

Neurological Assessment Handbook for Physiotherapists

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Dedication

This book is dedicated to my wife and my friends who helped me maintain my sanity while writing this book. Not to mention, to my parents who have been a constant support since I was born and almighty who has always blessed me.

CHAPTER 1-

SUBJECTIVE ASSESSMENT

While objective clinical testing is important and is given a lot of focus within clinical training programs, subjective assessment and history taking is one of the key aspects of the clinical reasoning process. A detailed subjective assessment will help a physiotherapist form provisional hypotheses as to the potential causes of the patient's presentation and therefore form the basis of the subsequent objective assessment.

Additionally, subjective history taking provides the first opportunity to establish the direct therapeutic relationship with patients and listen to their story with an unfolding of symptoms, problems and feelings. Epstein et al (2008) proposed that an accurate history taking will provide 80% of the information required for developing a diagnosis. On the other hand, a vague history and unclear description of the issues patient is experiencing will only lead to poor planning of objective examination and subsequently leading to poor clinical outcomes. But what makes a good subjective examination?

Demographic Data

The first and foremost thing when we approach any patient is to fill in their demographic data. This allow for the identification of a patient and his categorization into categories for the purpose of identity and statistical analysis

Demographic information examples **include**: name, age, race, ethnicity, gender, marital status, income, education, and employment. You can easily and effectively collect these types of information from the patient by mere conversation.

Points to be noted in Demographic data for assessment purpose :

1. Name – (XXXXXX XXXXXX) Used for identification, and interaction purpose, as individuals react by their name more fondly, specially neuro patients who may not be in fully conscious state. Also tells us about their ethnicity, which may detail us about their lifestyle, genepool, eating habits etc
2. Age –(XXyrs) Tells a lot about the prognosis, age related disorders etc

3. Gender – M/F – Gender related disorders
4. Occupation- Tells us about their activity level, work nature and its plausible effects on the body, like some occupational hazards ex. Corporate Cervial Spondylolysis , LBA etc
5. Address : Tells us about their regional conditions ex elevation, pollution, humidity and relatable clinical symptoms
6. Phone Number: For ease of contact
7. Handedness : Tells us about their dominant side
8. Chief Complaints: Now this is where the patient tells everything about his present complaints in his own style. It's always better to encourage him to speak all about his present illness in detail and while listening note down the imp details necessary for making the diagnosis
9. IPD/OPD No.- Registration number of the patient for record keeping
10. Date : Record keeping, and for progress charting
11. Provisional Diagnosis: The unconfirmed diagnosis made on the basis of subjective assessment

Name:	Age:
Gender:	Occupation:
Address:	
Phone:	Handedness:
IPD/OPD No:	Date:
Chief Complaints:	
Provisional Diagnosis:	

Table1.1 : Demographic data

HISTORY TAKING

Taking the patient's history is traditionally the first step in virtually every clinical encounter. A thorough neurologic history allows the physiotherapist to define the patient's problem and, along with the result of physical examination, assists in formulating an etiologic and/or pathologic diagnosis in most cases.

Past medical history

Some neurological problems can present years after a causative event .

- Enquire about other medical problems, past and present. These may give clues to the diagnosis. For example:

- A person in atrial fibrillation may be producing multiple tiny emboli.
- There may be vascular problems or recurrent miscarriage to suggest antiphospholipid syndrome.
- There may be diabetes mellitus.

Ask about pregnancy, delivery and neonatal health.

Ask about any infections, convulsions or injuries in infancy, childhood or adult life.

Particularly ask about head or spinal injury, meningitis or encephalitis.

Presenting History

- Ask about the symptoms:
 - What are they?
 - Which part of the body do they affect? Are they localised or more widespread?
 - When did they start?
 - How long do they last for?
 - Were they sudden, rapid or gradual in onset? Is there a history of trauma?
 - Are the symptoms static or deteriorating, or are there exacerbations and remissions? For example, worsening of symptoms with hot environments - eg, sauna, hot bath or hot weather in demyelinating disorders (called Uhthoff's sign).

- Does anything trigger the symptoms - eg, exercise, sleep, posture or external stimuli such as light or smell?

Ask about any associated symptoms (other features of neurological disease):

- Headache.
- Numbness, pins and needles, cold or warmth.
- Weakness, unsteadiness, stiffness or clumsiness.
- Nausea or vomiting.
- Visual disturbance.
- Altered consciousness.
- Psychological changes - eg, agitation, tearfulness, depression or elation, sleep disturbance.
- For children, ask about performance at school.

Try to understand how the symptoms may affect the patient's life - ask about activities of daily living.

Systematic enquiry

The systematic enquiry is very important here. For example:

- Loss of weight and appetite may suggest malignancy and this may be a paraneoplastic syndrome.
- Gain in weight may have precipitated diabetes mellitus.
- Polyuria may suggest diabetes mellitus. Difficulty with micturition or constipation may be part of the neurological problem but was not volunteered in the general history. In men, enquire about erectile dysfunction.

Social history

- Note smoking and drinking habits. Alcohol is a significant neurotoxin, both centrally and peripherally.

- Ask about drugs, including prescribed, over-the-counter and illicit (such as cocaine usage that can be linked to cardiovascular problems). This includes complementary and alternative medicines.
- Ask about occupation and what it involves. There may be exposure to toxins. Is repetitive strain injury likely? Is there prolonged visual work which may predispose to tension-type headache or migraine? The job may involve driving but the patient has admitted to convulsions. He/she may work at heights or in a dangerous environment.
- Ask about marital status. Has there been recent bereavement or divorce which may have affected symptoms?
- Ask about sexual orientation and consider the likelihood of sexually transmitted infection - eg, syphilis, HIV.

Family history

Consider if there may be a genetic basis or predisposition. For example:

- A cousin with Duchenne muscular dystrophy or Becker's muscular dystrophy would be very important for a boy who cannot run like his peers.
- Huntington's chorea is unusual in that it is a familial disease that does not present until well into adult life.
- A family history of, for example, type 2 diabetes mellitus, cerebral aneurysm, neuropathies, epilepsy, migraine or vascular disease may be important.

Past Medical History:

Present History:

Personal History:

Family History:

Socioeconomic History:

Table1.2 History Taking

VITALS

Vital signs are an important component of patient care and assessment. They determine which treatment protocols to follow, provide critical information needed to make life-saving decisions, and confirm feedback on treatments performed. Accurate, documented vital signs are a very important part of assessment. The four components of a set of vitals include blood pressure (BP), pulse, respiratory rate, and temperature.

Temperature:	Heart Rate:
Blood Pressure:	Respiratory Rate:

Table 1.3 Vitals

CHAPTER- 2

OBJECTIVE EXAMINATION

Objective or Physical examination is the process of evaluating objective anatomic findings through the use of observation, palpation, percussion, and auscultation. The information obtained must be thoughtfully integrated with the patient's history and pathophysiology. Moreover, it is a unique situation in which both patient and physiotherapist understand that the interaction is intended to be diagnostic and therapeutic. The physical examination, thoughtfully performed, should yield most of the data necessary for patient diagnosis and management.

1. **On Observation** : The therapist has to keenly observe the patient without touching him/her for the following aspects:

- Attitude of limbs:
- Built:
- Posture:
- Gait: Pattern of Movement:
- Mode of Ventilation:
- Type/ Pattern of Respiration:
- Oedema:
- Muscle Wasting:
- Pressure Sores:
- Deformity:
- Wounds:
- External Appliances:

2. **On Palpation:** Now the therapist touches/palpates the patient to evaluate the following:

- Warmth:
- Tenderness:
- Tone:
- Swelling:

3. **On Examination:** Now the therapist performs certain examinations on the patient to evaluate the following:

Higher Mental functions

- Level of Consciousness: GCS Scale (Table 2.1)
- Orientation:
 - Person:
 - Place:
 - Time:
- Memory:
 - Immediate:
 - Recent:
 - Remote:
 - Verbal:
 - Visual:
- Communication
- Cognition:
 - Fund of Knowledge:
 - Calculation:
 - Proverb Interpretation:
- Attention:
- Emotional Status:
- Perception:
- Body Scheme/ Body Imaging:
- Agnosias/ Apraxias:
- Special Senses:

Glasgow Coma Scale: /15

E (Best eye response) 4

- 1. No eye movement**
- 2. Eye opens to pain**
- 3. Eye opens to verbal command**
- 4. Eye opens spontaneously**

V (Best verbal response) 5

- 1. No verbal response**
- 2. Incomprehensible sounds**
- 3. Inappropriate words**
- 4. Confused**
- 5. Orientated**

M (Best motor response) 6

- 1. No motor response**
- 2. Extension to pain**
- 3. Flexion to pain**
- 4. Withdrawal from pain**
- 5. Localising pain**
- 6. Obeys commands**

Table 2.1 GCS Scale

- Cranial Nerve Testing

Cranial Nerve Integrity and How to test it

Cranial Nerve	Examination	Involvement
CN I - olfactory	- Test sense of smell by closing the other nostril and using non-irritating odors like coffee, lemon oil, etc	- Inability to detect smells (Anosmia) = temporal lobe lesions
CN II - optic	- Test visual acuity using a Snellen chart, test central and peripheral vision	- Blindness, impaired vision: far (myopia) and near (presbyopia)
CN II – optic CN III – oculomotor	- Test pupil equality, size and shape - Test pupil constriction by shining a light in the eye	- Absence of pupil constriction - Unequal pupils (anisocoria) - Horner's syndrome - CN III paralysis
CN III – oculomotor CN IV – trochlea CN VI - abducens	- Test extraocular movements - Observe eye position, presence of strabismus (loss of ocular alignment) or ptosis of eyelid - Test pursuit eye movement without head movement	- Strabismus and impaired eye movement - CN III: Ptosis, pupil dilation - CN IV: Eye cannot look down when adducted - CN VI: Eye pulled inward, eye cannot look out
CN V - trigeminal	- Pain and light touch sensation of face (forehead, cheeks, jaw) - Open and close jaw against resistance - Test corneal and jaw jerk reflex	- Loss of facial sensation and numbness - Loss of ipsilateral corneal reflex - Weakness and wasting of mastication muscles - Jaw deviation when opened to ipsilateral side
CN VII - facial	- Test motor function of the facial muscles and look for asymmetry: raise eyebrows, frown, smile, close eyes tightly, puff cheeks, etc.	- Ipsilateral paralysis of facial muscles: unable to close eye, mouth corner droops, difficulty with speech articulation = peripheral nerve injury (PNI) Bell's Palsy (CN VII); or facial paralysis due to stroke

CN VIII - vestibulocochlear	<ul style="list-style-type: none"> - Test balance - Gaze instability with head rotations - Test auditory acuity with a tuning fork placed in the middle on top of the head and check if the sound is equal or louder in one ear (Weber's test) - Vibrating tuning fork place on mastoid bone, then near the ear canal and note hearing acuity (Rinne's test) 	<ul style="list-style-type: none"> - Vertigo and disequilibrium - Nystagmus - Deafness, tinnitus and hearing loss - Unilateral conductive loss - Sensorineural loss: sound heard in good ear - Conductive loss: sound heard through bone is longer or equal than air - Sensorineural loss: sound heard longer through air
CN IX – glossopharyngeal CN X - vagus	<ul style="list-style-type: none"> - Listen to voice quality - Test for difficulty swallowing - Let the patient say “ah” and observe the soft palate elevating and that the uvula remain in midline - Examine the gag reflex 	<ul style="list-style-type: none"> - Dysphonia - Dysphagia - With paralysis the palate does not elevate (lesion CN V), unilateral paralysis there is asymmetrical elevation - Absent gag reflex (lesion CN IX, possibly X)
CN XI - accessory	<ul style="list-style-type: none"> - Examine muscle bulk - Test Trapezius and Sternocleidomastoid muscles against resistance 	<ul style="list-style-type: none"> - Atrophy, fasciculations, weakness PNI: shoulder droops and unable to shrug ipsilateral shoulder - Unable to turn the head to the contralateral side
CN XII - hypoglossal	<ul style="list-style-type: none"> - Examine protruded tongue: rapid side-to-side movements - Examine the tongue's resting position - Listen to the patient's word articulations 	<ul style="list-style-type: none"> - Movement impairment: deviation to weak side - Atrophy or tongue fasciculations - Dysarthria (CN X or XII lesions)

Table 2.2 CN Testing Technique and Region Affected (Credits Physiopedia)

Name	Comment	Name	Comment
I-Olfactory		VII-Facial	
II- Optic		VIII-Vestibular	
III- Oculomotor		IX- Glossopharangeal	
IV-Trochlear		X-Vagus	
V- Trigeminal		XI-Accessory	
VI-Abducent		XII-Hypoglossal	

Table 2.3 Cranial Nerve Testing

Sensory Testing :

- The sensory exam involves evaluation of pain (or temperature), light touch, position sense, vibration, and discriminative sensations. This portion of the exam is very subjective, and may become unreliable if repeated in quick succession. Therefore, your exam should not be rushed, but must proceed efficiently. Compare symmetrical areas on both sides of the body and compare proximal to distal areas.

Pain:

- Test pain using a sharp object. Objects frequently used include the point of a safety pin or a wooden tongue depressor broken to create a sharp edge. Take care not to puncture the skin, and remember that universal precautions require you to discard the instrument after examination. Using the sharp point, apply light pressure to the skin. At minimum, test the shoulders, arms and legs, comparing side to side and proximal to distal areas. In any area where the patient complains of sensory loss or hypersensitivity, more detailed testing may be required.

Light touch:

- Using your fingertips or a wisp of cotton, lightly stroke the skin and determine if the patient feels this symmetrically in all areas tested. Again, test the areas outlined above.

Temperature:

- Usually, if pain sensation has been tested and is normal, there is no need to test temperature sensation. To test cold sensation, apply the cool tines of your tuning fork to the skin in the areas outlined above. To test warm sensation, use a glass tube or other container filled with warm water.

Position sense:

- With the patient's eyes closed, test his ability to determine the direction of movement as you move the great toe upward or downward. When moving a digit, it is important to grasp it on both sides, rather than on the top and bottom. This is because pressure sensation on the top or bottom of the digit will help the patient determine position sense, even if proprioception is impaired. Repeat several times on each side, and in upper extremities using the thumb. Test a more proximal joint (for example ankle or wrist) if an abnormal response is obtained.

Vibration:

- Test vibratory sense on each side, using a 128 Hz or 256 Hz tuning fork, by placing the vibrating fork on the bony prominence of a finger or toe. Ask the patient to tell you what he feels. He should report this sensation as a vibration. Then ask him to tell you when he no longer feels the vibration. If there is impaired vibratory sense, test a more proximal bony prominence. With aging, vibratory sense may be diminished or lost in the feet and ankles.
- A disproportionate loss of vibratory sense and proprioception (compared to pain sensation) tends to suggest disease of the dorsal columns (e.g. tabes dorsalis, Vitamin B12 deficiency, multiple sclerosis) or demyelinating neuropathies.

Discriminative sense:

- The sensory cortex is involved in correlating, analyzing, and interpreting sensations. Three tests used to evaluate these abilities are: two-point discrimination, stereognosis and graphesthesia. These tests are dependent on the patient having a normal sense of touch, or only minimally impaired. The patient's eyes should be closed for each of these tests.

Location	Upper Extremity		Lower Extremity		Trunk		Comments
	Rt.	Lt	Rt.	Lt.	Rt.	Lt.	
Sensation							
Superficial							
Pain							
Temperature							
Touch							
Pressure							
Deep							
Mov. Sense							
Pos. Sense							
Vibration							
Cortical							
Tactile Localization							
2 pt. discrimination							
Stereognosis							
Barognosis							
Graphesthesia							
Texture Recognition							
Double Simultaneous Stimulation							

Table 2.3 Sensory Testing

MOTOR EVALUATION

Muscle Girth

Area	Right (cms)	Left (cms)
Arm		
Forearm		
Thigh		
Calf		

Table 2.3 Muscle Girth

- Range of Motion

Joint	Range	Comments
Shoulder		
Elbow		
Wrist		
MCP		
Phalanges		
Cervical Region		
Hip		
Knee		
Ankle		
Meta tarsals		
Thoracic Region		
Lumbar Region		

Table 2.4 Range of Motion

- Muscle Tone : Using **Modified Ashworth's scale**

Scoring

0 -No increase in tone

1- slight increase in tone giving a catch when slight increase in muscle tone, manifested by the limb was moved in flexion or extension.

1+ :slight increase in muscle tone, manifested by a catch followed by minimal resistance throughout (ROM)

2 :more marked increase in tone but more marked increased in muscle tone through most limb easily flexed

3: considerable increase in tone, passive movement difficult

4: limb rigid in flexion or extension

Muscle Tone:

Muscles	Rt.	Lt.
Shoulder		
Flexors		
Extensors		
Abductors		
Adductors		
External Rotators		
Internal Rotators		
Elbow		
Flexors		
Extensors		
Forearm		
Pronators		
Supinators		
Wrist		
Flexors		
Extensors		
Radial Deviators		
Ulnar Deviators		
Hand		
Intrinsics		
Extrinsics		

Muscles	Rt.	Lt.
Hip		
Flexors		
Extensors		
Abductors		
Adductors		
External Rotators		
Internal Rotators		
Knee		
Flexors		
Extensors		
Ankle		
Dorsiflexors		
Plantarflexors		
Foot		
Invertors		
Evertors		
Intrinsics		
Extrinsics		

Table 2.5 Muscle Tone Charting

- **Muscle Power :**

Muscle power grading **or** muscle strength testing is an important part of the neurological examination that could reveal details regarding neurologic deficits.

The main purpose of muscle power grading is to assess the complaint of weakness if there is a suspected neurologic disease or muscle weakness. It Includes

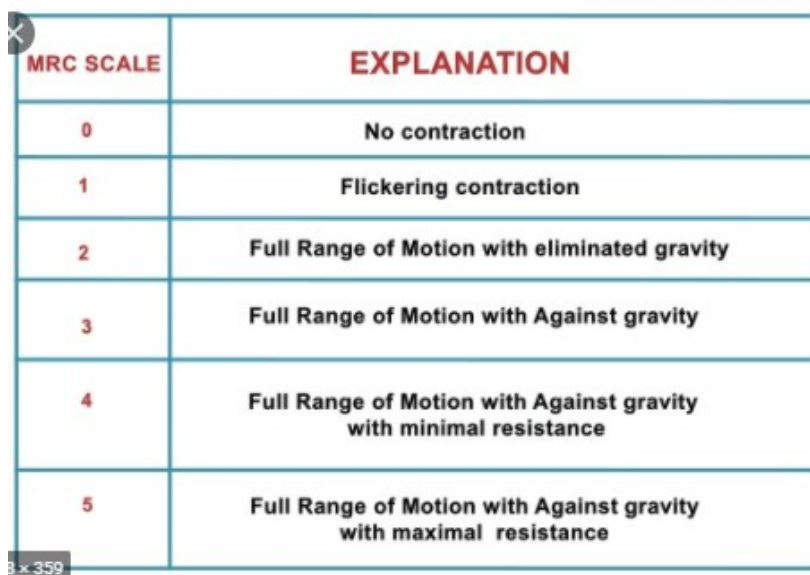
- Patients who are suffering from brain injury, stroke, spinal cord injury, neuropathy, and other neurological problems.
- Gait and Balance Issues in Elderly patients.
- After Joint replacements eg TKR
- Rehabilitation after any sports injuries eg ACL repair.

The most commonly accepted way of assessing muscle power/strength is the Medical Research Council's scale (MRC scale) of muscle power. This method involves the testing of key muscles in the upper and lower extremities.

And then grading the power of specific muscle groups for example like in case of large joint muscles (hip or knee joint) or individual muscles for example like muscles of hands or feet in relation to the movement of a single joint on a 0 to 5 scale accordingly.

For example – Muscles producing a common action or actions may be analyzed as a group or every muscle may be analyzed separately. for example, flexor carpi ulnaris and flexor carpi radialis muscles may be analyzed together as a set/group in wrist flexion. While Flexor carpi ulnaris may be analyzed more especially for the action of wrist flexion with ulnar deviation.

Use MRC scale to grade the group of muscles in the table/chart below:



MRC SCALE	EXPLANATION
0	No contraction
1	Flickering contraction
2	Full Range of Motion with eliminated gravity
3	Full Range of Motion with Against gravity
4	Full Range of Motion with Against gravity with minimal resistance
5	Full Range of Motion with Against gravity with maximal resistance

Figure 2.1 The Medical Research Council Scale

Muscle Tone

Muscles	Rt.	Lt.
Shoulder		
Flexors		
Extensors		
Abductors		
Adductors		
External Rotators		
Internal Rotators		
Elbow		
Flexors		
Extensors		
Forearm		
Pronators		
Supinators		
Wrist		
Flexors		
Extensors		
Radial Deviators		
Ulnar Deviators		
Hand		
Intrinsics		
Extrinsics		

Muscles	Rt.	Lt.
Hip		
Flexors		
Extensors		
Abductors		
Adductors		
External Rotators		
Internal Rotators		
Knee		
Flexors		
Extensors		
Ankle		
Dorsiflexors		
Plantarflexors		
Foot		
Invertors		
Evertors		
Intrinsics		
Extrinsics		

Trunk Flexors		
Trunk Extensors		
Trunk Side Flexors		
Trunk Rotators		

Table 2.6 Muscle Tone

- **Reflexes**

Superficial Reflexes

Root Level

1. Biceps and Brachioradialis C5/C6
2. Triceps C7 (Note: Some references include C6 OR C8, however C7 is predominantly involved.)
3. Patellar L2-L4
4. Ankle S1

Superficial Reflexes

Corneal reflex (blink reflex)

1. Involuntary blinking in response to corneal stimulation
2. Afferent: nasociliary branch of ophthalmic branch (V1) of trigeminal nerve (5th nerve)
3. Efferent: facial nerve (7th nerve)

Abdominal reflex

1. Contraction of superficial abdominal muscles when stroking abdomen lightly
2. Significant if asymmetric—usually signifies a UMN lesion on the absent side.

Cremaster reflex

1. Contraction of cremaster muscle (that will pull up the scrotum/testis) after stroking the same side of superior/inner thigh
2. Absent with:
3. testicular torsion
4. upper/lower motor neuron lesions
5. L1/L2 spinal cord injury
6. ilioinguinal nerve injury (during hernia repair)

Plantar reflex

1. The plantar reflex can be:
2. Normal (Toes down-going)
3. Absent

4. Abnormal or "Babinski Present"
5. Note: It is incorrect to say 'negative Babinski'

Visceral Reflexes

Anal reflex (anal wink)

1. Reflexive contraction of the external anal sphincter upon stroking the skin around the anus (afferent: pudendal nerve; efferent: S2-S4)

Bulbocavernosus reflex

1. Anal sphincter contraction in response to squeezing the glans penis or tugging on an indwelling Foley catheter
2. Reflex mediated by S2-4 and used in patients with spinal cord injury

DTR Scale

We are not big believers in grading reflexes (grading muscle power is much more useful). Nevertheless, if you need something beyond “absent,” “present,” “brisk,” or “hyperactive” then use below. *If you have a hyperactive reflex don't forget to look for clonus.*

1. 0: absent reflex
2. 1+: trace, or seen only with reinforcement
3. 2+: normal
4. 3+: brisk
5. 4+: non-sustained clonus
6. 5+: sustained clonus

Reflexes:

	Reflex	Left	Right
Superficial	Abdominal		
	Plantar		
Deep	Biceps		
	Brachioradialis		
	Triceps		
	Knee		
	Ankle		

Table 2.7 Reflex Charting

- **Co-ordination:**

The patient is asked to conduct the following activities several times and is scored on binary score of '0' if unable to perform correctly, and '1' if able to perform correctly.

Coordination:

Non Equilibrium Tests	Rt.	Lt.	Equilibrium tests	Grade
Finger to nose			Standing: Normal Posture	
Finger opposition			Standing: Normal Posture with vision occluded	
Mass Grasp			Standing: Feet together	
Pronation/Supination			Standing on one foot	
Rebound test			Standing: Lateral trunk flexion	
Tapping (Hand)			Tandem walking	
Tapping (Foot)			Walk: Sideways	
Heel to knee			Walk: Backward	
Drawing a circle(Hand)			Walk in a circle	
Drawing a circle(Foot)			Walk on heels	
			Walk on toes	

Table 2.8 Coordination Charting

- **Involuntary Movement**

Involuntary movements compose a group of uncontrolled movements that may manifest as a tremor, tic, myoclonic jerk, chorea, athetosis, dystonia or hemiballism.

- Tremor:** Rhythmic oscillations caused by intermittent muscle contractions.
- Tics:** Paroxysmal, stereotyped muscle contractions, commonly suppressible, might be simple (single muscle group) or complex. Temporarily suppressible.
- Myoclonus:** Shock-like, arrhythmic twitches. Not suppressible.
- Chorea:** Dance-like, unpatterned movements, often approximate a purpose (e.g. adjusting clothes, checking a watch). Often rapid and may involve proximal or distal muscle groups.
- Athetosis:** Writhing movements, mostly of arms and hands. Often slow.

- vi. **Dystonia:** Sustained or repetitious muscular contractions, often produces abnormal posture.
- vii. **Hemiballismus:** wild, large-amplitude, flinging movements on one side of the body, commonly affecting proximal limb muscles but can also affect the trunk

	Resting Tremor	Postural Tremor	Action Tremor
Description	Tremor when skeletal muscle is at rest.	Tremor when skeletal muscle holding in on position against gravity.	Tremor when in process of voluntary contraction of muscle.
Physical Exam Test	Observe at rest. Observe while asking patient to do mental work (may increase).	Ask patient to extend arms and hold in mid air.	Finger to nose, rapid alternating movements or heel to shin.
Examples	Parkinson's disease, Parkinsonian tremor (e.g. medications)	Essential tremor, increase physiologic tremor (hyperthyroid, stimulants like caffeine or nicotine), Wilson's disease	Cerebellar disease, multiple sclerosis, chronic alcohol abuse

Note: There can be overlap between these categories. For example, certain forms of Parkinson's disease will exhibit postural tremor. Conversely, severe essential tremor will be present at rest. It is important to look for other signs of the suspected diagnosis to make sure you don't miss the correct one!

Table 2.9 Involuntary Movement Testing

- **Balance**
- **Cerebellar tests**

- Rhomberg – stand with feet together eyes closed for 20 seconds (note body sway):- normal = mild (-ve) / moderate (+ve)
marked (+ve)

- **Gross Balance - time (secs)**

- Single leg stand - left
- Stepping - forwards
- Stepping - backwards
- Cross over steps

- **Gait**

Step Length:

Stride Length:

Base width:

Cadence:

Biomechanical Deviations:

- **Hand Functions:**

Reaching:

Grasping:

Releasing:

- **Assistive Devices:**

CHAPTER -3

SYSTEMS REVIEW

INTEGUMENTARY SYSTEM:

Skin Status:

Pressure Sores:

- **RESPIRATORY SYSTEM:**

RS Status:

Secretions:

Pattern of breathing:

Chest wall/Thoracic spine deformity:

- **CARDIOVASCULAR SYSTEM**

CVS Status:

Deep Vein Thrombosis:

- **MUSCULOSKELETAL SYSTEM**

Contractures: Subluxations:

Joint mobility:

Other pathology:

- **BLADDER & BOWEL FUNCTIONS**

Incontinence:

- **GASTROINTESTINAL SYSTEM**

Status:

- **AUTONOMIC SYSTEM**

Vasomotor:

Pseudomotor:

Trophic Changes:

Postural Hypotension:

Reflex Sympathetic Dystrophy:

CHAPTER 4

FUNCTIONAL ASSESSMENT SCALES

THE FUNCTIONAL INDEPENDENCE MEASURE SCALE

Evaluation 1: Selfcare

Item 1. Food

Item 2. Care of appearance

Item 3. Hygiene

Item 4. Dressing upper body

Item 5. Dressing lower body

Evaluation 2: Sphincter control

Item 6. Control of bladder

Item 7. Control of bowel movements

Evaluation 3: Mobility

Item 8. Bed, chair, wheel chair

Item 9. To go to the toilets

Item 10. Bath-tub, shower

Evaluation 4: Locomotion

Item 11. Go, wheel chair

Item 12. Staircases

Evaluation 5: Communication

Item 13. Auditive comprehension

Item 14. Verbal expression

Evaluation 6: Social adjustment/cooperation

Item 15. Capacity to interact and to socially communicate

Item 16. Resolution of the problems

Item 17. Memory

Mobility **The Modified Rivermead Mobility Index***

Scoring	0	=	unable to perform
	1	=	assistance of two people
	2	=	assistance of one person
	3	=	requires supervision of verbal instruction
	4	=	requires an aid or an appliance
	5	=	independent

Item Date						
1. Turning over Please turn over from your back to your _____ side						
2. Lying to sitting Please sit up on the side of the bed						
3. Sitting balance Please sit in the edge of the bed (The assessor times the patient for 10 seconds)						
4. Sitting to standing Please stand up from your chair (The patient takes less than 15 seconds)						
5. Standing Please remain standing (The assessor times the patient for 10 seconds)						
6. Transfers Please go from your bed to the chair and back again (The assessor places the chair on the patient's unaffected side)						
7. Walking indoors Please walk for 10 meters in your usual way						
8. Stairs Please climb up and down this flight of stairs in your usual way						

TOTAL SCORE						
Staff Signature (initial – please document full signatures below)						

Taken from CSP Stroke Audit 2002: Outcome Measures used in Stroke Rehabilitation; pp-145-157

*The Modified Rivermead Mobility Index is adapted from Lennon S, Hastings M. Key physiotherapy indicators for quality of stroke care, *Physiotherapy* 1996;82(12):655-664

Barthel Index of Activities of Daily Living

Instructions: Choose the scoring point for the statement that most closely corresponds to the patient's current level of ability for each of the following 10 items. Record actual, not potential, functioning. Information can be obtained from the patient's self-report, from a separate party who is familiar with the patient's abilities (such as a relative), or from observation. Refer to the Guidelines section on the following page for detailed information on scoring and interpretation.

The Barthel Index

Bowels

- 0 = incontinent (or needs to be given enemas)
- 1 = occasional accident (once/week)
- 2 = continent

Patient's Score: _____

Bladder

- 0 = incontinent, or catheterized and unable to manage
- 1 = occasional accident (max. once per 24 hours)
- 2 = continent (for over 7 days)

Patient's Score: _____

Grooming

- 0 = needs help with personal care
- 1 = independent face/hair/teeth/shaving (implements provided)

Patient's Score: _____

Toilet use

- 0 = dependent
- 1 = needs some help, but can do something alone
- 2 = independent (on and off, dressing, wiping)

Patient's Score: _____

Feeding

- 0 = unable
- 1 = needs help cutting, spreading butter, etc.
- 2 = independent (food provided within reach)

Patient's Score: _____

Transfer

- 0 = unable – no sitting balance
- 1 = major help (one or two people, physical), can sit
- 2 = minor help (verbal or physical)
- 3 = independent

Patient's Score: _____

Mobility

- 0 = immobile
- 1 = wheelchair independent, including corners, etc.
- 2 = walks with help of one person (verbal or physical)
- 3 = independent (but may use any aid, e.g., stick)

Patient's Score: _____

Dressing

- 0 = dependent
- 1 = needs help, but can do about half unaided
- 2 = independent (including buttons, zips, laces, etc.)

Patient's Score: _____

Stairs

- 0 = unable
- 1 = needs help (verbal, physical, carrying aid)
- 2 = independent up and down

Patient's Score: _____

Bathing

- 0 = dependent
- 1 = independent (or in shower)

Patient's Score: _____

Total Score: _____

(Collin et al., 1988)

Dynamic Gait Index

The Dynamic Gait Index (DGI) was developed as a clinical tool to assess gait, [balance](#) and [fall](#) risk. It evaluates not only usual steady-state walking, but also walking during more challenging tasks.

It assesses the individuals ability to modify balance while walking in presence of external demands.

Gait level surface _____

Instructions: Walk at your normal speed from here to the next mark (20')

Grading: Mark the lowest category that applies.

(3) Normal: Walks 20', no assistive devices, good speed, no evidence for imbalance, normal gait pattern

(2) Mild Impairment: Walks 20', uses assistive devices, slower speed, mild gait deviations.

Moderate Impairment: Walks 20', slow speed, abnormal gait pattern, evidence for imbalance.

Severe Impairment: Cannot walk 20' without assistance, severe gait deviations or imbalance.

2. Change in gait speed _____

Instructions: Begin walking at your normal pace (for 5'), when I tell you “go,” walk as fast as you can (for 5'). When I tell you “slow,” walk as slowly as you can (for 5').

Grading: Mark the lowest category that applies.

Normal: Able to smoothly change walking speed without loss of balance or gait deviation. Shows a significant difference in walking speeds between normal, fast and slow speeds.

Mild Impairment: Is able to change speed but demonstrates mild gait deviations, or not gait deviations but unable to achieve a significant change in velocity, or uses an assistive device.

Moderate Impairment: Makes only minor adjustments to walking speed, or accomplishes a change in speed with significant gait deviations, or changes speed but has significant gait deviations, or changes speed but loses balance but is able to recover and continue walking.

Severe Impairment: Cannot change speeds, or loses balance and has to reach for wall or be caught.

3. Gait with horizontal head turns _____

Instructions: Begin walking at your normal pace. When I tell you to “look right,” keep walking straight, but turn your head to the right. Keep looking to the right until I tell you, “look left,” then keep walking straight and turn your head to the left. Keep your

head to the left until I tell you “look straight,” then keep walking straight, but return your head to the center.

Grading: Mark the lowest category that applies.

Normal: Performs head turns smoothly with no change in gait.

Mild Impairment: Performs head turns smoothly with slight change in gait velocity, i.e., minor disruption to smooth gait path or uses walking aid.

Moderate Impairment: Performs head turns with moderate change in gait velocity, slows down, staggers but recovers, can continue to walk.

Severe Impairment: Performs task with severe disruption of gait, i.e., staggers outside 15” path, loses balance, stops, reaches for wall.

4. Gait with vertical head turns _____

Instructions: Begin walking at your normal pace. When I tell you to “look up,” keep walking straight, but tip your head up. Keep looking up until I tell you, “look down,” then keep walking straight and tip your head down. Keep your head down until I tell you “look straight,” then keep walking straight, but return your head to the center.

Grading: Mark the lowest category that applies.

Normal: Performs head turns smoothly with no change in gait.

Mild Impairment: Performs head turns smoothly with slight change in gait velocity, i.e., minor disruption to smooth gait path or uses walking aid.

Moderate Impairment: Performs head turns with moderate change in gait velocity, slows down, staggers but recovers, can continue to walk.

Severe Impairment: Performs task with severe disruption of gait, i.e., staggers outside 15” path, loses balance, stops, reaches for wall.

Gait and pivot turn _____

Instructions: Begin walking at your normal pace. When I tell you, “turn and stop,” turn as quickly as you can to face the opposite direction and stop.

Grading: Mark the lowest category that applies.

Normal: Pivot turns safely within 3 seconds and stops quickly with no loss of balance.

Mild Impairment: Pivot turns safely in > 3 seconds and stops with no loss of balance.

Moderate Impairment: Turns slowly, requires verbal cueing, requires several small steps to catch balance following turn and stop.

Severe Impairment: Cannot turn safely, requires assistance to turn and stop.

Step over obstacle _____

Instructions: Begin walking at your normal speed. When you come to the shoebox, step over it, not around it, and keep walking.

Grading: Mark the lowest category that applies.

Normal: Is able to step over the box without changing gait speed, no evidence of imbalance.

(2) Mild Impairment: Is able to step over box, but must slow down and adjust steps to clear box safely.

Moderate Impairment: Is able to step over box but must stop, then step over. May require verbal cueing.

Severe Impairment: Cannot perform without assistance.

Step around obstacles _____

Instructions: Begin walking at normal speed. When you come to the first cone (about 6' away), walk around the right side of it. When you come to the second cone (6' past first cone), walk around it to the left.

Grading: Mark the lowest category that applies.

Normal: Is able to walk around cones safely without changing gait speed; no evidence of imbalance.

Mild Impairment: Is able to step around both cones, but must slow down and adjust steps to clear cones.

Moderate Impairment: Is able to clear cones but must significantly slow, speed to accomplish task, or requires verbal cueing.

Severe Impairment: Unable to clear cones, walks into one or both cones, or requires physical assistance.

Steps _____

Instructions: Walk up these stairs as you would at home, i.e., using the railing if necessary. At the top, turn around and walk down.

Grading: Mark the lowest category that applies.

Normal: Alternating feet, no rail.

Mild Impairment: Alternating feet, must use rail.

Moderate Impairment: Two feet to a stair, must use rail.

Severe Impairment: Cannot do safely.

TOTAL SCORE: ____ / 24

Scoring

A four-point ordinal scale, ranging from 0-3. "0" indicates the lowest level of function and "3" the highest level of function.

Total Score = 24

Interpretation < 19/24 = predictive of falls in the elderly, > 22/24 = safe ambulators

- **Investigation Findings:**
- **Problem List**
- **Functional Diagnosis:**

CHAPTER 5 MANAGEMENT

- **Goals:**

Short term:

Long term:

- **Treatment:**

CHAPTER 6

REFERENCES

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APPENDIX

SAMPLE FORMAT

NEUROLOGICAL PHYSIOTHERAPY EVALUATION FORM

--

I. Subjective Assessment

Name: Age: Gender: M/F IP/OP

Occupation: Handedness: R/L Referred by:

Address:

Chief Complaints:

Past Medical History:

Personal History:

Family History:

Socioeconomic History:

Symptoms History:

Side: Site:

Onset: Duration:

Type: Severity:

Aggravating Factors:

Relieving Factors:

Vital Signs:

Temperature:		Heart Rate:	
Blood Pressure:		Respiratory Rate:	

II. Objective Examination

a) ON OBSERVATION:

Attitude of limbs:

Built:

Posture:

Gait:

Pattern of Movement: Mode of

Ventilation:

Type/ Pattern of Respiration: Oedema:

Muscle Wasting: Pressure

Sores: Deformity: Wounds:

External Appliances:

b) ON PALPATION

Warmth: Tenderness:

Tone: Swelling:

c) ON EXAMINATION

HIGHER MENTAL FUNCTIONS

Level of Consciousness:

Orientation:

Person: Place: Time:

Memory:

Immediate: Recent: Remote:

Verbal:

Visual: Communication:

Cognition:

Fund of Knowledge: Calculation:

Proverb Interpretation: Attention:

Emotional Status:

Perception:

Body Scheme/ Body Imaging: Agnosias/

Apraxias:

Special Senses:

Cranial Nerves:

Nerves	Comments	Nerves	Comments
I - Olfactory		VII - Facial	
II - Optic		VIII - VestibuloCochlear	
III - Oculomotor		IX - Glossopharyngeal	
IV - Trochlear		X - Vagus	
V - Trigeminal		XI - Accessory	
VI - Abducent		XII - Hypoglossal	

SENSORY SYSTEM:

Location	Upper Extremity		Lower Extremity		Trunk		Comments
	Rt.	Lt.	Rt.	Lt.	Rt.	Lt.	
Sensation							
Superficial							
Pain							
Temperature							
Touch							
Pressure							
Deep							
Mov. Sense							
Pos. Sense							
Vibration							
Cortical							
Tactile Localization							
2 pt. discrimination							
Stereognosis							
Barognosis							
Graphesthesia							
Texture Recognition							
Double Simultaneous Stimulation							

MOTOR SYSTEM:**Muscle Girth:**

Area	Rt.(cm.)	Lt.(cm.)
Arm		
Forearm		
Thigh		
Calf		

Voluntary Control:

Side	Rt.	Lt.
Upper Limb		
Lower Limb		

Range of Motion:

Joint	Side	Movement	Limitation	Limiting factor
Shoulder				
Elbow				
Forearm				
Wrist				
Hand & Fingers				
Hip				
Knee				
Ankle & foot				

Cervical Spine				
Thoracic Spine				
Lumbar Spine				

Limb Length

Side	Rt.(cm.)	Lt.(cm.)
True		
Apparent		

Muscle Tone:

Muscles	Rt.	Lt.
Shoulder		
Flexors		
Extensors		
Abductors		
Adductors		
External Rotators		
Internal Rotators		
Elbow		
Flexors		
Extensors		
Forearm		
Pronators		
Supinators		
Wrist		
Flexors		
Extensors		
Radial Deviators		
Ulnar Deviators		
Hand		
Intrinsics		
Extrinsics		

Muscles	Rt.	Lt.
Hip		
Flexors		
Extensors		
Abductors		
Adductors		
External Rotators		
Internal Rotators		
Knee		
Flexors		
Extensors		
Ankle		
Dorsiflexors		
Plantarflexors		
Foot		
Invertors		
Evertors		
Intrinsics		
Extrinsics		

Muscle Power:

Muscles	Rt.	Lt.
Shoulder		
Flexors		
Extensors		
Abductors		
Adductors		
External Rotators		
Internal Rotators		
Elbow		
Flexors		
Extensors		
Forearm		
Pronators		
Supinators		
Wrist		
Flexors		
Extensors		
Radial Deviators		
Ulnar Deviators		
Hand		
Intrinsics		
Extrinsics		

Muscles	Rt.	Lt.
Hip		
Flexors		
Extensors		
Abductors		
Adductors		
External Rotators		
Internal Rotators		
Knee		
Flexors		
Extensors		
Ankle		
Dorsiflexors		
Plantarflexors		
Foot		
Invertors		
Evertors		
Intrinsics		
Extrinsics		

Trunk Flexors		
Trunk Extensors		
Trunk Side Flexors		
Trunk Rotators		

Reflexes:

	Reflex	Left	Right
Superficial	Abdominal		
	Plantar		
Deep	Biceps		
	Brachioradialis		
	Triceps		
	Knee		
	Ankle		

Pathological:

Coordination:

Non Equilibrium Tests	Rt.	Lt.
Finger to nose		
Finger opposition		
Mass Grasp		
Pronation/Supination		
Rebound test		
Tapping (Hand)		
Tapping (Foot)		
Heel to knee		
Drawing a circle(Hand)		
Drawing a circle(Foot)		

Equilibrium tests	Grade
Standing: Normal Posture	
Standing: Normal Posture with vision occluded	
Standing: Feet together	
Standing on one foot	
Standing: Lateral trunk flexion	
Tandem walking	
Walk: Sideways	
Walk: Backward	
Walk in a circle	
Walk on heels	
Walk on toes	

Involuntary Movements:

Balance:

Sitting:

Standing:

Balance Reactions:

Posture:

Lying:

Sitting:

Standing:

Gait

Step Length:

Stride Length:

Base width:

Cadence:

Biomechanical Deviations:

Hand Functions:

Reaching:

Grasping:

Releasing:

Assisstive Devices:

III. Systems Review:

INTEGUMENTARY SYSTEM:

Skin Status:

Pressure Sores:

RESPIRATORY SYSTEM:

RS Status:

Secretions:

Pattern of breathing:

Chest wall/Thoracic spine deformity:

CARDIOVASCULAR SYSTEM

CVS Status:

Deep Vein Thrombosis:

MUSCULOSKELETAL SYSTEM

Contractures:

Subluxations:

Joint mobility:

Other pathology:

BLADDER & BOWEL FUNCTIONS

Incontinence:

GASTROINTESTINAL SYSTEM

Status:

AUTONOMIC SYSTEM

Vasomotor:

Pseudomotor:

Trophic Changes:

Postural Hypotension:

Reflex Sympathetic Dystrophy:

IV. Functional Assessment: (The Functional Independence Measure) Evaluation 1:

Selfcare

Item 1. Food

Item 2. Care of appearance Item 3.

Hygiene

Item 4. Dressing upper body Item 5.

Dressing lower body

Evaluation 2: Sphincter control Item 6.

Control of bladder

Item 7. Control of bowel movements

Evaluation 3: Mobility

Item 8. Bed, chair, wheel chair Item 9.

To go to the toilets Item 10. Bath-tub,
shower

Evaluation 4: Locomotion

Item 11. Go, wheel chair Item 12.

Staircases

Evaluation 5: Communication

Item 13. Auditive comprehension Item 14.

Verbal expression

Evaluation 6: Social adjustment/cooperation

Item 15. Capacity to interact and to socially communicate Item 16.

Resolution of the problems

Item 17. Memory

Investigation Findings:

Problem List:

Sl.	Impairment	Functional Limitation

Functional Diagnosis:

V. Management

Goals:

Short term:

Long term:

Treatment:



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