REHABILITATION in NEUROLOGICAL CONDITIONS

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What is Rehabilitation?

- Development of a person to their fullest potential consistent with their physiological or anatomical impairment and environmental limitations.

- Physical
- Psychological
- Social
- Vocational
- Avocational and
- Educational
Neurological Rehabilitation

- Process to try to restore the neurologically injured patient to their highest possible functional level, despite possible permanent impairment

  - Promotes recovery of loss of function
  - Prevent complications that might impair recovery
  - Teach compensatory techniques that allow performance despite physical incapacity
Neurological Conditions

Commonest neurological disorders that result in chronic problems requiring long term care

- Stroke – CVA / ICH
- Head Injury
- MS
- Parkinsons disease
- Dementia
- Spinal cord injury
- Back pain
- Muscular disorders
WHO Definitions - 1980

**IMPAIRMENT**
- Loss or abnormality of physiological, psychological or anatomical structure or function

**DISABILITY**
- Restriction resulting from an impairment of the ability to perform an activity in a manner considered normal

**HANDICAP**
- Disadvantage resulting from an impairment or disability that prevents the fulfilment of a role that is normal for an individual.
WHO Definitions - 1997

**IMPAIREDMENT**
- Loss or abnormality of physiological, psychological or anatomical structure or function

**ACTIVITY** (rather than disability)
- The nature and extent of functioning at the level of the person

**PARTICIPATION** (rather than handicap)
- The nature and extent of a persons involvement in situations in relation to impairments, activities, health conditions and environmental factors.
Organisation of Rehabilitation

**Multi-disciplinary**
- Parallel and discipline oriented
- Team members only address skills related to their discipline
- Treatment is the sum of each discipline's activities

**Inter-disciplinary**
- Different disciplines work together towards a common goal
- Contribute to a group effort
- Treatment program is synergistic
Realistic Goals

- Determined by team and person

- Working to optimise level of function
  - Despite residual disability
  - Even if the impairment is caused by an irreversible pathological process

- Increased independence
- Improved quality of life
- Reduced carer burden
Case Conference

- Communicate
- Collaborate - interactive
- Consolidate knowledge

- Goal setting and actions determined and evaluated
- Problem solving
- Decision making
- Co-ordinated, non-fragmented and cost effective treatment program established
Treatment Strategies

1. Prevent or correct additional disability
2. Enhance systems unaffected by pathology
3. Enhance functional capacity of affected system
4. Use adaptive equipment to promote function
5. Modify social and vocational environment
6. Psychological techniques to enhance performance
7. Patient education
Prevent Additional Disability

Medications

- Secondary stroke prevention
  - Anti-platelet
  - Hypertension
  - Hypercholestroleamia

Passive joint ROM

- Avoid contractures in weak limb
- Avoid DVT

Nutritional supplementation

- Prevent malnutrition

Shoulder sling

- Prevent subluxation
Enhance Functional Capacity

Graded exercise programs
- Deconditioned

Progressive resistive exercises
- Weakened muscles to enhance strength

Training dysarthric speakers
- Reduce speaking rates for improved intelligibility

Visual written cues
- Assist memory function
Use Adaptive Equipment

- Sticks, crutches and frames as mobility aids

- Augmentative communication devices for patients with unintelligible dysarthric speech

- Wheelchair training when walking is not possible

- Equipment to extend hand function in dressing
  - Long shoehorns, stocking pullers, buttonhooks

- Shoe modifications to promote standing balance
Enhance Unaffected Systems

- Progressive resistive exercise to the non-paralysed side of a stroke patient to aid in transfers

- Visual feedback for hand function in patients with a sensory deficit
Modify Social Environment

- Rails on stairs to promote stair climbing
- Assistance in the home for physically dependent
- Widen bathroom doorways to allow a wheelchair
  - Redesign work areas for wheelchair users
- Modified diet for certain swallowing problems
- Train family members not to reinforce sick role
Psychological and Education

- Repetition in training patients with memory problems
- Teach new skills by verbal instruction for patients with problems
- Teach new skills by demonstration for patients with language deficits
- Group therapy for patients with similar disabilities
Functional Independence Measure

Scale that describes the functional activity and the specific assistance levels required for each activity

13 Motor

- Self care
  - Eating, grooming, bathing, dressing upper body, lower, toileting
- Sphincter control
  - Bladder and Bowel
- Mobility
  - Bed, Toilet, shower, walk, stairs

5 Cognitive tasks

- Communication and Cognition
  - Comprehension, expression, interaction, problem solving, memory
Functional Independence Measure

Score out of 7

Assess disability and burden of care

7 – Complete Independence – no help required
6 – Modified Independence – assistive device
5 – Supervision or setup required
4 – Minimal assistance – <75% effort
3 – Moderate assistance – 50-75% effort
2 – Maximal assistance – 25-50% effort
1 – Total assistance - <25% effort
Concord Parkinson’s Clinic

Multi-disciplinary clinic
- Clinical Nurse Co-ordinator - 02 9767 7917

Allied Health Assessment – 4 hours
- Physiotherapist
- Occupational Therapist
- Speech Pathologist
- Dietician
- Psychologist (if required)

Neurologist review – 1 hour
- History, examination, management review

Case conference
- Discuss patient and formulate management plan
Physiotherapy

❖ Improve gait pattern and avoid immobilisation

❖ Walking
  ❖ Take larger steps and raise toes when stepping forward
  ❖ Feet approx 12 inches apart and upright posture
  ❖ Swing arms - takes body weight off legs and reduces fatigue
  ❖ Floor markings - visual cues and encourages stepping
  ❖ Walking over obstacles to encourage weight bearing
  ❖ Music to help regain rhythmic movement
  ❖ Walking aids - tend to carry but rollator frame best
  ❖ Maintain good posture and head control
Physiotherapy

✿ Restore normal body alignment
   ✦ Minimise risk of falls
   ✦ Stimulate balance reactions
   ✦ Teach how to regain balance when centre of gravity changed
   ✦ Encourage weight transfer with correct head and trunk movements

✿ Reduce increased tone
   ✦ ROM exercises - passive stretching
   ✦ Relaxation with facilitating techniques:
     • Light touching, vibration
Occupational Therapy

Adaptive equipment

- Elevating chair and bed
- Rails for the bathtub and toilet
- Toilet aids - raised toilet and bath seats
- Feeding - large rimmed plates and plate guards
- Large comfortable handles
- Velcro closures on clothes rather than buttons
- Bedpoles and monkey bar

Home visit to individualise needs
Speech Pathology

Assessment

- Hypophonic dysarthria
- Hesitations and freezing during speech

Formal therapy

- General speech and tongue exercises
- Provide appropriate communication aids
- Ice and stroking under chin (vibration of laryngopharyngeal muscles)
- Tilt head forward on swallowing

Advise on dietary strategies

- Eat smaller portions more frequently
- Increase water intake to reduce constipation
Other Problems

- **Urinary frequency and urgency**
  - Detrusor instability - TCA /oxybutinin
  - Enlarged prostate

- **Constipation**
  - Reduced mobility of bowel muscles – fluid intake

- **Dietary imbalance**
  - Poor eating and drinking
  - Loss of weight

- **Autonomic dysfunction**
  - Postural hypotension and syncope
Mr BMJ

- 53 YO
- Hx of HT
- Sudden onset L hemiparesis UL>LL dysarthria
- CT brain – right MCA CVA
- Transferred to Balmain hospital for IP rehab
Dense Hemiplegia

- Poor motor return in upper and lower limb
  - Power 0/5 UL
  - Power 1/5 LL
  - Tone initially normal

To try to improve motor return, functional electrical simulation (FES) used to stimulate muscles with electrical stimuli.
Functional Electrical Stimulation

Form of therapeutic treatment

- Uses transcutaneous electrical current to initiate contractions in paralyzed extremities

- Used in individuals who have sustained spinal cord injuries and other neuromuscular illnesses.
Functional Electrical Stimulation

48 hemiplegic patients randomly divided into two groups for treatment with FES and shoulder pads

The recovery of the patient's shoulder subluxation and movement function of upper extremities was evaluated at 6 weeks

FES was better than shoulder pads in improving shoulder subluxation and motor function

Stroke Aug 2005
Functional Electrical Stimulation

46 subjects, 70.9+/-8.0 yo and 9.2+/-4.1 days after stroke, randomly assigned to 1 of 3 groups receiving standard rehabilitation with FES, placebo stimulation or no stimulation (control)

FES applied 30 minutes and placebo stimulation, 5 days per week for 3 weeks

Outcome measurements included spasticity score, maximum isometric voluntary contraction of ankle dorsiflexors and plantarflexors and walking ability.
No significant differences in baseline measurements

After 3 weeks reduction in spasticity score and improvement in the ankle dorsiflexion in the FES group compared with the other 2 groups (p < 0.05)

All subjects in the FES group were able to walk after treatment and 84.6% returned home c.f. 53.3% in placebo and 46.2% of controls

15 sessions FES improved motor and walking ability

Stroke Jan 2005
Post-Stroke Pain

Within 2-3 weeks of onset of symptoms
- Developed sharp shooting pain L side
- Worse at night
- Occasionally burning sensation
- Occasional tingling and paraesthesia sensation

Amitriptyline 10mg nocte
- Marked improvement in pain
- Improved sleep

Gabapentin, Pregabalin
Foot Drop

Over next month, some motor return in the LL
- Started to walk with quad stick
- Tripping over toes due to weakness of ankle dorsiflexion

Ankle-Foot Orthosis (AFO)
- Custom made
- Stabilises inversion and eversion
- Improves dorsiflexion of ankle and toes
Shoulder Subluxation-Capsulitis

- Left shoulder pain
  - Non-functional left upper limb
  - Poor motor return
  - Gravitational effect of weight of arm

- Westmead sling
- Anti-inflammatory medication
  - Mobic
  - LA and steroid injection
Upper Limb Spasticity

- Increased tone in upper limbs
- ROM
- Stretching
- Splinting
- Drugs
  - Baclofen

- Second Skin
  - Lycra splinting
SECOND SKIN—Dynamic Lycra

Splashing has played an extensive role in spasticity management.

Lycra® splints are individually designed for clients according to their postural and tonal needs.

Lycra® splinting is appropriate for all aspects of muscle tone:
- spasticity, dystonia, ataxic or involuntary movement.
SECOND SKIN–Dynamic Lycra

- Improved posture
- Improved sensory awareness
- Improved patterning of movement when moving away from the centre of gravity
- Improved bilateral arm use and bimanual hand use in specific skill areas e.g. play, leisure, self-care skills, work related skills
- Improved grasp/sustained hold and active release skills.
SECOND SKIN

- Supports their posture and reduces the impact of altered muscle tone

- Splinting is frequently a long-term approach to develop their functional skills or to prevent deformity

- The challenge is to individually design lycra® splinting with maximum contour and comfort to enable consistent splinting
Lower limb Spasticity

- Developed localised spasticity of left foot flexors
  - Interfering with walking
  - Tripping over toes when walking

- Muscle over-activity is one of the cardinal features of spasticity and common disability of stroke

- Responsible for several limitations that interfere in their daily activities and quality of life
Botulinum Toxin

- Action at CNS level mediated through afferent pathways originating at muscle spindles

- 75 units injected into 2 sites - Flex. Hall. Ln

- 75 units injected into 2 sites - Tibialis Post

- 50 units injected into 1 site - Flex. Hallucis Brevis
Botulinum Toxin

Open-label, prospective study to assess effectiveness of BTX-A in improving functional mobility in early post-stroke population using individualised, flexible range of doses and targeted muscle groups

21 stroke patients (13 male, 8 female) injected with BTX-A - mean dose: 255 U; range: 185-300)

Individualised BTX-A injection regimens effective, reversible and safe treatment option for patients with spasticity.

Neurol Sci. Apr 2005
Botulinum Toxin

35% of patients receiving oral therapy showed an improvement in pre-treatment functional targets.

73% and 68% of patients treated with BTX-A first- and second-line therapy.

BTX-A treatment was also more cost-effective than oral therapy in the treatment of post-stroke upper limb spasticity (flexed wrist/clenched fist spasticity).

J Rehabil Med. Jul 2005
Future Treatments

Promising adjunct approaches include:
- Practice with robotic devices
- Practice in a virtual environment
- Electrical stimulation to increase cortical excitability during training
- Drugs to optimise molecular mechanisms for learning

Biological strategies for neural repair may augment rehabilitation in the next decade

Lancet Neurol. 2004 Sep;3(9):528-36