NEUROLOGICAL ASSESSMENT –

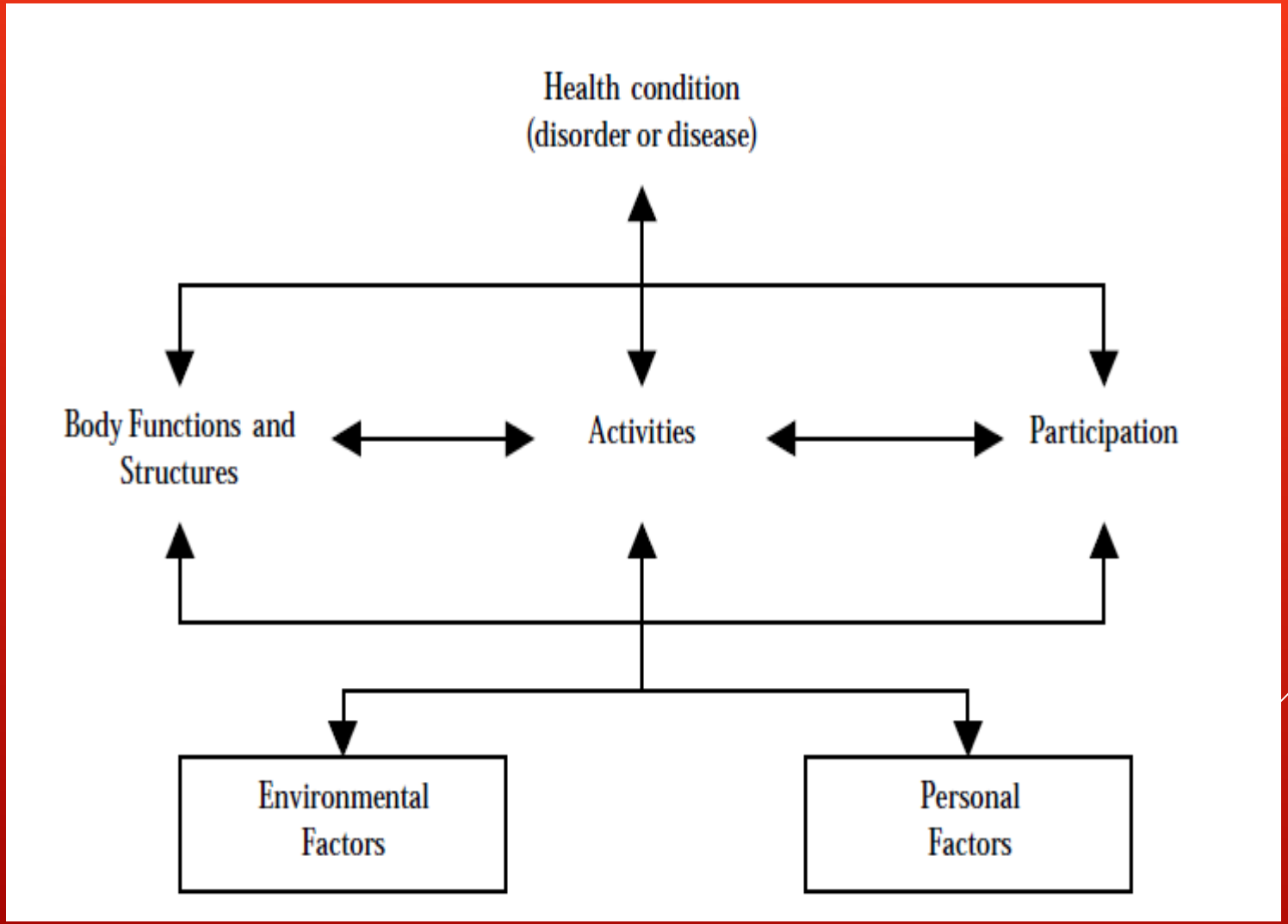
For a responsive patient

Tittu Thomas James

Physiotherapist

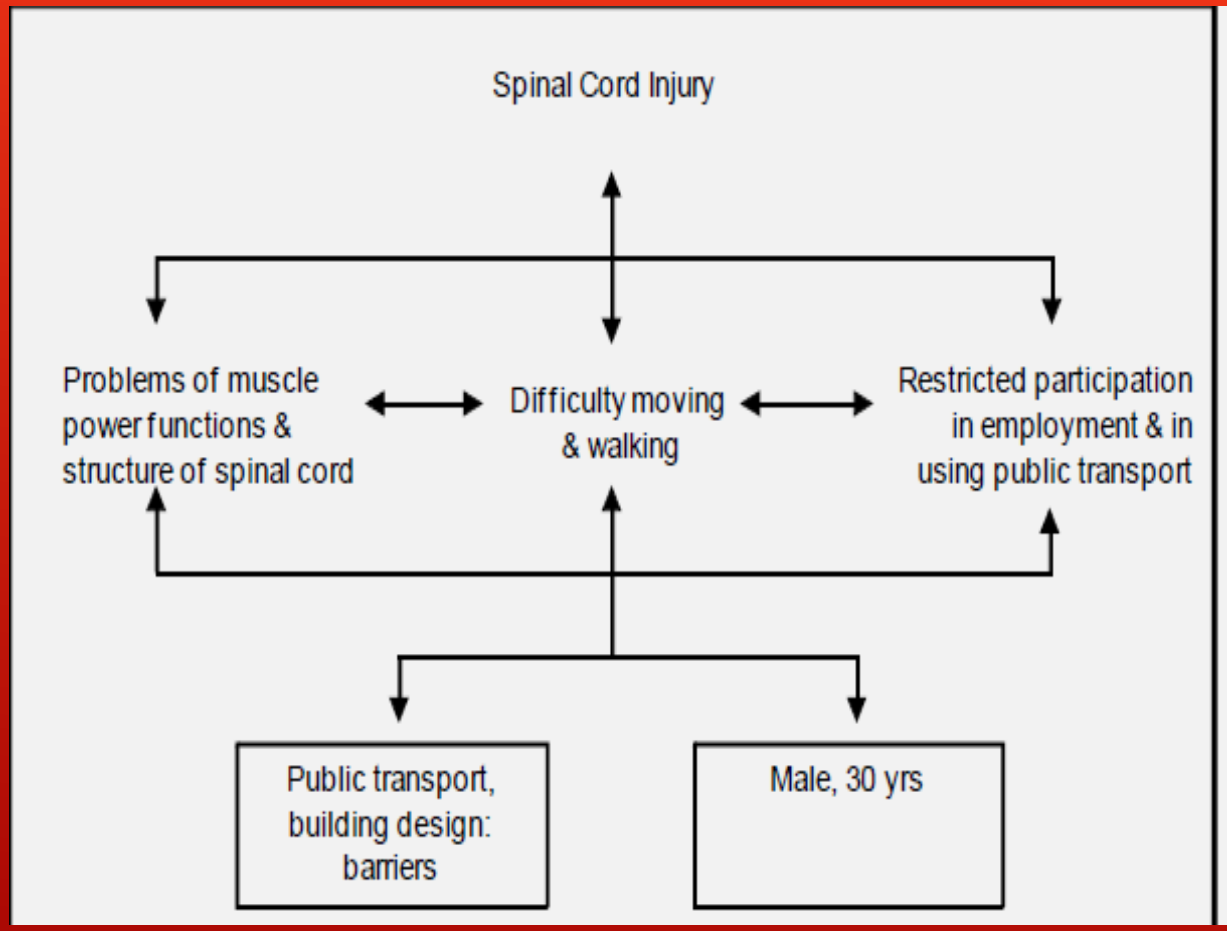
NIMHANS

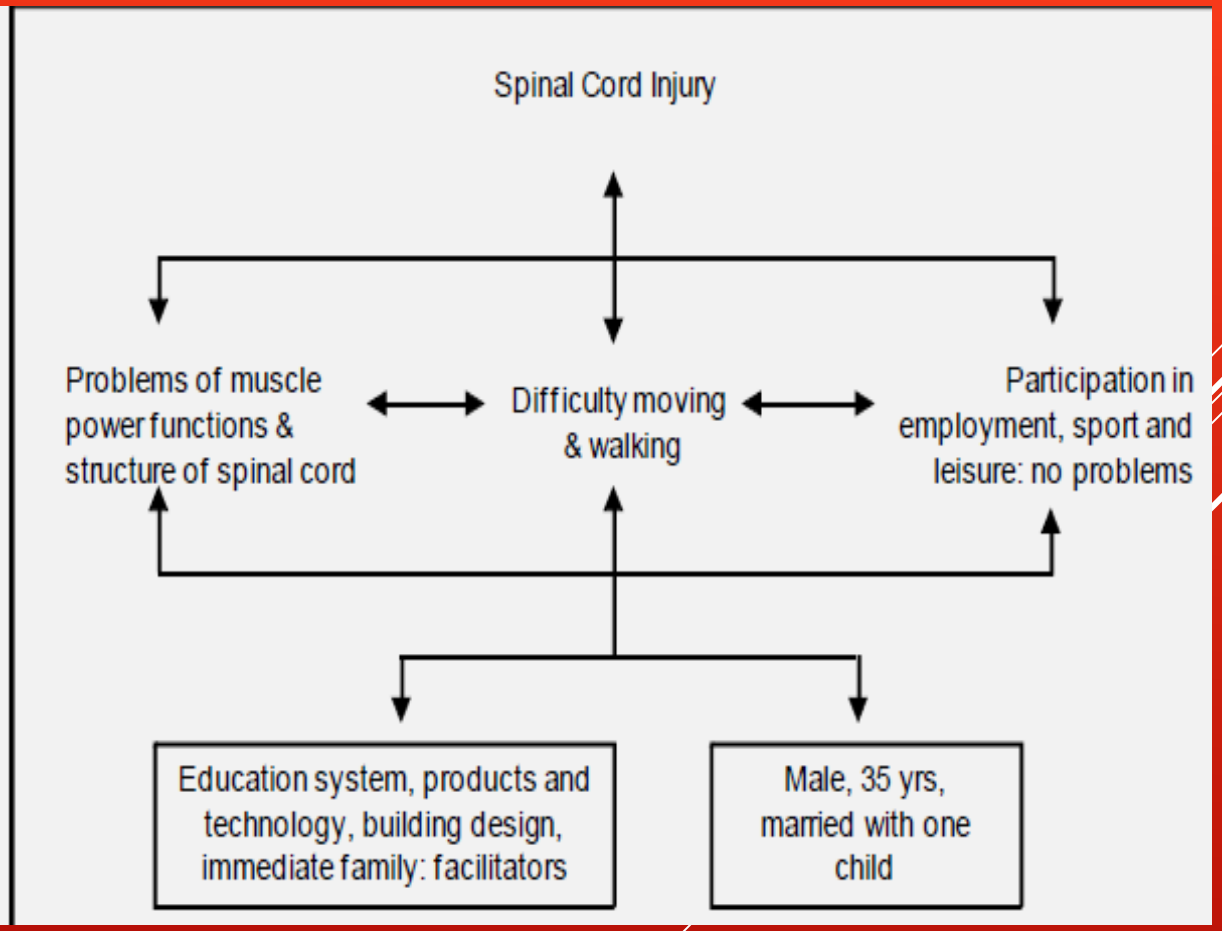
INTERNATIONAL CLASSIFICATION OF FUNCTION (ICF)

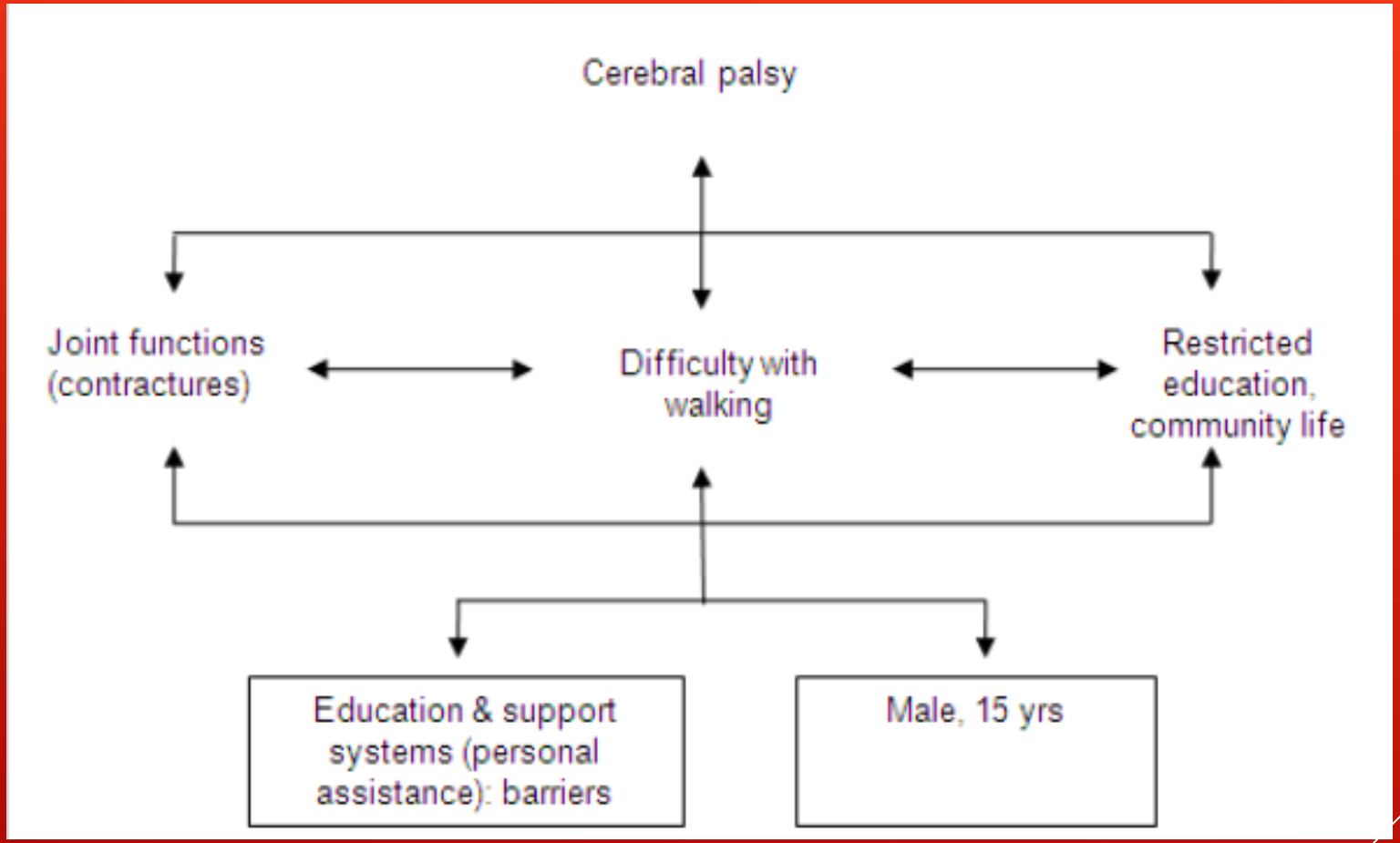


CHIEF COMPLAINT

- WHY DID HE APPROACH YOU?
  - Pain
  - Stiffness
  - Reduced movement of joint
  - Unable to comb
  - Unable to bend forward
  - Not able to stand for 30 minutes
  - Not able to walk longer
  - Not able to go for work
  - Unable to go to school
  - Not able to attend social gatherings


Spinal Cord Injury
Problems of muscle power functions & structure of spinal cord
Difficulty moving & walking
Restricted participation in employment & in using public transport
Public transport, building design: barriers
Male, 30 yrs


Spinal Cord Injury
Problems of muscle power functions & structure of spinal cord
Difficulty moving & walking
Participation in employment, sport and leisure: no problems
Education system, products and technology, building design, immediate family: facilitators
Male, 35 yrs, married with one child


Cerebral palsy
Joint functions (contractures)
Difficulty with walking
Restricted education, community life
Education & support systems (personal assistance): barriers
Male, 15 yrs

HISTORY TAKING – Be a good listener

- **PRESENT HISTORY – The part were you gain the confidence of patient**
  - Start with "Patient was apparently well till ……., when he had an episode of……"
    - What happened at first?
    - What he did for it?
    - Whether he was taken to hospital, if yes, how?
    - How many days he was admitted? Was he in ICU?
    - What happened then?
    - Any complications after that?
    - When did he start physiotherapy?
    - What was prescribed by the therapist?
    - Is he regular in doing exercises?
    - What are you here for now?

OTHER HIS-STORIES

- Past
- Associated problems
- Personal
- Medical
- Surgical
- Occupational
- Environmental
- Social
- Familial
- Pain
- ??????????????

ON OBSERVATION

- Body Build
  - Ecto, Meso, Endomorphic
- Attitude of limbs
- Deformities/ Contractures
- Skin (Colour, Texture, Presence of lesion, Scars)
- Pressure sores
  - Stage 1 – Non blanchable erythema of intact skin
  - Stage 2 – Abrasion, blister, shallow crater (affecting epidermis and dermis)
  - Stage 3 – Deep crater, necrosis/damage of necrotic tissue
  - Stage 4 – Extensive destruction, tissue necrosis extending to muscle and bone
- Posture – Assess as it is
- Ambulatory Status, Mobility aids
- External Appliances

ON PALPATION –

Palpate uninvolved side first

- Pulse
  - 4+ - Bounding
  - 3+ - Increased
  - 2+ - Brisk, expected
  - 1+ - Diminished, weaker than expected
  - 0 - Absent, unable to palpate
- Tenderness
  - 1 - complains of pain
  - 2 - complains of pain & winces
  - 3 - winces & withdraws limb
  - 4 - patient won't allow palpation
- Edema
  - Mild - < ¼" depth of depression (Score 1+)
  - Moderate - ¼" to ½" depth of depression (Score 2+)
  - Severe - ½" to 1" depth of depression (Score 3+)
- Muscle Firmness
  - Firm, Stiff, Flabby, Fatty

VITALS

- Temperature
- Blood pressure
- Pulse rate
- Respiratory rate

ON EXAMINATION

- Higher Cortical Functions
- Cranial Nerves
- Sensory Assessment
- Motor Assessment
  - Muscle Tone
  - ROM
  - Tightness
  - Muscle Power
  - Reflexes
  - Muscle Girth
- Limb Length
- Coordination
- Balance
- Posture
- Gait
- Functional Assessment
- Bowel and Bladder

HCF

- **Appearance & Hygiene** (Appropriateness of attire for age, weather, and situation (physician visit) and the purpose of accessories like glasses or a cane)
- **Behaviour/Mood** (Anxious, agitated, depressed, manic, obsessive/compulsive)
- **Speech** (Rate and volume, is it pressured, slow, accented?, Enunciation quality, tempo and whether it is loud, quiet or impoverished)
- **Eye Contact** (Maintaining or avoiding)
- **Comprehension** (Is he understanding conversations/instructions?, expressing feelings?, difficulty finding words (anomia)?, misusing words?, repetition of other people's words (echolalia)? Stuck in a thought/memory (perseveration)?,mumbling?)
- **Memory and Recall** (Immediate, Recent, Remote)
- **Orientation** (Person, place, time)
- **Concentration and Attention** (Recite ABC backwards, Days of week in reverse, 7x reverse)
- **Judgement and Intellect** (Expected outcome of a situation, their act, GK)
- **Abstraction Skills** (Eg: Two different meanings for the word 'RIGHT')

CRANIAL NERVES

SENSORY ASSESSMENT

- Superficial – Pain, Light Touch, Temperature (5-10 degree & 40-45 degree C)
- Deep – Kinesthesia, Proprioception, Vibration
- Cortical – Stereognosis, Tactile response, 2 point discrimination, Graphesthesia

Sensations		UE		LE		Trunk	
		Rt	Lt	Rt	Lt	Rt	Lt
Superficial	Pain						
	Temp						
	Touch						
Deep	Vibration						
	Proprio						
	Kinesthesia						
Cortical	2 point Disc						
	Stereognosis						

- **1** – Intact
- **2** – Decreased/delayed
- **3** – Exaggerated
- **4** – Inaccurate
- **5** – Absent
- **6** – Inconsistent or ambiguous

Deep Sensation
Normal – 7/10 trials

SCI
Assess each Dermatome
- **2** – Intact
- **1** – Hypo or Hyper
- **0** - Absent

Dermatome	Rt	Lt
C1 – T10	2	2
T 11	1	2
T 12	1	1
L1 – S3	0	0
S4 – S5	0	0

MUSCLE TONE

- 0 – **No increase** in muscle tone.
- 1 – Slight increase in muscle tone, manifested by a **catch and release** or by minimal resistance at the **end of the ROM** when the affected part(s) is moved in flexion or extension.
- 1+ - Slight increase in muscle tone, manifested by a **catch, followed by minimal resistance** throughout the remainder (less than half) of the ROM.
- 2 – More marked increase in muscle tone **through most of the ROM**, but affected part(s) easily moved.
- 3 – Considerable increase in muscle tone, **passive movement difficult**.
- 4 – Affected part(s) **rigid** in flexion or extension.

Limb	Muscle	Rt	Lt
Upper Limb	Biceps		
	Triceps		
Lower Limb	Quads		
	Hams		
	Gastrox		

ROM –

Mention the joint affected & its contralateral side

Limb	Joint	Movt	A/P	Rt	Lt	Endfeel	Remarks
Upperlimb	Shoulder	Flexion	Passive	0-90	0-180	Empty	Supine
	Elbow						
	Wrist						
Lower Limb	Hip						
	Knee						
	Ankle						

Accessory Joint Movements

Tested if PROM is limited or painful; Tested for amount of motion, effect on symptoms, and end feel.

- 0 – Ankylosed
- 1 - Considerable hypo mobility
- 2 - Slight hypo mobility
- 3 – Normal
- 4 - Slight hypermobility
- 5 - Considerable hypermobility
- 6 - Unstable

TIGHTNESS

- Tested passively
- Mention the limited range
- Hamstrings – Popliteal Angle (+ if >20 degrees)
- Special Tests
  - Ely's Test – Rectus femoris (in prone)
  - Thomas Test – Rectus femoris (in supine)
  - Obers Test – ITB
  - Fabers Test – Iliopsoas tightness
  - Pyriformis Test - Pyriformis

MUSCLE POWER - MMT

- Starting Position – Grade 3
- Max Score – 4+/5
- Grip and EHL – Good/ Fair/ Poor
- Beevors Sign to be assessed when needed
- PNL – Test individual muscle

SCI – MYOTOMES

- C5 – Elbow Flexors
- C6 – Wrist Extensors
- C7 – Elbow Extensors
- C8 – Finger Flexors
- T1 – Finger Abductors
- L2 – Hip Flexors
- L3 – Knee Extensors
- L4 – Ankle DF
- L5 – Long Toe Extensors
- S1 – Ankle PF

GRADING

- 0 – Total paralysis
- 1 – Palpable/visible contraction
- 2 – Active movt, G eliminated
- 3- Active movt against G
- 4 – Active movt against some resistance
- 5 – Active movt against full resistance
- NT – Not testable

Limb	Joint	Muscle Group	Rt	Lt
Upper Limb	Shoulder	Flexors		
		Extensors		
		Abd		
		Add		
	Elbow	Flexors		
		Extensors		
	Wrist	Flexors		
		Extensors		
Hand Grip				
Lower Limb	Hip	Flexors		
		Extensors		
		Abd		
		Add		
	Knee	Flexors		
		Extensors		
	Ankle	PF		
		DF		
EHL				

VOLUNTARY CONTROL GRADING

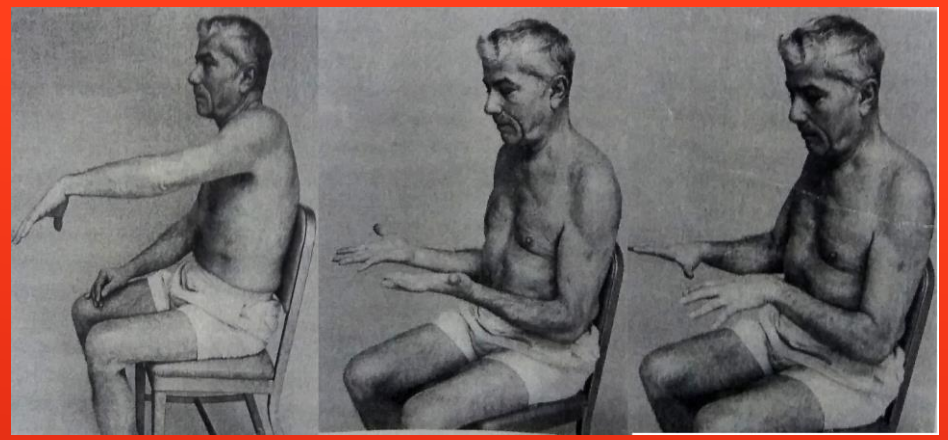
a.k.a. Recovery Stages

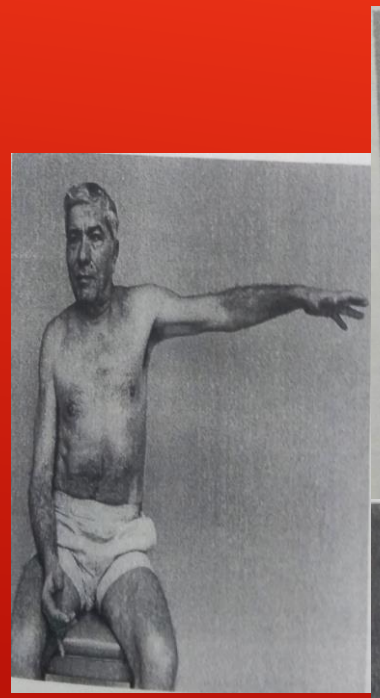
1. **Flaccidity**
   - Immediately following acute episode
   - No reflex or voluntary movements initiated
2. **Spasticity begins**
   - Basic limb synergies or their components appear as associated reactions
   - Minimal vol movts may present
3. **Spasticity at its peak**
   1. Gains vol control of synergies
   2. Semi voluntary movts (vol initiation)
4. **Spasticity begins to decline**
   - Movt combinations not part of synergy mastered
5. **Spasticity continues to decline**
   - More difficult movt combinations mastered
   - Basic limb synergies lose their dominance
6. **Spasticity disappears**
   - Individual joint movts possible
   - Coordination approaches normalcy
   - Patient capable of full spectrum of movt patterns
7. **Normal motor function restored**

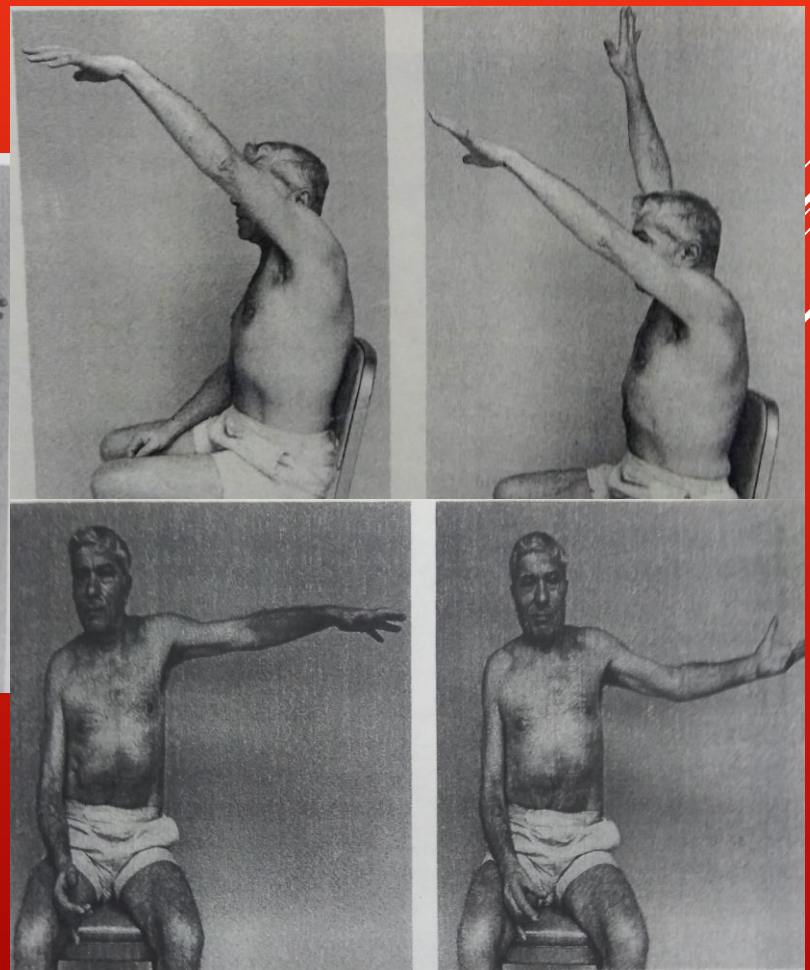
MOTOR TESTING – UPPER LIMB

- **Recovery Stage 1**
  - Limbs feel heavy when moved passively
  - Little or no muscular resistance to movement
- **Recovery Stage 2**
  - Synergies or components appear as associated reactions
  - Components of flexor synergy appear first
- **Recovery Stage 3**
  - Synergies or components performed voluntarily
  - Pts severely involved may never progress beyond it

- **Recovery Stage 4**
  - Placing hand behind body
    - Uses a modified flexor synergy, then a modified extensor synergy
    - Pec major inhibited
  - Elevation of arm to fwd horizontal position
    - Success = link b/w triceps and pecs declining
  - Pronation-Supination, elbows at 90 degrees
    - ROM, not speed, is emphasized
    - Elbow kept close to side of body
- **Recovery Stage 5**
  - Combinations of stage 4 easily performed
  - More difficult combinations mastered
    - Arm raising to a side-horizontal position
      - Elbow extended, forearm pronated
    - Arm raising fwd and overhead
      - With elbow extended, must closely resemble with normal side
    - Pronation- Supination, elbow extended
      - Done in flexion or abduction of shoulder
- **Recovery Stage 6**
  - Isolated joint movements
  - Spasticity not demonstrated with passive movts, but active movts with increased speeds will.







MOTOR TESTS: HAND

- Stage 1: Flaccidity
- Stage 2: Little or no active finger flexion
- Sage 3: Mass grasp; hook grasp but no release
- Stage 4: Lateral prehension, release by thumb movt
- Stage 5: Palmar prehension, vol mass extension
- Stage 6: All prehension types under control, full range vol extension of digits

MOTOR TESTS: TRUNK & LOWER LIMBS

- Stage 1: Flaccidity
- Stage 2: Minimal vol movts of LL
- Stage 3: Hip Knee Ankle flexn in sitting and standing
- Stage 4: Sitting, knee flexion > 90 degrees, vol DF
- Stage 5: Standing, isolated NWB knee flexion with hip extended, isolated DF with knee extended
- Stage 6: Standing, hip abduction near normal; sitting, reciprocal action of inner and outer hamstrings

REFLEXES

Reflex	Rt	Lt

- Superficial
  - Umbilical
  - Plantar (If abnormal = Babinski sign)
- Deep
  - Jaw
  - Biceps
  - Triceps
  - Hams
  - Patellar
  - Ankle

GRADING

0	: Absent
+	: Hypo
++	: Normal
+++	: Hyper
++++	: Clonus (2 to 3 beats)
+++++	: Sustained clonus

ASSOCIATED REACTIONS

- Homolateral Limb Synkinesis
  - Flexion of one limb facilitate flexion of other
- Raimiste's Phenomena
  - Resisting movt of normal leg brings about movt of affected
- Global Synkinesis
  - Increased tension of affected side on any movt of normal side
- Imitation Synkinesis
  - When attempted to move affected side, normal side perform same movt invol.
- Coordination Synkinesis
  - Shortening – Hip flexion = DF
  - Lengthening – Knee extn = PF
- Souques Finger Phenomenon
  - Passive elevation of arm = automatic finger extension
- Proprioceptive Traction Response
  - Stretch of flexors of onejoint of upperlimb evokes contraction of flexors = limb shortening

MUSCLE GIRTH

Muscle	Remarks	Rt	Lt
Biceps	5 cm above Lat epicondyle		
Triceps	5 cm above Lat epicondyle		
Forearm	5 cm below Lat epicondyle		
Quads	5 cm above sup patellar border		
Gastrox	10 cm below sup patellar border or 20 cm above crest of medial malleoli		

LIMB LENGTH –
Differenciate structural and functional LLD

- True
  - Square the pelvis, limbs placed in identical position
  - ASIS to crest of medial malleoli
  - + if difference is greater than ¼ inch
  - Structural leg length difference
- Apparent
  - Umbilicus/xiphisternum to crest of medial malleoli
  - Pelvis not squared, limbs not brought into identical positions
- FINDING
  - If true = apparent – no compensation
  - If true > apparent – part of the shortening has been compensated for
  - If true < apparent – fixed adduction deformity in addition to shortening without compensation

CO- ORDINATION

- Equilibrium Tests
  - Standing feet together
  - Standing one foot in front of other
  - Standing with alternate trunk flexion and extension
  - Walking on a straight line
  - Walking sideways
  - Marching
- Non Equilibrium Tests
  - Finger to nose
  - Finger to therapist's finger
  - Pronation/supination
  - Rebound test
  - Tapping foot
  - Pointing and past pointing
  - Heel on shin

GRADING

- 5 – Normal performance
- 4 – Minimal impairment: Able to accomplish, slightly less than normal speed, requires supervision/minimal contact guarding
- 3 – Moderate impairment: Able to accomplish activity, movements are slow, awkward and unsteady, requires moderate contact guarding
- 2 – Severe impairment: Able only to initiate activity without completion, reqUlres maximal contact guarding
- 1 – Activity impossible

Grade Rt and Lt side separately

BALANCE

Position		Grade
Sitting	Static	
	Dynamic	
Standing	Static	
	Dynamic	

Functional Balance Grades	
Normal	**Static:** Patient able to maintain steady balance without handhold support **Dynamic:** Patient accepts maximal challenge and can shift weight easily within full range in all directions
Good	**Static:** Patient able to maintain balance without handhold support, limited postural sway **Dynamic:** Patient accepts moderate challenge; able to maintain balance while picking object off floor
Fair	**Static:** Patient able to maintain balance with handhold support; may require occasional minimal assistance **Dynamic:** Patient accepts minimal challenge; able to maintain balance while turning head/trunk
Poor	**Static:** Patient requires handhold support and moderate to maximal assistance to maintain position **Dynamic:** Patient unable to accept challenge or move without loss of balance

O'Sullivan, S.B. and Schmitz T.J. (2007). *Physical rehabilitation: assessment and treatment* (5th ed.). Philadelphia: F. A. Davis Company. p.254

BALANCE TESTS

- Rhomberg Test
  - Patient stands with feet together & eyes opened for 20 sec
  - Patient stands with feet together & eyes closed for 20 sec
    - Positive if patient sways excessively, takes a step or falls
- Tandem (Sharpened) Romberg Test
  - Patient stands with one foot in front of the other in a heel-to-toe position with eyes open for 30 sec
- One legged Stance test
  - For 30 sec
- Dynamic Balance Test
  - Functional Reach Test
  - Multidirectional Reach Test

POSTURE

- Sitting
  - Ant
  - Post
  - Lat
- Standing
  - Ant
  - Post
  - Lat

- Compare both sides – Check for Symmetry

GAIT

- Observe
- Identify the deficit
- Identify the cause
- Identify the compensation

TEMPORAL VARIABLES
Stance Time
Single limb time
Double limb support time
Swing time
Stride time
Step time
Cadence
Speed

SPATIAL VARIABLES
Stride length
Step length
Width
Degree of toe out

FUNCTIONAL ASSESSMENT - FIM

- **SELF CARE**
  - Eating
  - Grooming
  - Bathing
  - Dressing – Upper
  - Dressing – Lower
  - Toileting
- **SPHINCTER CONTROL**
  - Bladder
  - Bowel
- **TRANSFER**
  - Bed, Chair, Wheelchair
  - Toilet
  - Tub, Shower
- **LOCOMOTION**
  - Walk/Wheelchair
  - Stairs
- **COMMUNICATION**
  - Comprehension
  - Expression
- **SOCIAL COGNITION**
  - Social Interaction
  - Problem Solving
  - Memory

LEVELS

- **7** – Complete Independence
- **6** – Modified Independence (Device)
- **5** – Supervision (Subject = 100%)
- **4** – Minimal Assistance (Subject >75%)
- **3** – Moderate Assistance (Subject >50%)
- **2** – Maximal Assistance (Subject > 25%)
- **1** – Total Assistance or not testable (Subject <25%)

BOWEL & BLADDER

- Continent or incontinent
- AIMS OF ASSESSMENT
  - Identify reversible factors that may be contributing to incontinence
  - Identify those individuals who may need more specialist diagnostic evaluations
  - Develop the most appropriate individual treatment or management plan

INVESTIGATIONS

- Blood Tests
- Scan Reports
- Other Tests

DIAGNOSIS

- Medical Diagnosis
- Physiotherapy Diagnosis

PROBLEM LIST

- Every problems you found in the assessment
  - All abnormal findings

GOALS

- Short Term
- Long Term

- **S**pecific
- **M**easurable
- **A**ttainable
- **R**elevant
- **T**ime bound

TREATMENT PLAN

- According to the diagnosis