Sick Call Screener Course

Neurological System

(2.6)

Enabling Objectives

- 1.40 Utilize the knowledge of neurological system anatomy while assessing a patient with a neurological complaint
- 1.41 Utilize the knowledge of neurological system physiology while assessing a patient with a neurological complaint
- 1.42 Obtain history from patient with common neurologic disorders
- 1.43 Perform a neurologic examination

Enabling Objectives (Cont.)

- 1.44 State signs and symptoms of common neurologic disorders
- 1.45 State treatments for common neurologic disorders
- 1.16 State Red Flag criteria

Introduction

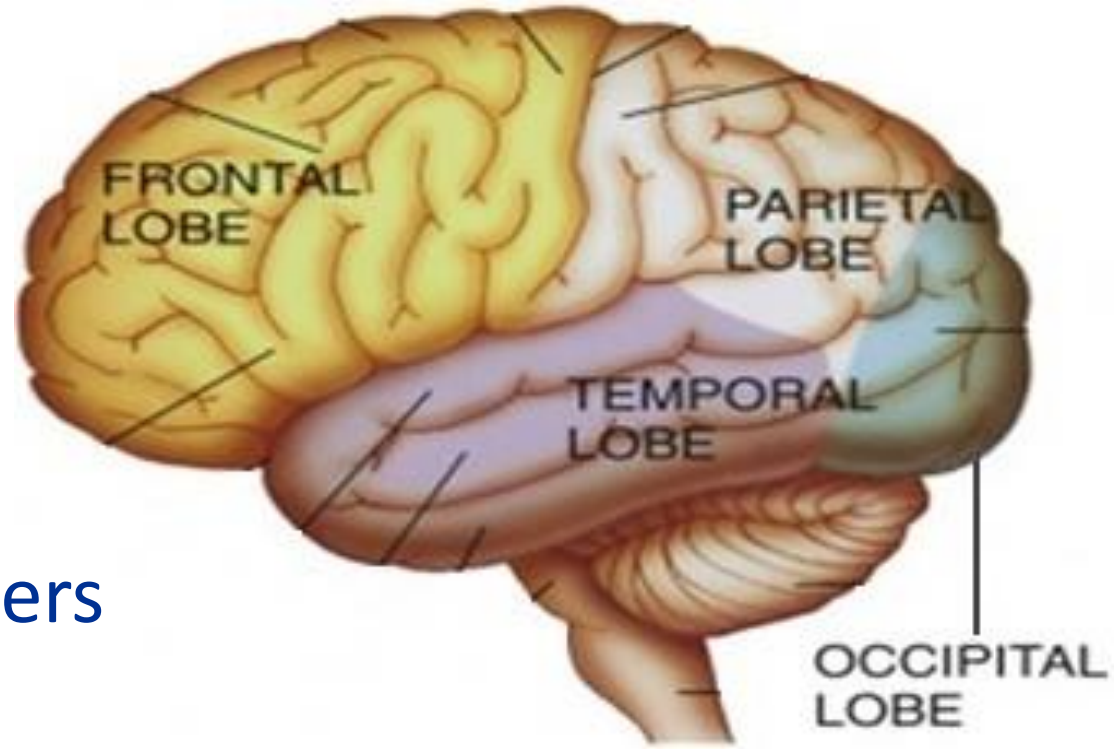
- Central and peripheral divisions,
- Maintains and controls all body functions
- One of the most complex portions of the physical examination.

Anatomy and Physiology of the Brain

- The brain has four major units:
  - The Cerebrum
  - The Cerebellum
  - Brainstem
  - Diencephalon

The Cerebrum

- Two hemispheres are divided into lobes:
  - Frontal Lobe
  - Parietal Lobe
  - Occipital Lobe
  - Temporal Lobe
- Cerebral Cortex
- Commissural Fibers



(From Seidel, H.M. and others. [2006]. Mosby's guide to physical examination [6th ed.]. St. Louis: Mosby.)

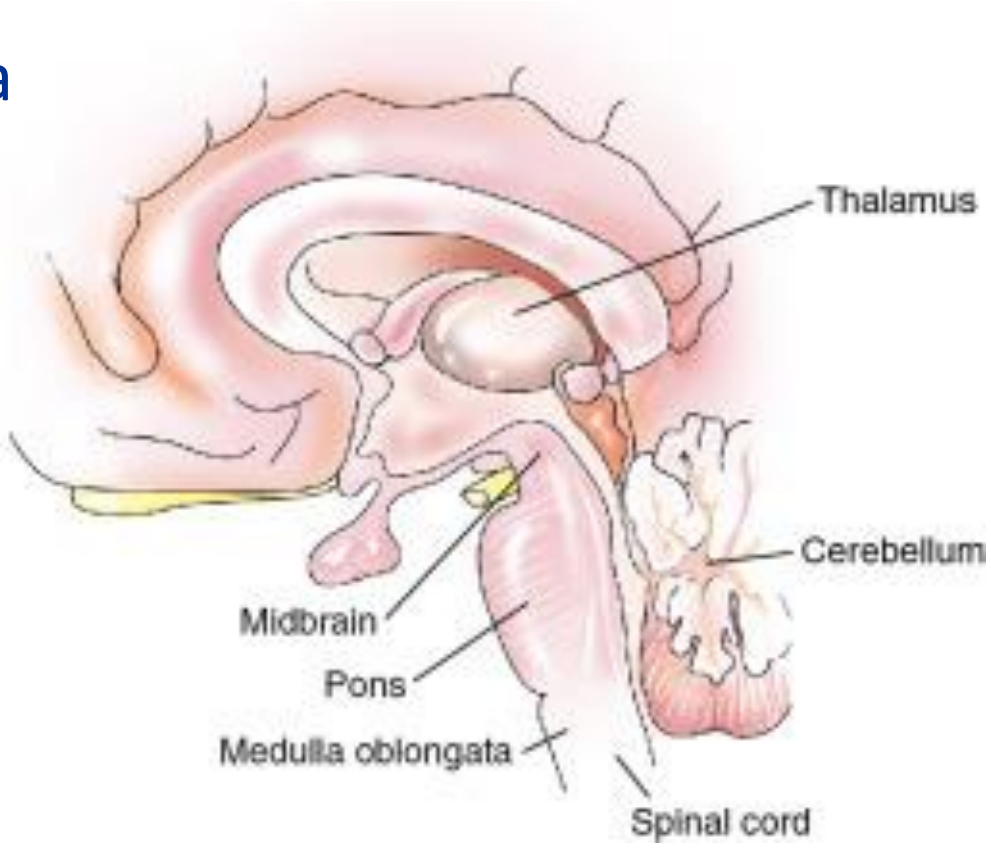
The Cerebellum

- Inferior and Posterior to the Cerebrum
- Divided into layers:
  - Cerebellar Cortex (grey matter)
  - Arbor Vitae (white matter)
  - Cerebellar Nuclei
- Center for voluntary muscle movements and balance

(From Seidel, H.M. and others. [2006]. Mosby's guide to physical examination [6th ed.]. St. Louis: Mosby.)

Brainstem

- Connects the brain to spinal cord:
  - Medulla Oblongata
  - Pons
  - Midbrain



(From Duderstadt, Karen G. [2006]. Pediatric Physical Examination [3rd ed.]. St. Louis: Mosby.)

Diencephalon

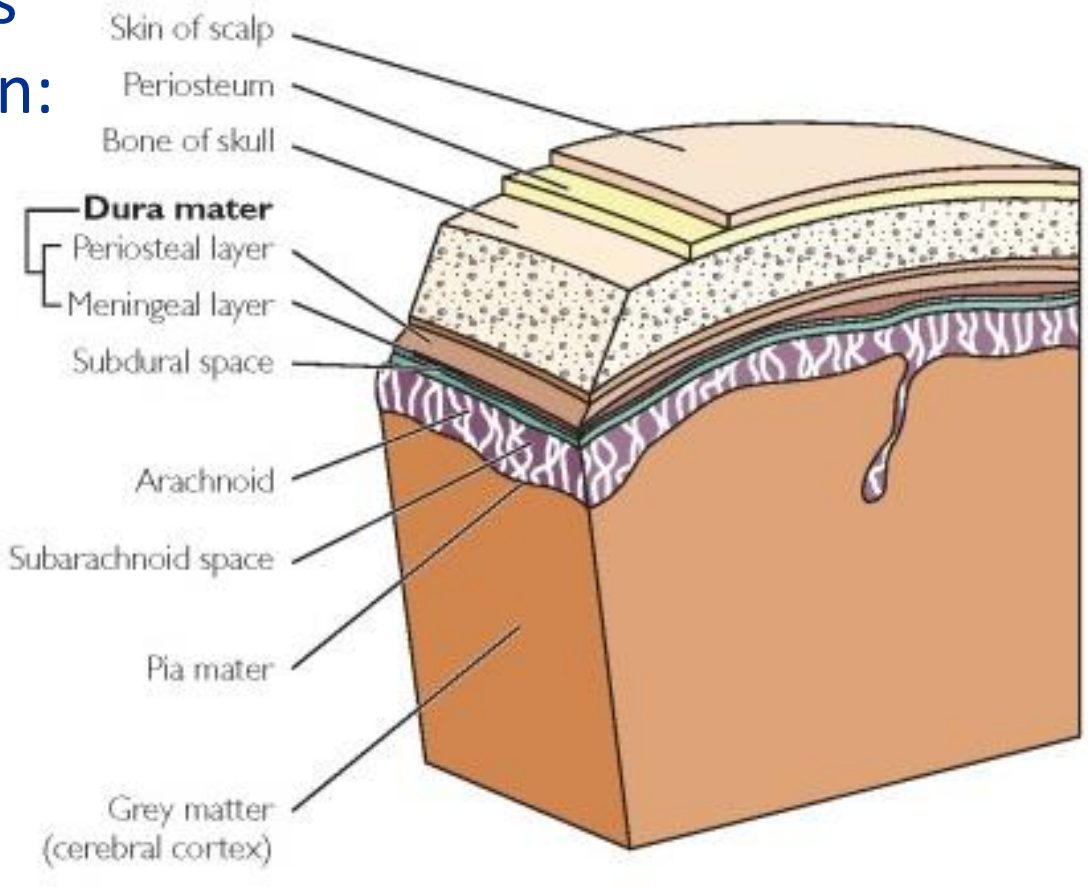
- Controls temperature, pain and other sensations.
- Contains:
  - Thalamus
  - Hypothalamus
  - Epithalamus
  - Cranial Nerves

Meninges

- Meninges are fibrous coverings of the brain:

  PAD (Pia mater, Arachnoid, & Dura mater)

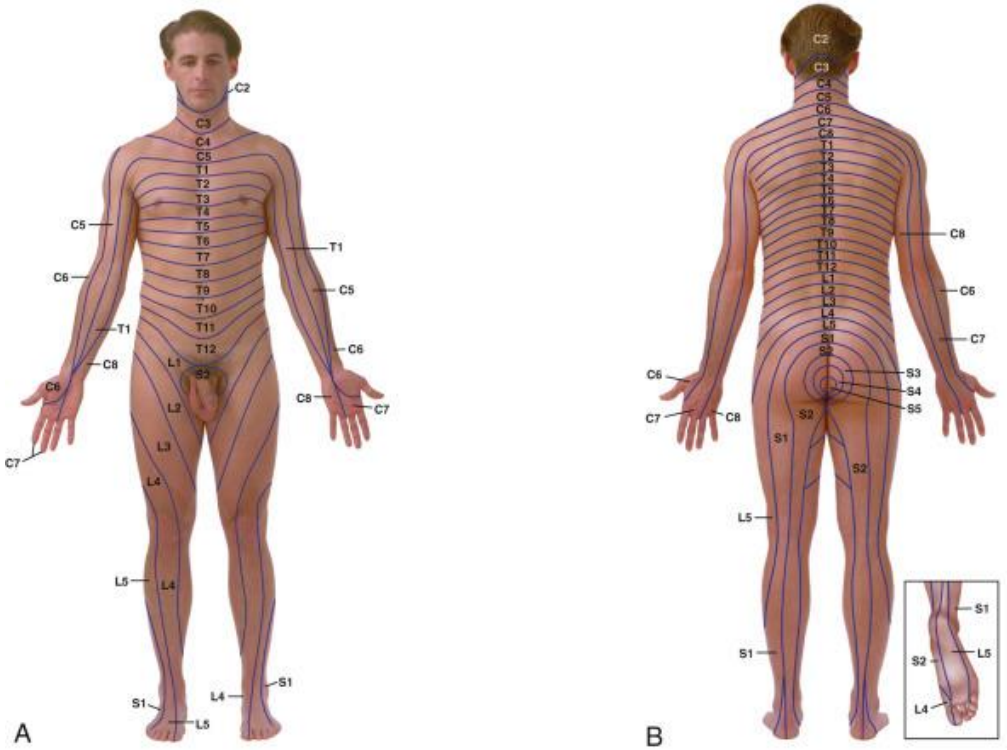
- Cerebrospinal Fluid



(From Stacy, Kathleen M. [2018]. Neurologic Anatomy and Physiologyed.]. St. Louis: Mosby.)

Dermatomes

- 21 pairs of spinal nerves
- Ascend from spinal cord to muscle group



(From Seidel, H.M. and others. [2006]. Mosby's guide to physical examination [6th ed.]. St. Louis: Mosby.)

Obtain History

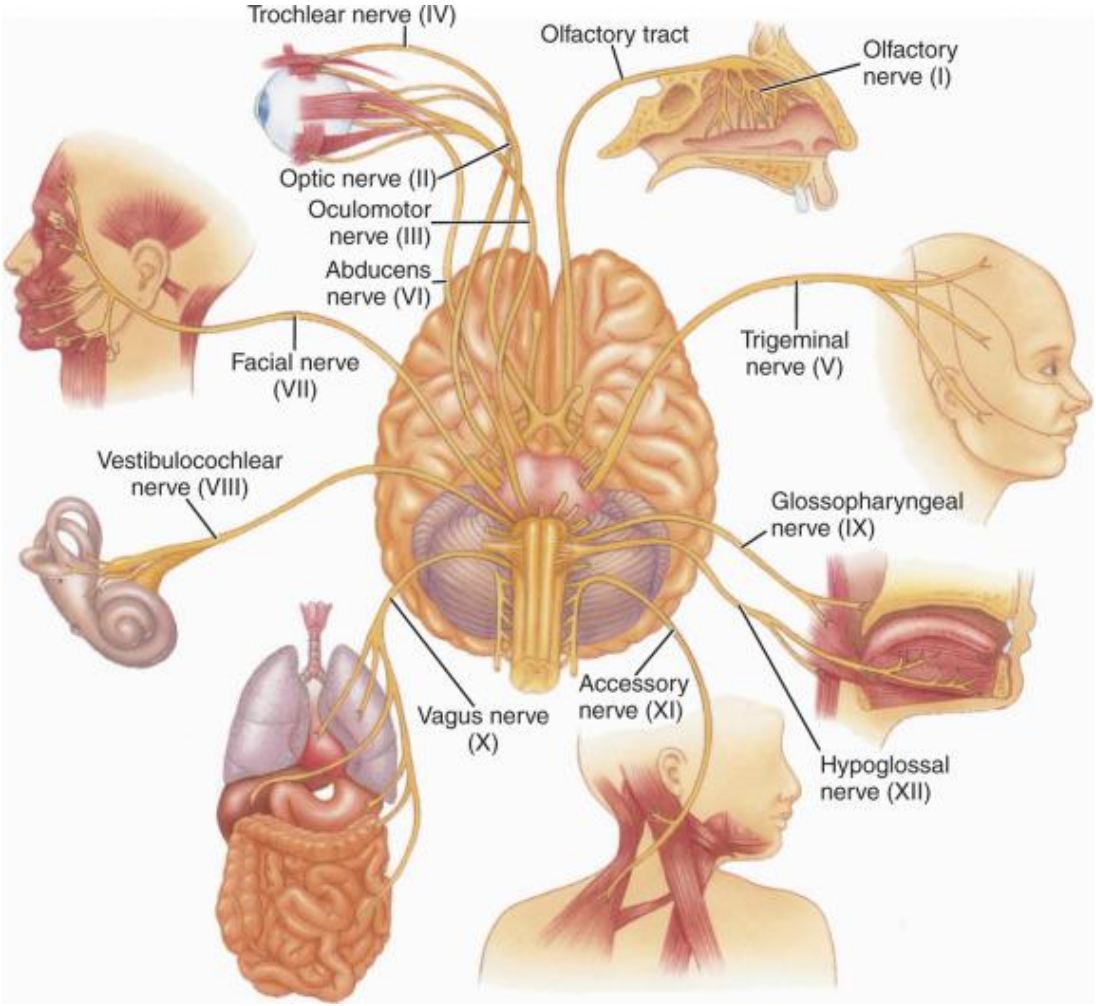
- Subjective
- Chief Complaint
  - ex. “headaches, weakness ”
- HPI
- PMHx & PSurgHx
- Family history
- Social history
- Review of Systems

(From General Headache Without Cause. Patient Education. Mosby

Examination

- General - Note patient's general appearance
- Mental status
- Cranial nerves
- Cerebellar functions
- Sensory testing
- Deep tendon reflexes (DTR's)
- Other special testing

Cranial Nerves



From Patton KT, Thibodeau GA. Anatomy and Physiology. 8th ed. St. Louis, MO: Elsevier, 2013

Cranial Nerves (Cont.)

I. Olfactory
II. Optic
III. Oculomotor
IV. Trochlear
V. Trigeminal
VI. Abducens
VII. Facial
VIII. Acoustic
IX. Glossopharyngeal
X. Vagus
XI. Spinal accessory
XII. Hypoglossal

Testing Cranial Nerves

- Cranial Nerve (CN) Function Test
  - Done in an orderly, systematic fashion.
  - Start with number one and work your way "down"

Olfactory

- CN I - Olfactory
  - Test the sense of smell
  - Each nostril should identify scent
  - Present none-irritant odors
  - Normally not performed in routine exam.

(From Seidel, H.M. and others. [2006]. Mosby's guide to physical examination [6th ed.]. St. Louis: Mosby.)

Optic

- CN II - Optic
  - Test visual acuity
  - Inspect pupils
  - Optional funduscopic examination

Oculomotor, Trochlear & Abducens

- CN III - Oculomotor
- CN IV - Trochlear
- CN VI - Abducens
  - Test the extraocular movement
  - Check convergence of the eyes.
  - Identify any nystagmus.
  - Look for ptosis
  - PEARRL-A

Trigeminal

- CN V - Trigeminal
  - Palpating the temporal and masseter muscles
  - Test facial sensation
    - Sharp and dull sensations
    - Test for light touch

(From Seidel, H.M. and others. [2006]. Mosby's guide to physical examination [6th ed.]. St. Louis: Mosby.)

Facial

- CN VII - Facial
  - Test the muscles of facial expressions and taste
  - Inspect face at rest and during conversation
  - Note weakness or asymmetry
  - Observe any tics or other abnormal movements

(From Seidel, H.M. and others. [2006]. Mosby's guide to physical examination [6th ed.]. St. Louis: Mosby.)

Acoustic

- CN VIII - Acoustic
  - Test the hearing and balance
  - Rub your thumb and index finger together lightly
  - Sound equally loud in each ear

*Weber and Rene tests are performed by provider

Glossopharyngeal and Vagus

- CN IX - Glossopharyngeal
- CN X - Vagus
  - Test phonation and gag reflex
  - Listen to the patient's voice
  - Have patient say "ah" or yawn
  - Then warn the patient that you are going to test the gag reflex

Spinal Accessory

- CN XI - Spinal Accessory
  - Test muscles of the neck and upper back
  - Look for atrophy or fasciculation in the trapezius muscles, bilaterally
  - Ask the patient to shrug both shoulders against your resistance
  - Ask the patient to turn his head to each side against resistance

Hypoglossal

- CN XII - Hypoglossal
  - Test the tongue
  - Listen patients articulation
  - Ask the patient to stick out tongue and side to side

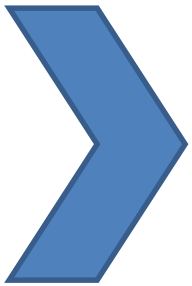
*Note the symmetry of the movement

(From Seidel, H.M. and others. [2006]. Mosby's guide to physical examination [6th ed.]. St. Louis: Mosby.)

Assess the Motor System

- Focus on the patient's body position during movement and rest

- Involuntary movements
  - Tremors
  - Tics
  - Fasciculation



- Note
  - Rate
  - Rhythm
  - Amplitude

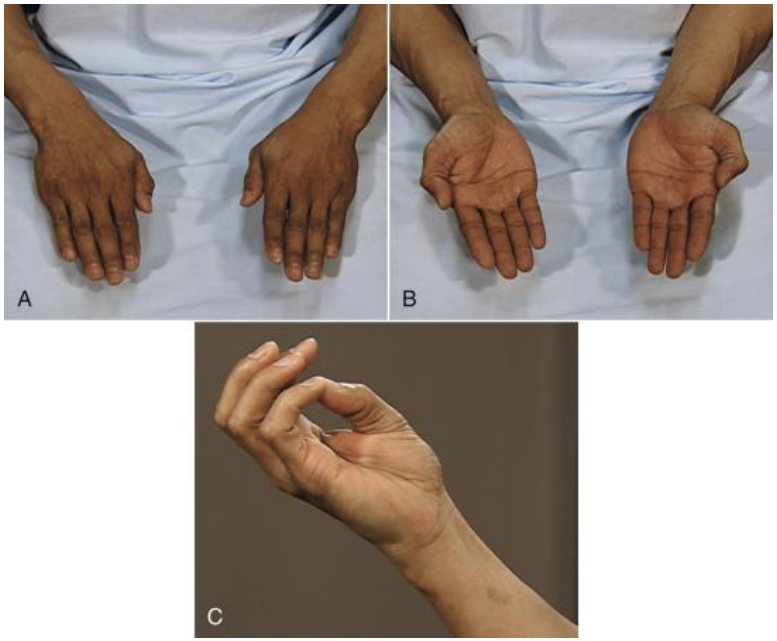
- Use muscle strength grading system

Assess the Motor System (Cont.)

- Muscle Strength Grading System 0 to 5 scale:
  - 0 = No muscle contraction
  - 1 = Visible twitch, no movement
  - 2 = Weak, insufficient to overcome gravity
  - 3 = Weak, overcome gravity, not resistance
  - 4 = Weak, overcome some resistance not full
  - 5 = Normal, overcome full resistance

Rapid Alternating Movements (RAM)

- Repeated as quickly as possible
- Turn and touch thigh with the dorsum of hand
- Alternate test:
  - Touch each finger with thumb of same hand as rapidly as possible
  - Observe speed, rhythm, and smoothness



(From Seidel, H.M. and others. [2006]. Mosby's guide to physical examination [6th ed.]. St. Louis: Mosby.)

Point to Point Movement

- Hold a finger in place an arm length from the patient
- With an arm and index finger outstretched, ask the patient to raise arm overhead and lower it again and touch your finger.
- After several repeats, ask them to close both eyes and try several more times. Repeat with the other arm.

* Test for sense of position and functions of both the cerebellum and labyrinthine systems

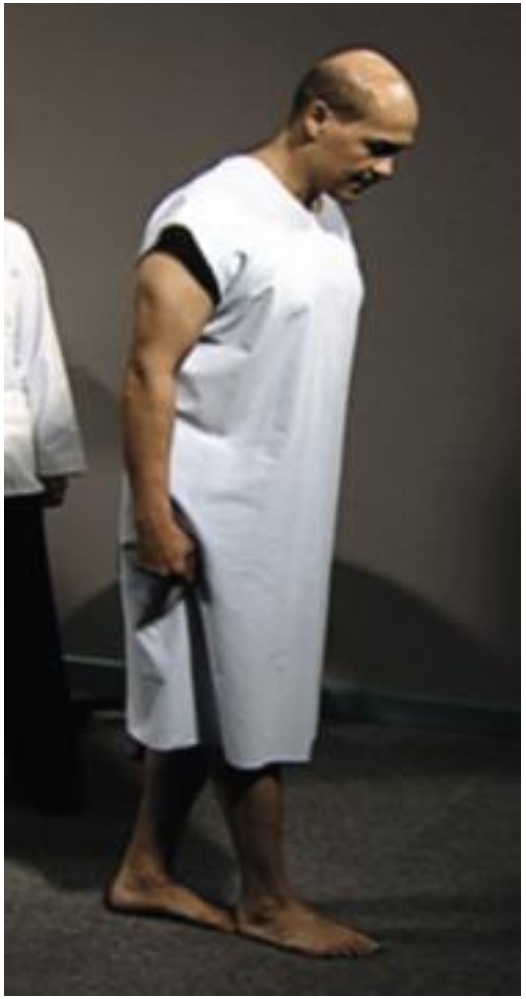
Finger to Nose (FTN)

- Hold your index finger about 18 in from patients face
- Patient touches back and forth as quickly as possible
- Note Clumsy movements or tremors

(From Seidel, H.M. and others. [2006]. Mosby's guide to physical examination [6th ed.]. St. Louis: Mosby.)

Heel-to-Toe-Walk

- Walk placing one foot directly in front of the other
- Walk in line from heel to toes
- Test
  - Strength of plantar flexion
  - Strength of dorsiflexion (ankle)
  - Balance and position sense



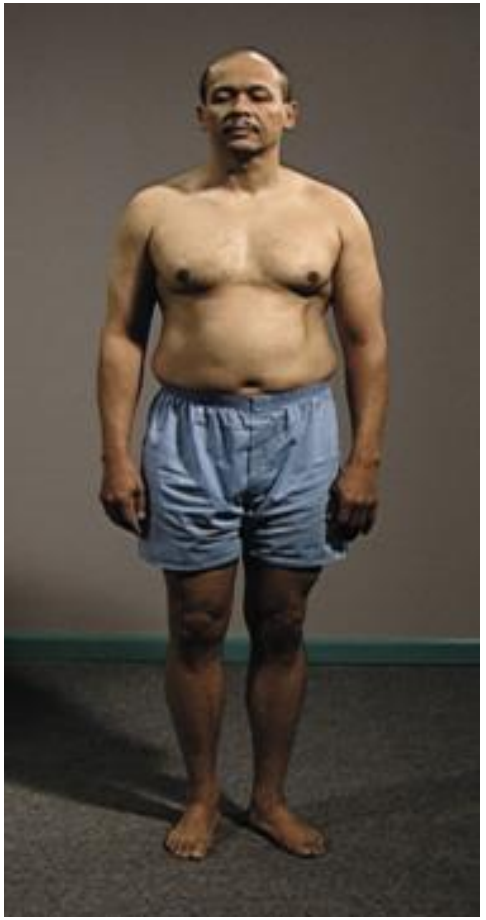
(From Seidel, H.M. and others. [2006]. Mosby's guide to physical examination [6th ed.]. St. Louis: Mosby.)

Hop in Place

- Have patient hop in place on each foot
- Indicates intact lower extremity motor system, cerebellar functions, and position sense

The Rhomberg Test

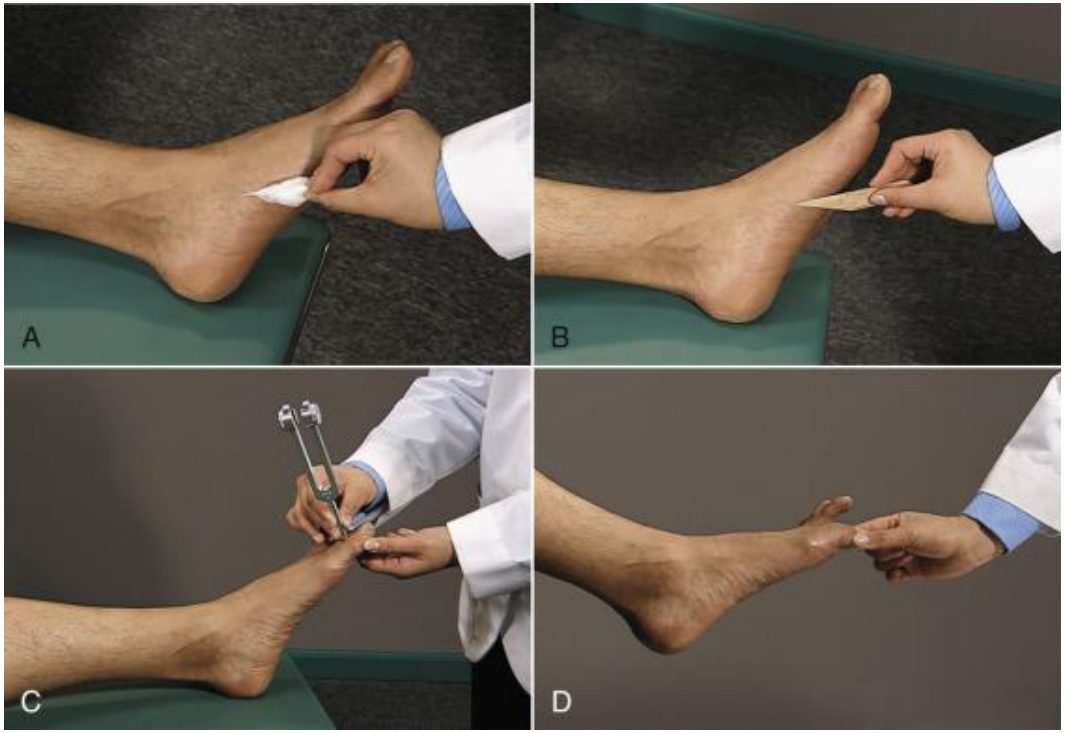
- Have patient stand with feet together, eyes open
- Close both eyes for 20 to 30 second without support
- Note ability to maintain upright posture



(From Seidel, H.M. and others. [2006]. Mosby's guide to physical examination [6th ed.]. St. Louis: Mosby.)

Sensory Testing

- Each test must be performed with patients eyes closed:
  - Superficial Touch
  - Superficial Pain
  - Vibration
  - Position of Joint



(From Seidel, H.M. and others. [2006]. Mosby's guide to physical examination [6th ed.]. St. Louis: Mosby.)

Cortical Sensory Functions

- Stereognosis
- Two Point Discrimination
- Graphesthesia
- Cortical or Discriminatory Sensory

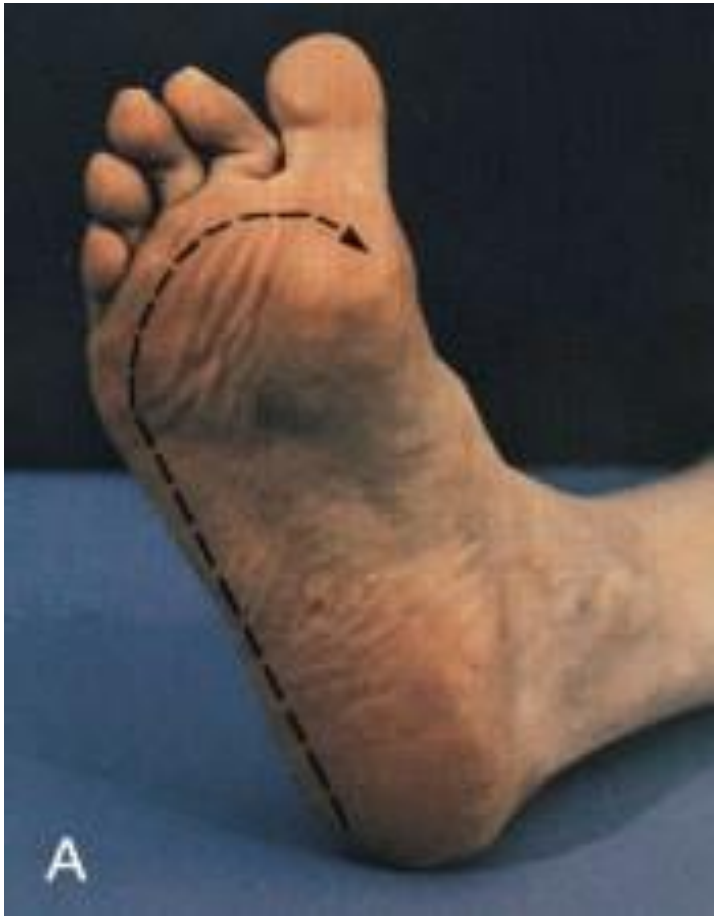
(From Seidel, H.M. and others. [2006]. Mosby's guide to physical examination [6th ed.]. St. Louis: Mosby.)

Reflex Testing

- Graded on a 0 to 4+ scale:
  - 4+ - Very brisk, hyperactive
  - 3+ - Brisker than average
  - 2+ - Normal
  - 1+ - Diminished
  - 0 - No response

Superficial Reflexes

- Plantar Reflex (L5, S1, and S2)
- Cremasteric Reflex (T12, L1, and L2)

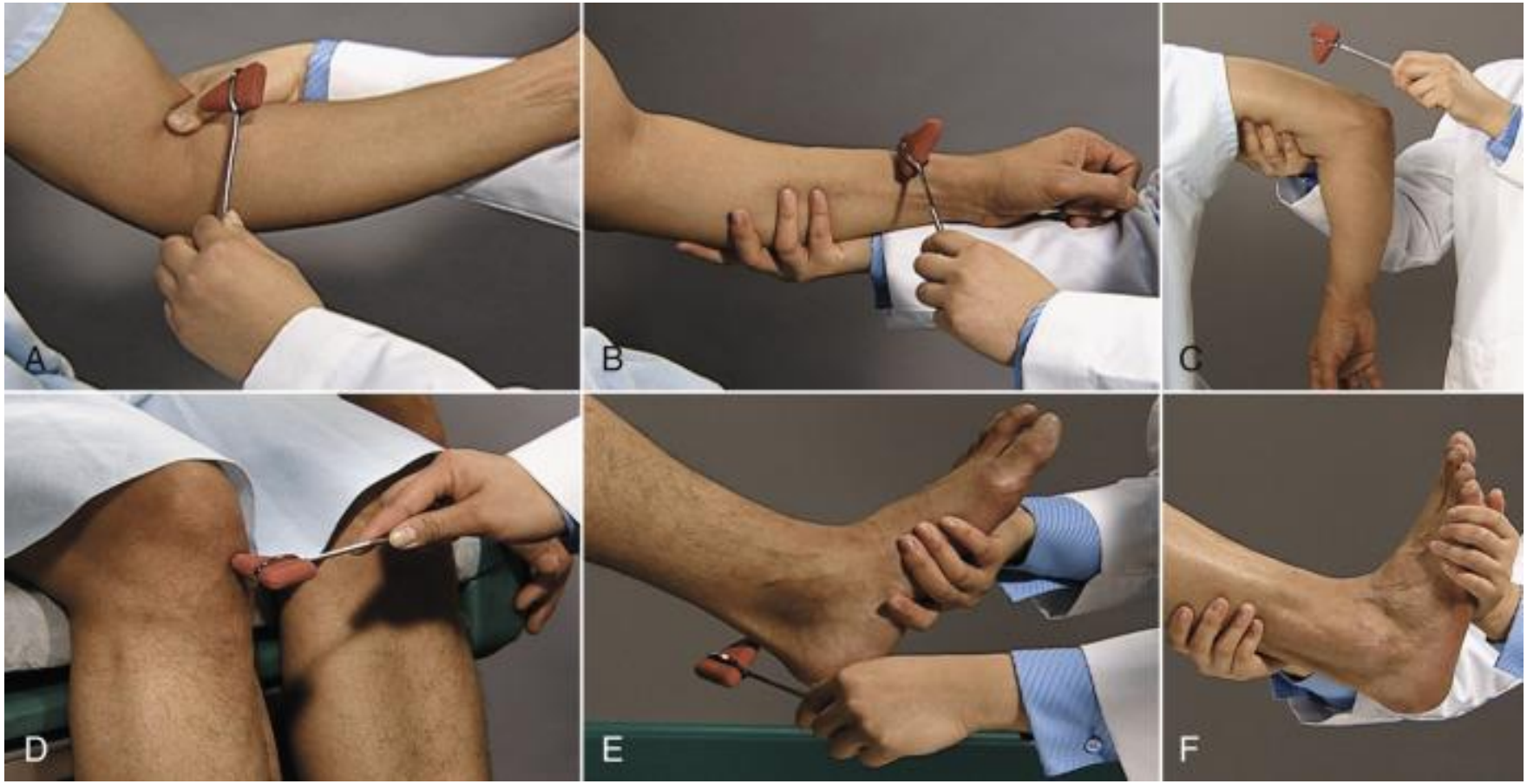


Mosby's Medical Dictionary, 9th edition. © 2009, Elsevier

Deep Tendon Reflexes

- Biceps Reflex (C5, C6)
- Triceps Reflex (C6, C7)
- Supinator or Brachioradialis Reflex (C5, C6)
- Knee Reflex (L2, L3, L4)
- Ankle Reflex (S1)
- Plantar Reflex (L5, S1)
- Clonus

Deep Tendon Reflexes (Cont.)



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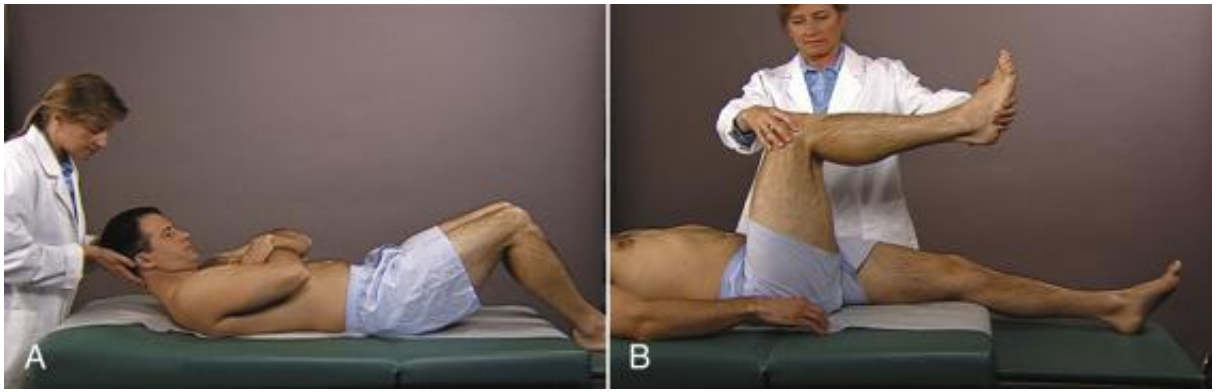
Special Test

- Meningeal Irritation
  - Stiff neck, or nuchal rigidity
  - Flex patients neck forward
  - If resistance is present; meningeal inflammation, arthritis, or injury may be present.



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Meningeal Signs

- Brudzinski's Sign
  - Flex the head forward, watch hips and knees in reaction to movement.
  - Positive flexion of hips and knees = positive Brudzinski's
- Kernig's Sign
  - Flex leg at both the hip and the knee. Then straighten the knee
  - Bilateral pain and increased resistance to extending the knee = positive Kerning's

Altered Mental Status

- General expression of a person's emotional responses, mood, cognitive functioning and personality.

- Changes can be effected by concussions or trauma, depression, anxiety, dementia or intellectual disabilities.

Assess Mental Status

- Appearance and behavior
- Altered state of consciousness
- Abstract reasoning
- Difficulty in memory gathering
- Articulation and sense of coherence
- Evaluate patient for signs of depression, anxiety, hallucinations or any other mental disturbances.

Altered Mental Status Plan

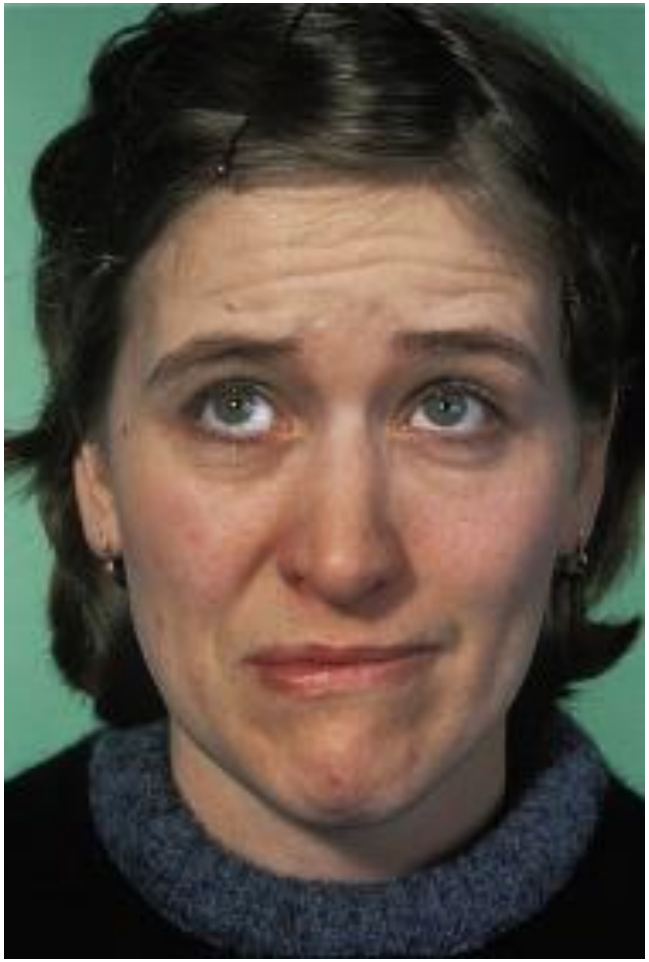
- Treat according to MOI
- Keep patient safe from harming self or others
- Refer to provider

Bell's Palsy

- Temporary paralysis or weakness of one side of the face
- Effecting CN VII, that may be caused by a viral infection
- Central nervous system lesions such as multiple sclerosis, stroke or tumor
- Most commonly in patients of diabetes mellitus.

Bell's Palsy (Cont.)

- S/Sx:
  - Facial numbness and muscle weakness
- Plan:
  - Notify provider immediately



(From Seidel, H.M. and others. [2006]. Mosby's guide to physical examination [6th ed.]. St. Louis: Mosby.)

Cauda Equina

- Caused by a lesion, tumor, infection or trauma to nerve roots before they exit the spinal canal.
- The lesions may cause lumbar disc herniation

Cauda Equina (Cont.)

- S/Sx:
  - Muscle weakness
  - Bowel/bladder incontinence
  - Weakened session
  - Saddle numbness
- Plan:
  - Notify provider immediately

Neuropathy

- Impaired blood flow, vasoconstriction, and chronic ischemic changes within the peripheral neuronal fibers leading to the sensory and autonomic nerve function deficits.

Neuropathy (Cont.)

- S/Sx:
  - Numbness tingling, burning, and cramping, most commonly in the hands and feet
  - Night pain in one or both feet or feelings of walking on cotton
- Plan:
  - Glycemic control
  - Avoid alcohol
  - Pain control
  - Notify provider

Radiculopathy

- Compression to the lower lumbar disc due to trauma, lesions, and improper lifting techniques.
  - S/Sx:
    - Recurrent back pain with pain down one or both legs
    - Triggered by cough, sneeze or bowel movement
    - Symptoms experienced based on location of lesion
  - Special Test:
    - Straight leg raise, cross straight leg raise or femoral stretch test
    - MRI, CT scan or x-rays

Radiculopathy Plan

- NSAIDs
- Muscle relaxants
- Oral corticosteroids
- Rest and ice therapy
- Follow up if no improvement or new symptoms appear.

Tension Headaches

- Most common type of headache
- Possible association with depression, anxiety or fatigue
- S/Sx:
  - Dull, persistent
  - Feeling of tight band around head
  - No nausea, vomiting, blurring vision
- Exam will be normal

Tension Headaches Plan

- NSAIDs
- Increase fluid intake
- Rest, relaxation techniques or stress reduction
- Follow up if no improvement or new symptoms appear

Migraine Headaches

- Vascular and result of intracranial artery constriction followed by dilation and distention of the arteries
- S/Sx:
  - Intense pain and throbbing on one side
  - an "aura" (visual, sensorial, or motor disturbance)
  - light or sound sensitivity
  - Nausea with or without vomiting

Migraine Headaches (Cont.)

- Examination will be normal
- Plan:
  - Refer patient to your provider

Cluster Headaches

- Causes one sided severe pain usually located around an eye.
- S/Sx:
  - Photophobia, lacrimation, rhinorrhea, and sweating.
  - Sudden onset
  - 10 minutes to two hours, recur in clusters and reoccur for weeks or months then remit for long periods.
  - Your examination is normal.
- Plan:
  - Refer patient to your provider

Post Trauma Cerebral Syndrome

- Headache that follows a head injury. Loss of consciousness, is potentially serious. Problems can be delayed as long as weeks after the injury.
- S/Sx:
  - Lethargy or sleepiness, vomiting
  - Severe or a headache increasing in severity,
  - Visual changes, problems with balance and coordination, losses of sensation,
  - Seizures, or any changes in personality or behavior.

Post Trauma Cerebral Syndrome Plan

- Immediately refer patient to your provider

Meningitis

- Inflammation of the membrane covering of the brain and spinal cord.
- Due to bacteria or viruses
- S/Sx:
  - Acute frontal headache
  - Stiff neck
  - fever, and possible altered mental status

Meningitis (Cont.)

- Special Test:
  - Brudzinski's signs
  - Kernig's signs
  - Noticing petechia or purpuric rash present
- Plan:
  - Refer patient to your provider.

TBI

- Disrupts normal functioning of the brain
- S/Sx :
  - Loss of consciousness
  - Loss of memory
  - Headache or light sensitivity
  - Neck pain
  - Change in breathing patterns
  - Nausea vomiting
  - Blurred or double vision

TBI (Cont.)

- MACE Screening Tool
- Plan
  - Refer to provider

Summary and Review

- 1.40 Utilize the knowledge of neurological system anatomy while assessing a patient with a neurological complaint
- 1.41 Utilize the knowledge of neurological system physiology while assessing a patient with a neurological complaint
- 1.42 Obtain history from patient with common neurologic disorders
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Summary and Review (Cont.)

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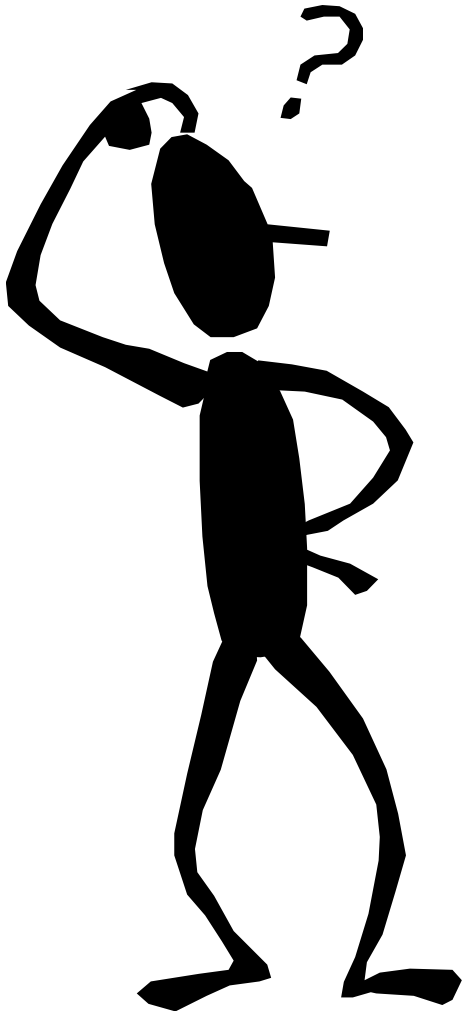
- 1.16 State Red Flag criteria

Questions



Application

Job Sheet SCSC 2.6-3, Neurological System Lab

SCSC Performance Test 6