Vital Signs, History Taking and Mechanism Of Injury (Class 5)

Patient History and SAMPLE

- General Information
  - Chief complaint
    - Why EMS assistance was requested
    - Should always be stated in patient’s own words if possible
      - Patient states “I can’t catch my breath”
    - If patient is unresponsive, unresponsiveness becomes chief complaint
    - Don’t ignore other obvious issues even if patient does not acknowledge the issue

- General Information (Cont.)
  - Age
    - Years, months, days
  - Sex
    - Male or female
  - Race

- Symptoms
- Allergies
- Medications
- Past medical/surgical history
- Last oral intake
- Events prior to calling for help

- Signs/Symptoms
  - Sign - any medical or trauma condition displayed by the patient and identifiable by the EMT-Basic, e.g., jaundice
  - Symptom - any condition described by the patient, e.g., shortness of breath or pain

- Allergies
  - Medications
  - Foods
  - Environmental allergies
  - Consider medical identification tag (MedicAlert®)
• Medications
  – Prescription
    • Current
    • Recent
    • Birth control pills
  – Non-prescription
    • Current
    • Recent
    – Consider medical identification tag (MedicAlert®)

• Pertinent Past History
  – Medical
  – Surgical
  – Trauma
  – Consider medical identification tag (MedicAlert®)

• Last oral intake
  – Solid and/or liquid
  – Time
  – Quantity
  – Also appropriate to ask about drugs and/or alcohol

• Events leading to the injury or illness

Mechanism of Injury/Nature of Illness

• Medical
  – Nature of illness - determine from the patient, family or bystanders why EMS was activated.
• Trauma
  – Mechanism of injury - determine from the patient, family or bystanders and inspection of the scene what is the mechanism of injury.

• Newton's First Law of Motion
  – Every object in a state of uniform motion tends to remain in that state of motion unless an external force is applied to it.
    • When a vehicle is moving at 60 mph, all passengers are also moving at that speed and will continue to do so until an external force halts their motion (e.g. a tree or bridge abutment).

• Newton's Third Law of Motion
  – For every action there is an equal and opposite reaction.
    • When the unrestrained driver of the above-mentioned vehicle strikes the steering wheel, the steering wheel will resist the impact with a force equal to that of the driver
striking the wheel.

- Kinetic Energy
  - The energy inherent in a thing by virtue of its motion.
    - $K_e = \frac{1}{2} mv^2$
    - Said another way, if the velocity (speed) of an object is increased two times, its kinetic energy will increase four times.
      - Therefore, vehicular speed is always something we should try to quantify as part of our assessment.
    - The kinetic energy contained in the collision of two rapidly moving objects (e.g. vehicles) can be tremendous.
      - Therefore, the way that two vehicles impact is also something to identify as part of our assessment.
      - Do not interpret the above to mean that an impact with a non-moving object is not significant.

- Newton’s First Law
  - Video
- Newton’s First & Third Laws
  - Video

- Newton’s Laws at Work
  - Video
  - Video
  - Video
  - Video

Vital Signs

- Baseline vital signs
  - Blood pressure, pulse, respirations, skin and pupils should be assessed as soon as possible and recorded
- Vital sign reassessment
  - Vital signs should be assessed and recorded every 15 minutes at a minimum in a stable patient
  - Vital signs should be assessed and recorded every 5 minutes in the unstable patient
  - Vital signs should be assessed following all medical interventions

Respirations
- Rate
  - Determined by
    - Assessed by observing the patient's chest rise and fall
    - One breath = one inhalation plus one exhalation
    - Counting the number of breaths in a 30-second period and multiplying by 2.
    - Care should be taken not to inform the patient, to avoid influencing the patient's breathing pattern.

- Quality of breathing can be determined while assessing the rate.
  - Quality can be placed in 1 of 4 categories:
    - Normal - average chest wall motion, not using accessory muscles
    - Shallow - slight chest or abdominal wall motion
    - Laboried
      - An increase in the effort of breathing
      - Grunting and stridor
      - Often characterized by the use of accessory muscles
      - Nasal flaring, supraclavicular and intercostal retractions in infants and children
      - Sometimes gasping
    - Noisy
      - An increase in the audible sound of breathing. May include snoring, wheezing, gurgling, crowing

- Gurgling
  - Cause - Fluid in upper airway
  - Site - Oropharynx, trachea
  - Noise - Loud bubbling
- Crackles (Rales)
  - Cause - Fluid in lower airway
  - Site - Bronchioles and alveoli
  - Noise - Twisting hair or sand in a tin can
- Rhonchi (Course Crackles)
  - Cause - Fluid in higher airways
  - Site - Bronchioles and bronchi
  - Noise - Loud crackling noises

- Sonorous breathing (snoring)
  - Cause - Tongue in back of throat
  - Site - Oropharynx
  - Noise - Patient will snore
- Stridor
  - Cause - Narrowed upper airway
  - Site - Bronchi, trachea, larynx
  - Noise - Crowing
- Wheezing
- Cause - Narrowed lower airway
- Site - Bronchioles, terminal bronchioles
- Noise - Wheezing

28 Adult Breath Sounds
- Vesicular (Normal) Breath Sounds
- Diminished Breath Sounds
- Medium Inspiratory Crackles
- Medium Inspiratory & Expiratory Crackles
- Course Inspiratory & Expiratory Crackles
- Mild Expiratory Wheeze
- Medium Inspiratory Crackles & Severe Expiratory Wheeze
- Inspiratory & Expiratory Stridor
- Bone Crepitus
- Adult Breath Sounds Audio

29 Infant Breath Sounds
- Vesicular (Normal) Breath Sounds
- Vesicular (Normal) Breath Sounds & Crying
- Medium Inspiratory & Expiratory Crackles
- Expiratory Grunting
- Stridor
- Infant Breath Sounds Audio

30 Patterns
- Kussmaul
  - Slow, deep respiration (sighs)
- Biot’s
  - Apnea followed by periods of normal breathing followed by periods of apnea followed by normal breathing and so on
- Cheyne-Stokes
  - Apnea followed by gradually increasing shallow breaths until the patient breathes normally. Then the breathing becomes more shallow until apnea is reached.
- Ataxic
  - Extremely irregular breathing

31 Pulse

32 • Major Central Pulses
  - Carotid
  - Femoral
• Major Peripheral Pulses
  - Brachial
  - Radial
- Posterior Tibial (Posterior Tib)
- Dorsalis Pedis (Pedal)

Responsive patients
- Initially a radial pulse should be assessed in all responsive patients one year or older.
- If peripheral pulse is not palpable, assess carotid pulse
  - Use caution. Avoid excess pressure on geriatrics
  - Never attempt to assess carotid pulse on both sides at one time

Unresponsive patients
- Initially a carotid pulse should be assessed in all unresponsive patients one year or older.
  - Use caution. Avoid excess pressure on geriatrics
  - Never attempt to assess carotid pulse on both sides at one time

Pediatric patients
- All patients less than one year of age should have their brachial pulse assessed whether responsive or unresponsive.

If the pulse is absent, begin resuscitation
If the pulse is present, assess rate, quality and regularity
- Rate
  - Number of beats in one minute
    - Assessed by palpating the pulse
    - Counting the number of beats in a 30-second period and multiplying by 2.
- Quality
  - Bounding
  - Weak
- Regularity
  - Regular
  - Irregular

Pupils & Eyes

Pupil size
- Constricted
- Normal
- Dilated
Relationship to other pupil
- Bilateral constriction (equal)
- Bilateral dilation (equal)
- Unilateral dilation (unequal)
Reaction to light
- Briskly (normal)
- Slowly
- None
• Gaze
  - Conjugate
  - Dysconjugate
• Color of sclera
  - Red
  - Yellow
• Periorbital signs
  - Ecchymosis (Raccoon eyes)
  - Hematoma
• Examples
  - Dilated
    • Fright, ischemia, drugs, death
  - Constricted
    • Narcotics, bright light, CNS disease
  - Unequal
    • Head injury, stroke, cataract surgery

Skin

• The patient's color should be assessed in the nail beds, oral mucosa, and conjunctiva
• In infants and children, palms of hands and soles of feet should be assessed
• Normal skin - pink
• Abnormal skin colors
  - Pallor (pale) - indicative of poor perfusion
  - Cyanosis (blue-gray) - indicating inadequate oxygenation or poor perfusion
  - Flushed (red) - indicating exposure to heat or carbon monoxide poisoning
  - Jaundice (yellow) - indicating liver abnormalities

• The patient's skin temperature should be assessed by placing the back of your hand on
the patient’s skin on the torso

- Normal - warm
- Abnormal skin temperatures
  - Hot - indicating fever or an exposure to heat
  - Cool - indicating poor perfusion or exposure to cold
  - Cold - indicates extreme exposure to cold

- Assess the relative moisture of the patient’s skin
  - Normal - dry
  - Abnormal - skin is wet, moist, or dry

- Assess capillary refill in infants and children less than six years of age
  - Capillary refill in infants and children is assessed by pressing on the patient’s skin or nail beds and determining time for return to initial color
  - Abnormal capillary refill in infants and children is > 2 seconds
  - Abnormal capillary refill in adults is > 3 seconds

- Examples
  - Red, hot and dry skin
    - Heat stroke
  - Pale, cold and clammy skin
    - Shock
  - Blue, cold and dry skin
    - Cold exposure
  - Cherry red, warm and moist skin
    - CO exposure
  - Red, hot and wet skin
    - Infection

**Blood Pressure**

- Perfusion
  - Definition - circulation of blood through an organ or a structure.
  - Perfusion is the delivery of oxygen and other nutrients to the cells of all organ systems and the removal of waste products.
  - Hypoperfusion is the inadequate circulation of blood through an organ or a structure.
    - Formerly known as “shock”

- Pressure wave created along length of an artery when the left ventricle contracts
- Two measures
  - Diastolic
    - Pressure created by presence of blood inside a closed container
    - Changes with increase or decrease in
- Volume of blood
- Volume of container

- Systolic
  - Pressure wave on top of diastolic pressure created when left ventricle contracts
  - Changes with increase or decrease in
    - Force of contraction of left ventricle
    - Rate of contraction of left ventricle
    - Amount of blood ejected by left ventricle

• Assessing systolic and diastolic pressures
  - There are two methods of obtaining blood pressure
    - Auscultation: In this case the EMT-Basic will listen for the systolic and diastolic sounds
    - Palpation: In certain situations, the systolic blood pressure may be measured by feeling for return of pulse with deflation of the cuff

• Blood pressure noises and how they are created
  - Blood pressure cuff is a tourniquet
  - After artery squeezed shut, blood flow halts
  - Cuff pressure is released and monitored
  - Cuff depression of artery produces turbulence and noise (Karotkoff sounds) as blood begins to pass area of compression (top number)
  - Noise continues until no compression and no turbulence (bottom number)

**Karotkoff Noises**

**Using Karotkoff Noises to take Blood Pressure**

• Systolic and diastolic pressures
  - Systolic blood pressure (top number) is the first distinct sound of blood flowing through the artery as the pressure in the blood pressure cuff is released. This is a measurement of the pressure exerted against the walls of the arteries during contraction of the heart
  - Diastolic blood pressure (bottom number) is the point during deflation of the blood pressure cuff at which sounds of the pulse beat disappear. It represents the pressure exerted against the walls of the arteries while the left ventricle is at rest

• Blood pressure should be measured in all patients older than 3 years of age
• The general assessment of the infant or child patient, such as sick appearing, in respiratory distress, or unresponsive, is more valuable than vital sign numbers
Pulse Oximetry

A non-invasive method of measuring what percentage of the patient’s hemoglobin is attached to oxygen or oxygen-like compounds.

Oxygen saturation is also referred to as SpO2.

Measures the absorption of two differing wavelengths of laser light.

Newer models can be used over nail polish; older models can’t. Even with newer models, black nail polish may distort readings.

Should not be used over false nails.

Acceptable normal ranges are from 95 to 100%, although values down to 90% are common.

Pulse oximetry does NOT measure the amount of oxygen dissolved in plasma, only the amount of hemoglobin bound to oxygen.

- For the above reason, you should never exceed 99% saturation as too much oxygen is dangerous due to the creation of free radicals.

Patients with carbon monoxide poisoning may have a falsely high reading.

- The pulse oximeter is actually measuring the amount of hemoglobin bonded with carbon monoxide, not oxygen.

If there is insufficient bloodflow or insufficient hemoglobin in the blood (anemia), tissues can suffer hypoxia despite high oxygen saturation readings.

Vital Signs
- Video