It is our pleasure to welcome you to your Neurology rotation. There are several things we would like you to know as you start your rotation with us. If you have any additional questions, please feel free to contact Joy Wegener, the Clerkship Coordinator at extension 3544 or Imran I. Ali, M.D., Clerkship Director or Gretchen Tietjen, M.D., Chief, Department of Neurology. The goals for this clerkship are to allow students to:

1. Obtain a complete neurologic history which allows an appropriate differential diagnosis.

2. Conduct comprehensive neurological exam. The student should also be able to describe the anatomic and physiologic basis of the neurologic exam.

3. Have sufficient familiarity with subsystems within the nervous system to recognize how disease involving these subsystems may present.

4. Demonstrate knowledge of the major categories of neurologic disease and their primary modes of presentation. Assess the acuity and prognosis of the clinical problem as it relates to the needs for immediate management requirements for proper expert intervention.

5. Appropriately apply neurodiagnostic studies to the evaluation of neurologic patients.

6. Demonstrate knowledge of the standard methods of care for the major neurologic disorders and form a rational plan of investigation.

7. Apply knowledge of basic neurobiology to an understanding of the mechanisms of neurologic disease and its treatment.

8. Apply information acquired in this course to ongoing self education in clinical neurobiology.

9. After each evaluation, develop a differential diagnosis based on history and examination. The fundamental purpose of this rotation is to develop a correct approach to diagnosis and management of neurologic disorders.

10. Review relevant clinical literature as it pertains to specific medical or neurologic problems encountered by the students.
All students will meet on the first morning of the rotation in the Neurology Conference Room, Room 1440-Ruppert Health Center at 8:30 a.m. One student will be assigned to St. Vincent’s one to Toledo Hospital for the rotation.

The rest of the students will be divided into two groups, half will be assigned to the outpatient clinic for two weeks and half to the inpatient service at MCO. After two weeks this group will switch so that all students at MCO will get adequate exposure to both outpatient and inpatient services. During the inpatient rotation students will be assigned to the rehabilitation unit for one week.

Recommended reading text is:


Other texts that may be useful include


*Current Therapy in Neurology.* Johnson & Griffin. 6th Edition 2000


Reference texts that are available in the Mulford Library as well as the Neurology Library include


*Neurologic Differential Diagnosis.* John Patten. Springer-Verlag 1999


All lectures and didactics sessions are meant to provide an outline and a brief overview of neurologic disorders. Students are expected to read and review relevant literature on their own.
What the Neurology Student Should Do

**CLINIC ASSIGNMENTS**

The Neurology Clinic is located across the hall from the academic office in the Ruppert Health Center. The clinic schedule is attached below. All clinics start at 8:30 a.m. or earlier and end by 5:00 p.m. Please check the clinic schedule a day earlier for timing. Students will be assigned clinic duties to outpatient neurology as well as neurosurgery clinic.

1. Look at the clinic list. If a patient is checked in, please go ahead and review the chart and evaluate the patient. After you have performed the history and physical evaluation ask the nurse to inform the Attending who will, then staff the patient for you.

2. For new patient evaluation a complete history and examination is required. All new patients should be in gowns for the physical examination. After the patient has been staffed a complete note has to be written for the chart.

3. For return visits an interim history and the SOAP approach is adequate.

4. Students will be expected to keep a log of all patients they have evaluated in clinic.

5. Please write detailed and legible notes in the chart.

**Clinic Schedule**

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Appendix A

Guidelines for a Screening Neurological Examination

All medical students should be able to perform a brief, screening neurologic examination that is sufficient to detect significant neurologic disease even in patients with no neurologic complaints. Although the exact format of such a screening examination may vary, it should contain at least some assessment of mental status, cranial nerves, gait, coordination, strength, reflexes, and sensation. One example of a screening examination is given here.

A. Mental Status (level of alertness, appropriateness of responses, orientation to date and place)

B. Cranial Nerves
   1. Visual acuity
   2. Pupillary light reflex
   3. Eye movements
   4. Hearing
   5. Facial strength (smile, eye closure)

C. Motor Function
   1. Gait (casual, tandem)
   2. Coordination (fine finger movements, finger-to-nose)
   3. Strength (shoulder abduction, elbow extension, wrist extension, finger abduction, hip flexion, knee flexion, ankle dorsiflexion)

4. Reflexes
   1. Deep tendon reflexes (biceps, patellar, Achilles)
   2. Plantar responses

E. Sensation (pinprick in hands and feet)

Note: If there is reason to suspect neurologic disease based on the patient’s history or the results of any components of the screening examination, a more complete neurologic examination may be necessary.
INPATIENT ROTATION

All students should carry beepers during this rotation. These can be obtained from the Neurology Academic offices.

INPATIENT NEUROLOGY

Student responsibilities on Neurology inpatient unit will involve follow up of inpatient consults and patients on primary service as well as seeing new consults. After a new patient evaluation the student will present that information to the Attending. Students will be expected to know all relevant details about their patients and be expected to present them on rounds along with the resident. Students will also be assigned to two short calls from 5:00 pm to 10:00 pm during the two weeks on Neurology. All students are expected to round on one weekend day and have one day off.

Appendix B

Guidelines for a Focused Neurologic Examination

All medical students should be able to perform the following parts of the neurologic examination

A. Mental Status
   1. Level of alertness
   2. Language function (fluency, comprehension, repetition, and naming)
   3. Memory (short-term and long-term)
   4. Calculation
   5. Visuospatial processing
   6. Abstract reasoning

B. Cranial Nerves
   1. Vision (visual fields, visual acuity, and funduscopic examination)
   2. Pupillary light reflex
   3. Eye movements
   4. Facial sensations
   5. Facial strength (muscles of facial expression and muscles of facial expression)
   6. Hearing
   7. Palatal movement
   8. Speech
   9. Neck movements (head rotation, shoulder elevation)
   10. Tongue movement

C. Motor Function
   1. Gait (casual, on toes, on heels, and tandem gait)
   2. Coordination (fine finger movements, rapid alternating movements, finger-to-nose,
3. Involuntary movements
4. Pronator Drift
5. Tone (resistance to passive manipulation)
6. Bulk
7. Strength (shoulder abduction, elbow flexion/extension, wrist flexion/extension, finger flexion/extension/abduction, hip flexion/extension, knee flexion/extension, ankle dorsiflexion/plantar flexion)

D. Reflexes
   1. Deep tendon reflexes (biceps, triceps, brachioradialis, patellar, Achilles)
   2. Plantar responses

E. Sensation
   1. Light touch
   2. Pain or temperature
   3. Proprioception
   4. Vibration

Appendix C

Guidelines for the Neurologic Examination
In Patients with Altered Level of Consciousness

A. Mental Status
   1. Level of arousal
   2. Response to auditory stimuli (including voice)
   3. Response to visual stimuli
   4. Response to noxious stimuli (applied centrally and to each limb individually)

B. Cranial Nerves
   1. Response to visual threat
   2. Pupillary light reflex
   3. Oculocephalic (doll’s eyes) reflex
   4. Vestibulo-ocular (cold caloric) reflex
   5. Corneal reflex
   6. Gag reflex

C. Motor Function
   1. Voluntary movements
2. Reflex withdrawal
3. Spontaneous, involuntary movements
4. Tone (resistance to passive manipulations)

D. Reflexes
   1. Deep tendon reflexes
   2. Plantar responses

E. Sensation (to noxious stimuli)
FINAL EXAMINATION:

Last Friday of rotation - Written Examination at 8:00 a.m. in Room 9- Ruppert Health Center.

ALL STUDENTS are expected to take this exam. We would appreciate a detailed evaluation of the rotation at this time. Comments will be taken seriously to improve the rotation for future groups of students.

ABSENCES:

THREE days are allowed during student clerkship rotation for any absences - interviews, illnesses, funerals, personal appointments, etc. It is the student’s responsibility to obtain permission for days off with the Clerkship Director - Imran I. Ali, M.D.

NOTE: The purpose of this rotation is for students to become introduced to neurologic disorders, their diagnosis and management. Part of the learning process involves being asked questions in clinic and on the inpatient rotation. The purpose is to develop constructive, thought-provoking discussions and not to harass any one person. If you at any time feel harassed or humiliated, please contact the Clerkship Director or Chairperson regarding such complaints. These complaints will be taken seriously and proper action taken.
The seminar series will consist of seven to nine topics for the rotation depending on starting
dates and various faculty and holiday scheduling. Not all of the topics will be covered during each
and every rotation. You are nonetheless responsible for the material not covered. The study
guide starting on page 11 of this handbook should serve as a reference for topics that you are
expected to know at the conclusion of the rotation.

Topics as follows:

Neurologic Examination/Localization in Clinical Neurology
Approach to a patient with diffuse weakness
Approach to a patient with involuntary movements
Approach to a patient with delirium
Transient or episodic loss of consciousness
Approach to a patient with focal weakness
Approach to a patient with dementia
Neurology case studies

The seminar series is intended to discuss case presentations to familiarize the student with
certain aspects of neurological presentations or particular disease entities. They are not didactic
lectures, so the student is expected to know the material prior to attending the seminar. The
purpose of the seminars is to clarify neuroanatomical and neurophysiologic processes and not to
reiterate the material learned in the first years of medical school. If you are unclear on how to
prepare for the seminar, we suggest you familiarize yourself with the study guide section
presented later in this handbook.

NOTE: The purpose of this rotation is for students to become introduced to neurologic
disorders, their diagnosis and management. Part of the learning process involves being asked
questions in clinic and on the inpatient rotation. The purpose is to develop constructive,
thought-provoking discussions and not to harass any one person. If you at any time feel
harassed or humiliated please contact the Clerkship Director or Chief of Neurology regarding
such complaints. These complaints will be taken seriously and proper action taken.
# STUDENT SCHEDULE *(LECTURES ARE MANDATORY)*

**First Monday - Student Orientation - 8:30 - 9:30 a.m.**

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<tr>
<th>Day</th>
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<tr>
<td>Monday</td>
<td>12:00 - 1:00 p.m.</td>
<td>Student Lecture</td>
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<td>Neurology Conference Room</td>
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<tr>
<td>Wednesday</td>
<td>12:00 - 1:00 p.m.</td>
<td>Student Lecture</td>
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<tr>
<td>Thursday</td>
<td>12:00 - 1:00 p.m.</td>
<td>Grand Rounds - Room 105 - Health Ed. Bldg.</td>
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<td>2(^{nd}) and 4(^{th}) Thursday of each month</td>
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<td>1:00 - 3:00 p.m.</td>
<td>Neurologic Examination and Localization</td>
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<td>Neurology Conference Room</td>
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**Friday 8:00 - 9:00 a.m.**  
Student Lecture - Neuro. Conf. Room

- Students on AHEC rotation are exempt from all lectures at MCO.
- Students at St. Vincent need to be present for lectures only.
- Grand Rounds attendance is **mandatory** for students at MCO and encouraged for students at St. Vincent.

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<tr>
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<tr>
<td>8:00 - 10:00 a.m.</td>
<td>Student Exam - Room 9 RHC</td>
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<td>(Last Friday of rotation)</td>
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<tr>
<td>12:45 - 5:00 p.m.</td>
<td>Clinical Skills Evaluation - Room 1600A- RHC</td>
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<td>(Second Friday of rotation - check schedule for assigned time)</td>
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### Resident Conferences/Schedule

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<th>Day</th>
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<td>Monday</td>
<td>Morning Report</td>
<td>Hospital</td>
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<td>Tuesday</td>
<td>Clinical Lecture Series</td>
<td>Clinic Conf. Room</td>
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<td>(July - February)</td>
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<tr>
<td>Wednesday</td>
<td>Subspecialty Conf./M&amp;M Q/A, Neurobehavior Jour. Club</td>
<td>Clinic Conf. Room</td>
<td>12:00-1:00PM</td>
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<tr>
<td>Thursday</td>
<td>Clinical Lecture Series</td>
<td>Clinic Conf. Room</td>
<td>12:00-1:00PM</td>
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<td>(July - February)</td>
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<td></td>
<td>Neurology Grand Rounds</td>
<td>Room 105 - HED</td>
<td>12:00-1:00 PM</td>
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<td>Localization Rounds/Residents Board Review</td>
<td>Room 13-RHC</td>
<td>5:00-6:00 PM</td>
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<td>(2nd and 4th Thursday)</td>
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Exit Objectives

By the time the student has completed the clinical neurology clerkship, she/he will be expected to be able to:

1. Obtain a neurologic history and formulate an appropriate differential diagnosis.

2. Conduct a sufficiently detailed neurological survey exam to elicit findings which allow further refinement of the differential diagnosis, as well as to locate the disease process within the nervous system.

3. Have sufficient familiarity with subsystems within the nervous system to recognize how disease involving these subsystems may present.

4. Demonstrate knowledge of the major categories of neurologic disease and their primary modes of presentation.

5. Appropriately apply neurodiagnostic studies to the evaluation of neurologic patients.

6. Demonstrate knowledge of the standard methods of care for the major neurologic disorders.

7. Apply knowledge of basic neurobiology to an understanding of the mechanisms of neurologic disease and its treatment.

8. Apply information acquired in this course to ongoing self education in clinical neurobiology.
Neurology Clerkship Objectives for Specific Topics

Educational objectives - Stroke

The student should be able:

1. To describe the different subtypes of stroke and their etiologies.
2. To match the specific stroke syndromes with the artery which is occluded.
3. To describe the tests which are commonly used in the diagnosis of stroke.
4. To name the major risk factors for stroke.
5. To outline the major points of the ischemic cascade.
6. To describe treatment of acute stroke and prevention of recurrent stroke.
7. To name the common medical complications of stroke and how to treat or prevent them.

Educational objectives - Epilepsy and Seizures

The student should be able:

1. To differentiate between seizures, epilepsy and syncope.
2. To classify seizures and recognize the clinical features of different subtypes of seizures.
3. To utilize ancillary tests such as EEG and MRI in the diagnosis and management of epileptic disorders.
4. To identify appropriate treatment options for patients with epilepsy including conventional as well as newer antiepileptic agents.
5. To recognize the role of surgery in management of epilepsy.
6. To recognize common adverse events associated with medications in management of epileptic disorders.
7. To recognize and manage status epilepticus.

Educational objectives - Dementia

The student should be able:

1. To define dementia and delirium.
2. To differentiate between delirium and dementia.
3. To recognize clinical and laboratory features of different types of dementia.
4. To create a differential diagnosis for individuals with cognitive problems.
5. To recognize and manage patients with Alzheimer’s disease.
Educational objectives - Neuromuscular Diseases

The student should be able:

1. To differentiate between upper motor neuron (UMN) and lower motor neuron (LMN) dysfunction by measuring distribution of weakness, muscle bulk, muscle tone, and reflex changes for disorders of weakness.
2. To list components of the motor unit and contrast the common LMN clinical syndromes of neuropathy, neuromuscular junction disorders and myopathy by symptoms, sensory changes, reflex changes, muscle bulk, and tone.
3. To describe each of the following and discuss the localization of each for peripheral sensorimotor disorders.
   a. Radicular pain
   b. Radiculopathy
   c. Mononeuropathy
   d. Meralgia paresthetica
   e. Mononeuritis multiplex (multiple mononeuropathy)
   f. Polyneuropathy
   g. Paresthesia
   h. Fasciculation
   i. Describe the typical clinical findings in root lesions at C-5 and L-5
   j. Herniated nucleus pulposus (HNP)
   k. Straight leg raising signs
4. To discuss symptoms, examination and laboratory findings of carpal tunnel syndrome (median mononeuropathy at the wrist).
5. To describe an approach to the workup of a chronic polyneuropathy.
6. To describe the time course, symptoms, laboratory findings, and treatment of acute inflammatory demyelinating polyneuropathy (AIDP; Guillain-Barre’ syndrome); Discuss criteria used to determine the need for ventilatory support in patients with AIDP.
7. To describe the usual clinical features and differential diagnosis of motor neuron disease.
8. To describe the pathogenesis, usual clinical presentation, workup, and therapy of myasthenia gravis.
9. To describe the common clinical manifestations and enzyme findings of the following myopathies:
   a. Duchenne muscular dystrophy
   b. Myotonic dystrophy
   c. Polymyositis
Educational objectives - **Headaches**

The student should be able:

1. To differentiate between primary and secondary headaches.
2. To understand the mechanism of headache and the pathogenesis of migraine.
3. To follow a systematic approach to management of patients with headaches
   a. History taking
   b. Diagnosis and differential diagnosis
   c. Investigations
   d. Treatment
4. Be able to present and discuss headache causes during the last ten minutes of lecture.

Educational objectives - **Movement Disorders**

The student should be able:

1. Clinically differentiate between hyperkinetic and hypokinetic movement disorders.
2. Describe the classic classical, pathological and neurochemical features of idiopathic Parkinson’s disease (PD).
3. Describe the clinical, genetic and pathological features of Huntington’s disease.
4. Discuss the pharmacological options available for the treatment of Essential Tremor (ET) and PD.
5. Name the most common complications of drug therapy of PD.
6. List the common non-motor complications of PD.
7. Describe the surgical options available to patients with ET and PD.
Neurology Student Lecture Series Objectives

Approach to a Patient with a Focal Motor Deficit

At the end of the lecture the student will be able to:

1. Ascertain whether focal weakness is due to a lesion in the central or peripheral nervous system.
2. Distinguish between upper motor neuron (UMN) and lower motor neuron (LMN) facial weakness, and give a differential diagnosis for LMN facial weakness.
3. Localize the lesion in a person with hemiparesis and give a differential diagnosis based on clinical exam and temporal course.
4. Localize the lesion in a patient presenting with “wrist drop”.
5. Localize the lesion in a patient presenting with “foot drop”.

Approach to a Patient with Transient Loss of Awareness

At the end of the lecture the student will be able to:

1. List and describe the major causes of transient loss of awareness.
2. Describe the differences between syncope and seizures.
3. Know the clinical features of headaches and sleep disorders that cause loss of awareness.
4. Describe the differences between simple partial, complex partial, and secondarily generalized seizures.
5. Describe the major types of generalized seizures and epilepsy syndromes, and their EEG features.
6. Know the major drugs used in treatment of partial vs. generalized epilepsies, and major surgical treatments of epilepsy.
7. Know the approach to treatment of status epilepticus.

Approach to a Patient with Diffuse Weakness

At the end of the lecture the student will be able to:

1. Differentiate various patterns of weakness.
2. Localize different patterns of weakness based on history and examination.
3. Review the different etiology of diffuse weakness.
4. Learn the clinical features of common neuropathies and myopathies.
5. Learn the clinical features of neuromuscular junction disorders.
Approach to a Patient with **Movement Disorders**

At the end of the lecture the student will be able to:

1. Describe differences between hypokinetic and hyperkinetic disorders.
2. Name the cardinal signs and symptoms of Parkinson’s disease (PD).
3. Describe three of the Parkinson’s plus syndromes and two clinical features that distinguish each from true idiopathic PD.
4. Name the cardinal signs and symptoms of Huntington’s disease.
5. List appropriate surgical procedures for the management of advanced PD.

Approach to a Patient with **Delirium**

At the end of the lecture the student will be able to:

1. Define delirium.
2. Contrast delirium with dementia as they are two common disorders of the elderly though they can occur at any age.
3. Describe features associated with delirium and its potential effect on outcome.
4. Name some causes of delirium and their respective methods of diagnostic evaluation and management.
5. Discuss delirium tremens, why it is an emergency, and why do such patients die?

Approach to a Patient with **Dementia**

At the end of the lecture the student will be able to:

1. Define dementia and delirium.
2. Differentiate between delirium and dementia.
3. Recognize clinical and laboratory features of different types of dementia.
4. Create a differential diagnosis for individuals with cognitive problems.
5. Recognize and manage patients with Alzheimer’s disease.
Appendix I

Neurology Clerkship Core Curriculum

1. Introduction

Up to 10% of patients seen by family practitioners present with neurologic symptoms and pose neurologic questions to their physicians. Only 16% of the 45 million Americans who visit a physician for a chief complaint referable to the nervous system are ever evaluated by neurologists. Clearly, primary care physicians are routinely called upon to evaluate and manage patients with neurologic disease. Practicing physicians require a firm understanding of the general principles of clinical neurology. The most suitable setting in which to lay the foundation for that understanding is in a neurology clerkship in the clinical phase of medical school. This document outlines the essential components of a clinical neurology clerkship.

2. Goals and Objectives of the Clinical Neurology Clerkship

A. Goal

To teach the principles and skills underlying the recognition and management of the diseases a general medical practitioner is most likely to encounter in practice.

B. Objectives

1. To teach or reinforce the following PROCEDURAL SKILLS
   a. The ability to obtain a complete and reliable history.
   b. The ability to perform a focused and reliable neurologic examination (See Appendix A)
   c. The ability to examine patients with altered level of consciousness or abnormal mental status (See Appendix C)
   d. The ability to deliver a clear, concise, and thorough oral presentation of a patient’s history and examination
   e. The ability to prepare a clear, concise, and thorough written presentation of a patient’s history and examination
   f. (Ideally) the ability to perform a lumbar puncture

2. To teach or reinforce the following ANALYTICAL SKILLS:
   a. The ability to recognize symptoms that may signify neurologic disease including disturbances of consciousness, cognition, language, vision, hearing, equilibrium, motor function, somatic sensation and autonomic function)
   b. The ability to distinguish normal from abnormal findings on a neurologic examination
   c. The ability to localize the likely site or sites in the nervous system where a lesion could produce a patient’s symptoms and signs
   d. The ability to formulate a differential diagnosis based on lesion localization, time course, and relevant historical and demographic features
e. An awareness of how to use and interpret common tests used in diagnosing neurologic disease
f. An awareness of the principles underlying a systematic approach to the management of common neurologic diseases (including the recognition and management of situations that are potential emergencies)
g. The ability to review and interpret medical literature (including electronic databases) pertinent to specific issues of patient care

3. **Content of subjects to be taught**
   A. The Neurologic Examination (as an integral component of the general medical examination)
      1. How to perform a focused neurologic examination (see Appendix A)
      2. How to perform a screening neurologic examination (see Appendix B)
      3. How to perform a neurologic examination on patients with an altered level of consciousness (see Appendix C)
      4. How to recognize and interpret abnormal findings on the neurologic examination
   
   B. Localization - general principles differentiating lesions at the following levels:
      1. Cerebral hemisphere
      2. Posterior fossa
      3. Spinal cord
      4. Nerve root/Plexus
      5. Peripheral nerve (mononeuropathy, polyneuropathy, and mononeuropathy multiplex)
      6. Neuromuscular junction
      7. Muscle
   
   C. Symptom Complexes - a systematic approach to the evaluation and differential diagnosis of patients who present with:
      1. Focal weakness
      2. Diffuse weakness
      3. Clumsiness
      4. Involuntary movements
      5. Gait disturbance
      6. Urinary or fecal incontinence
      7. Dizziness
      8. Vision loss
      9. Diplopia
      10. Dysarthria
      11. Dysphagia
12. Acute mental status changes
13. Dementia
14. Aphasia
15. Headache
16. Focal pain
   a. Facial pain
   b. Neck pain
   c. Low back pain
   d. Neuropathic pain
17. Numbness or paresthesias
18. Transient or episodic focal symptoms
19. Transient or episodic alteration of consciousness
20. Sleep disorders
21. Developmental disorders

4. Management of Specific Diseases - general principles for recognizing, evaluating and managing the following neurologic conditions (either because they are important prototypes, or because they are potentially life-threatening):
   1. Potential emergencies
      a. Increased intracranial pressure
      b. Toxic-metabolic encephalopathy
      c. Subarachnoid hemorrhage
      d. Meningitis
      e. Status epilepticus
      f. Acute stroke (ischemic or hemorrhagic
      g. Spinal cord or cauda equina compression
      h. Acute respiratory distress due to neuromuscular disease (e.g. myasthenic crisis or acute inflammatory demyelinating polyradiculoneuropathy)
      i. Temporal arteritis
   2. Strokes
   3. Seizures
   4. Alzheimer’s disease
   5. Parkinson’s disease
   6. Essential tremor
   7. Multiple sclerosis
   8. Migraine
   9. Bell’s palsy
   10. Carpal tunnel syndrome
   11. Diabetic polyneuropathy
   12. Myasthenia gravis
13. Brain death
Appendix II

IMPORTANT PRINCIPLES OF LOCALIZATION AND DIFFERENTIAL DIAGNOSIS

A. Differentiate focal, multifocal, and diffuse processes.

B. Determine if the history and examination indicate a neurological disorder.

C. Differentiate anatomically, aphasia, dysarthria, and confusion.

D. Differentiate dominant hemisphere from nondominant hemisphere deficits.

E. Describe the anatomical basis for brainstem lesions with respect to crossed deficits and dysconjugate gaze.

F. Contrast conjugate gaze deficits for cortical vs. brainstem lesions.

G. Localize the following visual field deficits:
   1. Deficits isolated to one eye
   2. Bitemporal deficits
   3. Homonymous deficits (e.g. homonymous hemianopsia)

H. Differentiate central from peripheral facial palsy.

I. Differentiate between an upper motor neuron (UMN) and a lower motor neuron (LMN) deficit with regard to patterns of weakness, muscle bulk, the presence of fasciculation, altered reflex changes, and the plantar reflex.

J. Discuss the significance of a sensory level and dissociated sensory deficits (contralateral spinothalamic and dorsal column deficits).

K. List the major deficits due to cerebellar lesions and distinguish midline deficits from those of a hemisphere.

L. Define the characteristics of a lesion of the following:
   1. Nerve root
   2. Plexus
   3. Peripheral nerve
   4. Neuromuscular junction
   5. Muscle
Appendix D

Comprehensive Evaluation

Neurological History and Examination

Neurological Review of Systems

Recognizing that history is the key to the neurologic evaluation, perform a competent history noting the following key factors:

A. Establish the onset, progression (temporal profile) and character of the disorder identifying all related symptoms and exacerbating/relieving factors

B. Perform a standard neurological review of symptoms with regard to personality, memory, headaches, pain, seizures, impairments of consciousness, vision, hearing, language function, swallowing, coordination, gait, weakness, sensory alterations, sphincter disturbance and involuntary movements, etc. (See more complete listing below.)

1. Perform the components of the general exam relevant to the neurologic evaluation to include the following:

   1. Skin examination
   2. Cardiovascular system evaluation including blood pressure and auscultation for bruits
   3. Examine for meningismus
   4. Straight-leg-raising maneuver

Mental Status and Specific Cortical Functions:

Loss of consciousness, memory loss, forgetfulness, periods of confusion, difficulty concentrating, seizures, change in intellect (decline), change in personality, nervousness, anxiety, emotional instability, irritability, crying spells, mental disease, family history, under the care of a psychiatrist or psychologist, previous psychiatric hospitalization or outpatient therapy, violence, trouble with the law, insomnia, sleep disturbances, difficulty with work, social withdrawal, drug or alcohol problems, trouble with speech) aphasia vs. dysarthria)

Local Examination:

Trauma to the head, neck or back, tenderness, degenerative disc disease, herniated disc, bone lesions, infections, headache, neck pain, back pain, sciatica, sighing hyperventilating
Cranial Nerves:

Loss of smell, loss of vision, visual blurring, double vision, loss of taste, facial numbness, facial droop/palsy, drooling, ringing in the ears (tinnitus), deafness, dizziness (vertigo), slurred speech (dysarthria), difficulty swallowing (dysphagia)
Motor:

Wasting, tremors, abnormal movements, stiffness, weakness, gait disturbances, loss of balance, strokes, tics, paralysis, dyskinesias

Sensory:

Dysesthesia, paresthesia, burns, trauma

Autonomic:

Change in bladder function, change in bowel function, impotence, other sexual problems, sweating changes

Mental Status Exam:

Level of consciousness - awake, confused, lethargic, obtunded, stupor, coma

Cognitive Function:

Orientation
1. Time (day of week, day of month, month, season, year)
2. Place (state, county, city, building, floor of building)
3. Person (who, occupation, relationships, age, place of birth, date of birth)

Attention and attention span
Serial 7s, subtraction, digit retention
(nl: Concentration forward-7; backwards-4)

Memory
a. Immediate (digit span forward and back)
b. Recent (three objects at 5 minutes)
3. Remote (history, presidents)

Intellectual
1. Education, calculations, information (political, geographical)
2. Functioning vocabulary (retarded, dull normal, normal, bright)
3. Abstraction (proverbs, similarities/differences)
4. Judgement

Behavioral Observations:
Appearance - dress, disordered, average, neat, bizarre, grooming, personal hygiene

Behavior (Affect) - labile, appropriate, flat, exaggerated, bizarre

Mood (Attitude) - detached, sad, suspicious, hostile, demanding, obstinate, anxious, friendly, cooperative, uncooperative, helpless, persistent, spontaneous, seductive, confused

Thought processes - concrete, functional, abstract

Thought Content and Perceptions - delusions, phobias, interpretations, abnormal beliefs, morbid thoughts, preoccupations, illusions, hallucinations (visual vs. auditory; formed-temporal, unformed-assoc. cortex.

Insight/Judgement - none, little, average, good

Depression/Mania

Suicide/Homicide - none, ideation, threat, attempts, no information

**Specific Cognitive Function:**

Dominance - hand, foot, eye

Speech (Motor Aspects) - slurring, dysarthria, aphasia, spontaneous (fluent, paraphasia), distinction of articulation, testing of rapid labial and lingual sounds, rhythm of speech

Content of Speech - comprehension (ability to follow commands); naming (objects, colors, fingers, word finding problems), repetition (no ifs ands buts or maybes); reading (aloud, comprehension, dysphonia), writing (dictation, copying, handwriting)

Praxis - commands, imitation with a real object, sequential acts, e.g., dressing

Right/Left disorientation

Neglect and Hemineglect - double simultaneous (visual, tactile, auditory)
Visual-spatial Topographical Function - draw the face of a clock, set a time; copying, cub

**Cranial Nerves:**

I  unilateral, bilateral odors (tobacco, coffee)

II light perception O.D. O.S.
confrontation fields
acuity (Jaeger, Snellen)
visual inattention
local exam of orbit
funduscopysty

III, IV and VI  eye position at rest (strabismus), extraocular movements, individual and conjugate eye movements, deviation, conjugate gaze, individual muscles, diplopia on extremes of gaze,
ptosis, optokinetic response, nystagmus, pursuit, saccades

Pupillary response

<table>
<thead>
<tr>
<th>size</th>
<th>shape</th>
<th>direct</th>
<th>consensual</th>
<th>convergence</th>
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<tbody>
<tr>
<td>Right</td>
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V corneal reflex, jaw reflex
sensory - 3 divisions; pin, touch (ophthalmic, maxillary, mandibular)
motor - masseters and temporalis; jaws open, bite, clench teeth

VII brow, mouth, nasolabial fold, taste anterior 2/3, hyperacusis, lacrimation, palpebral fissures volitional motor - raise eyebrows, wrinkle brow (upper nucleus); smile and frown (lower nucleus) close eyes tight, show teeth, frown, smile, puff cheeks, whistle emotional motor - joke

VIII acuity, Weber, Rhinne

Calorics

<table>
<thead>
<tr>
<th>Positional Nystagmus</th>
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<tbody>
<tr>
<td>Cold</td>
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<tr>
<td>R</td>
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<td>L</td>
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</table>
IX  swallowing, uvula, gag reflex L vs R, phonation; taste in the posterior 1/3 of tongue

X  yawn, say “ah”, elevation of palate

XI  sternocleidomastoid, trapezius; shrug shoulders, rotate head against resistance

XII  tongue protrusion, tremor, fasiculations, atrophy, asymmetry, deviations of the tongue to the right, left, or midline, tongue-rapid alternation

**Motor Exam:**

- **Inspection** - fasiculations, myokymia, tics, asterixis, contractures, abnormal movements, chorea, athetosis, dystonia, myoclonus, tremors (note amplitude and rate: resting, action, terminal, or postural) size, bulk, atrophy of muscle groups

- **Palpation** - myoedema, myotonia, consistency, tenderness, induration

- **Tone** - cogwheeling rigidity, flaccidity, hypotonia, clasp knife spasticicy, spasm, peritonea

- **Strength, Power** - distal weakness vs. proximal weakness, hemiparesis/heimplégia, push/pull testing; functional hop in place, knee bends, posture, drift (pronator or tibial)

- **Coordination:**
  - Slow RAM (rapid alternating motion), e.g., FN, FNF,HS; rebound
  - Rapid RAM; rapid alternation of tongue

- **Station** - standing, one foot, Romberg, sitting

- **Gait** - spastic, ataxic, myopathic, neuropathic, shuffling, apraxic, painful. Observe varus of feet, balance, arm swinging, turning tandem heel to toe walk, walk on toes, walk on heels, hopping, running
Reflexes:

Deep tendon reflexes (phasic stretch reflexes)
jaw jerk
biciceps (C56)
brachioradialis (C56)
pectoral
triceps
finger flexors
suprapatellar (L234)
quadriiceps (L234)
hamstrings (L45S1)
ankle/gastrocnemius (S12)

Clonus - ankle, patellar

Frontal Release Signs - glabellar, palmoment, rooting, grasp, snout, suck

Sensory:

Compare sides left to right
Compare proximal vs. distal
Dermatomes vs. peripheral nerve

Pain/pinprick (spinothalamic, contralateral)
Temperature (spinothalamic)
Crude touch (spinothalamic)

Fine touch (multiple places in cord)
Vibration (dorsal columns)
Position sense (dorsal columns)

Discriminative sensations
  two point discrimination (dorsal column
  object identifications - stereognosis
dermatographia/graphesthesiasextinction of double simultaneous stimulation
tactile inattention
localization
Autonomic/Trophic Changes - blood pressure, abnormal or absent sweating, cutaneous ulcerations, hair loss, poor circulation

Peripheral Nerve Status - enlargement, tenderness