PARAMEDIC

NATIONAL CONTINUED COMPETENCY PROGRAM

PARAMEDIC EDUCATION UPDATE

National Registry of
Emergency Medical Technicians®
THE NATION'S EMS CERTIFICATION™

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National Registry of Emergency Medical Technicians®
THE NATION'S EMS CERTIFICATION™

PARAMEDICS

AIRWAY, RESPIRATION, & VENTILATION

VENTILATION

ADULT & PEDIATRIC PATIENTS: EXPECTED DURATION 2 HOURS

INSTRUCTOR PREPARATIONS

- *National EMS Education Standards*
- Review relevant material in a Paramedic text
- Review current AHA Guidelines
- Assemble skills laboratory materials:
  - Airway management trainer
  - Bag Valve Mask Resuscitator and assorted masks
  - Oropharyngeal Airways and tongue blades
  - Nasopharyngeal Airways
  - Airway devices (e.g., supraglottic airway, intubation equipment, etc.)
  - Oxygen or simulated oxygen/compressed air source
  - Suction unit with catheters and tubing
  - Airway lubricant
  - Automatic Transport Ventilator (if available)
  - CPAP device
  - Airway skills evaluation form

LEARNING OBJECTIVES

- Differentiate between adequate and inadequate breathing
- Differentiate between respiratory distress and respiratory failure
- Differentiate between alveolar ventilation and minute ventilation
- Explain when to oxygenate and when to ventilate a patient
- Examine the effect of ventilation on venous return and cardiac output
  - Spontaneously breathing patient
  - Artificially ventilated patient
- Identify the use of automated transport ventilators when managing patients
- Discuss the AHA's position on routine suctioning of the newborn
- Demonstrate effective bag-valve-mask ventilation at a proper rate and depth
- Assess the advantages and disadvantages of various advanced airway adjuncts

LESSON CONTENT

I. Minute ventilation
   a. The volume of air a person moves in and out of the respiratory system in one minute
   b. Minute ventilation (MV) = Tidal volume x Respiratory rate
      i. Tidal volume (Vt) – The volume of air a person moves in and out of the respiratory system in each breath
      ii. Respiratory rate (Frequency (F)) – The number of times a person breathes per minute
   c. Example: 500mL of air x 12 breaths per minute = 6000mL/minute
   d. Explain adequate and inadequate breathing based on minute ventilation

II. Adequate and inadequate breathing
   a. Must have an adequate minute ventilation (adequate rate AND adequate tidal volume)
   b. Inadequate breathing requires immediate management with positive pressure ventilation.
      i. Inadequate breathing is caused by
         1. An inadequate tidal volume
         2. An inadequate rate
         3. A combination of both

c. Adequate breathing does not require positive pressure ventilation

III. Alveolar ventilation (Va)
- a. The amount of air that moves in and out of the alveoli per minute
- b. Alveolar ventilation = (tidal volume – dead air space) x respiratory rate in one minute
  - i. Va = (Vt – Vd) * F
  - ii. Example: (500mL of air – 150mL) x 12 breaths per minute = 4200mL/minute
- c. The difference between minute ventilation and alveolar ventilation is important because alveolar ventilation is the volume of air reaching the alveoli that participates in gas exchange (what oxygenates the blood.) By increasing the rate of ventilation in a patient with shallow breathing (inadequate tidal volume) may maintain the minute ventilation near normal; however alveolar ventilation (gas exchange) will be inadequate.

IV. Effect of ventilation on venous return and cardiac output
- a. In the normal patient, the negative pressure that causes inhalation facilitates venous return necessary for adequate cardiac output and perfusion.
  - i. Cardiac output is the amount of blood ejected from the left ventricle in one minute
  - ii. Cardiac output = stroke volume x heart rate
    1. Stroke volume = amount of blood ejected from the left ventricle with each contraction
    2. Heart rate = number of times the heart contracts in one minute
  - iii. Negative pressure during inhalation allows venous blood return to the right side of the heart, which is necessary for adequate cardiac output
- b. Artificial ventilation pushes air into the chest (positive pressure ventilation) increasing intrathoracic pressure
  - i. [1]"Death by Hyperventilation: A Common and Life-threatening Problem During Cardiopulmonary Resuscitation"
  - ii. Increases in intrathoracic pressure impedes venous blood return to the right side of the heart
  - iii. Excessive ventilation rates during positive pressure ventilation
    1. Decreases cardiac output
    2. Decreases vital organ perfusion
  - iv. For adults, artificial ventilatory rates greater than 12 times per minute (one ventilation every 5-6 seconds) decrease cardiac output and perfusion
    1. Do not exceed a ventilatory rate of 10-12 times per minute (one ventilation every 5-6 seconds).
    2. High artificial ventilatory rates (greater than 12 times per minute, one breath every 5-6 seconds) result in poor patient outcomes

V. Respiratory distress vs. failure
- a. Respiratory conditions are dynamic
  - i. Range from minor respiratory distress to respiratory arrest
  - ii. Can be acute, chronic, or chronic with acute exacerbation
  - iii. Signs/symptoms are dynamic and may change over time depending on the state of patient's disease process
- b. Many patients with respiratory diseases need only comfort care
- c. Important to know when exactly to provide an intervention (such as artificial ventilation) in order to increase the likelihood of patient improvement
- d. In respiratory failure, inadequate alveolar ventilation exhibited by
  - i. Decrease in or excessively high respiratory rate
    1. Reduces tidal volume and amount of air available for alveolar gas exchange
  - ii. Decrease in tidal volume (or both)

iii. Patients in respiratory failure are severely ill

e. Must recognize the transition of a respiratory disease from distress to failure
   i. Deterioration in mental status , confusion, loss of gag reflex
   ii. Accessory muscle use, head bobbing, grunting, nasal flaring
   iii. Decrease in SpO_2
   iv. Cyanosis
   v. Hypercarbia

VI. Continuous Positive Airway Pressure (CPAP)
   a. CPAP is used to provide better oxygenation to patients who are hypoxic
      i. Not designed to ventilate patients
   b. Reduces the effort for the patient to breathe, improves oxygenation and reduces hypercarbia
   c. Can prevent the exacerbation of respiratory distress or respiratory failure
   d. Applies positive airway pressures above atmospheric pressure during inhalation and provides positive end expiratory pressure (PEEP) during exhalation
   e. Indications
      i. Patient needing ventilatory support who is in moderate to severe respiratory distress or early respiratory failure
      ii. Patient must be awake, able to obey commands, and have intact airway reflexes
   f. Contraindications
      i. Inability to maintain an open airway
      ii. Severe hypotension (systolic BP < 90)
      iii. A respiratory rate of less than 8 breaths/min
   g. The EMS provider needs to deliver assisted artificial ventilations to patients who exhibit deterioration in mental status because of hypoxia and hypercarbia

VII. Automated Transport Ventilators (ATV)
   a. Intubated patients requiring artificial ventilation for a period of time may benefit from use of ATV, instead of BVM
   b. Advantages
      i. Can be used for
         1. Breathing and non-breathing patients
         2. Patients in respiratory failure
      ii. Frees the rescuer for other tasks
   c. Adjustable settings provide
      i. Specific tidal volume
      ii. Respiratory rate
      iii. Minute ventilation
   d. Disadvantages
      i. Need for an oxygen source, and sometimes electric power
      ii. Inability to detect increasing airway resistance
      iii. Some ATVs should not be used in children younger than 5 years old

VIII. Various advanced airway adjuncts
   a. Oropharyngeal (OPA)
      i. Indications
         1. Respiratory distress/failure
         2. Unconscious, unresponsive patient
      ii. Contraindications
         1. Gag reflex
         2. Presence of oral trauma (broken teeth, recent oral surgery, etc.)
   b. Nasopharyngeal (NPA)
      i. Indications

1. Respiratory distress/failure

ii. Contraindications
1. Presence of head, facial trauma
2. Presence of skull fracture

c. Supraglottic
i. Examples
1. Laryngeal mask airway (e.g., LMA™)
2. Esophageal-tracheal tube (e.g., Combitube™)
3. Laryngeal tube (e.g., King LT ™)
4. I-Gel

ii. Advantages
1. Does not require visualization of the glottis (blind insertion)
2. Initial training and maintenance of skills are easier
3. Chest compressions do not need to be interrupted to insert
4. Minimal equipment required for insertion

iii. Disadvantages
1. Contraindicated in patients with a gag reflex
2. Some devices contraindicated in patients at risk for regurgitation which can lead to aspiration (e.g., LMA™)
3. Unrecognized improper placement can occur
4. Additional contraindications common per local protocol

d. Endotracheal Tube (ETT)
i. Advantages
1. Keeps the airway patent
2. May protect the airway from aspiration
3. Allows suctioning of deep airway secretions
4. Potential route for drug administration

ii. Disadvantages
1. Difficult initial training
2. Insufficient skill maintenance without frequent practice
3. Frequently causes trauma to the oropharynx
4. Hypoxemia possible with prolonged intubation attempts
5. Adverse outcomes common when providers fail to recognize tube displacement or misplacement
6. High incidence of complications
a. when performed by inexperienced providers
b. with inadequate monitoring of tube placement

IX. Positioning of the pediatric patient for artificial ventilation
a. Sniffing position
b. Pad behind shoulders

X. Newborn care – suctioning the airway
a. Suctioning the airway in the newborn may cause bradycardia
b. Suctioning immediately following birth (including the use of a bulb syringe) should only be done in newborns who have an obvious obstruction to spontaneous breathing or who require positive pressure ventilation
c. Presence of meconium does not necessarily require suctioning
i. Review AHA Guidelines
1. Do not suction if newborn exhibits vigorous crying/respirations
2. Suction if newborn exhibits respiratory compromise/distress

PARAMEDIC VENTILATION SKILLS	Successful	Unsuccessful
1. Place an OPA		
2. Ventilate an apneic patient (simulated)		
a. Minimum of two minutes		
b. Maintain a mask seal		
c. Appropriate rate (10-12 breaths/min)		
d. Appropriate volume for patient size		
e. Monitor chest rise		
f. No insufflation of stomach, if applicable		
3. Suction the upper airway		
4. Insert appropriately sized supraglottic airway in pediatric patient		
5. Perform intubation in challenging scenarios, for example: low lighting, confined spaces, seated patient		
The adjunct and ventilation skills should be practiced as a simulation case. A scenario should be presented which requires the learner to differentiate between a patient that requires supplemental oxygenation and one that requires ventilation.		

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PARAMEDICS

AIRWAY, RESPIRATION, & VENTILATION

CAPNOGRAPHY

ADULT & PEDIATRIC PATIENTS: EXPECTED DURATION 1 HOUR

INSTRUCTOR PREPARATIONS

- *National EMS Education Standards*
- Review relevant material in a Paramedic text
- Review current AHA Guidelines
- Review capnography-specific educational resources
  - Examples (not exhaustive)
    - [2]Harvard Medical School—Kodali, 2014
- Assemble skills laboratory materials:
  - Airway management trainer
  - Capnography simulator
  - Bag Valve Mask Resuscitator and assorted masks
  - Airway devices (e.g., supraglottic airway, intubation equipment, etc.)
  - Oxygen or simulated oxygen/compressed air source
  - Suction unit with catheters and tubing
  - Airway lubricant
  - Automatic Transport Ventilator (if available)
  - CPAP device

LEARNING OBJECTIVES

- Assess the difference between ventilation and oxygenation
- Interpret blood oxygenation levels using pulse oximetry and capnography.
- Discuss how $ETCO_2$ measures ventilation and perfusion
- Confirm the phases of the $ETCO_2$ waveform of a capnography
- Analyze an $ETCO_2$ reading
  - To assess and monitor proper endotracheal tube placement
  - To determine and monitor effective ventilation
  - To determine and monitor effective perfusion

LESSON CONTENT

I. End tidal CO2
   a. Utilized to measure ventilation
   b. $ETCO_2$ measures partial pressure (mmHg) or volume (% vol) of exhaled CO_2 exiting the airway at the end of exhalation
      i. Carbon dioxide generated from metabolism
   c. Reflects change in ventilation within 10 seconds
   d. Breath-to-breath measurement provides information within seconds
   e. Not affected by
      i. Motion artifact
      ii. Poor perfusion
      iii. Dysrhythmias
   f. SpO_2 measures percentage of O_2 in red blood cells
      i. Reflects change in oxygenation within 5 minutes

II. Physiology
   a. Carbon dioxide can be measured
   b. Arterial blood gas is P_aCO_2
      i. Normal range: 35-45 mmHg

c. Mixed venous blood gas is P_vCO_2
    i. Normal range: 46-48 mmHg
d. Exhaled carbon dioxide is $ETCO_2$
    i. Normal range: 35-45 mmHg (5% vol)

III. ETCO2 reflects and monitors changes in
a. Ventilation - movement of air in and out of the lungs
    i. e.g., asthma, COPD, airway edema, foreign body, stroke
b. Diffusion - exchange of gases between the air-filled alveoli and the pulmonary circulation
    i. e.g., pulmonary edema, alveolar damage, CO poisoning, smoke inhalation
c. Perfusion - circulation of blood
    i. e.g., shock, pulmonary embolus, cardiac arrest, severe dysrhythmias

IV. Why Measure Ventilation— Intubated patients
a. Provide examples of and discuss the $ETCO_2$ findings for the following scenarios:
    i. Verify (and document) ET tube placement
    ii. Incorrectly placed or dislodged ETT (may result in death)
    iii. Immediately detect changes in ET tube position
    iv. Assess effectiveness of chest compressions
    v. Earliest indication of ROSC
    vi. Indicator of probability of successful resuscitation
    vii. Optimally adjust manual ventilations in patients sensitive to changes in CO_2

V. Why Measure Ventilation— Non-Intubated Patients
a. Provide examples of and discuss the $ETCO_2$ findings for the following scenarios:
b. Objectively assess acute respiratory disorders
    i. Asthma
    ii. COPD
c. Possibly gauge response to treatment
d. Gauge severity of hypoventilation states
e. Congestive heart failure
f. Sedation and analgesia
g. Stroke
h. Head injury
i. Assess perfusion status
j. Noninvasive monitoring of patients in DKA

VI. Interpreting $ETCO_2$ and the capnography waveform
a. Normal waveform of one respiratory cycle (Similar to ECG)
    i. Height shows amount of CO_2
    ii. Length depicts time
    iii. Waveforms on screen and printout may differ in duration
    iv. On-screen capnography waveform is condensed to provide adequate information the in 4-second view
    v. Printouts are in real-time
    vi. Capnograph detects only CO_2 from ventilation
    vii. No CO_2 present during inspiration
    viii. Baseline is normally zero
b. Capnogram Phase I - Dead space ventilation
    i. Beginning of exhalation
    ii. No CO_2 present
    iii. Air from trachea, posterior pharynx, mouth and nose
        1. No gas exchange occurs there

2. Called “dead space”

c. Capnogram Phase II - Ascending Phase
   i. CO_2 from the alveoli begins to reach the upper airway and mix with the dead space air
   ii. Causes a rapid rise in the amount of CO_2
   iii. CO_2 now present and detected in exhaled air

d. Capnogram Phase III - Alveolar Plateau
   i. CO_2 rich alveolar gas now constitutes the majority of the exhaled air
   ii. Uniform concentration of CO_2 from alveoli to nose/mouth
   iii. CO_2 exhalation wave plateaus

e. Capnogram Phase III - End-Tidal
   i. End of exhalation contains the highest concentration of CO_2
   ii. The “end-tidal CO_2”
   iii. The number seen on your monitor
   iv. Normal $ETCO_2$ is 35-45mmHg
   v. End of the wave of exhalation

f. Capnogram Phase IV - Descending Phase
   i. Inhalation begins
   ii. Oxygen fills airway
   iii. CO_2 level quickly drops to zero
   iv. Inspiratory down-stroke returns to baseline

PARAMEDIC CAPNOGRAPHY SKILLS	Successful	Unsuccessful
1. Assess qualitative $ETCO_2$ to verify ET placement		
2. Assess quantitative (if available) $ETCO_2$ to verify ET placement. If not available, run a scenario that suggests appropriate/inappropriate $ETCO_2$ levels.		
3. Interpret various $ETCO_2$ waveforms		
The above skills may be practiced as a simulation case and may be combined with a comprehensive airway management scenario that evaluates other airway skills at the same time.		

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PARAMEDICS
AIRWAY, RESPIRATION, & VENTILATION
OXYGENATION
ADULT & PEDIATRIC PATIENTS: EXPECTED DURATION ½ HOUR

INSTRUCTOR PREPARATIONS

- *National EMS Education Standards*
- Assemble skills laboratory materials:
  - Airway management trainer
  - Oxygen cylinder and regulator
  - Nasal Cannula
  - Non-rebreather mask
  - Oxygen therapy skills evaluation form

LESSON OBJECTIVES

- Analyze physiology related to oxygen transport and metabolism
- Identify the AHA's guidelines on oxygen therapy in post cardiac arrest, acute coronary syndrome, and stroke patients
- Discuss the role of free radicals related to oxygen therapy

LESSON CONTENT

I. AHA Guidelines now recommend that patients with suspected acute coronary syndrome (ACS) or stroke not receive oxygen unless
   a. SpO_2 less than 94% (on room air)
      i. If pulse oximeter is unreliable or not available, oxygen should be administered
   b. Presenting with dyspnea
   c. Has signs and symptoms of shock or heart failure

II. Oxygenation of chest pain and stroke patients
   a. 2 L/min via nasal cannula for patients who
      i. Complain of dyspnea
      ii. Experience signs and symptoms of shock
      iii. Experience heart failure
      iv. Have an SpO_2 of less than 94% (on room air)
   b. Titrate oxygen to maintain an SpO_2 of at least 94%

III. Tissue damage may increase
   a. When high concentrations of oxygen are given to ACS and stroke patient
      i. Oxygen releases "free radicals;" therefore, it is no longer recommended
      ii. Free radicals
         1. Byproducts of metabolism
         2. Toxic to neighboring cells
            a. Destroys their membranes
            b. Causes increased local tissue damage
      iii. Reintroducing high concentrations of oxygen to cells that have been functioning anaerobically increases the production of free radicals causing cell membrane damage and tissue death
   b. Delivering high concentrations of oxygen to ACS and Stroke patients may be more harmful than keeping the patient on room air

PARAMEDIC OXYGENATION SKILLS	none

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PARAMEDICS
CARDIOVASCULAR
POST-RESUSCITATION CARE
ADULT & PEDIATRIC PATIENTS: EXPECTED DURATION ½ HOUR

INSTRUCTOR PREPARATIONS

- *National EMS Education Standards*
- Review current AHA Guidelines

LESSON OBJECTIVES

- Identify signs associated with of Return of Spontaneous Circulation (ROSC)
- Effectively manage hemodynamic instability
- Investigate possible causes of cardiac arrest
  - Make appropriate treatment choices based on the cause
  - Determine appropriate destination
- Describe the process of induced hypothermia

LESSON CONTENT

I. Recognition of Return of Spontaneous Circulation (ROSC)
   a. CPR must be continued until signs of life are observed
      i. Sudden increase of $ETCO_2$ level
      ii. Presence a pulse after an organized rhythm is observed
      iii. Patient breathing
      iv. Patient movement

II. Optimizing ventilation and oxygenation in the post cardiac arrest patient
   a. Maintain an SpO_2 of greater than or equal to 94%
      i. Once your patient's SpO_2 is 94%, more oxygen is not necessarily better
   b. Avoid excessive ventilation (over-bagging)
      i. Reduces cardiac output
      ii. Decreases cerebral blood flow
   c. $ETCO_2$ between 35-40mm/Hg

III. Hemodynamic instability in the post-cardiac arrest patient
   a. Monitor vital signs
   b. Ensure vascular access
   c. Monitor and manage cardiac hemodynamics
      i. Hypotension – Systolic BP less than 90mm/Hg
         1. Fluid bolus
         2. Vasopressors (drips) titrated to systolic BP of at least 90mm/Hg or Mean Arterial Pressure (MAP) of 65
            a. Norepinephrine
            b. Dopamine
            c. Dobutamine
            d. Epinephrine
      ii. Arrhythmias
         1. Treat cardiac arrhythmias as required
         2. Do not administer antiarrhythmics prophylactically

IV. Identifying the potential cause of cardiac arrest
   a. Obtain and interpret a 12-lead EKG
      i. Evidence of AMI may require transport to a specialized facility for further treatment
   b. Consider and manage reversible causes

V. Targeted temperature management in post-cardiac arrest patients
   a. Shown to increase the favorable neurological outcome in patients with ROSC
   b. Lowering and controlling core temperature slows cellular metabolism
      i. Reduces cell damage and death
   c. Intentional reduction of core body temperature is accomplished by application of cold packs to the axilla, groin, and neck
   d. Temperature measurement is an in-hospital consideration
      i. Axillary, tympanic, temporal artery, and oral measurement may be unreliable measures of core temperature
      ii. Foley catheters or esophageal probes with temperature sensors are commonly used in the in-hospital settings
   e. The 2015 AHA Guidelines specifically recommend against the routine out-of-hospital cooling of patients with ROSC. Commonly this is done through rapid infusion of cold intravenous fluids which has been demonstrated to have adverse effects.

VI. System of care to ensure coronary reperfusion
   a. Most deaths following ROSC occur within the first 24 hours
   b. Transport to the most appropriate facility
      i. May include transport or transfer to an alternate facility, such as:
         1. STEMI/PCI Center
         2. Cardiac Center
         3. Therapeutic Hypothermia Centers

PARAMEDIC POST RESUSCITATION SKILLS	none

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PARAMEDICS
CARDIOVASCULAR
VENTRICULAR ASSIST DEVICES
ADULT & PEDIATRIC PATIENTS: EXPECTED DURATION ½ HOUR

INSTRUCTOR PREPARATIONS

- *National EMS Education Standards*

LESSON OBJECTIVES

- Understand the function of ventricular assist devices (VAD)

LESSON CONTENT

I. Ventricular Assist Devices (VADs)
   a. A mechanical device that is placed inside a person's chest, where it helps the heart pump oxygen-rich blood throughout the body.
      i. Implanted in heart failure patients
      ii. Replaces the function of the ventricles in circulating blood
      iii. Sometimes implanted as a temporary treatment, and sometimes used as a permanent solution to very low cardiac output

II. Assessment
   a. Initial assessment remains the same
   b. Most VADs produce continuous flow; therefore these patients may not have a palpable pulse, or measurable blood pressure
   c. Attempt to auscultate over the left chest for a "whirling" or "smooth, humming" sound indicating that the VAD is working
   d. SpO_2 readings may be inaccurate because of a weak or absent pulse
   e. Mental status and skin findings are most helpful with assessment of perfusion
   f. A cable exits the abdominal wall that connects the device to power and the control unit
   g. Many VAD patients also have an implanted cardiac defibrillator (ICD)
   h. Many hospital admissions in VAD patients are secondary to infection, not cardiac problems. Assess for signs of infection (especially at the insertion point) or sepsis
   i. Your patient and family members will be knowledgeable on the device
   j. The patient and/or family will have an identification card that has contact information for the VAD coordinator (contact VAD coordinator for assistance with device)
   k. Review local protocol for transport destination

III. Management
   a. Allow the patient and caregiver to guide your interaction with the device
   b. Keep batteries and controller within reach and secured to the patient
   c. Use caution when cutting and removing clothes, to avoid damaging the device
   d. Administer fluid boluses and vasopressors as you would with any other patient as indicated by signs of inadequate perfusion
      i. When in doubt, administer a fluid bolus
   e. Verify if chest compressions are indicated with the patient's specific device
      i. Consult family
      ii. View VAD identification card
      iii. Consult with VAD coordinator
   f. Use electrical therapy as you would with any other patient. Avoid placing the pads directly over the device (consider anterior-posterior pad placement)

PARAMEDIC VAD SKILLS	none

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PARAMEDICS
CARDIOVASCULAR
STROKE
ADULT & PEDIATRIC PATIENTS: EXPECTED DURATION 1 ½ HOURS

INSTRUCTOR PREPARATIONS

- *National EMS Education Standards*
- Review current AHA Guidelines
- [3]American Heart/Stroke Association—FAST

LESSON OBJECTIVES

- Identify the options for out-of-hospital stroke assessment tools
- Explain oxygen administration during a stroke emergency
- Discuss the importance of knowing a timeline of stroke events
- Identify patients needing rapid transport to the most appropriate stroke hospital
- Discuss the importance of starting the fibrinolytics check sheet

LESSON CONTENT

I. Stroke
   a. Definitive care for the stroke patient is delivered at a hospital that specializes in the management for stroke patients. Optimal out-of-hospital care for the stroke patient is recognition and rapid transport.
   b. Evaluate blood glucose levels
      i. Treat only if hypoglycemic, in accordance with local protocol
      ii. Hyperglycemia is associated with a poor clinical outcome
      iii. Hypoglycemia may mimic stroke
   c. Pediatric strokes, while rare, do happen

II. Out-of-hospital stroke assessment tools
   a. Specific tools used will be determined by local protocol
      i. Examples include
         1. Cincinnati Prehospital Stroke Scale, 1999
         2. Los Angeles Prehospital Stroke Screen-LAPSS, 2000
         3. Miami Emergency Neurologic Deficit Checklist, 2001
   b. Signs and Symptoms assessed by these tools
      i. Symmetry of the face
      ii. Weakness of extremities
      iii. Speech difficulties
      iv. Coordination
   c. Communicate assessment findings to the hospital while en route
      i. Allows for early activation of the stroke team

III. Management of stroke patients
   a. Provide supportive care
   b. Maintain an SpO_2 of 94% to 99% to avoid oxygen toxicity
      i. Consider 2 L/min O_2 via nasal cannula instead of O_2 via high flow mask
         1. High flow oxygen decreases cerebral blood flow
         2. High levels of oxygen produce free-radicals
            a. May cause cerebral edema and vasodilation
   c. Consider obtaining IV or IO access
   d. Rapid transport to an appropriate receiving facility

IV. Importance of accurately determining the time that the patient was last seen normal
   a. Some strokes are treated with fibrinolytics (tPA) which has a limited therapeutic window
   b. Some strokes are treated with endovascular interventions
      i. Angioplasty and stenting

ii. Mechanical clot disruption
iii. Clot extraction

V. Fibrinolytics check sheet should be started during transport when patient condition permits. Use is determined by local protocol
   a. Expedites the care at receiving hospital
   b. May be the only time the information can be gathered if the patient's condition deteriorates

PARAMEDIC STROKE SKILLS	none

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PARAMEDICS
CARDIOVASCULAR
CARDIAC ARREST
ADULT PATIENTS: EXPECTED DURATION 2 HOURS

INSTRUCTOR PREPARATIONS

- *National EMS Education Standards*
- Review current AHA Guidelines

LESSON OBJECTIVES

- State the chain of survival
- Describe the current techniques of one and two-rescuer CPR
- Discuss airway issues in cardiac arrest management
- Determine criteria for terminating cardiac arrest in the out-of-hospital setting
- Apply ALS management skills during a cardiac arrest
    - Airway management
    - Vascular access
    - Pharmacology
- Demonstrate the current techniques of one and two-rescuer CPR
- Demonstrate the current techniques of cardiac arrest management

LESSON CONTENT

I. Chain of survival
    a. There are 5 links in the adult Chain of Survival
        i. Immediate recognition of cardiac arrest and activation of the emergency response system
        ii. Early cardiopulmonary resuscitation (CPR) emphasizing chest compressions
        iii. Rapid defibrillation
        iv. Effective advanced life support
        v. Integrated post-cardiac arrest care
    b. Appropriate chain reactions can improve chances of survival and recovery for heart attack and stroke patients

II. Optimal chest compressions
    a. Compress at a rate of 100 – 120/min
    b. The number of compressions per minute is an important determinant of return of spontaneous circulation and good neurological outcomes
    c. Heel of one hand over the center of the patient's chest (lower half of the sternum) and the heel of the other hand over the first so the hands are overlapped and parallel
    d. Compress at least 2 inches (5 cm)
        i. Shallow compressions are associated with lower cardiac arrest survival
    e. Do not compress more than 2.4 inches (6 cm)
        i. Non-life threatening injuries may occur
    f. Allow complete recoil of chest between compressions
    g. Minimize interruption
        i. Ventilation/Compression Ratio
            1. 2 breaths after every 30 compressions if no advanced airway is in place
            2. 1 breath every 6 seconds with continuous compressions if an advanced airway is present
            3. Each breath should take about 1 second
            4. Ventilate with only enough volume to observe chest rise
    h. High performance CPR
        i. Coordinated manner with other practitioners (e.g., pit crew CPR)

ii. Function as a team, including team training

i. Mechanical CPR devices

i. Per AHA Guidelines, there is no clear benefit on the use of mechanical CPR devices vs. manual chest compressions in patients with cardiac arrest; however, mechanical compression devices should be considered in settings where compressions may be challenging or dangerous for a provider (e.g., in an ambulance during transport).

III. ALS Management of Cardiac Arrest

a. Airway management

i. BVM

1. Avoid hyperventilation as it decreases preload
2. Best technique is the 2-Rescuer technique with one rescuer holding mask seal and the other squeezing the bag with both rescuers watching for chest rise
3. 2 breaths for every 30 compressions without an advanced airway
4. One breath every 6-8 seconds after placement of advanced airway
5. May need to adjust ventilator rate based on capnography

ii. Endotracheal Tube (ETT)

1. Compressions should not be interrupted in the placement of an ETT

iii. Supraglottic airways

1. Considered an advanced airway
2. Alternative to ETT placement
3. Acceptable during CPR
4. Capnography should be attached to these airways

b. Continuous waveform capnography

i. Typically 35-45mm/Hg in a normally perfusing patient

1. Greater than 45 mm/Hg
   a. Ensure adequate ventilatory rate and volume
2. 15-35 mm/Hg
   a. Common in cardiac arrest patients with CPR in progress
3. Less than 10-15 mm/Hg
   a. Focus efforts on improving chest compressions
   b. Make sure the victim is not receiving excessive ventilations

ii. A sudden increase in $ETCO_2$ could indicate a return of spontaneous circulation (ROSC)

iii. Use caution with interpretation of $ETCO_2$ values within 1-2 minutes after administration of epinephrine due to decreased pulmonary blood flow.

IV. Termination of Efforts in Cardiovascular Resuscitation

a. Local protocol will determine if the EMT is able to terminate resuscitative efforts if the following conditions are met:

i. Arrest not witnessed
ii. Bystander CPR was not performed
iii. No ROSC after full ACLS (minimum of 20 minutes)
iv. No AED shocks were delivered

b. The AHA guidelines also recommend contacting medical direction when considering terminating resuscitative efforts

i. There is some emerging evidence for longer resuscitation times in certain limited cases such as persistent VF/VT
ii. EMS providers should follow local protocol

V. CPR of the pregnant patient

a. Adequate chest compressions

b. Placement of AED pads

PARAMEDIC CARDIAC ARREST SKILLS	Successful	Unsuccessful
1. Assess patient breathing and responsiveness simultaneously		
2. Assess patient carotid pulse		
3. Perform chest compressions adequately		
4. Demonstrate proper application and utilization of an AED		
5. Apply AED pads correctly on a pregnant patient		
6. Utilize crew resource management techniques		
a. Switch CPR every two minutes		
b. Pit Crew CPR		
7. Administer medication(s)at key interval times		

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PARAMEDICS
CARDIOVASCULAR
PEDIATRIC CARDIAC ARREST
PEDIATRIC PATIENTS: EXPECTED DURATION 2 ½ HOURS

INSTRUCTOR PREPARATIONS

- *National EMS Education Standards*
- Review current AHA Guidelines

LESSON OBJECTIVES

- Apply ALS management skills during a pediatric cardiac arrest
  - Airway management
  - Vascular access
  - Pharmacology
- Investigate unique causes of pediatric cardiac arrest
- Demonstrate the current techniques of one and two-rescuer CPR
- Demonstrate the current techniques of pediatric cardiac arrest management

LESSON CONTENT

I. Techniques of single rescuer CPR
   a. Infant (less than one year of age)
      i. 2-fingers just below the inter-mammary (nipple) line
      ii. 100 – 120 compressions per minute
         1. Number of compressions per minute is an important determinant of return of spontaneous circulation and good neurological outcomes
      iii. Compress 1/3 the anterior-posterior diameter of the chest (about 1 ½ inches)
      iv. Allow complete recoil of chest between compressions
      v. Minimize interruption
      vi. Ventilation/Compression Ratio
         1. Resuscitation outcomes in infants and children are best if compressions are combined with ventilations
         2. Two breaths after every 30 compressions
         3. Ventilate with only enough volume to observe chest rise
   b. Child (1 year of age until onset of puberty)
      i. 100 – 120 compressions per minute
      ii. Use one or two hands on the lower half of the sternum
      iii. Compress 1/3 the anterior-posterior diameter of the chest (approximately 2 inches)
      iv. Allow complete recoil of chest between compressions
      v. Minimize interruption
      vi. Ventilation/Compression Ratio
         1. Resuscitation outcomes in infants and children are best if compressions are combined with ventilations
         2. Two breaths after every 30 compressions
         3. Ventilate with enough volume to observe chest rise

II. Techniques of 2-Rescuer CPR
   a. Rescuer fatigue can lead to inadequate rate, depth and recoil in CPR in minutes, even when the rescuer does not feel fatigued
   b. When performing 2-Rescuer CPR, rotate the rescuer who is performing compressions with the rescuer who is performing ventilations at least every two minutes.
   c. Infant (less than one year of age)
      i. Two thumb encircling hands technique, just below the inter-mammary (nipple) line

ii. 100 – 120 compressions/min
iii. 1/3 the anterior-posterior diameter of the chest (about 1 ½ inches)
iv. Allow complete recoil of chest between compressions
v. Minimize interruption
vi. Ventilation/Compression Ratio
1. Compressions combined with ventilations greatly improve infant and children resuscitation outcomes
2. Two breaths after every 15 compressions
3. Ventilate with enough volume to see chest rise

d. Child (one year of age until onset of puberty)
e. Use one or two hands on the lower half of the sternum
f. 100 – 120 compressions per minute
g. 1/3 the anterior-posterior diameter of the chest (about 2 inches)
h. Allow complete recoil of chest between compressions
i. Minimize interruption
j. Ventilation/Compression Ratio
i. Compressions combined with ventilations greatly improve infant and children resuscitation outcomes
ii. Two breaths after every 15 compressions
iii. Ventilate with only enough volume to see chest rise

III. ALS Management of Pediatric Cardiac Arrest
a. Airway management
i. Bag Valve Mask (BVM)
1. Appropriately sized mask
2. High flow oxygen
3. 2 breaths for every 30 compressions (one-rescuer)
4. 2 breaths for every 15 compressions (two-rescuer)
ii. Endotracheal Tube (ETT)
1. Can use cuffed or un-cuffed ETT/Neonates always un-cuffed
2. Compressions should not be interrupted in the placement of an ETT
3. Supraglottic airway considerations for pediatrics
a. King ™
b. LMA
c. I-Gel ™
4. Capnography
a. Typically 35-45mm/Hg in a normally perfusing patient
b. Greater than 45 mm/Hg
i. Ensure adequate ventilatory rate and volume
c. 15-35 mm/Hg
i. Common in cardiac arrest patients with CPR in progress
d. Less than 10-15 mm/Hg
i. Focus efforts on improving chest compressions
ii. Ensure the victim is not receiving excessive ventilations
e. A sudden increase in $ETCO_2$ could indicate a return of spontaneous circulation (ROSC)
f. Use caution with interpretation of $ETCO_2$ values within 1-2 minutes after administration of epinephrine due to decreased pulmonary blood flow
iii. Vascular access
1. Limit the amount of time spent obtaining vascular access

2. Intraosseous (IO)
    a. Rapid, safe and effective
    b. All IV fluids and resuscitation medications can be administered via IO
3. Intravenous (IV)
    a. Placement may be difficult in a critically ill patient

b. Pharmacology
    i. Length based resuscitation devices (e.g., length based tape)
        1. Have been clinically validated as a predictor of body weight
            a. More accurate than provider estimates without a support tool
        2. Often have the doses for common resuscitation medications
c. Consider possible underlying causes
    i. "Hs and Ts"
        1. Hypoventilation, Hypoxia, Hydrogen ion (acidosis), Hyper/hypo-kalemia, hypothermia, hypo/hyper-gylcemia
        2. Toxins, Tamponade (cardiac), Tension pneumothorax, Thrombosis (coronary and/or pulmonary), Trauma
    ii. Other considerable underlying causes
        1. Drug overdose –toxic levels of drugs can occur, even if small amounts are ingested
        2. Hypertrophic Cardiomyopathy (HOCM) – Heart muscle becomes thick. Many patients have no symptoms. Often, the first symptom of HOCM in young patients is sudden collapse and possible sudden cardiac arrest. Almost half of sudden cardiac arrests due to HOCM occur immediately after physical activity
        3. Commotio Cordis – Cardiac arrest secondary to blunt trauma to the chest (R on T). Most common in young, healthy patients
        4. Long QT - AHA channelopathy – Previously undiagnosed conduction abnormalities leading to sudden cardiac arrest

PARAMEDIC PEDIATRIC CARDIAC ARREST SKILLS	Successful	Unsuccessful
1. Assess patient breathing and responsiveness simultaneously		
2. Assess patient carotid pulse		
3. Perform chest compressions adequately		
4. Appropriately apply and utilize an AED		
5. Utilize crew resource management techniques		
a. Switch CPR every two minutes		
b. Pit Crew CPR		
6. Administer medication(s) at key interval times		
7. Demonstrate appropriate pediatric cardiac arrest management		
a. Utilize length-based resuscitation tape for:		
i. Appropriate dose of resuscitation medications		
ii. Appropriate ETT size		
iii. Appropriate defibrillation energy		

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PARAMEDICS
CARDIOVASCULAR
CONGESTIVE HEART FAILURE
ADULT PATIENTS: EXPECTED DURATION ½ HOUR

INSTRUCTOR PREPARATIONS

- *National EMS Education Standards*
- Review current AHA Guidelines

LESSON OBJECTIVES

- Identify congestive heart failure
- Analyze appropriate and inappropriate treatments for CHF

LESSON CONTENT

I. Pathophysiology of CHF
   a. May refer to right or left sided heart failure
   b. No valves between left atria and lungs
      i. May allow fluid backup

II. Common causes of CHF
   a. Increased peripheral vascular resistance (PVR)
      i. Chronic hypertension
         1. Increased left ventricular workload
         2. Hypertrophy/cardiomegaly
         3. P mitrale (seen with left atrial enlargement)
      ii. Chronic COPD
      iii. Pulmonary emboli
      iv. Non-compliance with medications
   b. Ventricular failure
      i. Myocardial Infarction
         1. AMI
         2. Previous MI with ventricular involvement
         3. Non-compliance with medications
   c. Fluid overload
      i. Non-compliance with medications
      ii. Renal failure

III. Presentation/Signs/Symptoms of CHF
   a. Distended neck veins
   b. Peripheral edema
      i. Can be pitting (late sign)
   c. Difficulty breathing
      i. Crackles and wheezes in dependent portions of the lungs

IV. Treatment of CHF
   a. Continuous Positive Airway Pressure (CPAP)
      i. Positive end expiratory pressure
      ii. Forces alveoli open and helps keep them open
         1. Forces fluid out of alveoli
         2. Increases oxygenation
      iii. Contraindications
         1. Inability for the patient to maintain their own airway
         2. Hypotension (systolic BP of 90mm/Hg or less) may be a contraindication. Follow local protocol or guidelines.
         3. Recent esophageal surgery
   b. Nitroglycerin

i. Peripheral venodilator
ii. Reduces oxygen demand in the heart
iii. Dilates coronary arteries
iv. If unable to tolerate sublingually, use nitroglycerin paste
v. Contraindications
    1. Hypotension (systolic BP of 90mm/Hg or less)
    2. Use of phosphodiesterase inhibitors in the past 24-48 hours (e.g., Cialis®, Viagra®)

c. Check local protocol for use of furosemide (e.g., Lasix®)

PARAMEDIC CHF SKILLS	none

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PARAMEDICS
CARDIOVASCULAR
ACUTE CORONARY SYNDROME
ADULT & PEDIATRIC PATIENTS: EXPECTED DURATION 1 HOUR

INSTRUCTOR PREPARATIONS

- *National EMS Education Standards*
- Review current AHA Guidelines

LESSON OBJECTIVES

- Assess injury patterns on a 12-lead EKG
- Differentiate STEMI from STEMI imposters

LESSON CONTENT

I. Recognize injury patterns on a 12-lead EKG
   a. Review the anatomical view of the heart with each lead
   b. Provide 12-lead examples that demonstrate STEMI's from each area of the heart
   c. 12-lead crash course – review abnormal examples

II. Differentiate STEMI from STEMI imposters
   a. Common STEMI imposters (provide examples of 12-lead EKGs that show imposters)
      i. Left ventricular hypertrophy
      ii. Bundle branch blocks
         1. It is difficult to determine an acute from a chronic left bundle branch block without access to a previous 12- lead EKG
         2. A left bundle branch block, without other signs or symptoms of MI is not a STEMI
   b. Implanted pacemakers
   c. Pericarditis

PARAMEDIC ACS SKILLS/ACTIVITY	Successful	Unsuccessful
1. Sketch five random EKGs, including one for AMI to demonstrate knowledge of recognition		
2. Locate the MI in randomly selected EKGs (e.g., lateral, inferior)		
3. Apply 12-leads for a right sided EKG		

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PARAMEDICS
TRAUMA
TRAUMA TRIAGE
ADULT & PEDIATRIC PATIENTS: EXPECTED DURATION 1 HOUR

INSTRUCTOR PREPARATIONS

- *National EMS Education Standards*
- [4]*CDC—Guidelines for Field Triage of Injured Patients, 2011*

LESSON OBJECTIVES

- Identify the triage criteria in the CDC's Field Triage Decision Scheme
- State the four steps of the CDC's Field Triage Decision Scheme
- Examine local protocols

LESSON CONTENT

I. CDC Field Triage Decision Scheme
   a. Reference:
      i. [4]*Guidelines for Field Triage of Injured Patients, 2011*
   b. Four specific steps to consider during triage
      i. Step 1—Assess vital signs and level of consciousness; they are good predictors of patient's potential outcomes
         1. Glasgow Coma Scale (GCS)
         2. Systolic blood pressure
         3. Respiratory rate
      ii. Step 2—Assess anatomy of injury
         1. Consider priority transport to a trauma facility if patient is found with:
            a. Penetrating injuries above the knee
            b. Unstable chest wall
            c. Proximal long bone fractures (two or more)
            d. Extremity that is crushed, degloved, mangled, or pulseless
            e. Amputation proximal to wrist or ankle
            f. Pelvic fractures
            g. Skull fractures (open or depressed)
            h. paralysis
      iii. Step 3—Assess mechanism of injury and evidence of high energy impact
         1. Consider priority transport to a trauma facility if the mechanism of injury (MOI) meets any of the following criteria, despite patient assessment findings in steps 1 and 2
            a. Falls
               i. Adults >20 feet
               ii. Children >10 feet or >2x child's height
            b. Auto crash
               i. Intrusion >12 inches where occupied or >18 inches on any side
               ii. Partial or complete ejection from automobile
               iii. Death in same automobile
               iv. Vehicle telemetry data that indicates a high risk of injuries
            c. Pedestrian/bicyclist vs. automobile
               i. Thrown
               ii. Run over
               iii. Impact at speeds >20 mph
            d. Motorcycle crash >20 mph

iv. Step 4—Assess special patient or system considerations
    1. Consider priority transport to a trauma facility if patient meets these special considerations:
        a. Older adults
            i. 55 years and older have increased chances of injury/death
            ii. 65 years and older my present with shock if SBP is <110
            iii. Mechanism is low impact (ground height falls)
        b. Children
            i. Consider transporting all children to pediatric trauma centers
        c. Anticoagulants and bleeding disorders
            i. Head injuries may present with rapid deterioration
        d. Burns
            i. No other trauma—triage to burn facility
            ii. Other trauma findings—triage to trauma center
        e. Pregnancy >20 weeks
        f. Use provider judgement

II. Transport according to local protocol
    a. When in doubt transport to a trauma center

PARAMEDIC TRAUMA TRIAGE ACTIVITY	Successful	Unsuccessful
1. Generate a comparison of local triage protocols to the recommendations of the CDC: http://www.cdc.gov/mmwr/pdf/rr/rr6101.pdf		

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PARAMEDICS
TRAUMA
CENTRAL NERVOUS SYSTEM (CNS) INJURY
ADULT & PEDIATRIC PATIENTS: EXPECTED DURATION 1 HOUR

INSTRUCTOR PREPARATIONS

- *National EMS Education Standards*
- [5]EMS Spinal Precautions and the use of the long backboard, 2013
- [6]Centers for Disease Control and Prevention: HEADS UP
- See additional resources to research

LESSON OBJECTIVES

- Identify the signs and symptoms of a patient with a traumatic brain injury (TBI)
- Differentiate between the various levels of a TBI
- Explain the use of $ETCO_2$ readings as a guide for ventilating head injury patients
- Discuss the current research and practices for the use of selective spinal immobilization

LESSON CONTENT

I. Traumatic Brain Injury (TBI)
   a. Signs and symptoms of TBI may include any or all of the following:
      i. Physical
         1. Headache
         2. Nausea
         3. Vomiting
         4. Balance problems
         5. Dizziness
         6. Visual problems
         7. Fatigue
         8. Light sensitivity
         9. Noise sensitivity
         10. Numbness/tingling
      ii. Cognitive
         1. Mental fogginess
         2. Feeling slowed down
         3. Difficulty concentrating
         4. Difficulty remembering
      iii. Emotional
         1. Irritability
         2. Sadness
         3. Heightened emotions
         4. Nervousness
      iv. Sleep
         1. Drowsiness
         2. Sleeping less than/more than usual
         3. Trouble falling asleep
   b. Differentiate levels of TBI- (Per ATLS Guidelines, 9th Ed.)
      i. GCS Score 13-15 = Minor Brain Injury
      ii. GCS Score 9-12 = Moderate Brain Injury
      iii. GCS Score 3-8 = Severe Brain Injury
   c. Advocate for patient transport and proper patient education about the effects of TBI
II. Care And Education of the Concussion Patient
   a. If you suspect your patient has a concussion, transport them to the appropriate facility
   b. If the patient (or family) refuses transport, educate them regarding the following warning

signs and explain the importance, if any are present, of seeking medical attention
   i. One pupil larger than the other
   ii. Drowsiness or cannot be awakened
   iii. A headache that gets worse and does not go away
   iv. Weakness, numbness, or decreased coordination
   v. Repeated vomiting or nausea
   vi. Slurred speech
   vii. Convulsions or seizures
   viii. Difficulty recognizing people or places
   ix. Increasing confusion, restlessness, agitation, or unusual behavior
   x. Loss of consciousness (even brief)

c. "Return to play" considerations and criteria for sports
   i. [7]CDC—*HEADS UP*: "Sports Concussion Policies and Laws"
   ii. Requires specialized assessments that are usually considered beyond the scope of EMS providers. Consult local protocols and standards of practice

d. Utilizing $ETCO_2$ readings to guide ventilatory assistance in head injury patients
   i. Mild, controlled hyperventilation in the field may be performed during the prehospital phase. Mild hyperventilation is defined as an $ETCO_2$ of 30-35 mmHg as measured by capnography or by careful control of breathing rate.
   ii. Some experts recommend the use of $ETCO_2$ for trending purposes with the understanding that $ETCO_2$ and $PaCO_2$ do not correlate well in the severely ill or injured patient.
   iii. Additional resources/research
      1. [8]National Institute of Neurological Disorders and Stroke—Traumatic Brain Injury Information Page, 2016

e. Discuss the current research and practices for the use of selective spinal immobilization.
   i. [5]EMS Spinal Precautions and the use of the Long Backboard, 2013
   ii. [9]Resource Document to the Position Statement of the National Association of EMS Physicians and the American College of Surgeons Committee on Trauma, 2014

PARAMEDIC CNS SKILLS	none

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PARAMEDICS
TRAUMA
HEMORRHAGE CONTROL
ADULT & PEDIATRIC PATIENTS: EXPECTED DURATION ½ HOUR

INSTRUCTOR PREPARATIONS

- *National EMS Education Standards*
- [10]*Pre-hospital Haemostatic Dressings: A Systematic Review*

LESSON OBJECTIVES

- Identify and treat severe hemorrhage.
- Differentiate among indications, effects, and contraindications for the use of:
  - Tourniquets
  - Junctional Tourniquets
  - Hemostatic agents
  - TXA

LESSON CONTENT

I. Identify severe hemorrhage
   a. External bleeding that cannot be controlled by direct pressure

II. Tourniquets
   a. Indications
      i. External bleeding from an extremity that cannot be controlled by direct pressure
      ii. Multiple tourniquets may be required
   b. Effects
      i. Correctly applied tourniquets should block arterial blood flow
         1. Confirmed by the absence of a distal pulse
   c. Contraindications of tourniquet use
      i. None in an emergency situation

III. Junctional Tourniquets
   a. Indications
      i. Treat wounds that are located in the "junctional" areas of the body – where the extremities meet the torso
   b. Committee on Tactical Combat Casualty Care (CoTCCC) approved a number of devices for these types of wounds
      i. Some of these devices have been fielded by the US military for use in combat
      ii. Their use in the civilian setting has not, as of yet, been defined.
      iii. Examples include:
         1. SAM Junctional Tourniquet
         2. Combat Ready Clamp
         3. Junctional Emergency Treatment Tool
   c. Additional resources
      i. SAM Medical-Junctional Tourniquet (YouTube)
      ii. Combat Ready Clamp (YouTube)
      iii. JETT-Junctional Emergency Treatment Tool (YouTube)

IV. Hemostatic agents
   a. Reference: [10]*Pre-hospital Haemostatic Dressings: A Systematic Review*
   b. Types
      i. Powder that is poured onto the wound
      ii. Gauze that is impregnated with hemostatic material
   c. Indications
      i. Bleeding that cannot be stopped with direct pressure and is located on an area

of the body where a tourniquet is not practical.

d. Effects
    i. Enhances clotting when packed appropriately into a wound
    ii. Once applied, direct pressure must be held for a minimum of three minutes
    iii. Hemostatic impregnated gauze can be combined with the technique of wound packing for greater effectiveness. Consult local protocol.

V. Tranexamic acid (TXA)
    a. A medication that interferes with the process of breaking down of a blood clot to help maintain and stabilize the newly formed clot
    b. Has been used for years in other areas of medicine to help with bleeding
    c. Research surrounding the use of TXA in the out-of-hospital setting
        i. A randomized clinical trial showed a reduced risk of death by bleeding with TXA treatment if given within three hours of injury
        ii. In the same trial, the administration of TXA after three hours of the initial injury increased the risk of death by bleeding

PARAMEDIC HEMORRHAGE CONTROL SKILLS	Successful	Unsuccessful
1. Apply a tourniquet		
2. Apply 2nd and 3rd tourniquets as needed		

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PARAMEDICS
TRAUMA
FLUID RESUSCITATION
ADULT & PEDIATRIC PATIENTS: EXPECTED DURATION ½ HOUR

INSTRUCTOR PREPARATIONS

- *National EMS Education Standards*

LESSON OBJECTIVES

- Explain the concept of permissive hypotension
- Discuss research regarding fluid resuscitation
- Describe Mean Arterial Pressure (MAP) as a tool to better evaluate perfusion

LESSON CONTENT

I. Fluid Therapy
   a. Permissive hypotension - allowing specific patients to experience some degree of hypotension in certain settings.
      i. The goal of fluid resuscitation is to maintain vital organ perfusion
      ii. Level of consciousness is an indicator of vital organ perfusion
      iii. Assessment of the level of consciousness may guide the need for fluid administration
      iv. Normalization of blood pressure through fluid administration may be harmful and is discouraged

II. Dangers of excessive crystalloid administration
   a. Dilution of clotting factors and platelets
   b. Physical disruption of a clot
   c. Expanding the area of vascular defect as blood pressure increases
   d. Enhances red blood cell loss, thus reducing the total oxygen carrying capacity of the blood
   e. Research
      i. [11]National Institute of Health: Aggressive Early Crystalloid Resuscitation adversely affects outcomes in adult blunt trauma patients

III. Understand Mean Arterial Pressure (MAP) as a tool to better evaluate perfusion
   a. Mean Arterial Pressure (MAP) is a better assessment tool to determine perfusion to vital organs compared to systolic blood pressure.
   b. Calculated using the following formula:
      i. MAP=Diastolic Pressure +1/3 Pulse Pressure
   c. Example: If your patient has a BP of 120/80 then to calculate their MAP:
      MAP=80+[(120-80)/3]
      MAP=80+40/3
      MAP=80+13.3
      MAP=93.3 or about 93
   d. Aim for a MAP of 60-65mmHG during fluid therapy

IV. Discuss and understand local fluid resuscitation protocol

PARAMEDIC FLUID RESUSCITATION SKILLS	none

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PARAMEDICS
MEDICAL
SPECIAL HEALTHCARE NEEDS
ADULT & PEDIATRIC PATIENTS: EXPECTED DURATION 2 HOURS

INSTRUCTOR PREPARATIONS

- *National EMS Education Standards*

LESSON OBJECTIVES

- Identify common special needs patients seen in EMS
- Relate the role of caregivers of the special needs patient to the EMS professional's patient care
- Describe patient assessment of a special needs patient

LESSON CONTENT

I. What is a special healthcare need?
   a. A condition requiring medical management, healthcare intervention, and/or use of specialized services or programs. Health care for individuals with special needs requires attention, adaptation, and accommodative measures beyond what are considered routine
   b. May include one or more of the following:
      i. Physical limitations
      ii. Mental limitations
      iii. Heightened or decreased sensory attributes
      iv. Behavioral, cognitive, or emotional impairment
   c. Originations (not limited to these)
      i. Congenital
      ii. Developmental
      iii. Disease related
      iv. Post trauma
      v. Environmental related
   d. Statistics (see HRSA reference)
      i. 15.1 percent of children under 18 years of age in the United States
         1. 11.2 million children
      ii. 23.0 percent of U.S. households with children have at least one child with special health care needs

II. General considerations when managing a special needs patient
   a. Maintain and support airway, breathing, and circulation (ABCs)
   b. Involve parents/caregivers in the assessment and management of care
      i. Medical history
      ii. Is the patient acting appropriately?
      iii. Normal baseline vital signs
      iv. Medications
      v. Caregiver's "go bag" or "rescue kit" for the patient
         1. Supplies necessary to manage the patient's special needs
   c. Speak quietly and calmly
   d. Employ slower movements and firm, secure contact
   e. Request that the caregiver accompany EMS when transporting the patient
   f. Take time to explain your actions

III. Special considerations and questions when assessing a special needs patient
   a. Latex allergy (greater incidence, especially in Spina bifida patients)
   b. Developmental level
   c. Vision or hearing problems
   d. Do not assume that a patient with a physical disability is cognitively impaired
   e. Determine preferred hospital

IV. Common equipment EMS providers may encounter
- a. Tracheostomy tube
  - i. Surgical opening in the trachea (stoma)
    1. Keep clean and dry
    2. Suction as needed
  - ii. Oxygen delivery
    1. Blow-by
    2. Face mask/non-rebreather mask
    3. BVM
       a. May need an adapter
- b. Indwelling central venous catheters
  - i. Can provide nutrition or medications parenterally
  - ii. Potential for infection or occlusion
- c. Feeding tubes
  - i. Provide nutrition to patients who are unable to eat by mouth
  - ii. Common complications
    1. Infection
    2. Occlusion
    3. Malpositioned/dislodged tube
    4. May need transport to ER for tube replacement
    5. Tube deterioration
- d. Cerebrospinal fluid (CSF) shunts
  - i. Device used to drain excess CSF from the brain
  - ii. Hydrocephalus
    1. Shunt runs from a ventricle in the brain, under the skin, and down the neck into either the peritoneum of the abdomen or the right atrium
  - iii. Common complications
    1. Brain infection
    2. Obstruction, which can lead to increased intracranial pressure
    3. Peritonitis
- e. Dialysis shunts
  - i. Peritoneal Dialysis
  - ii. Hemodialysis
    1. Fistula
  - iii. Indwelling abdominal catheter
  - iv. Common complications
    1. Catheter infection
    2. Peritonitis
- f. Urinary Catheters
  - i. Foley catheters
  - ii. Suprapubic catheters
- g. GI Bags
  - i. Colostomy
    1. Divert stool away from colon or large intestine
- h. Ileostomy
  - i. Diverts stool from the ileum into an external bag
  - ii. Contents do not pass through large intestine at all
  - iii. Content is liquid or semisoft with green appearance

V. Cognitive Impairments
- a. Cognitively impaired or non-communicative patients may still be aware of your actions and words.

b. Despite their apparent age, cognitively impaired patients might still need a caregiver.
c. Common difficulties encountered in emergency medicine when dealing with cognitively impaired patients in the EMS setting is obtaining an accurate and complete history.
    i. Accommodations may be necessary when providing patient care.
    ii. Allow adequate time for
        1. Gathering a history
        2. Performing an assessment
        3. Patient management procedures
        4. Preparing the patient for transport.

VI. Common Cognitive Impairments
a. Intellectual developmental disorder
    i. Generalized disorder appearing before adulthood characterized by significantly impaired cognitive functioning and deficits in 2 or more adaptive behaviors
    ii. Syndromic mental retardation - intellectual deficits associated with other medical and behavioral signs and symptoms
    iii. Non-syndromic mental retardation - intellectual deficits that appear without other abnormalities

VII. Down Syndrome (Down)
a. A complex of symptoms associated with mental retardation caused by chromosomal abnormalities
b. Common physical signs
    i. Intellectual developmental disorder
    ii. Decreased muscle tone at birth
    iii. Upward slanting eyes with small skin folds in the corner
    iv. Small, abnormally shaped ears
    v. Flat facial features, small nose
    vi. Wide, short hands with short fingers
    vii. Hyperflexibility
    viii. Known cardiac issues
    ix. C-spine instability
    x. Large Tongue
    xi. Thyroid issues
    xii. Visual problems
    xiii. 15-20 times more likely to develop leukemia
c. Common mental and social complications
    i. Wandering or running off
    ii. Obsessive/compulsive behaviors
    iii. Stubborn/oppositional behavior
    iv. Impulsive behavior
    v. Poor judgment
    vi. Short attention span
    vii. Slow learning

VIII. Cerebral Palsy (CP)
a. A group of chronic, non-progressive disorders caused by damage to the motor centers of the brain in the early stages of life
b. Most of these problems occur in the womb, but can happen any time during the first 2 years of life while the brain is developing
c. Characterized by
    i. Abnormal muscle tone and posture
    ii. Muscular spasms
    iii. Hearing and vision problems

iv. Seizures
v. Some communication difficulty

d. Cause is difficult to determine
    i. May be caused by
        1. Low levels of oxygen
        2. Infection
        3. Head injury
        4. RH incompatibility
        5. Infections in the mother (e.g. Rubella, Herpes Simplex)
e. Transport assistive devices such as walkers or wheelchairs with the patient
f. Do not assume cognitive disability based on physical disability. Many CP patients have normal or mildly decreased cognition.

IX. Assessing patients with Autism Spectrum Disorder (ASD)
a. Know that autistic patients are aware of what is happening
b. Explain your actions
c. Include caregivers in the assessment
d. No sudden movements
e. Show the patient what you will do (demonstrate on caregiver if available)

PARAMEDIC SPECIAL HC NEEDS SKILLS	none

INSTRUCTOR PREPARATIONS

- *National EMS Education Standards*
- Review current AHA Guidelines

LESSON OBJECTIVES

- Identify abnormal presentations present during childbirth
- Discuss management of a patient with an abnormal presentation during delivery
- Describe a nuchal cord presentation
- Discuss the procedures to take when a nuchal cord is present during delivery
- Recognize the need for neonatal resuscitation during delivery
- Discuss the management principles of neonatal resuscitation
- Describe the routine care of a newborn not requiring resuscitation

LESSON CONTENT

I. Abnormal Presentations In Childbirth
   a. Breech
      i. Buttocks or both feet present first
      ii. Management
         1. Prompt transport (field delivery is not ideal)
         2. When delivery is unavoidable:
            a. Support buttock and legs
            b. Do not pull
            c. If head does not deliver within 3 minutes
               i. Arrange for immediate transport
               ii. Insert gloved hand into the vagina and use your fingers to form a "V" on either side of the infants nose
               iii. Push the vaginal wall away from the infant's face
   b. Limb presentation
      i. One leg or arm protruding from vagina
      ii. Management
         1. Do not touch the limb
         2. Do not attempt field delivery
         3. Provide supportive care and transport in the knee-chest position
   c. Multiple Births
      i. More than one fetus
      ii. Management
         1. Manage as normal delivery, recognizing the need for additional equipment and personnel
   d. Prolapsed Cord
      i. Umbilical cord presents from the vagina prior to fetus
      ii. Management
         1. Immediate transport in Trendelenburg or knee-chest position
         2. Insert two fingers of a gloved hand into the vagina to remove pressure off the cord
         3. Keep the cord moist with sterile dressing
         4. Do not attempt to pull the cord or push the cord back into the vagina
   e. Shoulder dystocia
      i. Shoulders unable to pass beyond pubic symphysis

ii. "Turtle sign"- head delivers but retracts back into the perineum because the shoulders are trapped.
iii. Management
1. McRoberts maneuver- (buttocks off the end of the bed with thighs flexed upward) and apply firm pressure with your hand above the pubic symphysis
2. Transport immediately (even if delivery attempt is unsuccessful)

f. Nuchal cord
i. Cephalic presentation but the umbilical cord is around the neck
ii. Common finding during delivery and rarely associated with adverse outcomes
iii. Management
1. Attempt to slip the cord over the infant's head.
2. If unable to slip the cord up and over the head, clamp and carefully cut the cord

II. Neonatal resuscitation
a. Assessment
i. If "yes" is answered to these three questions, the infant stays with the mother and standard care continues, including maintaining the newborn's temperature.
1. Full term gestation?
2. Good muscle tone?
3. Breathing or crying adequately?
ii. If "no" is answered to ANY of the above assessment questions, resuscitation efforts should be attempted in this sequence:
1. First 30 seconds postpartum
a. Dry the infant, then, warm and maintain normal temperature
b. Position airway
c. Clear secretions
d. Stimulate
2. 30-60 seconds postpartum
a. Heart rate below 100/min or gasping/apnea
i. Initiate positive pressure ventilation and monitor SpO_2
b. Labored breathing or persistent cyanosis
i. Position and clear the airway, monitor SpO_2, supplementary O_2 as needed
3. After one (1) minute postpartum
a. Heart rate >100/min
i. Provide post resuscitation care
b. Heart rate <100/min
i. Check chest movement
ii. Correct ventilations as needed
1. ETT, laryngeal mask, or appropriate supraglottic airway
c. Heart rate <60/min
i. Begin chest compressions coordinated with PPV and 100% O_2
ii. Place on ECG monitor
iii. Considerations
1. Intubation
2. IO or emergency umbilical vein cannulation (UVC)
3. Epinephrine

4. Hypovolemia
5. Pneumothorax

III. Magnesium Sulfate for Eclampsia/Pre-Eclampsia
   a. Reference: [12]ACOG—Hypertension in Pregnancy, 2013
   b. Recommended treatment for hypertension (eclampsia)
   c. Not recommended for pre-eclampsia
   d. Magnesium Sulfate can cause toxicity and result in cardiac arrest
   e. Discontinue magnesium sulfate if a pregnant patient in cardiac arrest has been receiving it as a treatment

IV. 2015 AHA/ECC Guidelines for Neonatal Resuscitation when meconium is present:
   a. Suctioning in the presence of meconium staining
      i. Vigorous neonates with good respiratory effort and muscle tone born through meconium stained amniotic fluid
         1. Do not benefit from suctioning
         2. Should stay with the mother to receive the initial steps of newborn care
         3. Gentle clearing of meconium from the mouth and nose with a bulb syringe may be done if necessary
      ii. Presence of fetal distress, poor muscle tone, respiratory compromise when born through meconium-stained amniotic fluid
         1. Immediately initiate resuscitation efforts
         2. Initiate PPV if heart rate less than 100/min
         3. Consider intubation for respiratory distress
            a. Do NOT intubate for the sole purpose of tracheal suctioning

V. Umbilical Cord Management
   a. Delayed cord clamping
      i. Reference: [13]American Heart Association-Part 13-Neonatal Resuscitation
      ii. Wait 30 seconds after delivery to clamp the cord
         1. Reduces intraventricular hemorrhage
         2. Increases blood pressure/blood volume
         3. Reduces need for transfusion after birth
         4. Reduces necrotizing enterocolitis
      iii. Adverse findings
         1. Increased level of bilirubin

PARAMEDIC OB SKILLS	none

INSTRUCTOR PREPARATIONS

- *National EMS Education Standards*
- [14]Centers for Disease Control and Prevention

LESSON OBJECTIVES

- Describe drug resistant infections
- State how the transmission of influenza virus (flu) occurs
- Investigate the role of the EMS provider in disease reporting
- Compare an epidemic to a pandemic
- Assess the differences between sepsis and septic shock

LESSON CONTENT

I. Anti-microbial resistance
   a. Microbes resist the effects of medications/treatments
      i. Germs are not killed; growth is not stopped
   b. Difficult to treat
   c. Anyone is susceptible; some must be more cautious, such as those with:
      i. Weakened immune systems
      ii. Open skin wounds
      iii. Recent surgery
      iv. Invasive procedures (PICC lines, IVs, in-dwelling catheters, etc.)
   d. Occurrence
      i. World-wide
      ii. Ongoing battles within institutions (hospitals, clinics, etc.)
   e. Common antibiotic resistant infections
      i. MRSA
      ii. VRE
      iii. VRSA
      iv. TB
      v. Clostridium difficile (C-Diff)

II. Influenza (flu)
   a. [15]CDC Information and Statistics:
      i. The combination of influenza and pneumonia is currently the eighth leading cause of death in the U.S.
      ii. More people die from it than from kidney disease or suicide
   b. Influenza viruses
      i. Spread from person to person via
         1. Large-particle respiratory droplet transmission
            a. Requires close contact between source and recipient persons
         2. Contact with respiratory-droplet contaminated surfaces
         3. Airborne transmission by small-particle residue of evaporated droplets
      ii. Typical incubation period is 1-4 days (average: 2 days)
      iii. Contagiousness begins the day before symptoms start and lasts 5-10 days
      iv. Children may be contagious several days before becoming symptomatic, lasting ten or more days after onset
      v. Severely immunocompromised persons can shed virus for weeks or months
      vi. Influenza vaccines
         1. 60% effective (varies with vaccine and flu strain)

2. Selected based on forecasts from CDC
3. Seasonal flu vaccine is usually trivalent (three component)
    a. Each component selected to protect one of three main flu viruses

III. Sepsis and Septic Shock
- a. The body's response to infection.
    - i. Life threatening
    - ii. Tissue damage
    - iii. Organ failure
- b. Septic shock
    - i. Sepsis with refractory hypotension or signs of hypo perfusion despite adequate fluid resuscitation
        1. End organ dysfunction
        2. Oliguria
        3. Altered mental status
- c. SOFA or quick SOFA Score (calculation tool)
    - i. Evaluates for poor outcomes in infected patients based on:
        1. Altered mental status
        2. Respiratory rate
        3. Blood pressure

IV. Emerging Infectious Diseases
- a. Incidence in humans has increased in past two decades
- b. Threatens to continue increasing
- c. Knows no national boundaries
- d. New infections resulting from changes or evolution of existing organisms
- e. Known infections spreading to new geographic areas or populations
- f. Previously unrecognized infections appearing in areas undergoing ecologic transformation
- g. Past infections reemerging
    - i. Result of antimicrobial resistance in known agents or breakdowns in public health measures.

PARAMEDIC INFECTIOUS DISEASE SKILLS	none

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PARAMEDICS
MEDICAL
MEDICATION DELIVERY
ADULT & PEDIATRIC PATIENTS: EXPECTED DURATION 1 HOUR

INSTRUCTOR PREPARATIONS

- Review *National EMS Education Standards*
- Review Local Protocols

LESSON OBJECTIVES

- Analyze the benefits of intramuscular (IM) administration compared to the subcutaneous (SQ) route
- Critique the delivery of medication with a nasal atomizer to other routes of administration

LESSON CONTENT

I. Benefits of intramuscular (IM) drug administration over the subcutaneous (SQ) route
   a. With certain drugs (e.g. epinephrine) IM drug administration is more consistent than SQ in the prehospital setting
      i. Obese patients
      ii. Pediatrics
      iii. Movement of the ambulance
   b. Prehospital medications previously given via the SQ route are transitioning to the IM route
      i. More predictable absorption in critical patients
         1. Peripheral vasoconstriction or poor perfusion (e.g. shock)
   c. Larger volumes of medication can be given via the IM route compared to the SQ route

II. Intranasal delivery of medications
   a. Combines a method of measuring a unit dose of medication
      i. Delivered with a syringe or unit dose pump with a spray tip
      ii. Medication is aerosolized into fine particles as it is being sprayed into the nose
      iii. Results in a broader distribution of the medication across the nasal mucosa and an increased bioavailability
   b. Not all medications can be delivered intranasally
      i. Must have the correct pharmacokinetics
   c. Medications that can be delivered via intranasal route include but are not limited to
      i. Fentanyl
      ii. Midazolam
      iii. Naloxone
      iv. Ketamine
      v. Glucagon
   d. Split dosage between nares
   e. Max volume in each nare is 1.0ml

PARAMEDIC MEDICINE ADMINISTRATION SKILLS	See toxicological and immunological emergencies

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PARAMEDICS
MEDICAL
PAIN MANAGEMENT
ADULT & PEDIATRIC PATIENTS: EXPECTED DURATION 1 HOUR

INSTRUCTOR PREPARATIONS

- Review *National EMS Education Standards*
- Review Local and Regional Protocols
- [16]ACEP—Out-of-hospital Use of Analgesia and Sedation

LESSON OBJECTIVES

- Conduct pain assessments appropriately by patient's age
- Critique clinical protocols for pain management
- Discuss non-pharmacological and pharmacological pain management options
- Determine the differences between acute and chronic pain management
- Analyze the value of QA/QI, medical direction involvement, and documentation of pain management
- Outline monitoring and documentation techniques during various phases of pain management
- Critique the position paper published by the National Association of EMS Physicians regarding Prehospital Pain Management

LESSON CONTENT

I. Pain Assessment
   a. Adequate pain control is not routinely provided for a number of reasons
      i. Most common—underestimation of patient's needs
      ii. EMS personnel may base their judgment on past, similar patients
      iii. Prehospital protocols should require
         1. Assessment of pain severity
         2. Reassessment of pain level after every intervention
         3. Document of every intervention
   b. Tools for pain assessment
      i. Use the same scale to assess and reassess
      ii. Interpretation of the signal includes the following dimensions:
         1. Physiologic
         2. Psychological
         3. Emotional
         4. Behavioral
      iii. Assessment instrument – document
         1. Presence of pain
         2. Intensity of pain
         3. Change in pain severity with time and treatment
   c. Types of scales
      i. Numeric Rating Scale
         1. "Rate your pain on a scale of 0-10"
         2. Proven more reliable in trauma
      ii. Graphic Scale
         1. Commonly used in pediatric patients

II. Clinical protocols for prehospital pain management
   a. Must list clear indications and contraindications for each form of analgesic intervention
   b. Should be in accordance with protocols from local and regional trauma centers
   c. Consensus of opinion and acceptance by receiving physicians

III. Non-pharmacologic interventions for pain management
   a. Careful use of appropriate wording

b. Distraction away from painful stimuli
c. Parents' presence typically reduces the level of distress in infants and children
d. Traditional interventions should be provided, for example:
    i. Immobilization of fractures
    ii. Elevation
    iii. Ice
    iv. Padding of spinal immobilization

IV. Pharmacological interventions for pain management
a. Most commonly used agents
    i. Narcotics (morphine, fentanyl, hydromorphone, etc.)
    ii. Ketamine
    iii. Nitrous oxide
    iv. Nalbuphine (Nubain®)
    v. NSAIDS
        1. Ketorolac (Toradol®)

V. Monitoring and Documentation before and after analgesic administration
a. Documentation of the patient's clinical status before and after analgesic administration is required
b. Vital signs
    i. Level of consciousness
    ii. HR, BP, pulse, pulse oximetry, etc.
        1. Baseline
        2. Following each intervention
c. Document
    i. Any significant change in clinical status
    ii. Any corrective action taken
d. Follow all local controlled substances policies for documentation, wastage, storage, etc.

VI. Quality improvement and medical oversight
a. Systems with established QI programs have better compliance to pain management protocols
    i. Establish benchmarks
    ii. Tracking plan
    iii. Feedback and discussion with ED staff, medical director, patients

VII. Acute vs. chronic pain management
a. Dependence, abuse, and addiction of prescribed medications is well documented
b. Perform a thorough pain assessment prior to providing treatment
c. Pain management should depend on objective clinical decision making
d. Pain is individualized with each patient.
    i. When patients report where their level of pain, it should not be influenced by the
    provider's bias

VIII. Sedation Monitoring
a. Reference: [16]ACEP—Out-of-hospital Use of Analgesia and Sedation
    i. Analgesia
        1. Use of NSAIDs and acetaminophen with opioids
        2. Fentanyl as an "ideal narcotic agent"
        3. Misplaced fear of clouding ultimate diagnoses when using analgesia
        4. Ketamine as a safe out-of-hospital analgesia
    ii. Sedation/Chemical Restraint
        1. Midazolam as an "optimal agent…of anxiety and…agitation"

2. Monitor patient closely when administering benzodiazepines
3. Butyrophenone use for violent patients
4. Ketamine use for violent patients

IX. Pediatric pain management
- a. Reference: [17]ACEP—Reducing Pediatric Pain and Anxiety
  - i. Optimizing the environment
    1. Combat anxiety and reduce pain by improving the physical environment
  - ii. Assessing pain
    1. Self-reporting pain scale examples:
       - a. Wong-Baker FACES®
       - b. FACES and FACES revised
       - c. OUCHER®
    2. Non-self-reporting pain scale example
       - a. FLACC Scale
         - i. Faces, Legs, Activity, Cry, Console
         - ii. Utilizes presenting history and physical exam
- b. Non-invasive pain management
  - i. Multidisciplinary/complimentary methods
  - ii. Distraction
  - iii. Alternative procedures
    1. e.g., Steri-Strips ™ vs sutures
- c. Local and Regional Anesthesia
  - i. Techniques
    1. Skin stimulation
    2. 25-gauge needles
    3. Slow infiltration of medication
    4. Room temperature medication
- d. Systemic Analgesia and Anxiolysis
  - i. Oral/liquid medications are usually sufficient
    1. NSAIDs and some opiate formulations
  - ii. Intranasal
    1. Less intrusive
    2. Efficient
    3. Easy and quick
    4. Effective route for analgesia and anxiolysis

X. Neo-natal pain management
- a. Reference: [17]ACEP—Reducing Pediatric Pain and Anxiety
- b. Physiologic awareness of medication us in children less than six months (neonates)
  - i. Most analgesics conjugate in the liver
  - ii. Enzymes for drug metabolism develop for up to six months
  - iii. Higher percentage of water/less fat
    1. Water soluble drugs distribute greater volumes in neonates
- c. Topical anesthesia
  - i. Requires appropriate dosing to prevent systemic toxicity
  - ii. No prolonged exposure

XI. Research
- a. Consider conducting research for evaluating pain management in local area
  - i. Intranasal vs. intravenous
  - ii. Intranasal drugs
    1. Fentanyl

2. Ketamine 3. Toradol	

PARAMEDIC PAIN MANAGEMENT SKILLS	none

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PARAMEDICS
MEDICAL
PSYCHIATRIC AND BEHAVIORAL EMERGENCIES
ADULT & PEDIATRIC PATIENTS: EXPECTED DURATION 1 HOUR

INSTRUCTOR PREPARATIONS

- Review *National EMS Education Standards*
- [18]*White Paper Report on Excited Delirium Syndrome*
- [19]*National Library of Medicine—Excited Delirium*
- [20]*CDC—Suicide Risk Factors*

LESSON OBJECTIVES

- Describe the components of a mental status examination
- Perform effective patient restraint methods (verbal and physical)
- State the risk factors for suicide
- Analyze the effects of opioids and excited delirium
- Identify common synthetic stimulants and natural or synthetic THC
    - Recognizing the effects
    - Synthetic stimulants
    - Natural and synthetic THC

LESSON CONTENT

I. Mental status examination
    a. Mechanism of injury or nature of illness?
        i. Injuries/illnesses can cause altered behavior
            1. Head injuries
            2. Hypoglycemia
            3. Hypoxia
            4. Stroke
            5. Dementia
        ii. Medication side effects
    b. Mental health history
    c. General appearance
        i. Dress
        ii. Grooming
        iii. Posture
        iv. Wringing of hands
        v. Facial grimaces
        vi. Mannerisms
        vii. Actions
        viii. Violence
    d. Speech
        i. Spontaneous or pressured
        ii. Slow or fast
        iii. Soft or loud
        iv. Understandable or not
        v. Appropriate or inappropriate
            1. Mixed/confused words (word salad)
            2. Full words inappropriately used together
            3. Delusional
        vi. Mood
            1. Depressed
            2. Euphoric

3. Manic
4. Anxious
5. Angry
6. Agitated
7. Fearful
8. Guilty

vii. Area of thought
1. Racing thoughts
2. Hallucinations
a. Auditory
b. Visual
c. Somatic (strange body sensations)
3. Obsessive
4. Delusions (false beliefs)
5. Suicidal
6. Unconnected
7. Disturbed or distorted

viii. Once you have completed a mental status examination, you should report
1. General appearance
2. Speech
3. Mood
4. Area of thought

II. Restraint techniques

e. Physical restraints

i. Attempt verbal de-escalation prior to physical restraint, if safe
ii. Provider safety
1. Ensure scene safety
2. Leave the scene if weapons are present
iii. Determine the need for ALS pharmacological restraint
iv. Restrain only those who can be overpowered with the physical forces available to you
v. Use only the force necessary to maintain control and prevent injury to all involved
vi. Five people should be available to apply full body restraint
1. One for each limb and one for restraint application
vii. Pre-plan each provider's role during restraint
1. Know your communication signals or verbal cues
viii. Swift, coordinated action is most effective
ix. Talk to the patient continually
x. Do not remove restraints in the out-of-hospital setting
xi. Thoroughly document restraints
1. Legal considerations
a. In law enforcement custody
b. Age
xii. Transportation
1. Ensure continued ability to restrain
2. Ensure adequate personnel and equipment
xiii. Principles of restraining motion
1. Understand normal range of motion
2. Restraining range of motion
3. Understand muscle groups

xiv. Patient considerations
1. Pregnant
2. Pediatric
3. Geriatric

f. Environmental restraint
i. Stabilize the environment (calm patient via therapeutic communication techniques)
ii. Separate stimulus from environment
1. (e.g., separate two fighting people, remove law enforcement from direct view)

g. Chemical restraint
i. Indications
ii. Patient poses a threat to himself or others
iii. Patients requiring physical restraint who struggle or fight should immediately be chemically restrained
iv. Requires continuous monitoring, assessment, and management
v. Medication types
1. Ketamine
2. Benzodiazepines (e.g. midazolam, lorazepam etc.)
3. Antipsychotics (haloperidol, risperidone etc.)
vi. Dosage
1. Titrate dosage to level of agitation
2. Combination therapy may be necessary
3. Consult with local medical direction when establishing protocols/designing education
vii. Medication routes
1. IM
2. IV/IO
3. Nasal
4. P.O./buccal

III. Agitated Delirium/Excited Delirium

h. Reference: [18]*White Paper Report on Excited Delirium Syndrome*

i. Reference: [19]*National Library of Medicine—Excited Delirium*

j. Stay calm, and do not cause more harm to the patient

k. Characterized by a sudden onset of extreme agitation and extremely irrational or combative behavior
i. Bizarreness, aggressiveness, agitation, ranting, hyperactivity, paranoia, panic
ii. Reported to result from substance intoxication, psychiatric illness, alcohol withdrawal, head trauma, or a combination of these
iii. Patient may exhibit hypertension, tachycardia, diaphoresis, dilated pupils, tachypnea, abnormal tolerance to pain, hyperthermia, noncompliance, and endless endurance and strength
iv. May lead to respiratory and cardiac arrest
1. Restraints may increase the risk

IV. Suicide/Depression (refer to the resources in the instructor preparations section)

l. [20]Risk Factors For Suicide
i. History of depression and other mental disorders
ii. Previous suicidal gestures/attempts
iii. History of family/child abuse (non-accidental trauma)
iv. Feelings of hopelessness

v. Unwillingness to seek mental health care (stigma attached)
vi. Feeling of being isolated from others
vii. History of impulsive or aggressive behavior
viii. Inability to access mental health
ix. Recent diagnosis of a serious illness, especially an illness that signals a loss of independence
x. Recent loss of a loved one, job, money or social loss
xi. Access to firearms
xii. PTSD
xiii. Alcohol or drug abuse
xiv. Loss of relationship
xv. Gives away personal belongings/cherished possessions
xvi. Physical or mental stress
xvii. Major physical stress such as surgery and long periods of sleep deprivation
xviii. Expression of a clear plan for committing suicide
xix. Ability of the mechanisms to carry out suicide

PARAMEDIC PSYCHIATRIC SKILLS	Successful	Unsuccessful
1. Demonstrate proper verbal de-escalation techniques		
2. Apply soft restraints		

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PARAMEDICS
MEDICAL
TOXICOLOGICAL EMERGENCIES--OPIOIDS
ADULT & PEDIATRIC PATIENTS: EXPECTED DURATION ½ HOUR

INSTRUCTOR PREPARATIONS

- Review *National EMS Education Standards*
- Poison Control: 1-800-222-1222
- [21]CDC—"Protecting Kids from Environmental Exposure"
- [22]Poison Control Centers: Poison & Prevention Information by Age

LESSON OBJECTIVES

- Identify common synthetic stimulants and natural or synthetic THC
  - Recognize the effects
  - Synthetic stimulants
  - Natural and synthetic THC
- Identify common opioids
  - Recognize the effects
- Explain common treatment options for a person experiencing opioid overdose

LESSON CONTENT

I. Poison control: 1-800-222-1222
II. Toxicological Emergencies
  a. Synthetic stimulants
  b. Tetrahydrocannabinol (THC - natural/synthetic)
  c. Opioid
III. Synthetic Stimulants
  a. Effects of synthetic stimulants
    i. Psychological
      1. Agitation, insomnia, irritability, dizziness, depression, paranoia, delusions, suicidal thoughts, seizures, and panic attacks
    ii. Somatic (effects on the body)
      1. Hyperthermia (significant with MDMA)
      2. Rapid heart rate - can lead to heart attacks and strokes
      3. Chest pains, nosebleeds, sweating, nausea, and vomiting
  b. Bath Salts
    i. Bliss, Blue Silk, Ivory Wave, White Dove, White Knight, White Lightning
    ii. Usually sold as a powder
      1. White to off-white in color
      2. Can also be sold in capsule
    iii. Usually inhaled nasally
      1. Can also be taken orally, intravenously, or smoked
  c. Methamphetamine
    i. Crank, Crystal Meth, Glass, Ice, Tweak, Yaba
    ii. Usually sold as crystals
      1. White to off-white in color
      2. Yellow/red crystalline powder
    iii. Usually smoked, snorted or injected IV
  d. MDMA (methylenedioxymethamphetamine)
    i. Ecstasy, E, X, XTC, Smarties, Scooby-Snacks, Skittles
    ii. Usually sold in tablets or capsules
      1. Can also be sold in liquid drops, snorted, or smoked
      2. Can be any color

IV. Tetrahydrocannabinol (THC)
    a. Natural
        i. Weed, bud, doobie, Mary Jane, pot, blunt, herb, hemp, grass, etc.
        ii. A green, brown or gray mixture of dried, shredded leaves, stems, seeds, and flowers of the hemp plant
        iii. Usually smoked in a cigarette or pipe
    b. Synthetic
        i. Characterized by mimicking natural THC
        ii. Can cause psychosis
        iii. K2, spice, black mamba, Bombay blue, genie, zohai
        iv. Similar appearance to natural THC
    c. Effects of THC
        i. Impaired short term memory
        ii. Decreased concentration and attention
        iii. Impaired balance and coordination
        iv. Increased heart rate and blood pressure
        v. Increased appetite

V. Opioids
    a. Synthetic or semi-synthetic opioids act on the Central Nervous System as a depressant to:
        i. Decrease the perception of pain
        ii. Decrease the reaction to pain
        iii. Increase pain tolerance
    b. May be prescribed for acute pain, debilitating pain, or chronic pain as part of palliative care
    c. May be abused to induce euphoria
    d. Prolonged use may lead to tolerance and/or addiction
    e. Common effects:
        i. Respiratory depression
        ii. Drowsiness
        iii. Constipation
        iv. Constricted pupils
        v. Dry mouth
        vi. Itching
        vii. Nausea and vomiting
    f. Common opioids
        i. Heroin
        ii. Morphine
        iii. Oxycodone (Percocet®)
        iv. Codeine
        v. Fentanyl
        vi. Hydrocodone (Vicodin®)
        vii. Hydromorphone (Dilaudid®)
        viii. Meperidine (Demerol®)
        ix. Methadone
    g. Treatment for opioid emergencies
        i. Naloxone (Narcan®)
            1. Opioid antagonist
            2. Reverses CNS and respiratory depression caused by opioid overdose
            3. NOT effective against non-opioid drugs
            4. Available intranasally or auto-injector
                a. First responders and bystanders may have administered prior to

EMS arrival; always ask before administering additional doses

5. Contraindications
    a. Known hypersensitivity to naloxone hydrochloride

VI. Pediatric toxicology/ingestion
- a. Poison Control: 1800-222-1222
- b. Risks for accidental ingestion
    - i. [22]Poison Control Centers: Poison & Prevention Information by Age
- c. Hazardous environment exposure
    - i. [21]CDC—"Protecting Kids from Environmental Exposure"

VII. Cannabinoid Hyperemesis Syndrome
- a. Reference: [23]NIH—Cannabinoid Hyperemesis Syndrome
- b. Be aware of patients who experience
    - i. Chronic cannabis use
    - ii. Cyclic episodes of nausea and vomiting
    - iii. Frequent hot bathing (associated with cannabis use)
- c. Treat findings accordingly

PARAMEDIC TOXICOLOGICAL EMERGENCY SKILLS	Successful	Unsuccessful
1. Assemble a Mucosal Atomization Device (MAD) for use		
2. Demonstrate administration of intranasal naloxone		
3. Measure pediatric and adult dosages of naloxone (may be simulated)		

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PARAMEDICS
MEDICAL
NEUROLOGICAL EMERGENCIES-SEIZURES
ADULT & PEDIATRIC PATIENTS: EXPECTED DURATION ½ HOUR

INSTRUCTOR PREPARATIONS

- Review *National EMS Education Standards*

LESSON OBJECTIVES

- Define altered mental status (AMS)
- State common causes of altered mental status
- Define status epilepticus/seizures
- Explain complications associated with seizures

LESSON CONTENT

I. Altered mental status definition and causes
   a. Definition: change in a person's level of awareness
   b. Causes (AEIOU-TIPPSS— acronym for assessment of AMS patient)
      i. Alcohol
      ii. Epilepsy (seizures)
      iii. Insulin (diabetic condition)
      iv. Oxygen (lack of)
      v. Uremia (kidney failure)
      vi. Trauma
      vii. Infection
      viii. Psychiatric
      ix. Poisoning (including drug overdose)
      x. Shock
      xi. Stroke

II. Types of seizures
   a. Generalized
      i. Tonic-clonic
      ii. Absence
   b. Partial
      i. Simple
      ii. Complex
   c. Status epilepticus
      i. [24]*Epilepsy Currents-AESG*—"Evidence Based Guideline: Treatment of Convulsive Status Epilepticus in Children and Adults: Report of the Guideline Committee of the American Epilepsy Society"
         1. A continuous seizure lasting more than 30 minutes
         2. Two or more seizures without regaining consciousness between any of them
         3. Prolonged seizures last between 5 and 30 minutes
            a. Should be treated as status epilepticus
      ii. Complications
         1. Aspiration
         2. Bone and spine fractures
         3. Brain damage from lack of oxygen and/or depletion of glucose
         4. Dehydration

III. Causes
   a. Medication non-compliance
   b. Rapid increase in body temperature (febrile)

c. Infection
d. Hypoxia
e. TBI
f. Alcohol or drug withdrawal
g. Stroke
h. Hypoglycemia
i. Eclampsia
j. Seizure disorder
k. Electrolyte disturbances
l. Poisoning

IV. Assessment findings
a. Spasms/muscle contractions/shaking or tremors
b. Sweating
c. Cyanosis during seizure activity
d. Increased secretions
e. Incontinence
f. Postictal state

V. Management
a. Protect from further injury; position on side to protect airway
b. Ensure open airway, adequate ventilations, and oxygenation
i. Consider using an NPA
c. Provide emotional support; reduce stimulants that may trigger more seizures
d. IV or IO
e. Consider administering a benzodiazepine

PARAMEDIC NEUROLOGICAL/SEIZURE SKILLS	none

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PARAMEDICS
MEDICAL
ENDOCRINE EMERGENCIES-DIABETES
ADULT & PEDIATRIC PATIENTS: EXPECTED DURATION 1 HOUR

INSTRUCTOR PREPARATIONS

- Review the *National EMS Education Standards*

LESSON OBJECTIVES

- Explain the role glucose plays on the cells
- Explain the role of insulin
- Identify symptoms commonly associated with hypo/hyperglycemia
- Identify commonly prescribed medications used to treat diabetes
- Discuss metabolic syndrome
- Explain the management of hyperglycemia
- Explain the management of hypo/hypoglycemia
- Compare the functions of different insulin pumps

LESSON CONTENT

I. Glucose
   a. Sugar
   b. Fuel for cells
   c. Proper amounts of glucose in blood ensures proper brain and cell functioning
      i. Changes in levels may result in altered behavior
      ii. Regulated by the pancreas
      iii. Rise in blood sugar stimulates secretion of insulin
         1. Insulin acts as a "carrier" for glucose to enter the cells and be used
      iv. Insulin release slows as blood sugar drops toward normal
      v. Excess glucose
         1. Stored in the liver and muscles as glycogen
         2. Pancreas releases glucagon
            a. Glucagon stimulates the liver
               i. Liver breaks down the glycogen into glucose

II. Diabetes
   a. Condition in which insulin is nonexistent, minimal, or nonfunctioning
   b. Without treatment it leads to high blood sugar
   c. Two types of diabetes
      i. Insulin dependent diabetes (IDDM, Type 1)
         1. Early age of onset
         2. Lack of insulin production
      ii. Non-insulin dependent diabetes (NIDDM, Type 2)
         1. Later age of onset
         2. Associated with obesity
         3. Some cases are resolved with weight loss
         4. Cells are less receptive to insulin
            a. Medication required to improve insulin sensitivity
            b. Common medications
               i. Metformin
               ii. Chlorpropamide
               iii. Glyburide
            c. Some may take insulin

III. Hypoglycemia
   a. Rapid onset and changes in mental status

- b. Sweating
- c. Hunger
- d. Rapid pulse
- e. Rapid, shallow respirations
- f. Seizures, come (late)
- g. Bizarre behavior (sudden onset and abnormal for patient)

IV. Hypoglycemia management
- a. Ensure an open airway, adequate breathing, circulation, and ability to swallow
- b. Determine blood glucose level
- c. Check for and deactivate insulin delivery device (insulin pump)
    - i. Administer medication as appropriate
        1. Oral glucose
        2. Glucagon
        3. Dextrose IV
- d. Consider using a D10 solution and administering in 10g increments
- e. Supportive care

V. Hyperglycemia
- a. Slow onset and changes in mental status
- b. Rapid breathing, sweet breath odor
- c. Dehydration, pale, warm, dry
- d. Weakness, nausea, vomiting
- e. Weak, rapid pulse
- f. Polyuria, polydipsia, polyphagia

VI. Hyperglycemia management
- a. Ensure an open airway, adequate breathing and circulation
- b. Determine the blood glucose level (if available)
- c. Supportive care
    - i. Blood sugar needs to be lowered slowly and monitored closely, usually in the ICU
    - ii. Field management should focus on ABC's and counteracting dehydration
- d. Transport

VII. Insulin Pumps
- a. Pager or smart phone appearance
- b. Secrete short acting insulin over 24 hours
- c. Attached subcutaneously by catheter
- d. Suspend pump administration or disconnect when treating a patient with hypoglycemia
- e. Tracks/stores helpful information that may assist in determining when and why a hypoglycemic episode occurred

VIII. Metabolic syndrome
- a. Named for a group of risk factors that increase the risk for coronary artery disease, stroke and type 2 diabetes
    - i. Central obesity
        1. Extra weight around the middle and upper parts of the body
        2. Often described as "apple-shaped"
    - ii. Insulin resistance
        1. Body uses insulin less effectively than normal
        2. Insulin is needed to help control the amount of sugar in the body.
            a. Blood sugar and fat levels rise
    - iii. Increased long-term risk for developing
        1. Heart disease
        2. Type 2 diabetes

3. Stroke
4. Kidney disease
5. Diminished blood supply to the legs.

IX. Adrenal hypoplasia
- a. Addison's Disease
  - i. Adrenal glands fail to produce adequate amounts of steroid hormones
    1. Cortisol
    2. Aldosterone
- b. Congenital Adrenal Hyperplasia
  - i. Can affect all adrenal hormones
  - ii. Can cause hyperadrenalism and hypoadrenalism
- c. Waterhouse Friderichsen Syndrome
  - i. Can present with life threatening hypoglycemia and hypotension during an adrenal crisis
    1. Out-of-hospital treatments
       - a. Fluid bolus for hypotension
       - b. Dextrose administration
       - c. Transport to the emergency department
       - d. Patient may carry an emergency kit containing either hydrocortisone or dexamethasone.
         - i. Check local protocols to assist with or administer these medications
         - ii. Legislation requiring EMS to carry/administer hydrocortisone is being approached in many states

PARAMEDIC ENDOCRINE/DIABETES SKILLS	Successful	Unsuccessful
1. Troubleshoot an insulin pump malfunction (may be simulated)*		
2. Suspend/disconnect pump administration		
3. Administer IV Dextrose		
*This skill may be practiced using diagrams of various types of insulin pumps. The use of a physical pump is not mandatory.		

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PARAMEDICS
MEDICAL
IMMUNOLOGICAL EMERGENCIES
ALLERGIC REACTION & ANAPHYLAXIS ADULT & PEDIATRIC PATIENTS: EXPECTED DURATION ½ HOUR

INSTRUCTOR PREPARATIONS

- Review the *National EMS Education Standards*
- [25]National Institute of Health: Visual Representation of …Criteria for Anaphylaxis

LESSON OBJECTIVES

- Discuss the physiology related to allergies and anaphylaxis
- Differentiate between a mild/localized allergic reaction and anaphylaxis
- Explain the actions of medications used to treat anaphylaxis
  - Benadryl®
  - Epinephrine

LESSON CONTENT

I. Allergic reaction
   a. Hyperactive, localized immune response to an allergen
   b. Some histamine is released
   c. Localized: redness, swelling, hives, itching
   d. May cause nausea, vomiting, and/or diarrhea
   e. Usually requires minimal supportive therapies
   f. Repeat exposures may lead to anaphylaxis (e.g., insect stings, foods, etc.)

II. Anaphylaxis
   a. Multiple body systems are affected, not just a localized reaction like allergies
   b. Life threatening reaction of the immune system to an allergen
   c. Large quantities of histamine are released throughout the body
   d. Vasodilation and increased capillary permeability
   e. May lead to shock
   f. Bronchoconstriction and mucous production
   g. May lead to respiratory distress
      i. Soft tissue swelling of the upper airway
      ii. Airway obstructions

III. Treatment for Anaphylaxis
   a. Out-of-hospital treatment
      i. Ensure adequate airway, ventilation, and oxygenation
      ii. SpO_2 <94% administer oxygen
      iii. Establish an IV or IO, administer fluids
      iv. Epinephrine
         1. First line medication of choice
            a. Reverses many of the effects of the histamine
               i. Bronchodilation
               ii. Vasoconstriction
            b. Requires continuous reassessment
            c. Consider additional dosing due to short half-life
      v. Diphenhydramine
         1. Second line medication of choice
            a. Blocks histamine receptors
               i. Inhibits further histamine response
      vi. Consider Albuterol (via nebulizer)
         1. Bronchodilator

2. Review local protocol

vii. Transport to an appropriate facility for evaluation

b. Statistics: [26]*Emergency department diagnosis and treatment of anaphylaxis*

i. Fifty-seven percent (57%) who present to the ED with anaphylaxis can be misdiagnosed

ii. Nearly eighty percent (80%) of those correctly diagnosed are NOT given epinephrine, the first line treatment

PARAMEDIC IMMUNOLOGICAL EMERGENCIES SKILLS	Successful	Unsuccessful
1. Demonstrate assisting a patient in administering medication with an auto-injector		

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PARAMEDICS
OPERATIONS
AT-RISK POPULATIONS
ADULT & PEDIATRIC PATIENTS: EXPECTED DURATION 1 HOUR

INSTRUCTOR PREPARATIONS

- *National EMS Education Standards*
- [27]Department of Homeland Security—Blue Campaign: Human Trafficking
- [28]Florida State University—The National Prevention Toolkit on Domestic Violence for Medical Professionals
- [29]The Journal of Law-Medicine: Improving the Emergency Medical Services System's Response to Domestic Violence

LESSON OBJECTIVES

- Determine training resources for special populations
  - Human trafficking
  - Domestic violence
- Recognize the unique characteristics of at-risk populations
- Determine the appropriate actions of EMS professionals in the presence of at-risk patients
- Recognize circumstances that may indicate abuse
  - Domestic abuse
  - Human trafficking
  - Non-accidental trauma
- State appropriate actions of EMS professionals in the presence of abused patients

LESSON CONTENT

I. Training resources
   a. [27]Human Trafficking
   b. [28]Domestic Violence

II. Unique characteristics of at-risk populations
   a. Pediatric
      i. Wide range in development
         1. Neonatal to young adult
      ii. Non-verbal to highly communicative
      iii. Response to shock changes with organ development
      iv. Injury and illness patterns change with development
      v. Depend on adults for protection and prevention
   b. Geriatric
      i. Fragility is a better indicator of risk than age in years
   c. Polypharmacy is common
      i. May have certain drug interactions
   d. Be aware of potential medication overdoses
   e. Age-related cognitive impairment
      i. Dementia
      ii. Delirium
   f. Loss of independence
   g. May have reduced uptake of certain medications

III. Indications of abuse
   a. Training resource: [28]Domestic Violence
   b. Documented studies report that domestic violence wounds are most likely to occur at the following anatomical sites (listed from most to least likely)
      i. Face and neck
      ii. Arms

iii. Head
iv. Back and buttocks
v. Breasts
vi. Abdomen (Increases during pregnancy)
vii. Genitals

c. Victims may be repeatedly
i. Injuries in different stages of healing

IV. Indications of trafficking victims
a. Training resource: [27]Human Trafficking
b. Bruises in various stages of healing caused by physical abuse
c. Scars, mutilations, or infections due to improper medical care
d. Urinary difficulties, pelvic pain, pregnancy, or rectal trauma
e. Chronic back, hearing, cardiovascular, or respiratory problems as a result of forced manual labor in unsafe conditions
f. Poor eyesight and/or eye problems due to dimly lit work sites
g. Malnourishment and/or serious dental problems
h. Disorientation, confusion, phobias, or panic attacks
i. Results of daily mental abuse, torture, and culture shock

V. EMS professionals' actions and considerations with at-risk patients
a. Assessment challenges
i. Unreliable historians
ii. Difficulty in relaying information
1. Previous medical history
2. Medications
3. Other current therapies
iii. Reliance on caregivers
iv. Proper interpretation of the patient's verbal and non-verbal communication
1. Interpretation of physical examination findings often drive care
v. Assess the environment in which patient was found and the need for additional follow-up

b. Treatment
i. Provide supportive care
ii. Treat injuries and illnesses as usual
iii. Document findings
iv. Know whether state law requires mandatory reporting of abuse

PARAMEDIC AT-RISK POPULATION SKILLS	none

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PARAMEDICS
OPERATIONS
AMBULANCE SAFETY
ADULT & PEDIATRIC PATIENTS: EXPECTED DURATION ½ HOUR

INSTRUCTOR PREPARATIONS

- [30] *NHTSA Advances Ground Ambulance Safety…*
- [31] *Real Stories Behind Ambulance Safety Data*
- [32] *NHTSA and Ground Ambulance Crashes April 2014*
- [33] *When Ambulances Crash: EMS Provider & Patient Safety*
- [34] *Strategy for a National EMS Culture of Safety*

LESSON OBJECTIVES

- Discuss federal initiatives developed to monitor and analyze ground ambulance crashes
- Identify the significance of ambulance crashes through the use of national data
- State specific factors that contributed to injuries and fatalities sustained during ambulance crashes
- Evaluate the policies and procedures at each participant's own EMS service related to protecting patient and provider safety during ground ambulance transport

LESSON CONTENT

I. Discuss federal initiatives developed to monitor and analyze ground ambulance crashes
   a. Reference: [30] *NHTSA Advances Ground Ambulance Safety…*
   b. The National Highway Traffic Safety Administration (NHTSA) collects, reports, and analyzes data on crash characteristics in which an ambulance is involved
   c. The NHTSA Office of EMS (OEMS) has collaborated with NHTSA's Special Crash Investigations Program (SCI) to conduct more in depth analysis on ambulance crash data in order to identify common data sets among events. The data gleaned can inform decisions and recommendations in the future.
      i. Efforts include creating a common reporting system, the Model Minimum Uniform Crash Criteria (MMUCC)
   d. NHTSA strives to collaborate with national and other stakeholder partners to improve safety for EMS personnel, patients, and the general public in relation to ground ambulance transport
   e. Data is disseminated in order to assist national stakeholders, state, and local officials in developing policies and procedures to protect EMS personnel and patients, as well as the general public
   f. NHTSA participates in monitoring ambulance defects as cause of crashes
   g. NHTSA promotes the implementation of *National Strategy for EMS Culture of Safety*
   h. NHTSA participates in efforts to improve ground ambulance standards
      i. Participation with National Fire Protection Agency (NFPA) and National Institute for Occupational Safety and Health (NIOSH).

II. Identify the significance of ambulance crashes through the use of national data
   a. Reference: [30] *NHTSA Advances Ground Ambulance Safety…*
   b. Reference: [32] *NHTSA and Ground Ambulance Crashes April 2014*
   c. Average of 4,500 crashes/year
      i. 1,500 of these are "injury crashes" with approximately 2,600 injured persons
      ii. 59% while in emergency use
      iii. Annual mean of 29 fatal crashes/year with 58% while in emergency use
      iv. 42% non-emergency use
         1. Of the fatalities
            a. 4% ambulance driver
            b. 21% ambulance passenger

c. 63% occupant of other vehicle
d. 12% non-occupant

2. Of the injuries:
   a. 17% ambulance driver
   b. 29% ambulance passenger
   c. 54% occupant of other vehicle

d. Limitations of data
   i. Only includes crashes that occur on a road way customarily open to the public
   ii. Not all vehicle crashes in the country are reported to the police
   iii. Police may not record ambulances accurately on crash report
   iv. Does not distinguish between ambulance types
   v. Does not determine when the crash occurred (en-route to scene, en-route to hospital)
   vi. Does not collect data showing the proportion of time an ambulance is on the road
   vii. Does not currently differentiate ambulance occupants in the passenger seat or patient compartment of the ambulance
   viii. In the future Model Minimum Uniform Crash Criteria (MMUCC) will improve data collection and lead to better analyses.

e. Specific factors that contributed to injuries and fatalities during ambulance crashes
   i. References:
      1. [30]NHTSA Advances Ground Ambulance Safety by Tracking and Investigating Crashes
      2. [33]Infographic—When Ambulances Crash: EMS Provider and Patient Safety
   ii. Statistics
      1. 84% were unrestrained EMS providers
      2. Unsecured patients (both shoulder and lateral restraints)
         a. 33% were secured by both restraints
      3. 44% of patients were ejected from the cot in serious crashes
      4. 61% of patients were restrained with lateral belts only
      5. 38% had shoulder harnesses available but were unused

f. Evaluate the policies and procedures at each participant's own EMS service related to protecting patient and provider safety during ground ambulance transport
   i. Participants should consider and discuss the following questions:
      1. What are your agency's current policies/guidelines regarding securing a patient to the cot during transport?
         a. Are those adequate to prevent injury in the event of an ambulance crash?
      2. What changes would you recommend to reduce the risk of patient injury in the event of an ambulance crash?
      3. What are your agency's current policies/guidelines regarding securing EMS providers in the patient compartment during transport?
         a. Are those adequate to prevent injury in the event of an ambulance crash?
      4. What changes would you recommend to reduce the risk of EMS provider injury in the event of an ambulance crash?
      5. What are your agency's policies/guidelines regarding securing equipment and supplies in the patient compartment?
         a. Are those adequate to prevent patient and/or EMS provider injury in the event of an ambulance crash (or during

transport)? 6. What preventative measures does your agency have in place regarding driving an ambulance to decrease the risk of ambulance crashes?

PARAMEDIC AMBULANCE SAFETY SKILLS	none

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PARAMEDICS
OPERATIONS
FIELD TRIAGE—DIASTERS/MCIs
ADULT & PEDIATRIC PATIENTS: EXPECTED DURATION 1 HOUR

INSTRUCTOR PREPARATIONS

- *National EMS Education Standards*
- [35]*National Implementation of the Model Uniform Core Criteria for Mass Casualty Incident Triage 2013 (MUCC)*

LESSON OBJECTIVES

- Relate MUCCs impact on the development of the CDC Field Triage Decision Scheme and SALT
- Analyze the triage methods for
  - SALT
  - START
  - JumpSTART

LESSON CONTENT

I. MUCC (Model Uniform Core Criteria)
   a. Reference:
      i. [35]*National Implementation of the Model Uniform Core Criteria for Mass Casualty Incident Triage 2013*
   b. A science and consensus-based national guideline that recommends 24 core criteria for all mass casualty triage systems
   c. Used as the basis for CDC Field Triage Decision scheme and SALT (Sort, Assess, Lifesaving Interventions, Treatment/Transport)

II. SALT Triage
   a. Reference: Sort, Assess, Lifesaving interventions, Treatment/transport
   b. Steps to consider during triage
      i. Sort: Global sorting
         1. Obvious life threat
         2. Purposeful movement
         3. Walk
      ii. Individual assessment
         1. Perform lifesaving interventions as indicated
         2. Perform ongoing reassessments
      iii. Treatment and/or transport

III. START (adult triage)
   a. Reference: Simple Triage and Rapid Treatment
   b. Steps to consider during triage
      i. Assess respirations
      ii. Assess perfusion
      iii. Assess mental status
   c. Immediate or delayed transport depends on the assessment findings

IV. JumpSTART (pediatric triage)
   a. Reference: Pediatric MCI Triage Tool
   b. First, triage patients who do not walk independently (based on age)
   c. Steps to consider during triage
      i. Assess respirations
      ii. Assess perfusion
      iii. Assess mental status
   d. Determine immediate or delayed transport based on assessment findings

PARAMEDIC FIELD TRIAGE SKILLS/ACTIVITIES	Successful	Unsuccessful
1. Outline the differences between trauma triage and disaster/MCI triage		
2. Triage patients, in accordance with local protocol, using the SALT or the START/JumpSTART algorithm in a simulated multi-casualty scenario		

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PARAMEDICS
OPERATIONS
EMS PROVIDER HYGIENE, SAFETY, AND VACCINATIONS
ADULT & PEDIATRIC PATIENTS: EXPECTED DURATION ½ HOUR

INSTRUCTOR PREPARATIONS

- *National EMS Education Standards*
- [36]CDC—Hand Hygiene Guideline
- [37]APIC—*Guide to Infection Prevention in Emergency Medical Services*

LESSON OBJECTIVES

- Identify proper hand washing techniques
- Identify appropriate use of alcohol-based hand cleaner
- Discuss the CDC's recommendations of vaccines for healthcare providers
- Assess eye safety indications and measures

LESSON CONTENT

I. Always wash hands
   a. Before and after patient contact
   b. Before eating
   c. After cleaning the ambulance or equipment
   d. After using the restroom
   e. After nose blowing, coughing, or sneezing

II. CDC Recommendations for washing with soap and water
   a. Reference: [36]CDC—Hand Hygiene Guideline
   b. Remove all jewelry
   c. Wet hands with clean running water
   d. Apply soap
   e. Scrub the back of hands
   f. Clean underneath fingernails
   g. Continuously rub hands for at least 20 seconds
   h. Rinse hands well under running water
   i. Dry hands using a clean towel or air dry

III. Alcohol-based hand cleaner/sanitizer
   a. Should contain at least 60% alcohol
   b. Reduces number of germs
   c. Does not eliminate all types of germs
   d. Does not kill viruses
      i. Creates inhospitable environments for viruses to live
   e. Ineffective when hands are visibly dirty
   f. Techniques for using hand sanitizer
      i. Know that soap and water is more effective than hand sanitizer
      ii. Apply to palm of one hand
      iii. Rub hands together
      iv. Rub all surfaces of hands and fingers until dry
      v. Wash hands when soap and water become available

IV. Eye and face protections
   a. Eye protection is recommended by the CDC when workers may be at risk of acquiring infectious diseases via ocular exposure
      i. Adenovirus
      ii. Herpes simplex
      iii. Staphylococcus aureus
      iv. Hepatitis B and C

v. HIV
vi. Rhinoviruses

b. Eye protection devices
i. Goggles
ii. Face Shields
iii. Safety glasses
iv. Full-face respirators

V. Vaccinations for healthcare providers
a. Reference: [38]CDC—Vaccines: Healthcare Provider/Professionals
b. Recommended vaccines (not exhaustive)
i. Hepatitis B
ii. Influenza
iii. MMR (measles, mumps and rubella)
iv. Varicella
v. Pertussis
vi. Consider vaccines recommended for disaster response
c. Vaccines
i. Help prevent transmission of certain diseases
ii. Some are attenuated (weakened or killed) viruses
iii. Some mimic certain diseases
1. Produce antibodies in the blood
iv. Some provide antibodies directly

PARAMEDIC HYGIENE SKILLS	none

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PARAMEDICS
OPERATIONS
EMS CULTURE OF SAFETY
ADULT & PEDIATRIC PATIENTS: EXPECTED DURATION ½ HOUR

INSTRUCTOR PREPARATIONS

- [34] *Strategy for a National EMS Culture of Safety*

LESSON OBJECTIVES

- Define culture of safety
- Identify and explain the six core elements necessary to advance an EMS Culture of Safety
- Identify the role of the EMS providers in establishing a culture of safety within EMS organizations

LESSON CONTENT

I. Define culture of safety
   a. Reference: [34] *Strategy for a National EMS Culture of Safety*
   b. "The enduring value and priority placed on worker and public safety by everyone in every group at every level of an organization. It refers to the extent to which individuals and groups will commit to personal responsibility for safety; act to preserve, enhance and communicate safety concerns; strive to actively learn, adapt and modify (both individual and organizational) behavior based on lessons learned from mistakes; and be rewarded in a manner consistent with these values."

II. Identify and explain the six core elements necessary to advance an EMS Culture of Safety as described in the 2013 *Strategy for a National EMS Culture of Safety*
   a. Just Culture
      i. Development of environments in which EMS personnel are safe to report errors
         1. Focus on the various factors that contributed to the error
      ii. Assess risks in order to identify means of overcoming factors that contribute to errors
         1. Systems factors and individual factors are examined in order to make improvements to avoid future errors
      iii. Blaming or punishing is not an option in a Just Culture
   b. Coordinated support and resources
      i. Creation of a guidance and resource coordination body
         1. e.g., EMS Safety Resource Center (EMSSRC)
            a. Purpose is to determine the best way to effectively serve EMS in the support role
            b. Partner with governing bodies to serve as a conduit of information and resources for EMS Safety
            c. No oversight or authority
            d. Suggested support areas:
               i. Outreach and Resources for EMS and other stakeholders
               ii. Resources for Public Outreach
               iii. Measuring Progress and Success
   c. EMS Safety Data System
      i. Data driven decisions and policies related to EMS safety can only be made if all data is accessible on a national level.
      ii. A robust, secure system would allow access to researchers, decision makers, and national stakeholder groups.
      iii. Data sets have been identified; data will be analyzed and used to inform future plans, initiatives, processes, and policies in order to protect the health and well-being of EMS personnel, their patients, and the general public

1. Injuries
2. Illnesses
3. Incidents

d. EMS Education Initiatives
   i. Safety starts with EMS leaders and educators and involves everyone
   ii. Initial EMS programs must encourage a culture of safety throughout the program
   iii. Continuing education and new employee onboarding must infuse culture of safety throughout the curricula

e. EMS safety standards
   i. Safety standards for patient and responder safety must be developed using data and evidence
   ii. EMSSRC can coordinate the efforts to combine work and data completed by various EMS stakeholders and projects

f. Requirements for reporting and investigation
   i. Mandates for reporting safety are necessary so a common language and data set can be created to improve responder and patient safety
      1. Steps may include:
         a. Determining what data are already mandated and available
         b. Determining what data are necessary and useful
         c. Learning from those with hands-on experience
         d. Assigning and obtaining authorization for an investigative body
         e. Identifying existing best practices

III. Consider these questions in regards to the policies, practices, and daily operations in your organization/agency:
   a. What changes are needed to encourage the development of a culture of safety?
   b. How are mistakes handled if one is made during a patient care encounter?
   c. How should it be handled if applying the concept of Just Culture?

PARAMEDIC CULTURE OF SAFETY SKILLS	none

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PARAMEDICS
OPERATIONS
PEDIATRIC TRANSPORT
ADULT & PEDIATRIC PATIENTS: EXPECTED DURATION ½ HOUR

INSTRUCTOR PREPARATIONS

- [39]*Working Group Best Practice Recommendations for the Safe Transportation of Children in Emergency Ground Ambulances*

LESSON OBJECTIVES

- Explain how to appropriately secure a child safety restraint to a wheeled ambulance stretcher
- Differentiate between the NHTSA recommendations for safe ambulance transport of children based on the condition of the child
- Discuss the on-going initiatives to increase the safety of children during ambulance transport
- Discuss the limitations of the current recommendations

LESSON CONTENT

I. Explain guiding principles of safely transporting pediatric patients
   a. All ambulances should have seats and restraints appropriate for securing children from newborn on up
   b. All Child seats/restraints in ambulances should be tested to FMVSS 213 ATD injury criteria using the pulse criteria from J3026
   c. Child seats/restraints should only be attached to cots, cot mounts and restraints that have been tested and comply with standards of J3027
   d. Child seats/restraints should only be attached to seating positions that pass the appropriate standard when tested as a system together
   e. A child passenger, especially a newborn, must never be transported on an adult's lap.
   f. It is NOT appropriate to transport children, even in a child restraint system, on the multi-occupant squad bench located in the patient compartment of ground ambulances

II. Differentiate between the NHTSA recommendations for safe ambulance transport of children based on the condition of the child
   a. Situation 1: For a child who is uninjured/not ill (child who is accompanying an injured or ill patient)
      i. Transport the child in a vehicle other than an emergency ground ambulance
      ii. When other transportation not possible/available
         1. Transport in a size-appropriate child restraint system that complies with FMVSS NO. 213, installed appropriately in the front passenger seat, with airbags in the "off" position; or
         2. Transport in the forward-facing EMS provider seat/captain's chair in a size appropriate child restraint system that complies with FMVSS NO. 213; or
         3. Transport in the rear-facing EMS provider seat/captain's chair in a size-appropriate child restraint system that complies with FMVSS No. 213; or
         4. Leave the uninjured/not ill child under appropriate adult supervision on scene
   b. Situation 2: For a child who is ill and/or injured and whose condition does not require continuous and/or intensive medical monitoring and/or interventions
      i. Appropriately secure and transport the child on the cot in a size-appropriate child restraint system that complies with the injury criteria of FMVSS No. 213
      ii. Situation 3 For a child whose condition requires continuous and/or intensive medical monitoring and/or interventions
         1. Appropriately secure and transport the child on the cot in a size-

appropriate child restraint system that complies with the injury criteria of FMVSS No. 213

c. Situation 4: For a child whose condition requires spinal immobilization or lying flat
    i. Secure the child to a size appropriate spine board
    ii. Secure the spine board to the cot
        1. Head first, with a tether at the foot (if possible) to prevent forward movement
        2. Use three horizontal restraints across the torso (chest, waist, and knees)
        3. Use a vertical restraint across each shoulder
d. Situation 5: For a child or children who require transport as part of a multiple patient transport (newborn with mother, multiple children, etc.)
    i. When possible, transport each as a single patient according to the guidance shown for Situations 1through 4.
    ii. Transport in the forward-facing EMS provider's seat in a size-appropriate child restraint system that complies with FMVSS No. 213
    iii. For mother and newborn, transport the newborn in an approved size-appropriate child restraint system that complies with the injury criteria of FMVSS No. 213
        1. In the rear-facing EMS provider seat that prevents both lateral and forward movement
        2. Transport the mother on the cot
        3. Do not use a rear-facing only seat in the rear-facing EMS provider's seat
        4. Consider using an integrated child restraint system certified by the manufacturer to meet the injury criteria of FMVSS No. 213.

III. Discuss the ongoing initiatives to increase the safety of children during ambulance transport
a. NASEMSO leads the Safe Transport of Children Committee with the following goals:
    i. To recommend the criteria or specifications for proper restraint of children in ambulances. Such criteria will be evidence-based and will consider safety of both patients and providers
    ii. To have the recommended criteria adopted by one or more accredited standard setting organizations.
    iii. To develop a strategy and resources for educating EMS providers on safely transporting children in ground ambulances based on the recommended criteria or standards.

IV. Discuss the limitations of the current recommendations
a. Available research on child- restraint systems only rates the safety in normal use, not in ambulances
b. Not enough evidence from research on simulated ambulance crashes involving child restraint systems to recommend evidence-based guidelines
c. All child restraint systems are only as effective as the manner in which they are secured to a cot and in an ambulance

PARAMEDIC PEDI-TRANSPORT SKILLS	none

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PARAMEDICS
OPERATIONS
CREW RESOURCE MANAGEMENT
ADULT & PEDIATRIC PATIENTS: EXPECTED DURATION 1 HOUR

INSTRUCTOR PREPARATIONS

- [40] *IAFC Crew Resource Management Manual*

LESSON OBJECTIVE

- Define Crew Resource Management (CRM)
- Explain the benefits of CRM to EMS
- State the guiding principles of CRM and briefly explain each
- Explain the concept of communication in the team environment using advocacy/inquiry or appreciative inquiry
- State characteristics of effective team leaders
- State characteristics of effective team members
- Explain how the use of CRM can reduce errors in patient care

LESSON CONTENT

I. Define Crew Resource Management
   a. Reference: [40] *IAFC Crew Resource Management Manual*
   b. Effectively using all resources in an effort to minimize errors, improve safety, and improve performance.
   c. Based on crew resource management training created by the aviation industry
      i. Their mission is "preventing accident by improving crew performance through better crew coordination." U.S.D.O.T., F.A.A., 2004
   d. Addresses various human factors that contribute to errors
   e. Created to optimize human performance by reducing the effect of human error through the use of all resources, including:
      i. People
      ii. Hardware
      iii. Information

II. Benefits of Crew Resource Management to EMS
   a. Overarching aim is to minimize errors
   b. Improved safety for patients and care providers
   c. Improved team performance
      i. Conflict resolution
      ii. Improved communication
      iii. Increased feedback
      iv. Better workload management; task assignments
      v. Improved clinical decision making
   d. Improved situational awareness
   e. All team members have equal value and input
   f. All members of the organization participate in CRM and CRM training

III. Five guiding principles of Crew Resource Management
   a. Situational Awareness
      i. Awareness of surroundings
      ii. Evaluation of options
      iii. Communicating options with team members
   b. Decision making
      i. Life threatening vs. non-life-threatening
      ii. Entire team should be aware of all necessary information
      iii. Collective team knowledge and experience should be utilized to make a

decision
    iv. Team leader is ultimate authority on final decision but relies on input from all members with equal weight, incorporating experience and knowledge of team
c. Workload/Task management
    i. Tasks should be divided among all team members to optimize functioning of team as a whole
    ii. Team leaders and members must recognize and communicate limitations
d. Teamwork
    i. Teams are comprised of leaders and followers
    ii. There are competencies for each role: leadership and followership
    iii. Development of leadership and followership allows teams to resolve conflicts during stressful situations and stay on task with the mission of the team
    iv. Team leaders and team members must develop accurate self-assessment skills (meta-cognition) to be effective in their roles
e. Communication
    i. Involves transmitting and receiving messages
    ii. Possibility of transmitting erroneous information
    iii. Possibility of interpreting information incorrectly
    iv. Clarification is necessary in both transmission and reception of information
    v. Clarify and agree on the message between individuals and gain agreement prior to any proposed action (closed-loop communication) in order to reduce errors

IV. Advocacy and Inquiry Communication; appreciative inquiry
a. Four steps to using inquiry/advocacy or appreciative inquiry to improve communication among teams
    i. Alert the other members of the team to a situation or action of concern
    ii. State the problem as it is seen
    iii. State a solution or alternative
    iv. Obtain agreement among the team to alter plan or action

V. Characteristics of effective team leaders
a. Creates, implements and revises an action plan
b. Communicates accurately and concisely while listening and encouraging feedback
c. Receives, processes, verifies, and prioritizes information
d. Reconciles incongruent information
e. Demonstrates confidence, compassion, maturity, and command presence
f. Demonstrates a role of authority for the group and scene
g. Maintains accountability for team's actions/outcomes
h. Assesses situation and resources and modifies accordingly
i. Maintains situational awareness
j. Utilizes appreciative inquiry/ inquiry/advocacy when miscommunication or potential errors occur
k. Uses closed-loop communication
l. Reports progress on tasks
m. Performs tasks accurately and in a timely manner
n. Addresses safety concerns and is safety conscious at all times
o. Treats all team members as equals and with equal level of respect, regardless of rank or experience level

VI. Characteristics of effective team members
a. Communicates accurately and concisely while listening and accepting feedback
b. Demonstrates followership–is receptive to leadership
c. Demonstrates confidence, compassion, maturity

d. Maintains situational awareness e. Utilizes appreciative inquiry, advocacy/inquiry when miscommunications or potential errors occur f. Uses closed-loop communication g. Reports progress on tasks h. Performs tasks accurately and in a timely manner i. Advocates safety concerns and is safety conscious at all times j. Treats all team members as equals and with equal level of respect, regardless of rank or experience level k. Immediately suggests corrective action if a harmful intervention is ordered/performed by others VII. Effects of using Crew Resource Management to reduce errors in patient care a. Increased communication among crew (team leader and team members) can reduce potential safety concerns for the crew b. Increasing patient safety, mitigation or elimination of errors, and increasing the overall effectiveness of a team are benefits of increased communication and effective communication techniques, such as: i. The process of identifying a potential or actual error, ii. Supplying information, iii. Suggesting alternative actions, iv. Agreeing on a new plan, c. Team members experience a safe environment in which to identify human errors and suggest ways to mitigate or eliminate errors. d. Routine training and practice of CRM can increase self-awareness and self-efficacy for all personnel.

PARAMEDIC CREW RESOURCE SKILLS	none

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PARAMEDICS
OPERATIONS
EMS RESEARCH
ADULT & PEDIATRIC PATIENTS: EXPECTED DURATION 1 HOUR

INSTRUCTOR PREPARATIONS

- [41]*National EMS Research Agenda 2001*
- [42]*Safety in Numbers: EMS Data IS Important* (course handout)
- [43]*CARES in Action*

LESSON OBJECTIVES

- Identify national initiatives and resources that promote and enable EMS Research
- Explain the practical use of research in EMS care
- Explain the scientific method
- Differentiate among the different research methods
- Explain the process of conducting a literature review

LESSON CONTENT

I. National initiatives and resources that promote and enable EMS Research
   a. Federal Interagency Committee on EMS (FICEMS) included "data-driven and evidence-based EMS systems that promote improved patient care quality" as a strategic goal, published in 2014.
   b. National Highway Traffic Safety Administration (NHTSA) supports the development of evidence based guidelines through the use of standardization and improvement of EMS data collection using NEMSIS
   c. The National Institute of General Medical Sciences coordinates EMS research efforts, promotes ideas for research funding and collaboration

II. Practical use of research in EMS
   a. Ensures that care provided will glean the best, safest possible results and patient outcomes
      i. Reference: [43]*CARES in Action*
      ii. Supported by evidence and expert experience
   b. Demonstrates value of EMS care with reportable outcomes
   c. Improves working conditions-safety research can be focused on EMS providers
   d. Encourages accurate and complete documentation

III. Describe the scientific method
   a. Ask a question
   b. Conduct literature review to seek answers
   c. Determine a hypothesis based on literature review
   d. Test the hypothesis
   e. Analyze the data to prove or disprove hypothesis, consider limitations
   f. Report findings, discuss limitations
   g. Repeat with adjustments or refine hypothesis and begin again

IV. Contrast the different research methods
   a. Quantitative research
      i. Represents collection of measurable data, statistical analysis, and finite possibilities
      ii. Scientific method is used
      iii. Variables are isolated and tested
      iv. Generally termed experimental (either randomized or non-randomized)
      v. Used to develop evidence based guidelines;
      vi. Can be retrospective rather than experimenting
   b. Qualitative research

i. Often observational
ii. Data is more descriptive instead of measurable;
iii. Multiple variables can exist and may not be controlled;
iv. Studies characteristics of a population or group

V. Process of conducting a literature review
   a. Conduct a preliminary search in research databases
      i. Examples
         1. *Pub Med*
         2. *CINAHL Complete*
         3. *Google Scholar*
      ii. "Literature" peer reviewed research
         1. published in professional works and journals
   b. Various focuses and rigor of publications
      i. Peer reviewed
         1. Articles document research that utilized scientific method
         2. Reviewed by subject matter experts and professional peers
         3. Examples
            a. *Prehospital Emergency Care*
            b. *Annals of Emergency Medicine*
            c. *Circulation*
      ii. Trade publications
         1. Starting point for finding scholarly, peer reviewed research resources
         2. Not scientifically rigorous
         3. Should not be used as a primary source for research
         4. Examples
            a. *JEMS*
            b. *EMS World*
   c. Refine search terms to narrow results
   d. Review the source to determine if there are conflicts of interest
   e. Review article to ensure scientific method was used
      i. Confounding factors are explained

PARAMEDIC RESEARCH SKILLS	none

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PARAMEDICS
OPERATIONS
EVIDENCE BASED GUIDELINES
ADULT & PEDIATRIC PATIENTS: EXPECTED DURATION ½ HOUR

INSTRUCTOR PREPARATIONS

- [44]NASEMSO—*Statewide Implementation of an Evidence-Based Guideline*
- [45]NASEMSO—Statewide Implementation of an EBG: References
- [46]National Prehospital Evidence-based Guideline Model Process

LESSON OBJECTIVES

- Define evidenced based medicine and practice
- Identify resources available through NASEMSO to aid states and agencies in developing evidence based guidelines
- Explain the benefits of EBG to patients

LESSON CONTENT

I. Define evidenced based medicine and practice
   a. Statements developed through rigorous scientific inquiry that inform EMS systems, medical directors and EMS personnel on standards of care that have been vetted by research
   b. The National Prehospital Evidence-base Guideline Model Process has been approved by the Federal Interagency Committee on EMS and the National EMS Advisory Council
   c. The Process is cyclical in nature:
      i. System Inputs
      ii. EMS Evidence Accumulation & Evaluation
      iii. Establish Priorities for Guideline Development
      iv. EMS Protocol Development
      v. Dissemination of Guidelines/Protocols
      vi. Implementation
      vii. Evaluation of Effectiveness/Outcomes
      viii. EMS Evidence Accumulation
      ix. Repeat

II. Resources available to aide states and agencies in developing EBGs
   a. Resource: [44]NASEMSO—*Statewide Implementation of an Evidence-Based Guideline*
   b. NASEMSO was awarded a grant
      i. Focus on pediatric patients
         1. To implement an evidence-based guideline on pre-hospital pain management

III. Patients benefit from EBGs
   a. Ensures high quality patient management
      i. Standardized, consistent approach
      ii. Proven successful through expert practice and clinical evidence

PARAMEDIC EVIDENCE BASED GUIDELINES ACTIVITY	Successful	Unsuccessful
1. Create an outline or a synopsis of one or more of the following EMS Evidence Based Guidelines		
a. [47]An Evidence-based Guideline for Pediatric Prehospital Seizure Management Using Grade Methodology		
b. [48]An Evidence-based Guideline for Prehospital Analgesia in Trauma		
c. [49]An Evidence-based Guideline for the Air Medical Transportation of Prehospital Trauma Patients		

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