

**BASIC VEHICLE
RESCUE
OPERATIONS
LEVEL**

Department of Health Basic Vehicle

Rescue Curriculum

BVR Awareness level - 16 hours

BVR Operations level - 16 hours

BVR Technician – 16 hours & DOH test

Awareness Level

Lesson 1 Overview (*BVR lesson 1*)

Lesson 2 Hazards (*BVR lesson 2*)

Lesson 3 Anatomy (*BVR lesson 3*)

Lesson 4 Stabilization (*BVR lesson 5*)

Practical evolutions stabilizing vehicles in wheels, on side, on roof and resting on another vehicle or object

Operations Level

Lesson 5 Part 1 Tools – uses and hand tools (*BVR lesson 4*)

Lesson 6 Patient Access (*BVR lesson 6*)

Lesson 7 Patient Extrication (*BVR lesson 8*)

Lesson 8 Post Rescue (*BVR lesson 9*)

Review Anatomy, hazards, and stabilization.

Practical evolutions of hand tool usage, none destructive access, destructive access, patient packaging and tool maintenance.

Technician Level with DOH BVR Technician Written Test

Lesson 5 Part 2 Tools – power tools (*BVR lesson 4 continued*)

Lesson 9 Disentanglement (*BVR lesson 7*)

Review Anatomy, Hazard mitigation, Stabilization, Access, Packaging, and Post rescue.

Practical evolutions of power tool usage and disentanglement scenarios

COURSE DESCRIPTION

The Basic Vehicle Rescue Operations Level Training Curriculum is part of a comprehensive rescue training program designed to be presented to those emergency service personnel responsible for patient rescue operations on highways of Pennsylvania. This Vehicle Rescue module is designed as the second part of a three-part rescue-training program, and as such, will help prepare the student for other rescue modules by introducing a wide variety of tools, equipment, and techniques associated with highway rescue. This module introduces the student to a systematic approach to rescue, which includes hazard recognition and control, incident command, situational assessment, and personal protection in addition to the requisite tools, equipment, and techniques of vehicle rescue.

While this module is introduced as a part of a total rescue-training program, it is also constructed in such a manner so as to be a freestanding course of instruction to be taken after the student has finished the Basic Vehicle Rescue Awareness Level training. This module contains all materials necessary to meet the needs of fire, rescue, and emergency medical services currently providing for vehicle rescue operations on the highways of Pennsylvania.

While not teaching patient care, i.e., medical assessment and treatment, this instructional program should provide rescue personnel with a strong sense of patient oriented techniques and activities. It is a given, that must be understood by all rescuers, that we are performing “patient rescue” of persons involved in vehicle accidents, NOT “rescuing vehicles” from the highways of Pennsylvania.

The Basic Vehicle Rescue Operations Level Curriculum places emphasis upon the development of knowledge and skills to be used by rescue personnel to achieve a safe, efficient, and effective rescue operation.

The Basic Vehicle Rescue Curriculum mixes a combination of classroom lectures, discussions, and demonstrations with field situational demonstrations and practice sessions which

provides each and every student with the opportunity to practice the skills taught under the guidance and supervision of qualified Vehicle Rescue Instructors.

PURPOSES OF THE COURSE

The purpose of the Basic Vehicle Rescue Training Program is :

1. To develop the knowledge and skills necessary to assess a vehicle accident situation.
2. To develop the knowledge and skills necessary to recognize and control existing and potential hazards to vehicle rescue operations.
3. To develop the knowledge and skills necessary to gain access to persons trapped in the wreckage of vehicles involved in accidents.
4. To develop the knowledge of the requirements of “patient oriented rescue” which addresses the need for medically trained and capable personnel to provide for patient assessment, medical treatment, packaging, and extrication concurrent with rescue operations.
5. To develop the knowledge and skills required to accomplish patient disentanglement to facilitate patient care, packaging, and extrication.
6. To develop the knowledge and skill required to accomplish patient removal (extrication) from the entrapment.
7. To develop the knowledge and skills required to safely and properly employ the hand tools and equipment associated with contemporary vehicle rescue operations.
8. To develop the knowledge and skills necessary to assure the safety of the patient(s), bystanders, and rescuers involved in vehicle rescue operations.

BASIC VEHICLE RESCUE COURSE

TERMINAL OBJECTIVE

Given a rescue team, not to exceed five (5) members, a simulated vehicle accident with patient(s) entrapped, and all minimum recommended tools and equipment, the student will be able to demonstrate his/her ability to perform the following:

1. Perform a situational assessment of the accident scene to determine what support services, if any, are needed and to determine the effective application of tools, equipment, and personnel;
2. Recognize existing and/or potential hazards and take appropriate steps to control the same;
3. Gain access to the entrapped patient(s);
4. Provide for patient assessment and any necessary emergency medical care;
5. Assess and perform disentanglement of the patients so as to facilitate patient care, patient packaging, and extrication;
6. Provide for patient packaging and removal;
7. Assess for and perform patient extrication from the damaged vehicle;
8. Return the rescue scene to a status where no other vehicles or personnel are threatened from accident debris;
9. Return all tools, equipment, personnel, and rescue vehicle to an operational status by properly cleaning all tools and equipment, as required, and performing operational checks on all tools and equipment to assure proper performance.

Successful performance will require that the student perform the following:

1. Proper sequence of rescue tasks;
2. Creates no hazard(s) to threaten the patient(s) or rescuers;
3. No injury is incurred by the rescuer(s) or the patient(s) as a result of the rescue operation;
4. All equipment, tools, and personnel are accounted for and returned to an operational status following the simulated rescue operation.

STUDENT QUALIFICATIONS AND STUDENT SUPPLIED MATERIALS

1. The student must be eighteen (18) years of age prior to the first day of the class.
2. The student must show that he/she is insured against accidental injury.
3. The student is responsible to provide his/her own personal protective clothes and equipment. The following minimum gear is required:
 - a. Helmet, fire type (or equivalent) with full impact suspension and liner. Note: If full hood is worn, then helmet liner is not needed.
 - b. Coat, fire type, with all liners in place. An extrication jumpsuit made of a fire resistant material may be used in place of the coat
 - c. Pants, fire type, with all liners in place. Not needed if student is wearing an extrication jumpsuit
 - d. Boots, fire type, rubber or leather. Boots must have steel toes and steel insole.
 - e. Eye protection, full goggles or wraparound safety glasses are required. Helmet shields alone are not acceptable as eye protection. Safety glasses should be secured with a strap.
 - f. Gloves of leather or Kevlar construction
 - g. Hearing protection, either ear plugs or full coverage ear protectors.
 - h. A flashlight
 - i. Notebook and writing implement for both the classroom and the field portions of the course.

CLASS SIZE

In order to maximize student participation in class discussion, skill demonstrations, and practice sessions, the class size will be limited to a minimum of ten (10) students and a maximum of thirty (30) students. Any larger numbers of students would reduce the “hands-on” training time of each student.

It is recommended that students be divided into small groups, approximately five (5) per group, during the practice sessions to facilitate the direct supervision and evaluation of each student. It is furthermore recognized that small group activities will simulate real life rescue squad practices and permit for a greater degree of personal assistance from each instructor. At no time shall the student/instructor ration exceed 5:1 during any hands on activities and/or field practice portions of the class.

SCHEDULING

The presentation of the Basic Vehicle Rescue Operations Level Training Program, will require a minimum of sixteen (16) hours. The program is divided into two stages, the classroom portion and the field practice portion.

Field practice sessions may be extended to permit students to avail themselves of additional practice time. However, this permission shall not be misinterpreted as a requirement to exceed the minimum number of hours, beyond sixteen hours (16). If additional field practice time is scheduled, remember to predetermine this and include it as part of the original class schedule. Added field hours will increase resources required, i.e., more practice vehicles.

A variety of schedules are possible and the course schedule can be tailored to meet the needs of almost any group of people. The following are some sample schedules of hourly breakdowns which may be considered:

1. Four 4 hour class sessions.
2. Two 8 hour class sessions.
3. Two 4 hour class sessions and one 8 hour sessions.

While the scheduling of class sessions lends itself to a great deal of flexibility, it is strongly recommended that field practice sessions be scheduled for six (6) or eight (8) hour day. Full day practice sessions will reduce the time lost to class starts and stops and minimize the total time required for preparation, cleanup, and maintenance of tools and equipment, not to mention additional transportation time required of shorter class sessions.

In an effort to maximize the quality of the learning experience and provide for maximum safety, course coordinators and instructors are strongly discouraged from scheduling any class day in excess of eight (8) hours total time.

FACILITIES

Classroom

The classroom for the didactic portion of the class should be large enough to accommodate a minimum of thirty (30) students and one (1) instructor. The room should be large enough to provide for tool and equipment layout to permit discussion, visualization, demonstration, and practice, where applicable. The classroom should have the following equipment available to support class presentation:

1. Seating, with writing surface, for thirty (30) students
2. Teacher desk and chair
3. Audiovisual aid equipment table (cart)
4. Projection screen
5. 35mm slide projector
6. VCR, 1/2" VHS format
7. LCD Projector and Computer
8. Color monitor(s)
9. Chalkboard or dry erase board
10. Window shades for slide/overhead presentations
11. Display table(s) for equipment

Student seating should be arranged so that the students have an unobstructed and comfortable view of the instructor's desk, chalkboard, and the projection screen.

Equipment Storage and Work Area

It is recommended that an equipment storage and work area be provided on a permanent basis. This storage area should be large enough to store all training equipment on shelves or racks, with no equipment to be stored on the floor. The room should be large enough to provide for a cleaning and maintenance area. A workbench for servicing and repairing of equipment

should be present and should include adequate storage area for tools and supplies needed in the servicing and maintenance of all equipment. A double tub cleaning sink with drain boards should be provided along with hot and cold running water. There should be adequate drying racks and lines for equipment and sufficient storage space for all cleaning supplies. The floor should be constructed of concrete or tile to facilitate the cleanup of spilled substances during the cleaning, servicing, and repairing of equipment.

* Equipment may be from a local rescue squad and may be stored on the apparatus. It is a given that the equipment may not be readily available due to an emergency call.

Field Practice Facility

Adequate space must be provided for the students to apply the theory and skills they have been taught in the classroom. This application phase of training should be in an open environment and under the direct supervision of the course instructors.

The practice facility must be large enough to accommodate a minimum of six (6) to ten (10) vehicles for students to practice the skills of stabilization, access, disentanglement, and extrication. The facility must be large enough to provide for a minimum of twelve (12) feet between each practice vehicle. When vehicles are placed in an unstable position for the purpose of stabilization demonstrations and practice and for advanced access, disentanglement and extrication practice, the distance between each vehicle must be increased to a minimum of twenty (20) feet so that any falling vehicles, debris or equipment will not endanger any other practicing students or instructors.

Ideally, the practice area should be as close to the classroom and equipment storage areas as possible to minimize the time lost in relocation from one site to another. However, priority should be given to site characteristics, rather than relative nearness to other training facilities. Do not let a travel distance of one (1) or two (2) miles deter you from using an ideal site.

Consideration should be given to the surface of the practice grounds. It is strongly recommended that concrete or asphalt surfaces be provided for permanent sites. These surfaces

increase the safety factors considerably for they present a constant surface for vehicle and equipment stabilization and do not provide the inherent hazards of dirt, sand or gravel. The latter three (3) surfaces tend to present a significant variable, at time quite excessive, to stabilization and safety of the operation. Temperature, rainfall, snow, ice, and other environmental effects tend to create a wide response from dirt, sand, gravel, and sod surfaces. These environmental changes also affect concrete and asphalt but to a lesser degree and the concrete and asphalt surfaces provide for easier mitigation of unfavorable environmental conditions and make it much easier for debris cleanup after the practice session. In addition, concrete and asphalt surfaces tend to significantly reduce equipment and personnel exposure to dirt, mud, and other foreign matter. This decreased exposure to foreign material will greatly reduce the cleanup time and equipment servicing and maintenance time.

In the event you require a night practice session, which is strongly recommended, you should provide for lighting of the practice area in such a manner as you would a real vehicle accident scene. The use of vehicle generators or portable generators to support portable lighting is part of the curriculum, and as such, requires practice by the student. The use of these devices during a night training exercise adds realism to the student's learning experience.

Classroom Equipment and Materials

The following should be provided for proper presentation of the classroom portion of the training class:

1. Seating, with writing surface, for thirty (30) students
2. Teacher desk and chair, with lectern or podium
3. Audiovisual aid equipment table (cart)
4. Projection screen
5. 35mm slide projector
6. Overhead transparency projector
7. VCR, ½" VHS format

8. LCD Projector and Computer
9. Color monitor(s)
10. Chalkboard or dry erase board
11. Window shades for slide/overhead presentations
12. Display table(s) for equipment
13. Rescue Training Policies and Procedures Manual, 1 each
14. Instructor Lesson Plans and Guide, 1 each
15. Student Guides, 1 per each student

Cleaning and Maintenance Supplies, Materials and Equipment

1. Scrub bucket, 2 each
2. Detergent
3. Soap, liquid
4. Soap, hand
5. Hand cleaner, degreaser
6. Sponges
7. Cleaning and drying towels
8. Wire brush, 2 each
9. Scrub brush, 2 each
10. Steel Wool
11. Cleaning solvent, for metal surfaces
12. Oil, Air Tool
13. Oil, light to medium lubricating
14. Hand tools

Vehicles

The field practice portion of the training program will require damaged vehicles for student practice of theory and skills taught in the class. It is recommended that a minimum of six

(6) to ten (10) vehicles be provided for each practice session. Prior removal of hazardous materials and waste prior to the training session limits environmental impact. One (1) of these vehicles should be set aside for use by the instructors in presenting demonstrations to the class prior to the student application of the skill. The remaining vehicles will be used by the students to practice stabilization techniques, access, disentanglement, and extrication.

If demonstrations and practice sessions are carefully supervised by the instructors, then the total of six (6) to ten (10) vehicles should be adequate for all practice sessions.

Stabilization demonstrations and practice will inflict little or no damage of significance to any of the vehicles and will permit all vehicles to be used in other sessions. With the student practicing in proper sequence of the rescue operation, access will not hinder later disentanglement sessions, and likewise, disentanglement should not damage the vehicles in such a manner that they may not be used for other practices.

Students should be assigned to a working “rescue squad” group of four (4) or five (5) students per crew. Each working crew of students must be assigned an instructor who is responsible for supervision, instruction, and the safety of each student in the group.

TABLE A-1

The following is the recommended amount of tools needed for a class of thirty (30) students
HAND TOOLS

Tool box	5 each
Axe, "crash axe"	5 each
Axe, flat head	2 each
Axe, pick head	2 each
Bar, prying (Halligan type)	6 each
Chisel, cold, set of 4 (1/4", 3/8", 1/2", 3/4")	5 sets
Cutter, bolt	3 each
Hammer, ball-peen, 32 oz.	5 each
Hammer, rip claw 20 oz.	5 each
Hammer, sledge or drilling, 3 lb, 15" handle	5 each
Hammer, sledge, 8 lb long handle	3 each
Jack, "hi lift"	4 each
Knife, Utility type	6 each
Locksmith's tools (set)	2 sets
Mallet, rubber, 16 oz	5 each
Pliers, arc-joint ("channel lock")	5 each
Pliers, lineman's 8"	5 each
Pliers, locking ("vise-grip"), 10"	5 each
Pliers, needle nose, 6"	5 each
Pliers, slip joint 8"	5 each
Punch, center, standard	5 each
Punch, center, spring operated	10 each
Saw, hacksaw	10 each
Saw, windshield	5 each
Saw blades, spare for hacksaws	40 each
Screwdriver, phillips, #3 x 8"	5 each
Screwdriver, phillips, #2 x 8"	5 each
Screwdriver, slotted, 3/8" x 12"	10 each
Screwdriver, slotted, 5/16" x 8"	5 each
Screwdriver, slotted, 1/4" x 6"	5 each
Screwdriver, Torx 15	5 each
Screwdriver, Torx 20	5 each
Snips, tin, compound action, straight cut	5 each
Strap, Ratcheting 20'	5 each
Tape, locking, 3/4" x 16"	5 each
Wrench, adjustable ("crescent," 12")	5 each
Wrench, combination, 10 piece set (1/4" – 3/4")	1 set
Wrench, pipe, 18"	5 each
Wrench, socket, 1/4" drive, standard, 15 piece set	1 set
Wrench, socket, 3/8" drive, standard, 13 piece set	1 set
Wrench, socket, 1/2" drive, standard, 16 piece set	1 set
Wrench, socket, 3/8" or 1/2" drive, metric, set, optional	1 set

TABLE A-2

The following is the recommended amount of tools needed for a class of thirty (30) students

POWERED TOOLS AND EQUIPMENT

Generator, portable, 5kw minimum, gasoline/diesel	1 each
Saw, chain	1 each
Hydraulic rescue kit, (porta-power), 4 ton	1 set
Hydraulic rescue kit, (porta-power), 10 ton	1 set
Jack, hydraulic, "bottle type," 4 ton	4 each
Jack, hydraulic, "bottle type," 12 ton	4 each
Lifting bags, pneumatic, high pressure, set of 4 bags	1 set

TABLE A-3

The following is the recommended amount of tools needed for a class of thirty (30) students
MISCELLANEOUS TOOLS AND SUPPORT EQUIPMENT

Winch, chain, hand operated (come-a-long), 1 ½ ton	3 each
Shovel, flat	4 each
Shovel, round	4 each
Broom, stiff bristle, push type	4 each
Broom, standard	4 each
Salvage cover, 8" x 12" minimum	8 each
Chain, rigging, minimum 3 ton rating, w/ hooks	
3 foot	4 each
6 foot	6 each
8 foot	4 each
20 foot	4 each
Block, snatch, to accent 5/8" rope	4 each
Can, gasoline	4 each
Cribbing, hard wood, 2" x 4" x 18"	60 each
Cribbing, hard wood, 4" x 4" x 18"	60 each
Cribbing, hard wood, 4" x 4" x 24"	60 each
Cribbing, hard wood, 4" x 4" x 72"	6 each
Cribbing, step chock, base 2" x 6" x 30"	4 each
Wedges, assorted	60 each
Plates, jacking, 10" x 10" minimum	12 each
Air cylinder, 45 cubic feet	10 each
Pneumatic shores	4 each
Rope, static nylon kernmantle, ½" x 150'	6 each
Lantern, 6 volt, hand held	10 each
Flare, 30 minute, railroad type	1 case
Fire extinguisher, 20 lb., ABC	6 each
Blanket, wool or synthetic	8 each
Blanket, aluminized	2 each
Emergency medical kit	1 each
Power cable, 100 feet with reel	4 each
Portable electric lamps, 500 watt, minimum	6 each
Smoke ejector, (ventilation fan)	1 each
Webbing, tubular construction, nylon, 2" x 20'	12 each
Medical kit for real emergencies during training	1 each

LESSON 5

Part 1

TOOLS AND EQUIPMENT

LESSON 5 PART 1

TOOLS AND EQUIPMENT

TERMINAL OBJECTIVE

Given all minimum recommended tools and equipment, the student will be able to demonstrate his/her ability to:

1. Identify and name all tools and equipment.
2. List advantages and disadvantages as they apply to the use of the tool or piece of equipment when applied to vehicle rescue operations.
3. List applications of all tools or equipment as applied to vehicle rescue operations.
4. Assemble all equipment and tools that require assembly or setup prior to use.
5. Operate all tools and equipment.
6. Properly clean all tools and equipment.
7. Perform operator servicing and maintenance on all tools and equipment.
8. Properly store all tools and equipment.

LESSON 5 PART 1

TOOLS AND EQUIPMENT

KNOWLEDGE OBJECTIVES

1. Given the minimum recommended rescue tools and equipment, the student will be able to identify and name each tool and piece of equipment.
2. Given the name of a tool or piece of equipment, the student will be able to list advantages of that tool or piece of equipment when applied to vehicle rescue operations.
3. Given the name of a tool or piece of equipment, the student will be able to list disadvantages of that tool or piece of equipment when applied to vehicle rescue operations.
4. Given a vehicle rescue situation and an identified task, the student will be able to list the appropriate tool(s) and equipment to accomplish the identified task. In addition, the student will be able to list at least one (1) alternative tool or piece of equipment to accomplish the task should the primary tool not be available for use.
5. Given the name of a tool or piece of equipment, the student will be able to list all associated tools, hardware or equipment necessary to employ the primary device in optimum fashion to effect a vehicle rescue.
6. Given the name of a tool or piece of equipment, the student will be able to list all special hazards or operational considerations associated with the use of that tool or piece of equipment.
7. Given a list of tools or equipment, the student will be able to identify those tools and that equipment which require assembly prior to operation.
8. Given the name of a tool requiring assembly prior to use, the student will be able to list the steps of assembly in proper sequence.

LESSON 5 PART 1

TOOLS AND EQUIPMENT

SKILL OBJECTIVES

1. Given a 30 minute, railroad type warning flare (“Fusee”), the student will be able to demonstrate his/her ability to safely ignite and position the flare.
2. Given a piece of utility rope, the student will be able to demonstrate his/her ability to tie the following knots and hitches:
 - a. Bowline
 - b. Half hitch
 - c. Clove hitch
 - d. Water knot
3. Given a ratchet strap the student will be able to assemble the strap and properly tighten the strap.
4. Given a spring loaded center punch, the student will be able to demonstrate his/her ability to set the correct spring tension for proper utilization of the tool.
5. Given a hacksaw and a spare blade, the student will be able to demonstrate his/her ability to change the curing blade of the tool.
6. Given a salvage cover (minimum size 12’ x 12’), the student will be able to demonstrate his/her ability to fold and store the cover.
7. Given a 10 lb or 20 lb ABC fire extinguisher, the student will be able to demonstrate his/her ability to activate the device and successfully employ the device in fire suppression practices.
8. Given a set of chains with grab hooks on both ends, the student will be able to demonstrate his/her ability to rig the chains to permit a stabilization or a pulling operation.

9. Given a mutually powered, ratchet type, winch (come-a-long) and all necessary chains, the student will be able to demonstrate his/her ability to attach the rigging chains to the object to be pulled, to a counter traction point, and to the hand winch and accomplish the following:
 - a. Pull the object
 - b. Reverse ratchet direction and release pull
 - c. Disassemble equipment
 - d. Clean all equipment
 - e. Service all equipment
 - f. Store all equipment

10. Given a four (4) ton hydraulic rescue kit (porta-power), the student will be able to demonstrate his/her ability to perform the following:
 - a. Assemble the equipment to permit a spreading application using the jaws
 - b. Assemble the equipment to permit a spreading application using the ram
 - c. Assemble the equipment to permit a spreading application using the ram and sufficient extending bars to spread objects that are a minimum of 24 inches apart
 - d. Assemble the equipment so as to demonstrate which ends are appropriate for securing a purchase on flat surfaces, round surfaces, and irregular surfaces
 - e. Disassemble all equipment
 - f. Clean all equipment
 - g. Service all equipment
 - h. Store all equipment

13. Given a ten (10) ton hydraulic rescue kit (porta-power), the student will be able to demonstrate his/her ability to perform the following:
 - a. Assemble the equipment to permit a spreading application using both the small jaws (“Wedgie”) and the large jaws (“Duckbill”)

- b. Assemble the equipment to permit a spreading application using the ram
 - c. Assemble the equipment to permit a spreading application using the ram and sufficient extending bars to spread objects that are a minimum of 36 inches apart
 - d. Assemble the equipment so as to demonstrate which ends are appropriate for securing a purchase on flat surfaces, round surfaces, and irregular surfaces
 - e. Disassemble all equipment
 - f. Clean all equipment
 - g. Service all equipment
 - h. Store all equipment
14. Given a gasoline powered or diesel powered, portable electric generator, power cable, and portable lights, the student will be able to demonstrate his/her ability to perform the following:
- a. Start the generator
 - b. Lay power cable for portable lights a minimum distance of 25 feet
 - c. Power a minimum of two (2) portable electric lights at a minimum distance of 25 feet from the generator and with a minimum distance of 25 feet between the lights
 - d. Disassemble the lights and power cables
 - e. Clean the generator, cables, and lights
 - f. Properly coil and store the power cable
 - g. Properly service and store the lights
 - h. Properly service and store the generator
16. Given a hydraulic jack and all necessary cribbing, the student will be able to demonstrate his/her ability to properly set up and operate the hydraulic jack.
17. Given a high lift jack and all necessary cribbing and support equipment, the student will be able to demonstrate his/her ability to properly set up and operate the high lift jack.

18. Given a complete set of pneumatic lifting bags and all associated equipment, the student will be able to demonstrate his/her ability to perform the following:
 - a. Assemble the air bag, hose, valve, regulator, and air supply
 - b. Inflate a single air bag
 - c. Deflate a single air bag
 - d. Attach and make use of an inline valve
 - e. Set up the lifting system to effect a multiple pressure point lift using single air bags at each point
 - f. Set up the lifting system to effect a single point two bag lift
 - g. Disassemble, clean, service, and store all equipment
19. Given a 20 foot section of tubular nylon webbing, the student will be able to demonstrate his/her ability to perform the following:
 - a. Tie a water knot to create a continuous loop

Lesson 5 Part 1: Tools and Equipment

- A. General
 1. Tools and equipment are an integral part of any rescue operation
 2. Generally, we use tools and equipment to perform four (4) different functions

- a. Increase grip
 - b. Increase strength
 - c. Increase reach
 - d. Increase speed with which we can accomplish a task
3. In addition, various tools and support equipment are used to provide for safety during the rescue operation
4. Specific job functions we expect from our tools and equipment are:
- Hazard Control and Safety
 - Severing
 - Distorting
 - Displacing
 - Disassembling
- a. Hazard control and safety
 - 1) We employ various tools and equipment to neutralize or at least minimize hazards to the rescue operation
 - 2) We must protect our patient(s) from further injury, from exposure to the elements, and from ourselves
 - b. Severing
 - 1) Definition: To divide into two or more parts by cutting, piercing, penetrating, splitting, breaking, sawing, etc.
 - 2) Applications:
 - a) Gaining access to patient
 - b) Disentanglement of the patient
 - c) Enlarging area to permit removal
 - 3) General advantages:
 - a) Positive removal of obstruction

- b) No special assembly of components or fitting to structure required
- c) Usually a quick procedure
- 4) General disadvantages:
 - a) Many cutting methods and tools create sparks or heat
 - b) Noisy
 - c) May be dangerous to personnel
 - d) Power supplies may be heavy or complex
 - e) May require supportive equipment
 - f) Hand powered tools may be slow
- c. Distorting
 - 1) Definition: To change the shape of an object in a plastic flow manner or other permanent manner without severing or parting
 - a) Examples of distorting are bending, prying, spreading, enlarging, expanding, squeezing, compressing, etc.
 - 2) Applications:
 - a) To move portions of a vehicle structure to a more advantageous position
 - b) To remove obstacles
 - c) To enlarge spaces
 - 3) General advantages:
 - a) Relatively quiet, except for power plants

- b) Usually a smooth application of force occurs,
i.e., no vibration
 - c) Usually requires a reactive surface
 - d) May be slow into operation due to equipment
setup time required
 - e) May require large force application
- d. Displacing
- 1) Definition: The moving of an object or a portion of an
object from its original position. The motion may be in
any plane and the effect of the force applied is generally
controllable. Minor distortion may occur during
displacing.
 - a) Examples: lift, lower, push, pull, rotate
 - 2) Applications:
 - a) Removal of debris or portions of structure to
gain access
 - b) Removal of wreckage for disentanglement
 - c) Removal of wreckage from patient
 - d) Removal of patient from the wreckage
 - e) Transportation of the patient from wreckage to
the ambulance
 - 3) General advantages:
 - a) May be rapid
 - b) May provide for complete access or
disentanglement with no other functions
required

- c) Generally, no sparks or heat
- d) Wide variety of surfaces to work on or with
- 4) General disadvantages:
 - a) May require reactive surfaces
 - b) Objects being displaced may assume an unstable position or collapse with potential of additional injury to patient or rescuer
 - c) Setup time may be lengthy

e. Disassembling

- 1) Definition: Reducing objects to basic component parts in the reverse manner from which originally assembled
- 2) Applications:
 - a) Disentanglement
 - b) Removal of patient from the wreckage
- 3) General advantages:
 - a) Probably least hazardous of all
 - b) No heat, no sparks
 - c) No unpredictable motion or position
 - d) No noise or vibration
- 4) General disadvantages:
 - a) Structural damage may inhibit or prohibit the disassembly of vehicle components
 - b) May have difficulty reaching bolts, screws, etc.
 - c) Probably the slowest of all

B. General Classifications and Functions of Tools and Equipment

1. Classification

- a. We will classify tools and equipment into four (4) areas
 - 1) Small hand tools
 - a) Small tools stored and carried in a tool box
 - 2) Large hand tools
 - a) Too big to be stored and carried in a standard tool box
 - b) Stored individually in compartments
 - 3) Powered tools
 - a) Require power source for operation
 - 1)) Air
 - 2)) Electric
 - 3)) Gasoline
 - 4)) Hydraulics
 - b) Generally, stored individually with other components of the system and/or support equipment
 - 4) Support tools and equipment
 - a) Used in conjunction with other tools and equipment, or individually, in support of vehicle rescue operations
 - 5) You should familiarize yourself with Tables 5-1, 5-2, 5-3, and 5-4 which identify the basic tools and categories

2. Functions

- a. Earlier in this module we stated that the general functions of the tools can be divided into five (5) categories
 - 1) Hazard Control and Safety

- 2) Severing
 - 3) Distorting
 - 4) Displacing
 - 5) Disassembling
- b. Many tools can function in more than one of these categories depending upon the following variables:
- 1) The mode of operation
 - 2) The mode of application
 - 3) The manner in which assembled
 - 4) Is support equipment used, if so, what?
- c. A good rescuer needs to be familiar with the functions of all of our tools and equipment
- d. A good rescuer needs to compare functions of tools and equipment
- 1) What tools will perform the same function?
 - 2) Even though a tool may require extra effort or a longer period of time to perform its job, you should be aware of what different function each and every tool WILL perform
 - 3) This multiple function awareness is very critical!!!
 - a) If our tool of choice fails to operate or breaks during use, we must be able to replace the tools and finish the task
 - 4) NEVER PERMIT YOURSELF TO BECOME A ONE TOOL RESCUER!!!!

- a) As sure as we are here in class, one day your favorite tool will fail to work in a critical situation!!!
- b) You must then be able to quickly and easily use a secondary tool to perform the task
- c) You should familiarize yourself with Tables 5-5, 5-6, 5-7, 5-8, 5-9, and 5-10 so you will know what general function or functions your tools and equipment are capable of performing

C. Advantages and Disadvantages

1. Hand tools

a. Advantages

- 1) Light weight
- 2) Simple construction
- 3) Little, if any, support equipment required
- 4) Very rapid application (i.e., fast into operation)
- 5) No special setup required
- 6) Low level of noise and vibration
- 7) Can be applied in small spaces
- 8) Wide variety of tools can be quickly brought to the scene
(tool box)
- 9) Most tools are common and can be used with a minimum training and experience
- 10) Inexpensive (?)
- 11) Easy to clean and maintain
- 12) Low incidence of equipment failure or breakage

- 13) Inexpensive to repair/replace
- 14) Easy to store, requires minimum space

b. Disadvantages

- 1) Physical effort required to operate
- 2) Total force that is generated is considerably less than that of powered tools
- 3) The application of force is inconsistent due to human effort required
 - a) Intensity and direction of force
- 4) The speed of completing a task is significantly less than speed of power tools
- 5) May have inconsistent results due to human variances
- 6) Long term application of force yields a reduction of operations efficiency due to the physical fatigue and mental frustration of the operator
- 7) Single tool may have a limited or sole function

2. Power tools

a. Advantages

- 1) Force generated is significantly greater than hand tools
- 2) Force is consistent and predictable
- 3) Relatively rapid completion of task
- 4) Requires minimal physical exertion of operator
- 5) One tool may accomplish many functions

b. Disadvantages

- 1) Heavy

- 2) Complex construction
- 3) Usually requires supportive equipment or assembly prior to use
- 4) Slow into operation
- 5) Requires special training and experienced operator
- 6) May have a relatively high noise and vibration level
- 7) More prone to failure or breakage than hand tools (more moving parts)
- 8) Requires special cleaning and maintenance considerations
- 9) High initial cost
- 10) High cost of repairs/replacement
 - a) Professional repair may be needed
- 11) May require inventory of spare parts
- 12) May require special storage space
 - a) Size of compartment
 - b) Environmental conditions, compatibility, etc.
- 13) May require special (periodic) operational checks and run ups

D. Tools Requiring Support Equipment

<u>TOOL</u>	<u>SUPPORT EQUIPMENT NEEDED</u>
Cold chisel	Hammer
Saws (All)	Spare blades
Gasoline powered equipment	Fuel, oil, spare plugs
Porta-power	Cribbing, plates
Jacks	Cribbing, plates
Air bags	Air supply, straps
Hand winch	Chains, cribbing

E. Tools Requiring Rigging or Assembly Prior to Using

1. General

- a. There are many tools available to perform multiple functions; however, for the most part these tools will first require assembly of component parts prior to use
- b. A change in applied function usually requires a change in the assembly procedure
- c. Some tools that provide for only one function require assembly or rigging
- d. For the most part, tools requiring assembly or rigging fall into the “Power Tool” category
- e. We will identify the tools requiring assembly, including component parts, and we will learn to assemble or rig the tool based upon the desired function

- f. There will be demonstrations of assemblies and riggings, as well as practice time, before we put the equipment to work on an automobile
2. Tools and component parts
- a. Air bags (pneumatic lifting bags)
 - 1) Functions
 - a) Hazard control and safety – air bags can be used for stabilization, either independently or as support equipment, to set cribbing
 - b) Distorting – can be used in conjunction with nylon straps as a distorting tool
 - c) Displacing – can be used to lift or push entire objects. “this was the original designed function of this piece of equipment – to accomplish displacement of extremely heavy objects through lifting”
 - 2) Components
 - a) Air bags – assorted sizes
 - b) Air hoses, minimum of three (3)
 - c) Control valves
 - d) Pressure reducing regulator
 - e) In-line valves
 - f) Air cylinder
 - 3) Assembly
 - a) Attach regulator to cylinder
 - b) Attach air hose to regulator

- c) Attach air hose from regulator to control valves
 - d) Attach in-line valves to air bags
 - e) Attach air hoses to in-line valves
 - f) Attach air hoses to control valve outlets
- b. Come-a-long, winch, hand operated, ratchet type
- a) Function – displacing tool – pulling tool
 - b) Requires rigging prior to operation
 - c) Rigging is usually of chains; however, nylon webbing of appropriate strength may be used
- 1) Rigging the chains and tool
- a) Attach rigging chain to object to be moved
 - b) Attach rigging chain to static point
 - 1)) This point must be on the car, not a tree, pole, guard rail, etc.
 - c) Attach “moving hook” of the winch to the chain which is rigged to the object to be pulled
 - c) Attach the “static hook” of the winch to the chain that is rigged to the “static point” on the car
- c. Electric lights
- 1) Function
 - a) Support operations
 - b) Hazard control
 - 2) Components
 - a) Electric lights
 - b) Power cable

- c) Electric generator
- 3) Assembly
 - a) Attach cable to generator
 - b) Attach cable to lights
 - 1)) Note: If lights are not equipped with switches, you should first start the generator then attach the cables. Do not start the generator under load.
- d. Rope
 - 1) Function
 - a) Hazard control
 - 1)) Crowd control
 - 2)) Safety lines
 - 3)) Stabilization (last resort)
 - b) Displacing
 - 1)) Lift or move objects either alone or in conjunction with snatch blocks or other equipment
 - c) Support
 - 1)) Hand lines or life lines
 - 2)) Equipment hoisting and/or lowering
 - 2) Assembly
 - a) Bowline
 - b) One half hitch
 - c) Clove hitch
 - d) Overhand knot

- e. Webbing
 - 1) Function
 - a) Hazard control & safety
 - b) Support equipment
 - 2) Assembly
 - a) Water knot
- f. Porta-power
 - 1) Function
 - a) Distorting – bending, pulling, spreading
 - b) Displacing – moving objects
 - 2) Components
 - a) Hand pump
 - b) Hydraulic hose
 - c) Spreading jaws
 - 1)) Large – “Duckbill”
 - 2)) Small – “Wedgie”
 - d) Rams spreader
 - e) Jack (ram) body tool
 - f) Jack (ram) tool
 - g) Jack (ram) base
 - h) V-notch cap
 - i) Rubber head
 - j) Offset spreading toe
 - k) Extension tubes (20”, 16”, etc.)
 - l) Extension tube clips
 - m) Chain pull collar

- n) Chain pull head
- o) Ram cups
- p) Chains with hooks
- q) Chain shorteners with hooks
- 3) Assembly
 - a) Pump – Hose- Ram
 - b) Pump – Hose – Jaws
 - c) Extension tubes
 - d) Toes, heads, bases

F. Special Operational Considerations and Hazards

- 1. Axes
 - a. Dull – skip rather than cut
- 2. Cold chisels and air chisel bits
 - a. Dull – skip rather than cut
- 3. Wooden handled tools – ALL
 - a. Loose handles and cracked handles
- 4. Center punch, spring loaded
 - a. Too much spring tension – “blow in” the window
- 5. Saw blades
 - a. Number of teeth per inch
 - b. Composition
 - c. Purchase high quality – do not scrimp!!!
- 6. Gasoline power sources, generators, saws, etc.
 - a. Special considerations
 - 1) Significant parts of all engines
 - a) Choke

- b) Throttle
 - c) Starter/pull cord
 - d) Ignition switch
 - e) Ground switch/spark arrestor/off switch
 - f) Fuel valve
- 2) For 2 cycle engines - What is the mix ration of oil to fuel?
- 3) What is the difference between a 2 cycle and 4 cycle engine?
- 4) Regular operations
- a) **POWER PLANTS MUST BE RUN
REGULARLY**
 - 1)) Recommend a minimum of once per week
 - 2)) Start and allow to run until warm (10 minutes)
 - b) Need to clean filters regularly
 - 1)) After every use?
 - 2)) Fuel filter
 - 3)) Air filter

b. Hazards and drawbacks of gasoline powered equipment

- 1) Fire hazard
- 2) Noise
- 3) Exhaust fumes
- 4) Vibrations

7. Electric generator

- a. Fused circuits?
 - b. Spare fuses?
 - c. Switches ?
8. Chain saw, gas, electric, or hydraulic
- a. Special considerations
 - 1) Spare chain
 - 2) Spare fuel/oil mix or extension cord
 - 3) Chain oil
 - b. Hazards/Disadvantages
 - 1) Torque
 - a) Jump/kick
 - 2) See gasoline power sources
 - 3) Sawdust, chips, eye hazard
 - 4) Hearing hazard
 - 5) Heat, noise, vibration
9. Rescue kit (porta-power)
- a. Special considerations
 - 1) Will not work as hard as you think
 - 2) Common problem: blown seals and hydraulic fluid leaking
 - 3) Requires two people to operate
 - a) One at the spreader
 - b) One at the hand pump
 - 4) Should use cribbing at pressure points
 - 5) Tends to be a good “inside” tool

b. Hazards/Disadvantages

- 1) Setup and assembly time may be extensive

G. Cleaning and Servicing of Tools and Equipment

1. General

a. Painted surfaces

- 1) Wash with soap and water
- 2) Rinse and dry
- 3) Avoid oil and grease

b. Wood surfaces

- 1) Wash and dry
- 2) Inspect for cracks and loose attachments
- 3) Do NOT paint wood, leave natural or clear varnish so that you do not hide any damage
- 4) Avoid grease and oil

c. Bare metal surfaces

- 1) Wash and dry
- 2) Wipe with lightly lubricated rag
- 3) Make sure to remove ALL excess oil
- 4) Do not allow grease or oil to accumulate on handles
- 5) Do not paint metal, this may mask damage
- 6) Cutting edges should be protected with a cover to prevent accidental injury and to maintain the cutting Edge
- 7) Cutting edges should be lubricated
- 8) Moving parts should be oiled at any point of articulation

d. Plastics

- 1) Wash with soap and water
 - 2) Dry
 - 3) Avoid cleaning solvents and petroleum products
- e. Rubber
- 1) Wash with soap and water
 - 2) Dry
 - 3) Avoid cleaning solvents and petroleum products
- f. Rope
- 1) Wash with soap and water
 - 2) Dry completely
 - a) 48 – 72 hours
 - b) Avoid sunlight
 - c) Avoid high temperatures
 - d) Air dry by hanging is probably best
- g. Nylon fabrics and implements (webbing and straps)
- 1) Wash with soap and water
 - 2) Rinse and dry
 - 3) Avoid cleaning solvents and petroleum products
- h. Natural fabrics
- 1) Launder according to manufacturers standards

H. Demonstration

1. Instructor should provide for demonstration of the following:
 - a. Chain rigging
 - b. Air bag system assembly and operation
 - c. Electrical equipment assembly and operation of the generator

- d. Rope
 - 1) Bowline
 - 2) One half hitch
 - 3) Overhand knot
 - 4) Clove hitch
- e. Webbing
 - 1) Water knot
 - 1)
- f. Porta-power
 - 1) Ram spreader
 - 2) Jaw spreader
 - 3) Extensions
 - 4) Heads, toes, and feet
- 2. Demonstrate the operation of all power plants
 - a. Generator
 - b. Chain saw
- I. Student Practice – The instructor should provide for student practice of the following skills under close supervision. Successful practice will require the student to assemble and operate the following:
 - 1. Chain rigging
 - 2. Come-a-long
 - 3. Air bag system
 - 4. Electrical equipment
 - 5. Porta-power
 - 6. All power saws
 - 7. Hydraulic jacks

8. High lift jacks
9. Smoke ejector
10. Generator
11. Fire extinguishers
12. Change hacksaw blade
13. Change reciprocating saw blade
14. Set spring tension on center punch

TALBLE 5-1

SMALL HAND TOOLS

1. Slip joint pliers	15. Center punch (standard and spring)
2. Arc joint pliers	16. Hacksaw (regular and low profile with spare blades)
3. Locking pliers	17. Screwdrivers, slotted (3/8" x 12"; 5/16" x 8"; 1/4" x 6")
4. Lineman's pliers	18. Screwdrivers, phillips (#2 & #3)
5. Needle nose pliers	19. Metal snips
6. Windshield saw	20. Locking measuring tape (16 ft. min.)
7. 32 oz. Ball peen hammer	21. Pipe wrench
8. 20 oz. Rip claw hammer	22. Adjustable wrench
9. 3 lb. Sledge or drilling hammer	23. Box end wrenches
10. 16 oz. Rubber mallet	24. Open end wrenches
11. Ratchet strap	25. Ratchet drive sockets wrenches
12. Utility knife	26. Spark plug gap tool and wrench
13. Locksmith's tools	27. Screwdriver, Torx, (10, 15, 20)

TABLE 5-2
LARGE HAND TOOLS

1. "Crash axe"
2. "Pry axe"
3. Pick head axe (8 lbs.)
4. Flat head axe (8 lbs.)
5. Pry bar, 48"
6. Wrecking bars
7. "Halligan" bar
8. Jack, hydraulic (4 ton, 8 ton, 10 ton, 20 ton, etc.)
9. Jack, ratcheting, "high lift"
10. Winch, hand (come-a-long)
11. Bolt cutters
12. Sledge hammer (6-9 lbs., long handle)

TABLE 5-3

POWER TOOLS

1. Electric generator
2. Porta-power (4 ton, 10 ton, 20 ton, etc.)
3. Pneumatic lifting bags
4. Chain saws

TABLE 5-4
SUPPORT TOOLS AND EQUIPMENT

1. Square shovel	13. Portable electric lights (500-1500 watt)
2. Round shovel	14. Fusees
3. Brooms	15. Traffic cones
4. Salvage covers	16. Safety vests
5. Chains	17. Fire extinguishers
6. Rope	18. Electric cables and reels
7. Gasoline cans with fuel	19. Blankets (wool, disposable, aluminized)
8. Cribbing	20. Smoke ejector
9. Wedges	21. Medical kit
10. Jack plates	22. Nylon webbing
11. Air cylinders, spare	23. Car door opening kit
12. Flashlights	24. Ratchet straps

TABLE 5-5

HAZARD CONTROL, SAFETY TOOLS AND EQUIPMENT

1. Fusees – warning devices
2. Traffic cones – warning devices
3. Salvage cover – patient protection
4. Chains – stabilization
5. Pneumatic shores - stabilization
6. Jacks (hydraulic and high lift) – stabilization
7. Pneumatic lifting bags
8. Come-a-long – stabilization
9. Ratchet Strap – stabilization
10. Cribbing, wedges and plates – stabilization
11. Rope – stabilization, crowd control, personal protection
12. Nylon webbing – stabilization, personal protection
13. Vest – personal protection
14. Personal protective gear – personal protection
15. Hammers
16. Rubber mallet – non-sparking
17. Smoke ejector – ventilation
18. Portable lights and power cable – lighting
19. Flashlights – lighting
20. Electric generator – lighting
21. Blankets
22. Fire extinguisher

TABLE 5-6

TOOLS AND EQUIPMENT FOR SEVERING

Definition: Dividing into two or more parts by cutting, piercing, penetrating, splitting, breaking or sawing.

1. Crash axe
2. Pry axe
3. Pick head axe
4. Flat head axe
5. Cold chisels
6. Bolt cutter
7. Hammers
8. Utility knife
9. Lineman's pliers
10. Locking pliers
11. Center punches
12. Hacksaws
13. Chain saws
14. Windshield saw

TABLE 5-7

TOOLS AND EQUIPMENT FOR DISTORTING

Definition: To change the shape in a permanent manner without severing or parting. Processes which might be used include bending, prying, spreading, enlarging, expanding, squeezing, or compressing.

1. Pry axe
2. Pick head axe
3. Flat head axe
4. Pry bars
5. Wrecking bars
6. Halligan bars
7. Cold chisels
8. Hammers
9. Pliers – ALL
10. Screwdrivers
11. Porta-powers
12. Jacks – ALL
13. Air bags
14. Come-a-long
15. Chains

TABLE 5-8

TOOLS AND EQUIPMENT FOR DISPLACING

Definition: An object, or portion of an object, is moved from its original position by lifting, lowering, pushing, or rotating.

1. Porta-powers
2. Come-a-long
3. Chains
4. Ropes
5. Pneumatic lifting bags
6. Jacks

TABLE 5-9

TOOLS AND EQUIPMENT FOR DISASSEMBLING

Definition: To reduce objects to component parts in the reverse order in which they were assembled.

1. Arc joint pliers
2. Locking pliers
3. Needle nose pliers
4. Slip joint pliers
5. Screwdrivers – ALL
6. Adjustable wrench
7. Box end wrenches
8. Open end wrenches
9. Ratchet drive socket wrenches

TABLE 5-10

TOOLS AND EQUIPMENT FOR SUPPORT OPERATIONS

1. Hammers
2. Locksmith's tool – car door opening kit
3. Spare saw blades
4. Locking tape
5. Generator
6. Shovels
7. Salvage covers
8. Chains
9. Gasoline cans
10. Tool boxes
11. Cribbing and wedges
12. Rope
13. Flashlights
14. Portable lights
15. Blankets
16. Medical kit

LESSON 6

ACCESS

LESSON 6

ACCESS

KNOWLEDGE OBJECTIVES

1. Given the minimum recommended rescue tools and equipment, the student will be able to identify and name each tool or piece of equipment associated with the access phase of the vehicle rescue operation.
2. Given the name of an access tool or shown the tool, the student will be able to list the manner(s) in which the tool is employed to gain access to entrapped patients in a vehicle accident situation.
3. Given the name of an access tool or shown the tool, the student will be able to list the advantage(s) of each tool when applied to gaining access to trapped patients of vehicle accidents.
4. Given the name of an access tool or shown the tool, the student will be able to list the disadvantage(s) of each tool when applied to gaining access to trapped patients.
5. When asked, the student will be able to list the access routes available to reach trapped patients. The student must be able to respond both in writing and verbally.
6. Given a picture or simulated vehicle accident, the student will be able to identify the primary, secondary, and tertiary access routes, each in proper order of attempt.

LESSON 6

ACCESS

SKILL OBJECTIVES

1. Given a picture or simulated vehicle accident and the primary, secondary, and tertiary routes of access, the student will be able to select the proper tools required to gain access to the patient. Successful performance requires that the student must identify the tools of each access route identified.
2. Given a simulated vehicle accident and all necessary tools and equipment, the student will be able to demonstrate his/her ability to gain patient access through the doors of the vehicle under the following conditions:
 - a. Door unlocked and undamaged
 - b. Door locked and undamaged
 - c. Door unlocked and damaged
 - d. Door locked and damaged

To be successful, the student must gain access under all conditions and must be able to affect access through all doors of the vehicle which include front, passenger, and rear doors in the case of station wagons and vans. The student must also select the proper tool for the procedure and demonstrate the correct use.

3. Given a simulated vehicle accident and all necessary tools and equipment, the student will be able to demonstrate his/her ability to gain access through the windows of a damaged vehicle. To be successful, the student must be able to gain access to the patient compartment through the following windows and make use of the proper tool in the appropriate manner:
 - a. Side passenger window, rear
 - b. Side passenger window, front
 - c. Rear window

d. Windshield

4. Given a simulated vehicle accident and all necessary tools and equipment, the student will be able to demonstrate his/her ability to gain access through the damaged vehicle's roof using the proper tool(s) in the appropriate manner.
5. Given a simulated vehicle accident and all necessary tools and equipment, the student will be able to demonstrate his/her ability to gain access through the damaged vehicle's trunk using the proper tool(s) in the appropriate manner.
6. Given a simulated vehicle accident and all necessary tools and equipment, the student will be able to demonstrate his/her ability to gain access through the damaged vehicle's floor using the proper tool(s) in the appropriate manner.
7. Given an undamaged, locked vehicle and all necessary tools and equipment, the student will be able to demonstrate his/her ability to unlock and open the door in a non-destructive manner. (Scenario is to simulate "child locked in car.")

Lesson 6 Access

A. Goal

1. To create a pathway so that qualified medical personnel may reach the patient(s) and begin patient assessment and medical care
 - a. This is a critical phase of the rescue operation
 - 1) The patient(s) must receive medical evaluation and treatment as quickly as possible
 - 2) The welfare of the injured is really the primary concern of the rescue company NOT the reduction of the damaged vehicle into its component parts
 - a) It sometimes seems that rescue units concern themselves more with the dismantling or further destruction of the damaged vehicles than they do with the patient's welfare
 - b. While it is not necessary that the rescue squad have trained EMT/Paramedics as part of its manpower complement, IT IS IMPERATIVE that the rescue squad use EMT/Paramedics on the scene of the rescue operation
 - 1) These EMT/Paramedics may be assigned to the fire apparatus, rescue unit or emergency medical services unit in the district
 - 2) If the rescue squad does not have any EMT/Paramedics, there MUST be a strong understanding of the importance of the patient's medical needs; therefore, a very close working relationship with the emergency medical service providing the care at the scene

- 3) REMEMBER: Anybody can take a vehicle apart with the tools and equipment available today, but there is really little need for this skill if we ignore the medical needs of the patient(s)
- c. We have delayed our access to the patient(s) in order to size-up the accident scene, recognize and control hazards, and to call in support units to perform functions that the rescue squad did not have the ability of handling alone
- d. Access must then be gained as quickly as possible to permit the proper evaluation of the patient(s) and the initiation of basic life support treatment of the patient(s)
 - 1) In many accidents, access routes may already exist as a result of the mechanism of the accident
 - 2) In other accidents, tools and equipment must be used to gain access
2. Once the pathway to the patient(s) is identified or has been created, what are the objectives of the EMT/Paramedic that accesses the patient(s)?
 - a. Evaluate the patient's medical condition
 - b. Recognize and report all airbag location in the vehicle
 - c. Begin basic life support treatment
 - d. Assess the needs for disentanglement of the patient
 - 1) Disentanglement is the next phase of the rescue operation and as such has two (2) basic goals:
 - a) Remove the patient(s) from the entrapment

- b) Provide sufficient room within the damaged vehicle for proper medical treatment and packaging of the patient(s)
 - e. Assess the needs for additional tools and equipment application to create a pathway for the removal of the packaged patient(s)
 - f. Protect the patient during the disentanglement, packaging, and removal phases of the operation
 - g. Package the patient for removal
 - h. Assist with the physical removal of the patient from the wreckage
- 3. The EMT/Paramedic that accesses the patient is historically the weak link in our vehicle rescue operation
 - a. WHY??????
 - 1) If personnel who are only rescue trained, not medically trained, are used to access the patient, they must have the necessary knowledge and skills to accomplish five (5) of the objectives of rescue:
 - a) Assess disentanglement needs
 - b) Recognize all potential hazards in the vehicle i.e. air bags
 - c) Assess needs for creating an extrication pathway
 - d) Protect the patient(s) from the rescue operation
 - e) Assist with the removal of the patient
 - 2) The tasks that the RESCUE ONLY person cannot accomplish in the rescue operation are:
 - a) Evaluation of the patient's medical condition

- b) Basic life support treatment of the patient(s)
 - c) Packaging of the patient(s) for safe removal
- 3) If only medically trained, not rescue trained, personnel are used, they will have the necessary knowledge and skills to accomplish the following tasks required of the rescue operation:
- a) Evaluation of the patient's medical condition
 - b) Provide basic life support treatment of the patient(s) while the rescue operation proceeds
 - c) Protect the patient(s) during the remainder of the operation
 - d) Packaging of the patient(s) for safe removal
- 4) What the MEDICAL ONLY person is lacking is the ability to accomplish the other objectives of the operation:
- a) Assess the needs for disentanglement
 - b) Assessment of potential hazards in the vehicle
i.e. air bag systems
 - c) Assess the needs for an extrication pathway
- b. We can now see that the demands of the rescue operation are really two-fold:
- 1) The physical rescue operation
 - 2) The medical care of the patient(s)
- c. We must begin to properly train individuals to perform ALL aspects of vehicle rescue operations so that our patient(s) do not

suffer because of the lack of knowledge or skills on the part of the rescuers

- d. REMEMBER: Additional injury, or even death, may result from the rescue operation that does not provide for competent medical evaluation and treatment of the patient during the rescue operation
- e. REMEMBER: The finest medical care available will not benefit the patient(s) if we do not have the knowledge and skills to properly apply the tool(s), equipment, and techniques of vehicle rescue in order to remove the patient(s) from the entrapment

B. Access Tools and Equipment

- 1. Access is to be accomplished as quickly as possible
 - a. Most access problems can be solved with the use of hand tools
 - 1) It is thought that 95% of all access can be accomplished with hand tools alone
 - 2) Hand tools are quick into operation and will usually create a pathway large enough for patient access
 - 3) Power tools require set up time and will further delay access to the patient(s)
 - 4) If power tools are needed for the access phase of the operation consider the following:
 - a) Begin with hand tools – you may accomplish access before the power tool is operational
 - b) Begin with hand tools – you will make the application of the power tool more efficient by “paving the way” with your hand tools

c) Begin with hand tools – you are doing
“something”

1)) Nothing looks worse than a crew
standing around at the scene of an
accident waiting for equipment to be
made ready!!!

b. Tools and equipment used to gain access

- 1) Axes
- 2) Pry bars
- 3) Wrecking bars
- 4) Halligan bars
- 5) Cold chisels
- 6) Door opening kit
- 7) Pliers
- 8) Center punches
- 9) Hacksaws
- 10) Hammers
- 11) Screwdrivers
- 12) Wrenches

c. The access tools should be carried in pairs so that two (2)
rescuers can work simultaneously on the task

2. Routes of access

* doors

* windows

* roof

* other parts of the body of the vehicle

- a. Access through the doors of the vehicle
 - 1) FIRST try to open ALL the doors of the vehicle before any tools are brought into play
 - a) Many times a door is unlocked and can be easily opened
 - b) It does not matter which door access is gained through, this is not necessarily the route of extrication
 - c) Do not forget to try the tailgate of station wagons, the rear doors of vans, and the rear hatch of a hatchback vehicle
 - 2) Unlocking an undamaged door
 - a) Tools
 - 1)) Locksmith's tool
 - 2)) Bent wire
 - 3)) Screwdrivers
 - 4)) Car opening kit
 - b) The approach to the problem
 - 1)) Coupes are relatively easy, since there is no window support pillars or framework around the glass
 - a)) A screwdriver may be used to pry the window out for the insertion of another screwdriver or a bent wire to activate the lock pin or slide

- c) Problems encountered
 - 1)) Locking button has been replaced and now has a smooth surface rather than the original mushroom head
 - a)) This may make the use of a bent wire very difficult
 - b)) Tape a washer to the wire or a rod and drop over the smooth rod
 - 2)) Sedan
 - a)) There is a frame completely surrounding the window glass which will inhibit the easy prying of the glass
 - b)) You may need to use a locksmith's tool, rod or a door unlocking tool
 - 3)) Electric door locks
 - a)) Usually electric door locks are always "hot." If you can reach the switch, the locks will operate
 - b)) No power??
 - 1))) Back to basics – open manually

3) CHILD LOCKED IN CAR

- a) This is usually a non-emergency situation except for the anxious parents or in a hot environment
 - b) The nondestructive unlocking of an automobile requires special tools and techniques
 - c) Most newer cars have anti-theft components included in the doors to protect from this type of opening
 - d) Car opening kit
 - 1)) Multiple wire rods, depending upon manufacturer
 - 2)) Plastic wedge
 - 3)) Universal folding tool
 - 4)) You may need a flashlight but usually you will accomplish the unlocking of the door by touch, not sight
 - 5)) A car unlocking kit may be purchased at most auto parts stores
 - 6)) A manual will accompany the kit
 - e) Practice, practice, practice. It is NOT as easy as you think
- 4) Problems encountered with the opening of a damaged door
- a) Door may be jammed
 - 1)) You will need additional leverage to open the door
 - 2)) What tools can be used?

- a)) Long pry bars
 - b)) Wrecking bars
 - c)) Halligan bars
 - d)) Axes
 - e)) Power tools
- 3)) REMEMBER: The use of power tools requires set up time. You should begin the procedure with hand tools until the power tools are ready for operation
- a)) You may even open the door with hand tools before the power tools can be brought into play
- 4)) Specific power tools that are well adapted for opening damaged doors:
- a)) Powered hydraulic rescue tool systems
 - b)) Porta-powers
- 5)) Removing a door in its entirety from the vehicle
- a)) This procedure probably does not belong with the access portion of the rescue operation
 - b)) This is best suited to the disentanglement and/or

- extrication phase of the rescue operation
- c)) Very seldom, if ever, will you need to completely remove a door of a vehicle
 - d)) Powered hydraulic rescue tools are best suited for this task
- 6)) Opening a door past its normal range of motion
- a)) This procedure may occasionally be necessary for access; however, it is usually associated with the disentanglement phase of the operation
 - b)) Tools and equipment
 - 1))) Manpower – often one (1) or two (2) men can push a door beyond its normal range.

CAUTION: This procedure may result in the movement of the vehicle and could cause additional injury to the patient(s) trapped inside

2))) Chains and come-a-long

a))) Rig chain to
front of vehicle
and door, then
insert winch
and operate

3))) Powered hydraulic
rescue tools

a))) Spreaders

b))) Rams

b. Access through the windows of the vehicle

1) Many times the access path already exists for the rescuers

a) The mechanism of the accident breaks the glass

b) Windows were simply rolled down prior to the
accident

2) If the glass is intact, we must either break the glass or
remove it to gain access to the passenger compartment of the
car

a) Breaking is much quicker than trying to remove
glass

3) Laminated glass – will usually have to be cut or removed in
one or more pieces. The plastic lamination prevents the
complete shattering of the glass

a) Tools that may be used:

1)) Axes

2)) Windshield saws (“Glas-Master”)

- 3)) Air chisel
 - 4)) Reciprocating saw
 - b) If the glass is already damaged, you may be able to pull sections away using a large screwdriver or pry bars
 - c) The complete removal of the windshield is usually considered a disentanglement and/or extrication procedure, not access
- 4) Breaking tempered glass
- a) Quick access routes can be created by the breaking of the side or rear windows of a vehicle
 - 1)) You should use a pointed tool to break the glass
 - 2)) The use of blunt (heavy) tools, such as hammers, may result in an explosive scattering of glass pieces which may harm the patient(s) and rescuers
 - a)) Many times blunt objects will simply bounce off the glass without breaking it at all
 - b) Tools used to break tempered glass
 - 1)) Tool of choice – spring loaded center punch
 - a)) WHY???
 - b)) Tool is easy to control

- c)) Point of application of force is more precise than with tools that require a swinging stroke
- d)) The amount of glass that is scattered as a result of breaking is less and more easily controlled
- e)) Technique
 - 1))) Place punch on glass at a well supported corner – bottom or side
 - 2))) Reinforces glass and prevents the window from rebounding during impact
 - 3))) Result is less force being needed and cleaner severing operation
 - 4))) If using spring loaded punch, tension should only be enough to break glass
 - 5))) The greater the tension, the greater the

possibility of
uncontrollably
scattering glass pieces

f)) Once the glass is broken, it will
usually remain in position in the
frame

1))) You should pull the
remaining glass
outward to protect your
patient(s) from glass
shards

2)) Pick head axe

3)) Crash axe

4)) Pry axe

5)) Halligan bar (awl end) and sledge or axe

c) What glass do we break??

1)) It is usually best to break glass that will
result in the least threat to the person(s)
trapped within the vehicle

a)) A vent window may be broken
to provide enough access to
unlock a door

b)) A rear or side window may
often times be large enough to

provide for physical access to
the patient

- 2)) If the doors are inoperable and you plan to access the passenger compartment through a window, you should first consider breaking a rear side window
 - a)) Farthest from driver?
 - b)) In some vehicles, there may be no rear windows or that glass will be too small to permit physical entry

- 3)) An alternate access route may be gained through the door windows opposite the driver of the vehicle, front side glass, or through the rear window
 - a)) If you are entering through the front door windows, remember the proximity to the patient(s) creates a hazard which you may not be able to control
 - b)) Entry through the rear window provides wide spaces but also adds much more broken glass to the operation

- d) REMEMBER: You are trying to gain access to your patient(s) and as of yet you are not aware of the patient's needs or condition.
 - 1)) This means that you will be unable to protect your patient(s) during the operation of breaking glass
- e) Some rescue authorities believe that the use of duct tape, adhesive paper ("Contact") or adhesive sprays, minimizes the amount of glass scattered during the procedure, thereby reducing the hazards to the patient(s)
 - 1)) While achieving this purpose, the application of the adhesive material, the breaking of the glass and the removal of the broken materials will take additional time and may not stick due to oils or water on glass
 - 2)) REMEMBER: You have not yet accessed your patient(s)!!!
 - a)) You may be able to gain quicker access with a relatively high degree of patient safety by breaking a window that is away from any patient(s) and do so in a controlled manner using a spring loaded center punch

- 3)) Other considerations which may adversely affect the application of adhesive materials to glass are:
 - a)) Snow
 - b)) Ice
 - c)) Rain
 - d)) Dirt, road film, etc.
 - e)) Other foreign materials

5) Polycarbonate windows

- a) Can not be broken with hand tools
- b) Reciprocation saw will cut the Lexan but is the student cuts to fast it will melt back together
- c) A hole saw or a plunge router are the best tools for access through this glazing

c. Access through the roof

- 1) Cutting through the roof with hand tools
 - a) The three sided cut
 - 1)) The procedure is to make a three sided cut so as to form a “flap” of sheet material
 - 2)) Tools
 - a)) Flat head axe and sledge hammer
 - b)) Panel cutter and drilling hammer

- 3)) The need to “flap” a roof generally implies that the vehicle is on its side, not its wheels. There are probably better techniques to be used for a car on its wheels than a roof “flap” cut
- 4)) The use of the axe and the sledge hammer is considered to be a two (2) rescuer operation
 - a)) Make a starting hole with a bar, sharp pointed object or the tip of the axe itself
 - b)) One rescuer inserts the axe into the starting hole and holds the handle of the axe
 - c)) The second rescuer strikes the flat head of the axe with a sledge hammer, thus driving the axe through the sheet metal
 - d)) The first cut should be a downward cut following the top of the windshield
 - e)) The second cut should begin at the opposite corner of the roof from the finish of the first cut and cut back to the first cut

- 1))) This will permit a firm point from which to initiate the second cut
- f)) The final cut should be made by starting several inches below the beginning of your second cut and cutting downward, parallel to the top of the rear window
- g)) Finally, go back and remove the small portion of the roof that was left to reinforce the final cut
- h)) Fold the sheet metal “flap” downward
 - 1))) This will expose the headliner and the support rods
- i)) Cut the headliner out and pull the headliner support rods from their positions
- j)) Finally, cut the top of the roll bars, if present, and fold them downward onto the sheet metal “flap”
- k)) The last important step is to cover exposed edges to protect patients and rescuers
 - 1))) Old sections of hose

2))) Salvage covers

- b) The cutting of the roof with a pry axe follows the same procedure described above, except it is a one rescuer procedure

- 1)) If you have two (2) pry axes, two (2) rescuers may combine to provide for simultaneous cutting of the roof

- 2)) This significantly decreases the amount of time required for the operation

2) Cutting through the roof with power tools

- a) Air chisel is an excellent tool

- 1)) The bit does not protrude far into patient space

- b) The cutting procedure remains the same with only a few variances

- 2)) The cuts can be continuous

- c) For cutting the roof sheet metal you should use the “T” or “W” sheet metal blade

- d) A second rescuer should be assigned duty as the “hose tender”

- 1)) It is this rescuer’s responsibility to assure that the high pressure air hose does not become kinked, entangled, or cut during the operation

- e) When cutting with an air chisel, it is important to remember several basic procedures:

- 1)) The tool should be held as close to the roof surface as possible so that the cut is along the roof line and not INTO the roof
 - 2)) If you cut into the roof, you may bury or jam your cutting bit
 - 3)) Never force the tool, rather let the tool do the cutting and merely guide it through the proper range of the cut
- f) When the sheet metal cut has been completed and the roof flap folded down, you should change cutting bits to the wedge shaped bit or the curved bit
- 1)) With this bit you are ready to cut the roll bars
 - 2)) Remember to cut at the top and fold downward
- g) Limitations of the tool:
- 1)) You will have only a limited supply of air to achieve your objective
 - a)) This should be more than enough air to perform the required cut if you preplan the direction of your cut and conserve your air by using

proper pressures and cutting
techniques

2)) It does no good to increase the pressure of the air chisel for low pressure devices because they cannot make use of the pressure and it may well become a safety hazard

a)) You will only succeed in using more air to accomplish the same cut

3)) The use of power saws to cut the roof

a)) Rotary power saws should NOT be used to gain access because of the inherent hazards involved

1))) High heat

2))) Flying sparks

3))) Cutting blade

protruding into

passenger spaces

b)) REMEMBER: You are NOT yet able to protect your patient(s), for you have not accomplished access.

c)) A reciprocating saw MAY be acceptable; however, there are several disadvantages involved:

- 1))) Power source required
- 2))) Cutting blade protrudes into passenger spaces
- 4)) The use of cutting torches to gain access should NOT be a consideration for the following reasons:
 - a)) High heat of unit threatens your patient directly
 - 1)) Direct contact
 - 2)) Conducted heat
 - b)) Sparks and molten material
 - c)) Requires skilled operator
 - d)) This type of equipment is better suited for heavy debris removal and recovery activities rather than to highway rescue operations
- 3) Removing the roof of a vehicle
 - a) Tools and equipment
 - 1)) Powered hydraulic rescue tools
 - 2)) Reciprocating saw
 - 3)) Hack saws
 - b) Techniques
 - 1)) Flap
 - 2)) Complete removal

- c) We mention this technique under access for it may be needed with some styles of vehicles; however, the technical discussion on the processes of roof removal will be delineated in the disentanglement module
- d. Access through other parts of the body of the car
 - 1) Access through the trunk
 - a) Open the trunk
 - 1)) Use a large punch, chisel or other pointed tool to drive the locking tumbler inward
 - 2)) This will leave a hole and expose the locking mechanism
 - 3)) Insert a slotted screwdriver into the slot of the locking mechanism and rotate clockwise to open
 - a)) You may need a flashlight to see the slot in the locking mechanism
 - b) Other tools which may be used to open the trunk:
 - 1)) A dent puller may be used to pull the tumbler outward rather than driving it inwards
 - 2)) An air chisel may be used to cut a flap to expose the mechanism

- 3)) Porta-powers or powered hydraulic rescue tools may be used to forcibly spread the trunk open
 - a)) NOTE: This is usually a time consuming job as points of purchase are difficult to establish and maintain. You may choose to just cut the trunk for access if simple breaking and entering fail.
- c) Once the trunk deck is open
 - 1)) Remove the contents of the trunk so you have room to enter
 - 2)) Cut away the seat back structural supports
 - a)) Reciprocating saw
 - b)) Air chisel
 - c)) Hack saw
 - 3)) Remove rear seat back and make entry into passenger compartment
- 2) Access through the floor of the vehicle
 - a) This is the most difficult access procedure of all
 - 1)) Heaviest construction
 - 2)) Cannot visualize patients to know of the potential harm that your access procedures may cause

- 3)) Access pathway will be very limited due to construction of vehicle
- b) Procedure
 - 1)) Try to establish patient position within the passenger space
 - a)) If you cannot locate the patient(s), make a cut only big enough to permit visualization of the patient's location
 - 2)) Cut through the floor of the vehicle using an air chisel or reciprocating saw
 - a)) If saw is used, it should not be a rotary saw
 - b)) REMEMBER: Saw blade protrudes into patient spaces
 - 3)) **Truly the last choice of access!!!**
 - a)) Great difficulty in cutting the bottom of car
 - b)) Drive shafts??
 - c)) Relatively SMALL access space available
- e. Accessing the patient trapped beneath a vehicle
 - 1) This is NOT a rare occurrence
 - 2) Proper procedures

- a) First, determine the EXTRICATION PATHWAY you will want to use to remove the patient
 - 1)) You must consider how much of the patient is under the vehicle
 - 2)) You must consider other limiting factors that may exist
 - a)) Other vehicles
 - b)) Walls or other obstructions
 - 3)) What will be the easiest and safest removal route?
 - 4)) Will you use scoop stretcher, backboard, slings?
- b) Second, Stabilize The Vehicle!!!
 - 1)) Chock the wheels of the vehicle
 - a)) In the interest of safety, you should chock all wheels
 - 2)) Do not enter the vehicle to place gear shift selector in park or first
 - a)) Adds weight to trapped person
 - 3)) Do not enter vehicle to put emergency brake on
 - a)) Adds weight to trapped person
 - 4)) Build a box crib beneath the vehicle on the opposite side of the lift points

- a)) Prevents off side from dropping on suspension when lift is affected
 - b)) A safety person should be assigned to constantly monitor off side box cribs and wheel chocks
- c) Third, lift the vehicle
- 1)) Tools and equipment
 - a)) Hydraulic bottle type jacks
 - b)) Ratcheting high lift jacks
 - c)) Porta-power
 - d)) Pneumatic lifting bags
 - e)) Powered hydraulic rescue tools
 - f)) Wrecker or crane
 - 2)) CAUTION: You should use jack plates and cribbing to assure a firm contact with the ground and your lifting tools; and the car and your lifting tools
 - 3)) What is the desired height to raise the vehicle?
 - a)) The vehicle must be lifted high enough to remove the patient
 - b)) You must provide enough working room to safely remove the patient

c)) BUT, you should only raise the vehicle the minimum distance to accomplish these tasks

1))) You may create added hazards by over raising the vehicle

2))) You may exceed your original stabilization

4)) As you develop the lift, you MUST be prepared to provide added protection for the patient(s) and the rescuers that will be working near or under the vehicle

a)) Rescuers should be assigned to build box cribs as the vehicle is being lifted

b)) These cribs should be at two (2) points on the side of the lift

c)) These cribs should be “moving” cribs, i.e., build as we lift

C. Summary

1. The routes of access, in order of preference of use are:

a. Through the doors

b. Through the glass

c. Through the roof

d. Through the other parts of the vehicle body

1) Through the trunk

2) Through the floor

2. You have not yet seen your patient(s) and do not know what their condition is; therefore, you must act quickly but safely
3. Hand tools will affect over 90% of all access problems in vehicle rescue operations
4. The use of power tools to affect access will require additional time to prepare the tools and equipment for use
5. YOU MUST PROVIDE ACCESS AS QUICKLY AS POSSIBLE SO THAT QUALIFIED MEDICAL PERSONNEL CAN EVALUATE THE PATIENT AND BEGIN MEDICAL TREATMENT
6. The remainder of the rescue operation, disentanglement, and removal will hinge on the patient's medical needs and are best established by the rescuer who has accessed the patient

LESSON 7

EXTRICATION

LESSON 7

EXTRICATION

TERMINAL OBJECTIVE

Given the minimum recommended rescue tools and equipment, a vehicle rescue situation with patient(s) entrapped, an access route established, the patient(s) packaged and the disentanglement completed, the student will demonstrate his/her ability to create a pathway for patient removal (extrication) and successfully remove (extricate) the patient(s) from the damaged vehicle in such a manner as to cause no additional hazard or injury to the patient(s) or the rescuer(s).

LESSON 7

EXTRICATION

KNOWLEDGE OBJECTIVES

1. The student will be able to relate the two (2) main objectives of the removal (extrication) phase of the rescue operation.
2. The student will be able to list the three (3) criteria used to determine if the patient is ready to be removed the wreckage.
3. The student will be able to list three (3) functions of the long spine board when applied for patient removal
4. The student will be able to list at least two (2) alternate devices which may be used to remove the patient from the wreckage.
5. The student will be able to identify 4 different mechanisms of injury

LESSON 7

EXTRICATION

SKILL OBJECTIVES

1. The student will be able to demonstrate his/her ability to move a patient onto a full spine board. The student must move a patient found in the following conditions:
 - a. Seated on the front seat, driver's side
 - b. Seated on the front seat, passenger side
 - c. Seated on the rear seat
 - d. Lying on the front seat
 - e. Lying on the rear seat
 - f. Lying on front floor
 - g. Lying on rear floor
 - h. Hanging from a seatbelt with the vehicle on the side
 - i. Hanging from a seatbelt with the vehicle on the roof
 - j. Seated in the drivers seat in a cattle chute – vertical extrication
2. The student will be able to demonstrate his/her ability to properly secure a patient onto a full backboard using straps and/or rope.
3. The student will be able to demonstrate his/her ability to properly move a patient immobilized on a backboard from inside the vehicle to an ambulance.
4. The student will be able to demonstrate his/her ability to assist an EMT/Paramedic apply a Cervical collar
5. The student will be able to demonstrate his/her ability to assist a trained EMT/Paramedic apply a half board, KED XP1, etc., onto a patient while that patient is still in the vehicle.
6. The student will be able to demonstrate his/her ability to properly move a partially packaged patient (short backboard, KED, etc.) into a fully packaged configuration and then remove the patient from the vehicle.

Lesson 9: Patient Extrication

- A. Two major objectives
 - 1. Remove the packaged patient from the wreckage
 - 2. Transfer the patient from a point outside of the damaged vehicle to the ambulance

- B. Is your patient ready for extrication?
 - 1. This decision requires that the EMT/Paramedic determine the patient's readiness to be moved
 - 2. Consideration must be given to the following:
 - a. Is the patient properly packaged?
 - 1) Purposes of packaging
 - a) Protect the patient from further injury
 - b) Facilitate the removal of the patient from the wreckage
 - b. Is disentanglement complete?
 - 1) The patient must be completely free from entrapment
 - 2) Don't forget the seat belt
 - c. Does an extrication pathway exist?
 - 1) You must have sufficient work space to accomplish the following:
 - a) Work around the patient
 - b) Move the packaged patient out of the wreckage
 - c) Provide for patient safety during extrication

1)) You do not want your patient to be injured by coming in contact with debris of the vehicle during the extrication

C. Tools and equipment

1. Long spine board

- a. Provides for total patient support
- b. Provides for total security of the patient
- c. Provides excellent hand holds for rescuer
 - 1) It is much more difficult to lift and move a patient using body holds than it is to lift and move a patient on a backboard
- d. Provides patient protection should you need to stop the extrication and rest the patient upon the damaged vehicle
 - 1) This would not be possible if you were moving a patient bodily rather than on a spine board

2. Sling and board

- a. Excellent means of removing patients from under a vehicle
 - 1) In-line pull
- b. May serve to move a patient for a vertical extrication
- c. May be contraindicated for patients with chest trauma
- d. Sling materials
 - 1) Rope
 - 2) Nylon webbing
 - 3) Nylon straps

3. Scoop stretcher

- a. May be used when slings are contraindicated

- b. You can immobilize a patient in the position in which he is found
 - 1) No extra moving is necessary as with a full board
- 4. Half board, KED, XP1, etc.
 - a. Provides cervical spine stabilization and protection
 - b. Application of these devices in the vehicle permits a safer movement of patients during extrication
 - c. CAUTION: THESE DEVICES DO NOT PROVIDE FOR TOTAL IMMOBILIZATION
- D. Mechanism of injury
 - 1. Windshield starred
 - a. Possible head injury
 - b. Can be caused by the passenger side air bag
 - 2. Steering wheel bent
 - a. Chest and abdominal injuries
 - 3. Bottom of dash crushed
 - a. Knee, hip, leg injuries
 - 4. Pedals bent
 - a. Lower leg injuries
 - 5. Deployed Airbag
 - a. Abrasions (Airbags do not burn)
- E. Patient packaging
 - 1. Patient sitting in drivers seat or passengers seat
 - a. C-Collar placed
 - b. Short board or KED device used to stabilize the patient's spine

- c. Long Board if positioned on seat, under patient. Patient is pivoted on to the Long Board.
 - d. Patient is slide up on board, Head Immobilization device is put in place and patient strapped onto board.
- 2. Patient sitting in the rear seat
 - a. Same procedure as above
- 3. Patient laying on the seat
 - a. Patient disentangled
 - b. Cervical spine immobilized
 - c. Long board slide in beside the patient and the patient rolled onto the board
 - d. Patient attached to long board with HID and straps
- 4. Patient laying on the floor
 - a. Patient disentangled
 - b. Cervical spine immobilized
 - c. Three straps/slings placed around the patient (torso, pelvis, legs)
 - d. Straps wrapped around a pike pole
 - e. Patient lifted and long board placed under the patient
 - f. Patient packaged onto long board with HID and straps
- 5. Patient in a drivers seat in a cattle chute or other area of confinement
 - a. A cattle chute is a construction zone with jersey barriers on both side. Normal extrication techniques may not be able to be employed
 - b. No access to the side or sides of the vehicle
 - c. Roof is removed

- d. Seat laid back, and long board slid in behind the patient from above
 - e. Patient is slid onto board by using the patients arms, or sling, or a KED
 - f. The board will pivot down and flat onto the trunk area. Patient is strapped to the long board in the normal fashion
6. Patient strapped into seat belt in a vehicle in the side or on the roof
- a. Patient disentangled
 - b. Straps/slings put around the patient (seatbelt can be used also)
 - c. Patient lowered onto long board
 - d. Patient packaged onto long board in the normal fashion
- F. Other Patient Considerations
- 1. Children
 - 2. Drug and alcohol
 - 3. Multiple patients
 - 4. Family and bystanders on scene
 - 5. Aeromedical evacuation of the patients

LESSON 8

POST RESCUE

LESSON 8

POST RESCUE

TERMINAL OBJECTIVE

Given a completed rescue operation with its associated debris, the student will be able to demonstrate his/her ability to clean the debris to such an extent that there is no threat to equipment, vehicles or personnel upon departure of the rescue personnel from the site of operations.

Lesson 8: Post Rescue

A. Debris

1. While debris removal may not be your responsibility, you are responsible for hazard control during and subsequent to rescue operations
 - a. If the remaining debris is a hazard, you should be prepared to control this hazard until it is removed
 - b. You may have to do nothing more than perform traffic and crowd control operations and secure the scene
 - 1) You should not remove or alter the position of debris any more than is absolutely necessary to gain access, disentangle, and extricate your patient(s)
 - 2) The type and position of the debris and wreckage may be critical to the completion of an accident investigation by local police officers
 - c. You may still have to provide other hazard control functions:
 - 1) Fire protection
 - 2) Site security
 - 3) Crowd and traffic control, etc.
2. Just because all patients have been removed from the scene does not mean that the rescue operation is complete

B. Recall

1. Once the operation is complete, you must return all personnel, tools, and equipment to an operational status
2. Vehicle service is usually well established within a department so we will not deal with what is required to assure that the rescue truck is in service

3. Equipment servicing is a very critical part of the post rescue phase of the operation

a. Tasks to be accomplished:

1) Clean all equipment

a) Refer to Lesson 2, Tools and Equipment

b) Decontamination of equipment due to contact with bio hazards

2) Replace broken/damaged tools

3) Sharpen edged tools as needed

4) Service power tools and devices

5) Replace all equipment in the proper storage area of the vehicle

C. Documentation

1. Incident reports should be completed as soon as possible after the rescue operation

2. Reports should include all applicable time:

a. Dispatch

b. Response

c. Arrival on scene

d. Extrication completed

1) Patient removed from vehicle

2) Multiple patients will reflect multiple times in this category until all patients are extricated

e. Return to quarters

f. In service

3. You must include a description of the scene upon arrival

4. Document what tools, equipment, activities, and rescue tasks were employed
 5. Document problems and successes
 6. Document personnel in attendance
- D. Critique of operation
1. Conduct an initial debriefing
 - a. Usually completed at the station immediately after the call
 - b. In some unique rescue situations, a debriefing may begin at the site so as to illustrate the unique problems and solutions of the operation
 2. Secondary critique
 - a. Participants should include ALL SERVICES and ALL PERSONNEL who participated in the rescue operation
 - b. This should be a discussion of facts, not a fault finding session
 - c. Stress the positives and improve upon the negatives
 - d. Make sure to document any new operational policies and mutual assistance agreements that may occur as a result of the critique
- E. Rehabilitation
1. Rehabilitation of rescue personnel
 2. Remove gear, cool down, fluid replacement (water)
 3. Vitals back to normal ranges (pulse and respiration most important)
- F. Critical Incident Stress Management
1. You may find the need to provide for a critical incident stress management program
 2. Identify the need early and implement the management program early

3. The initial debriefing of the crew may be the time to determine the need for professional support services
 4. At the very least, whether implemented or not, the stress management needs to be addressed as part of the operational critique
- G. Accident Reconstruction
- H. Public Information – dealing with the press

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Glen Burnie, MD 21061 (410) 768-9662, Info@holmatro-usa.com

Video – Traffic Injury The Medicine-Engineering Link, Association for the
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Video – The Car Busters Series, Mosby Lifeline

Video – Crash-Rescue, Public Broadcasting Service, NOVA 1998

Video – Crash Test / Kinetics of Injury, Discovery Channel, 1998

Video – Dayton Air Bag Incident, American Heat, Extrication.Com

Video – NHTSA Air Bag Guidelines, NHTSA

Web Page – Transportation Emergency Rescue Committee IAFC, www.TERC.org

Web Forum – Search and Rescue Society of British Columbia – Vehicle Extrication
Forum. www.sarbc.org

Web Page and Forum– Ron Shaw, Extrication .Com - www.extrication.com

Web Page and Forum – Ron Moore, Firehouse .com – www.firehouse.com

Web Page – Exatec Limited (Polycarbonate glazing)- www.exatec.llc.com

Web Page – Autoliv Inc (Air bag manufacturer) – www.autoliv.com

Web Page – Wreck Technology Inc – www.wrecktech.org

Web Page – Insurance Institute for Highway Safety – www.hwysafety.org

Web Page – Rescue training resources and guide – www.techrescue.org

Web Page – National Highway Traffic Safety Administration – www.nhtsa.dot.gov/

Web Page – International Centre Extrication Techniques – www.icet.nl

Web Page – Automotive Learning Online – www.innerauto.com

Web Page – Simula Inc (air bag manufacturer) – www.simula.com

