

Telehealth Neurosurgery Presenting

1. SCOPE

- 1.1. MCHS Hospital-Based Ambulatory Care
 - Telehealth Presenters
- 1.2. MCHS Clinic Ambulatory Care
 - Telehealth Presenters
- 1.3. Facilities and departments included in the scope listed above are further defined in the [Scope Definitions Resource Guide](#) if not specifically outlined above.

2. DEFINITIONS & EXPLANATIONS OF TERMS

- 2.1. Abbreviations:
 - C: Cervical
 - EOM: Extra ocular movements
 - L: Lumbar
 - MA: Medical Assistant
 - MCHS: Marshfield Clinic Health System
 - PA: Physician Assistant
 - RN: Registered Nurse
 - ROM: Range of Motion
 - SCM: Sternocleidomastoid
 - T: Thoracic
- 2.2. Definitions
 - Ataxia: is a gait that lacks coordination with instability.
 - Conjugate eye movement refers to both eyes moving in the same direction, at the same speed, and in constant alignment
 - Cranial Nerves (12) (Hickey, 2009)
 - ◇ I Olfactory Sense of smell assessment usually deferred
 - ◇ II Optic- Vision
 - ◇ III Oculomotor- Pupil constriction; elevation of upper eyelid
 - ◇ IV Trochlear- Extraocular movement
 - ◇ V Trigeminal- Sensation to face; Mastication muscles
 - ◇ VI Abducens- Extraocular movement

- ◇ VII Facial- Muscles for facial expression
- ◇ VIII Vestibulochoclear/Auditory Nerve- Hearing and balance
- ◇ IX Glossopharyngeal- Palate, pharynx, vocal cords, and gag reflex
- ◇ X Vagus- Palate, pharynx, vocal cords, and gag reflex
- ◇ XI Spinal Accessory- Shrug shoulders and movement of head side to side
- ◇ XII Hypoglossal- Movement of tongue
- Diplopia: double vision or seeing two separate images of the same object in visual space. Diplopia results when the visual images fall on each retina at different points, rather than on the same points
- Direct Light Reflex response to light:
 - ◇ Brisk: very rapid constriction when light is introduced
 - ◇ Sluggish: constriction occurs but more slowly than expected
 - ◇ Nonreactive or fixed: no constriction or dilation is noted
- Dysarthria: defective articulation that may be caused by a motor deficit of the tongue or speech muscles.
- Dysconjugate gaze is the lack of alignment between the two visual axes
- Flaccidity: loss of muscle tone. The muscle is weak, soft, and floppy.
- Hypertonia: increased tone
- Hypotonia: decreased tone
- Intention Tremors: Absent at rest. Appear with activity and often increase as the target is neared. Causes include disorders of the cerebellar pathways, as in multiple sclerosis.
- Muscle Tone: When a normal muscle with an intact nerve supply is relaxed voluntarily; it maintains a slight residual tension. Decreased resistance suggests disease of the peripheral nervous system, cerebellar disease, or the acute stage of spinal cord injury.
- Muscle Strength Grading:
 - ◇ 5 = Active movement against gravity and full resistance; normal muscle strength
 - ◇ 4 =Active movement against gravity and some resistance; examiner can overcome muscle resistance
 - A plus [+] or a minus [-] in "4" category may be used to indicate how strong patient's muscle strength was against examiner's resistance. A "4+" indicates a large amount of resistance by examiner was necessary for patient's muscle to be finally overcome
 - ◇ 3 = Active movement against gravity
 - ◇ 2 =Active movement of body part when gravity is eliminated

- ◇ 1 =A very weak muscle contraction is palpated; only a trace of a contraction is evident, but no active movement of body part is noted
- ◇ 0 =No muscle contraction is detectable

- Muscular atrophy: refers to a loss of muscle bulk (wasting) and results from diseases of the peripheral nervous system such as diabetic neuropathy, as well as diseases of the muscles.
- Nystagmus: is a common, involuntary drift of the eye with a fast correction in the opposite direction. The movement may be rhythmic to-and-fro oscillation of the eyes that may be horizontal, vertical, rotary, or mixed in direction. The tempo of the movements can be regular, rhythmic, pendular, or jerky, with a noted fast and slow movement component.
- Postural (Action) Tremors: Postural tremors appear when the affected part is actively maintaining a posture and worsen somewhat with intention.
- Pulses: 3+= bounding, hyperkinetic, 2+= normal, 1+= weak, thready, hypokinetic, 0= absent
- Reflexes:
 - ◇ Biceps Tendon- located in the front of the bend of the elbow; located in the right antecubital fossa. The biceps reflex is elicited by placing your thumb on the biceps tendon and striking your thumb with the reflex hammer and observing the arm movement
 - ◇ Triceps Tendon- located just above the elbow bend (funny bone), the triceps reflex is measured by striking the triceps tendon directly with the hammer while holding the patient's arm with your other hand.
 - ◇ Brachioradialis- located along the thumb side of the wrist, about 2-3 inches above the round bone at the bend of the wrist. The brachioradialis reflex is observed by striking the brachioradialis tendon directly with the hammer when the patient's arm is resting. Strike the tendon roughly 2-3 inches above the wrist. This normally causes contraction of the brachioradialis and hence flexion of the elbow.
 - ◇ Patellar/Quadriceps Reflex- A reflex contraction of the quadriceps muscle resulting in a sudden involuntary extension of the leg, produced by a sharp tap to the tendon below the patella.
 - ◇ Achilles Reflex- A reflex bending of the foot resulting from contraction of the calf muscles when the Achilles tendon is sharply struck.
 - ◇ Babinski- a reflex extension of the great toe with flexion of the other toes, evoked by stroking the sole of the foot: normal in infants but otherwise denoting central nervous system damage.
 - ◇ Ankle Clonus- a reflex elicited by quick vigorous dorsiflexion of the foot while the knee is held in a flexed position resulting in repeated clonic movement of the foot as long as it is maintained in dorsiflexion. Feel for oscillations between flexion and extension of the foot indicating clonus
 - ◇ Hoffman's Sign- elicited by holding the patient's middle finger between the examiner's thumb and index finger. Ask the patient to relax their fingers

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completely. Once the patient is relaxed, using your thumbnail press down on the patient's fingernail and move downward until your nail "clicks" over the end of the patient's nail. Normally, nothing occurs. A positive Hoffman's response is when the other fingers flex transiently after the "click".

- Resting Tremors: Resting tremors are most prominent at rest and may decrease or disappear with voluntary movement. Illustrated by relatively slow, fine, pill-rolling tremor of Parkinsonism, about 5 per second.
- Rigidity: Increased tone resistance to passive movement throughout movement; due to steady contraction of flexors and extensors
- Spasticity: Resistance to passive movement for portions of the movement; due to loss of suprasegmental influence on the tonic contractions of the muscle; usually greatest in the flexors of the upper extremity and the extensors of the lower extremity.
- Visual acuity: Ability of the eyes to perceive visual detail (near and/or far). Ranges from light perception only to perception of shape, shadow, & motion; to image/color interpretation.
- Weakness: is impaired strength.

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3. PROCEDURE BODY

All clinical staff responsible for the presenting of patients to Neurology Services or any provider who may need a component of a neurological physical exam shall be proficient in providing neurological exam data via Telehealth technologies while working within scope of practice

3.1. Pre-Consult Preparation

a. See [Telehealth Core Presenting Document](#)

- Vitals signs: Be sure to select the appropriate provider and correct appointment that coincides with the provider portion of the visit before entering vitals
 - Weight
 - Blood Pressure
 - Pulse
 - Respirations
 - Temperature
 - Any vital collection displayed in Red in Dashboard should be completed

3.2. Pre-Assessment Physical If indicated by provider

- a. If indicated by provider, assess walking pulse oximetry and enter results in Provider Worksheet.
- b. Neurosurgery Provider (RN, MA, PA, Physician) will complete Neurosurgical History and Physical form with patient during Telehealth visit.

3.3. Provider Directed Physical Exam: Under direction of the provider ,the Telepresenter will assist with following physical exam while ensuring that patient is always framed appropriately so provider can see all aspects of exam.

a. Neck

- Inspect neck for muscle: symmetry, tone, size and contour. Report abnormal findings to provider
- Instruct patient to notify provider of radicular pain
- Palpate and percuss areas of neck specified by provider. Assess for radicular pain
- Instruct patient to notify you/provider of radicular pain with flexion/extension/rotation of neck
- Patient moves head and neck at direction of provider or Telepresenter. Assess for radicular pain.

b. Back

When document is printed it becomes an uncontrolled copy. Please refer to DCS system for most current version.

- Inspection
 - Provider will inspect back for muscle: symmetry, tone, size and contour.
- Palpation and Percussion-
 - Instruct patient to notify provider of radicular pain
 - Palpate and percuss areas of back and spine specified by provider. Provider will assess for radicular pain (pain traveling down arms or legs).
- Flexion/extension/rotation of neck
 - Instruct patient to notify provider of radicular pain
 - Patient moves back/torso at direction of provider or Telepresenter. Provider will assess for radicular pain

c. Neuro Exam

- Mental/cognitive status and speech exam (mentation)
 - Ensure that patient is always framed appropriately so provider can see all aspects of exam.
 - Level of consciousness-
 - Assess/observe general level of consciousness/arousal:
 - Is patient awake or asleep,
 - Alert or lethargic (drowsy, but answers questions appropriately before falling asleep again)
 - Obtunded (opens his eyes and looks at you but gives slow, confused responses).
- Affect/Mood
 - Provider will assess/observe general appearance/emotional status
 - Observe facial expressions. Does it change through interview or remain immobile (labile)?
 - Does patient express happiness, sadness, anger, or depression?
 - Does he appear restless, agitated, irritable, detached or indifferent?
 - Assess intensity of mood. How long has this lasted?
 - Is affect appropriate for stimulus/ situation?
- Cognition
 - Provider will assess/observe patient's:
 - Knowledge and vocabulary
 - Thought processes: Abstract reasoning, similarities/differences

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Thought content: Appropriate and intact or delusions, hallucinations, compulsions, paranoid, or obsessed with one idea.

□ Grooming and Personal Hygiene

- Provider will assess/observe

How is patient dressed? It takes mechanical ability to dress oneself.

Is appearance appropriate for season, climate and occasion?

Observe patient's hair, teeth, nails, skin, facial hair, use of cosmetics, and body odor. Deterioration in grooming and personal hygiene in a previously well-groomed person suggests an emotional, psychiatric, or organic brain disorder (Alzheimer's disease).

One-sided neglect may suggest a brain lesion in parietal lobe.

□ Speech and Language

- Provider will assess/observe patient for Motor Speech

Normal speech is inflected, clear and strong, fluent, and articulate, and varies in volume

Assess for coordination of muscle groups, problems with articulation, phonation, pacing, and proper matching of respirations to speech.

Note whether patient speaks spontaneously or only when asked a direct question.

Note slowness or explosiveness of speech or a staccato-like speech with pauses between syllables (scanning or Wernicke's speech).

An organically depressed person's speech usually loses animation and rhythm. People with very rapid, well-articulated speech, do not have an organic lesion. Altered mental status with slow, well-articulated speech is probably due to a psychiatric problem.

Have they lost speech and only make sounds (Alzheimer's patients)?

d. Cranial Nerves Exam

- Provider will assess/observe Extra ocular movements (EOM's) while the telepresenter performs the following exam

- Stand or sit in front of patient with patient facing you
- Hold up finger, penlight or other object in front of patient
- Instruct patient to follow a finger/object in all six directions of gaze (see figure below).

- Eyes should move together. Assess conjugate or dysconjugate gaze.

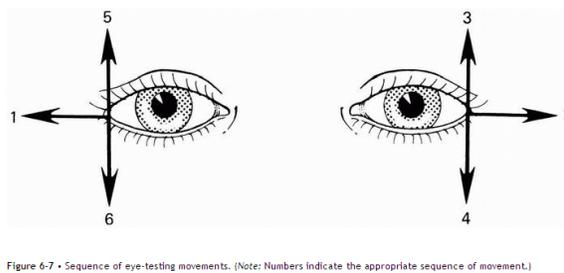


Figure 6-7 • Sequence of eye-testing movements. (Note: Numbers indicate the appropriate sequence of movement.)

- Assess/observe for nystagmus. Report to provider if present.
 - Assess/observe ask patient if problems with diplopia. Report to provider if present.
- Examination of Pupils
- Instruct patient to focus on a distant object located straight ahead.
 - Provider will assess/observe pupil size, shape, and equality.

Normal diameter of a pupil is 2 to 6 mm, with an average diameter of 3.5 mm.

Shape of pupils normally is round; however, patients who have had cataract surgery, pupils assume a keyhole shape. An ovoid pupil indicates pupillary dysfunction

□ Pupillary Reflexes

- Provider will assess/observe pupillary reflexes
- Assist provider to examine each eye direct response to light stimulus:

Dim room lights if necessary

Have patient look straight ahead

Bring light source (penlight) in from side (so they cannot see light source)

Direct beam of light through pupil.

Observe pupil and report pupil response. (Should briskly constrict at least 1 mm):

Brisk

Sluggish

Non-reactive

- Assist provider to examine each eye for consensual response to light stimulus

Have patient continue to look straight ahead

Bring light in from side and shine into pupil.

Observe opposite pupil for response

- Repeat procedure on other eye
- Report findings to provider
- Pain perception
 - Use picky and dull ends of a broken wooden applicator, tongue depressor or sharp and dull ends of a pin
 - Demonstrate difference between sharp and dull to patient.
 - Instruct patient to respond “sharp” or “dull every time skin is touched
 - Patient closes eyes
 - Touch skin with sharp and occasionally dull end of your testing tool.
 - Compare findings on each side of face

e. Motor Exam

- Motor System- As the provider assesses the motor system, he/she will focus on body position, involuntary movements, characteristics of the muscles (bulk, tone, and strength), and coordination. With the hand held camera or room camera zoom in on neuromuscular activity, proceed from neck, to upper limbs, to trunk, and, finally, to lower extremities.
- Limb evaluation proceeds from proximal to distal.
 - Not all muscles may be assessed individually, but major groups are assessed; more detailed examination may be conducted if deficits are noted in a particular area
- Involuntary Movements- provider will assess for involuntary movements such as tremors or tics, noting location, quality, rate, rhythm, and amplitude. Be prepared to use camera and/or hand held camera to zoom in on action of finite motor responses or pan out for room view to show entire patient movement.
- Body position: Provider will observe patient's body position during movement and at rest.
- Muscle bulk: Provider compares size and contours of muscles, assessing if the muscles look flat or concave. Provider may pay particular attention to hands, shoulder, and thighs when assessing for atrophy.
 - Provider will inspect muscles bilaterally note:
 - Symmetry
 - Size
 - Contour
 - Muscle wasting, atrophy, or hypertrophy
 - A tape measure can be used to measure a muscle and compare it with same muscle on

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opposite side of body. Measurements must be taken from same reference point for accuracy.

f. Muscle Tone

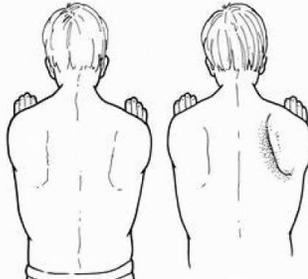
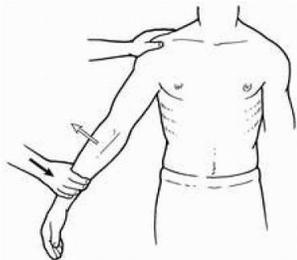
- Feel the patient's muscle resistance to passive stretch.
 - Instruct/persuade patient to relax.
- Provider to direct Telepresenter to assess muscles and joints
 - Telepresenter puts joints through normal range of motion movements (e.g., flexion and extension).
 - Systematic evaluation proceeds from:
 - shoulder, elbow, wrist, and fingers in upper extremities
 - hip, knee, and ankle in lower extremities.
 - Compare findings from left side and right side.
 - Report/note findings or variations in muscle tone to provider (e.g. normal, hypertonia or hypotonia)

g. Muscle Strength

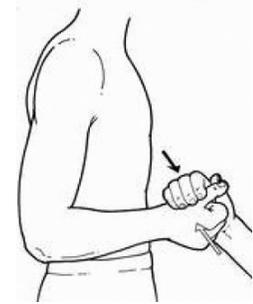
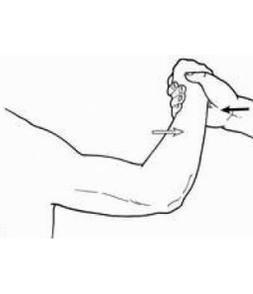
- Muscle Strength Grading:
 - Grade 5 Full ROM against gravity, full resistance
 - Grade 4 Full ROM against gravity, some resistance
 - Grade 3 Full ROM with gravity
 - Grade 2 Full ROM with gravity eliminated (passive motion)
 - Grade 1 Slight Contraction
 - Grade 0 No Contraction
- Compare functional level of each muscle/muscle group to functional level of same muscle/muscle group on opposite side (e.g. compare muscle strength of Right Bicep to Left Bicep)
- Pattern of muscle extremity evaluation includes both proximal and distal muscle groups
- Provider instructs patient to move muscles actively against gravity and then against resistance provided by Telepresenter.
- Provider decides muscles/muscle groups to be assessed and directs Telepresenter through assessment of muscle strength.
 - Make your directions to patient clear. Demonstrate movements as necessary.
 - See table below for muscle assessment details
- Upper Extremity
 - Deltoid C 5, 6
 - Biceps C 5, 6

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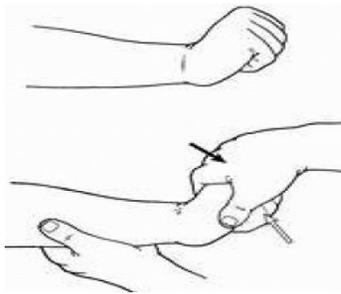
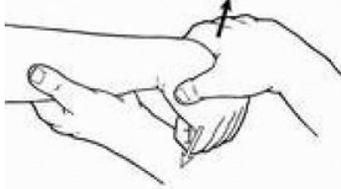
- Triceps C 6, 7, 8
 - Wrist flex/extend C7, 8
 - Grip C7, 8, T1
 - Interossei (keeping fingers spread apart) C 8, T 1
- Lower Extremity
- Iliopsoas L 1, 2, 3
 - Hip adductors L-2, L-3, L-4
 - Quadriceps L 2, 3, 4
 - Anterior Tibialis L 4, 5
 - Gastrocnemius S 1, 2
 - EHL (Big toe extension) L 5

Muscle Group/ Muscle/ Spinal Level	Patient Instructions	Examiner and Observation	Image Dark Arrow = Provider action Light Arrow = Patient action
Shoulder Serratus Anterior C 5, 6, 7	Patient pushes against a wall with arms extended horizontally in front of them. Extend your arms parallel to floor and push with your palms against wall.	Observe scapula for increased prominence of scapular tip (winging). Normally, each scapula is close to thorax. Winging suggests serratus anterior muscle weakness.	
Shoulder Deltoid C 5, 6	Instruct patient to flex elbow slightly and move upper arm away from their body. (Alternative, ask patient to position his or her arms like chicken wings.)	Try to push abducted upper arms down against resistance. Patient attempts to abduct his arm against resistance. Deltoid contraction can be seen and palpated.	

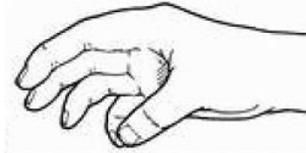
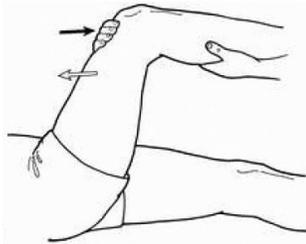
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Muscle Group/ Muscle/ Spinal Level	Patient Instructions	Examiner and Observation	Image Dark Arrow = Provider action Light Arrow = Patient action
Upper Arm Biceps C 5, 6	Flex your elbow and make a muscle with your palm parallel to shoulder.	Try to pull flexed forearm open. On attempts to flex forearm against resistance, bicep muscle contraction can be seen and palpated	 A line drawing of a person's upper arm and shoulder. The arm is flexed at the elbow with the palm facing the shoulder. A dark arrow points to the biceps muscle, and a light arrow points to the forearm, indicating the patient's action of flexing against resistance.
Upper Arm Brachioradialis C5, 6	Flex your elbow and make a muscle while your palm is pointed at midline	Try to pull flexed forearm open. On flexion at semi pronated forearm (thumb up) against resistance, muscle contraction can be seen and palpated.	 A line drawing of a person's upper arm and shoulder. The arm is flexed at the elbow with the forearm semi-pronated (thumb up). A dark arrow points to the brachioradialis muscle, and a light arrow points to the forearm, indicating the patient's action of flexing against resistance.
Upper Arm Triceps C6, 7, 8	Push me away with that same arm.	Provide resistance, thus trying to prevent extension. On attempts to extend partially flexed forearm against resistance, of triceps contraction can be seen and palpated.	 A line drawing of a person's upper arm and shoulder. The arm is partially flexed at the elbow. A dark arrow points to the triceps muscle, and a light arrow points to the forearm, indicating the patient's action of extending against resistance.
Pronator Drift	Outstretch both arms in front of you parallel to floor with hands open and palms up. Fully extend elbows and wrists also. Now close your eyes and stay that way for 20 or 30 seconds.	(May examine patient while standing or sitting.) Observe for slow pronation of wrist, slight flexion of elbow and fingers, and a downward and lateral drift of hand; called pronator drift. Suggests mild hemiparesis and may be noted before any significant weakness noted.	 A line drawing of a person's upper body from the chest up. Both arms are extended forward at shoulder level with palms facing up. This illustrates the starting position for the pronator drift test.

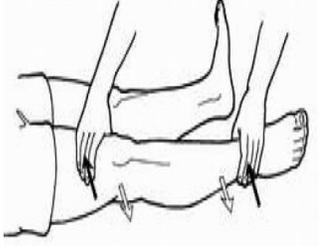
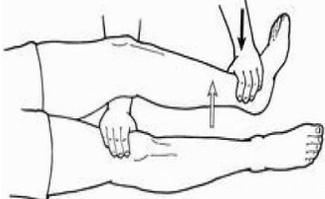
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Muscle Group/ Muscle/ Spinal Level	Patient Instructions	Examiner and Observation	Image Dark Arrow = Provider action Light Arrow = Patient action
Lower Arm Wrist Extension C7, 8	Extend your wrist and don't let me straighten it.	Examiner attempts to straighten wrist. If straightened, it suggests wrist drop. On attempts to extend hand at wrist against resistance, bellies of extensors carpi radialis longus, carpi ulnaris, and digitorum communis can be seen and palpated	
Lower Arm Wrist Flexion C7, 8	Flex your wrist and don't let me straighten it.	Examiner attempts to straighten wrist.	
Hand and Fingers Grip C7, 8, T1 Extension of fingers	Put your fingers straight out and don't let me push them down.	Try to push fingers down.	
Hand and Fingers Grip C7, 8, T1 Flexion of Fingers	Flex your fingers and don't let me straighten them.	Try to straighten fingers.	
Hand and Fingers Interossei C8, T1 Adduction of fingers	Put your hand on table with fingers slightly spread. Try to resist my attempt to pull your fingers outward.	Try to pull fingers outward.	

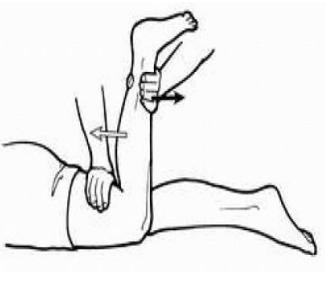
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Muscle Group/ Muscle/ Spinal Level	Patient Instructions	Examiner and Observation	Image Dark Arrow = Provider action Light Arrow = Patient action
Hand and Fingers Interossei C8, T1 Abduction of fingers	Put your hand on table and spread your fingers. Try to resist my attempt to bring fingers together.	Try to push fingers together.	
Hand and Fingers Grip C7, 8, T1 Opposition of thumb	Touch tip of your little finger with your thumb. (thumb nail should be parallel to palm.)	Try to pull thumb away from little finger with your index finger or thumb.	
Hip Iliopsoas L1, 2, 3 Hip Flexion	Flex your thigh against resistance provided (try to pull/bring knee towards head against my resistance)	Position patient supine. patient attempts to flex thigh against resistance	
Hip Iliopsoas L 1, 2, 3 Hip Flexion	Raise knee off table against my resistance.	Alternate method: patient sits on edge of exam table or chair with legs dangling. Stabilize pelvis by placing your hand over iliac crest and other hand over distal femoral portion of knee; apply resistance as patient attempts to raise knee off table	
Hip Hip adductors L2, L3, L4 Hip Adduction	Lie on your back: extend your legs; now separate them about 6 Inches, (examiner places both hands firmly	Place both hands firmly between both knees, recumbent patient attempts to adduct (move inward) extended leg against resistance; contraction of adductor muscles can be	

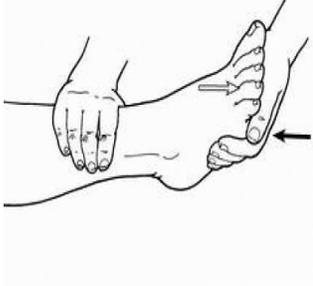
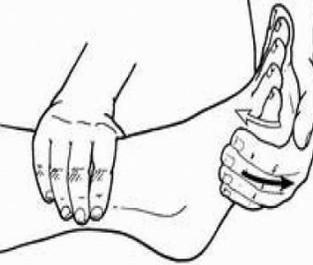
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Muscle Group/ Muscle/ Spinal Level	Patient Instructions	Examiner and Observation	Image Dark Arrow = Provider action Light Arrow = Patient action
	between both knees). Try to bring your knees together	seen and palpated. Determine how much resistance patient can overcome.	
Hip Hip abductors, Gluteus Medius and Minimus L2, L3, L4 Hip Abduction	Lie on your back: Spread both legs against my hands. Try keeping me from bring your legs together	After legs are abducted, (examiner places both hands on lateral thighs just above patient's knees.) Recumbent patient attempts to move extended leg outward against resistance; contraction of gluteus medius and tensor fasciae latae can be palpated. Determine how much resistance patient can overcome.	 <p>A line drawing of a person lying on their back. The examiner's hands are placed on the lateral thighs, just above the knees. A light arrow points upwards from the patient's feet, indicating the direction of movement. A dark arrow points downwards from the examiner's hands, indicating resistance.</p>
Hip Gluteus Maximus L5, S1, S2 Hip Extension	Instruct patient try and keep thigh from touching bed	Examiner's hand is positioned on posterior thigh and other on top; feel for muscle contraction on posterior thigh. Attempt to push leg down to bed Alternate method: ask Patient to stand from a sitting position without using arms.	 <p>A line drawing of a person sitting on a bed. The examiner's hands are positioned on the posterior thigh and the top of the thigh. A light arrow points upwards from the leg, indicating the direction of movement. A dark arrow points downwards from the examiner's hands, indicating resistance.</p>
Upper Leg Quadriceps L2, 3, 4 Knee Extension	Straighten your lower leg.	Patient prone, Stabilize thigh by placing one hand just above knee. Place other hand just above ankle and provide resistance. quadriceps for a contraction with stabilizing hand.	 <p>A line drawing of a person lying on their stomach (prone). The examiner's hands are placed on the thigh (just above the knee) and the ankle. A light arrow points upwards from the foot, indicating the direction of movement. A dark arrow points downwards from the examiner's hands, indicating resistance.</p>

PROCEDURE

Muscle Group/ Muscle/ Spinal Level	Patient Instructions	Examiner and Observation	Image Dark Arrow = Provider action Light Arrow = Patient action
Upper Leg Quadriceps L2, 3, 4 Knee Extension	Straighten your lower leg.	Alternate method: sitting on side of examining table: direct patient to extend knee	
Upper Leg Hamstrings L5, S1, S2 Knee flexion	Flex your knee. Bring foot towards head	Examiner grasps partially flexed knee about 4 inches above ankle and stabilizes hip with other hand; provides resistance against flexion.)	
Upper Leg Hamstrings L5, S1, S2 Knee flexion	Ask patient to bend knee and keep it bent while you provide resistance.	Alternate methods: have patient sit on edge of examining table with legs dangling. Ask patient to bend knee and keep it bent while you provide resistance or ask patient to squat in a deep knee bend (should be able to flex both knees symmetrically).	
Lower Leg and Ankle Anterior Tibialis L4, 5 Ankle Dorsiflexion	Examiner positions ankle in neutral position and then places other hand on top of foot near fifth metatarsal. Pull your toes toward your nose.	Anchor ankle by stabilizing heel; with your flattened fingers on top of foot, provide resistance to dorsiflexion. Patient attempts to dorsiflex foot against resistance; contraction of tibialis anterior can be seen and palpated Alternate method: ask patient to walk on heels.	

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Muscle Group/ Muscle/ Spinal Level	Patient Instructions	Examiner and Observation	Image Dark Arrow = Provider action Light Arrow = Patient action
Lower Leg and Ankle Gastrocnemius S1, 2 Plantarflexion of ankle	Press down like on gas pedal.	Anchor ankle by stabilizing heel; with your palm on bottom of foot, provide resistance to plantarflexion. Patient attempts to plantar flex foot at ankle joint against resistance; Contraction of gastrocnemius and associated muscles can be seen and palpated Alternative method: ask patient to walk on toes.	 <p>The diagram shows a lateral view of a right foot and ankle. The examiner's left hand is placed on the heel to stabilize it. The right hand is placed on the bottom of the foot, with a dark arrow pointing downwards, indicating resistance to plantarflexion. A light arrow points upwards from the ball of the foot, indicating the patient's action of plantarflexion.</p>
Ankle and Foot Foot inversion L4, 5	Try to move your foot outward and down.	Position thumb to dorsiflex and invert foot. Patient attempts to raise inner border of foot against resistance; tendon of tibialis posterior can be seen and palpated just behind medial malleolus Try to force foot into plantarflexion and eversion by pushing against head and shaft of first metatarsal; tendon of tibialis posterior can be seen and palpated behind medial malleolus.	 <p>The diagram shows a lateral view of a right foot and ankle. The examiner's left hand is placed on the medial malleolus to stabilize the ankle. The right hand is placed on the first metatarsal, with a dark arrow pointing towards the foot, indicating resistance to inversion. A light arrow points away from the foot, indicating the patient's action of inversion.</p>
Ankle and Foot Foot eversion S1 J	Turn your foot outward.	Secure ankle by stabilizing heel and place your other hand that forces plantarflexion and eversion. Provide resistance to eversion by pushing on fifth metatarsal with palm. Patient attempts to raise outer border of foot	 <p>The diagram shows a lateral view of a right foot and ankle. The examiner's left hand is placed on the heel to stabilize it. The right hand is placed on the fifth metatarsal, with a dark arrow pointing towards the foot, indicating resistance to eversion. A light arrow points away from the foot, indicating the patient's action of eversion.</p>

PROCEDURE

Muscle Group/ Muscle/ Spinal Level	Patient Instructions	Examiner and Observation	Image Dark Arrow = Provider action Light Arrow = Patient action
		<p>against resistance; tendons of peronei longus and brevis can be seen and palpated just above and behind lateral malleolus.</p> <p>Alternative method: patient walks on medial borders of feet.</p>	
<p>Toe Extensor Halucis Longus (EHL) muscle L5 Big toe extension</p>	<p>Ask patient to move large toe against resistance up towards their face.</p>	<p>Apply downward resistance on big toe while patients tried to pull toe up towards face. This tests extensor halucis longus muscle.</p>	

h. Deep Tendon Reflexes

- Radial
- Biceps
- Triceps
- Knee
- Ankle
- Hoffmans Sign
- Ankle Clonus
 - Refer to [Reflex Guide](#)
 - Encourage patient to relax.
 - Position limbs properly and symmetrically. Hold reflex hammer loosely between your thumb and index finger so that it swings freely in an arc within limits set by your palm and other fingers.
 - With wrist relaxed, strike tendon briskly using a rapid wrist movement. Reflex response depends partly on the force of your stimulus. Compare response of one side with other.
 - Clinician will grade reflexes based on following scale:
 - 4+= Very brisk, hyperactive with clonus (spasmodic alternation of muscular contraction and relaxation).

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PROCEDURE

3+= Brisker than average; possibly but not necessarily indicative of disease.

2+= Average; normal

1+= Somewhat diminished; low normal

0= No response/ absent.

i. Sensation

- Provider determines patient's ability to perceive various types of sensations.
- Compare left and right sides of body as well as sensory perceptions at distal and proximal portions of all extremities. Testing proceeds in an orderly fashion.
- Body areas commonly evaluated include face, neck, deltoid regions, forearm, hands (top side), chest, abdomen, thighs, lower legs, and feet (top surface).
- Sensory function is rated according to following scale:
 - 2: normal
 - 1: present, but diminished (abnormal)
 - 0: absent
- Sensation Assessment
 - Provider determines areas to be assessed and directs telepresenter assessment. Following areas may/may not be assessed:
 - posterior aspect of the shoulders (C4)
 - lateral aspect of the upper arms (C5)
 - medial aspect of the lower arms (T1)
 - tip of the thumb (C6)
 - tip of the middle finger (C7)
 - tip of the pinky finger (C8)
 - thorax, nipple level (T5)
 - thorax, umbilical level (T10)
 - upper part of the upper leg (L2)
 - lower-medial part of the upper leg (L3)
 - medial lower leg (L4)
 - lateral lower leg (L5)
 - sole of foot (S1)
 - Instruct patient to close eyes
 - Instruct patient to tell provider if they notice a difference in strength of sensation on each side of their body

PROCEDURE

- Touch one body part followed by corresponding body part on other side (e.g., right shoulder then left shoulder) with same instrument. This allows patient to compare sensations and note asymmetry.

- Light touch

A wisp of cotton, alcohol wipe, gauze, brush etc. is used to lightly touch various areas of skin.

Patient tells provider/you if they can feel light touch in area being assessed.



- Position

Patient closes eyes

Examiner holds patients big toe and moves it up or down. Make certain to hold toe on its sides, (holding top or bottom provides patient with pressure cues which make this test invalid. Thumb may also be used

Patient reports if their big toe is "up" or "down" when examiner manually moves patient's toe in respective direction. Repeat on opposite foot and compare.



Rapid Alternating Hand

- Provider will instruct patient to place hands on thighs and then rapidly turn hands over (supinate and pronate) and lift them off thighs. Once patient understands movement, repeat it rapidly for approximately 10 seconds. Normally this is possible without difficulty.
- Telepresenter will demonstrate activity for patient if needed.
- Provider will observe speed, rhythm, and smoothness of movements.



j. Gait

- Evaluated by having patient walk across room under observation.
- Patient may be unstable. Telepresenter protects patient from falls during assessment should stand close to patient to assure patient safety.
- Provider instructs patient to walk across room or down hall, then turn and come back. Provider assessing gait for posture, balance, decreased or non-existent arm swing, short shuffling steps (festination), difficulty in negotiating turns, and sudden freezing spells (inability to take the next step).
- Heel Walk
 - Walking on heels is most sensitive way to test for foot dorsiflexion weakness



- Toe Walk
 - Walking on toes is best way to test early foot plantar flexion weakness



- Tandem Walk (heel to toe)
 - Walking heel to toe tests integrity of the cerebellum

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- Patient walk heel to toe along a line (tandem gait).



- Gross gait abnormalities are noted by provider
- k. Proximal muscle weakness assessment (Chair Rising):
- Provider instructs patient to rise from sitting position without arm support or may have patient step up on a sturdy stool.
 - Have patient sit in a chair without arms.
 - Provider asks patient to stand without using their arms.



- Provider looks at legs for strength and balance.
- l. Posture and postural stability:
- Provider assess patient's overall/general posture
- 3.4. Post Physical Exam
- a. See [Telehealth Core Presenting Document](#)
- 3.5. Post Considerations
- a. See [Telehealth Core Presenting Document](#)

PROCEDURE

4. ADDITIONAL RESOURCES

4.1. References:

- Hickey, J. (2009). The Clinical Practice of Neurological and Neurosurgical Nursing, (6th ed.). Philadelphia, PA: Lippincott Williams & Wilkins. (Chapters 6 and 7). Retrieved from Database Marshfield Clinic Books@Ovid July 2013.
- Russell, S., Triola, M. (2006) The Precise Neurological Exam. New York University School of Medicine retrieved from <http://informatics.med.nyu.edu/modules/pub/neurosurgery/index.html>
- Jarvis, C. Pocket Companion for Physical Examination & Health Assessment. 6th ed. St. Louis, MO: Elsevier Saunders; 2012.

4.2. Supporting documents available:

- [Reflex Guide](#)
- [Telehealth Core Presenting Document](#)

5. DOCUMENT HISTORY

Version No.	Revision Description
.0	New Document
2.0	Removed Marshfield Clinic Logo, Updated Quick Part in Header, Reformat of Section 2.