique. Remember that even if CPR results in complications, the alternative is death.

11.4 Mistakes in Performing CPR

Mistakes in Performing CPR

Problem	Result
Patient is not on a hard surface	Compressions are not effective
Patient is not in horizontal position	If patient's head is higher than the rest of the body, there is insufficient blood flow to reach the brain
Head-tilt chin-lift manoeuvre improperly performed	Open airway not ensured
Incomplete seal around the patient's mouth and/or nose	Ventilations are not effective
Nostrils not completely pinched and the patient's mouth is not fully open during mouth-to-mouth ventilation	Ventilations are not effective
Hands not in correct position or compressions incorrectly placed	Fractured ribs; fractured sternum; lacerated liver, spleen, lungs or injured pleura as a result of fractured ribs
Compressions too deep or frequent	Insufficient amount of blood is pumped
Improper compression/ventilation ration	Inadequate oxygenation of blood

11

Special Considerations Regarding CPR (Cont.)

Visual Aids and Other Materials

Time Elapsed

11.5 Interrupting CPR

Once you begin CPR, you should not interrupt for more than a few seconds to check for breathing, or to reposition yourself or the patient. In addition, you interrupt CPR to:

- Move the patient onto a stretcher
- Move the patient down a flight of stairs or through a hallway
- Loading or unloading the patient into the ambulance
- Allow for defibrillation or ACLS (Advanced Cardiac Life Support) measures to be initiated
- Recover from physical exhaustion

MFR LESSON 7

CPR FOR ADULTS, CHILDREN AND INFANTS

Age	older 9 years	1 to 9 years	Birth to 1 year
Recognition	Unresponsive (for all ages)		
	No breathing or only gasping		
	No pulse palpated within 10 seconds for all ages		
Compression sequence	**C–A–B**		
Compression depth	At least 2 in (5 cm)	At least 1/3 anterior - posterior diameter or about 2 in (5 cm)	At least 1/3 anterior - posterior diameter or about 1½ in (4 cm)
Compression rate	at least 100/minute		
Each ventilation	1 second	1 second	1 second
Pulse check location	carotid artery (throat)	carotid artery (throat)	brachial artery (upper arm)
One-rescuer CPR compressions-to-ventilations ratio	30 : 2	30 : 2	30 : 2
Two-rescuer CPR compressions-to-ventilations ratio	30 : 2	15 : 2	15 : 2
When working alone: Call emergency medical services	After establishing unresponsiveness — before beginning resuscitation	After establishing unresponsiveness —before beginning resuscitation	After 2 minutes of resuscitation

Based on 2010 AHA Guidelines for CPR and ECC

Defibrillation:-

Defibrillation is the application of an electric shock to a patients heart in an attempt to convert a lethal rhythm into a normal one.

Automated External Difbrilation:-

AED is a device which can assess a hearts rhythm , determine if defibrillation is necessary , and deliver an electrical shoch when needed.

Attaching the AED: -

Assess the patient to confirm that he or she is in cardiac arrest.

Have your partner or someone else trained in Basic Life Support (BLS) begin CPR while you set up the AED. If you are alone, make sure EMS has been called and immediately attach the AED.

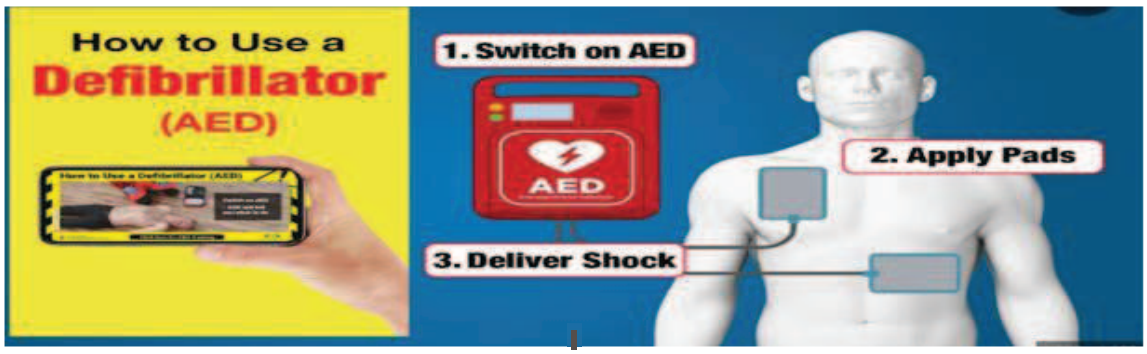
Turn ON the AED and attach the pads. Once the pads are in place, the AED will begin to analyze the patient's rhythm. Some devices may require you to press the 'analyze' button. Make certain no one is touching the patient while the device analyzes.

If a shockable rhythm is detected, the AED will advise so and charge to the appropriate energy level. When needed, the AED will prompt you to push the 'shock' button.

After you push the shock button, the AED will deliver one shock.

Following the shock, immediately begin CPR. (The most current AEDs are programmed to pause for two minutes after each shock to allow you to perform CPR).

After two minutes, the AED will advise you to stop CPR. It will then reanalyze the heart rhythm and, if indicated, advise the rescuer to deliver another shock.This sequence of one shock and two minutes of CPR should continue until more highly trained provider arrive.



12

Foreign Body Airway Obstruction (FBAO)

Visual Aids and Other Materials

Time Elapsed

12.1 Causes of Airway Obstruction

There are upper and lower airway obstructions. An upper airway obstruction is anything that blocks the back of the mouth or throat, or the nasal passages. A lower airway obstruction is caused by breathing in a foreign body or by severe spasm of the bronchial passages, such as asthma. Airway obstruction can be caused by the following:

<Give participants time to fill in info below.>

▶ *NOTE*

▶ *PPT 7-11*

- **Tongue:** The tongue falls back, blocking the throat. This problem is common in unconscious patients.
- **Epiglottitis:** Occurs when patients try to force breathing. Also caused by allergies and spasms of different kinds.
- **Foreign body:** Objects such as food, ice, toys, dentures, vomitus and liquids that remain in the upper portion of the throat or airways.
- **Tissue damage:** Can be caused by a penetrating injury to the neck, crushing trauma to the face, inhalation of hot air (as occurs in fires), ingestion of chemicals, and severe neck trauma.
- **Illness:** Respiratory infections and certain chronic conditions (such as asthma) or Sudden Infant Death Syndrome may cause tissue inflammation or muscular spasms and obstruct the airways.

The most common airway obstruction in a responsive patient is *food*, and in the Unresponsive patient it is the *tongue*. The focus of this lesson is primarily on removing upper FBAO.

12

Foreign Body Airway Obstruction (FBAO) – Cont.

Visual Aids and Other Materials

Time Elapsed

12.2 Recognizing FBAO

The key to successful treatment is early recognition. Suspect FBAO in any victim who suddenly stops breathing, becomes cyanotic, and loses consciousness for no apparent reason.

There are two types of FBAO – **partial** and **complete**.

- **Partial:** An object caught in the throat that does not totally block breathing. A patient with partial obstruction may have adequate or poor air exchange. With **adequate air exchange**, the patient may cough forcefully, though there may be wheezing between coughs. Do not interfere with patient's attempt to clear the airway. With **poor air exchange**, the patient will exhibit a weak, ineffective cough, high-pitched noise while inhaling, increased respiratory difficulty and possible cyanosis. Treat this situation as a complete airway obstruction.

  ▶ *PPT 7-12*

- **Complete:** The patient is unable to speak, breathe or cough. May clutch the neck with thumb and finger – this gesture is known as the *universal sign of choking*. Air movement will be absent.

  ▶ *PPT 7-13*

13

Managing FBAO in Adults and Children

The method recommended for relieving FBAO with poor air exchange or complete obstruction is the abdominal thrust (Heimlich manoeuvre). Each individual thrust should be administered with the intent of relieving the obstruction. It may be necessary to perform several thrusts. It is possible to damage internal organs with this method. To minimize the possibility of injury to the patient, never place your hands on the xiphoid process or on the lower edges of the rib cage. Your hands should be below this area but above the navel.

Manage a complete airway obstruction in children the same way you would for adults, that you **never use a blind finger sweep in children and infants**. Airway obstructions in children may also be caused by infections such as epiglottitis or croup, which produce airway oedema. Suspect this condition if an infant or child has a fever with congestion, hoarseness or drooling. A patient with any of these conditions must be transported to an emergency facility. It is dangerous to the patient to attempt to relieve this form of obstruction.

13

Managing FBAO in Adults and Children (Cont.)

Visual Aids and Other Materials

Time Elapsed

13.1 Responsive Adult/Child (Patient Standing or Sitting)

▶ *NOTE*

<Give participants time to take notes on steps below.>

1) **Take BSI precautions.** Introduce yourself and ask permission.
2) **Determine if the obstruction is complete or partial obstruction with poor air exchange.** Ask, “Are you choking?” or “Can you speak?”
3) **If partial obstruction**, encourage the patient to cough, if unable to cough, go to step 4.
4) **Get in position.** Stand behind the patient. Place one leg between the patient’s legs to obtain a stable position.
5) **Position your hands.** Reach around with one hand to locate the patient’s navel. Make a fist with one hand, place the thumb-side of the fist against the patient’s abdomen, slightly above the navel and below the xiphoid process.
6) **Perform an abdominal thrust.** Grasp your fist with the first hand and pull in and up with swift firm thursts.
7) **Repeat thrusts** until the object is expelled from the airway or the patient becomes unconscious.

If the patient becomes unresponsive before you are able to clear the airway obstruction, direct someone to call EMS and begin CPR.

13

Managing FBAO in Adults and Children (Cont.)

Visual Aids and Other Materials

Time Elapsed

13.2 Unresponsive Adult or Child / Obese or pregnant (Patient Lying Down)

▶ *NOTE*

<Give participants time to take notes on steps below.>

1) **Position the patient** *face up* (supine).

2) Tap and shout to assess responsiveness. If unresponsive, activate EMS.

3) **Get in position (as in CPR). Begin CPR** (without a pulse check). CPR will be discussed further later in this lesson.

4) **After 30 compressions, open airway.** If object is seen, remove object from patient's mouth by finger sweep. Use the tongue-jaw lift to open the patient's mouth. Insert the index finger of the other hand along the inside of the cheek into the throat, using a hooking action to dislodge the foreign body and lift it out.
DO NOT use finger sweep on unresponsive patients who have a gag reflex.

5) **Attempt to give 2 ventilations.**

6) If after 2 attempts of ventilation you are not able to achieve chest rise, continue CPR until effective. (CPR will be discussed later in this lesson)

13.3 Pregnant or Obese Responsive Adult (Patient Standing or Sitting)

Chest thrusts are to be used only with patients in late stages of pregnancy or with the markedly obese, when abdominal thrusts cannot be applied effectively.

1) Determine if the obstruction is complete or partial obstruction with poor air exchange. Ask, "Are you choking?" or "Can you speak?". If partial obstruction, encourage the patient to cough. If unable to cough, go to next step.

Visual Aids and Other Materials

Time Elapsed

13 Managing FBAO in Adults and Children (Cont.)

2) **Get in position.** Stand behind the patient, with your arms directly under the patient's armpits, and encircle the patient's chest.

3) **Position your hands.** Place the thumb-side of your fist along the patient's sternum, avoiding the xiphoid process and margins of the rib cage.

4) **Perform a chest thrust.** Grab your fist with the other hand and perform 5 chest thrusts in rapid succession. Observe for evidence that the object has been removed.

5) If the patient's airway remains obstructed, repeat the thrusts until the object is expelled from the airway or the patient becomes unconscious.

6) If the patient becomes unresponsive before you are able to clear the airway obstruction, activate the EMS and begin CPR.

14 Managing FBAO in Infants

Always suspect foreign body airway obstruction in infants who demonstrate a sudden onset of respiratory distress associated with gagging, coughing or wheezing. Most common causes are *toys* or *other small objects (coins)*. As mentioned earlier, airway obstructions may also be caused by *infection*. Suspect this condition if the infant has a fever with congestion, hoarseness or drooling. Do not attempt to relieve this form of obstruction and transport the patient immediately.

14.1 Removing FBAO in a Conscious Infant

Perform the following procedures only if the infant has a complete obstruction or partial obstruction with poor air exchange, and only if you suspect a foreign object.

1) **Verify complete airway obstruction.** Serious breathing difficulty, ineffective cough, no strong cry.

2) **Position the infant.** Straddle the infant face-down over one of your forearms, head *lower* than the body. Support the infant's head by holding the jaw with your hand.

14

Managing FBAO in Infants (Cont.)

Visual Aids and Other Materials

Time Elapsed

3) **Deliver 5 back blows.** Use the heel of your hand between the shoulder blades. If foreign object is not expelled, **position the infant** *face-up* on your arm, head lower than the body.

4) **Deliver 5 chest thrusts.** Position your middle and ring fingers in the middle of the infant's sternum, just below the imaginary line between the infant's nipples. Use a quick downward motion.

5) **Repeat steps 2 to 4 until effective, or until infant becomes unconscious.**

6) Begin CPR when the infant becomes unconscious.

14.2 Removing FBAO in an Unconscious Infant

1) **Establish unresponsiveness.** If unresponsive, direct someone to activate EMS. If you are alone, provide *2 minutes* of rescue support before stopping to call EMS.

2) **Begin CPR with chest compressions**

3) **Open airway and give 2 ventilations.**

4) If after 2 attempts you are unable to achieve adequate chest rise, continue CPR until effective.

REVIEW

Clarify points and answer questions before proceeding to the practicals.

PRACTICAL EXERCISES

See Practical Exercise worksheets. Instruct participants to bring their workbooks.

POST-TEST

No Post-Test. Objectives will be evaluated in the practical exercises.

CLOSE

1) Comments, suggestions.

2) Thank the participants and announce the next lesson.

PRACTICAL EXERCISE
CPR and FBAO

Practical exercises will be split into two sections
one for FBAO Manoeuvres and another for CPR.

Section 1: Cardiopulmonary Resuscitation

Stations 1 & 2:
Conscious infant who later becomes unconscious.

Stations 3 & 4:

Conscious adult who later becomes unconscious.

Section 2: FBAO Manoeuvres

The first four stations consist of one-rescuer CPR, and the last four for two-rescuer CPR on adults and one-rescuer CPR on infants. More practice will be dedicated to adult CPR as this is what the participants will most often encounter.

Stations 1 & 2: One-rescuer CPR on adults.

Stations 3 & 4: One-rescuer CPR on adults.

Stations 5 & 6: Two-rescuer CPR on adults.

Stations 7 & 8: One-rescuer CPR on infants.

Rotation type for this lesson:

Rotation type 2

Number of rotations:

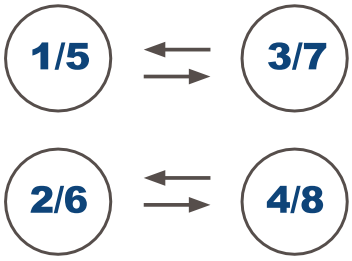
2

CPR Duration:

3 hours 45 minutes
(1 hour 15 minutes per station)

FBAO Duration:

3 hours (1 hour, 30 minutes per station)



<Give a brief explanation of the mechanics of this station, and allow practice to begin. Do not spend time on explanations already given in class. Allow the participants to practice as much as possible. The assistant in charge of each station will demonstrate the procedure, then supervise the participants' performance. >

Stations 1 and 2:

FBAO – Conscious infant who later becomes unconscious.

Materials:

- Latex gloves for each participant
- Disinfectant and dressings
- Face shields
- 5 infant mannequins (per availability)
- 1 sheet per mannequin
- Skills Checklist form (for each participant)

Use the procedures described in the Skills Checklist and corresponding flipchart for this practical exercise.

Stations 3 and 4:

FBAO – Conscious adult who later becomes unconscious.

Materials:

- Latex gloves for each participant
- Skills Checklist form
- Disinfectant and dressings
- 5 adult mannequins
- Face shields
- 1 sheet per mannequin
- Skills Checklist form (for each participant)

Use the procedures described in the Skills Checklist and corresponding flipchart for this practical exercise. Explain the differences between the manoeuvres for adults and infants.

PRACTICAL EXERCISE
Section 1: CPR

Stations 1 and 2: One-rescuer CPR on adults.

Materials:

- Latex gloves for each participant
- Disinfectant and dressings
- Face shields
- 3-5 adult mannequins
- 1 sheet per mannequin
- Skills Checklist form (for each participant)

Use the procedures described in the Skills Checklist and corresponding flipchart for this practical exercise.

Stations 3 and 4: One-rescuer CPR on adults.

Materials:

- Latex gloves for each participant
- Disinfectant and dressings
- Face shields
- 3-5 adults mannequins
- 1 sheet per mannequin
- Skills Checklist form (for each participant)

Use the procedures described in the Skills Checklist and corresponding flipchart for this practical exercise. Explain the differences between the manoeuvres for adults and infants.

Stations 5 and 6: Two-rescuer CPR on adults.

Materials:

- Latex gloves for each participant
- Disinfectant and dressings
- Face shields
- 3-5 adult mannequins
- 1 sheet per mannequin
- Skills Checklist form (for each participant)

Use the procedures described in the Skills Checklist and corresponding flipchart for this practical exercise.

Stations 7 and 8: One-rescuer CPR on infants.

Materials:

- Latex gloves for each participant
- Disinfectant and dressings
- Face shields
- 3-5 infant mannequins
- 1 sheet per mannequin
- Skills Checklist form (for each participant)

Use the procedures described in the Skills Checklist and corresponding flipchart for this practical exercise. Explain the differences between the manoeuvres for adults and infants.

Infant FBAO — Conscious/Unconscious

Stations 1 or 2

Student Name: _____ **Dates:** _____

Instructions: Check the box showing on which attempt the participant was able to perform the step successfully. UTP indicates unable to perform successfully within four attempts.

Performance Guidelines		Successful on Attempts				UTP
		1	2	3	4	
1.	Proper use of PPE					
2.	Confirm airway obstruction.					
3.	Position the infant.					
4.	Give 5 back blows followed by 5 chest thrusts.					
5.	Repeat Step 4 until effective or victim becomes unconscious.					
	Victim becomes unconscious					
6.	Activate the EMS system (if rescuer is not alone).					
7.	Begin CPR with 30 compressions.					
8.	Open airway, remove object if seen (finger sweep).					
9.	Attempt to give 2 ventilations.					
10.	Perform CPR (30:2) until effective or until 2 min and activate EMS (if rescuer is alone)					

If the victim is breathing or resumes adequate breathing, place in recovery position and continue to monitor.

Comments: _____

_____

_____

Overall Performance: ☐ Outstanding ☐ Successful ☐ Needs Improvement

Instructor: _____

Adult FBAO — Conscious/Unconscious

Stations 3 or 4

Student Name: _____ **Dates:** _____

Instructions: Check the box showing on which attempt the participant was able to perform the step successfully. UTP indicates unable to perform successfully within four attempts.

Performance Guidelines	Successful on Attempts				UTP
	1	2	3	4	
1. Proper use of PPE					
2. Ask the patient, “Are you choking?”					
3. Give abdominal thrusts (chest thrusts for pregnant or obese patient).					
4. Repeat thrusts until effective or victim becomes unconscious.					
Victim becomes unconscious					
5. Activate the EMS system. Place patient in supine position.					
6. Begin CPR with 30 chest compressions.					
7. Open airway, remove object if seen (finger sweep).					
8. Attempt to give 2 ventilations.					
9. Perform CPR (30:2) until effective.					

If the victim is breathing or resumes adequate breathing, place in recovery position and continue to monitor.

Comments: _____

_____

_____

Overall Performance: ☐ Outstanding ☐ Successful ☐ Needs Improvement

Instructor: _____

Adult/Child — One-Rescuer CPR

Stations 1, 2, 3 or 4

Student Name: _____ **Dates:** _____

Instructions: Check the box showing on which attempt the participant was able to perform the step successfully. UTP indicates unable to perform successfully within four attempts.

Performance Guidelines	Successful on Attempts				UTP
	1	2	3	4	
1. Proper use of PPE					
2. Establish unresponsiveness and briefly assess breathing (no breathing or only gasping). Activate the EMS system.					
3. Check carotid pulse. If pulse is present but no breathing, provide rescue breathing (1 breath every 5 seconds, or about 12 breaths per minute).					
4. If no pulse, give cycles of 30 chest compressions (rate of at least 100 compressions/minute).					
5. Open airway (head-tilt/chin-lift or jaw-thrust).					
6. Give 2 ventilations, watch chest rise, allow for exhalation between breaths (1.5 to 2 seconds per breath).					
7. After 5 cycles of 30:2 (or about 2 minutes), recheck pulse. If no pulse, continue 30:2 cycles beginning with chest compressions.					

If the victim is breathing or resumes adequate breathing, place in recovery position and continue to monitor.

Comments: _____

_____

_____

Overall Performance: ☐ Outstanding ☐ Successful ☐ Needs Improvement

Instructor: _____

Adult/Child — Two-Rescuer CPR

Stations 5 or 6

Student Name: _____ **Dates:** _____

Instructions: Check the box showing on which attempt the participant was able to perform the step successfully. UTP indicates unable to perform successfully within four attempts.

Performance Guidelines	Successful on Attempts				UTP
	1	2	3	4	
1. Proper use of PPE					
2. Establish unresponsiveness and briefly assess breathing (no breathing or only gasping). Activate the EMS system.					
Rescuer 1					
3. Check carotid pulse for not more than 10 sec. If pulse is present but no breathing, provide rescue breathing (one every 5 secs or about 12 breaths per minute). If no pulse is detected, inform Rescuer 2 to start chest compressions.					
4. Open airway (head-tilt/chin-lift or jaw-thrust). Performed after set of chest compressions.					
5. Give 2 ventilations (1.5 to 2 seconds per breath), watch chest rise, allow for exhalation between breaths.					
6. Check carotid pulse for not more than 10 sec.					
Rescuer 2					
7. **Adult Patient:** If no pulse, give cycles of 30 chest compressions (at least 100 compressions per minute); followed by 2 ventilations by Rescuer 1. **Child Patient:** If no pulse, give cycles of 15 chest compressions followed by 2 ventilations by Rescuer 1.					
8. For child 2-rescuer CPR, the ratio is 15:2. After 2 minutes of rescue support or 5 cycles, recheck pulse (by Rescuer 1). If no pulse , continue 15:2 cycles. For adult 2-rescuer CPR, the ratio is 30:2. After 2 minutes of rescue support or 5 cycles, recheck pulse (by Rescuer 1). If no pulse , continue 30:2 cycles.					

If the victim is breathing or resumes adequate breathing, place in recovery position and continue to monitor.

Comments: _____

_____

Overall Performance: ☐ Outstanding ☐ Successful ☐ Needs Improvement

Instructor: _____

Infant — One-Rescuer CPR
Stations 7 or 8

Student Name: _____ **Dates:** _____

Instructions: Check the box showing on which attempt the participant was able to perform the step successfully. UTP indicates unable to perform successfully within four attempts.

Performance Guidelines	Successful on Attempts				UTP
	1	2	3	4	
1. Proper use of PPE					
2. Establish unresponsiveness. If second rescuer is available, ask him or her to activate the EMS system. If rescuer is alone, continue through Step 3 to 6 for 2 minutes then activate EMS.					
3. Check brachial pulse. If pulse is present, but no breathing, provide rescue breathing (one breath every 3 seconds, or about 20 breaths per minute).					
4. If no pulse, give 30 chest compressions (at least 100 compressions per minute).					
5. Open airway (head-tilt/chin-lift or jaw-thrust).					
6. Give 2 ventilations (1 to 1.5 seconds per breath), watch chest rise, allow for exhalation between breaths.					
7. After 2 minutes (about 5 cycles of 30 compressions : 2 ventilations) of rescue support, recheck pulse for not more than 10 sec. If no pulse, continue 30:2 cycles beginning with chest compressions.					

If the victim is breathing or resumes adequate breathing, place in recovery position and continue to monitor.

Comments: _____

_____

_____

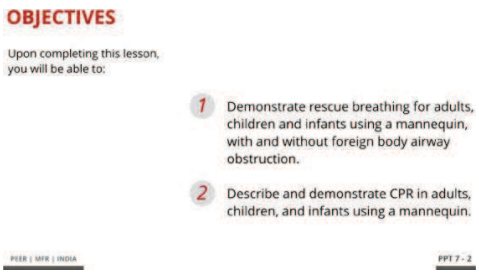
Overall Performance: ☐ Outstanding ☐ Successful ☐ Needs Improvement

Instructor: _____

LESSON 7
— PPT's

7-1

7-2



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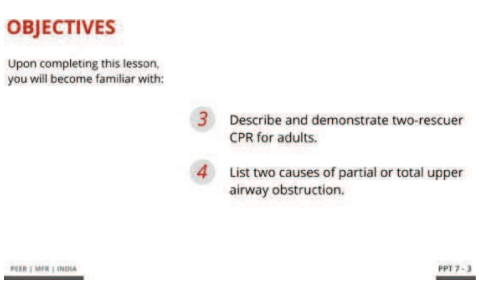

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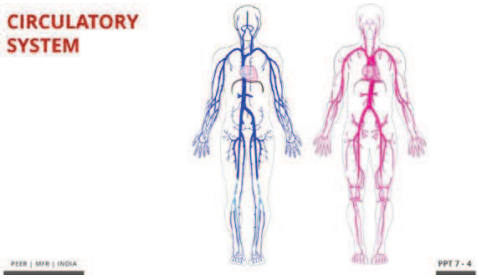

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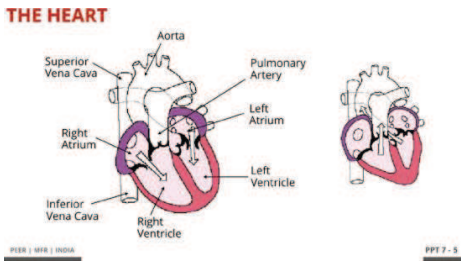

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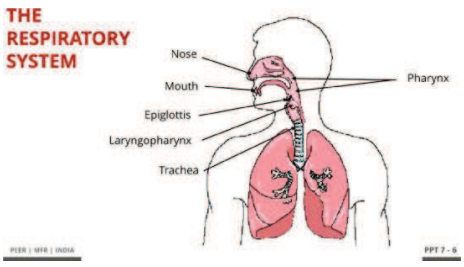
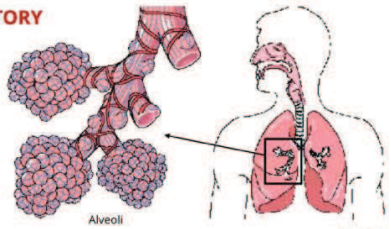


LESSON 7
— PPT's

7-7

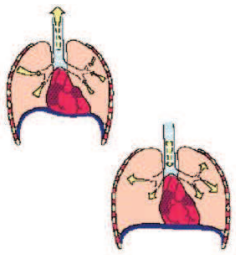
THE RESPIRATORY SYSTEM



PEER | MFR | INDIA PPT 7 - 7

7-8

HOW RESPIRATION WORKS



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7-9

CLINICAL DEATH

Occurs when a patient is in respiratory arrest (not breathing) or in cardiac arrest (heart not beating).

The patient has a period of 4 to 6 minutes to be resuscitated without brain damage.

Clinical death can be reversed.

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7-10

CAUSES OF AIRWAY OBSTRUCTION

- Tongue
- Epiglottitis
- Foreign Body
- Tissue damage
- Illness

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7-11

PARTIAL AIRWAY OBSTRUCTION

- Weak, ineffective cough
- High-pitched noise when inhaling
- Increased respiratory difficulty and may clutch at the throat
- Cyanosis (bluish discoloration of the skin and mucous membranes)

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7-12

COMPLETE AIRWAY OBSTRUCTION

- A patient with complete foreign body airway obstruction will not be able to speak and may grasp at his/her throat.

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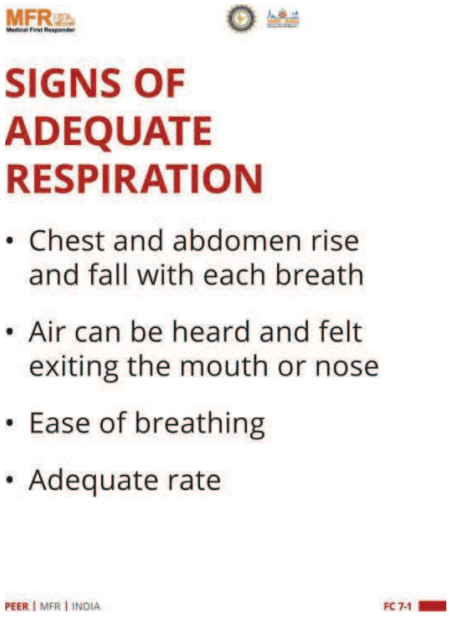
LESSON 7

— FLIP CHARTS

FC7-1



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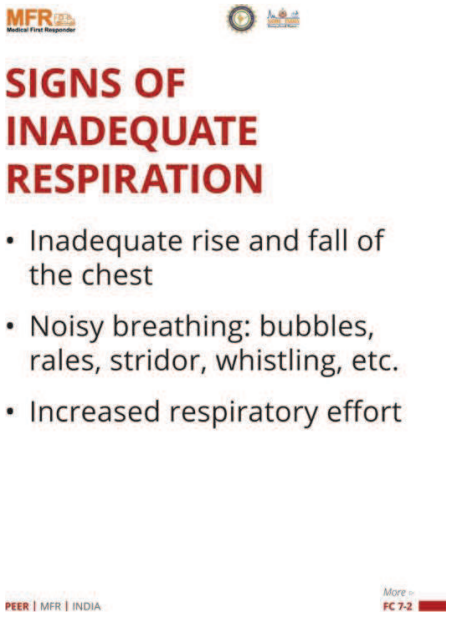

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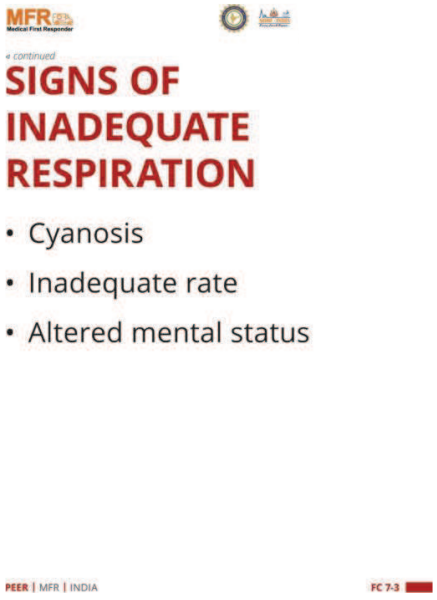

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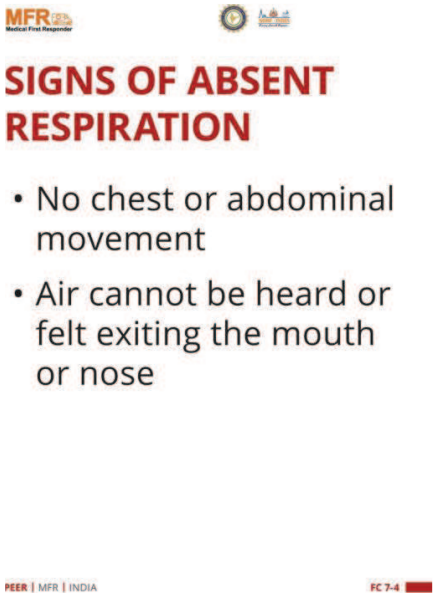
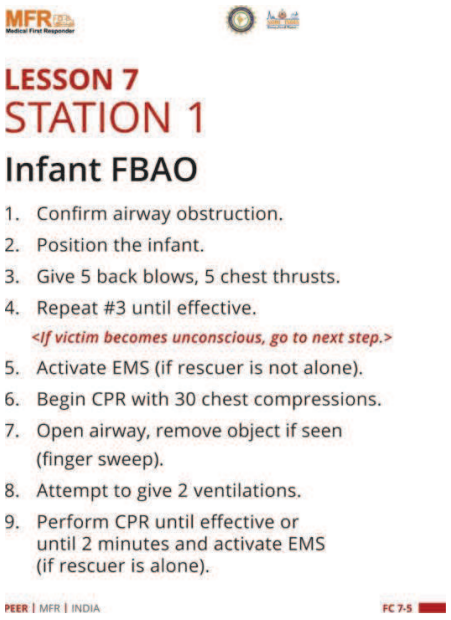


LESSON 7
— FLIP CHARTS

FC7-5



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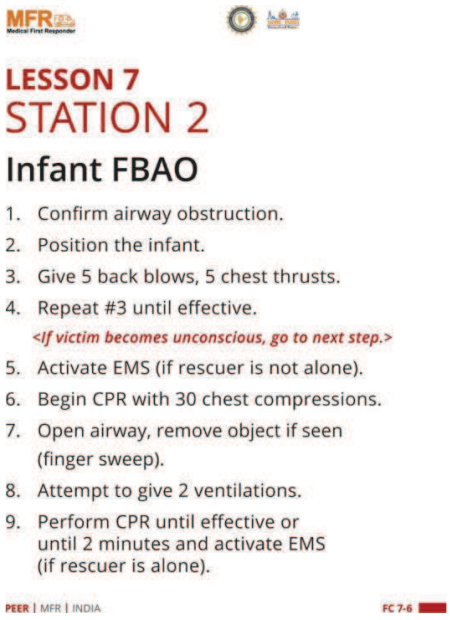

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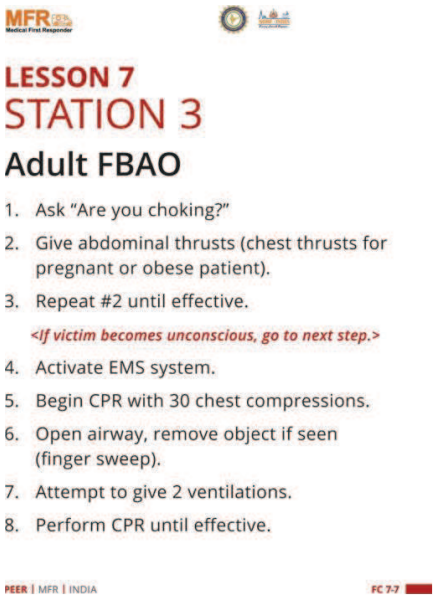

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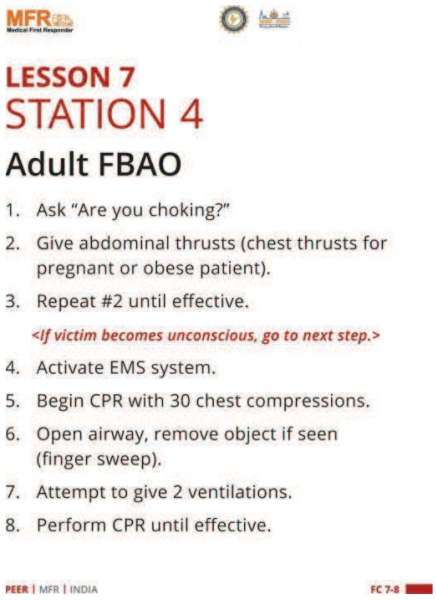
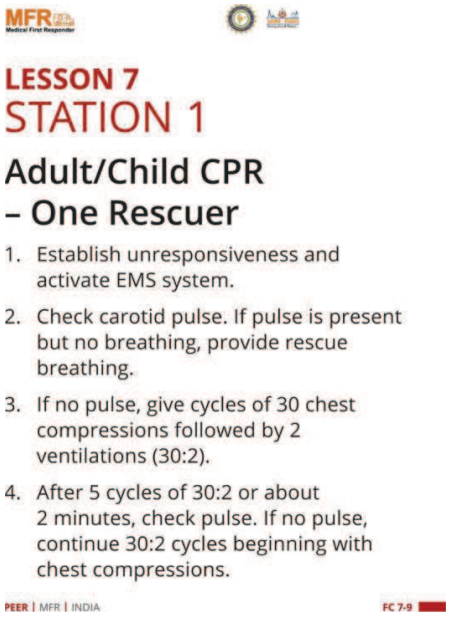


LESSON 7
— FLIP CHARTS

FC7-9



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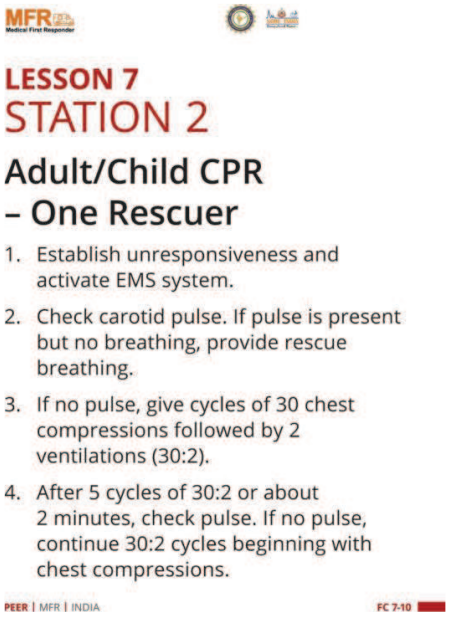

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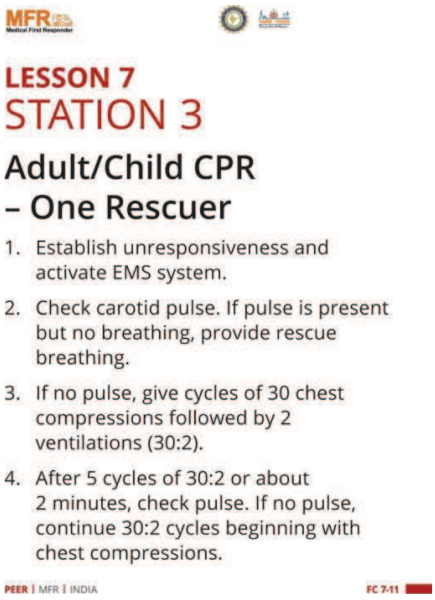

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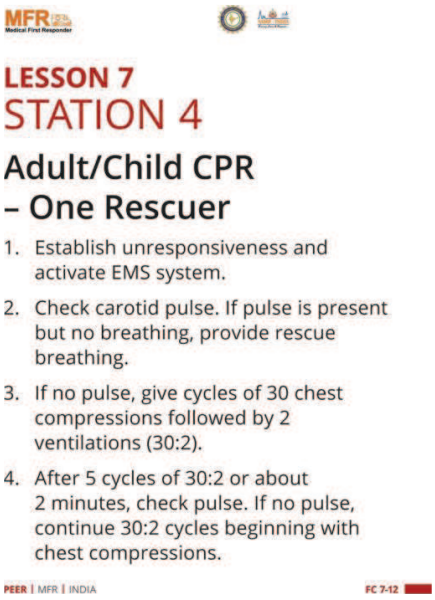
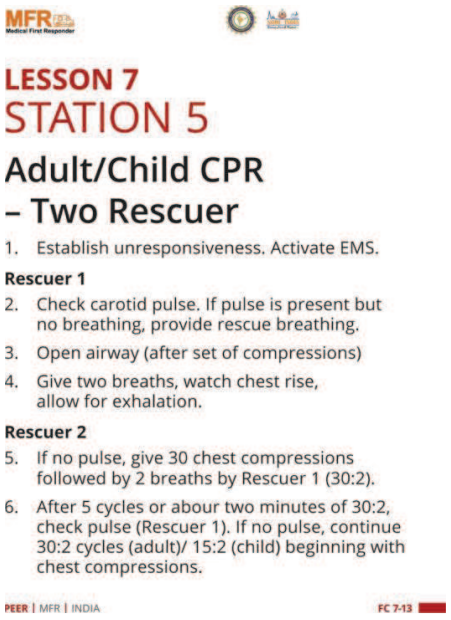


LESSON 7
— FLIP CHARTS

FC7-13



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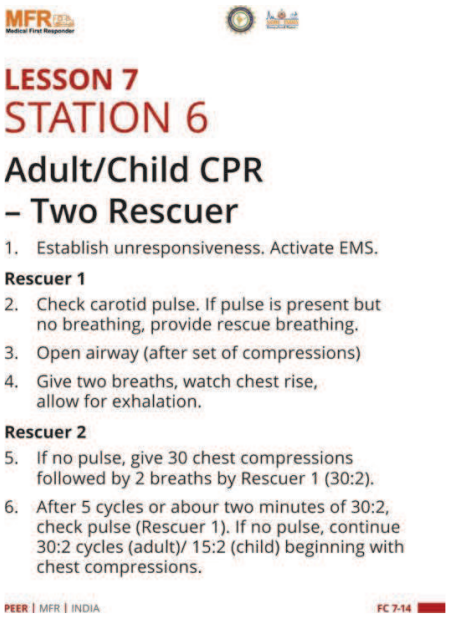

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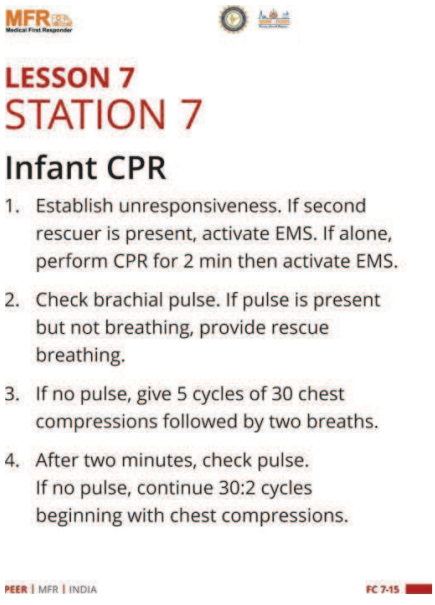

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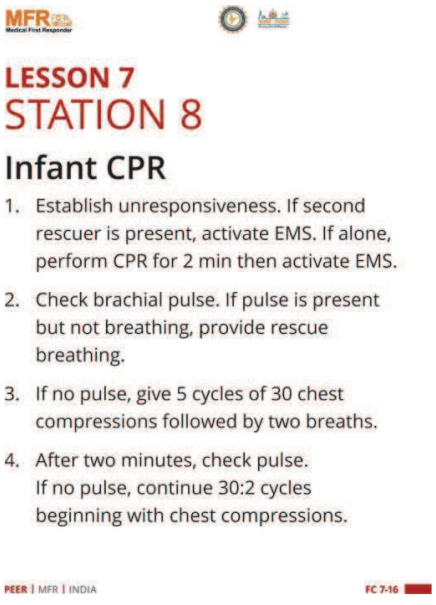


LESSON PLAN

08 OXYGEN THERAPY

Duration 07 Periods
(Lecture-02 Periods and Practical-05 Periods)

Equipment / Materials:

- 6 pocket masks
- 6 adult bag-valve-masks
- 6 pediatric bag-valve-masks
- 4 oxygen cylinders
- Humidifiers and regulators
- 4 nasal cannulas
- 4 simple masks
- 4 pulse oxymeters
- Gauze
- Antiseptic solution
- Mannequins
- Powerpoint presentation
- Multimedia projector and screen
- Computer

LESSON OBJECTIVES

Upon completion of this lesson, you will be able to:

1. Name five situations in which the application of oxygen is indicated.
2. Describe an oropharyngeal airway, a CPR mask, a bag-valve mask and demonstrate their uses.
3. List four key pieces of equipment in an oxygen delivery system.

1. INTRODUCTION

	Visual Aids and Other Materials	Time Elapsed
1) Introduction of lead instructor and co-instructors. 2) Introduction of lesson. 3) Introduction of the lesson objectives. Have one of the participants read them from the workbook.	▶ *PPT 8-1 to 8-2*	

2. PRESENTATION

	Visual Aids and Other Materials	Time Elapsed

1

Indications for Oxygen Use

Oxygen that is used for medical needs is colorless, and non-combustible. The air we breathe contains 21% oxygen. The oxygen used in medicine has a concentration of 100%.

A patient can require oxygen for a variety of medical needs. There are five typical examples in which the application of oxygen is indicated:

▶ *PPT 8-3*

- Heart failure/heart attack
- Respiratory deficiency (e.g. COVID-19 Severe infection)
- Excessive Bleeding
- Complications in childbirth
- Poisoning

<Discuss Pulse Oxymeter, reading ranges (>95% as healthy, 85-95 for COPD Patients, 85-94 hypoxic, <85 severe hypoxic), possible hypoxia, how to recognize symptoms of hypoxia, and treatment.>

Hazards Associated with Oxygen Use

- **Fire:** Do not allow smoking or the use of a flame when using oxygen. Oxygen is not combustible, but it does increase the intensity of a fire and will cause fire to flare up.
- **Explosion:** Never use oil or grease around an oxygen cylinder. Oil and grease near high concentrations of oxygen can cause an explosion.
- **Valve damage:** Avoid dropping or placing a cylinder where it can fall. The regulator or valve can be damaged and the cylinder can become a projectile.

▶ *NOTE*

<In India there is no local protocol in administering oxygen, administer oxygen only if necessary. Emphasize that oxygen is a medication. Discuss possible medical hazards.>

Oxygen Toxicity: -

Oxygen toxicity is also known as oxygen poisoning, observed when a person breathes higher than normal concentrations of oxygen at depth.

Sign & Symptoms :-

1. Pleuritic chest pain
2. Substernal heaviness
3. Coughing
4. Convulsions.
5. Trouble with breathing.
6. Euphoria
7. Nausea & Vertigo

(As per Indian Medical Association)

Medical Oxygen Cylinders

Medical Oxygen is stored as a compressed gas in cylinders. Oxygen cylinder size varies as per the capacity to hold water & amount of compressed gas or liquid oxygen, ranging from portable 1 liter to Jumbo cylinders.

The cylinders are produced in various sizes designated by a capital letter code. Homecare domiciliary oxygen cylinders are smaller though. These cylinders are identified according to color For color code identification, all oxygen cylinders have their shoulders painted with white color. Commonly used oxygen cylinder types are B, C, D, E & G In India, commonly used oxygen cylinders in hospitals are B type, D type & Dura LMO Cylinders. A type oxygen cylinders are for anesthesia purpose.

B Type & 0 Type oxygen cylinders.
B Type are used as bed-side cylinders
0 Type are used for Central Oxygen Supply system.

Approximate Specifications of Oxygen Cylinders

O2 Cylinder	B Type	D Type	Dura - 200	Dura - 208	Dura - 247
Type	Ward Cylinder	Jumbo	LMO	LMO	LMO
Capacity	1320 L Compressed Gas	7000 L Compressed Gas	1,67,000 Liters	1,74,000 Liters	2,10,000 Liters
Wastage – Approximate 15-20%					

Duration for which Cylinders will last as per oxygen use. (after excluding wastage)

1 L/min	17 hours	95 hours	-	-	-
2 L/min	8.5 hours	50 hours	-	-	-
5 L/min	3.5 hours	20 hours	-	-	-
8 L/min	2 hours	12 hours	350 hours	365 hours	437 hours
10 L/min	1.7 hours	9.5 hours	275 hours	290 hours	350 hours
15 L/min	1 hour	6 hours	185 hours	195 hours	233 hours
This is the approximate time that cylinder will last for 1 bed. Time may shorten due to leakage or if the cylinder is not completely filled.					

2 Oxygen Delivery System

Visual Aids and Other Materials

Time Elapsed

An oxygen delivery system consists of the following parts:

- Oxygen cylinder with valve
- Low pressure regulator with humidifier
- Appropriate oxygen delivery device

2.1 Oxygen cylinder with valve

When providing oxygen in the field, the standard source is a seamless steel or lightweight alloy cylinder filled with pressurized oxygen. A green (steel) or gray (aluminum) cylinder identifies oxygen. In India oxygen cylinders are black with white neck.

The cylinders should be inspected daily and pressure-tested annually due to the high-pressure contents (2,000 psi).

Valve: The control located at the top of the cylinder, used to turn the bottle on and off. Keep in mind that a certain valve type might not work with different types of regulators.

CYLINDER TYPES

Most common cylinder types:

Cylinder D — contains 350 liters

Cylinder E — contains 625 liters

Cylinder M — contains 3000 liters

▶ *PPT 8-5*

Size	Capacity (L)	Pressure (psi)	Tare Wt. (kg)
B	200	1900	2.27
D	400	1900	3.4
E	660	1900	5.4
F	1360	1900	14.5
G	3400	1900	34.5
H	6900	2200	53.2
M	3450	2200	29.0

▶ *NOTE*

<Cylinder size and types of regulators may vary. Ask participants what size and types are used in their area.>

2 Oxygen Delivery System (Cont.)

Visual Aids and Other Materials

Time Elapsed

2.2 Low Pressure Regulators and Flow meters

Regulators reduce the high pressure (2,000 psi) from the oxygen cylinder and decrease it to between 40 and 70 psi.

Flowmeters control the flow of oxygen, which is usually administered at between 2 and 20 litres per minute.

Duration of Flow Formula

▶ *PPT 8-6*

$$\frac{\text{Tank Pressure X Conversion Factor}}{\text{Liters per Minute (LPM)}}$$

2.3 Precautions When Giving Oxygen

- The pressure in a full cylinder is between 2,000 and 2,200 psi. Reduce the pressure to 40-70 psi before administering the oxygen to the patient.
- The appropriate delivery of oxygen to the patient is achieved by the use of a flow meter and regulator. They are usually connected as one piece.

Oxygen is considered a medication.

2.4 Accessories for Ventilation

<Ask assistant to display each accessory as it is discussed.>

▶ *NOTE*

▶ **Oropharyngeal Airway**
Device usually made of plastic, can be inserted into the patient's mouth and curves back into the throat. The airway holds down the patient's tongue and creates an air passage. Airways come in several sizes, from 0 for new borns to number 7 for adults.

CYLINDER SIZE	CONVERSATION FACTOR
D	0.16
E	0.28
M	1.56
H	3.14

2 Oxygen Delivery System (Cont.)

Visual Aids and Other Materials

Time Elapsed

Procedure for inserting airway:

1) Select proper size. If the patient is a child, use a tongue depressor to help insert the device.

2) Open the patient's mouth.

3) Insert the adjunct upside-down (tip facing the roof of the mouth).

4) Advance the adjunct gently until you encounter slight resistance (when the adjunct touches the back of the roof of the mouth).

5) Turn the airway 180 degrees.

6) Advance the adjunct until the flange rests on the patient's teeth, then secure it with tape.

If the patient exhibits a gag reflex during insertion or after it is in place, remove the adjunct.

▶ **CPR Mask**
<The mask is applied to all unconscious patients.>

▶ *NOTE*

The pocket face mask is designed to aid the rescuer when providing ventilations during CPR. It is made of a soft plastic that conforms to the patient's face. The mask can come both with or without an oxygen inlet. Its use avoids direct contact with the patient's mouth and decreases the chance of contamination.

▶ **Bag-Valve-Mask (BVM) (manual resuscitator)**

Many different types are available. The bag-valve-mask is a hand-held device you squeeze to ventilate a patient. It comes in adult, child and infant sizes. All have the same basic parts: face mask, non-rebreather patient valve, a bag (rubber or vinyl), intake valve/oxygen reservoir valve, oxygen supply connection tube, and oxygen reservoir.

2 Oxygen Delivery System (Cont.)

Visual Aids and Other Materials

Time Elapsed

2.5 Adjunct Equipment for Administering Oxygen

▶ **Nasal Cannula**

Description:
Has two stems that are placed into the patient's nostrils. Used most often in the hospital setting. Most patients tolerate it well and it is the best accessory for administration of give low-concentration oxygen.

Flow Rate:
1-6 lpm (each liter increases O2 concentration 3-4%)

O_2 Delivered:
Approximately *24-44%* oxygen concentration.

Notes: May cause the nasal mucus membranes to dry at higher flow rates. Appropriate for patients who cannot tolerate a mask

▶ **Non-Rebreather Mask**

Description:
Face mask with an oxygen reservoir bag and one-way valves. Requires a tight seal to ensure high oxygen concentration delivery.

Flow Rate: *12-15* lpm

O_2 Delivered:
Approximately *80-90*% oxygen concentration.

Notes: Reservoir must always contain enough oxygen so that it does not deflate by more than one third when patient inhales (must maintain proper flow rate). Delivery system of choice for patients requiring high O2 concentration.

Safety feature: Exhalation port is open in case oxygen supply fails (prevents 100% O2 delivery).

2

Oxygen Delivery System (Cont.)

Visual Aids and Other Materials

Time Elapsed

▶ **Humidifier**

Description:
Non-breakable jar of water attached to the flowmeter. Provides moisture to the dry oxygen coming from the supply cylinder.

Notes: Must be kept clean. Can become a breeding ground for algae, harmful bacteria and fungal organisms. No longer used, as not indicated for short transport due to risk of infection.

Pulse Oximeter:- Pulse oximeter is a small, non invasive device that measure the amount of oxygen in blood and heart rate without using needles or taking blood samples.

2.6 Mechanical Suction

- Maintain airway at all times – keep free of blood, vomit, secretions and other liquids or objects. Use mechanical suction to remove these substances or objects.
- Solid objects such as food, teeth or very thick secretions cannot always be removed with suction, and may require alternative equipment or a finger sweep.
- Suction should be performed rapidly to decrease the chance of blood or other foreign matter from moving into the lungs, which may cause pneumonia or complete airway obstruction.

▶ **Suction Equipment**

A suction unit consists of a suction source, a collection container, tubing and suction tips. May be portable or truck-mounted.

- Suction devices use negative pressure. Manual or electrically powered, air or oxygen-powered.
- Must have wide bore, thick walls, non-kinking tubing to fit a suction catheter.
- Several disposable catheters should be available, made of either rigid or flexible plastic.
- Unbreakable collection container with water for rinsing and cleaning.
- Enough vacuum power and flow to be effective.

	Visual Aids and Other Materials	Time Elapsed

PRACTICAL EXERCISES

In their groups, the participants rotate through the various stations according to the lesson plan.

REVIEW

Review objectives and ensure everyone has understood them.

EVALUATION

1) Verify that the objectives have been achieved.
2) Allow 2 minutes for participants to complete the lesson evaluation form.

CLOSING

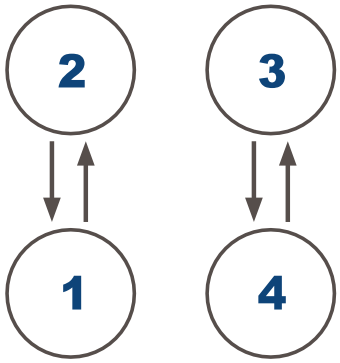
1. Comments, suggestions.
2. Thank the participants and announce the next lesson.

PRACTICAL EXERCISE
Oxygen Therapy

Stations 1 and 3: **Administering oxygen**

Stations 2 and 4: **Using airways, mask, and the bag-valve mask**

Rotation type for this lesson:



Number of rotations:

2

Duration:

90 minutes (45 min. per station)

Participants will practice in two groups. Both groups practice the same procedure with a mannequin. Rotate after everyone has practiced. Protocols for scene safety, initial assessment and physical examination do not apply.

<Give a brief explanation of the mechanics of this station, and allow practice to begin. Do not spend time on explanations already given in class. Allow the participants to practice as much as possible.>

PRACTICAL EXERCISE
Oxygen Therapy (Cont.)

Stations 1 and 3: Administering oxygen

Materials

- 2 complete sets (oxygen cylinder, regulator, flow meterand humidifier & pulse oximeter)
- 2 masks with reservoir
- 2 nasal cannulas to administer oxygen
- 2 adult mannequins

Procedure

1. Remove the seal of the cylinder.
2. Clean the valve of the cylinder.
3. Connect the regulator to the cylinder.
4. Open main valve of the cylinder.
5. Connect the mask with the reservoir to the flow meter.
6. Regulate the flow (according to the patient's medical needs).
7. Fill the reservoir bag.
8. Place the mask on the patient.
9. Repeat Steps 5, 6 and 8 using a nasal cannula in place of the mask.

Stations 2 and 4: Using airways, mask, and the bag-valve mask

Materials

- 2 complete sets (oxygen cylinder, regulator, flow meter and humidifier)
- 2 CPR masks
- 2 oropharyngeal airways
- 4 double female oxygen tubes
- 2 adult mannequins
- 2 pediatric mannequins
- 2 bag-valve-masks (1 pediatric, 1 adult)

Procedure

1. Inserting the adult and pediatric oropharyngeal airway.
2. Application of the CPR mask with oxygen.
3. Use of a bag-valve-mask.

Stations 1 and 2 –or– 3 and 4

Student Name: _____ **Dates:** _____

Instructions: Check the box showing on which attempt the participant was able to perform the step successfully. UTP indicates unable to perform successfully within four attempts.

Performance Guidelines		Successful on Attempts				UTP
		1	2	3	4	
Station 1	Use of PPE.					
	Prepare oxygen cylinder.					
	Assemble regulator and cylinder.					
	Attach oxygen mask and adjust flow meter.					
	Attach nasal cannula and adjust flow meter.					
Station 2	Use of PPE.					
	Select and insert oropharyngeal airway.					
	Place, seal and ventilate with CPR mask.					
	Place, seal and ventilate with bag-valve mask.					
Station 3	Use of PPE.					
	Prepare oxygen cylinder.					
	Assemble regulator and cylinder.					
	Attach oxygen mask and adjust flow meter.					
a	Attach nasal cannula and adjust flow meter.					
Station 4	Use of PPE.					
	Select and insert oropharyngeal airway.					
	Place, seal and ventilate with CPR mask.					
	Place, seal and ventilate with bag-valve mask.					

Overall Performance	
Station 1 ☐ Outstanding ☐ Successful ☐ Needs Imp. Instructor:	**Station 2** ☐ Outstanding ☐ Successful ☐ Needs Imp. Instructor:
Station 3 ☐ Outstanding ☐ Successful ☐ Needs Imp. Instructor:	**Station 4** ☐ Outstanding ☐ Successful ☐ Needs Imp. Instructor:

Please write applicable comments on reverse, and check box: ☐

— INSTRUCTOR'S COPY

POST-TEST | LESSON 8

Oxygen Therapy

1. Name five situations in which the application of oxygen is indicated.

- *Heart failure/heart attack*
- *Respiratory deficiency*
- *Bleeding*
- *Complications of childbirth*
- *Poisoning*

2. Briefly describe the following devices and explain their uses (1-2 sentences for each):

- Oropharyngeal airway
  A curved breathing tube that lifts the patient's tongue and holds it forward
- CPR Mask
  Prevents mouth-to-mouth contamination when performing CPR
- Bag-Valve-Mask
  A hand-held device that you squeeze to manually ventilate the patient

3. List four key pieces of equipment used in an oxygen delivery system.

- *Cylinder with valve*
- *Low pressure regulator*
- *Flowmeter*
- *Appropriate oxygen delivery device*

LESSON 8
— PPT's

8-1

8-2

OBJECTIVES

Upon completing this lesson, you will be able to:

1. Name five situations in which the application of oxygen is indicated.
2. Describe an oropharyngeal airway, a CPR mask, a bag valve mask and demonstrate their uses.
3. List four key pieces of equipment in an oxygen delivery system.

8-3

OXYGEN THERAPY

- Heart failure/heart attack
- Respiratory deficiency
- Bleeding
- Complications of childbirth
- Poisoning

8-4

HAZARDS ASSOCIATED WITH OXYGEN

1	2	3
Fire	Explosion (oil, grease)	Valve damage

8-5

CYLINDER TYPES

Size	Capacity (L)	Pressure (psi)	Tare Wt. (kg)
B	200	1900	2.27
D	400	1900	3.4
E	660	1900	5.4
F	1360	1900	14.5
G	3400	1900	34.5
H	6900	2200	53.2
M	3450	2200	29.0

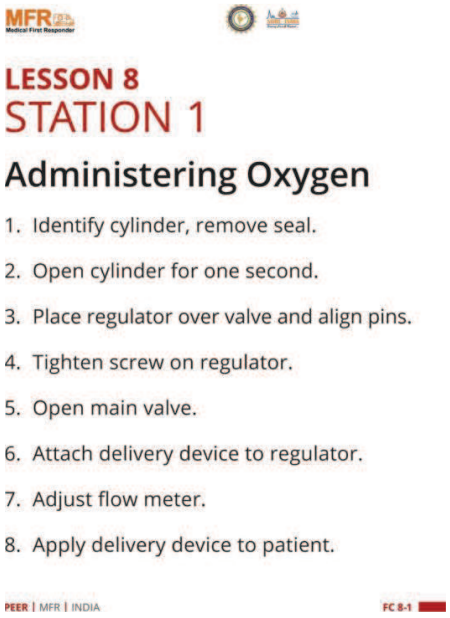
8-6

PRECAUTIONS WHEN GIVING OXYGEN

- Reduce the pressure to 40-70 psi before administering oxygen. The pressure in a full cylinder is 2,000-2,200 psi.
- Use a flow meter and pressure regulator.

LESSON 8
— FLIP CHARTS

FC8-1



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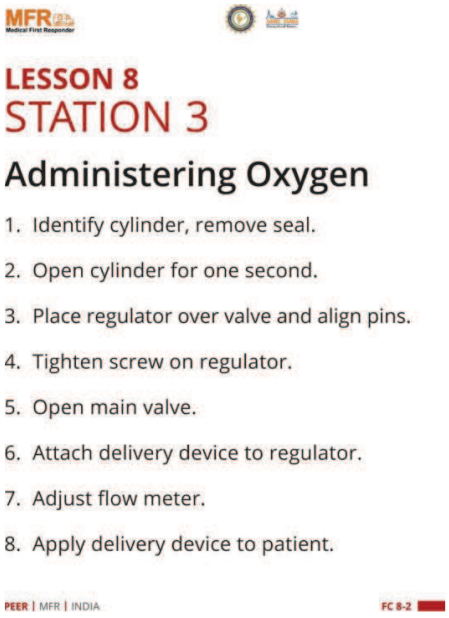

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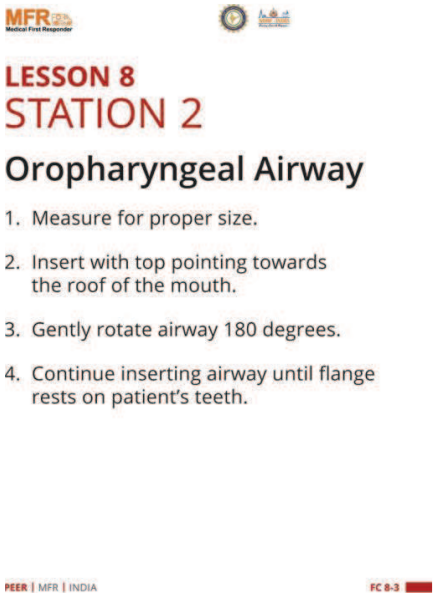

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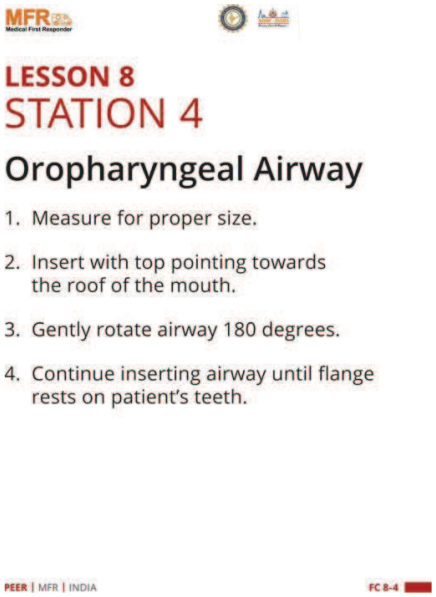
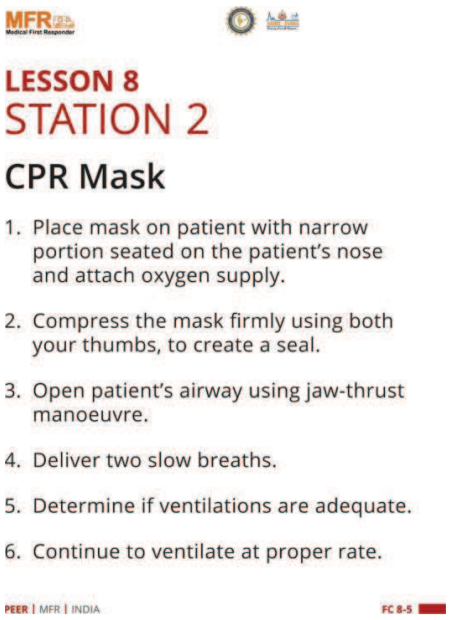


LESSON 8
— FLIP CHARTS

FC8-5



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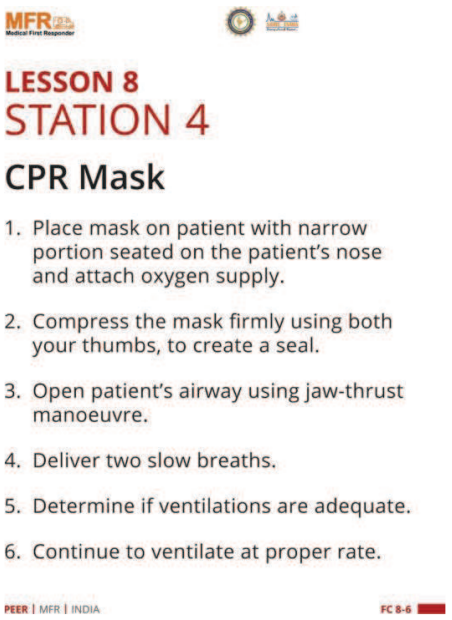

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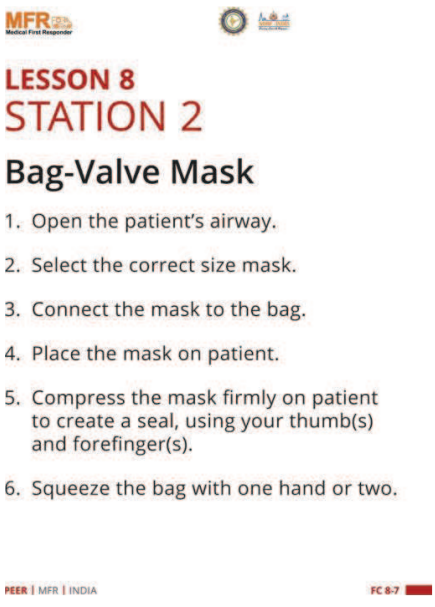
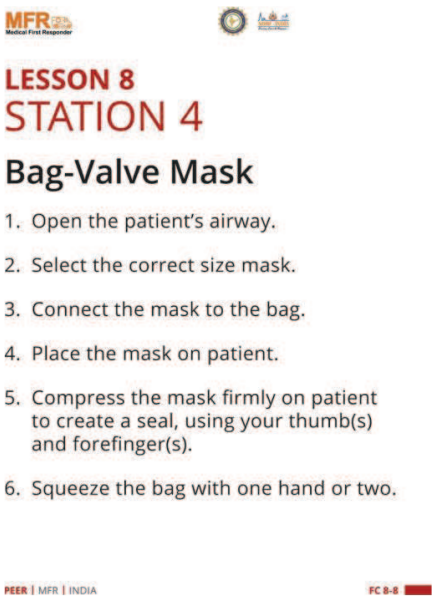


FC8-8



LESSON PLAN

09

HAEMORRHAGE AND SHOCK

Duration • 02 Periods • (Lecture 02 Periods)

Equipment / Materials:

- PowerPoint presentation
- Multimedia projector and screen
- Computer
- Flip charts

LESSON OBJECTIVES

Upon completion of this lesson, you will be able to:

1. List four methods of controlling external haemorrhage.
2. List the three steps for pre-hospital treatment for internal haemorrhage.
3. List ten signs and symptoms of shock.
4. List the five steps for pre-hospital treatment of shock.

	Visual Aids and Other Materials	Time Elapsed

1. INTRODUCTION

1) Introduce lead instructor and co-instructor.
2) Introduce the lesson.
3) Present lesson objectives. Ask participants to read them out of the workbook.

► *PPT 9-1 to 9-3*

2. DEVELOPMENT

Severe haemorrhage and shock are considered life-threatening emergencies. Appropriate care can make the difference between life and death.

Evaluating the problems that threaten the patient's life is the first responsibility at the scene. Making the correct evaluation is of primary importance to the first responder.

1 Review of the Organs and How They Work in the Circulatory System

Visual Aids and Other Materials

▶ *PPT 9-4*

Time Elapsed

1.1 The Heart

The heart is a hollow muscular organ.

- The *right* side of the heart receives the deoxygenated blood coming from the body and pumps it to the lungs for reoxygenation.
- The *left* side of the heart receives the oxygenated blood coming from the lungs and from there it is pumped through the whole body.

1.2 Arteries

Arteries are blood vessels that transport the blood to the body. These are very high pressure blood vessels. They are of different diameters, ranging from very thick (aorta, femoral), to medium (radial) and small (arterioles). Arterial bleeding is characterized by a *bright red* color.

1.3 Capillaries

Each artery is divided into increasingly smaller transport vessels until they narrow down into capillaries, the tiny vessels closest to the skin. Through their thin walls, the exchange of *oxygen* and *carbon dioxide* takes place. Other substances are also exchanged between the body's cells and the blood.

1.4 Veins

Blood vessels that carry blood back to the heart. Veins do not have as much pressure as the arteries. Venous bleeding is characterized by a *dark red* colour.

2 Blood

Visual Aids and Other Materials

Time Elapsed

2.1 Composition

The solid portion of the blood consists of *white blood cells, red blood cells* and *platelets*. The liquid portion of blood is called *plasma*. The normal adult has approximately five to six liters of blood.

2.2 Functions

- Blood transports *oxygen and nutrients* to tissues. It also transports cells that combat *infection* and eliminate *waste products*.
- Blood also has the capacity to *clot* (Solidify); this process usually takes 6 to 7 minutes.

3 Pulse

<Use the TR to show the location of the different pulses.>

▶ *NOTE*

The pulse can be felt more easily in areas of the body where *arteries* arecloser to the skin and near a solid structure (bone).

The most accessible pulse locations:

▶ *PPT 9-5*

- Radial
- Femoral
- Carotid
- Brachial

<Discuss why these are important. Discuss the blood pressure for each.>

▶ *NOTE*

Every time the heart pumps, you can feel the pulse of the arterial system.

4 Haemorrhage

Visual Aids and Other Materials

Time Elapsed

Definition: The loss of blood from the body.
It can be external and or internal.

4.1 External Haemorrhage Types

With external haemorrhage, the wound and loss of blood are visible.

- **Arterial:** Arterial haemorrhage is bright red and characterized by blood spurts coinciding with the pulse.
- **Venous:** Venous bleeding is steady and dark red.
- **Capillary:** Blood flows smoothly out of the capillaries and is similar in appearance to venous bleeding

4.2 Pre-hospital Treatment for External Haemorrhage

1) **Apply direct pressure.**
With a hand on the wound using a bandage or gauze dressing, apply pressure to control bleeding. A compressive bandage should follow the dressing.

2) **Elevate extremity**
If the forearm is bleeding, it is not necessary to elevate the whole extremity, only the forearm. Apply direct pressure to the bleeding are as explained before.

3) **Use pressure points.** Use pressure points only when direct pressure fails.

   Example: If it is not possible to make a compression bandage, a pressure point could be used to control severe haemorrhage of an arm or a leg.
   - Arm: Press on the brachial artery to control the bleeding.
   - Thigh: Press on the femoral artery to control the bleeding from the leg.

4) **Use a tourniquet.**

▶ *NOTE*

<Immobilize extremity. Fractures may cause tissue damage. Immobilization can quickly control the hemorrhage associated with the injury.>

4 Hemorrhage (Cont.)

Visual Aids and Other Materials

Time Elapsed

4.3 Using a Tourniquet

Use a tourniquet **only** in a severe emergency when other means fail to stop the bleeding from an extremity. The tourniquet should be applied as **distal** as possible.

> **DANGER:**
> Using a tourniquet can cause damage to the nerves and blood vessels. It can result in the loss of extremity.

<Check Brady, for guidelines on use.>

▶ *NOTE*

5 Internal Haemorrhage

Internal haemorrhaging can range from minor to a life-threatening problem. The loss of blood cannot be seen in internal bleeding. Examples:

- A closed fracture of the femur can cause a loss of 1 liter of blood.
- A laceration to the liver or spleen can cause a severe loss of blood, potentially fatal.

5.1 Signs and symptoms

Some signs of internal bleeding can be identified. One or more of the following may present:

- Coughing up bright red blood
- Vomiting dark-colored blood (the color of coffee grounds)
- Small or large areas of bruising
- Rigid abdomen

5 Internal Hemorrhage (Cont.)

Visual Aids and Other Materials

Time Elapsed

5.2 Pre-hospital Treatment for Internal Haemorrhage

1) Maintain an open airway and provide high-flow oxygen per local protocol.
2) Keep the patient warm, but be careful not to overheat him/her.
3) Treat for shock.

Transport the patient as soon as possible.

Report the possibility of internal bleeding as soon as more highly trained EMS personnel arrive at the scene.

6 Perfusion

Definition: The circulation of blood throughout an organ.

▶ *PPT 9-6*

An organ is perfusing when oxygenated blood is entering through the arteries and is exiting through the veins.

Perfusion maintains the cells in the organ by giving them oxygen and other nutrients and by removing waste products. If perfusion fails, it will result in the death of an organ.

7 Shock

Visual Aids and Other Materials

Time Elapsed

Definition: Failure of the circulatory system to provide adequate oxygenated blood supply throughout the body (inadequate tissue perfusion).

▶ *PPT 9-7*

7.1 Causes of Shock

Shock is caused by:

- Inability of the heart to pump enough blood through the organs.
- Severe loss of blood; insufficient blood in the system.
- Excessive dilation of blood vessels. Blood volume will be insufficient to fill them and shock will develop.

Any of the above can cause oxygen insufficiencies in the body's organs. There are different types of shock but the end result is the same: inadequate perfusion to the organs.

7.2 Signs of Shock

Breathing: Shallow and rapid

▶ *FC 9-1*

Pulse: Rapid and weak

Skin: Pale, cool and clammy

Face: Pale, often with blue color (cyanosis) in the lips, tongue and ear lobes

▶ *FC 9-2*

Eyes: Lackluster, pupils dilated

7.3 Symptoms of Shock

- Nausea and possible vomiting.
- Thirst
- Weakness
- Vertigo
- Uneasiness and fear – in some patients these symptoms can be the first sign of shock.

▶ *FC 9-3*

There is nothing the first responder can do to reverse the late stages of shock, but it is possible to keep the patient from deteriorating until a higher level of help arrives.

It is of utmost importance that the patient be evaluated and treated to prevent the onset of shock.

7

Shock (Cont.)

Visual Aids and Other Materials	Time Elapsed

7.4 Pre-hospital Treatment for Shock

1) Maintain open airway. If breathing is inadequate, administer oxygen.

2) Prevent further blood loss (by using direct pressure, elevation with direct pressure).

3) Elevate the lower extremities 20-30 cm, only if there are no suspected spinal, neck, chest or abdominal injuries. If anyone these injuries is suspected, keep the patient supine (face up) or can lift footend of the spine board.

4) Keep the patient warm, but do not overheat.

5) Provide care for specific injuries.

Transport patient immediately.

Visual Aids and Other Materials	Time Elapsed

REVIEW

1. Review objectives and ensure every one has understood them.
2. Review concepts such as internal bleeding, external bleeding, shock, signs and symptoms of shock and pre-hospital treatment.

EVALUATION

1) Verify that the objectives have been achieved.
2) Allow 2 minutes for participants to complete the lesson evaluation form.

CLOSING

1. Comments, suggestions.
2. Thank the class for their participation and announce the next lesson.

— INSTRUCTOR'S COPY

POST-TEST | LESSON 9

Haemorrhage and Shock

1. List the three methods of controlling external haemorrhage:

- *Direct pressure*
- *Elevation*
- *Pressure points*
- *Tourniquet*

2. List the ten signs and symptoms of shock.

- *Breathing: Shallow and rapid.*
- *Pulse: Rapid and weak*
- *Skin: Pale, cool and clammy*
- *Face: Pale, often with blue color (cyanosis) in the lips, tongue and ear lobes*
- *Eyes: Lackluster, pupils dilated*
- *Nausea and possible vomiting*
- *Thirst*
- *Weakness*
- *Vertigo*
- *Uneasiness and fear*

3. List the five steps for pre-hospital treatment of shock.

1) *Maintain open airway. If breathing is adequate, administer oxygen.*
2) *Prevent further blood loss (by using direct pressure, elevation with direct pressure).*
3) *Elevate the lower extremities 20-30 cm, only if there are no suspected spinal, neck, chest or abdominal injuries. If anyone these injuries is suspected, keep the patient supine (face up).*
4) *Keep the patient warm, but do not overheat.*
5) *Provide care for specific injuries.*

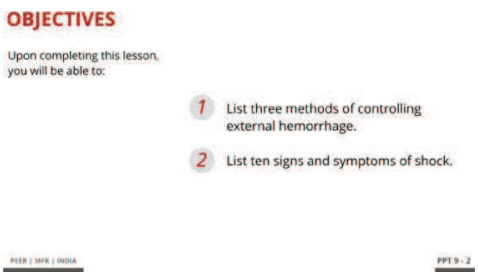
4. List the three steps for pre-hospital treatment for internal haemorrhage.

1) *Maintain an open airway and provide high-flow oxygen per local protocol.*
2) *Keep the patient warm, but be careful not to overheat him/her.*
3) *Treat for shock.*

LESSON 9
— PPT's

9-1

9-2



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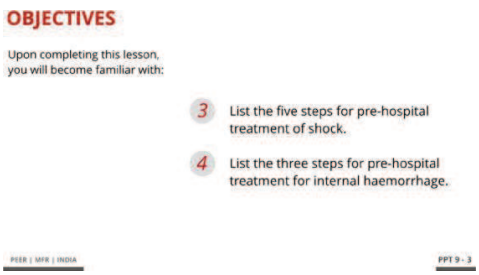

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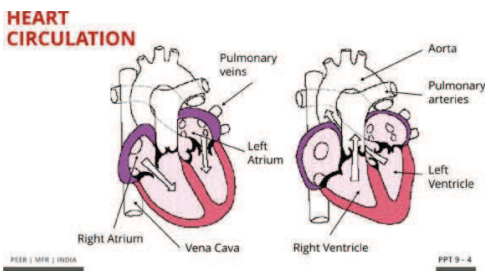

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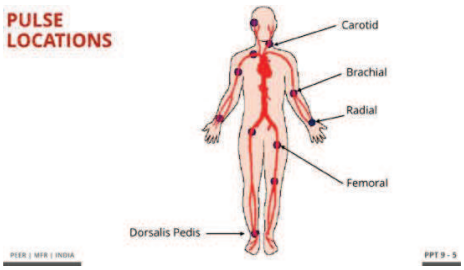

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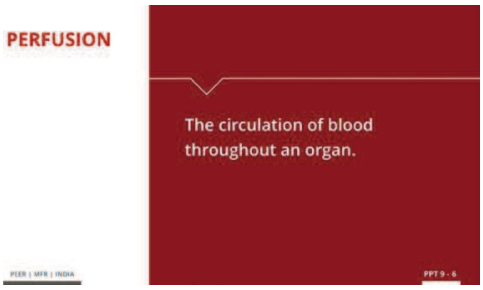
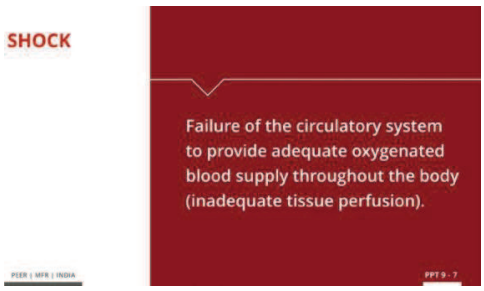


LESSON 9
— PPT's

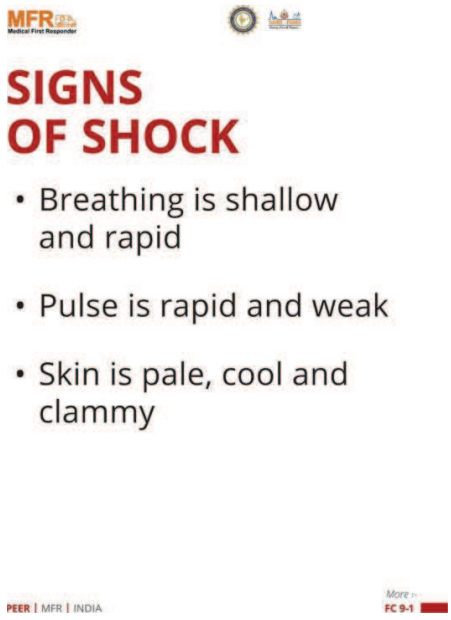
9-7



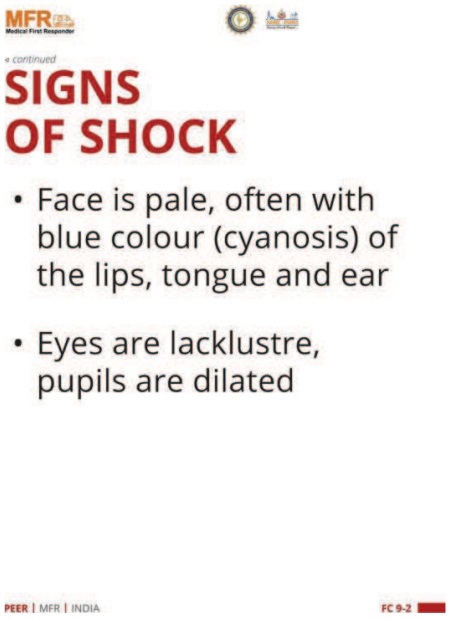
LESSON 9

— FLIP CHARTS

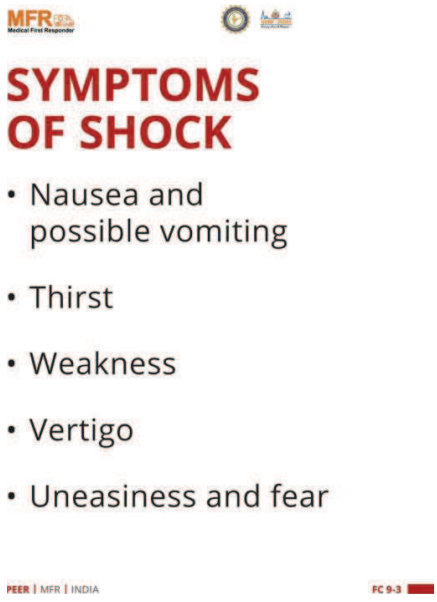
FC9-1



FC9-2



FC9-3



LESSON PLAN

10 SOFT-TISSUE INJURIES

Duration 09 Periods (Lecture-02 Periods and Practical-07 Periods)

Lesson Materials:	• Computer • Multimedia projector and screen • Powerpoint presentation • Flipchart and board markers	
Station materials for each group of students:	• 2 trauma dressings • 12 gauze dressings (4 x 4) • 6 sanitary napkins • 3 rolls of elastic bandages • 1 roll of elastic bandage • Trauma scissors	• Pencil to simulate impaled object • 3 triangular bandages • 1 roll of tape • Paper cups • 2 bulky dressings

LESSON OBJECTIVES

Upon completion of this lesson, you will be able to:

1. List two steps to treat a closed wound.
2. List six steps to treat an open wound.
3. List the steps for pre-hospital treatment for eye, ear, nose and mouth injuries.
4. List the steps for pre-hospital treatment of abdominal and genital injuries.
5. Demonstrate the use of dressings and bandages to control bleeding when given a specific area of the body.
6. Demonstrate the pre-hospital treatment for the following:
   - Impaled object in the eye or cheek
   - Bleeding neck injuries

Visual Aids and Other Materials

Time Elapsed

1. INTRODUCTION

► *PPT 10-1 to 10-4*

1) Introduce instructors and co-instructors.
2) Present the lesson.
3) Present lesson objectives. Ask participants to read them from the Workbook.

This lesson covers soft tissue injuries to all parts of body except the thorax.

2. DEVELOPMENT

1 Definition

Soft tisue injuries, commonly referred to as **wounds**, are injuries to the skin, muscle, nerves, and blood vessels.

► *PPT 10-5*

2 Closed Wounds

Visual Aids and Other Materials

Time Elapsed

Closed wound:
Injury to the soft tissues beneath unbroken skin.

▶ *PPT 10-6*

Closed wounds can involve superficial damage to the skin or can be severe with damage to internal organs. Small contusions generally do not need treatment, whereas more serious injuries can be fatal. Closed wounds are generally caused by impact with a *blunt* object.

▶ **How to recognise closed wounds:**

- Swelling
- Tenderness
- Discoloration
- Possible deformity

▶ **Pre-hospital treatment for closed wounds**

Use universal precautions and secure the scene.

1) Apply **"RICE"** method: rest, ice, compress, elevate.
2) Monitor the patient for any *rapid changes in vital signs* that might indicate internal bleeding, which should be treated by a physician.
3) Treat for shock.

Transport the patient as soon as possible.

<Severe trauma care will be discussed later in conjunction with the specific parts of the body.>

▶ *NOTE*

3 Open Wounds

Visual Aids and Other Materials

Time Elapsed

Open wound:
A soft tissue injury resulting in breaking of the skin.

▶ *PPT 10-7*

▶ *PPT 10-8*

▶ **Types of open wounds**

- Scratches and abrasions
- Lacerations - regular and irregular
- Penetration and puncture wounds
- Avulsions
- Amputations
- Crushing injury (may be open or closed)
- Gunshot wounds
- Impaled object

<Ask participants for additional examples of open wounds.>

▶ *NOTE*

▶ **Pre-hospital treatment for open wounds**
Use universal precautions and secure the scene.

1) **Expose the wound.** Remove all clothing and expose soft tissue. Avoid removing clothing by pulling it over the patient's head. Best method is to remove clothing by *cutting with trauma scissors.*

2) **Control bleeding.** Begin with direct pressure or indirect pressure and elevation. If wound continues to bleed use a pressure point. Use a tourniquet only as *last resort*.

3) **Prevent contamination.** Remove debris and contamination around the surface of the wound. Do not try to remove embedded particles.

4) **Dress and bandage.** Use a sterile dressing and secure with a bandage to cover the wound.

5) **Cover the patient.** Keep patient calm.

6) **Treat for shock.**

Transport the patient as soon as possible.

4 Dressings and Bandages

Visual Aids and Other Materials | **Time Elapsed**

Dressing: Any material used to cover a wound that helps control bleeding and aids in the prevention of additional contamination.

▶ *PPT 10-9*

Bandage: Any material used to hold a dressing in place.

▶ *PPT 10-10*

Occlusive dressing: Any water-resistant material (plastic or waxed paper) applied to a wound to prevent the entrance of air and the loss of moisture from internal organs.

▶ *PPT 10-11*

Bulky dressing: Multiple stacked dressings made to form a single dressing 2-3 cm thick, such as a thick sanitary towel or any similar material.

▶ *PPT 10-12*

4.1 Applying Dressings and Bandages

When applying a bandage and dressing you should be able to:

- Control bleeding.
- Apply the dressings using aseptic technique.
- Cover the wounds completely.
- Ensure that the dressing and the bandage are firm, fixed and comfortable, but not so tight as to affect circulation.
- Ensure there are no loose ends that can get caught.
- Avoid covering the fingertips.

▶ *PPT 10-13*

▶ *PPT 10-14*

The pre-hospital treatment of wounds and soft tissue injuries is directed at controlling bleeding and preventing contamination.

4

Dressings and Bandages (Cont.)

4.2 Bandaging Unusual Wounds

Visual Aids and Other Materials

Time Elapsed

- **Penetrating Injury**
  1) Cover any open wound completely.
  2) Examine the patient for possible exit wound.

- **Impaled Objects**
  1) Do not remove unless impaled in the cheek or affecting the airway or CPR.
  2) Control bleeding.
  3) Stabilise the object with a bulky dressing and apply a bandage.

- **Avulsion (skin flap)**
  1) Clean the wound surface
  2) Return skin flap to original position
  3) Control bleeding
  4) Cover with bulky dressing and apply a bandage.

- **Amputations and unattached avulsions**
  1) Clean the wound
  2) Control bleeding
  3) Apply dressing and bandages
  4) Keep amputated part cold and moist, but not wet.

5 Special Situations

Visual Aids and Other Materials

Time Elapsed

5.1 Injuries to the Scalp

Suspect spinal injury in any patient with a head injury. Do not apply direct pressure if you suspect a skull fracture.

5.2 Wounds to the Eyes (puncture wound or impaled object)

1) **Bandage the good eye** to prevent movement of injured eye.

2) In an **unconscious patient**, close the eyes before blindfolding the patient to prevent the eyes from drying, which may cause blindness.

3) **Treat an extruded eye the same way as you would treat an eye with an impaled object.** Do not replace the eye if it has been expelled. Cover it with a cup or cardboard cone before applying the bandage.

5.3 Injuries to the Ear

► *PPT 10-15*

Blood, clear fluid, or blood-tinged fluid draining from the ear may indicate skull fracture or severe head trauma.

- Never probe the ear.
- Never pack the ear to stop bleeding; check for clear fluid (CSF) which may indicate a skull fracture.
- Place a loose clean dressing across the opening to absorb the fluids.
- Do not apply pressure.

Visual Aids and Other Materials

Time Elapsed

5.4 Nosebleed

A nosebleed is an emergency that can be serious and should not be neglected. The loss of blood can be great and lead to shock. If the patient has a suspected skull fracture or spinal injury, do not try to *stop the bleeding*. (This topic will be discussed in more detail in the lesson on skull injuries.)

▸ **Pre-hospital treatment for nosebleeds**
Use universal precautions and secure the scene.

1) **Maintain open airway.**

2) **Pinch nostrils together** or place a dressing between the upper lip and the gum and apply pressure.

3) **Keep the patient seated and still.**

4) **Do not pack the nose, check for clear fluid** (CSF) which may indicate a skull fracture.

5) **Do not remove any object you may find inside the nose.**

6) For avulsions, **apply a compressive dressing.**

5 Special Situations (Cont.)

Visual Aids and Other Materials

Time Elapsed

5.5 Injuries to the Neck

▶ *PPT 10-16*

- Visible lacerations or other wounds can produce massive bleeding or air embolism.
- Difficulty speaking, loss of voice.
- Airway obstructions without foreign bodies in mouth, nose, or airway. Often caused by inflammatory process (subcutaneous emphysema).
- Tracheal deviation.

▶ *PPT 10-17*

- Deformities or depressions.
- Immobilize the patient if you suspect spinal injury.

▶ **Pre-hospital treatment for injuries to the neck**
Use universal precautions and secure the scene.

1) If there is bleeding from a neck wound, apply *slight to moderate pressure* with an *occlusive dressing*. Tape down all edges of the dressing to form an airtight seal, to avoid air embolism. Do not delay treatment; cover injury with a gloved hand and apply direct pressure if necessary. Add a bulky dressing over the occlusive one. Never apply pressure to both sides of the neck at the same time. Never apply a pressure dressing completely around the neck.
2) For patient without spinal injury, place patient on left side with a 15-degree incline (head lower), if possible.
3) If an object is impaled in the neck, stabilise it in place with bulky dressings. Do not remove it.
4) Treat for shock.

IMPORTANT: With any head, face, scalp, eye, ear, nose or neck injury, the MFR should also suspect a possible spinal injury.

Visual Aids and Other Materials

Time Elapsed

5.6 Injuries to the Abdomen

The abdomen contains solid and hollow organs. The rupture of *hollow organs* (stomach, large and small intestine) can cause the contents (acids, digestive enzymes, bacteria) to spill into the peritoneal cavity, causing an inflammatory reaction. Rupture of the *solid organs* (liver, spleen, etc.) can cause severe haemorrhage.

A contusion may indicate injury to the abdomen or pelvis.

▶ **Signs and symptoms of abdominal injury**

- Pain or cramps in the abdominal area, local or diffuse ▶ *PPT 10-18*
- Guarding the abdomen or lying down in foetal position
- Tenderness of the abdomen
- Signs of shock ▶ *PPT 10-19*
- Rigid, tense or distended abdomen
- Mild discomfort progressing to intolerable pain
- Deep, penetrating pain in the pelvis or lower back
- Pain radiating to a shoulder or both shoulders ▶ *PPT 10-20*
- Vomiting blood, bright red or like coffee grounds.
- Blood in the stool, bright red or tarry black.

▶ **Pre-hospital treatment for abdominal injuries**

Use universal precautions and secure the scene.
Be alert for patient vomiting.

1) **Cover all open wounds.**
2) **Do not replace exposed internal organs** – cover them with thick, moist sterile dressing. Then loosely cover moist dressing with occlusive dressing. Keep exposed area warm by placing a dressing or towel over the occlusive dressing.
3) **Do not remove impaled objects** – stabilise them with bulky dressings.
4) **Constantly monitor vital signs.**
5) **Place patient supine** with legs in most comfortable position.
6) **Treat for shock.**

Visual Aids and Other Materials

Time Elapsed

5 Special Situations (Cont.)

5.7 Injuries to the Genitals

▸ **Pre-hospital treatment for wounds to genitalia**

Wounds to the genitals should be treated the same as any other wound. However, special care and attention should be given to protect the patient's privacy.

PRACTICAL EXERCISES

Divide the participants into four groups.
Move into the station and continue practicing the exercises.

REVIEW

<Review objectives on page 1 to ensure participants have understood them clearly. Answer any questions.>

POST-TEST

1) Verify that the objectives have been achieved.

2) Remind the participants to answer the post test.
<Lesson evaluation will be done after all practical exercises have been completed.>

CLOSING

1. Comments, suggestions.
2. Thank participants and announce the next lesson.

MFR LESSON 10

PRACTICAL EXERCISE

Soft Tissue Injuries

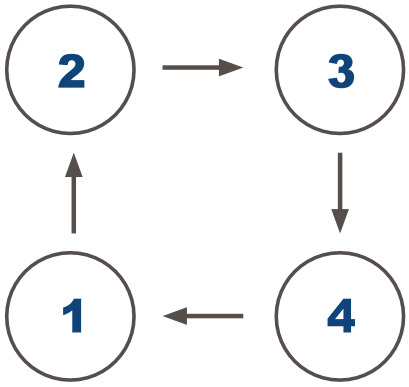
Stations 1: **Treatment of bleeding neck injuries.**

Stations 2: **Applying bandages and dressings to soft-tissue injuries.**

Stations 3: **Treatment of extruded and impaled eyeball**

Stations 4: **Treatment of impaled objects.**

Rotation type for this lesson:



Number of rotations:

4

Duration:

3 hours (45 minutes per station)

Pair up participants; one to act as the patient and the other as the rescuer.
They then exchange places and repeat the exercises.

PRACTICAL EXERCISE
Soft Tissue Injuries (Cont.)

Stations 1: Treatment of bleeding neck injuries.

Materials

- PPE for all participants
- Four 6-inch elastic bandages
- Four 3-inch elastic bandages
- 4 rolls gauze bandage
- Sixteen (16) 4-inch x 4-inch dressings
- 4 occlusive dressings
- 4 rolls of cloth tape
- Evaluation forms

Set up participants in pairs. Each participant will take turns acting as the rescuer and then the patient. They will practise techniques for controlling arterial/venous bleeding with a compressive dressing. Initial assessment and physical exam protocols do not apply.

Stations 2: Applying bandages and dressings to soft-tissue injuries.

Materials

- PPE for all participants
- Four 6-inch elastic bandages
- Four 3-inch elastic bandages
- 4 rolls gauze bandage
- Sixteen (16) 4 x 4-inch dressings
- 4 rolls of cloth tape
- 4 triangular bandages
- Evaluation forms

Participants will practice the technique of applying a compressive dressing to control bleeding. Initial assessment and physical exam protocols do not apply.

Stations 3: Treatment of extruded and impaled eyeball

Materials

- PPE for all participants
- Four 6-inch elastic bandages
- Four 3-inch elastic bandages
- 4 rolls gauze bandage
- Sixteen (16) 4 x 4-inch dressings
- 4 occlusive dressings
- 4 rolls of cloth tape
- 4 pencils (simulated impaled object)
- 4 paper cups
- 4 pairs of scissors
- Evaluation forms
- Elastic bandages (Ace)
- 8 triangular bandages

Participants will practice treatment for an extruded and impaled eyeball. One participant plays the role of the patient while the other provides treatment. After finishing, they will exchange places. This technique is also used to secure an object impaled in the eye, cutting out the bottom of the cup. Initial assessment and physical exam protocols do not apply.

PRACTICAL EXERCISE
Soft Tissue Injuries (Cont.)

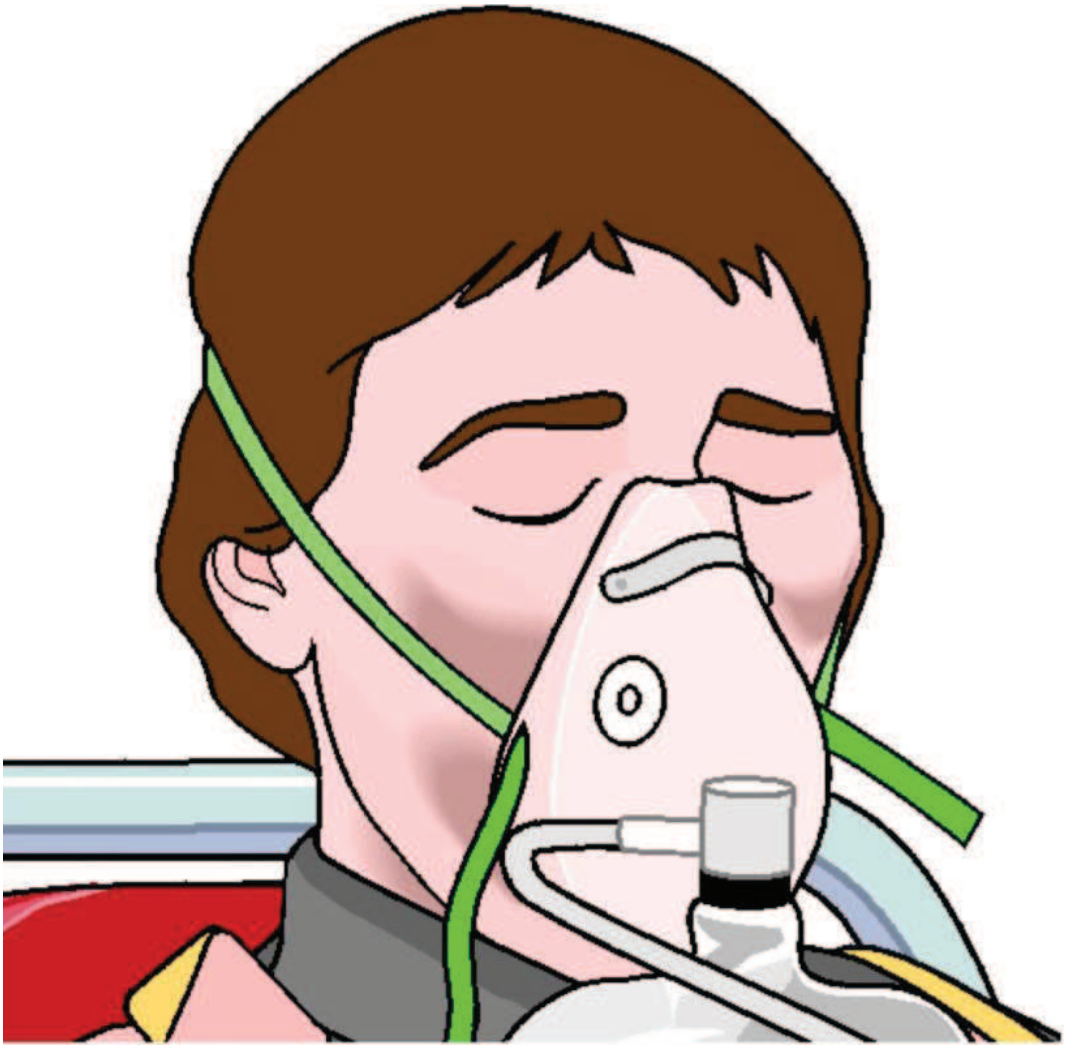
Stations 4: Treatment of impaled objects.

Materials

- PPE for all participants
- Four 6-inch elastic bandages
- Four 3-inch elastic bandages
- 4 rolls gauze bandage
- Sixteen (16) 4 x 4-inch dressings
- 4 occlusive dressings
- 4 rolls of cloth tape
- 8 bulky dressings
- 3 pairs of scissors
- 4 pencils (simulated impaled object)
- Evaluation form

Participants will practice the technique for stabilizing an impaled object. Participants take turns acting as the patient and then the rescuer. This technique is also used to fix an object impaled in other areas of the body such as the thigh, back, arm, etc. Initial assessment and physical exam protocols do not apply.

(To be used in Station 2, Applying Tourniquet)



Stations 1, 2, 3 and 4

Student Name: _____ **Dates:** _____

Instructions: Check the box showing on which attempt the participant was able to perform the step successfully. UTP indicates unable to perform successfully within four attempts.

Performance Guidelines		Successful on Attempts				UTP
		1	2	3	4	
Station 1	Use of PPE.					
	Control bleeding and bandage bleeding neck wound.					
Station 2	Use of PPE.					
	Control bleeding.					
	Apply compressive bandage.					
	Apply tourniquet.					
Station 3	Use of PPE.					
	Bandage extruded eyeball. Cover with moist during & protective cup. Bandage both eyes.					
	Isolate and bandage impaled object in eye.					
Station 4	Use of PPE.					
	Stabilise and bandage impaled object.					

Comments _____

Overall Performance	
Station 1 ☐ Outstanding ☐ Successful ☐ Needs Imp. Instructor:	**Station 2** ☐ Outstanding ☐ Successful ☐ Needs Imp. Instructor:
Station 3 ☐ Outstanding ☐ Successful ☐ Needs Imp. Instructor:	**Station 4** ☐ Outstanding ☐ Successful ☐ Needs Imp. Instructor:

— INSTRUCTOR'S COPY

POST-TEST | LESSON 10

Soft Tissue Injuries

1. List six steps used to treat an open wound.

1) *Expose the wound. Remove all clothing and expose soft tissue. Avoid removing clothing by pulling over patient's head. Best method is to remove clothing by cutting with trauma scissors.*
2) *Clean the surface of the wound. Remove debris and contamination on the surface of the wound. Do not try to remove embedded particles.*
3) *Control bleeding. Begin with direct pressure or indirect pressure and elevation. If wound continues to bleed use a pressure point. Use a tourniquet only as last resort.*
4) *Prevent contamination. Use a sterile bandage, clean cloth or a handkerchief to cover the wound.*
5) *Cover the patient. Keep patient calm.*
6) *Treat for shock.*

2. List two steps used to treat a closed wound.

1) *Continually monitor the patient for any rapid changes in vital signs. Sudden changes might indicate internal bleeding, which should be treated by a physician.*
2) *Treat for shock.*

3. Describe the pre-hospital treatment for the following injuries.

Mouth:

1) *Maintain open airway.*
2) *Cuts to the lips. Use rolled gauze. Place the dressing between the lips and gums. Ensure the dressing does not come loose and enter the airway.*
3) *Lip avulsions. Apply compression to the wound.*
4) *Cuts to the inside of the mouth. Do not pack the mouth with a bandage. Any dressing placed between the cheek and the gum needs to be held in position by hand. This is necessary to prevent the patient from swallowing the dressing. If possible, position the patient's head to allow the mouth to drain.*

POST-TEST | LESSON 10

Soft Tissue Injuries (Cont.)

Nose:

1) *Maintain open airway.*
2) *Pinch nostrils together or place a bandage between the upper lip and the gum and press.*
3) *Keep patient seated still.*
4) *Do not pack the nose; check for clear fluid (CSF) which may indicate a skull fracture.*
5) *Do not remove any objects you may find inside the nose.*
6) *For avulsions, apply a compressive dressing.*

Eyes:

1) *Do not try to remove the impaled object. Give emotional support to the patient.*
2) *Stabilise the object. Do not apply direct pressure to lacerated globe. Use a roll of 3- inch gauze or folded 4 x 4-inch bandages on either side of the object.*
3) *Cover the object. Fit a disposable paper drinking cup or paper cone over or around the impaled object. Allow it to rest on the dressing. Do not allow it to apply pressure to the object.*
4) *Secure the dressings. Have another rescuer stabilise the dressings and cup while you secure them in place with tape or gauze. Do not secure the bandage to the top of the cup.*
5) *Administer oxygen per to local protocol.*
6) *Bandage the good eye to prevent movement of injured eye.*
   In an unconscious patient, close the eyes before blindfolding the patient to prevent the eyes from drying, which may cause blindness.
7) *Treat for shock*

Outer Ear:

- **Minor Laceration:** *Cover with dressing and apply a bandage.*
- **Severe Laceration:** *Apply dressings to the injured ear and the side of the head.*
- **Avulsion:**
  If still attached, use a bulky dressing and secure it with a bandage.
  If detached, keep the avulsed part wrapped in gauze, moist and cool in a plastic bag. If no plastic bag is available, wrap with gauze.

POST-TEST | LESSON 10

Soft Tissue Injuries (Cont.)

Middle Ear:

- *Never probe the ear.*
- *Never pack it to stop bleeding from the ear canal.*
- *Place a loose clean dressing across the opening to absorb the fluids.*
- *Do not apply pressure.*

4. What is the pre-hospital treatment for abdominal injuries?

1) *Cover all open wounds.*
2) *Do not replace exposed internal organs – cover them with thick, moist sterile dressing. Then loosely cover moist dressing with occlusive dressing. Keep injured area warm by placing a dressing or towel over the occlusive dressing.*
3) *Do not remove impaled objects – stabilize them with bulky dressings.*
4) *Constantly monitor vital signs.*
5) *Put patient on his/her back with legs in most comfortable position.*
6) *Treat for shock.*

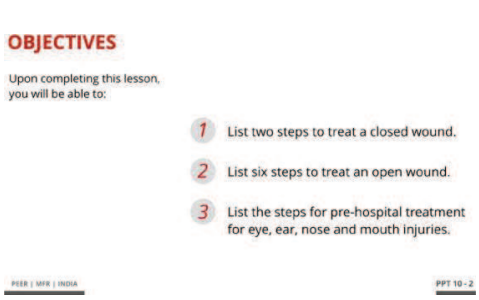
5. What is the pre-hospital treatment for genital injuries?

Wounds to the genitals should be treated the same as any other wound.
However, special care and attention should be given to protect the patient's privacy.

LESSON 10
— PPT's

10-1

10-2



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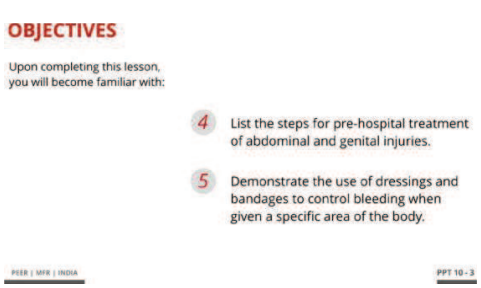

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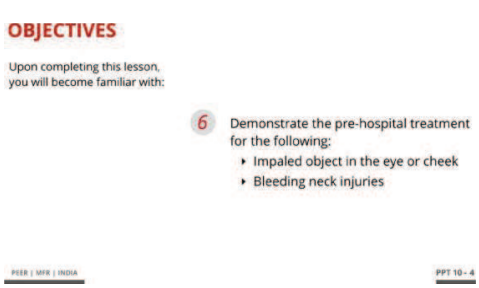

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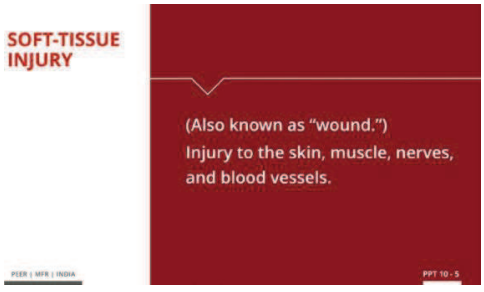

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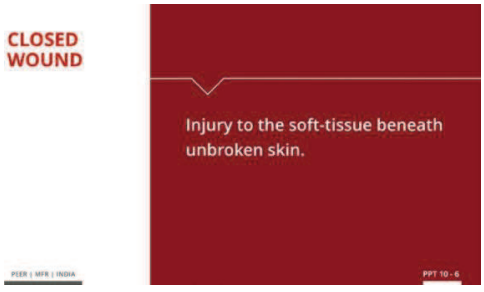


LESSON 10
— PPT's

10-7

OPEN WOUND

A soft-tissue injury resulting in breaking of the skin.

PPT 10 - 7

10-8

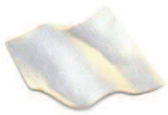
TYPES OF OPEN WOUNDS

- Scratches and abrasions
- Lacerations – regular and irregular
- Penetration and puncture wounds
- Avulsions
- Amputations
- Crushing injury
- Gunshot wounds
- Impaled object

PPT 10 - 8

10-9

DRESSING



Any material used to cover a wound that helps control bleeding and also aids in the prevention of additional contamination.

PPT 10 - 9

10-10

BANDAGE

Any material used to hold a dressing in place

PPT 10 - 10

10-11

OCCLUSIVE DRESSING

Any water-resistant material (plastic or waxed paper) that is applied to a wound to prevent the entry of air and loss of moisture from internal organs.

PPT 10 - 11

10-12

BULKY DRESSING

Multiple stacked dressings made to form single dressing 2-3 cm thick, such as a thick sanitary napkin or any similar material.

PPT 10 - 12

LESSON 10
— PPT's

10-13

APPLYING DRESSINGS AND BANDAGES

- Control bleeding.
- Apply the dressing using aseptic technique.
- Cover the wounds completely.

PEER | MFR | INDIA PPT 10 - 13

10-14

APPLYING DRESSINGS AND BANDAGES

CONT.

- Ensure that the dressing and the bandage are firm, fixed and comfortable, but not so tight as to affect circulation.
- Ensure there are no loose ends that can get caught.
- Avoid covering the fingertips.

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10-15

WOUNDS TO THE EAR

- Never probe the ear.
- Never pack it to stop bleeding from the ear canal.
- Place a loose, clean dressing across the opening to absorb the fluids.
- Do not apply pressure.

PEER | MFR | INDIA PPT 10 - 15

10-16

INJURIES TO THE NECK

- Visible lacerations or other wounds can produce massive bleeding or air embolism
- Difficulty speaking; loss of voice
- Airway obstructions without foreign bodies in mouth, nose, or airway; often caused by inflammatory process (subcutaneous emphysema)

PEER | MFR | INDIA PPT 10 - 16

10-17

INJURIES TO THE NECK

CONT.

- Tracheal deviation
- Deformities and depressions
- Immobilize the patient if you suspect a spinal injury

PEER | MFR | INDIA PPT 10 - 17

10-18

ABDOMINAL INJURY

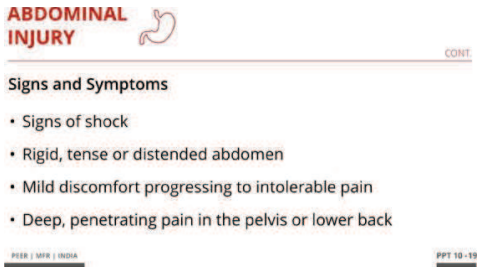
Signs and Symptoms

- Pain or cramps in the abdominal area, local or diffuse
- Guarding the abdomen or lying down in fetal position
- Tenderness of the abdomen

PEER | MFR | INDIA PPT 10 - 18

LESSON 10
— PPT's

10-19



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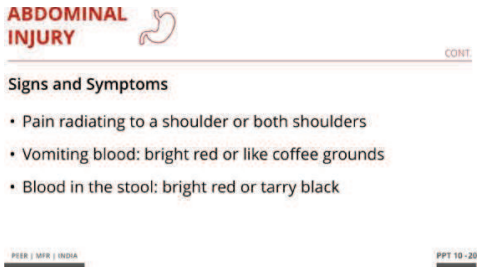
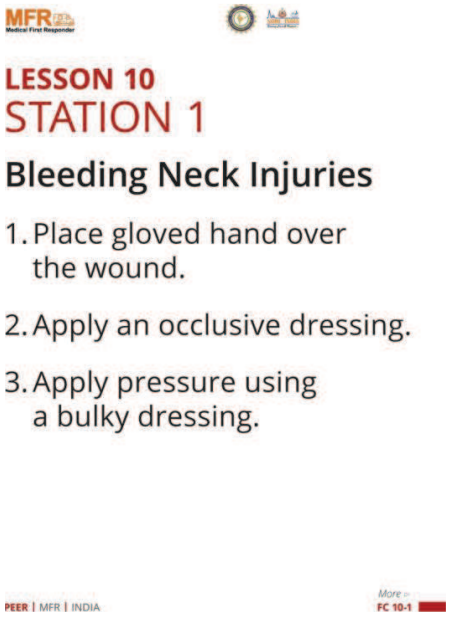


LESSON 10
— FLIP CHARTS

FC10-1



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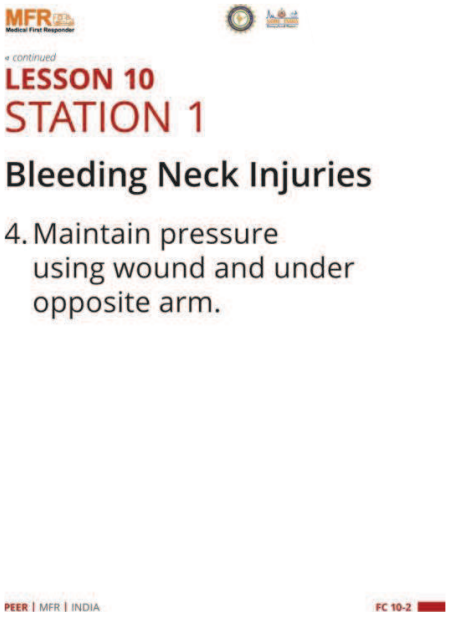

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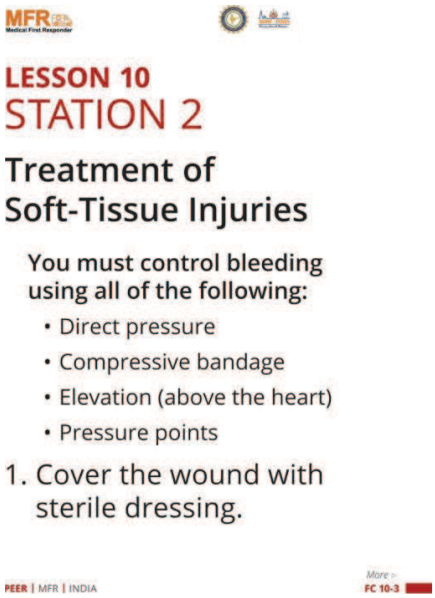

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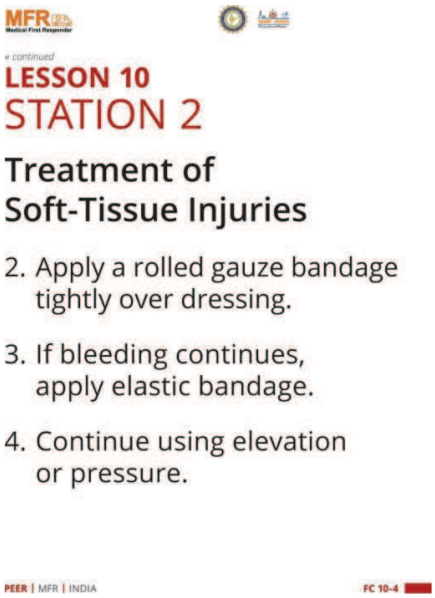
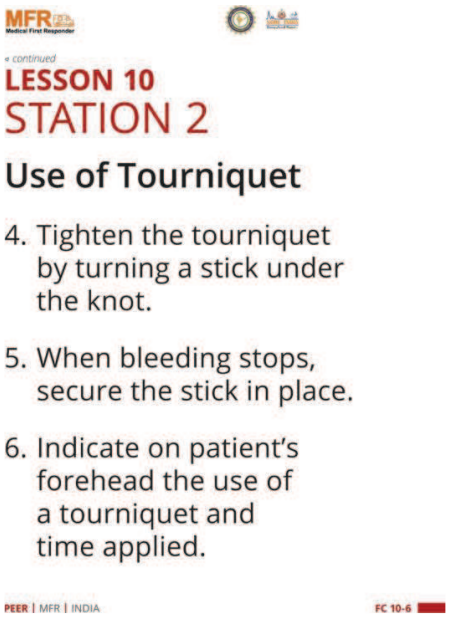


LESSON 10
— FLIP CHARTS

FC10-5

FC10-6



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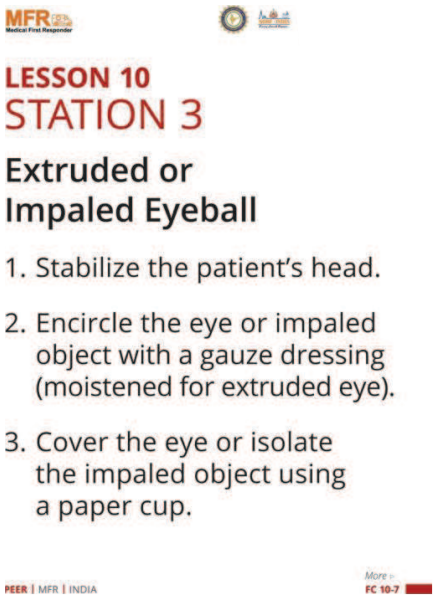

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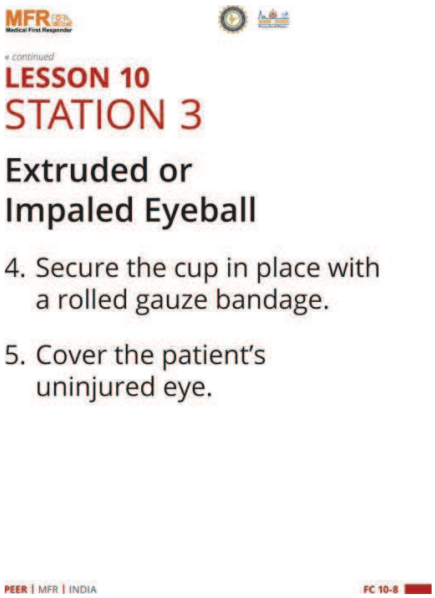
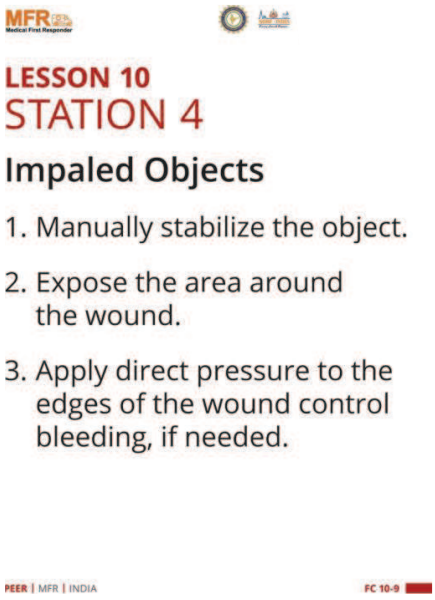


LESSON 10
— FLIP CHARTS

FC10-9



FC10-10