

Pre-Lecture

I. You Are the EMT

This activity is designed to help introduce your students to the processes of lifting and moving patients. The activity also provides you an opportunity to stress personal safety in the performance of basic EMT skills.

Purpose

To introduce students to the processes of moving, lifting, and carrying patients in a manner that provides for safety of the patient and the EMT-B.

Instructor Directions

1. Direct students to read the "You Are the EMT" scenario found in the beginning of Chapter 6.
2. You may 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 assign this as an individual activity and ask students to turn in their comments on a separate piece of paper.

Lecture

I. Body Mechanics

A. Learning proper mechanics avoids injury to self, partner, and patients

B. Anatomy review

1. When you are standing upright, the weight of anything you lift and carry in your hands is transferred to your shoulder girdle, your spinal column, your pelvis, and your legs.
2. If your shoulder girdle is aligned over your pelvis and your hands are held close to your legs when you lift something, the force exerted against your spine occurs in an essentially straight line down the strong stacked vertebrae in the spinal column.
3. With your back properly maintained in an upright position, little strain occurs against your muscles and ligaments, and significant weight can be lifted and carried without injuring your back.
4. You may injure your back if you lift with your back curved and if you are bent significantly forward at the hips.
5. The first rule of lifting is to always keep the back in a straight upright (vertical) position and to lift without twisting.
6. Power lift.
 - a. Tighten your back in normal upright position.
 - b. Spread your legs approximately 15" apart.
 - c. Extend your arms down side of your body and grasp the cot or backboard with hands held palms up.
 - d. Adjust your orientation and position until the weight is balanced and centered between both arms.
 - e. Reposition the feet so that they are about 15" apart with one slightly forward and rotated.
 - f. With the arms extended downward, lift by straightening the legs until fully standing.
7. Safety depends on using proper lifting techniques and having and maintaining a proper hold when lifting or carrying a patient.
8. A power grip gets the maximum force from your hands whenever you are lifting a patient.
 - a. The arm and hand have their greatest lifting strength when facing palms up.
 - b. Your hands should be at least 10" apart whenever you grasp a cot or backboard.
 - c. Each hand should be inserted under the handle with the palm facing up and the thumb extended upward.

- d. Curl your fingers and thumb tightly over the top of the handle.
- e. Make sure that the underside of the handle is fully supported on your curved palm.
- f. Never grasp a cot or backboard with the hands placed palms down over the handle.

II. Weight and Distribution

A. If a patient is supine on a backboard or ambulance cot, weight is not equally distributed between both ends of the device.

1. Between 68% and 78% of the body weight of a patient in a horizontal position is in the torso.
2. More of the patient's weight rests on the head half of the device than on the foot half.

B. A patient on a backboard or stretcher should be lifted and carried by four rescuers.

1. Diamond carry: One EMT-B at the head end of the device, one at the foot end, and one at each side of the patient's torso to balance the weight
 - a. The four EMT-Bs should lift the device while facing the patient.
 - b. Once the patient is lifted, the EMT-B at the foot end should turn around and face forward.
 - c. The EMT-Bs at the sides should turn their hands at the torso palms down and face the feet.
 - d. All four EMT-Bs should be facing the same direction and walking forward when carrying the patient.
2. A patient should be carried feet first.
 - a. This puts lightest load on the EMT-B at the patient's feet.
 - b. This allows a conscious patient to see in the direction of movement.

C. One-handed carrying technique is another lifting and moving technique.

1. If four or more EMT-Bs are carrying a patient, each should use one hand to support the stretcher.
2. Each EMT-B should face forward while walking.
3. To lift the stretcher, at least two EMT-Bs should be on each side of the stretcher, facing each other. They should use both hands to lift.
4. Once the stretcher is at carrying height, the EMT-Bs should turn in the direction they will be walking and switch to using one hand to carry the stretcher.
5. EMTs should pick up and carry the stretcher with their backs in the locked position.

D. A diamond carry is more stable.

1. The diamond carry is recommended when a patient must be carried in a building.
2. To carry a patient through a narrow doorway or hallway, the EMT-Bs should stop and turn toward the patient.
3. Take small, slow steps to move through the doorway or hallway.
4. If a doorway, hallway, or stairwell is very narrow, it will only be possible to carry the backboard or stretcher from the head and foot ends.

E. Whenever you must carry a backboard or stretcher up or down a flight of stairs, be sure that the patient is so secured to the device that he or she cannot slide significantly when the stretcher is at an angle.

1. A strap that passes tightly across the upper torso and through each armpit, but not over the arms, is required.
2. When you carry the patient down stairs, carry the foot end first so the head end is elevated higher than the foot end.
3. When you carry a patient up stairs, the head end of the backboard or cot should go first.
4. If possible, use the patient's armpits as anatomic anchors and support points when you use a direct body lift or drag to move the patient or when assisting a patient who can stand.

F. Wheeled ambulance stretcher or cot

1. Weighs between 40 and 70 lb, depending on its design and features
2. Is generally not taken up or down stairs.
3. Stays on the ground floor landing, as the patient is brought to it

G. Stair chair

1. Use a wheeled stair chair to bring a conscious patient to the waiting cot, if the patient can be placed in a sitting position.
2. Transfer the patient from the stair chair to the cot.

H. Backboard

1. Backboard: A device that provides support to patients with suspected hip, pelvic, spinal, or lower extremity injuries
2. Also called a spine board, trauma board, or long board
3. Placed on the ambulance cot with the patient and secured with additional straps

III. Directions and Commands

A. To safely lift and carry a patient, anticipate and understand every move.

1. Each move must be executed in a coordinated manner.
2. Team leaders should indicate where each team member is to stand.

B. Orders should be given in two parts.

1. Preparatory command (ie, "All ready to stop.")
2. Command of execution (ie, "STOP!")
 - a. Deliver in a louder voice.
 - b. Use a countdown when lifting a patient.
 1. Example 1: "We're going to lift on three. One-two-THREE!"
 2. Example 2: "I'm going to count to three and then we're going to lift. One-two-three-LIFT!"

C. Additional lifting and carrying guidelines include:

1. Find out how much the patient weighs before attempting to lift.
2. Know how much you can comfortably and safely lift.
3. If lifting the patient places strain on you, stop lifting and lower the patient.
4. Obtain additional help before attempting to lift again.
5. Communicate clearly and frequently with your partner and other rescuers whenever you are lifting a patient.
6. Do not attempt to lift a patient who weighs more than 250 lb with fewer than four rescuers.
7. Find out the weight limitations of the equipment you are using.
8. Special techniques, equipment, and resources are required to move any patient who weighs more than 300 lb.
9. The strongest of the available EMT-Bs should be located at the head end of the device.
10. Whenever possible, use a stair chair instead of a stretcher to carry a patient down stairs.
11. Always remember to keep your back in the locked position.
12. Flex at your hips, not at your waist.
13. Bend your knees and keep the patient's weight and your arms as close to your body as possible.
14. Avoid any unnecessary lifting and carrying of the patient.

IV. Principles of Safe Reaching and Pulling

A. When using a body drag, apply the same basic body mechanics and principles as when lifting and carrying.

1. The back should always be locked and straight.
2. Avoid any twisting so that the vertebrae remain in normal alignment.
3. Avoid hyperextending the back.
4. When pulling a patient on the ground, kneel to minimize the distance that you will have to lean over.
5. When a patient is at a different height from you, bend your knees until your hips are just below the height of the plane across which you will be pulling the patient.
6. When pulling, extend your arms no more than about 15° to 20° in front.
7. Keeping your reach within the recommended distance, reach forward and grasp the patient so that your elbows are just beyond the anterior torso.
8. Reposition your feet so the force of pull will be balanced equally between both arms, and the line of pull will be centered between them.
9. Pull the patient by slowly flexing your arms.
10. When you can pull no further, stop and move back another 15° to 20°. When properly positioned, repeat the steps.
11. If you must drag a patient across a bed, use the sheet or blanket under the patient.
12. Unless the patient is on a backboard, transfer a patient from the ambulance cot to the bed with a body drag.
13. Drag the patient in increments until he or she is properly centered on the bed.

B. Sometimes during a body drag, you and another EMT-B may have to pull the patient with one of you on each side of the patient.

1. Kneel just beyond the patient's shoulder and face toward his or her groin.
2. Extend one arm across and in front of your chest.
3. Grasp the patient's armpit. Extend the other arm in front and to the side of the torso and grasp the patient's belt.
4. Raise your elbows and flex your arms.
5. Pull the patient with the line of force at the minimum angle possible.

C. Log-rolling maneuver

1. When log-rolling a patient onto his or her side, you will have to reach farther than 18°.
2. To minimize this distance, kneel as close to the patient's side as possible.
3. Keep your back straight and lean forward solely from the hips.
4. Roll the patient without stopping until the patient is resting on his or her side.

D. Wheeled ambulance stretcher maneuvers

1. When rolling a wheeled ambulance stretcher, make sure it is elevated.
2. Pull the stretcher from the foot end.
3. As you pull the stretcher, bend slightly forward at the hips.
4. Keep the line of the pull through the center of your body by bending your knees.
5. A second EMT-B should guide the head end and assist by pushing.
6. Never push an object with your arms fully extended in a straight line and your elbows locked.
 - a. Arms will not be able to absorb shock.
 - b. Do not push from an overhead position from below the waist.

V. General Considerations

- A. Moving a patient should normally be done in an orderly, planned, and unhurried fashion to protect both the EMT-B and the patient.
- B. Carefully plan ahead and select the method(s) that will involve the least lifting and carrying.
- C. Always consider whether there is another option that will cause less strain on you and the other EMT-Bs.

VI. Emergency Moves

A. If there is some potential danger, use an emergency move to remove a patient to a safe place before conducting the initial assessment.

1. The only other time an emergency move should be used is if the patient's location or position prevents a proper assessment or delivery of immediate potentially critical emergency care.
2. A single EMT-B working alone can use a drag to pull the patient along the long axis of his or her body to a safer position.
3. The primary concern in an emergency move is the danger of aggravating an existing spinal injury.

B. Ways to move a patient on his or her back along the floor or ground include:

1. Pulling on the patient's clothing in the neck and shoulder area
2. Placing the patient onto a blanket, coat, or other item that can be pulled
3. Rotating the patient's arms so that they are extended straight on the ground beyond his or her head, grasping the wrists and, with the arms elevated above the ground, dragging the patient
4. Placing your arms under the patient's shoulders and through the armpits, grasping the patient's arms, and dragging the patient backward

C. A single EMT-B working alone who must remove an unconscious patient from a car should take the following steps:

1. Move the patient's legs so they are clear of the pedals.
2. Rotate the patient so his or her back is positioned facing the open car door.
3. Place your arms through the armpits and grasp either the patient's forearms or your own forearms.
4. Support the patient's head against your body.
5. Drag the patient from the seat to a safe location.
6. If the legs and feet do not clear the car, slowly lower the patient until he or she is lying on his or her back next to the car, clear the legs, and use a long axis body drag to move the patient.

D. Other one-rescuer techniques include:

1. Front cradle
2. Firefighter's drag
3. One-person walking assist
4. Firefighter's carry
5. Pack strap

VII. Urgent Moves

A. Even if the scene is safe, an urgent move may be necessary for patients with an altered level of consciousness, inadequate breathing, or shock (hypoperfusion).

B. When a patient sitting in a car or truck must be urgently moved, use the rapid extrication technique.

C. The rapid extrication technique requires more than one EMT-B.

1. If the rapid extrication technique is used because the scene is dangerous, the cot should immediately be moved a safe distance away from the vehicle before the patient is assessed or treated.
2. Steps of the rapid extrication technique must be considered a general procedure to be adapted as needed.
3. The rapid extrication technique should be used only in life-threatening situations.
 - a. The vehicle or scene is unsafe.
 - b. The patient cannot be properly assessed before being removed from the car.
 - c. The patient needs immediate intervention that requires a supine position.
 - d. The patient's condition requires immediate transport to the hospital.
 - e. The patient blocks the EMT-B's access to another seriously injured patient.
4. Rapid extrication technique
 - a. Apply manual in-line support of the cervical spine.
 - b. Team leader gives commands, applies c-collar and performs initial assessment.
 - c. Second EMT-B supports patient's torso.
 - d. Third EMT-B rotates patient's feet and legs.
 - e. Patient must be moved as a unit.
 - f. Patient is lowered to the backboard after being rotated.
 - g. Patient is slid onto the backboard.

VIII. Nonurgent Moves

A. When both the scene and the patient are stable, the EMT-B should carefully plan how to move the patient.

B. Three general methods may serve as a basis for planning, all of which can be adapted to meet the needs of specific case situations.

1. Direct ground lift
 - a. Used on patients without spinal injury
 - b. Used if necessary to carry the patient some distance to stretcher
 - c. Should be done by three EMT-Bs
2. Extremity lift
 - a. Used on patients without spinal injury
 - b. Helpful for carrying patients through narrow passages
 - c. Communication and coordination essential
3. Transfer moves
 - a. Direct carry: Lift patient then rotate to cot
 - b. Drawsheet method
4. Lifting a patient by a sheet or blanket
 - a. Center the patient on the sheet.
 - b. Tightly roll up the excess fabric on each side.
 - c. This produces a cylindrical handle that provides a strong, secure way to grasp the fabric.

5. Scoop stretcher
 - a. Adjust stretcher length.
 - b. Lift the patient slightly and slide stretcher into place, one side at a time.
 - c. Lock the stretcher ends together, avoiding pinching.
 - d. Secure the patient and transfer to the cot.

IX. Patient-Moving Equipment

A. Wheeled ambulance stretcher

1. The wheeled ambulance stretcher is the most commonly used device to move and transport patients.
2. Most patients are placed directly on the ambulance cot.
3. Patients with a possible spinal injury or multiple-system trauma should be placed and secured on a backboard first.
4. Patients who can tolerate being in a sitting position can be carried down a flight of stairs in a stair chair, then transferred to the cot.
5. The EMT-B must be familiar with the features of the wheeled ambulance stretcher.
 - a. The EMT-B must be familiar with the specific features of the cot carried on the ambulance.
 - b. The ambulance cot has a specific head end and foot end.
 - c. The cot should be pulled, pushed, or lifted only by its main frame or by the handles attached to the main frame.
 - d. Hinges at the area of the patient's hips allow the head end to be elevated and the patient's back to be positioned at any desired angle from flat to fully upright.
 - e. The head end of the cot is designed to be elevated or moved down only when the tilt control is purposely released.
 - f. A retractable guardrail is attached along the central portion of the main frame of the cot at each side.
 - g. The guardrail should be lowered out of the way when a patient is being loaded onto the cot.
 - h. After the patient has been properly placed on the cot, the guardrail should be drawn up and the handle locked.
 - i. The folding undercarriage is designed so that the cot can be adjusted to any height from about 12" above the ground to 32" or 36" above the ground.
 - j. As an additional safety feature on most cots, the main frame must be lifted slightly to remove weight from the undercarriage before the cot will fold, even if the control is pulled. This ensures that even if the handle is accidentally pulled, the elevated cot will not suddenly drop.
 - k. The mattress on an ambulance cot must be fluid resistant.
6. Moving the cot requires care and practice.
 - a. Whenever a patient is on an elevated cot, the cot should be held firmly between two hands at all times so that it cannot tip.
 - b. If the loaded cot must be carried down a short flight of steps, the undercarriage must first be retracted.
 - c. This is not necessary when the cot must be lifted over a curb, single step, or obstacle of a similar height.
 - d. The cot is secured in the ambulance by strong clamps.
 - e. Clamps are located in a rack on the floor or side of the patient compartment.
 - f. The ambulance cot is designed to be rolled on regular flat surfaces.
 - g. If the cot must be moved over a lawn or other irregular surface, it should be lifted and carried, not rolled over the terrain.
7. Loading a cot into an ambulance
 - a. Tilt the head of the stretcher upward, and place it into the patient compartment with the wheels on the floor.
 - b. Second rescuer on the side of the cot releases the undercarriage lock and lifts undercarriage.
 - c. Roll the cot into the back of the ambulance.
 - d. Secure the cot to the clamps mounted in the ambulance.
8. Other considerations the EMT-B must remember
 - a. An IV pole is attached to many ambulance cots.
 - b. Some cots also include a carrier to hold an ECG monitor or AED and a portable oxygen unit.
 - c. On models that do not include these features, the portable oxygen unit and ECG monitor or AED should be secured on the top surface of the cot mattress at the patient's legs.

- d. All stretchers and patients must be fully secured before the ambulance moves.

B. Portable/folding stretchers

1. A stretcher with a strong rectangular tubular metal frame and rigid fabric stretched across it.
2. Does not have a second multipositioning frame or adjustable undercarriage.
3. May be folded in half across the center of each side so that the stretcher is only half its unusual length during storage.

C. Flexible stretchers

1. Several types of flexible stretchers, including the SKED, the Reeves, and the Navy stretcher, either can be rolled up across their width or, in the case of the SKED, their length.
2. Flexible stretchers form a rigid stretcher that conforms around the patient's sides and does not extend beyond them.
3. The SKED stretcher can also be used if the patient must be belayed or rappelled by ropes.
4. The flexible stretcher is the most uncomfortable of all the various devices for moving patients; however, it provides excellent support and immobilization.
5. When the stretcher is wrapped around the patient and the straps are secured, the patient is completely immobilized.

D. Backboards

1. Backboards are long flat boards, 6' to 7' long, made up of rigid, rectangular material.
2. They are used to carry patients and immobilize supine patients who have suspected spinal injury or other multiple trauma.
3. Parallel to the sides and ends of the backboard are a number of long holes that are about $1/2$ " to 1" from the outer edge.
4. These holes form handles so that the board can be easily grasped, lifted, and carried.
5. Straps that secure and immobilize the patient can also be inserted through the holes.
6. If wooden boards are used, infection control procedures must be followed before the boards can be reused.
7. A short board, or half-board, should be used to immobilize the torso, head, and neck of a seated patient who has a suspected spinal injury until the patient can be immobilized on a backboard.
8. Short boards are 3' to 4' long. Short wooden backboards have generally been replaced with a vest-type device that is specifically designed to immobilize the patient until he or she is moved from a sitting position to supine on a backboard.

E. Basket stretchers

1. A basket stretcher, often called a Stokes litter, is used to carry a patient across uneven terrain in a remote location that is inaccessible by ambulance or other vehicle.
2. If the patient has a suspected spinal injury, he or she should be immobilized on a backboard before being placed in the basket stretcher.
3. Basket stretchers may be made of plastic with an aluminum frame or have a full steel frame that is connected by a woven wire mesh.
4. Basket stretchers surround and support the patient, but their design allows water to drain through holes in the bottom.
5. Some styles can also be used for technical rope rescues and some water rescues.
6. Not all basket stretchers are rated or are appropriate for these specialized rescue uses.

F. Scoop stretcher

1. A scoop stretcher is designed to be split into two or four pieces.
2. Sections are fitted around a patient lying on the ground or a relatively flat surface.
3. Parts are reconnected and the patient is lifted and placed on a long spine board or stretcher.
4. Both sides of the patient must be accessible.
5. The EMT-B must pay special attention to the closure area beneath the patient so that clothing, skin, or other objects are not trapped.

6. The patient must be fully stabilized and secure before he or she can be moved.
7. Scoop stretchers are not adequate when used alone for standard immobilization of a spinal injury.

G. Stair chairs

1. Stair chairs are folding aluminum frame chairs with fabric stretched across them to form a seat and seat back.
2. Fold-out handles enable the EMT-B to carry the head and foot ends up or down a flight of stairs.
3. Most have rubber wheels at their back with casters in front.
4. Stair chairs serve as an adjunct for moving a patient up or down stairs.
5. The stair chair can be rolled on the floor to stairwell, and then carried down.

X. Moving and Positioning the Patient

A. Every time a patient is moved, the EMT-B must take special care so that no one is injured.

B. Training and practice are required to use all the equipment described in this chapter.

1. After each patient transfer, EMT-Bs should evaluate the appropriateness of the technique used, as well as the technical skill in completing the transfer.
2. EMT-Bs must maintain equipment to the manufacturer's specifications.

C. Certain patient conditions, such as head injury, shock, spinal injury, and pregnancy, call for special lifting and moving techniques.

1. Patients with chest pain or difficulty breathing should sit in a position of comfort, as long as they are not hypotensive.
2. Patients with suspected spinal injuries must be immobilized on a long backboard.
3. Patients in shock should be packaged and moved in a supine position or with their legs elevated 8" to 12".
4. Pregnant patients who are hypotensive should be positioned and transported on their left sides.
5. Patients who are nauseated or vomiting should be transported in a position of comfort, and the EMT-B must be positioned appropriately to manage the airway.

XI. Skill Drills

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 is to be evaluated on each skill prior to the completion of the course.

Purpose

To allow students an opportunity to observe, practice, and perform patient care skills associated with lifting and moving patients.

Materials Needed

1. Patient carrying devices (backboards, gurneys, scoop stretcher, basket stretcher, stair chair, bed sheets, flexible stretcher, folding stretcher)
2. Patient securing devices (straps, tape, belt, gauze rolls, etc.)
3. Cervical collars (assorted sizes)

Instructor Directions

1. Demonstrate each skill, emphasizing any critical points or procedures.
2. On the basis of the specific skill, assign each student to a partner or team. Provide each partner/team with equipment or materials as may be needed.

3. Direct students to practice each skill using team members as patients and observers. Closely monitor the practice sessions and provide constructive comments and redirecting.
4. As individual students achieve success, conduct skill proficiency exams. Students failing the exam should be given redirection and opportunity to practice before being retested.

Skills

- A. Performing the Power Lift (Skill Drill 6-1)
- B. Performing the Diamond Carry (Skill Drill 6-2)
- C. Performing the One-Handed Carrying Technique (Skill Drill 6-3)
- D. Carrying a Patient on Stairs (Skill Drill 6-4)
- E. Principles of Safe Reaching and Pulling (Figure 6-11)
- F. Methods for Dragging a Patient (Figures 6-12, 6-15, 6-17)
- G. Direct Ground Lift (Figure 6-18)
- H. Transfer Moves (Figures 6-19, 6-20)
 - I. Performing Rapid Extrication Technique (Skill Drill 6-6)
 - J. Extremity Lift (Skill Drill 6-7)
 - K. Using a Scoop Stretcher (Skill Drill 6-8)
 - L. Loading a Cot into an Ambulance (Skill Drill 6-9)