LESSON PLAN

11

MUSCULOSKELETAL INJURIES

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

Materials:	• Powerpoint presentation • Computer • Multimedia projector and screen • 4 splints for upper extremities • 4 splints for lower extremities • 4 tourniquets • 20 triangular bandages • Tongue depressors • Tape • 4 blankets • 4 pillows • 8 rolls of bandage (elastic or Kling) • 2 long backboards • Complete human skeleton model • Handouts

LESSON OBJECTIVES

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

1. Define an open fracture and closed fracture and list four signs and symptoms.
2. Define a dislocation, a sprain and a strain and list four signs and symptoms.
3. Give two reasons for immobilizing a fracture, a sprain or a strain on a patient.
4. Demonstrate the pre-hospital treatment of fractures and dislocations of the extremities, hips and shoulder.

	Visual Aids and Other Materials	Time Elapsed

1. INTRODUCTION

1) Introduce instructors and co-instructor.
2) Introduce the lesson.
3) Present lesson objectives. (Have participants read them from the WB.)

▶ *PPT 11-1 to 11-3*

2. DEVELOPMENT

1 Skeletal System

The adult skeleton is composed of 206 bones. The human skeleton consists of two main divisions, the axial skeleton and the appendicular skeleton.

▶ *PPT 11-4*

<Quickly review the human skeletal system, identify the main bones and joints.>

<Allow participants enough time to fill in WB.>

▶ *NOTE*

Functions of the skeletal system

- Provides a *framework* for the body
- Protects *vital organs*
- Provides for body *movement*
- Produces *red blood* cells

1

Skeletal System (Cont.)

Axial Skeleton

The axial skeleton (at right) consists of 80 bones, including:

- Skull
- Thorax
- Vertebral (spinal) column

Appendicular Skeleton

The appendicular skeleton consists of 126 bones which includes:

- Shoulder: clavicle and scapula
- Upper extremities: arms, hands, fingers
- Pelvis (hips)
- Lower extremities: legs, feet, toes

Joints (articulations)

Joints are bone ends that fit into each other. There are several types of joints:

- Immovable joints, such as in the skull
- Slightly movable joints, such as the spine
- Freely movable joints, such as the elbow or knee joints (hinge) or the hip joint (ball and socket)

Ligaments and Tendons

- Ligaments connect and hold bones together at the joints
- Tendons attach the skeletal muscles to the bone. These muscles control the movement of the joints.

Visual Aids and Other Materials

Time Elapsed

2 Fractures, Dislocations and Sprains

Visual Aids and Other Materials

Time Elapsed

2.1 Fractures

Definition: Any break in the continuity of a bone.

▶ *PPT 11-5*

Fractures can be open or closed.

Closed fracture: One in which the overlying skin is intact. Proper splinting helps prevent closed fracture from becoming open fracture.

Open fracture: One in which the skin has been broken or torn either from the inside by the injured bone, or from the outside by the object that caused the penetrating wound with the associated bone injury. The bone may or may not protrude through the wound. Open fractures are serious because of risk of contamination or infection is greater.

Treat life-threatening injuries first. It is impossible to rule out a fracture through a physical exam of the patient. Many sprains and dislocations present signs and symptoms similar to a fracture.

2.2 Dislocation

Dislocation: Injury in which a bone is moved out of its normal position in a joint and remains that way.

▶ *PPT 11-6*

A dislocation sometimes causes the tearing of ligaments and soft tissues if stretched far beyond the normal range of motion. The shoulder, elbow, fingers, hips, and ankles are the joints most frequently affected. Signs and symptoms of dislocation are similar to those of a fracture.

2 Fractures, Dislocations and Sprains (Cont.)

Visual Aids and Other Materials | Time Elapsed

2.3 Sprains and Strains

Sprain: Injury in which ligaments are stretched or partially torn, commonly associated with joint injuries

▶ *PPT 11-7*

Do not confuse a sprain with a strain, which involves muscle injury.

Strain: Injury in which a muscle, or a muscle and tendon are over-extended.

▶ *PPT 11-8*

Dislocation, fracture and sprain may all be present in an injury.

2.4 Signs and Symptoms of a Musculoskeletal Injury

<Allow time for participants to take notes on this section in their workbooks.>

▶ *NOTE*

- Deformity or angulation: compare with opposite limb

▶ *PPT 11-9*

- Pain and tenderness upon palpation or movement
- Crepitus (grating) – a sound or feeling of broken bone ends rubbing together
- Swelling
- Bruising or discoloration

▶ *PPT 11-10*

- Exposed bone ends
- Joint locked in position – reduced motor ability or reduced ability to articulate a joint
- Numbness and paralysis – may occur distal to site of injury caused by bone pressing on a nerve
- Circulatory compromise distal to injury evidenced by alteration in skin colour, temperature, pulse or capillary refill

NEVER intentionally induce crepitus.
This may cause or aggravate soft tissue injury.

3 Splinting

Visual Aids and Other Materials

Time Elapsed

Definition: Applying a device to stabilize any painful, swollen, or deformed body part

▶ *PPT 11-11*

The primary objective of splinting is to prevent further movement of body parts. For any splint to be effective, it must immobilize adjacent joints and bone ends.

▶ *NOTE*

<Explain "adjacent" joints.>
<Allow participants to copy the bulleted items below into their workbooks.>

Reasons for splinting include:

▶ *PPT 11-12*

- To prevent motion of bone fragments or dislocated joints
- To reduce pain and suffering
- To minimize damage to soft tissues (for example, nerves, arteries, veins and muscle)
- To prevent a closed fracture from becoming an open fracture
- To minimize blood loss or shock

3.1 Types of Splints

Effective splinting may require some ingenuity. Though you may carry many types of splinting devices, many situations will require you to improvise.

▶ *NOTE*

<Have participants give other examples of improvised splints.>

▶ **Five basic types of splints**

- **Rigid splint:** Requires limb to be in anatomical position. Ideal for long-bone injuries. (for example cardboard, wood).
- **Conforming splint:** Can be moulded to different angles to surround the extremity (for example air or vacuum splints).
- **Traction splint:** Used specifically for femur fractures.
- **Sling and swathe:** Two triangular bandages used to hold an injured arm in place against the body.
- **Improvised splints:** a book, cardboard, pillow or blanket, etc.

Visual Aids and Other Materials

Time Elapsed

3.2 General Rules for Splinting

Regardless of the method of splinting, general rules apply to all types of immobilization, as follows:

- Always communicate your plans with your patient, if possible.
- Before immobilizing an injured extremity, expose and control bleeding.
- Always cut away clothing around the injury site before immobilizing the joint. Remove all jewelry from the site and below it.
- Assess P.M.S. (pulse, motor function and sensation)
- If limb is severely deformed or distal circulation is compromised (cyanosis distal to fracture site or no distal pulse), align the bone with gentle traction (pulling). If pain or crepitus worsens, discontinue.
- Do not attempt to push protruding bone ends back into place. However, when realigning, they may slip back into place. Make a note if this occurs.
- For patient comfort and proper immobilization, pad voids between the body and the splint, since many rigid splints do not conform to body curves.
- Pad a splint before applying it.
- If a joint is injured, immobilize it and the bones above and below.

AVOID TUNNEL VISION

- **Do not over-splint the patient.** In multi-system trauma patients, do not be distracted from life-threatening injuries by the gross appearance of non-critical injuries.
- Securing the patient to a long spine board supports and splints every bone and joint in one step without wasting time.
- Be flexible while splinting. Keep in mind patient's comfort and principles of splinting.

4

Pre-hospital Treatment for Suspected Fracture, Dislocation or Sprain

Visual Aids and Other Materials

Time Elapsed

Examining involves use of your senses and skills of inspection (looking), palpation (feeling) and auscultation (listening). Use universal precautions and secure the scene.

1) **Perform initial assessment**

▶ *PPT 11-13*

- Identify and treat *life-threatening* problems.
- Do not be distracted by *dramatic-looking injuries*.
- Remember cervical collar and oxygen, if necessary.

2) **Perform physical exam.**
You can use the mnemonic (BPDOC) to guide your exam as you look for signs and symptoms of injuries.

- Check for visible *Bleeding*. Check all joints and bones through entire length of body.
- Assess for Pain or ask the patient if he/she feeling pain.
- Check for visible *deformities*.Check all joints and bones through entire length of body.
- Check for *wounds*, common with extremity injuries.
- Check for *crepitus* sound of bones

For extremity injuries, always assess for distal circulation, sensation and motor function (C.S.M.), **before and after splinting.**

- **Pulse:** Radial in upper extremity injuries oe pedial pulse such as, dorsalis pedis (top of foot) or posterior tibial pulse (back of ankles, medially) for lower extremities.
- **Motor function:** check patient's ability to move, such as wiggling toes or fingers. (movement indicates intact nerves).
- **Sensation:** Gently squeeze or pinch one extremity then the other, asking if patient can feel your touch.

3) **Stabilise the injury.** After completing a physical exam, secure the injury site providing manual stabilization. Do not release manual stabilization of an injured extremity until it is properly and completely immobilized.

4 Pre-hospital Treatment for Suspected Fracture, Dislocation or Sprain (Cont.)

Visual Aids and Other Materials

Time Elapsed

4) **Expose the injury.** Cut away clothing and remove jewelry before swelling occurs.

5) **Treat open wounds and control bleeding.** Cover with a clean or sterile dressing, avoid direct pressure over broken bone ends. Use pressure points as needed if bone ends protrude from injury, use caution not to allow bone ends to re-enter wound.

6) **Prepare your splinting materials.**

▶ *PPT 11-14*

7) Carefully splint individual injuries.

<Splint some extremities as found, realign others to restore pulse, motor function or sensation.>

▶ *NOTE*

- Measure or adjust the splint into position, maintain manual stabilisation as appropriate during splinting until procedure is complete.
- Apply and secure to adjacent joints and injury site
- Be careful not to restrict circulation

8) **Reassess circulation, motor function and sensation**

9) **Apply cold packs or ice** to injury site to reduce pain and swelling.

10) Treat for shock.

5 Pre-hospital Treatment for Specific Injuries and Application of Splints

Visual Aids and Other Materials

Time Elapsed

▶ *NOTE*

<Discuss all signs and symptoms of fracture with participants as you discuss injuries.>

<Initial assessment protocols should be performed on all patients.>

IMPORTANT: Always reassess pulse, motor function and sensation before and after splinting.

5.1 Splinting the Upper Extremities

▶ **Shoulder and Clavicle**

Signs and symptoms: Shoulder appears to be "dropped," deformity (asymmetry), pain.

Treatment: Apply a sling and swath. Provide any padding necessary to fill void between body and arm.

▶ **Humerus (Upper arm) and Shoulder**

Signs and symptoms: Pain, swelling, deformity

Treatment: Apply a rigid splint to outside of arm, pad voids, then apply sling and swath

▶ **Elbow**

Important: Splint in position found, do not attempt to straighten.

Signs and symptoms: Pain, swelling, deformity

Treatment: If arm is bent at elbow, splint with sling and swath alternate is pillow or blanket. If elbow is straight, splint entire arm, armpit to fingertips, both sides.

▶ **Forearm and Wrist**

Signs and symptoms: Pain, swelling, deformity

Treatment: Splint area with arm board, then sling and swath. (Pneumatic splints are an option.)

5 Pre-hospital Treatment for Specific Injuries and Application of Splints (Cont.)

Visual Aids and Other Materials

Time Elapsed

▸ **Hands and Fingers**

Important: Pulse can be checked by capillary refill.

Signs and symptoms: Pain, swelling, deformity

Treatment: If one finger is fractured, tape it to an adjacent finger or use tongue depressor to splint. If more than one finger is fractured, splint the entire hand in the position of function. Place a roll of bandage in palm of hand, or other object, then wrap entire hand and place on arm board.

5.2 Splinting the Lower Extremities

▸ **Pelvic**

- Pelvic injuries can be life-threatening due to *massive blood loss.*
- Suspect shock.
- Any force strong enough to injure the pelvis can also injure the *spine.*

Signs and symptoms of pelvic injury

- Pain, especially when pressure is applied to iliac crests or pelvic bones
- Inability to lift legs while lying on back

Pre-hospital treatment for pelvic injury

1) Minimize patient movement.
2) Do not log roll or lift with pelvis unsupported.
3) Place a folded blanket between patient's legs from groin to feet and bind together with cravats (2 upper leg, 2 lower leg).
4) Place the patient on long backboard.
5) Treat for shock.

5 Pre-hospital Treatment for Specific Injuries and Application of Splints (Cont.)

Visual Aids and Other Materials

Time Elapsed

▶ Hip Injuries

With this type of injury, it is difficult to differentiate an upper femur fracture from a hip or pelvic fracture or dislocation. Assess for life threatening injuries as with pelvic injuries.

Signs and symptoms of hip injury

- Pain, swelling and discoloration
- Inability to move leg(s)
- Possible foot rotation (outward or inward)

Pre-hospital treatment for hip injury

1) Bind legs together with a folded blanket between patient's legs
2) Support the hip with pillows.
3) Stabilize patient on long backboard, or use long splints along outer thigh, from foot to armpit with padding; and along the inner thigh, from groin to foot.
4) Secure with cravats.

▶ Femoral Injuries

A femoral fracture can produce massive internal bleeding. Treat life-threatening conditions first.

Signs and symptoms of femoral fracture

- Pain (often intense)
- Deformity
- Rigidity
- Shortened limb

Pre-hospital Treatment

If you find the leg in a straight position, use two padded splints one along the inner thigh from groin to the foot, the other along the outer thigh from the armpit to the foot. Secure with cravats.

5 Pre-hospital Treatment for Specific Injuries and Application of Splints (Cont.)

Visual Aids and Other Materials

Time Elapsed

▶ **Knee Injuries**

Signs and symptoms: Pain, swelling, deformity

Bent position: Immobilize in the position found. The bones above and below it should be splinted with short padded boards.

Straight position: Use two padded long splints, the first on the inner thigh from groin to beyond foot. Place the second on the outer thigh, from hip to beyond foot. Secure with cravats.

▶ **Tibia or Fibula Injury**

Signs and symptoms: Pain, swelling, deformity

Pre-Hospital Treatment: Use two padded long splints – groin to foot and thigh to foot. Secure with cravats. Alternative method for a closed injury to the tibia or fibula is to use a circumferential splint or pneumatic splint.

▶ **Ankle and Foot Injuries**

Signs and symptoms: Pain, swelling, deformity.

Pre-Hospital Treatment: Stabilize, remove shoes and socks if possible (expose injury). Circumferential or formable splint such as a pillow secured with cravats is recommended.

Alternative: Padded boards to mid-thigh

<Spinal injuries will be discussed in another lesson>

▶ *NOTE*

Visual Aids and Other Materials

Time Elapsed

REVIEW

1. Describe a fracture, a dislocation, a sprain and a strain and list their signs and symptoms.
2. Give two reasons for immobilizing a fracture, a sprain or a strain on a patient.
3. Demonstrate the pre-hospital treatment for fractures and sprains of the extremities, hips and pelvis.

PRACTICAL STATION

Divide the class into four stations. Work in groups of two, with instructor's assistance. The participants will practice immobilizing or splinting fractures dislocation and sprains for each particular station.

EVALUATION

1. Objective 3 should be completed during practice stations.
2. Allow participants 5 minutes to complete the Lesson Evaluation.
3. Verify all objectives have been met.

CLOSING

1. Comments, suggestions.
2. Thank the group for their participation, and present the next lesson and the lead instructor.

PRACTICAL EXERCISE
Musculoskeletal Injuries

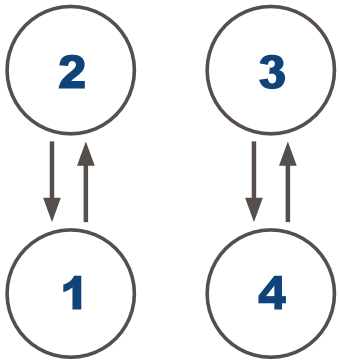
Stations 1 and 3:

Splint a injury to the shoulder, upper arm, elbow, forearm, and wrist

Stations 2 and 4:

Splint a injury to the hip, thigh, knee, lower leg, and ankle

Rotation type for this lesson:



Number of rotations:

2

Duration:

3 hours (90 min. per station)

Participants will practice in pairs. One will act as the patient and the other as the rescuer, then allow them trade places. The person in charge of each station supervises the performance of the other two participants. These exercises will not require arrival protocols, initial assessment or physical exam.

<NOTE: After briefly explaining the procedures of this station, allow participants to begin practicing. Do not spend time explaining material that was already covered during lecture.>

PRACTICAL EXERCISE

Musculoskeletal Injuries (Cont.)

Stations 1 and 3:

Splint a injury to the shoulder, upper arm, elbow, forearm, and wrist

Materials:

- Latex gloves for each participant
- 12 triangular bandages
- 3 long rigid splint sets
- 3 medium rigid splint sets
- 3 short rigid splint sets
- Three 1-inch bandage rolls
- 3 blankets
- 3 pillows
- Instructor evaluation form

Stations 2 and 4:

Splint a injury to the hip, thigh, knee, lower leg, and ankle

Materials:

- Latex gloves for each participant
- 12 triangular bandages
- 3 long rigid splint sets
- 3 medium rigid splint sets
- 3 short rigid splint sets
- Three 1-inch bandage rolls
- 3 blankets
- 3 pillows
- Instructor evaluation form

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 or Station 3	Use of PPE.					
	Splint a fracture or a dislocation of the shoulder					
	Splint fracture of the upper arm.					
	Splint dislocation of a bent elbow.					
	Splint fracture of the forearm.					
	Splint fracture of the wrist using rigid splint or pillow.					
Station 2 or Station 4	Use PPE.					
	Splint hip injury using two rigid splints.					
	Splint fracture of the thigh.					
	Splint fracture or dislocation of a bent knee.					
	Splint fracture of the lower leg.					
	Splint ankle injury using rigid splints or pillow.					

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:

Comments _____

— INSTRUCTOR'S COPY

POST-TEST | LESSON 11

Musculoskeletal Injuries

1. Describe an open and closed fracture, a sprain and a strain and list their signs and symptoms.

Closed fracture: *one in which the overlying skin is intact. Proper splinting helps prevent closed fracture from becoming open fracture.*

Open fracture: *One in which the skin has been broken or torn either from the inside by the injured bone, or from the outside by the object that caused the penetrating wound with the associated bone injury. The bone may or may not protrude through the wound. Open fractures are serious because of risk of contamination or infection is greater.*

Signs and symptoms of a fracture

- *Deformity or angulation: compare with opposite limb*
- *Pain and tenderness upon palpation or movement*
- *Crepitus (grating) – a sound or feeling of broken bone ends rubbing together*
- *Swelling*
- *Bruising or discoloration*
- *Exposed bone ends*
- *Joint locked in position – reduced motor ability or reduced ability to articulate a joint*
- *Decreased or absent sensory perception distal to injury*
- *Decreased or absent circulation distal to injury evidenced by alteration in skin colour, temperature, pulse or capillary refill*

Sprain

Injury in which ligaments are stretched or partially torn, commonly associated with joint injuries. (Do not confuse with strain, a muscle pull.)

Signs and symptoms

Similar to the signs and symptoms of fracture or dislocation.

Strain

Injury in which a muscle, or a muscle and tendon, are over-extended.

Signs and symptoms

Similar to the signs and symptoms of fracture or dislocation.

POST-TEST | LESSON 11

Musculoskeletal Injuries (Cont.)

2. Give two reasons for immobilizing a fracture, a sprain or a strain on a patient.

- *To reduce pain and suffering*
- *To minimize damage to soft tissues (e.g., nerves, arteries , veins and muscle)*
- *To prevent a closed fracture from becoming an open fracture*
- *T o minimize blood loss or shock*

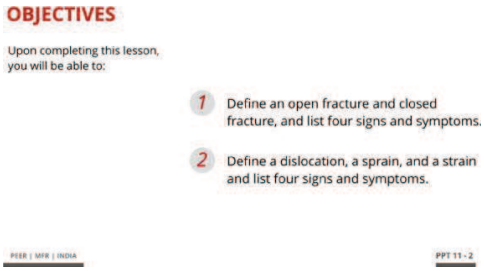
3. Describe the pre-hospital treatment of fractures and sprains of the extremities, hips and pelvis.

1) *Use universal precautions and secure the scene.*
2) *Perform initial assessment.*
3) *Perform a physical exam – D.O.T.S., P.M.S.*
4) *Stabilize the injury. After completing a physical exam, secure injury site providing manual stabilization. Do not release manual stabilization of an injured extremity until it is properly and completely immobilized.*
5) *Expose the injury. Cut away clothing and remove jewelry before swelling occurs.*
6) *Treat any open wounds. Control bleeding. Cover with a clean or sterile dressing, avoid direct pressure over broken bone ends. Use pressure points as needed if bone ends protrude from injury, use caution not to allow bone ends to re-enter wound.*
7) *Prepare splinting materials*
8) *Carefully splint individual injuries (or immobilize the whole body on a long spine board)*
9) *Reassess P.M.S.*
10) *Apply cold packs or ice to injury site to diminish pain & swelling.*
11) *Treat for shock*

LESSON 11
— PPT's

11-1

11-2



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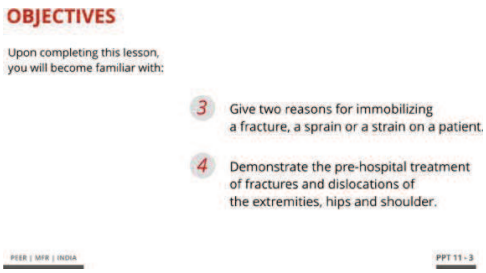

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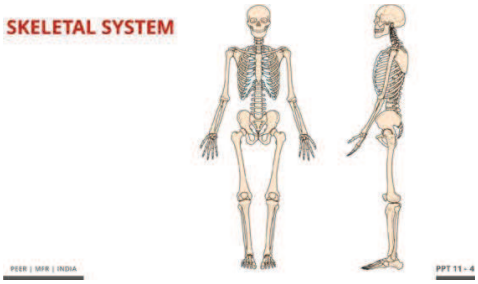

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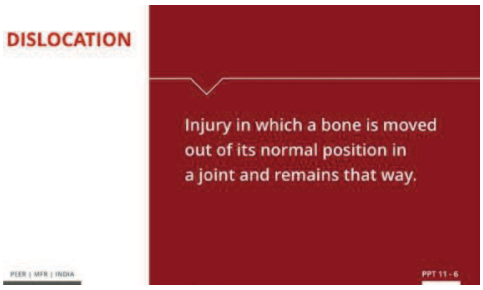

LESSON 11
— PPT's

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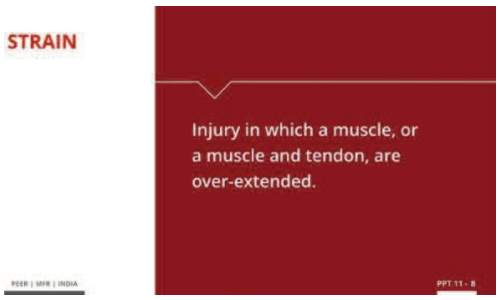

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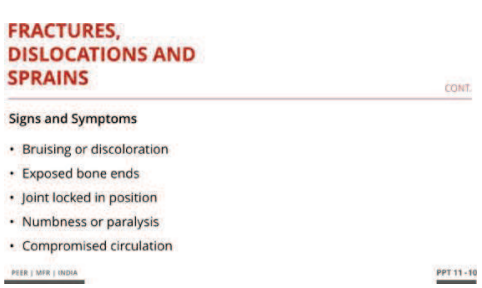

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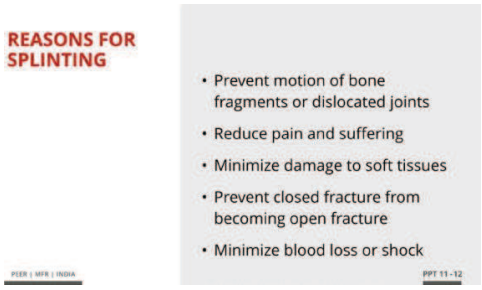
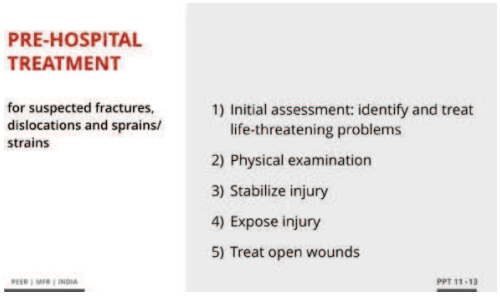


LESSON 11
— PPT's

11-13



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LESSON 11
— FLIP CHARTS

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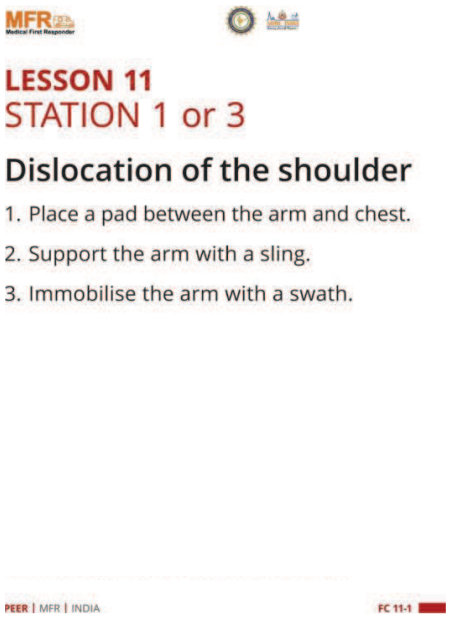

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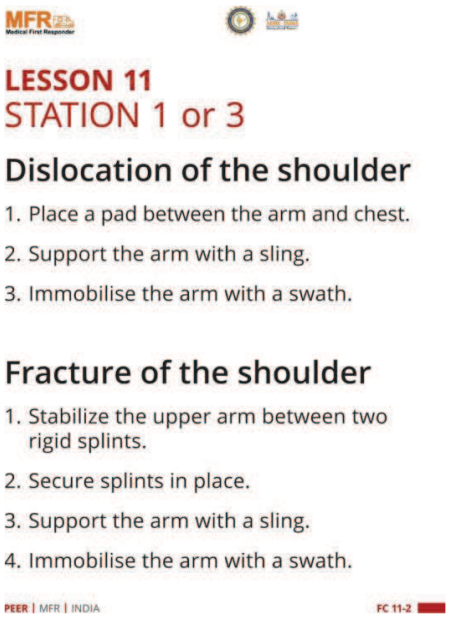

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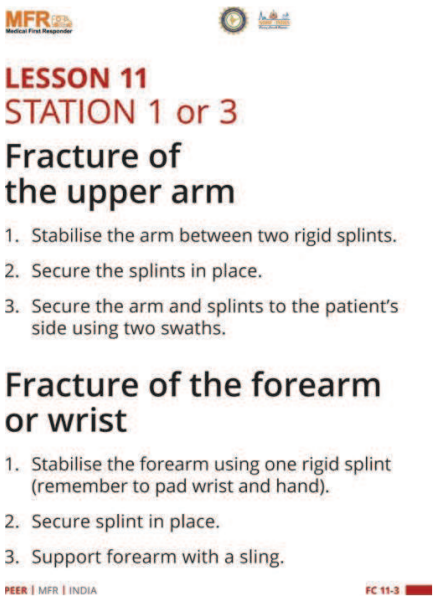

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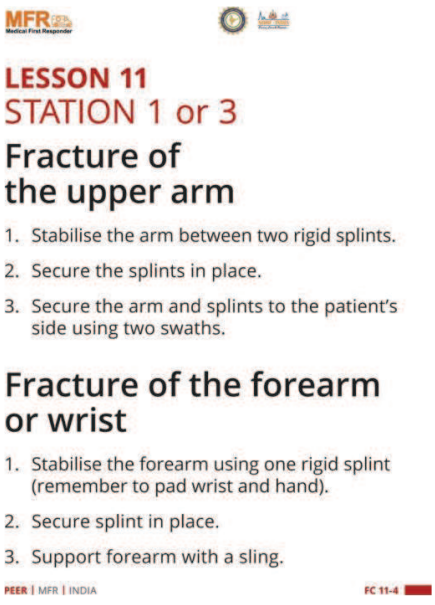

LESSON 11
— FLIP CHARTS

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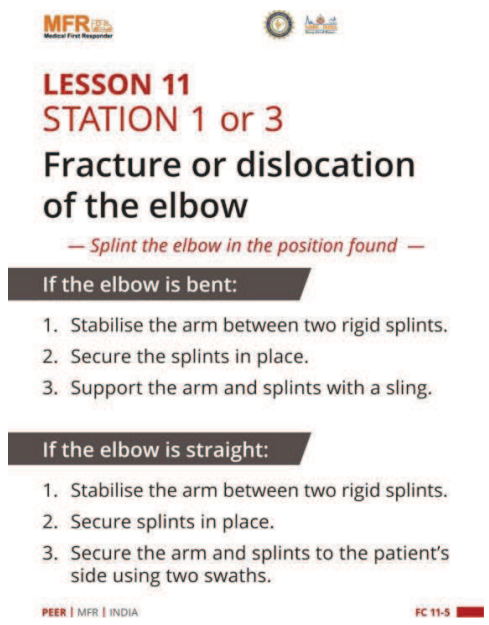

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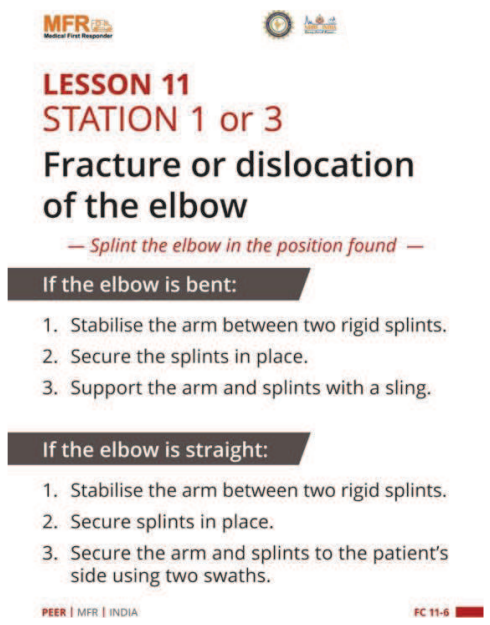

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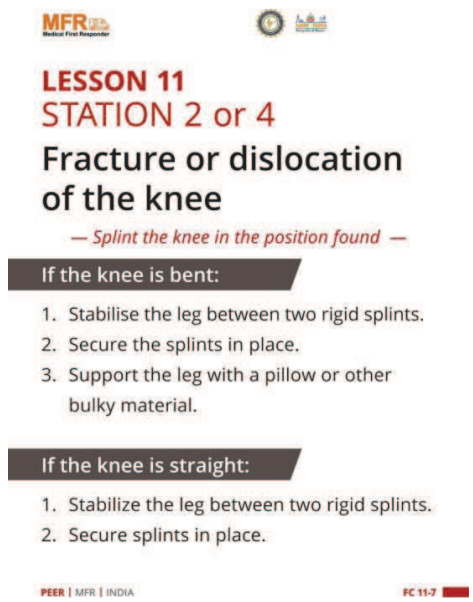

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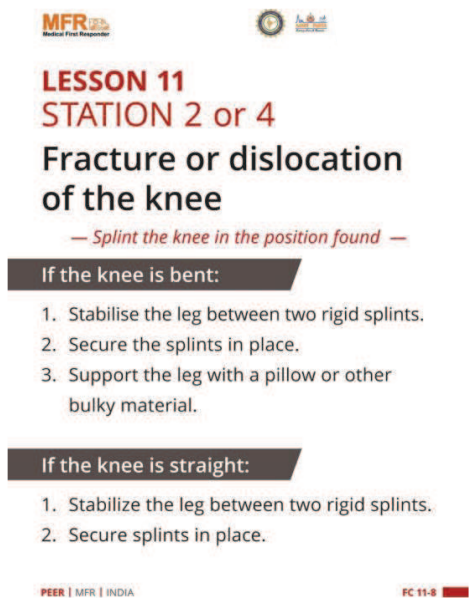

LESSON 11
— FLIP CHARTS

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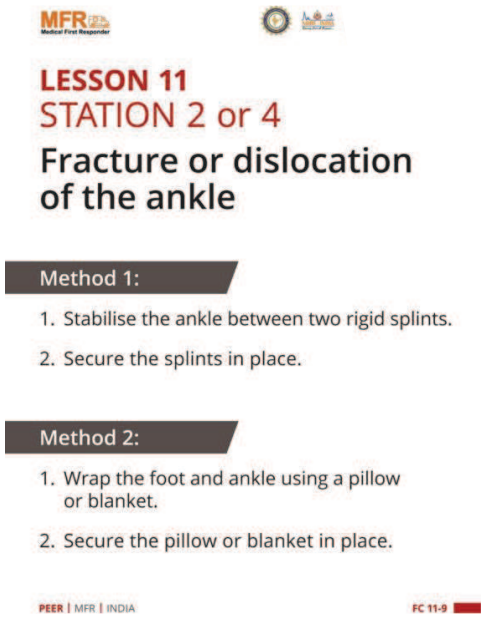

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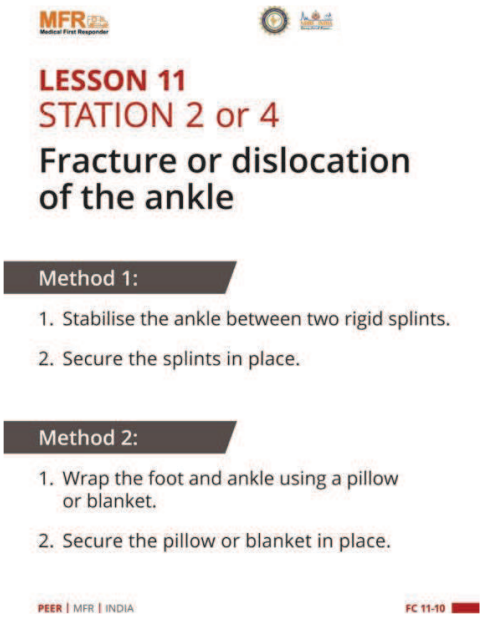

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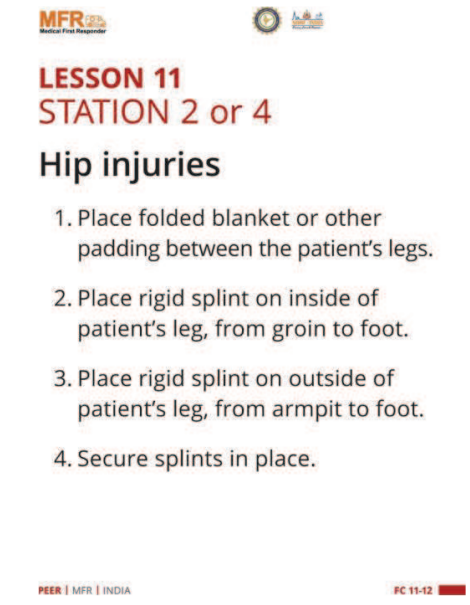

LESSON 11
— FLIP CHARTS

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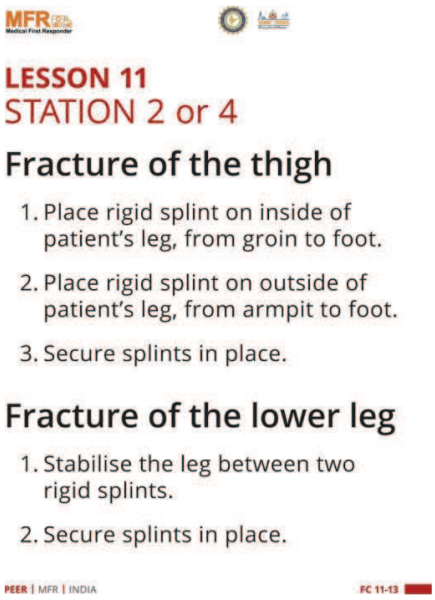

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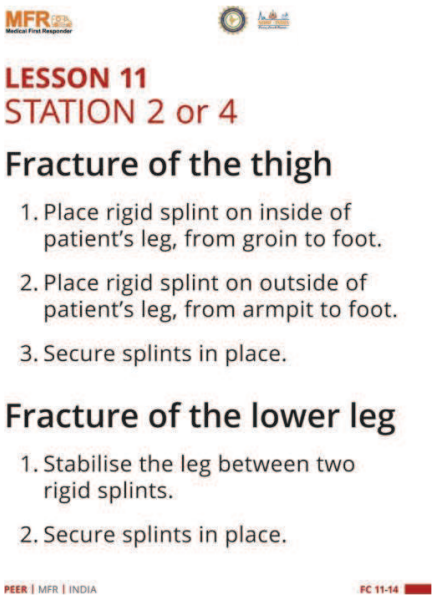


LESSON PLAN

12

INJURIES TO THE SKULL, SPINAL COLUMN AND CHEST

Duration • 08 Periods • (Lecture-02 Periods and Practical-06 Periods)

Materials:

- Powerpoint presentation (including slides)
- Multimedia projector and screen
- Computer
- 16 bandage rolls
- Dressings
- Adhesive tape
- Thick plastic
- 20 triangular bandages
- 4 scissors
- 16 bulky dressings
- 4 pillows
- 4 bedsheets
- 4 collars
- Gloves

LESSON OBJECTIVES

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

1. List five signs and symptoms of a skull fracture.
2. List six signs and symptoms of a spinal injury.
3. List five signs and symptoms of chest injuries.
4. Demonstrate the procedures for the evaluation and pre-hospital treatment of injuries to the skull and spine.
5. Demonstrate the procedures for the evaluation and pre-hospital treatment of rib fractures, flail chest and penetrating chest injuries.

	Visual Aids and Other Materials	Time Elapsed

1. INTRODUCTION

1) Introduce instructors and the co-instructors.
2) Introduce Presentation.
3) Present lesson objectives (ask participants to read aloud.)

▶ *PPT 12-1 to 12-3*

2. DEVELOPMENT

1

Review of the Axial Skeleton

▶ *PPT 12-4*

1.1 Bones of the Head

▶ *PPT 12-5*

The **skull** (cranium) has a number of broad, flat bones that form a hollow shell. The top (including the forehead), back and sides of the skull make up the cranium. It houses and protects the brain.

- **Cerebrospinal fluid (CSF)** is a water-like *cushion* that protects the brain and spinal cord from trauma.
- The cranial vault is quite strong in adults and provides effective protection. However, even without a skull fracture, the brain can be damaged by trauma.

1 Review of the Axial Skeleton (Cont.)

Visual Aids and Other Materials

Time Elapsed

1.2 Bones of the Face

- There are several small bones in the face. They give shape to the face and permit the jaw to move. These small bones are fused together except for the mandible (temporo mandibular joint, or TMJ) which allows the jaw to move.

1.3 Spinal Column

▶ *PPT 12-6*

The spinal column houses and protects the spinal cord. The spinal column is the central supportive bony structure of the body. It consists of 33 bones known as *vertebrae*. The spine is divided into five sections:

1) **Cervical** spine (the neck, consisting of 7 vertebrae)
2) **Thoracic** spine (the upper back, consisting of 12 vertebrae)
3) **Lumbar** spine (lower back, consisting of 5 vertebrae)
4) **Sacrum** (lower part of spine, consisting of 5 fused vertebrae)
5) **Coccyx** (tailbone, consisting of 4 fused vertebrae)

An injury to the spinal column can cause paralysis or death if it affects the cervical region.

1.4 Chest

▶ *PPT 12-7*

- **Bony structures:** The chest or rib cage includes the *ribs*, the thoracic *vertebrae* and the *sternum*. The ribs are attached at the back to the vertebrae. All but the bottom *two* ribs are not attached to the sternum.
- **Organs:** The thoracic cavity contains the *lungs*, the *heart* and the *major* blood vessels. Damage to the rib cage can cause injury to the vital organs.

2 Specific Injuries

Visual Aids and Other Materials

Time Elapsed

2.1 Skull Fractures

The primary function of the skull is to provide protection for the brain. The skull is not easily fractured. A skull fracture may be suspected with any significant trauma to the head.

A skull fracture may occur with an open or closed wound. With a skull fracture, the MFR should suspect the possibility of a brain injury. With any head injury, there is also concern for possible spine injury.

DANGER!

- Do not try to remove an object impaled in the skull – stabilise it with bulky dressings.
- Do not try to stop the flow of cerebrospinal fluid if the fluid is leaking from the ears or a head wound. Cover the opening loosely with sterile gauze dressing.

Signs and symptoms of skull fracture

- Altered mental status, ranging from confusion to unresponsiveness
- Pain or inflammation at the injury site
- Deep laceration or hematoma in the scalp or forehead
- Softness or depression of the skull
- Facial bruising
- Bruising behind the ears, or "Battle's Sign" ▶ *SL 12-1*
- Bruising around the eyes, or "racoon eyes" ▶ *SL 12-2*
- One or both eyes appear sunken
- Unequal pupil size ▶ *SL 12-3*
- Headache, disabling in severity or appearing suddenly
- Blood or cerebrospinal fluid leaking from the ears or nose ▶ *SL 12-4*
- Deterioration of vital signs
- Nausea and vomiting
- Abnormal posturing
- Seizure

2 Specific Injuries (Cont.)

Visual Aids and Other Materials

Time Elapsed

2.2 Pre-Hospital Treatment for skull fractures

Use universal precautions and secure the scene.

1) **Perform initial assessment.**
Treat life-threatening conditions. If brain injury is suspected, hyperventilate the patient at 25 rpm.

2) **Control bleeding.** Do not try to stop the draining of blood or cerebrospinal fluid from the nose and ears.

3) Suspect cervical injury or another type of injury to the spinal column. **Manually immobilise** the head and neck in neutral in-line position. Apply cervical immobilisation device.

4) **Administer oxygen** if needed.

5) **Cover and bandage** open wounds.

6) **Position the patient properly** and do not allow the patient to move or change positions. If the patient is not hypotensive, consider elevating head 30 degrees. **Caution:** Be alert for possible patient vomiting. Beware of cervical injuries.

7) **Assess level of consciousness.** Monitor vital signs.

2.3 Brain Injuries

<Consider all suspected head injuries to be serious.>

▶ *NOTE*

- **Open/penetrating:** An open brain injury is accompanied by a break in the skull, caused by a fracture or an impaled object, for example. This usually implies exposure of the cranial cavity.

- **Closed:** A closed brain injury does not involve a break in the skull although the skin may be broken; even so, the brain can be seriously injured.

▶ *SL 12-5*

Visual Aids and Other Materials

Time Elapsed

Signs and symptoms of brain injuries

- Vomiting
- Sickness
- Weakness
- Vision problems
- Headache
- Unconsciousness or decreased level of consciousness
- Posture change (decorticate and decerebrate)
- Altered breathing

Pre-hospital treatment for brain injuries is the same as those indicated for skull fractures.

2.4 Facial Fractures

The main danger of facial fractures is *the possibility of bone fragments and blood causing airway obstruction.* Always check for airway obstruction.

▶ *SL 12-6*

Signs and symptoms of facial fracture

- Blood in the airway
- Facial deformities
- Colour change below the eyes
- Inflammation of the jaw or limited motion
- Teeth that do not meet normally
- Pain or numbness in the face
- Loose or broken teeth
- Swelling
- Any indication of a severe blow to the face (contusions or bruising)

2 Specific Injuries (Cont.)

Visual Aids and Other Materials

Time Elapsed

Pre-hospital treatment for facial fracture

(The same as for soft tissue injuries.)
Use universal precautions and secure the scene.

1) Ensure open airway
2) Control bleeding
3) Bandage open wounds
4) Monitor vital signs
5) Treat for shock

2.5 Spinal Injuries

Signs and symptoms

▶ *SL 12-7*

- Numbness, tingling sensation in the arms or legs
- Paralysis of the arms or legs
- Pain during movement of the arms and legs
- Sensitivity or pain along the later part of the neck or the back
- Deformity of the head or neck
- Head injury or hematomas in the shoulders, back or the patient's sides
- Loss of bowel or bladder control
- Difficulty breathing with little or no chest movement
- The patient may be found supine with arms extended above the head (also known as posturing), which may indicate damage in the cervical region
- Priapism (persistent erection of the penis)

2 Specific Injuries (Cont.)

Visual Aids and Other Materials

Time Elapsed

Determining possible spinal injury

- **Conscious patient**
  - Ask what happened. Ask the patient how he/she is feeling. Ask the patient to move his/her hands or feet.
  - Observe for hematomas, lacerations and deformities.
  - Feel (palpate) for sensitive areas, deformities.

  Signs of spinal injury may not be apparent. However, that does **not** rule out spinal injury.

- **Unconscious patient**
  - Observe for cuts, hematomas, and deformities.
  - Feel for deformities and injuries.
  - Ask others: What happened and how?

Complications of spinal injury

- Respiratory arrest, caused by paralysis of the thoracic muscles. Breathing can be accomplished only by the diaphragm, and paralysis of the thoracic muscles can severely reduce or compromise breathing.
- Neurological injury can affect the diameter of blood vessels, producing shock (neurogenic shock).
- General paralysis

2 Specific Injuries (Cont.)

Visual Aids and Other Materials

Time Elapsed

Pre-hospital treatment for spinal injury

Use universal precautions and secure the scene.

1) Determine the mechanism of injury.

2) Provide **manual in-line neutral stabilization** of the head and neck upon first contact with the patient.

3) **Conduct initial assessment.** Consider any unconscious patient to be a trauma victim with possible neck or spinal injury until proven otherwise.

4) **Administer oxygen** per local protocol.

5) **Perform physical exam** and provide treatment.

6) **Maintain manual stabilisation** until patient is completely immobilised.

7) **Continually monitor vital signs** during patient transport.

▶ *SL 12-8 to 12-12*

Visual Aids and Other Materials

Time Elapsed

2.6 Chest Injuries

▶ *NOTE*

<Briefly review chest anatomy.>

Methods of Injury

- **Blunt trauma** – usually results in closed injury; chest cavity is not penetrated. Can be associated with severe injury.
- **Compression injury** is a form of blunt trauma in which the chest is rapidly compressed.
- **Penetrating injury** – open injury; chest cavity is penetrated.

Signs and symptoms of chest injury

- Tenderness/pain at the injury site
- Chest deformity, coughing blood
- Shallow breathing with possible crackling sensation near site
- Increased pain during breathing
- Patient's posture toward the side of the fracture or injury
- Extensive, visible bruising to the chest
- Grating or crepitus upon palpation
- Subcutaneous emphysema
- Distended neck veins
- Bloodshot eyes
- Cyanotic tongue and lips
- Swollen upper torso

2 Specific Injuries (Cont.)

Visual Aids and Other Materials

Time Elapsed

▶ Rib Fractures

Pre-hospital treatment for rib fractures

Use universal precautions, secure scene and alert EMS. **Your first priority is to ensure patient can breathe adequately.**

1) Apply a sling and swathe to hold the patient's arm against the injured side of the chest. Give the patient a pillow or blanket to hold against the ribs for support.
2) If patient is alert, allow him/her assume a comfortable position.

<Do not use any methods that fully encircle the chest.>

▶ *NOTE*

▶ Flail Chest

▶ *SL 12-13 to 12-14*

Flail chest is a closed chest injury causing the chest wall to become unstable, due to fractures of the sternum, cartilage connecting the ribs to the sternum or fractured ribs (the chest between the fractures becomes unstable).

Pre-hospital treatment for flail chest

Use universal precautions, secure the scene and alert EMS.

1) Locate the flailed section of the chest by carefully feeling the injured site.
2) Stabilize flail chest by applying a *pillow* or *bulky dressing*. You can also use a small object as a weight (less than 2 kg.)

▶ *SL 12-15*

3) Use adhesive tape to secure the bulky dressing. If no tape is available, use your hand to secure the injured site.

2 Specific Injuries (Cont.)

Visual Aids and Other Materials

Time Elapsed

▶ Penetrating Wounds

- Penetrating chest injuries are open chest wounds in which the chest wall is torn, typically by a foreign object. Look for possible exit wound (perforating injury).
- Chest injuries: A penetrating chest wound can prevent a patient from breathing adequately. These wounds are called *"sucking chest wounds"* because they produce a sucking sound every time the patient breathes. In this case, apply an *occlusive dressing*. This special type of dressing is used to form *an airtight seal*.

▶ *SL 12-16 to 12-17*

<SHOW OCCLUSIVE DRESSING (e.g., sheets of plastic)>

▶ *NOTE*

▶ Impaled Objects

▶ *SL 12-18 to 12-25*

As recommended in a previous lesson, an impaled object should always be immobilized in place, unless it is located in the patient's cheek, or if it interferes with airway management or CPR. It should be stabilized with bulky dressings and adhesive tape to secure the dressing in place.

▶ Injuries to the Heart and Lungs

<Ask participants for possible methods of injury.>

▶ *NOTE*

- A collapsed lung may be caused by *air escaping the lung* due to injury or by *blood accumulation* in the chest cavity.
- The blood in the cavity of the pericardium (the serous membrane that encloses the heart) can cause the heart to collapse.

<ALL THE ABOVE INJURIES ARE SERIOUS EMERGENCIES AND REQUIRE IMMEDIATE TRANSPORT.>

▶ *NOTE*

	Visual Aids and Other Materials	Time Elapsed

PRACTICAL EXERCISES

Working in groups of four and assisted by the instructors, the students will practice the handling of:

- Penetrating wounds and impaled object in the chest
- Rib fractures and flail chest
- Demonstration and practice of placing the cervical collar

REVIEW

1. Review lesson objectives.
2. Objectives 4 and 5 should be achieved in the practice.

EVALUATION

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

CLOSING

1. Allow for comments and suggestions.
2. Announce the following lesson and thank the participants.

MFR LESSON 12

PRACTICAL EXERCISE

Injuries to the Skull, Spinal Column and Chest

Station 1:
Treating penetrating and impaled chest injuries

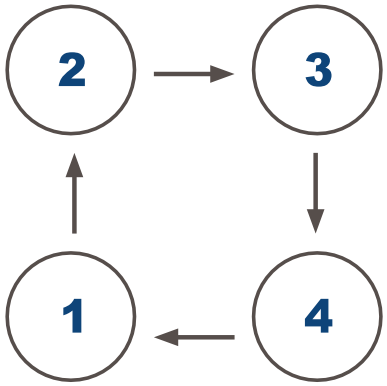
Station 2:
Treating rib fractures and flail chest injuries

Station 3:
Treatment of cervical spine injuries using a cervical collar

Station 4:

Treatment of cervical spine injuries using a backboard

Rotation type for this lesson:



Number of rotations:

4

Duration:

3 hours (45 minutes per station)

Allot sufficient time for each station. Set up participants in pairs. One will act as the patient and the other rescuer; then exchange places.

<NOTE: Briefly explain what is expected in each station from the participant, then allow practice to begin. The instructors in charge of each station will supervise the performance of participants.>

<Don't spend time covering material already given in class. Allow the participants to practice as much as possible.>

PRACTICAL EXERCISE

Injuries to the Skull, Spinal Column and Chest (Cont.)

Station 1:

Treating penetrating and impaled chest injuries

Materials:

- PPE for each participant
- 1 package of dressings or 24 sanitary towels
- 3 rolls of 1-inch tape
- 4 sheets of thick plastic measuring 30 cm. x 30 cm. (occlusive dressing)
- 3 pencils or a similar item to simulate an impaled object
- Instructor evaluation form (Skills Checklist)

In this station, participants will take turns playing the role of the patient and rescuer. Arrival protocols are only mentioned not used. Perform initial assessment and physical exam. The following procedures should be completed:

- Treatment of penetrating chest injury/sucking chest wound
- Treatment of impaled object chest injury

Station 2:

Treating rib fractures and flail chest injuries

Materials:

- PPE for each participant
- 12 triangular bandages
- 3 rolls of 2-inch tape
- 4 dressings swollen or enough simple dressings
- Instructor evaluation form (Skills Checklist)

In this station, participants will take turns playing the role of the patient and rescuer. Arrival protocols are only mentioned not used. Perform initial assessment and physical exam. The following procedures should be completed:

- Treatment of rib fracture
- Treatment of chest injury

PRACTICAL EXERCISE

Injuries to the Skull, Spinal Column and Chest (Cont.)

Station 3:

Treatment of cervical spine injuries using a cervical collar

Materials:

- PPE for each participant
- Sets of cervical collars
- Instructor evaluation form (Skills Checklist)

In this station, participants will take turns playing the role of the patient and rescuer. Arrival protocols are only mentioned verbally, not performed. Perform initial assessment and placement of cervical collar. The following are the steps to be taken:

1) Arrival at the scene (verbal)
2) Initial assessment (perform)
3) Administer oxygen (verbal)
4) Suspect spinal injury (verbal)
5) Placement of cervical collar (perform)
6) Secondary evaluation (verbal)
7) Dress any trauma (verbal)
8) Maintain patient in resting position (verbal)
9) Immobilize patient (verbal)
10) Prevent or treat for shock (verbal)
11) Monitor vital signs (verbal)

PRACTICAL EXERCISE

Injuries to the Skull, Spinal Column and Chest (Cont.)

Station 4:

Treatment of cervical spine injuries using a backboard

Materials:

- PPE for each participant
- 3 backboards
- 3 blanket rolls
- Instructor evaluation form (Skills Checklist)

In this station, participants will take turns playing the role of the patient and rescuer. Arrival protocols are only mentioned verbally, not performed. The following procedures should be completed:

<At this station, the participants will only place the patient on the backboard. Securing the patient to the backboard will be covered in Lesson 19.>

1) Place patient on backboard from a supine position.
2) Place patient on backboard from a prone position.

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.					
	Treat penetrating and sucking chest wound					
	Treat impaled object to the chest					
Station 2	Use PPE					
	Treat a rib fracture					
	Treat flail chest					
Station 3	Use PPE					
	Place cervical collar on a sitting patient					
	Place cervical collar on a supine patient					
Station 4	Use of PPE					
	Place patient on backboard from supine position					
	Place patient on backboard from prone position					
	Place patient on backboard from standing position					

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:

Comments _____

— INSTRUCTOR'S COPY

POST-TEST | LESSON 12

Injuries to the Skull, Spinal Column and Chest

1. List five signs and symptoms of a skull fracture.

- *Altered mental status, ranging from confusion to unresponsiveness*
- *Pain or inflammation in the place of the injury*
- *Deep cut laceration or hematoma in the scalp or forehead*
- *Softness or depression of the skull*
- *Facial bruising*
- *Bruising behind the ears, or "Battle's Sign"*
- *Bruising around the eyes, or "raccoon eyes"*
- *One or both eyes appear sunken*
- *Unequal pupil size, one eye sunken*
- *Headache, disabling in severity or appearing suddenly*
- *Blood or cerebrospinal fluid leaking from the ears or nose*
- *Deterioration of vital signs*
- *Nausea and vomiting*

2. List six signs and symptoms of injury to the spine.

- *Numbness, tingling sensation in the arms or legs*
- *Paralysis of the arms or legs*
- *Pain during movement of the arms and legs*
- *Sensitivity or pain along the posterior of the neck or the back*
- *Deformity, to the head or neck*
- *Head injury or hematomas in the shoulders, back or the patient's sides*
- *Loss of bowel or bladder control*
- *Difficulty breathing with little or no chest movement*
- *Position of the arms above the head (also known as posturing)*
- *The patient may be found on his back with their arms extended above the head, which can indicate damage in the cervical region*
- *Priapism (persistent erection of the penis)*

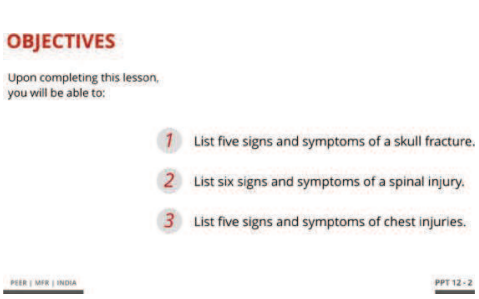
3. List five signs and symptoms of chest injuries.

- *Tenderness/pain at the injury site*
- *Chest deformity / coughing blood*
- *Shallow breathing with possible crackling sensation near site*
- *Increased pain during breathing*
- *Patient's posture toward the side of the fracture or injury when attempting to splint*

LESSON 12
— PPT's

12-1

12-2



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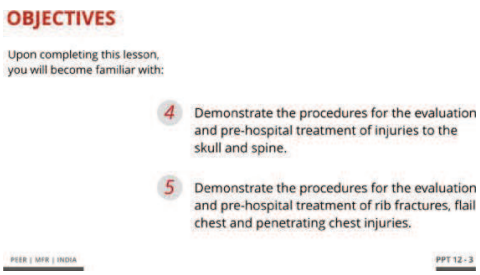

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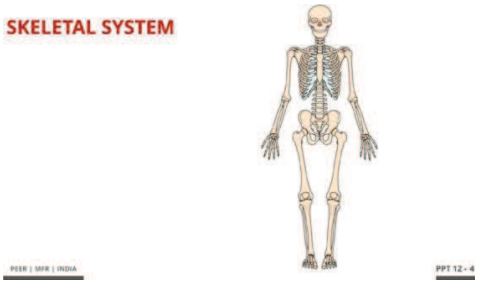

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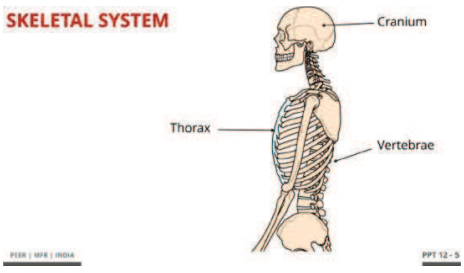

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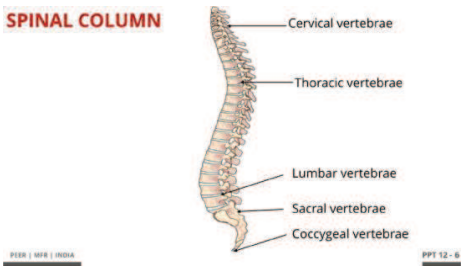
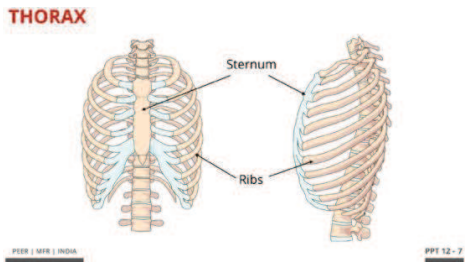


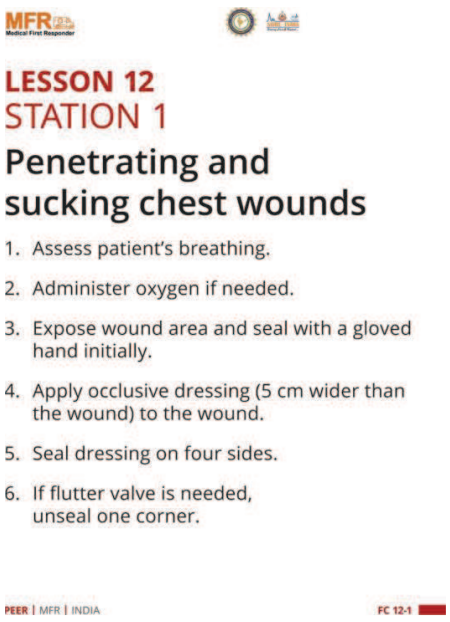
LESSON 12
— PPT's

12-7



LESSON 12
— FLIP CHARTS

FC12-1



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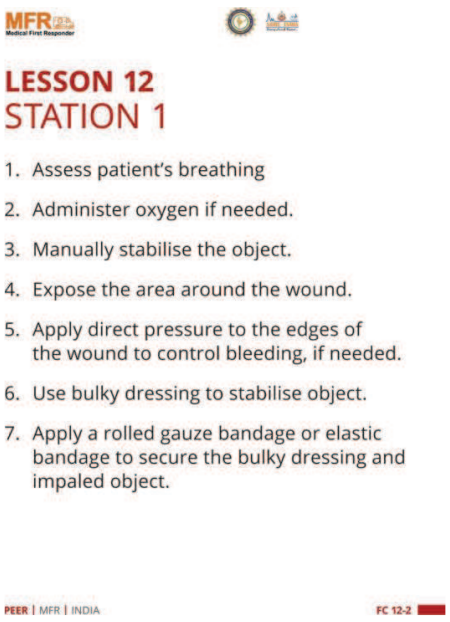

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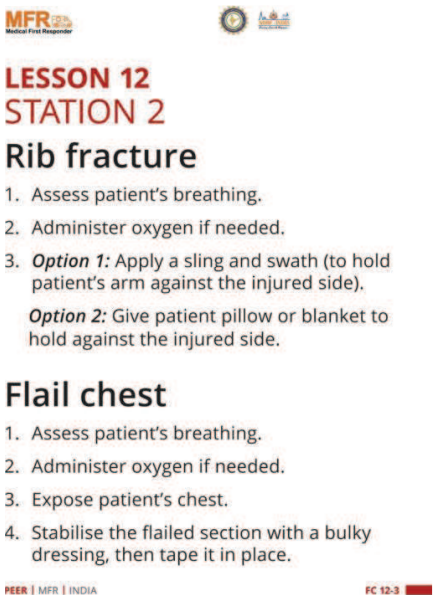

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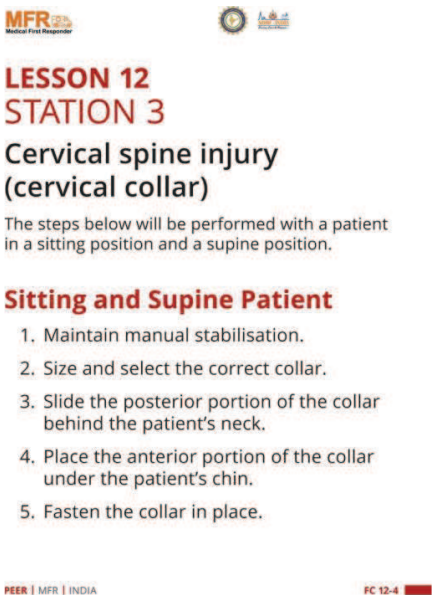
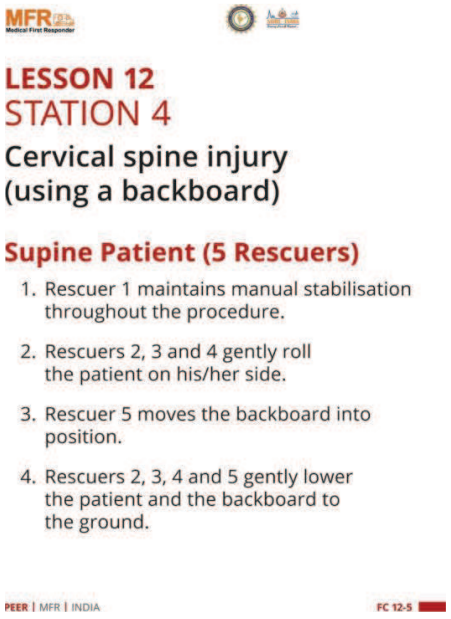
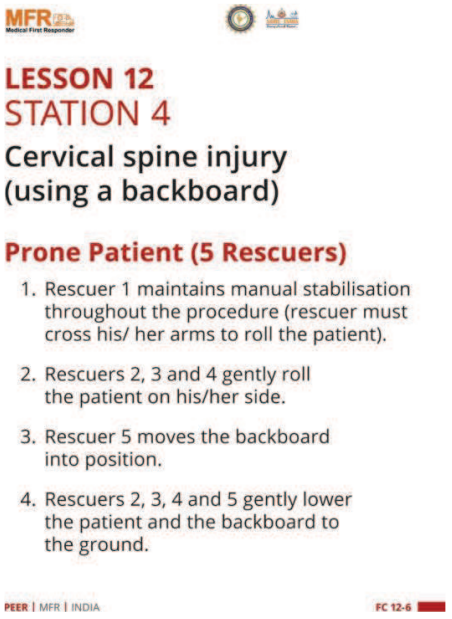


LESSON 12
— FLIP CHARTS

FC12-5



FC12-6



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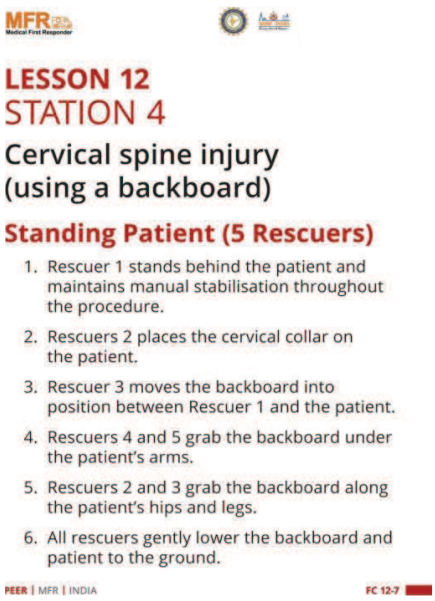


LESSON 12
— SLIDES

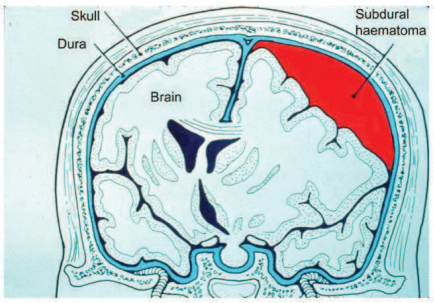
SL 12-1

SL 12-2

SL 12-3

SL 12-4

SL 12-5



SL 12-6

LESSON 12
— SLIDES

SL 12-7

PEER | MFR | INDIA SL 12 - 7

SL 12-8

PEER | MFR | INDIA SL 12 - 8

SL 12-9

PEER | MFR | INDIA SL 12 - 9

SL 12-10

PEER | MFR | INDIA SL 12 - 10

SL 12-11

PEER | MFR | INDIA SL 12 - 11

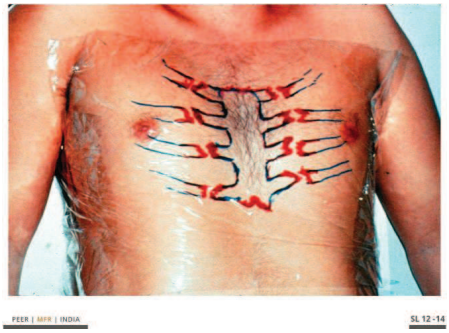
SL 12-12

PEER | MFR | INDIA SL 12 - 12

LESSON 12
— SLIDES

SL 12-13

SL 12-14



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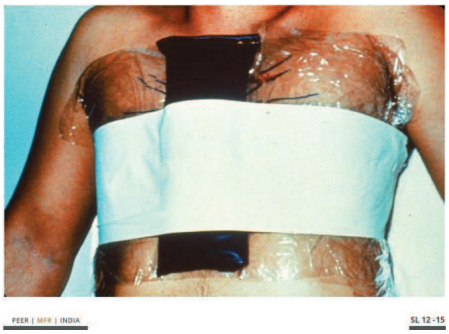
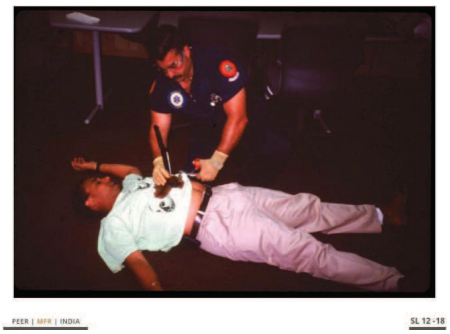


SL 12-16

SL 12-17

SL 12-18



LESSON 12
— SLIDES

SL 12-19

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SL 12-20

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SL 12-21

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SL 12-22

PEER | MFR | INDIA SL 12-22

SL 12-23

PEER | MFR | INDIA SL 12-23

SL 12-24

PEER | MFR | INDIA SL 12-24

LESSON 12
— SLIDES

SL 12-25

LESSON PLAN

13

BURNS AND ENVIRONMENTAL EMERGENCIES

Duration • **03 Periods** • **(Lecture-03 Periods)**

Materials:

- Powerpoint presentation
- Flipcharts
- Handout
- Multimedia projector and screen
- Computer

LESSON OBJECTIVES

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

1. Match the signs and symptoms for each of the three types of burns according to their depth.
2. Apply the “Rule of Nines” to determine the Total Body Surface Area (TBSA) burnt on a patient when given a specific part of the body.
3. List three steps for pre-hospital treatment of chemical burns.
4. List three steps for pre-hospital treatment of electrical burns.
5. List three signs and symptoms of heat cramps, heat exhaustion and heat stroke and list all pre-hospital treatment steps for each.
6. List four sign and symptoms of lightening and describe pre-hospital treatment.
7. List three signs and symptoms of both mild and severe hypothermia and list six steps for pre-hospital treatment.
8. List three signs and symptoms of frostbite and three steps for pre-hospital treatment.

Visual Aids and Other Materials

Time Elapsed

1. INTRODUCTION

1) Introduction of instructor and the co-instructors.
2) Introduce the lesson.
3) Present lesson objectives (have the participants read from WB).

▶ *PPT 13-1 to 13-4*

2. DEVELOPMENT

1 Burns

Definition: Injuries caused by exposure to excessive heat from thermal, chemical, electrical or radiation.

▶ *PPT 13-5*

<Review layers and functions of the skin.>

▶ *NOTE*

Burns can injure the skin, muscles, blood vessels, nerves and bones. The eyes, ears and the respiratory system can also be affected. Apart from the physical damage, the victim suffers psychologically and emotionally.

1

Burns (Cont.)

Visual Aids and Other Materials	Time Elapsed

1.1 Causes of Burns

1) **Thermal:** heat (fire, vapour and hot objects), and very cold (freezing or frozen objects)

2) **Chemical:** includes several caustics such as acids and alkalis

3) **Electrical:** electricity, such as house current or lighting

4) **Radiant:** ultraviolet rays (including sunlight) and radioactive agents.

1.2 Classification, Signs and Symptoms of Burns

▶ **Classification by depth** — ▶ *PPT 13-6*

Burns are classified by depth: superficial, partial thickness and full-thickness.

- **Superficial (first-degree) burns:** — ▶ *SL 13-1*
  These involve only the top layer of the skin. *There is a reddening of the skin and some pain and swelling of the area.*
- **Partial thickness (second-degree) burns:** — ▶ *SL 13-2*
  The superficial layer of the skin is burned through and the second layer is damaged This type of burn is painful. There will be swelling and blistering, skin may appear white or red, may be moist and mottled.
- **Full thickness (third-degree) burns:** — ▶ *SL 13-3*
  All the layers of the skin are burnt, including the fatty layer, muscles, blood vessels and nerves, and in some cases the bone. This type is the most serious of all burns and is characterized by the following:
  - Skin is usually dry, hard, pale or white but it can be brown or scorched.
  - May be accompanied by a loss of the sensitivity in the area affected due to destruction of nerves. Possible pain around periphery of burn area.
  - First-degree or second-degree can be very painful burns, but with third-degree burns most of the nerve endings have been damaged. Skin may feel hard to the touch.

1

Burns (Cont.)

Visual Aids and Other Materials

Time Elapsed

- **Extent of Body Surface Burned**

  The **"Rule of Nines"** is a standardised way of estimating the amount of body surface area (BSA) burned: The body is divided into regions for estimating body surface areas as follows:

▶ *SL 13-4*

THE RULE OF NINES FOR ADULTS AND CHILDREN

EXTENT OF BURNS

▶ *FC 13-1*
▶ *FC 13-2*
▶ *PPT 13-7*

	Adult	Child
Head and Neck	9%	18%
Upper extremities	9% each	9% each
Anterior Trunk	18%	18%
Posterior Trunk	18%	18%
Genital	1%	incl. in anterior trunk
Lower extremities	18% each	14% each
TOTAL	**100%**	**100%**

▶ *NOTE*

<Not necessary to spend too much time determining a burn's exact BSA. Slight differences will not affect treatment.>

1

Burns (Cont.)

Visual Aids and Other Materials

► *FC 13-3*

Time Elapsed

1.3 Burn Severity

The two primary factors considered in rating burn severity are **body surface area (BSA)** and **location**. Burn severity can be rated as follows:

► **Minor Burns**

- Full-thickness burns of less than 2% BSA, excluding face, hands, feet, genitalia, or respiratory tract
- Partial thickness burns of less than 15% BSA.
- Superficial burns of 50% BSA or less.

► **Moderate Burns**

- Full-thickness burns of 2% to 10% BSA, excluding face, hands, feet, genitalia, or respiratory tract
- Partial thickness burns of 15% to 30% BSA.
- Superficial burns over 50% BSA

► **Critical Burns**

- All burns complicated by injuries of the respiratory tract, other soft-tissue injuries, and injuries of the bones.
- Partial-or full-thickness burns involving the face, hands, feet, genitalia, or respiratory tract.
- Full-thickness burns of more than 10% BSA.
- Partial-thickness burns of more than 30% BSA.
- Burns complicated by musculoskeletal injuries.
- Circumferential burns.

1

Burns (Cont.)

Visual Aids and Other Materials

Time Elapsed

- **Additional Considerations:**
  - **Source of the burn.**
    - **Electrical** burns can cause small surface injury while causing severe internal damage.
    - **Chemical** burns are of special concern, as chemicals may remain on the skin and continue burning for an extended period and/or enter the bloodstream.
  - **Body regions burned**
    - Face
    - Hands and feet
    - Groin, genitalia, buttocks and inner thighs
    - Burns around joints
  - **Other complicating factors:**
    - Patient's age.
    - Patient's pre-existing illnesses.

NOTE

<Burns which by the above classification are moderate, should be considered critical in a patient less than 5 or more than 55 years of age.>

Visual Aids and Other Materials

Time Elapsed

1.4 Pre-hospital Treatment for Burns

▶ *SL 13-5*

Use universal precautions, secure the scene and alert EMS.

1) Stop the burning process. Run cold water over the scald burns. Flush away chemicals with water for ***20*** minutes or more.

2) Remove any smoldering clothing and jewelry. If you meet resistance or if you see pieces melted into the skin, cut around the area. Do not try to remove them.

3) Perform initial assessment.

▶ *NOTE*

<Most victims die from blocked airway, inhaled toxins or other trauma rather than from the burn itself. Treat life-threatening injuries.>

4) Administer oxygen per local protocol. Provide ventilation if needed.

5) Determine the severity of burns, using the rule of nines.

6) Cover the burns. Use dry sterile dressings or disposable sterile burn sheet. Do not use grease or fat, ointment, lotion, antiseptic, or ice on the burns. Do not break any blisters. If a burn involves the eye, be sure to cover both eyes after treating. Fingers with second- or third-degree burns require dressing each finger individually.

7) Keep the patient warm and treat for shock.

Visual Aids and Other Materials

Time Elapsed

1.5 Pre-hospital Treatment for Chemical Burns

▶ *NOTE*

<Rapid treatment is essential. Below are general guidelines only.>

CAUTION:
If patient is contaminated, wash off the person from a distance to avoid exposing yourself to the chemicals.

Use universal precautions, secure the scene, and alert EMS.

1) Brush off dry chemicals, such as lime powder, before flushing with water.
2) Rinse the area with water for at least 20 minutes or more. Remove and set aside clothes and jewelry while the patient is being washed off.
3) Apply a sterile dressing to the affected area.
4) Treat for shock.

1.6 Pre-hospital Treatment for Chemical Burns to the Eyes

▶ *SL 13-6 To SL 13-16*

Rinse the eyes immediately with water for at least 20 minutes. Maintain a flow of water on the affected eye from a faucet (low pressure), bottle, glass or other source. Keep the patient's eyelid(s) open.

1

Burns (Cont.)

Visual Aids and Other Materials

Time Elapsed

1.7 Pre-hospital Treatment for Electrical Burns

The more serious problems related to electrical burns are respiratory and/or cardiac arrest, damage to the nervous system and injury to internal organs. Follow local protocols. Use universal precautions, secure the scene and alert EMS.

► *SL 13-17*

Prolonged CPR should be performed on electrical injury victims as they can remain viable for a longer period than with other types of injuries.

Care for electrical burns the same as any other type of burn, also using the following specific guidelines for electrical burns.

1) **Perform initial assessment.**
The electrical current passing through the body often causes cardiac arrest. Partial airway obstruction can also be present due to inflammation of airway tissues.

2) **Evaluate burns and look for at least two burn areas:**
One will be in the place where the patient made contact with the energy source (often the hand). The other will be where the patient made contact to ground, where the electricity exited the body (often a foot or a hand).

► *SL 13-18*

3) **Apply a dry, sterile dressing to the burns.**

4) **Treat for shock.**

Visual Aids and Other Materials

Time Elapsed

1.8 Inhalation Injury

This type of injury occurs when a patient inhales heated air, smoke and/or toxic products. Symptoms for these injuries may appear mild initially, then become more severe.

Signs and symptoms of inhalation injury

- Singed nasal hair ▶ *PPT 13-8*
- Burns to the face
- Specks of soot in the sputum
- Sooty or smoky smell on the breath.
- Respiratory distress ▶ *PPT 13-9*
- Hoarseness, cough, or difficulty speaking
- Restricted chest movement
- Cyanosis

Pre-hospital treatment for inhalation injury

1) Administer oxygen per local protocol.
2) Monitor patient's airway and breathing.
3) Be prepared to ventilate.

2 Environmental Emergencies

2.1 Heat Exposure

Visual Aids and Other Materials

Time Elapsed

Exposure to excessive heat can produce serious health conditions. There are three common emergencies brought about by exposure to excessive heat:

- **Heat Cramps**
- **Heat Exhaustion**
- **Heat Stroke**

- **Heat Cramps**
  Heat cramps consist of pains and muscle spasms that occur when the body loses a large quantity of *salt* through excessive sweating.

Signs and symptoms of heat cramps

▶ *PPT 13-10*

- Severe muscle cramps, usually in the legs and abdomen.
- Exhaustion
- Nausea
- Periods of fainting

Pre-hospital treatment for heat cramps

1) Move the patient to a cool area.
2) Give the patient water. The muscle cramp should be alleviated after drinking water.

The patient needs the water more than the salt – do not delay giving water to look for salt. Commercial electrolytes or oral rehydration solution (ORS) can also be used.

2 Environmental Emergencies (Cont.)

Visual Aids and Other Materials

Time Elapsed

▶ Heat Exhaustion

Heat exhaustion can occur when a person in poor physical condition exerts himself or herself during physical activity in a very hot environment, causing blood flow to be affected.

<Point out this risk in firefighting.>

▶ *NOTE*

Signs and symptoms of heat exhaustion

▶ *PPT 13-11*

- Rapid, shallow breathing
- Weakpulse
- Cold, clammy, pale skin and mucous membranes, with a lot of sweating
- Weakness
- Dizziness, sometimes leading to fainting

Pre-hospital treatment for heat exhaustion

1) Move the patient to a cool place to rest.
2) Remove or loosen clothing as necessary to cool the patient without causing chills.
3) Place the patient in a supine position with legs elevated 20 to 30 cm.
4) Administer oxygen per local protocol.
5) Give water, but not to an unconscious patient.

2 Environmental Emergencies (Cont.)

Visual Aids and Other Materials

Time Elapsed

▸ Heat Stroke

Heat stroke is a very serious life-threatening condition. The body becomes overheated and, in many cases, the patient stops sweating. If left untreated, brain cells will begin to die.

Signs and symptoms

▶ *PPT 13-12*

- Deep, rapid breathing
- Rapid, strong pulse followed by a rapid, weak pulse
- Dry, hot skin, sometimes red
- Dilated pupils
- Loss of consciousness
- Convulsions or muscular tremors

Pre-hospital treatment for heat stroke

Use universal precautions, secure the safety, and alert EMS.

▶ *SL 13-19 to 13-21*

1) Cool the patient quickly in any way possible. Move the patient away from the source of heat. Remove his or her garments and wrap the patient with wet sheets. Pour cold water on the sheets. This should normalize the patient's core temperature and help prevent brain cells from dying.
2) Place cold bags or ice packs below each armpit, behind the knees and around the ankles, and one on each side of the neck.
3) Look for a large container or bathtub and submerge the patient in cold water up to the neck. Use ice to cool the water.

Visual Aids and Other Materials

Time Elapsed

HEAT EMERGENCY COMPARISON CHART

	Heat Cramps	Heat Exhaustion	Heat Stroke
Muscle cramps	YES	NO	NO
Sickness	YES	YES	YES
Breathing	Varies	Quick & Superficial	Deep initially, later superficial
Pulse	Varies	Weak	Rapid & Strong
Skin	No change	Cool, clammy & pale	Dry, red & hot
Loss of consciousness	Rarely	Sometimes	Frequently

2.2 Lightening

Lightening is weather related disaster associated with thunderstorms.Lightening occurs due to the electrically charged regions in a cloud which is called intra cloud lightening(IC)or between cloud to cloud (CC Lightening), or between a cloud and the ground (CG lightening).

The charged region in the atmosphere temporarily equalizethemselves through this discharge referred to as a flash.A lightening flash becomes a strike if it involves an object on the ground.The flow of electric charges can affect any electrically conductive body. Living beings coming in contact with lightening, either directly or indirectly through electrical conductors ,can be affected , which may lead to severe burns or even death.

2 Environmental Emergencies (Cont.)

Visual Aids and Other Materials	Time Elapsed

Lightning can produce a wide spectrum of peripheral and central neurologic injuries. The current can produce brain hemorrhages, edema, and small-vessel and neuronal injury. Hypoxic encephalopathy can result from cardiac arrest. Victims are most likely to die of lightning injury if they experience immediate respiratory or cardiac arrest and no treatment is provided.

Patients who do not suffer respiratory or cardiac arrest and those who respond to immediate treatment have an excellent chance of recovery.

Signs and symptoms

▶ *PPT 13-13*

- Loss of conscience,
- Loss of circulation or respiration
- Disorientation
- Superficial burns

Pre-hospital treatment for lightening

Victims with respiratory arrest may require only ventilation and oxygenation to avoid secondary hypoxic cardiac arrest. For victims in cardiac arrest, treatment should be early, aggressive, and persistent. Resuscitative attempts may have higher success rates in lightning victims than in patients with cardiac arrest from other causes, and efforts may be effective even when the interval before the resuscitative attempt is prolonged.

- Move the patient in a safe area
- Check CAB, Provide CPR if needed
- Provide artificial ventilation if needed
- Finally provide PHT for other injuries.

Visual Aids and Other Materials

Time Elapsed

2.3 Cold Emergencies

Exposure to excessive cold can cause two kinds of emergencies:

▶ SL 13-21

- ▶ **Hypothermia**
- ▶ **Frostbite or local cold injuries**

▶ Hypothermia

When cooling affects the entire body, this causes a condition known as hypothermia, or generalized cooling. Hypothermia can develop in temperatures well above freezing.

Signs and symptoms of mild hypothermia

▶ PPT 13-14

- Chills
- Drowsiness
- Rapid breathing, slow pulse
- Loss of vision
- Sluggish pupils
- Uncontrollable shivering

Signs and symptoms of severe hypothermia

▶ PPT 13-15

- Extremely slow breathing rate
- Extremely slow pulse rate
- Unresponsiveness
- Fixed and dilated pupils
- Rigid extremities
- Absence of shivering

2 Environmental Emergencies (Cont.)

Visual Aids and Other Materials	Time Elapsed

Pre-hospital treatment for hypothermia

Handle patient very gently and offer comfort and reassurance. Use universal precautions, secure the scene, and alert EMS.

1) Conduct initial assessment and physical exam.
2) Remove the patient from the cold environment.
3) Maintain open airway and administer oxygen per local protocol.
4) Remove any wet clothing and cover patient with a blanket. Keep the patient dry.
5) Do not give the patient anything to eat or drink (including hot coffee, tea or alcohol). These substances may affect blood vessels and worsen the patient's condition.
6) Constantly assess vital signs.

2 Environmental Emergencies (Cont.)

Visual Aids and Other Materials

Time Elapsed

▶ Frostbite or Local Cold Injuries

This type of injury consists of the freezing or near-freezing of a body part. Usually the toes, fingers, face, nose, and ears are at most risk. Onset is slow, but can occur quickly under high- wind conditions.

Signs and symptoms of frostbite and local cold injuries

- Loss of sensation to the affected area.
- Affected area of skin becomes white and waxen. Dark skin will turn pale. This color change can be very quick.
- Sometimes the area becomes swollen, blistered, and white.

Never rub or massage the affected area of a local cold injury. Ice crystals under the skin could damage the fragile capillaries and tissues, making the injury worse.

Pre-hospital treatment for frostbite and local cold injuries

If you suspect hypothermia, treat for hypothermia before treating for frostbite (**"life before limb"**). Use universal precautions, secure the scene and alert EMS .

1) Remove the patient from the cold environment. Do not allow the patient to walk on a frozen limb.
2) Protect the frozen area from further injury and re-freezing. For an injured extremity, stabilize.
3) Dry the affected area and apply a clean bandage. Place dressings between the fingers if they are affected. If superficial, cover and keep warm. If deep, apply dry, sterile dressings.

If transport will be delayed, consider re-warming the affected area.

<Do not allow the patient to risk freezing any part of the body again.>

▶ *NOTE*

2 Environmental Emergencies (Cont.)

Visual Aids and Other Materials

Time Elapsed

▶ **Late or Deep-cold Injury**

Later stages of frostbite are referred to as late or deep-cold injury. In this condition, the skin may appear to be waxy and may be firm to the touch. As freezing continues, it becomes mottled and blotchy. Finally, the area becomes swollen, blistered and white. This type of injury can appear similar to partial thickness (second-degree) burns.

Signs and symptoms of late or deep-cold injury

- Blotches in the skin (spotted). White color appears first, then greyish yellow and finally greyish blue.
- The surface of the skin will feel frozen in the affected area and the layers of skin below the surface will feel hard to the touch.

Pre-hospital treatment for late or deep-cold injury

Use universal precautions, secure the scene and alert EMS. Provide the same treatment as for frostbite; however, never re-warm an area with deep-cold injury. Follow local protocol.

Visual Aids and Other Materials

Time Elapsed

REVIEW

1) Match the signs and symptoms for each of the three types of burns according to their depth.
2) Apply the “Rule of Nines” to determine the Total Body Surface Area (TBSA) burnt on a patient when given a specific part of the body.
3) List three steps for pre-hospital treatment of chemical burns.
4) List three steps for pre-hospital treatment of electrical burns.
5) List three signs and symptoms of heat cramps, heat exhaustion and heat stroke and describe pre-hospital treatment for each.
6) List four sign and symptoms of lightening and describe pre-hospital treatment.
7) List three signs and symptoms of hypothermia and frostbite, and describe pre-hospital treatment of each.

EVALUATION

1) Answer the evaluation questions.
   Give 2 minutes to complete it.
2) Verify the achievement of objectives.

CLOSING

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

— INSTRUCTOR'S COPY

POST-TEST | LESSON 13

Burns and Environmental Injuries

1. Fill in the correct type of burn to match the signs and symptoms described:

Partial thickness : Burns displaying redness and blisters; burns to the epidermis and the dermis.

Full thickness : Burns that involve the muscle, skin and bone.

Superficial : Burns causing redness and pain; only the epidermis is affected.

2. You are assisting a patient that has been burned by hot oil. The patient presents with burns that cover the anterior trunk as well as the anterior part of the arm and forearm. Using the Rule of Nines, estimate the TBSA.

22.5%

3. List four steps for pre-hospital treatment of <u>chemical burns</u>.

1) *Brush off dry chemicals, such as lime powder, before flushing with water.*
2) *Rinse the area with water for at least 20 minutes or more. Remove and set aside clothes and jewelry while the patient is being washed off.*
3) *Apply a sterile dressing to the affected area.*
4) *Treat for shock.*

4. List four steps for pre-hospital treatment of <u>electrical burns</u>.

1) *Check pulse and breathing, including airway obstruction.*
2) *Evaluate burns – look for contact wound and exit wound.*
3) *Apply a dry, sterile dressing to the burns.*
4) *Treat for shock.*

— INSTRUCTOR'S COPY

POST-TEST | LESSON 13

Burns and Environmental Injuries (Cont.)

5. List three signs and symptoms of heat cramps and describe pre-hospital treatment.

Signs and symptoms

- *Severe muscle cramps, usually in the legs and abdomen.*
- *Exhaustion*
- *Nausea*
- *Periods of fainting*

Pre-hospital treatment

1) *Move the patient to a cool area.*
2) *Give the patient water.*

6. List three signs and symptoms of heat exhaustion and list five steps for pre-hospital treatment.

Signs and symptoms

- *Rapid, shallow breathing*
- *Weak pulse*
- *Cold, clammy, pale skin and mucous membranes, with a lot of sweating*
- *Weakness*
- *Dizziness, sometimes leading to fainting*

Pre-hospital treatment

1) *Move the patient to a cool place to rest.*
2) *Remove or loosen clothing as necessary to cool the patient without causing chills.*
3) *Place the patient in a supine position with legs elevated 20 to 30 cm.*
4) *Administer oxygen per local protocol.*
5) *Give water, but not to an unconscious patient.*

POST-TEST | LESSON 13

Burns and Environmental Injuries (Cont.)

7. List three signs and symptoms of heat stroke describe pre-hospital treatment.

Signs and symptoms

- *Deep, rapid breathing*
- *Rapid, strong pulse followed by a rapid, weak pulse*
- *Dry, hot skin, sometimes red*
- *Dilated pupils*
- *Loss of consciousness*
- *Convulsions or muscular tremors*

Pre-hospital treatment

1) *Cool the patient quickly in any way possible. Remove the patient from the source of heat. Remove his or her garments and wrap the patient with wet sheets. Pour cold water on the sheets.*
2) *Place cold bags or ice packs below each armpit, behind the knees and around the ankles, and one on each side of the neck.*
3) *Look for a large container or bathtub and submerge the patient in cold water up to the neck. Use ice to cool the water.*

8. List three signs and symptoms of both mild and severe hypothermia, and list six steps for pre-hospital treatment.

Signs and symptoms of mild hypothermia

- *Chills*
- *Drowsiness*
- *Rapid breathing, slow pulse*
- *Loss of vision*
- *Sluggish pupils*
- *Uncontrollable shivering*

Signs and symptoms of severe hypothermia

- *Extremely slow breathing rate*
- *Extremely slow pulse rate*
- *Unresponsiveness*
- *Fixed and dilated pupils*
- *Rigid extremities*
- *Absence of shivering*

POST-TEST | LESSON 13

Burns and Environmental Injuries (Cont.)

8. List three signs and symptoms of both mild and severe hypothermia, and list six steps for pre-hospital treatment. (Cont.)

Pre-hospital treatment

1) *Conduct initial assessment and physical exam.*
2) *Remove the patient from the cold environment.*
3) *Maintain open airway and administer oxygen per local protocol.*
4) *Remove any wet clothing and cover patient with a blanket. Keep the patient dry.*
5) *If the patient is alert, offer warm liquids (non-stimulant) slowly.*
6) *Constantly assess vital signs.*

9. List three signs and symptoms of frostbite and list three steps for pre-hospital treatment.

Signs and symptoms

- *Loss of sensation to the affected area.*
- *The affected area of skin becomes white and waxen. Dark skin will turn pale. This colour change can be very quick.*
- *Sometimes the area becomes swollen, blistered, and white.*

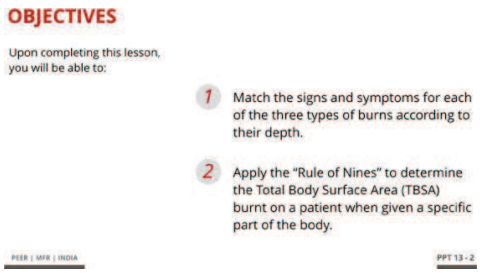
Pre-hospital treatment

1) *Remove the patient from the cold environment. Do not allow the patient to walk on a frozen limb.*
2) *Protect the frozen area further injury and re-freezing. For an injured extremity, stabilise.*
3) *Dry the affected area and apply a clean bandage. Place dressings between the fin gers if they are affected. If superficial, cover and keep warm. If deep, apply dry, sterile dressings.*

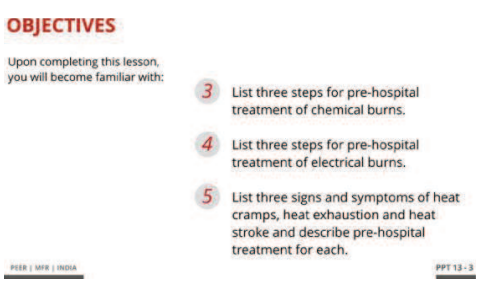
LESSON 13
— PPT's

13-1

13-2



13-3



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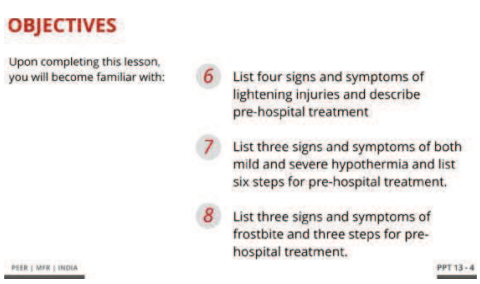

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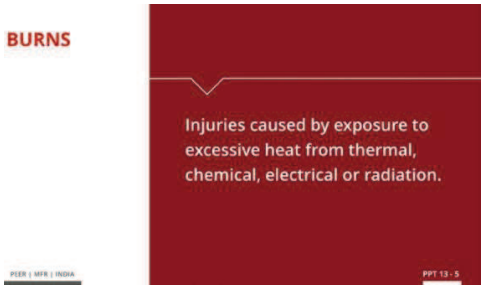

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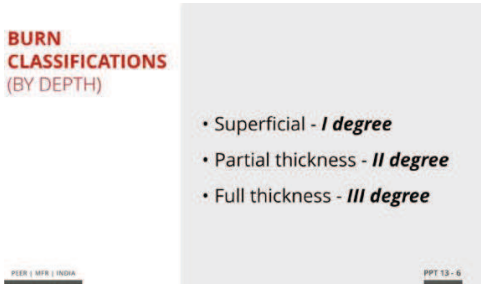

LESSON 13
— PPT's

13-7

RULE OF NINES (% BODY SURFACE AREA)

EXTENT OF BURNS		
	Adult	Child
Head and Neck	9%	18%
Upper extremities	9% each	9% each
Anterior Trunk	18%	18%
Posterior Trunk	18%	18%
Genital	1%	incl. in anterior trunk
Lower extremities	18% each	14% each
TOTAL	100%	100%

PEER | MFR | INDIA

PPT 13 - 7

13-8

INHALATION INJURY

Signs and Symptoms

- Singed nasal hair
- Burns to the face
- Specks of soot in the sputum
- Sooty or smoky smell on the breath
- Respiratory distress

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PPT 13 - 8

13-9

INHALATION INJURY

Signs and Symptoms CONT.

- Hoarseness, cough, or difficulty speaking
- Restricted chest movement
- Cyanosis

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PPT 13 - 9

13-10

HEAT CRAMPS

Signs and Symptoms

- Severe muscle cramps
- Exhaustion
- Nausea
- Periods of fainting

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PPT 13 - 10

13-11

HEAT EXHAUSTION

Signs and Symptoms

- Rapid, shallow breathing
- Weak pulse
- Cold, clammy and pale skin
- Weakness
- Dizziness

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PPT 13 - 11

13-12

HEAT STROKE

Signs and Symptoms

- Deep, rapid breathing
- Rapid pulse fluctuating in strength
- Dry, hot skin
- Dilated pupils
- Loss of consciousness
- Convulsions or muscular tremors

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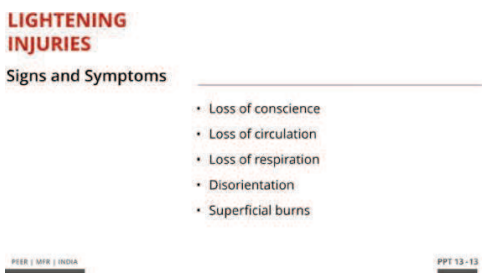
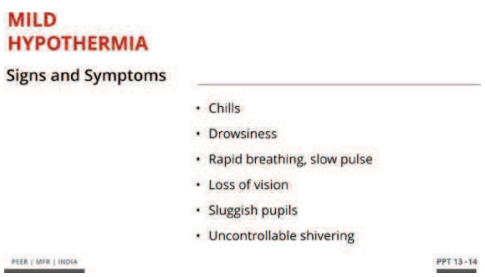
PPT 13 - 12

LESSON 13
— PPT's

13-13



13-14



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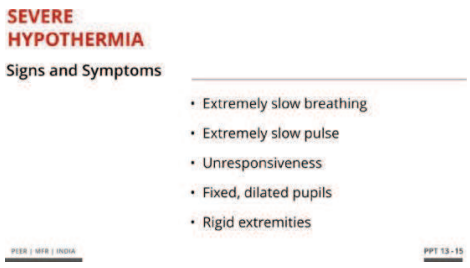
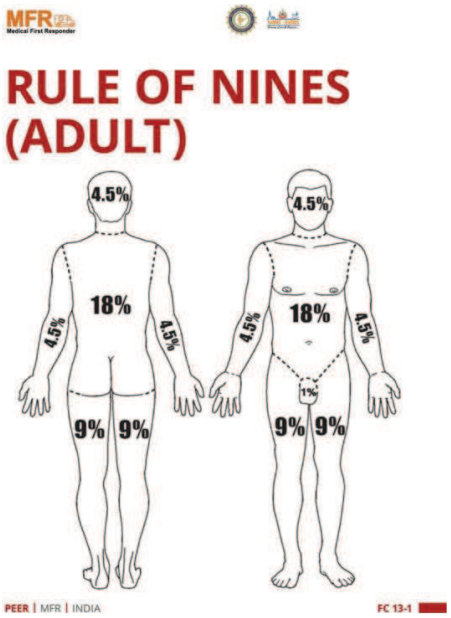
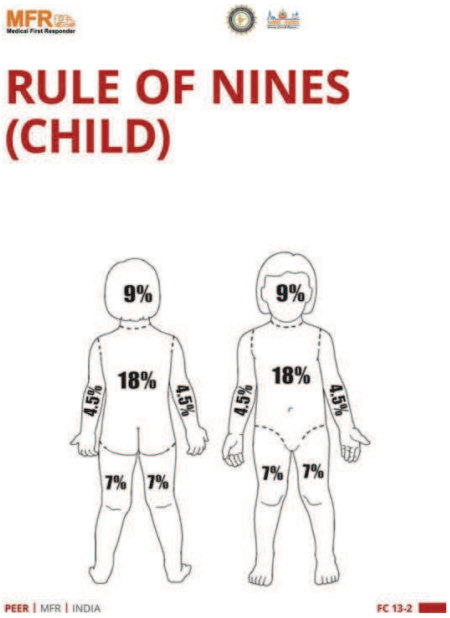


LESSON 13
— FLIP CHARTS

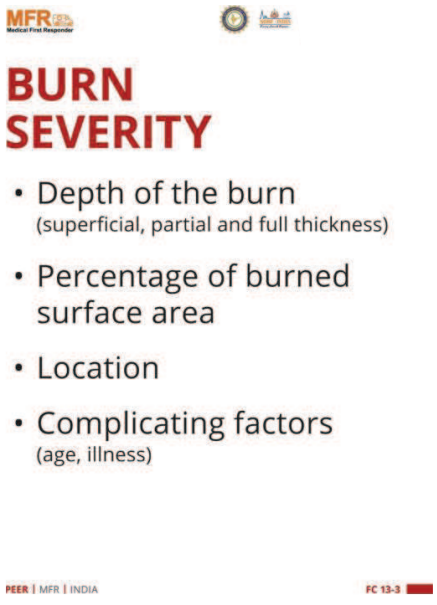
FC13-1



FC13-2



FC13-3



LESSON 13
— SLIDES

SL 13-1

PEER | MFR | INDIA SL 13 - 1

SL 13-2

PEER | MFR | INDIA SL 13 - 2

SL 13-3

PEER | MFR | INDIA SL 13 - 3

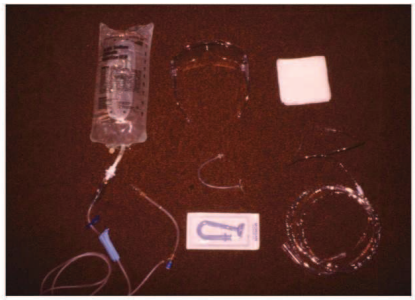
SL 13-4

PEER | MFR | INDIA SL 13 - 4

SL 13-5

PEER | MFR | INDIA SL 13 - 5

SL 13-6



PEER | MFR | INDIA SL 13 - 6

LESSON 13
— SLIDES

SL 13-7

SL 13-8

SL 13-9

SL 13-10

SL 13-11

SL 13-12

LESSON 13
— SLIDES

SL 13-13