Chapter 29 Neurology

Pathophysiology

CNS Disorders:
- Alterations in mental status in the _____________________________ sign of central nervous system disorder
- Alterations may range from a loss in the thought process to totally unconscious

Components of the CNS:
- _____________________________
- Spinal Cord

Pathophysiology
- Any alteration in consciousness is cause for _____________________________

Generally, there are 3 mechanisms capable of producing alterations in mental status:
- Structural _____________________________
- Toxic- _____________________________ states
- Difficult-to-classify causes

Structural Lesions
- Depress consciousness by destroying or encroaching upon the substance of the brain
- Examples:
  - Brain tumor (_____________________________)
  - _____________________________ disease
  - Intracranial _____________________________
  - Parasites
  - Trauma

Toxic-Metabolic States
- Involve either the presence of circulating _____________________________ or metabolites or the lack of metabolic substrates (oxygen, glucose, or thiamine)
- Produce depression of both sides of the _____________________________

Toxic-Metabolic States
- Causes
  - _____________________________
  - Diabetic Ketoacidosis (DKA)
  - Hepatic failure
  - _____________________________
  - Renal failure
  - Thiamine deficiency
  - Exposure to _____________________________

Difficult-to-Classify
- _____________________________
  - Depressants, narcotics, hallucinogens
- Cardiovascular
  - Arrest, CVA, Dysrhythmias, shock
- Respiratory
  - COPD, _____________________________
- Infections
- AIDS, encephalitis, ________________

8 **Peripheral Nervous System**
- Peripheral Nervous System (PNS): consists of the nerves that connect the spinal column to the ________________
- Divided into the autonomic and ________________ nervous system
- Autonomic nervous system: controls ________________ functions
- Somatic nervous system: controls ________________ bodily functions

9 **Peripheral Nervous System Disorders**
- Peripheral neuropathy: any malfunction or damage of the peripheral nerves.
- Results may include muscle weakness, loss of sensation, impaired reflexes, and internal organ malfunctions
- Mononeuropathy: involves a ________________ nerve
- Polyneuropathy: involves ________________ nerves
- ________________ is a major cause of peripheral neuropathy

10 **Scene Size-up and Initial Assessment**
- AVPU
- General ________________
- Speech
- Skin & Facial ________________
- Mood, Thought, Perception, Judgment, ________________, & Attention

11 **Initial Assessment**
- During the initial assessment, be alert to any signs of nervous system dysfunction. If present, these will prompt you to place particular emphasis on the neurological evaluation during the focused history and physical exam.

12 **Focused History & Physical Exam**
**History-Taking**
- ________________-Related
  - When?, any LOC?, MOI?, Incontinence?
- Underlying Medical Problems
  - ________________, CVA, seizure
- Environmental Clues
  - Medications, Medic-alert tags, Chemicals, hazardous materials,
  ________________

13 **Physical Exam**
- Face
  - Ability to smile, frown, and ________________ his forehead indicates intact facial nerves
- Eyes
  - Controlled by the ________________ nerve
  - Pupils may be equal, unequal, reactive, non-reactive, constricted, dilated, or fixed
- Mouth
  - In the presence of facial paralysis, drooping of the mouth may occur
  - Ask patient to show his/her ________________

14 **Physical Exam**
- Respiratory status
- Look for _____________________________ breathing patterns

● Cardiovascular status
  - Heart rate
  - _____________________________
  - Jugular vein distention (JVD)

15 Physical Exam

Nervous System Status

● _____________________________ Evaluation: to detect loss of sensation and/or motor function
  - Used to evaluate possible spinal injuries
● Posturing indicates deep cerebral or upper brainstem injury
● _____________________________ Posturing: arms flexed, legs extended.
● _____________________________ Posturing: arms and legs extended

16 Decorticate Posturing

17 Decerebrate Posturing

18 Physical Exam

Motor System Status:

● Muscle tone: are the muscles firm?
● Strength: good and equal strength?
● Flexion/ _____________________________ : can the patient flex, extend, and move extremities adequately?
● _____________________________ : Are the patient’s gait and movements steady and smooth? Can the patient touch finger to nose
● _____________________________ : Can the patient stand or sit up without becoming dizzy

19 Glasgow Coma Scale

20 Vital Signs

Increased intracranial pressure is characterized by the following changes in vitals signs. Called Cushing’s Reflex

● _____________________________ BP
● _____________________________ Pulse rate
● _____________________________ respirations
● _____________________________ temperature

21 Increased ICP vs. Shock (Page 1254)

22 Other Assessment Tools

● End-Tidal CO2 Detector (capnometer)
● Pulse oximeter

23 Management of Neurological Emergencies

General Principles:

● Airway & Breathing
  - Oxygen, _____________________________ as needed

● Circulatory Support
  - Establish IV, tko, of _____________________________ solution
- Monitor ECG

- Pharmacological Intervention
  - Dextrose, _____________________________, Thiamine, Diazepam

24. **Management of Neurological Emergencies**

- Psychological Support
  - Emotional support
  - Explain _____________________________

- Transport Considerations
  - Rapidly transport all _____________________________ patients

25. The primary treatment for nervous system emergencies in the field is supportive.

26. **Altered Mental Status**

AEIOU-TIPS: Causes of AMS

- A = acidosis, alcohol
- E = _____________________________
- I = Infection
- O = _____________________________
- U = Uremia (kidney failure)
- T = Trauma, tumor, toxins
- P = Psychosis, poisons
- S = Stroke, seizure

27. **Management of AMS**

- Initial Assessment (ABC’s)
  - _____________________________ patient
- IV Access
  - Monitor _____________________________
- Determine blood sugar
  - If low, Give _____________________________
  - Give Narcan 2mg IV push for suspected OD
  - Give _____________________________ 100mg IV for suspected alcoholic

28. **Management of AMS**

- Check for Increased Intracranial Pressure
  - Limit IV fluids
  - Consider giving _____________________________ to remove fluids around brain

- Monitor LOC and _____________________________

- Supportive measures

29. **Stroke & Intracranial Hemorrhage**

- Stroke: injury or death of brain tissue usually due to interruption of cerebral blood flow
- Strokes are caused by:
  - _____________________________ of an artery
  - _____________________________ from a ruptured cerebral artery

30. **Occlusive Strokes**

- Embolic Strokes: caused by an embolus
  - _____________________________ : clot that forms elsewhere and is circulated to the
brain and becomes lodged
- Thrombotic Strokes: caused by a thrombus
- ___________________________: a blood clot that forms within the cerebral artery

31 Stroke & Intracranial Hemorrhage

32 Signs/ Symptoms of a Stroke
- Facial Drooping
- ___________________________
- Aphasia (inability in speaking)
- ___________________________(difficulty to speak)
- Hemiparesis (weakness on one side)
- ___________________________(paralysis on one side)
- Paresthesia (numbness or tingling)

33 Signs/ Symptoms of a Stroke
- Gait Disturbances or uncoordinated fine motor movements
- Incontinence
- ___________________________
- Agitation
- ___________________________
- Vision Problems
- ___________________________

34 Signs/ Symptoms of a Stroke
- Unequal ___________________________
- Vital Signs of increased ICP
  - Increased BP
  - Decreasing ___________________________
  - Slowing respirations
- Caution: S/S of ___________________________ can mimic a stroke

35 Transient Ischemic Attacks
- Indicative of ___________________________ artery disease.
- Symptoms of neurological deficit:
  - Symptoms resolve in less than ___________ hours.
  - No long-term effects.
- Evaluate through history taking:
  - History of HTN, prior stroke, or TIA.
  - Symptoms and their progression.
- Most significance is that it may indicate an impending ___________________________

36 Management of Stroke
- Maintain the ___________________________.
- Support breathing.
- Obtain a detailed history.
- ___________________________ the patient.
- Determine the blood glucose level.
- Establish IV access.
- Monitor the cardiac rhythm.
- Protect ___________________________ extremities.
Gather EXACT time of onset of S/S

### Cincinnati Stroke Scale
Components:
- _________________ Droop
  - Ask patient to show their teeth
  - Abnormal if asymmetrical
- _________________ Drift
  - Have patient close eyes for 10 seconds and hold arms out with palms up
  - Abnormal if do not move equally
- _________________
  - Ask patient to say “the sky is blue in Cincinnati”
  - Abnormal if words are slurred or confused

### Stroke Designated Facilities
- There is a movement towards a stroke designation for _____________________________, much like trauma designation.
- Consider transport destination to assure ability of CT scan and _____________________________.
- Notify hospital _____________________________ in assessment to allow for activation of stroke plan.

### AHA Stroke Algorithm

#### Seizures and Epilepsy
- Seizure: a temporary alteration in behavior due to the massive electrical discharge of one or more groups of neurons in the brain.
- _________________: the potential to develop seizures in circumstances that would not induce them in most individuals.
- Seizures can be classified as generalized or partial seizures.

#### Seizures and Epilepsy
- _________________ seizures begin as an electrical discharge in a small area of the brain but spread to involve the entire cerebral cortex causing widespread malfunction.
- _________________ seizures may remain confined to a limited portion of the brain causing localized malfunction or may spread and become generalized.

#### Generalized Seizures
- _____________________________ (Grand Mal) Seizures
  - Aura (sensation)
  - Loss of Consciousness
  - _________________ Phase (muscle contractions)
  - Hypertonic Phase (muscular rigidity)
  - _________________ Phase (muscle spasms, rhythmic jerking)
  - Postseizure (remains unconscious)
  - _____________________________ (confusion and fatigue)

#### Generalized Seizures
- _____________________________ Seizure (Petit Mal)
  - Brief loss of consciousness or awareness
  - May have eye or muscle fluttering
Pseudoseizures (Hysterical)
- Most common in _____________________________
- Stem from _____________________________ disorders
- Sharp and _____________________________ movement
- Can sometimes be stopped with a sharp command

Partial Seizures
- _____________________________ Partial Seizures
  - Involve one body area.
  - Can progress to _____________________________ seizure.
- _____________________________ Partial Seizures
  - Characterized by auras.
  - Typically 1–2 minutes in length.
  - Loss of contact with surroundings.

Syncope vs. Seizure
- Syncope: Normally begins _____________________________
- Seizure: May begin in any position
- _____________________________: Pt will normally remember a warning sign such as weakness or dizziness
- Seizure: May begin without warning or may be preceded by an _____________________________
- Syncope: _____________________________ motion not present
- _____________________________: jerking motion present during unconsciousness

Syncope vs. Seizure
- Syncope: Patient regains consciousness almost _____________________________ on becoming supine
- Seizure: Patient remains unconsciousness during seizure, remains _____________________________ during postictal phase

Patient History
- History of _____________________________
  - History of Head Trauma
  - Any Alcohol or Drug Abuse
  - Recent History of _____________________________, Headache, or Stiff Neck
  - History of Heart Disease, Diabetes, or Stroke

Patient History
- Current Medications
  - Phenytoin (_____________________________), phenobarbitol, valproic acid (_____________________________), or carbamazepine (Tegretol)
- Physical Exam
  - Signs of head trauma or injury to _____________________________, alcohol or drug abuse

Management of Seizures
- Scene safety & BSI.
- Maintain the airway.
- Administer high-flow oxygen.
- Establish IV access.
- Treat _____________________________ if present.
- Do not _____________________________ the patient.
- Maintain body temperature.

Management of Seizures

- _____________________________ the patient.
- _____________________________ if required.
- Monitor cardiac rhythm.
- Treat prolonged seizures.
- _____________________________ medication as indicated
- Provide a quiet atmosphere.
- Transport.

Status Epilepticus

- Two or More _____________________________ Seizures
  - Seizures occur without a return of _____________________________.
- Management
  - Management of airway and breathing is critical.
  - Establish IV access and cardiac monitoring.
  - Administer 25g 50% _____________________________ if hypoglycemia is present.
  - Administer 5-10mg _____________________________ IV or 4mg Ativan slow IV push
  - Monitor the airway closely.

Ativan

- AKA _____________________________
- A benzodiazepine with sedative and anticonvulsant effects
- Indications: Seizures, sedation, chemical restraint
- Contraindications: allergic, _____________________________

- Dosage: _________mg slow IV push for status epilepticus
  - Repeated X 1 if needed
- Side Effects: respiratory depression, _____________________________

Syncope

- A Sudden, _____________________________ Loss of Consciousness
- Assessment:
  - Cardiovascular:
    - _____________________________ or mechanical problems?
  - Noncardiovascular.
    - Metabolic, neurological, or psychiatric condition?
  - Idiopathic.
    - The cause remains _____________________________ even after careful assessment.
  - Extended unconsciousness is NOT syncope.

Management of Syncope

- Scene safety & BSI.
  - Maintain the _____________________________.
  - Support breathing.
  - Check circulatory status.
  - Monitor _____________________________ status.
Establish IV access.
Determine blood ___ level.
Monitor the cardiac rhythm.
Reassure the patient and transport.

Headache

- Though, often laughed at by EMS, headaches can be a sign of a serious condition
- Nearly 45 million Americans suffer from chronic headaches
- Headaches may be
  - _____________________________ : sudden onset
  - _____________________________ : constant or recurrent
  - _____________________________ : all over
  - _____________________________ : in one specific area

3 Categories of Headaches

- Tension

Vascular Headache

- Types of vascular headaches
  - _____________________________
    - Throbbing pain, photosensitivity, nausea, vomiting, and sweats; more frequent in women
    - May last for extended periods of time.
  - _____________________________
    - One-sided with nasal congestion, drooping eyelid, and irritated or watery eye; more frequent in men
    - Typically lasts 1-4 hours.

Tension Headache

- Sometimes occur on a daily basis
- Sufferers often awake with a _____________________________ headache that gets worse throughout the day.
- Dull, achy pain that feels like a _____________________________ that is being applied to the neck and/or head.

Organic Headache

- Occurs due to _____________________________, infection, or other diseases of the brain, eye, or other body system.
- Headaches associated with fever, confusion, nausea, vomiting, or rash can be indicative of an _____________________________ disease.

Assessment of Headache

- What was the patient doing at the onset of pain?
  - Does anything _____________________________ or relieve the pain?
- What is the _____________________________ of the pain?
- Does the pain _____________________________ to the neck, arm, back, or jaw?
- What is the severity of the pain?
- How long has the headache been present?

Management of Headache

- Scene safety and BSI
Maintain the airway.
Establish IV access.
Determine blood glucose level.
Monitor the cardiac rhythm.
Consider medication.
Reassure the patient and transport.

“Weak and Dizzy”
- A problem encountered by EMS
- Can be symptomatic of many diseases
- Often presents with “vague” symptoms
- Should not be off

Assessment of “Weak and Dizzy”
Focused Assessment:
- Include a detailed exam.
- Specific signs and symptoms:
  - Cardiovascular causes
  - Nausea and vomiting
  - Dizziness

Management of “Weak and Dizzy”
- Scene safety & BSI.
- Maintain airway & administer oxygen.
- Establish IV access & monitor cardiac rhythm.
- Determine blood glucose level.
- Consider medication.
- Transport and reassure patient.

Neoplasms
- : New growth of a tumor
- Neoplasms that affect the CNS occur in over 40,000 Americans per year
- 2 categories
  - tumors: non-cancerous
  - tumors: cancerous

Assessment of Neoplasms
Signs/Symptoms
- Recurring or severe
- Nausea and vomiting
- Weakness or paralysis
- Lack of coordination or unsteady gait
- , double vision
- Seizures a prior history of seizures

History:
- Surgery, chemotherapy or radiation therapy
Management of Neoplasms
- Scene size-up and BSI.
- Protect patient from _____________________________
  - Maintain airway & administer high-flow oxygen.
  - Position of comfort.
  - Establish IV access and monitor cardiac rhythm.
  - Consider medication administration.
    - Analgesics, _____________________________ meds,
      _____________________________________________ meds
  - Transport and reassure patient.

Degenerative Neurological Disorders
- Degenerative Neurological Disorders: A collection of diseases that selectively affect one or more functional systems of the _______________.
- They generally produce symmetrical and _____________________________ involvement of the CNS, affect similar areas of the brain, and produce similar signs and symptoms

Types of Degenerative Neurological Disorders
- _____________________________ Disease
  - Most frequent cause of dementia in the elderly.
  - Results in atrophy of the brain due to nerve cell death in the cerebral cortex.
- Muscular _____________________________ (MD)
  - Characterized by progressive muscle weakness.
- Multiple _____________________________ (MS)
  - Unpredictable disease resulting from deterioration of the myelin sheath of the brain

Types of Degenerative Neurological Disorders
- _____________________________ Disease
  - A group of disorders characterized by muscle contractions that cause twisting and repetitive movements, abnormal postures, or “freezing” in the middle of an action
- Tremor, rigidity, bradykinesia, postural instability

Types of Degenerative Neurological Disorders
- _____________________________
  - A condition that results from damage or injury to the brain, brainstem, or spinal cord.
  - Characterized by intense steady pain described as burning, aching, tingling, or a “pins and needles” sensation
  - May occur weeks, months, or years after a CNS injury
  - Pain medications normally do not work

Types of Degenerative Neurological Disorders
- _____________________________ Palsy
  - Most common form of facial paralysis
  - Inflammatory reaction of the facial nerve
- AKA Lou Gehrig’s disease
  - A progressive degeneration of specific nerve cells that control voluntary movement
  - Weakness, loss of motor function, difficulty speaking, and cramping.
- Leads to breathing problems

74 Types of Degenerative Neurological Disorders
- Temporary, involuntary twitching or spasm of a muscle or group of muscles
- Normally a symptom of other disorder
- Spina (SB)
  - Neural defect that results from the failure of one or more of the fetal vertebrae to close properly during pregnancy
  - Physical, mobility, and learning impairments

Types of Degenerative Neurological Disorders
- Poliomyelitis
  - Infectious, inflammatory viral disease of the CNS that sometimes results in permanent paralysis
  - Characterized by fatigue, headache, fever, vomiting, stiffness of the neck, and pain to the feet and hands
  - New cases are rare but are present

Management of Degenerative Neurological Disorders
- Obtain history.
  - Exacerbation of illness or new problem?
- Special considerations
  - Mobility, communication, compromise, and anxiety

Management of Degenerative Neurological Disorders
Interventions
- Determine blood level.
- Establish IV access.
- Monitor rhythm.
- Transport and reassure the patient.

Back Pain & Nontraumatic Spinal Disorders
Low Back Pain Causes:
- Injury
- Vertebral Injury
- Cysts &
- Other Causes
  - kidney stones, abdominal aortic aneurysm

Assessment of Back Pain & Nontraumatic Spinal Disorders
Evaluate history
- Speed of .
- Risk factors such as or repeated lifting.
- Determine if pain is related to a life-threatening problem.

Management of Back Pain & Nontraumatic Spinal Disorders
- Consider c-spine immobilization
- if in doubt.
- Monitor ECG if possible cardiac event
- Consider analgesics.
- Demerol
- _____________________________
- Fentanyl