VII. MEDICAL TEAM SKILLS STATIONS
A. INTRODUCTION

SKILL STATIONS

- Airway Management
- Vascular Access/Fluid Administration
- Introduction to Confined Spaces
- Evaluation of the Partially Accessible Patient
- Patient Monitoring & "Packaging"
- Immobilization/Extrication

VIEW GRAPH VII A - 1

INTRODUCTION

- Thus far, the course has covered much of the background information and overview material necessary to provide medical care for Urban Search and Rescue. The Skill Stations are an essential part of this course, addressing the "hands-on" skills and knowledge essential for the safe and effective practice of confined-space medicine.

- Skill stations:
  - Airway Management
  - Vascular Access/Fluid Administration
  - Confined Spaces Maneuvers
  - Evaluation of the Partially Accessible Patient
  - Patient Packaging and Monitoring
  - Immobilization and Extrication

- Limitations
  - Practice period limited by time constraints.
  - Designed to provide exposure to techniques and equipment, not provide advanced proficiency.
  - This is not a "certification" activity.

FEMA US&R RESPONSE SYSTEM
TASK FORCE MEDICAL TEAM TRAINING 04/97
MEDICAL TEAM SKILL STATIONS

LIMITATIONS

SKILL STATION DESCRIPTIONS

Airway Management

- Objectives:
  - Reinforce the concept that next to scene safety, airway control is of primary importance for a successful rescue and resuscitation in a confined space environment.
  - Review various methods of airway control adapting for the confined space environment.
  - Practice airway technique adapted for confined spaces.
  - Review the problems associated with dust inhalation on both the victim and rescuer in a confined space incident.

VII. MEDICAL TEAM SKILLS STATIONS
A. INTRODUCTION

SKILL STATION DESCRIPTIONS (continued)

Airway Management (continued)

■ Format:
- This session is designed to enable the student to review standard basic and advanced airway procedures, followed by performing variations of those airway procedures while in a confined space environment.

■ Protective gear should be worn during the practice part of this station.

Vascular Access/Fluid Administration

■ Objectives:
- Review equipment and techniques for vascular access in confined space medicine, discussing the advantages and disadvantages of the different methods of venous access.
- Discuss the advantages and disadvantages of different techniques that may be required for vascular access, fluid administration and invasive monitoring.
- Student performance of vascular access procedures.

■ Format:
- The session is designed to review basic and advanced IV access technique through demonstrations followed by hands-on student practice of technique.

■ Protective gear should be worn during the practice part of this station to acclimate the students to "real-life" limitations.

■ The use of Universal Precautions is emphasized.

FEMA US&R RESPONSE SYSTEM

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TASK FORCE MEDICAL TEAM TRAINING 04/97

■ Format...
- Demonstration using IV access models and equipment

TASK FORCE MEDICAL TEAM TRAINING 04/97

- Student practice of technique on models
- PROTECTIVE GEAR USE

■ Objectives...
- Review basic and advanced equipment and techniques or vascular access
- Discuss advantages and disadvantages of various technique
- Performance of vascular access technique for confined space

VII. MEDICAL TEAM SKILLS STATIONS
A. INTRODUCTION

SKILL STATION DESCRIPTIONS (continued)

Confined Spaces Maneuvers

■ Objective:
- Provide the experience of movement and the problems impeding mobility within a confined space environment. This includes movement of rescuers and equipment and the manipulation of a "packaged" patient.
- Practice standard safety procedures in the confined space.
- Understand and demonstrate hazard recognition in the confined space.

■ Format:
- The participants enter a confined space and remove a simulated patient, using proper technique and observing all safety rules. No patient care will be required.

■ The student must wear safety equipment to participate in this exercise.

Evaluation of the Partially Accessible Patient

■ Objectives:
- Review the primary and secondary trauma assessment.
- Determine all available assessment information and procedures which should be performed despite a limited patient exposure situation.

■ Format:
- Uses a mannequin to review patient assessment adapted for confined space patients. Adaptation for performing procedures in poorly accessible patients is also discussed.

■ Protective gear should be worn by the student when performing an evaluation.

■ Objectives...
- Provide experience of confined space mobility
- Practice safety technique
- Review of hard recognition in confined spaces

■ Format...
- Students enter simulated confined space and remove a "victim"
- PROTECTIVE GEAR USE

VII. MEDICAL TEAM SKILLS STATIONS
A. INTRODUCTION

SKILL STATION DESCRIPTIONS (continued)

Monitoring Equipment/Strategy

- Objectives:
  - Discusses monitoring strategy for patients in confined spaces.
  - Reviews appropriate devices and technique for monitoring oxygen saturation levels, adequate ventilation, temperature, pulse rate, blood pressure and cardiac rhythm.
  - Student practice of monitor placement and preparing patient for extrication, using one method of "packaging" a patient for an extended extrication while retaining the ability to closely monitor and treat the patient.

- Format:
  - This session discusses monitoring strategy and demonstrates techniques.
  - Students then practice "packaging" a hypothermic patient for an extended egress from a collapsed structure without losing the ability to monitor and treat the patient.

- Protective gear should be worn during the practice part of this station to acclimate the students to "real-life" limitations.

Immobilization/Extrication Technique

- Objectives:
  - Practice immobilization of a patient in a confined space using standard EMS immobilization equipment and techniques.
  - Review methods of splinting injured extremities to allow patient extrication.
  - Secure a patient in a Stokes basket to safely allow hoisting and other basket manipulations during egress.
  - Discuss the assessment and preparation of an egress

FEMA US&R RESPONSE SYSTEM
TASK FORCE MEDICAL TEAM TRAINING 04/97

- **Objectives**
  - **Discuss monitoring strategy in the confined space**

route.

VII. MEDICAL TEAM SKILLS STATIONS
A. INTRODUCTION

SKILL STATION DESCRIPTIONS (continued)

Immobilization/Extrication Technique (continued)

- Format:
  - This session is a demonstration of equipment and technique, followed by the students practicing the techniques.
- Protective gear should be worn during the practice part of this station to again acclimate the students to "real-life" limitations.
- The use of Universal Precautions is emphasized.

SKILL STATION "ASSUMPTIONS"

- The stations assume a fully equipped and prepared Medical Team.
- The degree of patient evaluation and care is assumed to be "the maximum."

GROUND RULES

- Wear protective gear when required.
- Safety!
  - Follow rules stated by the individual station instructor.
  - Emergency signalling: (whistle or air horn)
    - 3 short (1 second each) **EVACUATE**
    - 1 long blast (3 seconds) **STOP**
    - 1 long and 1 short **RESUME**
- Apply knowledge learned earlier in the course.
- Have fun!

FEMA US&R RESPONSE SYSTEM
TASK FORCE MEDICAL TEAM TRAINING 04/97

- Assumptions...
  - You are a fully equipped Medical Team
  - The degree of patient evaluation and care to be "The Maximum"

TASK FORCE MEDICAL TEAM TRAINING 04/97

FEMA US&R RESPONSE SYSTEM
TASK FORCE MEDICAL TEAM TRAINING 04/97

- Format...
  - Demonstration of equipment and technique
  - Students practice immobilization techniques with splints and Stokes Basket
  - PROTECTIVE GEAR USE
- Ground-rules...
  - Protective gear when required
  - Follow safety rules
  - Apply course knowledge
  - Have fun!
- React to emergency signalling...
  - 1 long blast STOP
  - 1 long, 1 short RESUME
  - 3 short blasts EVACUATE

VII. MEDICAL TEAM SKILLS STATIONS

B. AIRWAY MANAGEMENT

SKILL STATION/EQUIPMENT CONSIDERATIONS

- This Skill Station will review many methods of airway management. The instructor will cover this material in an abbreviated form, demonstrating important techniques (15-20 minutes) .

- The students will then have the remaining time to practice selected techniques and, once proficient, practice some in a darkened/confined space.
  - Consideration shoul be given to conducting the practices either under the demonstration table, or in another selected site. The student will then become acclimated to performing interventions in a confined space/limited space environment.
  - Underneath the demonstration tables or another selected site should be used to acclimate the student to performing interventions in a difficult environment.

- PROTECTIVE GEAR SHOULD BE WORN DURING THE PRACTICE PORTION OF THIS STATION to acclimate the students to "real-life" limitations. The use of Universal Precautions must be emphasized by the instructor.

- Site selection/preparation:

  - A site should be selected that will allow room for two standard 8' conference tables and space for the students/instructor to stand and practice technique (at least 20 feet long by 15 feet wide).

  - The tables will be used initially to display the equipment as it is reviewed by the instructor. An area on the tables should be provided for student practice.

  - The site should also provide a "confined" area of near-total darkness for students to practice (this could be under the tables if they are draped with cloth or paper).

VII. MEDICAL TEAM SKILLS STATIONS

B. AIRWAY MANAGEMENT

<u>**SKILL STATION/EQUIPMENT CONSIDERATIONS**</u> **(continued)**

- Equipment:
  - Respiratory system chart/diagram (1)
  - Airway head (1)
  - Intubation Annie (2)
  - Cricothyrotomy mannequin (1)
  - Pediatric/infant head (1)
  - Oxygen cylinder [filled] and regulator (1)
  - Oxygen cylinder conversion time chart (1)
  - Oxygen tubing: 7, 25 and 50 feet (2)
  - Endotracheal tubes (ETT):
    - Endotrols (2)
    - Cuffed #7.5 ETT (2)
    - Uncuffed #3.0 ETT (2)
  - Suction device (Z Vac or battery type) (1)
  - Suction catheters:
    - Yankaur (1)
    - French (1)
    - Endotracheal cath (w/ protective sheath) (1)
  - Autovent ventilator (1)
  - Oxygen nebulizing device (1)
  - Pocket mask (1)
  - Oropharyngeal airway - large (2)
  - Nasal trumpet (nasopharyngeal airway) (1)
  - Bag-valve-mask-reservoir device:
    - Adult size (2)
    - Peds size (2)
  - Demand valve and connectors (2)
  - Nasal cannula (2)
  - Non-rebreather masks (2)
  - Seal Easy mask (1)
  - Aerosol nebulizer and mask (1)
  - End tidal CO_2 detector (disposable) (2)
  - Heat exchanger (2)
  - Positive End Expiratory Pressure (PEEP):
    - device (2)
    - attachment (2)
  - Masks appropriate for the environment

VII. MEDICAL TEAM SKILLS STATIONS

B. AIRWAY MANAGEMENT

<u>SKILL STATION/EQUIPMENT CONSIDERATIONS</u> (continued)

■ Equipment: (continued)
- Airway kit:
  - Laryngoscope - adults blades (2 sets)
  - Laryngoscope - peds blades (1 set)
  - satin slip stylets - adult size (2)
  - satin slip stylets - peds size (1)
  - water soluble lubricant (large tube) (1)
- Lighted stylets:
  - rigid - orotracheal (1)
  - flexible - nasotracheal (1)
- Transtracheal Jet (TTJ) (regulator device and tubing) (1)
- TTJ Catheters (2)
- Angiocaths:
  - 14 gauge (3)
  - 18 gauge (6)
  - 20 gauge (6)
- Syringes:
  - 10cc (7)
  - 35cc (1)
- Needles - 18 gauge (5)
- Latex exam gloves - nonsterile (50 pr)
- Stethoscopes (3)
- Endoloc ETT devices (2)
- Cloth tape - 1" (2 rolls)
- Cook catheter set-up (chest drainage) (1)
- Seldinger technique chest tube kit (1)
- Seldinger technique cricothyrotomy Kit (1)
- Straight hemostats (2)
- Scalpels [#11] on handles (2)
- Suture material - O-silk/straight needle (2)
- Heimlich valve (1)
- Foley bag [to attach to chest tube] (1)
- Chest tube [size 28] (1)
- Shiley #4 cricothyrotomy tube (1)

VII. MEDICAL TEAM SKILLS STATIONS

B. AIRWAY MANAGEMENT

CONTENT OUTLINE

- Airway control in the confined space has the same paramount position in patient care as in any other pre-hospital or emergency medicine discipline.
- This session is designed to enable the student to review standard basic and advanced airway procedures, followed by performing variations of those airway procedures while in a confined space environment.

RESPIRATORY ANATOMY

See airway/ventilation Paramedic Manual P 25-39

- Upper airway:
  - Mandible/tongue relationship.
  - Turbinates:
    - nasal cavity.
    - may bleed causing problems with nasal intubation.
  - Tongue is the most common airway obstruction. Can be treated with the Head-Tilt — Chin-Lift.
  - Epiglottis.
  - Larynx.
    - thyroid cartilage/adams apple.
    - Apply pressure to aid visualization of anterior cords.
    - vocal cords - laryngeal spasm (narrowest portion in the adult).
  - Cricoid cartilage.
    - landmark for TTJ and cricothyroid airway.
    - complete ring.
    - apply pressure to avoid aspiration during intubation by occluding the esophagus.
    - in infants and children less than 8 years of age it is the narrowest portion of the airway. This is one reason for use of uncuffed ET tubes.

Airway diagram

Airway head

See Sellick"s Maneuver - BTLS

See AHA-PALS P 21

VII. MEDICAL TEAM SKILLS STATIONS

B. AIRWAY MANAGEMENT

RESPIRATORY ANATOMY (continued)

- Lower airway:
  - Trachea:
    - Incomplete rings to facilitate food passage through esophagus.
  - Bronchi:
    - Carina — the bifurcation of the right and left bronchi.
    - The right mainstem bronchus branches at a wide angle making it easier for a tube to be placed during intubation.
  - Lungs:
    - right lung has three lobes.
    - left lung has two lobes.

PATHOPHYSIOLOGY OF BREATHING

- Primary control center of breathing in the medulla.

- Peripherally controlled in the aortic arch and the carotids.

- Normal respiratory rates:
  - Adults — 12/min.
  - Children — 24/min.
  - Infants — 40-60/min.

- Resuscitative rates:
  - Adults — 1 breath/5 seconds.
  - Children — 1 breath/4 seconds.
  - Infants — 1 breath/3 seconds.

See AHA guidelines

- Cellular brain death begins to occur due to anoxia within 6 minutes. 6-10 minutes is an average time but is truly dependent on many factors such patient medical history, injuries, temperature, environment.

VII. MEDICAL TEAM SKILLS STATIONS

B. AIRWAY MANAGEMENT

BASIC AIRWAY MANAGEMENT

- Opening an Airway.
  - Head-Tilt-Chin-Lift.
  - Jaw-Lift.
  - Jaw-Thrust:
    - should be used for victims with a high suspicion of C-spine injury.
  - Method:
    - two hands.
    - thumbs on zygoma.
    - fingers beneath symphysis of mandible.

See AHA, BTLS, Paramedic Manual P 37 - 38

- Methods:
  - Mouth-to-mouth.
  - Mouth-to-mask:
    - room air — 16% O_2.
    - 10 L/min O_2 — 50% O_2.
    - 15 L/min O_2 — 80% O_2.
  - Bag-valve-mask system:
    - room Air — 21% O_2.
    - 12 L/min O_2 — 40% O_2.
    - with reservoir bag 15 L/min = 98% O_2.
    - tidal volume varies w/ size (250, 500, 1000, 1500, 2000cc).
  - Nasal trumpet/airway:
    - Measure from ear lobe to nares.
    - Aids in suctioning.
    - can be used on patients with an intact gag reflex.
  - Oropharyngeal airway:
    - measure from ear lobe to edge of lip.
    - aids in suctioning.
    - effective bite block.
    - holds tongue up out of the hypopharynx.

See AHA, BTLS

Seal Easy Mask

Splice O_2 tubing

14' O_2 tubing
Demand valve attach for contaminated atmosphere

VII. MEDICAL TEAM SKILLS STATIONS
B. AIRWAY MANAGEMENT

BASIC AIRWAY MANAGEMENT (continued)

- Oxygen delivery:
  - Room air-21% O_2
  - Nasal cannula:
    - 1 L/min — 24%O_2.
    - 2 L/min — 28%O_2.
    - 8 L/min — 40%O_2.
  - Simple face mask:
    - 6 L/min — 50-60%O_2.
  - Partial rebreather mask:
    - 6 L/min — 35%O_2.
    - 10 L/min — 60%O_2.
  - Non-rebreather mask:
    - 10-15L/min — 90+%O_2.

- Suction equipment:
  - Battery powered device or manually operated.
  - Suction no longer than 10 seconds.
  - Suction catheters:
    - flexible.
    - rigid (large bore Yankauer).
    - infant suctioning.
    - endotracheal suction caths (sterile technique required, sheath protected for prolonged use).

ADVANCED AIRWAY MANAGEMENT

- Esophageal devices present aspiration of stomach contents via blind insertion without hyperextension of neck.
  - Esophageal obturator airway (EOA):
    - occludes esophagus.
    - side holes.
    - must use with matching mask.
  - Esophageal Gastric Tube Airway (EGTA):
    - occlude esophagus, but has a lumen to pass a

gastric tube to decompress stomach.

- ventilation via oropharynx not side holes.
- must use with a matching mask.

See Emergency Care in the Streets P 209

O_2 cylinder
Conversion Time Chart

Yankauer

DeLee

Flexible catheter
Critical care-sheathed
ET catheter

See BTLS P 62 - 64

EOA

EGTA

VII. MEDICAL TEAM SKILLS STATIONS

B. AIRWAY MANAGEMENT

ADVANCED AIRWAY MANAGEMENT (continued)

■ Esophageal devices. . . (continued)
- Proper use:
  - patient MUST be unresponsive and lack a gag reflex.
  - a head tilt or jaw thrust must be done to insure ventilation.
  - adequate mask seal must be maintained to ventilate.
  - should NOT be used on victims with facial trauma with massive bleeding; esophageal injury or disease; children under 15 years; under 5' tall.
- Insertion technique.

See BTLS P 62 - 64

■ Endotracheal Intubation — prevents aspiration and provides complete control of the airway. Note the procedure should not take longer than 30 seconds to complete without oxygenation.
- Nasal intubation:
  - patient must be breathing for the tube is passed through the cords during inspiration.
  - head and neck may remain in the neutral position.
  - placement may be confirmed in the usual fashion and also by the use of the flexible lighted stylet.
- Proper use:
  - lubricate tube.
  - endotrol tube.
  - control of distal tip facilitates nasal intubation.
  - pre-shape tube into a donut shape.
  - DO NOT USE a stylet.
  - insert with bevel against floor of septum, insert GENTLY.
  - insertion technique.

Suction must always be available.

Flexible lighted stylet

Xylocaine/Phenylephrine spray
Endrotrol tube

See BTLS P 326 - 327

VII. MEDICAL TEAM SKILLS STATIONS

B. AIRWAY MANAGEMENT

<u>ADVANCED AIRWAY MANAGEMENT</u> (continued)

■ Endotracheal Intubation. . . (continued)

- Direct Laryngoscopy:
  - secures an airway by direct visualization of the vocal cords.
  - pre-oxygenate for several minutes before and between attempts.
  - a laryngoscope and either the MacIntosh or Miller blades are utilized.
    - * Miller (straight)picks up the epiglottis.
    - * Mac (curved) is placed in the vallecula
  - to position the patient align the three axis.
    - * head.
    - * pharynx.
    - * trachea.
  - may be completed with in-line stabilization if C-spine injury suspected.
  - distal tip tube location in relation to tube at teeth marking.
    - * 15 cm - Adams Apple.
    - * 20 cm - sternal notch.
    - * 25 cm - carina.
  - suction must be available.
  - if stylet is used, lubricate before inserting it into the tube.
  - sizing of tubes:
    - * male: 8-8.5mm.
    - * female: 7-7.5mm.
    - * child: (16+ age in years ÷ 4).
  - insertion technique.
  - confirmation of tube placement.
    - * bilateral breath sounds (high apices, mid-axillary, quiet epigastrum, sternal notch).
    - * end-tidal CO_2 detector.
    - * condensation on tube.
    - * lighted stylet — light seen through

VII. MEDICAL TEAM SKILLS STATIONS

B. AIRWAY MANAGEMENT

bronchoscope.

* esophageal detection device

"Sniff Position"

Blood and body fluid precautions

End-Tidal CO_2 detector

ADVANCED AIRWAY MANAGEMENT (continued)

- Digital Intubation: Original method of intubation.
  - Blind intubation (i.e., does not require a laryngoscope).
  - The intubator utilizes a hand and fingers to lift the victim's epiglottis and aid in passing the endotracheal tube through the cords.
  - Must be only done on the unconscious patient unless dental prods are available to prevent being bitten.
  - Indications:
    - difficulty in positioning.
    - inaccessible to full view.
    - C-spine injury.
    - distorted anatomy.
    - copious amounts of oropharyngeal bleeding that render visualization difficult.
  - Contraindication:
    - patient with an intact gag.
    - head injured patient with signs of increased ICP.
  - Insertion technique — stylet with pronounced J-like curve.

See BTLS P 76

Consider Lidocaine

- Lighted Stylet:
  - Bright light on the distal end of a stylet can be seen through the cricothyroid cartilage when the endotracheal tube is properly placed.
  - Requires a rigid lighted stylet.
  - ET tubes must be pre-cut to 25 cm.
  - Advantages same as digital.
  - Indications same as digital.
  - Insertion technique.

Rigid lighted stylet

- Seated intubation:
  - Used when access to the patient is only available from the feet.
  - Equipment is reversed in the operator's hands (i.e., laryngoscope held in right hand - pull up and toward rescuer).
  - Cords visualized and ETT placed with left hand.

VII. MEDICAL TEAM SKILLS STATIONS
B. AIRWAY MANAGEMENT

ADVANCED AIRWAY MANAGEMENT (continued)

- Other:
  - Securing tube :
    - tape method.
    - consider neck immobilization with infants to minimize misplacement of tube with movement.
    - ETT securing device
  - Suctioning tube:
    - sterile.
    - lavage with small amounts of saline, especially if dust compaction.
    - sheath protected catheter for sterile, long term care.
  - ET medications:
    - needle/catheter in tube enables continuous ventilation while administering the med.
    - N-narcan.
      A-atropine.
      V-valium
      E-epinephrine.
      L-lidocaine.
    - dust insult meds (if wheezing):
      * Alupent.
      * Poventil.
    - warmed, nebulized oxygen for treatment of hypothermia.
  - Tube care:
    - PEEP device (Positive-End Expiratory Pressure) prevents alveoli from fully collapsing. Especially important for dust insult.
    - end-tidal CO_2 detector helps assure CO_2 expiration, therefore proper tracheal tube placement.
    - filter — humidifies (TV=700 cc), filters, warms.
    - autovent ventilator.
    - medications:
      * increased ICP, increased vagal tone consider 1mg/kg Lidocaine IVP.
      * sedation.
      * paralytic agents.

Endolock

Sheathed ET suction catheter

Angio and syringe
3-way stopcock

Nebulizer

PEEP device

Filter

Autovent

VII. MEDICAL TEAM SKILLS STATIONS

B. AIRWAY MANAGEMENT

<u>ADVANCED AIRWAY MANAGEMENT</u> (continued)

- Transtracheal jet insufflation. Means of oxygenating a victim of an upper airway obstruction caused by edema, facial or laryngeal fractures, or severe facial hemorrhage.
  - Requires recognizing the cricothyroid membrane Apple)and the inferior cricoid cartilage.
    - this site is used because of the solid cartilage posteriorly. This prevents the chance of inadvertently puncturing through the trachea and lacerating the esophagus.
    - the site is used also due to relative position of the thyroid gland.
  - Must use at least a 14 gauge catheter or larger to adequately oxygenate.
  - The catheter should be inserted utilizing a saline filled 10cc syringe to insure proper placement via free air flow in that syringe.
  - Patient can be oxygenated with high flow oxygen via oxygen tubing. 1 second on, 4 seconds off. (Note: This is not a means of securing an airway, rather a temporary means of oxygenating a patient.)
  - Patient can be ventilated via a transtracheal jet. The regulator produces a 50 psi of O_2 enabling ventilation.
    - beware of proper positioning and means of securing the catheter during "Jetting".
    - subcutaneous emphysema develops from improper placement and prolonged usage.
  - Insertion technique:
    - identify the landmarks.
    - clean the cricothyroid membrane site with an aseptic solution.
    - insert angiocath with saline filled syringe attached at a 45 degree angle to the skin.
    - after gently puncturing through the skin, pop through the membrane while constantly aspirating the syringe for free flow of air.
    - once accomplished, remove the syringe and needle and ventilate.
    - auscultate for breath sounds.
    - secure the cat

heter in place.

14 gauge angio needle cric kit

O_2 tubing with one-way valve

Transtracheal jet

Back pressure may dislodge improperly secured catheter

See BTLS

VII. MEDICAL TEAM SKILLS STATIONS

B. AIRWAY MANAGEMENT

ADVANCED AIRWAY MANAGEMENT (continued)

- Cricothyrotomy — a surgical means of securing an airway when other methods fail.
  - This method requires the use of a scalpel, a #5.0 or larger cuffed ET tube, or a commercial cricothyrotomy set.
  - One disadvantage is hemorrhage from lacerating surrounding structures, primarily the thyroid gland or great vessels.
  - Insertion technique:
    - identify the cricothyroid membrane.
    - clean area with antiseptic solution.
    - make a vertical incision through the **skin** with #11 scalpel.
    - make a puncture through the membrane, spread membrane with either the scalpel blade or Troussou Dilator (hemostats).
    - insert the endotracheal tube and pass the cuff through the membrane.
    - inflate the cuff.
    - auscultate bilateral breath sounds (4), quiet epigastric, positive sternal notch.
    - secure and dress tube.
    - if an endotracheal tube is used rather than a kit, the tube may be cut shorter. Be careful not to cut the pilot balloon line.

Goat trachea

Cricothyrotomy kit (Seldinger technique)

- Chest decompression/needle thoracotomy — a rapid means of relieving a tension pneumothorax.
  - By definition, tension pneumothorax is when a one-way valve occurs in the pleura so that air can enter but not leave the pleura space.
  - The result is a collapse of the affected lung with a subsequent pushing of the mediastinum in the opposite direction.
  - This causes a "kinking" of the vena cava thereby decreasing the venous return to the heart and compromising the function of the other lung.

Demonstrate

VII. MEDICAL TEAM SKILLS STATIONS

B. AIRWAY MANAGEMENT

See BTLS

ADVANCED AIRWAY MANAGEMENT (continued)

- Chest decompression/needle thoracotomy (continued)
  - Signs/symptoms:
    - apprehensive/agitated.
    - increasing dyspnea.
    - increasing cyanosis.
    - shock: cool, clammy skin.
    - possible subcutaneous emphysema.
    - distended neck veins if patient is not significantly volume depleted.
    - diminished breath sounds on suspected injured side.
    - hypertympanitic percussion - injured side.
    - increased hypotension.
    - increased resistance to bagging efforts.
    - bradycardia.
  - Insertion technique:
    - high flow O_2.
    - identify anatomical landmarks (2nd intercostal space mid-clavicular line, 5th intercostal space mid-axillary line).
    - clean with antiseptic solution.
    - insert the catheter at a 90 degree angle to skin just over the superior (top) border of the rib into the interspace. (pleura space) Insert until air escapes.
    - use 2" or longer angiocaths.
    - insert catheter along superior border because of the anatomical location of veins, arteries and nerves along the inferior border.
    - remove the needle and secure the catheter in place until it can be replaced by a chest tube.
    - a one-way valve should be applied to the catheter while in the pleura. This is then attached to a foley bag for collection of fluids. Be sure to put a vent hole in the upper portion of the bag.

14 guage angio (2")
needle thoracotomy kit

Heimlich valve
Foley bag

VII. MEDICAL TEAM SKILLS STATIONS

B. AIRWAY MANAGEMENT

ADVANCED AIRWAY MANAGEMENT (continued)

- Chest Tubes. Treatment of massive hemothorax — by definition, blood in the pleural space. Each thoracic cavity may contain up to 3000 cc of blood.
  - Sign/symptoms:
    - anxiety.
    - increasing hypotension.
    - decreased or absent breath sounds on injured side.
    - flat neck veins.
    - cyanosis.
    - dullness to percussion on injured side.
    - may have a flail segment. By definition, three or more adjacent ribs are fractured in at least two places (crepitus, paradoxical movement).
  - Insertion technique:
    - variation of needle thoracotomy.
    - direct palpation.
    - use of wire (Seldinger technique).
    - suture in place.

Chest tube kit
Seldinger technique
See BTLS, ATLS

Standard chest tube kit

PEDIATRIC AIRWAY MANAGEMENT

- Anatomic differences:
  - Larynx is more cephalad.
  - The epiglottis is "U" shaped, and large in relation to pharynx. Pharyngeal tissues are proportionally larger.
  - The vocal cords are short and concave.
  - In infants and children less than 8 years of age the narrowest portion of the airway is the cricoid. This is one reason for using an uncuffed tube.

See PALS P 21 - 22

VII. MEDICAL TEAM SKILLS STATIONS
B. AIRWAY MANAGEMENT

PEDIATRIC AIRWAY MANAGEMENT (continued)

- Considerations:
  - Insure proper fitting mask for ventilating.
  - Humidified O_2 at proper infant and child respiratory rate preferred:
    - birth: 30-60.
    - 6 months: 24-40.
    - 1 year: 20-40.
    - 3 year: 20-30.
    - 6 year: 18-25.
    - 8 year: 18-25.
    - 12 year: 14-20.
    - 15 year: 12-20.
    - 18 year: 12-18.
  - Airway obstruction:
    - in infants, hyperextension of the neck may actually cause an airway obstruction, due to the disproportionate large size of the head.
    - treatment:
      - infant — 4 chest thrusts, 4 back blows.
      - child — 6-10 abdominal thrusts.
    - choose correct size of ET tube (after one, 4+age÷4).
    - beware of easy obstruction of ET tube.
      - inability to control secretions.
      - because the diameter of the tube is small, any accumulation of material in the tube results in a large reduction in the cross-sectional area.
    - beware of size of bag-valves. The tidal volume of a child is less than an adult.
      - too small results in hypoventilation.
      - too large results in tension pneumothorax.
    - beware of bag-valve systems with pop-off valves normally set at 35-40cm H_2O to prevent barotrauma.
      - pressures needed to ventilate may exceed

ff" lungs cannot be ventilated effectively.

* if this occurs, the pop-off valve may be occluded - push/secure in off position.

Pediatric airway head blades, masks, bag, tubes

Broselow Tape

VII. MEDICAL TEAM SKILLS STATIONS
B. AIRWAY MANAGEMENT

PEDIATRIC AIRWAY MANAGEMENT (continued)

- Considerations: (continued)
  - Airway obstruction: (continued)
    - patients may be medicated with atropine prior to intubation attempts in an effort to prevent reflex bradycardic arrhythmias.
      - dosage: .02mg/kg.
      - minimum: 0.1mg.
    - beware of gastric distention compromising ventilation by limiting downward displacement of the diaphragm.
      - prevent by using cricoid pressure.
      - decompress using a naso-gastric tube.
    - insertion technique.

PRACTICE

- Bag-valve-mask ventilation and methods of endotracheal intubation in the following positions.
  - On tables.
  - On floor.
  - Under tables.
  - In the dark.
  - With the intubation head in awkward positions, in an effort to inhibit the medical provider from aligning the three axis required to complete a standard intubation.

VII. MEDICAL TEAM SKILLS STATIONS

C. VASCULAR ACCESS AND FLUID ADMINISTRATION

INTRODUCTION

- The ability to gain intravenous access for fluid and medication administration is very important. To overcome the technical difficulties imposed by the confined space, this station exposes the student to a variety of access techniques.

- The session is designed to review basic and advanced IV access technique through demonstrations and hands-on opportunities. The student will become familiar with the different equipment and techniques that may be required for vascular access, fluid administration and invasive monitoring.

METHODS/EQUIPMENT

- This skill station will review many methods of IV access and fluid administration. The instructor will cover this material in an abbreviated form, demonstrating important techniques.

- The students will then have the remaining time to practice selected techniques in a darkened/confined space. Underneath the demonstration tables or another selected site should be used to acclimate the student to performing interventions in a difficult environment.

- Protective gear should be worn during the practice part of this station to again acclimate the students to "real-life" limitations. The use of Universal Precautions must be emphasized.

SITE SELECTION/PREPARATION

- A site should be selected that will allow room for two standard 8 foot conference tables and space for the students/instructor to stand and practice technique (at least 20 feet long by 15 feet wide). The tables will be used initially to display the equipment and models as they are reviewed/used by the instructor. An area on the tables should be provided for student practice. The site should also provide a "confined" area of near-total darkness for students to practice.

Review of safety equipment, Universal
Precautions in the
confined space

VII. MEDICAL TEAM SKILLS STATIONS

C. VASCULAR ACCESS AND FLUID ADMINISTRATION

EQUIPMENT

- Assorted lengths and gauges of peripheral IV catheters.
- At least two IV arms.
- At least one external jugular IV mannequin.
- Four sizing-up kits (Arrow) to perform the Seldinger technique.
- Two central venous access torsos.
- Four central line IV kits including introducers and triple lumen catheters.
- At least two of each crystalloid IV solutions (NS, LR and D5W) (may be outdated).
- At least two of each type of IV tubing including microdrip, macrodrip and trauma tubing with blood pumps, manual fluid pumps and buretrols.
- Two pressure infusers.
- Two Intraosseous needles and at least 10 chicken legs.
- Two sets of cutdown instruments including scalpel with #11 blade, scissors, 0 silk, 2 mosquito clamps.

UNDERSTANDING IV CATHETER SIZE AND APPARATUS

- Microdrip.
- Macrodrip.
- In-line "blood" pump.
- Pressure infuser.
- Trauma tubing.

Demonstration of each modality and fluid flow rate with various sized catheters (14 - 20G).

VII. MEDICAL TEAM SKILLS STATIONS

C. VASCULAR ACCESS AND FLUID ADMINISTRATION

IV "SIZE-UP" TECHNIQUE

- Indications.
- Advantages.
- Technique.

IV CUTDOWN

- Indications.
- Site.
- Advantages/complications.
- Technique.

INTRAOSSEOUS ACCESS

- Indications.
- Sites.
- Advantages/complications.
- Technique.

CENTRAL VENOUS ACCESS

- Indications.
- Sites.
- Advantages/complications.
- Technique.

NOTE: Credentialling in these techniques requires approval of local EMS jurisdiction and certification of competency by the task force Medical Director.

Demonstration, using IV arm, of Seldinger technique (guide wire and dilators) for placing large bore peripheral IV.

Demonstration (or description) of standard technique for IV cut-downs.

Demonstration of intraosseous placement.

Demonstration of central venous line placement.

Practice of techniques, including environment.

VII. MEDICAL TEAM SKILLS STATIONS

D. CONFINED SPACE MANEUVERS

REQUIREMENTS/METHODS

- This will be primarily an exercise for the students to work within a safe confined space environment. It requires the construction of a site and the monitoring of the participants as they navigate the course.

- Safety issues should be stressed and the standard emergency signalling employed as needed.

SITE SELECTION/PREPARATION

- A site should be selected that will allow for construction of a confined area at least 20 feet long by 15 feet wide and be able to provide total darkness with the lights turned off.

    - Inside office without an outside light source (i.e. windows, skylights, etc.) such as conference rooms or storerooms are likely locations.

    - If a pre-fabricated actual confined space is to be used, it should be completely free of real hazards (i.e. unprotected rebar ends, exposed nails, unstable sections of concrete or wood) due to the introductory nature of this skill station.

- Props for the site can generally be found in any training site by using chairs, tables, light boards, cardboard and a small amount of construction materials. A suggested confined space layout is shown on Chart 1.

VII. MEDICAL TEAM SKILLS STATIONS

D. CONFINED SPACE MANEUVERS

DESCRIPTION OF REFERENCE POINTS ON CHART 1

- Area #1.
  - Twelve chairs placed facing each other approximately 24" apart at the bottom, with some means of simulating a roof resting on the chair seats.
  - The roof can be sheets of cardboard or plastic, but should not be anything heavy enough to pose a danger to students should they push the chairs out from under their roof during attempts to maneuver in the space. Taping the rear legs of the chairs provides for extra stabilization.
  - Spacing the roof sections (unless using clear plastic) allows observers to follow the student movements.

- Area #2.
  - Three standard conference or banquet tables spaced approximately 8" apart parallel to each other. The spacing allows for observers and the instructor to watch the students' movements in the area.

- Area #3.
  - Constructed tight confined tunnel. This area is designed to require the student to slide a loaded Sked or Stokes through the 6 foot tunnel in an angled, rather than the usual horizontal, position.
  - Because the students will have to struggle with this section, it must be constructed to allow for pressure on either side without pushing out. Chairs are unsatisfactory do to the inability to FIRMLY anchor them to the floor and provide straight, strong sides.
  - It may be constructed of plywood pieces 30" x 6', with a bottom of plywood measuring 18" x 6' which provides for a smooth dragging surface, and a top of furring strips spaced approximately 8" apart to allow for observation of the student's progress through the tunnel, but preventing them from raising their heads above the tunnel for better mobility.

VII. MEDICAL TEAM SKILLS STATIONS

D. CONFINED SPACE MANEUVERS

DESCRIPTION OF REFERENCE POINTS ON CHART 1 (continued)

- Area #4.
  - The 90 degree angle is built with tables spaced approximately 7 feet apart with clear plastic or cardboard pieces between the tops.
  - The outside edge of the corner should be blocked with cardboard, plywood, or an overturned table to provide a straight wall entering the tunnel.
  - The inner edge of the far table should also be blocked to simulate a wall.

- Area #5.
  - Four tables spaced 8" apart should continue the path at a 90 degree angle from the corner created in (4) above.

- Area #6.
  - Twelve chairs positioned as in (1) above will complete the space, with the Sked packaged at the end.

- Area #7.
  - Simulated patient is a Sked or similar extrication device weighted by approximately 80 pounds, with an oxygen line and simulated patient monitoring cables already attached to the simulated patient.
  - Time constraints do not allow for simulation of a 'heavy' patient for students to struggle with, nor would this provide any additional experience to the students other than make movement and extrication substantially more difficult and prolonged.

- Using a confined space of this nature, student groups should be able to approach the work station from either direction. This eliminates the need for excessive "set-up" time between student groups by having to return the Sked and "patient" to the other end of the set.

- In each separate area of the confined space, provisions must be made for observation by the instructor to allow s/he to interact with the students. Students not currently participating in the exercise may also observe and learn.

VII. MEDICAL TEAM SKILLS STATIONS
D. CONFINED SPACE MANEUVERS

PROPS REQUIRED FOR SUGGESTED SPACE

- Nine (9) standard folding tables.
- (24) standard folding chairs.
- Plywood and pine furring strips or other suitable material to build the wooden confined space listed above.
- One (1) empty portable oxygen cylinder.
- One (1) small (approximately 10 in X 10 in) box to simulate a heart monitor. Tackle boxes or storage containers are suitable. Used monitor cables (or simulated ones) should be attached.
- Two (2) sections of oxygen tubing or heavy string.
- Several large pieces of cardboard or tarp.
- Heavy duty tape for securing the props and for students to use to secure the simulated monitor and oxygen setup during their exercise.
- Simulated patient - SKED stretcher or other suitable extrication device packaged with not more than 60-80 pounds of weight evenly distributed and securely packaged to prevent shifting during movement through the confined space. The simulated patient should be adequate to represent an actual patient, but not so heavier than can be maneuvered through a confined area by two light rescuers within a short period of time.
- Participants personal protective gear and light source.

VII. MEDICAL TEAM SKILLS STATIONS

D. CONFINED SPACE MANEUVERS

INTRODUCTION

- Experience has shown that the level of exposure to confined spaces of medical personnel participating in these exercises is limited.

- The purpose of this skill station is to reinforce basic safety procedures in confined spaces and to introduce students to the problems with simple procedures such as self-movement, equipment access and patient extrication in a confined space atmosphere.

- This skill station is not intended to challenge students with advanced access techniques and stabilization skills. It is also not for instruction of advanced confined space rescue techniques or to replace the rescue component of the task force.

PREPARATION FOR ENTRY

- Prior to entry, all students about to enter the confined space must have the following safety equipment:
  - Helmet.
  - Safety goggles or glasses.
  - Dust mask.
  - Steel toe shoes or boots.
  - Coveralls or protective clothing.
  - Cap lamp or flashlight.
  - At least one safety line on lead person.
  - Latex gloves.
  - Leather work gloves.

VII. MEDICAL TEAM SKILLS STATIONS

D. CONFINED SPACE MANEUVERS

PRE-ENTRY BRIEFING

- In this scenario the rescue personnel have a patient packaged and ready for removal from the site.
  - All gasses are being monitored and the situation is stable for access without self-contained breathing apparatus (SCBA).
  - For purposes of this skill station, students will not be required to appoint a gas monitoring person, but it should be noted that in future class scenarios that function will be required.

- The 'point persons' (or "providers") will enter from the near end, traverse the confined space tunnels, go around a corner and find the simulated packaged patient.
  - The patient is already prepared with an oxygen tube and monitor cables, so the rescuers must simply take an oxygen bottle and simulated monitor into the space with them, tape the oxygen tubing to the tank and tape the monitor cable to the monitor and return the patient to the opening.
  - They may use the students outside to help pull the patient with a rope (their lifeline) if necessary.

- No patient care either real or simulated in this exercise is necessary. The 'point persons' should keep their 'anticipator' informed of their movements, position and any assistance to be required in moving the patient from confinement."

ENTRY EXERCISE

- The lights in the room should be turned off, and only the instructor and those entering the confined space should use flashlights to keep other light to a minimum.

- Students will enter the confined space in pairs. They must take an empty portable oxygen cylinder, and a small box to simulate a heart monitor.

VII. MEDICAL TEAM SKILLS STATIONS
D. CONFINED SPACE MANEUVERS

ENTRY EXERCISE (continued)

- Students enter the confined workspace and crawl to the patient.Upon reaching the patient, attach the simulated heart monitor and oxygen tank with tape and string or tubing to the patient.
- Students must maneuver the patient back through the tunnels to the entry point.
- Students will now remove the oxygen and monitor props and return the patient to his original position for the next group.

POST EXERCISE/REVIEW

- Adherence to proper safety procedures i.e. students functioned at all times with helmet, gloves, eye protection and dust mask.
- Alternate methods for moving the patient through tight areas, i.e. having rescuers outside pull a rope attached to the extrication device.
- Various other safety procedures that participants' home service may be using in confined spaces.
- The need to pre-plan movement through a confined space, such as the point person's body position, before entering the tunnel. Such factors as the need to face the patient to guide him requires the front provider to exit by backing through the tunnel.

VII. MEDICAL TEAM SKILLS STATIONS
E. EVALUATION OF THE PARTIALLY ACCESSIBLE PATIENT

SKILL STATION/EQUIPMENT CONSIDERATIONS

- Students will be in groups of six students per instructor.

- One student will demonstrate a typical assessment in an exposed area of a simulated, "covered" patient. Blankets may be used to visually obstruct the remaining anatomy of the patient.

- As each area is exposed on the simulated patient, students will take turns leading discussion on what may be assessed and what treatment may be given. This discussion will proceed in the order of:
  - Primary survey,
  - Secondary survey,
  - Treatment.

  It is important that the entire group be involved in this process.

EQUIPMENT REQUIRED PER GROUP

- Simulated patient (this may be a mannequin).

- Stethoscope (1/student).

- Pen light (1/student).

- Several blankets.

- Personal protective equipment (dust masks, eye protection, latex gloves, work gloves, helmet with a light, steel-toe boots).

INTRODUCTION

- The evaluation of a patient within a confined space, given the provider's limited vision and mobility and the limited access to the patient's body, may require significant adaptations from everyday medical care.

VII. MEDICAL TEAM SKILLS STATIONS
E. EVALUATION OF THE PARTIALLY ACCESSIBLE PATIENT

INTRODUCTION (continued)

- This Skill Station is designed to challenge the student to develop an ability to modify the patient evaluation in order to reliably obtain the most complete evaluation possible.
  - Advanced trauma assessment (i.e. BTLS or PHTLS).
  - Assessment of isolated areas:
    - V - indicates item ascertained requires visualization.
    - P - indicates item ascertained via palpation.
    - A - indicates item ascertained by auscultation.
    - Unmarked items are self-explanatory.

- A visualization of the entire body for severe bleeding during the primary survey is not mentioned due to emphasis on only isolated areas being accessible.

- Hemorrhage may be discovered during visualization or palpation of any area exposed and should be dealt with appropriately.

HEAD

Primary

- Level of Consciousness (LOC):
  - Alert.
  - Verbal Stimuli.
  - Painful Stimuli (P).
  - Unresponsive (P).
  - AVPU.

- Airway - Look in or feel for obstruction (V or P).

- Breathing:
  - Look - but chest is not visible: vapor from nose or mouth may be seen.
  - Listen - the situation may be too noisy.
  - Feel.

Review typical trauma assessment (5 min.)

Begin interactive discussion/demonstration by students (30 min.)

The mannequin should have the head exposed only. The neck is not accessible.

VII. MEDICAL TEAM SKILLS STATIONS

E. EVALUATION OF THE PARTIALLY ACCESSIBLE PATIENT

HEAD (continued)
Primary (continued)

- Circulation - temporal pulse.

Secondary

- Trauma (V or P).
- Skin.
  - Color (V).
  - Temperature (qualitative or quantitative) (P).
  - Wet or dry (V or P).
- Pupils (V).
- Fluid from ears/nose (V or P).
- Mouth - odors.
- Respiration:
  - Rate (V or P).
  - Rhythm (V or P).
  - Character (V or P).
- Pulse - temporal:
  - Rate.
  - Rhythm.
  - Character.
- Pulse oximeter.

Interventions

- Clear dust from mouth, nose, and lips and apply dust mask.
- Face shield.
- Oxygen.

VII. MEDICAL TEAM SKILLS STATIONS

E. EVALUATION OF THE PARTIALLY ACCESSIBLE PATIENT

HEAD (continued)
Interventions (continued)

- Suction.
- Manual ventilation.
- Intubation, oral airway, nasal airway, EOA.
- Psychological intervention.

NECK

Primary

- LOC - AVPU.
- Airway - not able to visualize nor palpate.
- Breathing:
  - Look - not possible.
  - Listen - with stethoscope over trachea.
  - Feel - not possible.
- Circulation - carotid pulse.

Secondary

- Trauma (V or P).
- Skin.
  - Color (V).
  - Temperature (P).
  - Wet or dry (V or P).
- Jugular vein distention (V or P).
- Tracheal deviation (P).

Discuss the approach if the patient is accessible by palpation only.

The neck only should be exposed. The rest of the mannequin should be covered. Switch students.

VII. MEDICAL TEAM SKILLS STATIONS

E. EVALUATION OF THE PARTIALLY ACCESSIBLE PATIENT

NECK (continued)
Secondary (continued)

- Subcutaneous emphysema (V or P).
- Respiration:
  - Rate (A).
  - Rhythm (A).
  - Character (A).
- Pulse:
  - Rate.
  - Rhythm.
  - Character.

Interventions

- Cervical collar.
- Needle cricothyroidotomy.
- Jugular IV.

CHEST

Primary

- LOC - AVPU.
- Airway - costal retractions (V or P).
- Breathing:
  - Look.
  - Listen with a stethoscope.
  - Feel - not possible to feel air movement, may feel chest rise and fall.
- Circulation - listen with stethoscope for heart sounds.

The chest only should be exposed. Switch students.

VII. MEDICAL TEAM SKILLS STATIONS

E. EVALUATION OF THE PARTIALLY ACCESSIBLE PATIENT

CHEST (continued)
Primary (continued)

- Trauma:
  - Deformity (V or P).
  - Penetrations (V or P).
  - Paradoxical respirations (V or P).
  - Contusions/abrasions (V or P).

Secondary

- Skin.
  - Color (V).
  - Temperature (P).
  - Wet or dry (V or P).
- Lung Sounds (A).
- EKG - crush wave form changes - electrodes may still be placed if situation precludes visualization of patient.
- Percussion.
- Respiration:
  - Rate (V, P, or A).
  - Rhythm (V, P, or A).
  - Character (V, P, or A).
- Pulse:
  - Rate (A).
  - Rhythm (A).
  - Character - can not be easily determined.

Interventions

- Chest Decompression.
- Subclavian IV.
- Pacing, Defibrillation, Cardioversion.

Students should be quizzed about what to look for in the EKG: peaked T waves, prolonged PR intervals, dropped Ps, and widened QRS. Switch students.

VII. MEDICAL TEAM SKILLS STATIONS

E. EVALUATION OF THE PARTIALLY ACCESSIBLE PATIENT

BACK

Primary

- LOC - AVPU.
- Airway - nothing adequate to use for assessment.
- Breathing:
  - Look - for back to move.
  - Listen with a stethoscope.
  - Feel - not possible to feel air but one may feel the back move.
- Circulation - indirect and delayed information via skin color (V) and temperature (P).
- Trauma:
  - Deformity (V or P).
  - Penetrations (V or P).
  - Paradoxical Respiration (V or P).
  - Contusions (V or P).
  - Abrasions (V or P).

Secondary

- Skin.
  - Color (V).
  - Temperature (P).
  - Wet or dry (V or P).

Interventions

- Chest decompression - midaxillary line.

The back should only be exposed for this section.
Switch students.

VII. MEDICAL TEAM SKILLS STATIONS

E. EVALUATION OF THE PARTIALLY ACCESSIBLE PATIENT

ABDOMEN

Primary

- LOC - AVPU.
- Airway - not possible.
- Breathing - some motion in abdomen may be seen or felt; indirect and delayed information from skin color (V) and temperature (P).
- Circulation - indirect and delayed information from skin color (V) and temperature (P).

The abdomen only should be exposed. Switch students.

Secondary

- Skin:
  - Color (V).
  - Temperature (P).
  - Wet or Dry (V or P).
- Trauma:
  - Rigidity (P).
  - Distention (V or P).
  - Penetrations (V or P).
  - Pulsations (V or P).
  - Contusions (V or P).

Interventions

- None.

VII. MEDICAL TEAM SKILLS STATIONS

E. EVALUATION OF THE PARTIALLY ACCESSIBLE PATIENT

PELVIS

Primary

The pelvis only should be exposed.
Switch students.

- LOC - AVPU.
- Airway.
- Breathing - delayed and indirect information via skin temperature (P) and color (V).
- Circulation - femoral pulse.

Secondary

- Skin:
  - Color (V).
  - Temperature (P).
  - Wet or dry (V or P).
- Pelvic Stability (P).
- Priapism (V or P).
- Pulse:
  - Rate.
  - Rhythm.
  - Character.

S2 - S4

Interventions

- Foley catheter.
- IV access.

VII. MEDICAL TEAM SKILLS STATIONS

E. EVALUATION OF THE PARTIALLY ACCESSIBLE PATIENT

EXTREMITIES

Primary

- LOC - AVPU.
- Airway.
- Breathing - indirect and delayed information via skin color (V) and temperature (P) very likely incorrect.
- Circulation - peripheral pulses if present also indicate a BP greater than 80 systolic.

Secondary

- Skin:
  - Color (V).
  - Temperature (P).
  - Wet or dry (V or P).
- Pulse:
  - Rate.
  - Rhythm .
  - Character.
- BP - on <u>any</u> extremity.
- Ability to feel.
- Ability to move.
- Strength.
- Capillary refill (V and P).
- Trauma (V or P).
- Pulse Oximeter.

One extremity only should be exposed. The student should be given all negative information (poor skin color, cold skin, etc.). Then it should be emphasized that this tells you information about the extremity and not necessarily the patient. If the information is positive, this can tell much about the patient.

VII. MEDICAL TEAM SKILLS STATIONS

E. EVALUATION OF THE PARTIALLY ACCESSIBLE PATIENT

EXTREMITIES (continued)

Interventions

- IV depends upon absence of crush situation in that extremity.

Patient assessment dictates patient treatment and thus it is essential that the most information possible be obtained. A unique situation occurs when one has limited access to the patient. This access may allow visualization or palpation only. The ideas presented here should enable one to assess these patients with confidence.

VII. MEDICAL TEAM SKILLS STATIONS

F. PATIENT MONITORING AND PACKAGING

SKILL STATION/EQUIPMENT CONSIDERATIONS

- This skill station will review many methods of patient monitoring using standard devices from prehospital or emergency department care and are part of the FEMA Medical Team cache.

- The instructor will review monitoring strategy, the use of the equipment (brief demonstration) and will walk-through the "packaging" of a patient (20-25 minutes).

- The students will then have the remaining time to practice monitoring techniques and patient packaging.

- PROTECTIVE GEAR SHOULD BE WORN DURING THE PRACTICE PART OF THIS STATION to acclimate the students to "real-life" limitations. The use of Universal Precautions must be emphasized by the instructor.

SITE SELECTION/PREPARATION

- A site should be selected that will allow room for two standard 8' conference tables and space for the students/instructor to stand and practice technique (at least 20 feet long by 15 feet wide).

- The tables will be used initially to display the equipment as it is reviewed by the instructor. An area on the tables should be provided for student practice.

- The site should also provide a "confined" area of near-total darkness for students to practice (this could be under the tables if they are draped with cloth or paper).

VII. MEDICAL TEAM SKILLS STATIONS

F. PATIENT MONITORING AND PACKAGING

EQUIPMENT

- Bag-valve (1)
- End-tidal CO_2 monitor (1)
- Pulse oximeter with sensors (1)
- Hypothermia probes (demonstration only, since this is not in cache) (1)
- Cardiac monitor (1)
  - MRL, or
  - LifePak 5
  - Pacemaker (optional)
- Pressure bags (IV station)
- Dextrose Stix (bottle) (1)
- Urine Multi-Stix (bottle) (1)
- Foley catheter/drainage bag (1)
- Nasogastric tube with suction device (1)
- Blood pressure cuffs
  - Pediatric (1)
  - Adult regular (1)
  - Adult obese (1)
- Hypothermia wrap
  - Plastic tarp 6 ft X 8 ft (1)
  - Two blankets (cotton for this demo, wool in true response) (1)
  - Space blankets (Mylar or other) (2)
  - Hood or towel for patient's head (1)
- Stokes basket with tapered backboard (1)
- Patient face shield (1)

INTRODUCTION

- Monitoring a patient's medical parameters within a tight confined space and during extrication/egress from the collapsed structure is vitally important. At the same time, it may be difficult to closely monitor a victim who is difficult to access or who must be "packaged" for immobilization, hypothermia or protection during the extrication.

VII. MEDICAL TEAM SKILLS STATIONS

F. PATIENT MONITORING AND PACKAGING

INTRODUCTION (continued)

- This session discusses monitoring strategy. It also demonstrates many available monitoring techniques and a method of securely "packaging" a patient for an extended egress from a collapsed structure without losing the ability to monitor and treat the patient. The students then apply the monitoring devices to a patient and successfully "package" the patient.

MONITORING STRATEGY

- Close monitoring is important.
- Re-evaluate patient periodically and after every significant move.
- Monitoring mental status:
  - Often the most sensitive indicator.
  - Keep talking with patient!

AIRWAY/OXYGEN MONITORING

- Bag-valve:
  - Different tidal volumes per size of bag.
  - Increased resistance indicates occlusion, pulmonary edema, tension pneumo, significant hemothorax, improper placement, or patient not tolerating tube.
- End-tidal CO_2 monitor:
  - Purple/yellow/purple/yellow indicates proper tube placement.
  - Continuous purple indicates improper tube placement.
- Heat/moisture exchanger:
  - Captures exhaled air's moisture and heat to be returned to patient with the next ventilation.

Bag valve.
Stress importance of reservoir.

Demonstrate connecting end-tidal CO_2 monitor to BVM.

Heat/moisture exchanger.

VII. MEDICAL TEAM SKILLS STATIONS

F. PATIENT MONITORING AND PACKAGING

AIRWAY/OXYGEN MONITORING (continued)

- Pulse oximeter:
  - Used to assess oxygen saturation and perfusion status on a continuous non-invasive basis (Melton, Heller, Kaplan, Mohen-Klein, 1988).
  - Measures saturation of hemoglobin.
  - Consists of wavelengths of light transmitted twenty times a second and measures the optical density of arterial hemoglobin (Burki and Albert, 1983).

CARDIAC MONITORING

- LifePak 5 with quick defib and hands-off defib.
- MRL with hands-off defib.

BLOOD PRESSURE MONITORING

- Blood pressure is the measurement in millimeters of mercury of the pressure being exerted against the arterial walls during the contraction (systolic) and relaxation (diastolic) of the heart.
  - Falling blood pressure may indicate blood loss, hypoxia, cardiac dysrhythmias, pulmonary emboli, or tension pneumothorax.
  - Rising blood pressure may indicate fluid overload and rising intracranial pressures.
- Capillary refill/pulse ladder on pulse oximeter.
- Manual cuffs - use two (2) for prolonged extrication.
- Presence of distal pulses:
  - Radial - at least 80 mm Hg.
  - Femoral - at least 70 mm Hg.
  - Carotid - at least 60 mm Hg.

Pulse oximeter.

Demonstrate the use of two different probes on the patient at the same time.

Cardiac monitor.

Demonstrate two complete sets of leads on the patient at the same time.

Demonstrate proper placement and securing in place of a stethoscope and BP cuff.

VII. MEDICAL TEAM SKILLS STATIONS

F. PATIENT MONITORING AND PACKAGING

INPUT/OUTPUT MONITORING

- Inputs (IV station).
- Outputs:
  - Nasogastric tubes - eliminates stomach contents (air and fluid).
  - Foley catheter (kidney perfusion/blood - osmolarity/urine pH/urine myoglobin).

GLUCOSE MONITORING

- Dextrose stix - quick, rough estimate of blood glucose level.

PEDIATRIC MONITORING

- Note different norms for espiratory rate, pulse rate, and blood pressures.
- Equipment adaptations (probes, electrodes, defib paddles, ambu bags, ET tubes, catheters, etc.).
- Broslow tape.

TEMPERATURE MONITORING

- Axial, rectal, esophageal, and skin monitoring probes.
  - Normal temperature is controlled by the hypothalamus in the brain.
- Hypothermia:
  - Moderate - 90 to 95 degrees Fahrenheit (32.2 to 35 degrees Centigrade):

- confusion and disorientation.
- shivering.
- amnesia.
- pale, cool skin.
- irregular heart beat.

Nasogastric tube.

Foley catheter and drainage bag.
Urine multi-stick.
Demonstrate with finger prick.

Temperature monitor.
Demonstrate the use of two different probes on the patient at the same time. (Demonstration only since not in cache.)

VII. MEDICAL TEAM SKILLS STATIONS

F. PATIENT MONITORING AND PACKAGING

TEMPERATURE MONITORING (continued)

- Hypothermia: (continued)
  - Severe - below 90 degrees Fahrenheit (32.2 C):
    - bradycardia, v-fib, asystole.
    - stuporous/coma.
    - cold, pale skin.
    - muscle rigidity.
    - heart sounds inaudible.
    - slow or absent respirations.
    - dilated pupils.
    - generalized edema.
  - Death usually occurs at temperatures below 78 degrees F (28.6 C). Mortality rate exceeds 50% below 86 degrees F (30 C). (Greenwald, 1988)

- Hypothermia wrap (see below).

PATIENT PACKAGING

(For prolonged extrication or for hypothermic patients.)

- Immobilization devices as indicated.

- Monitors:
  - Monitor/Defibrillator with hands off defibrillation adapter (R2 or Fast Patch).
  - Pulse oximeter.
  - Blood pressure cuff and stethoscope (if available, automatic BP monitor can be used with a manual backup).

- All leads and devices should have a backup.

Utilize one student as a model for complete hypothermia packaging.

Step-by-step immobilization device placement, monitor placement, hood and layered blanket placement of patient onto tapered back-board and into Stokes basket.

PATIENT PACKAGING (continued)

- Special tricks:
  - Apply two sets of EKG electrodes and two sets of cables with lead wires routed to the patient's head.
  - Defibrillation electrodes should be in place with leads connected.
  - Tape blood pressure cuff in place with stethoscope diaphragm taped in the appropriate location on the patient's arm and routed to the patient's head.
  - BP cuff and stethoscope should be placed on each arm if possible.
  - Two separate pulse oximeter leads should be applied and routed to the patient's head.

HYPOTHERMIA WRAP

- Equipment .

- Procedure:
  - Lay the tarp in the stokes basket with the 8' length perpendicular to the basket.
  - Lay the wool blankets on the tarp with the long sides perpendicular to the basket.
  - Lay the space blankets on the wool blankets.
  - Place the patient on the hypothermia wrap.
  - Route all monitoring leads and IV tubing to the patient's head.
  - Wrap each layer around the patient:
    - space blanket first.
    - wool blankets.
    - tarp.
  - Cover the patients head with the hood or towel.
  - Place face shield on patient.
  - Secure the patient in the transport device (Stokes basket in this case).

VII. MEDICAL TEAM SKILLS STATIONS

F. PATIENT MONITORING AND PACKAGING

CONCLUSION

- Monitoring a patient during a rescue is just as important as the initial monitoring stages.

- Utilizing the variety of monitoring devices available, the patient condition can be treated appropriately to insure a successful, quality patient recovery.

- If a victim's O_2 saturation drops, anticipate tube misplacement, inadequate tissue perfusion, low hemoglobin, hypothermia, hypoventilation, tension pneumo, pulmonary emboli, cardiac arrest, and even a misplaced probe.

- Monitoring devices aid the rescuer in treating the patient in the most efficient manner possible.

VII. MEDICAL TEAM SKILLS STATIONS

G. IMMOBILIZATION AND EXTRICATION

METHODS/REQUIREMENTS

- This Skill Station will review several methods of spinal immobilization during extrication (standard pre-hospital equipment/technique with adaptations).

- Plaster splinting material will also be briefly reviewed, methods of securing patients in a Stokes basket will be reviewed and important egress assessments will be discussed.

- The students will then have the remaining time to practice selected techniques and, once proficient, practice some in a darkened/confined space. Underneath the demonstration tables or another selected site should be used to acclimate the student to performing interventions in a difficult environment.

- PROTECTIVE GEAR SHOULD BE WORN DURING THE PRACTICE PART OF THIS STATION to again acclimate the students to "real-life" limitations. The use of Universal Precautions must be emphasized by the instructor.

- It is recognized that the material in this section cannot be covered in depth in the allotted time. The instructor should "tailor" the presentation to the skill level of each audience.

SITE SELECTION/PREPARATION

- A site should be selected that will allow floor room for the immobilization equipment and a standard 8' conference table for demonstrating technique.

- Adequate space for the students/ instructor to stand and practice technique is required (at least an area 20 feet long by 15 feet wide). The table will be used initially to display the equipment as it is reviewed by the instructor.

- An area on the tables should be provided for student practice. The site should also provide a "confined" area of near-total darkness for students to practice (this could be under the tables if they are draped with cloth or paper).

VII. MEDICAL TEAM SKILLS STATIONS

G. IMMOBILIZATION AND EXTRICATION

EQUIPMENT

- Blankets (2)
- Face shield (1)
- One section: 9mm Kernmantle utility rope [or equivalent], 50' to 60' long (1)
- Stokes basket: wire or ABS plastic (1)
- Plaster splinting (Maxi-splint or equiv), 4" roll (1)
- Utility scissors (1)
- Bucket of water (1 gal) (1)
- KED or XP-1 (1)
- SKED (1)
- Sagar splint, Kendrick splint or equiv. (1)
    - Miller body splint (if available)
    - Reeves sleeve stretcher (if available)
    - Orthopedic stretcher (if available)
    - Ferno Model 10 folding stretcher (if avail)
- Long spine board (cut to fit Stokes basket) (1)
- Short spine board (1)
- MAST pants - adult (1)
- 12' Tape measure (1)

- This session is designed as a review of pre-hospital immobilization devices and strategy, emergency splinting and securing a patient in a Stokes basket. The students then practice the techniques.

INTRODUCTION

- Patient immobilization and extrication from a confined space can be among the most challenging rescue scenarios. The encroaching rubble may be immovable and so techniques may differ markedly from those used in automobile extrication.

- The combined expertise of the pre-hospital provider (using immobilization devices) and the physician (using splinting and pain meds) may be required to complete the extrication. Egress from the structure may also require a securing of the patient so that hoisting, lowering and turning the patient on his/her side may be safely accomplished.

VII. MEDICAL TEAM SKILLS STATIONS
G. IMMOBILIZATION AND EXTRICATION

IMMOBILIZATION - SPINE

- Patients must have Cervical spine immobilization prior to packaging and extrication.

- C-spine immobilization should occur as soon as the head and neck are free: a minimum of a rigid cervical collar (stiff neck, neck lock, etc.)

- Remember that even though a patient has been trapped for several hours to days without C-spine immobilization the mechanism of injury potential is great and the patient may not have had the ability to move his head to aggravate the injury until you extricate him.

- Immobilization devices should be chosen with the following in mind.
  - Ease of application in the confined space.
  - Can you fit the patient and the device through the route of egress?
  - Example - 90^o turn in the egress route, will the patient and device fit? The patient may have to be placed in a KED, then placed in a Stokes so that the patient can be removed without loss of C-spine immobilization for the move through the narrow area and then placed back in the Stokes for the remainder of the egress.
  - Can the device be used if there is a vertical ascent or descent in the egress route?
  - Will the device fit into a Stokes or other extrication device if the need arises?
  - Can you easily retrieve or trade your devices when the patient is transferred to the local authorities.

- Immobilization techniques in the confined space are not different <u>in principle</u> from those outlined in the National Standard Curriculum for EMT Training, BTLS, or PHTLS.

- Remember the best immobilization tool is two human hands and should be used until mechanical stabilization is available.

- Thoracic/lumbar spine immobilization as indicated.

Discussion and demonstration.

Demonstration of spinal immobilization devices, their correct applications and confined space adaptations.

VII. MEDICAL TEAM SKILLS STATIONS

G. IMMOBILIZATION AND EXTRICATION

IMMOBILIZATION - LIMBS

- Arms and legs may require the stabilization/immobilization of unstable fractures prior to a difficult extrication.
- Methods:
  - Traction splints.
  - Plaster splinting or other contrived splint.
  - MAST used as splint. Avoid compression-type splints if crush injury present in extremity.
- Judicious use of pain meds.

EGRESS EVALUATION

Identify the following extrication problems:

- Safety of egress:
  - Sharp edges/points.
  - Stability of roof/walls.
  - Atmosphere/utility dangers:
    - Special packaging for extrication through hazards (smoke, dust, etc.)?
- Size of route:
  - Sharp angles and other areas where a long board may not pass.
  - Special needs: vertical ascent or descent.
  - Use measuring tape.

IMMOBILIZATION IN STOKES BASKET

- Allows safe manipulation of patient for hoisting, lowering, etc.
- Should be accomplished quickly.
- Should allow fast patient removal if necessary.
- "Needle and thread" method is recommended.

Brief demonstration of splints.

Brief note of Mast pants.

Demonstration of immobilization on back-board with straps, placement in Stokes basket and secured with rope using "Needle and Thread" or "Criss Cross" methods.