Chapter 7
Assisting the ALS Provider

Overview
- The Team Concept
- ALS Procedures and Equipment
  - Electrocardiogram (ECG) Monitoring
  - Intravenous Therapy
  - Endotracheal Intubation

The Team Concept
- Prehospital care involves many individuals and entities
- Providing proper quality care relies heavily on teamwork
The Team Concept

- Failure to adequately assess and intervene in the management of the airway, breathing, and circulation of a patient in distress will often result in an undesired patient outcome.
- The ability of the EMT to quickly and efficiently assess these areas remains paramount as the foundation of quality care.

The Team Concept

- EMTs may work with ALS providers.
- ALS providers may elect to initiate additional interventions, including:
  - Cardiac monitoring
  - Intravenous therapy
  - Endotracheal intubation

The EMT who is able to anticipate the need or is requested to assist the ALS provider with such skills and procedures will greatly enhance the functioning of the team.

ALS Procedures and Equipment

- ECG monitoring
- Intravenous therapy
- Endotracheal intubation
ECG Monitoring

- The ability to assess the electrical activity of the heart may guide what interventions are appropriate for the presenting patient condition
- Assisting with the application of the cardiac monitor will expedite the assessment and any necessary interventions

ECG Monitoring

- Typical patients requiring monitoring
  - Altered mental status
  - Unresponsive patient
  - Cardiac arrest
  - Chest pain
  - Respiratory distress
  - Abdominal pain or discomfort
  - Traumatic injuries to the chest
  - Hypotension
  - Diabetes

ECG Monitoring

- There are several common types of cardiac monitors used by ALS providers in the out-of-hospital setting
- Become familiar with the type, application, and start-up features of the monitor used by the ALS services in your area
ECG Monitoring

- Many cardiac monitors offer multiple electronic features
  - ECG monitoring
  - Defibrillation
  - Synchronized cardioversion
  - Transcutaneous pacing
- Other features may include
  - Automatic noninvasive blood pressure
  - Pulse oximetry
  - Capnometry/CO₂ monitoring

ECG Monitoring

- Electrode placement
  - Cardiac monitoring involves the application of electrodes to the skin of a patient and connection of the electrical cables to the cardiac monitor
  - The number of electrodes used and their placement on the patient will be based on the number of monitor cables

ECG Monitoring

- The most common electrode placements used to view the electrical activity of the heart are three-, five-, or twelve-lead systems
Following placement of the electrode on the patient’s skin, the electrical cables are connected to the appropriate electrodes.

Each connector may be identified based on color and letter indications on each snap connector.

On three-cable systems, the identifiers include:
- Right arm (RA) – WHITE
- Left arm (LA) – BLACK
- Left leg (LL) – RED

Five-cable systems
- Addition of the right leg (RL) – BROWN
- Central ground (G) – GREEN
ECG Monitoring

- Twelve-lead ECG
  - Ten cable-electrode connections

ECG Monitoring

- Electrode placement
  - Placed on the chest, abdomen or arms, and legs
  - Often based on practicality and accessibility

ECG Monitoring

- With three- and five-lead systems
  - Right arm (RA) – **WHITE**
    - Just below the lateral clavicular area
  - Left arm (LA) – **BLACK**
    - Just below the lateral clavicular area
  - Left leg (LL) – **RED**
    - Right lateral abdominal area
ECG Monitoring

- Twelve-lead systems
  - Ten electrodes are placed on the patient
  - Limb leads are placed distally on the extremities
  - Remaining six electrodes are placed across the anterior to left lateral chest wall

ECG Monitoring

- The electrode must be firmly secured to the skin to obtain an adequate view of the electrical activity of the heart
- Preparation of the skin
  - Removal of any moisture that may be present
  - Removal of excess hair may be necessary to allow the adhesive portion of the electrode to completely adhere

ECG Monitoring

- When indicated, the electrical activity of the heart may be monitored through the application of defibrillator/pacer pads as used in hands-free operation of the monitor/defibrillator
- These pads are placed in the same manner as AED pads
ECG Monitoring

- Identify need for cardiac monitoring
- Identify electrode placement based on monitor cable system
- Expose patient skin in the area of electrode placement to ensure it is dry and free of excess hair
- Remove protective cover from electrode and apply to patient’s skin
- Connect electrical cables to electrodes
- Turn monitor to on position and ensure appropriate monitoring view is selected

Intravenous Therapy

- Administration of medications and fluids may improve a patient’s condition and outcome
- Intravenous access is obtained by placement of a small catheter in a vein

Intravenous Therapy

- The catheter is left in place as the access port to the circulatory system
- This port may also be used to obtain blood samples for glucose checks and laboratory studies
Intravenous Therapy

- Standard intravenous access equipment
  - Sharps container
  - Tourniquet
  - 2x2 or 4x4 dressing
  - Alcohol prep
  - Intravenous catheter
  - Heparin port or “saline lock”
  - Administration set
  - Intravenous fluid
  - Tape
  - Bioocclusive dressing
  - Gloves

- The ALS provider will decide what type of fluid will be administered to the patient

  Establishing vascular access without fluid administration is a common practice

- The end of the catheter is capped with a heparin port or “saline lock”

  Medications may be introduced through this port without connecting the catheter to a fluid administration set
Intravenous Therapy

- The EMT must always check the appropriate fluid is prepared, as well as the expiration date and clarity of the fluid.
- If the fluid is discolored, expired, or the bag is leaking, another bag must be used.

Intravenous Therapy

- To access the fluid bag, tear or carefully cut the protective covering and remove the fluid bag.
- Fluid bags may have multiple ports located on the inferior end:
  - One port will be for connecting the administration
  - One permits medication to be added to the fluid

Intravenous Therapy

- An administration set must be attached to the fluid bag.
- This tubing transports the fluid to the intravenous catheter placed in the patient’s circulatory system.
- Two common types of administration sets are available as intravenous tubing.
Intravenous Therapy

- Choice of the administration set is based on the desire to infuse small or large amounts of fluid to the patient
  - A macrodrip administration set produces large drops of fluid (10-20 drops per 1 cc) and facilitates the rapid infusion of fluid
  - A microdrip administration produces small drops of fluid (60 drops per 1 cc), restricting the amount of fluid being administered

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Intravenous Therapy

- Assembly
  - Identify desired type of fluid and administration set
  - Confirm fluid for expiration date, clarity, and no leaks
  - Open fluid bag and administration set
  - Close administration set using regulating clamp on tubing
Intravenous Therapy

- **Assembly**
  - Ensure that sterility is maintained
  - Remove protective covers from fluid bag and administration chamber side of tubing
  - Insert administration set into fluid bag

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Intravenous Therapy

- **Assembly**
  - Squeeze administration set chamber to fill approximately one half
  - Open regulating clamp on tubing to fill tubing with fluid
  - Ensuring sterility is maintained, remove distal tubing protective cap if needed
  - Close regulating clamp on tubing when tubing is filled
  - Ensure all air is removed from tubing
  - Replace distal tubing protective cap if removed

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Intravenous Therapy

- **Patient preparation**
  - The ALS provider will most likely be the individual preparing the patient and intravenous insertion site for the procedure
Intravenous Therapy

- The area where the intravenous catheter will be introduced through the skin is prepared by swabbing with an alcohol prep.

- Swab over the area in a circular motion, beginning at the center of the area and moving outward.

- The area cleansed should be approximately 3 × 3 inches.

Intravenous Therapy

- Securing
  - BSI
  - The ALS provider will remove the needle and insert the distal tubing end into the catheter.
    - The needle should immediately be placed in a sharps container.
  - The tourniquet should be released.
  - Any excess fluid or blood should be removed from the catheter area.

Intravenous Therapy

- Securing and monitoring
  - The regulating clamp is moved to the open position and the site is observed for infiltration of the fluid.
Intravenous Therapy

- Monitoring
  - Common signs and symptoms of intravenous infiltration:
    - Increased pain in the area of the catheter
    - Swelling
    - Discoloration
    - Intravenous fluid infuses slowly or not at all

Intravenous Therapy

- Monitoring
  - If signs of infiltration are noted, immediately close the regulation clamp
  - The ALS provider will remove the catheter from the skin and gentle pressure with a dressing is applied to the insertion area

Intravenous Therapy

- The catheter is secured to the skin using a bioocclusive dressing and/or tape
- Follow the instructions given by the ALS provider when assisting with this procedure
Intravenous Therapy

- A small loop is placed in the administration set tubing and secured to the patient's skin.
- This loop will assist in preventing dislodgment of the catheter from the insertion site.
- In areas where the insertion site is over a joint, placement of a splint to stabilize the extremity may be necessary to maintain infusion continuity.

Intravenous Therapy

- After securing the catheter and administration tubing, the site should be rechecked for signs of infiltration.
- The rate of fluid infusion should be confirmed by the ALS provider.
- Frequent reassessment of the infusion site should occur during all aspects of patient contact.

Video Clip: Assembly of Intravenous Administration Set and Fluid
Endotracheal Intubation

- A procedure that is performed when a patient is unable to maintain a patent or secure airway without assistance

Endotracheal Intubation

- Conditions potentially requiring endotracheal intubation
  - Altered mental status/unresponsive
  - Respiratory distress/arrest
  - Cardiopulmonary arrest
  - Traumatic injuries disrupting the airway
  - Status epilepticus

Endotracheal Intubation

- The three primary methods of intubation in the out-of-hospital setting include
  - Direct laryngoscopy
  - Nasotracheal
  - Digital
Endotracheal Intubation

- Equipment and patient preparation
  - Two of the three prominent areas where the EMT can assist are equipment and patient preparation
  - Some ALS providers may want you to manage the airway while preparations are made for intubation
  - Others may want you to set up the equipment and prepare the patient for the procedure

- It is important that the EMT preoxygenate the patient prior to the procedure

- Ventilate with a normal rate and tidal volume for a minimum of 2 minutes prior to beginning the endotracheal intubation procedure

- When the ALS provider is ready to perform the endotracheal intubation procedure:
  - Stop assisting with ventilations
  - Remove the oropharyngeal airway
  - Perform any oral suctioning that may be required

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Endotracheal Intubation

- When the EMT is requested to set up the equipment and prepare the patient for the procedure, all necessary items must be gathered and assembled.

Endotracheal Intubation

- Standard endotracheal intubation equipment
  - Hard and soft suction catheters
  - Laryngoscope handle with various sizes of blades
  - Magill forceps
  - Oropharyngeal airway and tongue depressor
  - Endotracheal tubes and stylet
  - 10-cc syringe
  - Commercial endotracheal tube holder
  - Tape
  - End-tidal CO₂ and esophageal bulb detectors
  - Gloves and eye protection

Endotracheal Intubation

- BSI
- Assemble the laryngoscope handle with the desired blade of the ALS provider
- The two standard laryngoscope blade styles are straight (Miller) or curved (MacIntosh)
- Each style comes in various sizes
Endotracheal Intubation

- The blade is attached to the laryngoscope by placing the blade into the top of the handle in an unopened position and securing it to the pin with a downward motion.
- A “click” may be heard when using metal equipment.

Endotracheal Intubation

- When using blades that are nonfiberoptic, the EMT must ensure the bulb at the distal end of the blade is tight by attempting to turn the bulb in a clockwise manner.
- If secure, the bulb will not move.

Endotracheal Intubation

- Move the blade into the open position on the laryngoscope handle.
- This is accomplished by moving the distal end of the blade away from the handle in an outward motion.
- The blade will pivot on the top of the handle and lock into position.
Endotracheal Intubation

- At this time the bulb on the blade should be brightly illuminated
- After confirming bulb illumination, close the blade by depressing the distal end of the blade back into the unlocked position
- Leave the blade attached to the laryngoscope handle

Endotracheal Intubation

- Inquire about what size endotracheal tube the ALS provider wishes to use

- Standard adult sizes range from 6.0 to 9.0, with ½ sizes available (e.g., 6.5, 7.5)
Endotracheal Intubation
• Remove the tube from the packaging and attach a 10-cc syringe without a needle to the cuff connection port near the top of the tube

• Inflate the distal cuff using no more than 10 cc of air and disconnect the syringe

• Check to make sure the distal cuff remains inflated

Endotracheal Intubation
• Check the endotracheal cuff for air leaks

Endotracheal Intubation
• Reattach the 10-cc syringe to the cuff connection port and withdraw all the air in the cuff

• If any air remains in the cuff, this may cause complications during the endotracheal intubation procedure
Endotracheal Intubation

- A stylet is a fairly rigid devise that assists in maintaining a desired shape of the endotracheal tube
- If instructed, place the stylet into the top of the endotracheal tube and advance it until the end is just proximal to the Murphy hole or "eye" on the side of the distal end of the endotracheal tube

Endotracheal Intubation

- Bend the stylet over the top of the endotracheal tube and reconfirm the distal end of the stylet is not beyond the landmark identified
- The EMT may also be instructed to apply a lubricant to the distal end of the endotracheal tube

Endotracheal Intubation

- Following stylet and lubrication as directed, place the endotracheal tube back into the packaging and keep the 10-cc syringe with the tube
- The esophageal detection, end-tidal CO₂, and commercial tube-securing devices, along with the prepared endotracheal tube, laryngoscope handle and blade, and suction unit, should be placed within reach of the ALS provider performing the endotracheal procedure
Endotracheal Intubation

- The application of cricoid pressure decreases the risk of aspiration by occluding the esophagus
- During spinal restrictive maneuvers for suspected neck injuries, the EMT will often take a position above the head of the patient and hold spinal restrictive measures from this position

Endotracheal Intubation

- Confirmation of tube placement
  - Failure to ensure appropriate placement of an endotracheal tube will often result in the decompensation and ultimately death of a patient
  - Verification of placement is through the assessment and evaluation of multiple methods
  - The EMT may be requested to confirm the endotracheal tube placement by auscultation of breath sounds, placement of the esophageal and/or end-tidal CO₂ detectors

Endotracheal Intubation

- Squeeze the esophageal detector device to remove the air
- Attach it to the 15-mm connection at the top of the endotracheal tube
- After it is attached to the tube, release the detector; it should reinflate at this time
- The absence of inflation may indicate esophageal placement of the endotracheal tube
Commercially available end-tidal CO₂ detectors are used to detect the presence of carbon dioxide during the expiration phase of respiration/ventilation.

Attach the device directly to the 15-mm connector; provide four or five ventilations.

A color change indicates the presence of carbon dioxide.

Commonly used devices change from purple to yellow in the presence of carbon dioxide, but not all devices use this color scheme.

Signs of proper placement:
- Symmetrical chest rise and fall
- Absence of epigastric sounds
- Presence of bilateral breath sounds
- Color of patient skin
- Reinflation of the esophageal detector
- Color change from purple to yellow on the CO₂ detector
- Endotracheal tube is free of large amounts of secretions, blood, and vomit.
Endotracheal Intubation

- Following confirmation for correct placement, securing the tube is the next priority

- Assist the ALS provider in applying a commercially available endotracheal tube holder or by using a preferred taping method

- Note the depth of the endotracheal tube in reference to the lips or teeth of the patient

Endotracheal Intubation

- An endotracheal tube secured by a commercially available device

Endotracheal Intubation

- Consider securing nontraumatic patients who are intubated to a long spine board with a cervical immobilization device.
  
  - This will restrict movement of the head and decrease the risk of inadvertent endotracheal tube displacement.
Endotracheal Intubation

- Ventilate the patient with the bag-mask device
- Attach the bag-mask device to the 15-mm endotracheal tube
- Perform ventilations

Summary

- The Team Concept
- ALS Procedures and Equipment
  - Electrocardiogram (ECG) Monitoring
  - Intravenous Therapy
  - Endotracheal Intubation