

## Pre-Lecture

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### I. You Are the EMT

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Time: 10 Minutes

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Small Group Activity

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This activity is designed to help motivate students to understand the critical aspects of properly assessing and treating injuries to the eye.

#### Purpose

To introduce students to the assessment and emergency care of injuries to the eye.

#### Instructor Directions

1. Direct students to read the “You Are the EMT” scenario found in the beginning of Chapter 25.
2. You may wish to assign students to a partner or a group. Direct them to review the discussion questions at the end of the scenario and prepare a response to each question. Facilitate a class dialogue centered on the discussion questions.
3. You may also use this as an individual activity and ask students to turn in their comments on a separate piece of paper.

## Lecture

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### I. Anatomy and Physiology of the Eye

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Time: 10 Minutes

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Slides: 1-4

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Lecture/Discussion

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- A. Globe shaped, 1"-diameter, located in the bony socket of the skull (orbit)
- B. Has two fluid chambers that maintain its (globe) shape
  1. The back chamber contains vitreous humor, a clear, jelly-like fluid that cannot be replaced if lost.
  2. The front chamber (in front of lens) contains aqueous humor, a clear fluid that the body can replace with time.
- C. Conjunctiva: Delicate membrane covering the inner surface of eyelids and surface of eye
- D. Lacrimal glands (tear glands): Produce fluid to keep the conjunctivae moist
- E. Sclera (white of the eye): Tough fibrous tissue that helps maintain the globe's shape
- F. Cornea: Clear transparent membrane that allows light to enter
- G. Iris (colored portion of eye): Circular muscle with a central opening that changes size to allow light to enter
- H. Pupil: The opening in the center of the iris, normally black, which allows light to enter the back of the eye
- I. Lens: Lies behind the iris and focuses images

J. Retina: Light-sensitive area at the back of the globe with numerous nerve endings

K. Optic nerve: Transmits signals from nerve endings in the retina to the brain

## II. Common Eye Injuries

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Time: 30 Minutes

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Slides: 5-12

Trauma Slides: 53, 54, 74, 75, 76, 77, 79, 80

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Lecture/Discussion

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A. Eye injuries can produce severe complications, including blindness.

B. In a normal, uninjured eye, the entire circle of the iris is visible.

1. The pupils are round, equal in size, and react equally when exposed to light.
2. Both eyes move together in the same direction to follow a moving object.

C. After an injury, pupillary reaction, shape, and eye movement are often disturbed.

1. Any of these conditions should cause you to suspect an injury of the globe or associated tissues.
2. Abnormal pupillary reactions sometimes are a sign of brain injury rather than eye injury.
3. Report signs and symptoms, details of injury, changes in vision, the use of any eye medications, and any history of eye surgery.

D. Foreign objects

1. A very small foreign object, such as a grain of sand lying on the surface of the conjunctiva, may produce severe irritation.
2. The conjunctiva becomes inflamed and red almost immediately.
3. The eye begins to produce tears in an attempt to flush out the object.
4. A foreign object in the eye causes intense pain and is aggravated by bright light.
5. Use irrigation with normal saline solution to treat for small foreign objects lying on the surface of the eye.
  - a. Use a small bulb syringe.
  - b. Use a round nasal airway or cannula to direct the saline into the affected eye.
  - c. Flush from the nose side of the eye toward the outside.
  - d. After a foreign body is flushed away, it will often leave a small abrasion on the surface of the conjunctiva.
  - e. For this reason, the patient will complain of irritation even when the particle itself is gone.
6. Gentle irrigation usually will not wash out foreign bodies that are stuck to the cornea or lying under the upper eyelid.
  - a. Examine the undersurface of the upper eyelid by pulling the lid upward and forward.
  - b. If you spot a foreign object, you may be able to remove it with a moist, sterile, cotton-tipped applicator.
  - c. Never attempt to remove a foreign body that is stuck to the cornea.
7. Care of foreign bodies impaled in the eye
  - a. Do not remove an object impaled in the eye; it must be removed by a physician.
  - b. Care involves stabilizing the object and preparing the patient for transport to definitive care.
  - c. Bandage the object in place to support it.
  - d. Cover the eye with a moist, sterile dressing, and surround the object with a collar made from roller gauze or a small gauze pack.
  - e. Stabilize the object and the gauze collar with a roller bandage around the head.
  - f. Cover the injured and uninjured eye.

E. Burns of the eye

1. Chemicals, heat, and light rays can burn the eye, often causing permanent damage.
2. Chemical burns

- a. Chemical burns to the eye are usually caused by acid or alkaline solutions and require immediate emergency care.
- b. Flush the eye with sterile saline solution.
- c. If sterile saline is not available, use any clean water.
- d. Direct the greatest amount of solution or water into the eye, as gently as possible.
- e. You may have to force the eye open to irrigate the eye adequately.
- f. If only one eye is affected, take care to avoid getting contaminated water into the unaffected eye.
- g. Irrigate the eye for at least 5 minutes.
- h. If an alkali or a strong acid caused the burn, irrigate the eye for at least 20 minutes.
- i. After you have completed irrigation, cover the eye with a clean, dry dressing and transport the patient.

### 3. Thermal burns

- a. During a fire, the eyes usually close rapidly because of the heat.
- b. Burns of the eyelids require very specialized care.
- c. Cover both eyes with a sterile dressing moistened with sterile saline solution.
- d. Transport the patient to a burn center.

### 4. Light burns

- a. Infrared rays, eclipse light, direct sunlight, and lasers cause significant damage to the sensory cells of the eye.
- b. Exposure to extremes of light generally is not painful but may result in permanent damage to vision.
- c. Superficial burns of the eye can result from ultraviolet rays.
  1. This kind of burn often is not painful at first but may become so 3 to 5 hours later.
  2. The patient usually develops severe conjunctivitis.
  3. Ease the pain from these corneal burns by covering each eye with a sterile, moist pad and an eye shield.
  4. Protect from further exposure to bright light.

5. Transport the patient in a supine position.

## F. Lacerations

1. If there is a laceration of the globe itself, apply no pressure to the eye.
2. Guidelines in treating lacerations of the eye
  - a. Never exert pressure on or manipulate the injured eye (globe).
  - b. If part of the eyeball is exposed, gently apply a moist, sterile dressing to prevent drying.
  - c. Cover the injured eye with a protective metal eye shield.
3. Treatment of a displaced globe
  - a. Do not attempt to reposition the globe.
  - b. Simply cover the eye and stabilize it with a moist, sterile dressing.
  - c. Have the patient lie in a supine position while en route to the hospital.

## G. Blunt trauma

1. Trauma to the eye ranges from the ordinary “black eye” to a severely damaged globe.
2. Hyphema, or bleeding into the anterior chamber of the eye, may obscure part of or the entire iris and may seriously impair vision.
3. This may be a sign of a more serious injury to the globe.
4. Blowout fracture is a fracture of the orbit, particularly of the bones that form its floor and support the globe.
  - a. Fragments of fractured bone can entrap some of the muscles that control eye movement, causing double vision.
  - b. A patient who reports pain, double vision, or decreased vision after a blunt injury of the eye should be placed on a stretcher and transported promptly.
  - c. Protect the eye from further injury with a metal shield; cover the other eye to minimize movement on the injured side.
5. Trauma to the eye may result in retinal detachment.
  - a. Often seen in sports, especially boxing
  - b. Painless but produces flashing lights, specks, or “floaters” in the field of vision and a cloud or shade over the patient’s vision
  - c. Requires prompt medical attention to preserve vision in that eye

### III. Eye Injuries Following Head Injuries

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Time: 5 Minutes

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Slide: 13

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Lecture/Discussion

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A. Abnormalities in the appearance or function of the eyes often occur after a closed head injury.

B. Signs of a head injury

1. One pupil larger than the other
2. Eyes not moving together or looking in different directions
3. Eyes cannot follow the movement of your finger as instructed
4. Bleeding under the conjunctiva
5. Protrusion or bulging of one eye

C. Treatment if the patient is unconscious

1. Keeping the eyelids closed.
2. Covering the lids with moist gauze, or holding them closed with clear tape.

### IV. Contact Lenses and Artificial Eyes

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Time: 5 Minutes

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Slide: 14

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Lecture/Discussion

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A. Contact lenses

1. Types
  - a. Hard contact lenses usually are tinted.
  - b. Large, soft ones are clear and can be very difficult to see.
2. Removal guidelines
  - a. Do not attempt to remove either kind of lens.
  - b. Never attempt to remove a lens from an eye that has been or may have been injured.
  - c. Remove contact lenses immediately in the field in the case of a chemical burn of the eye.
3. Removal techniques
  - a. If it is necessary to remove a hard contact lens, use a small suction cup, moistening the end with saline.
  - b. To remove soft lenses, place one to two drops of saline onto the lens, gently pinch it between your thumb and index finger, and lift it off the surface of the eye.
4. Always advise emergency department staff if a patient is wearing contact lenses.

B. Artificial eyes

1. Suspect an eye of being artificial when it does not respond to light, move in concert with the opposite eye, or appear quite the same as its mate.
2. If you think a patient may have an artificial eye but are not sure, ask about it.

## V. Skill Drills

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Time: 30 Minutes

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Demonstration/Group Activity

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Remember to maintain an adequate instructor-to-student ratio. A ratio of 1 instructor to 6 students is recommended by the DOT National Standard Curriculum. Also remember that each student must be evaluated on each skill before completing the course.

### Purpose

To allow students the opportunity to observe, practice, and perform patient care skills associated with injuries to the eye.

### Materials Needed

1. Cotton-tipped applicators
2. Sterile (clean) water
3. Bulb syringes/IV tubing
4. Assorted dressings and bandages
5. Materials for simulating impaled objects or other traumatic injuries

### Instructor Directions

1. Demonstrate each skill, emphasizing any critical points or procedures.
2. Based on the specific skill, assign each student to a partner or team. Provide each partner/team with appropriate equipment or materials.
3. Direct students to practice each skill using team members as patients and observers. Closely monitor the practice sessions and provide constructive comments and directions.
4. As individual students achieve success, conduct skill proficiency exams. Students who fail the exam should be given direction and opportunity to practice before being retested.

### Skills

- A. Removing a Foreign Object from Under the Upper Eyelid (Skill Drill 25-1)
- B. Stabilizing a Foreign Object Impaled in the Eye (Skill Drill 25-2)

## Post-Lecture

### I. Prep Kit Activities

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Time: 60 Minutes

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Individual/Small Group Activity/Discussion

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Note: The Prep Kit contains various student-centered end-of-chapter activities designed as enhancement to the instructor's presentation. As time permits, these activities may be presented in class. They are also designed to be used as outside/homework activities.

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#### A. Assessment in Action

This activity is designed to assist students in gaining a further understanding of issues surrounding injuries to the eye. The activity incorporates both critical thinking and application of basic EMT-B knowledge.

## Purpose

This activity allows the student an opportunity to analyze an emergency care scenario and develop responses to critical thinking questions.

## Instructor Directions

1. Direct students to read the “Assessment in Action” scenario located in the Prep Kit at the end of Chapter 25.
2. For the quiz questions, direct students to read and individually answer the quiz questions at the end of the scenario. Allow approximately 10 minutes for this part of the activity. Facilitate a class review and dialogue of the answers, allowing students to correct responses as necessary. Use the quiz question answers noted below to assist in building this review. Allow approximately 10 minutes for this part of the activity.
3. You may also use these as individual activities and ask students to turn in their comments on a separate piece of paper.

## Answers to Multiple-Choice Questions

1. Answer: A Excessive tearing usually indicates irritation, usually from a foreign body on the cornea. A laceration of the globe will cause bloody fluid to escape. A hyphema does not cause tearing by itself. A ruptured lens does not cause tearing by itself.
2. Answer: B The purpose of tears is to flush the eye and wash away any irritant. Even though the production of tears may be influenced by emotions, the actual purpose of tears is to flush the eye. Tears do not prevent mucus from clouding the eye. The conjunctiva is nourished through the arteries and capillary beds that feed the delicate tissues.
3. Answer: B Attempt to visualize his eye to determine appropriate treatment. You will need to determine if a direct injury has occurred to the eye and whether or not irrigation is appropriate. Patching both eyes may be necessary but only after appropriate treatment. In the case of blunt trauma, never irrigate the eyes without knowing the extent of damage. A lacerated globe should not be irrigated. Direct pressure on the globe is not appropriate.
4. Answer: D The black powder is likely irritating the conjunctiva and, because of the mechanism, could be the source of a burn. The eye needs to be irrigated to flush the powder. None of the other answers is appropriate when the eye needs to be irrigated.
5. Answer: D Running water from one eye to the other is never a good practice. Fluid under high pressure also can damage delicate eye membranes. Pouring water from the nasal side of the eye to the lateral side is the appropriate cause of action.
6. Answer: B Because of the irritation, bright light, complaint of pain, and possibility of burns, it is necessary to patch both eyes with sterile, moist dressing and transport the patient in a supine position. Although protecting the eyes from bright lights and turning off all interior lights seem to be appropriate, patching will be the best method to protect the eyes.
7. Answer: A It is very possible this patient ruptured the eardrum(s). Look for bloody, watery fluid coming from the ear. The patient also may report complain of ringing in his ears and an inability to hear. Lung damage is unlikely, as is ruptured abdominal organs. It would be more likely for the patient to have sustained a closed head injury or even fractured facial bones.

## Challenging Questions Answers

8. Answer: Any watery substance on the surface of the eye will drain through the lacrimal ducts into the nasal cavity. This is why, when people have tears, they sometimes need to blow their noses. Any blood coming from the eye itself will follow the same path.
9. Answer: The supine position limits the effect of gravity on the eye and puts the globe in the best neutral position.
10. Answer: Having both eyes patched prevents the globe from moving. The eyes move concurrently, which means if one eye moves, the other moves with it. Therefore, if just one eye is patched, both would still move with the action of the unpatched eye.

## B. Points to Ponder

This activity helps students probe the more difficult situations that they face. Use this as an opportunity to allow them to express differences of opinion and approach, while directing them to be thorough and decisive in their answers. Encourage challenges.

## Purpose

To allow students an opportunity to apply critical thinking analysis to a given case study.

## Instructor Directions

1. Direct students to read the “Points to Ponder” scenario found in the Prep Kit at the end of Chapter 25.
2. You may wish to assign students to a partner or a group and direct them to review the discussion question at the end of the scenario and prepare a response. Allow approximately 10 minutes for this part of the activity. Facilitate a class dialogue centered on the discussion point. Allow approximately 10 minutes for this part of the activity.
3. You may also use this as an individual activity and ask students to turn in their comments on a separate piece of paper.
4. Personally review the scenario and discussion question based on your experience and knowledge as an emergency care worker. Develop your own key points for guiding this discussion.

## Scenario

You are dispatched to chemical burn at a local manufacturing plant. You arrive to find an employee standing at an eye wash station, flushing her eyes. Other employees are watching and encouraging her to keep flushing. You find out that she has spilled sulfuric acid in her eyes and that she has been flushing them for about 20 minutes. You decide to stop flushing long enough to assess the injury. You find her left eye to be surprisingly unaffected considering the number of burns around the eyelid. Her right eye appears to be burned quite badly. The patient tells you that her left eye is “fake,” she lost it in a childhood accident, and wants to know how bad her right eye is. She keeps asking if she is going to be blind. What would you tell the woman? How would you treat this differently knowing that she has lost one eye already? How would you comfort her?

## Issues

- Dealing with Disabling Injuries
- Comforting Patients
- Honesty Vs Comfort
- Affects of Disabling Injuries on Care Providers
- Critical Incident Stress Teams

## C. Online Outlook

This activity requires students to have access to the Internet. This may be accomplished through personal access, employer access, or through a local educational institution. Some community colleges, universities, or adult education centers may have classrooms with Internet capability so that this activity can be completed in class. Check out local access points and encourage students to complete this activity as part of their on-going reinforcement of basic EMT-B knowledge and skills.

## Purpose

To provide students an opportunity to reinforce chapter material through use of online Internet activities.

## Instructor Directions

1. Use the Internet and go to [www.emtb.com](http://www.emtb.com). Follow the directions on the web site to access the exercises for Chapter 25.
2. Review the chapter activities and take note of desired or correct student responses.
3. As time allows, conduct an in-class review of the Internet activity and provide feedback to students as may be needed.
4. Be sure to check the web site before assigning this activity, because specific chapter-related activities may change from time to time.

# II. Lesson Review

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Time: 10 Minutes

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Discussion

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Note: Facilitate a review of this lesson’s major topics using the review questions as direct questions or overhead transparencies. Answers are found throughout this lesson plan with IRK references listed for each question.

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- A. Describe the normal anatomic and physiologic status of the eye. (Lecture I)

- B. Describe the process of removing a foreign object from the eyes. (Lecture II-D)
- C. Describe the emergency care for an impaled object in the eye.  
(Lecture II-D-7)
- D. Describe the treatment for chemical burns to the eye. (Lecture II-E-2)
- E. Describe a blowout fracture and its signs and symptoms. (Lecture II-G-4)
- F. What characteristics might the eyes display that indicate a possible a head injury? (Lecture III)
- G. Describe the EMT-B's concerns and approach to patients with contact lenses. (Lecture IV-A)
- H. What is the best approach if you believe a patient may have an artificial eye? (Lecture IV-B)

### III. Assignments

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Time: 5 Minutes

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Lecture

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- A. Review all materials from this lesson and be prepared for a lesson quiz to be administered (date to be determined by instructor).
- B. Read Chapter 26: *Injuries of the Face and Throat* for the next class session.