FOCUS GROUP UPDATE ON STROKE REHABILITATION

UPPER LIMB

DISCLAIMER

This update was developed to be a guide for best clinical practice, based on the best available evidence at the time of development. Specific attempts were made to use local data and publications to ensure local relevance. The update was adapted mainly from the Australian Clinical Guidelines, Canadian Stroke Best Practices and NICE Stroke Rehabilitation for adults 2023 (1, 2. 3). Other sources were reviewed when necessary. The update will also be updated from time to time. Adherence to this update is at the discretion of the healthcare provider and does not necessarily lead to the best clinical outcome in individual patient care. Every healthcare provider is responsible for the management of his/her unique patient based on the clinical presentation and management options available locally.

1. https://informme.org.au/guidelines/living-clinical-guidelines-for-stroke-management
2. https://www.strokebestpractices.ca/recommendations
3. NICE Stroke rehabilitation in adults: Clinical Guideline, [NG236] 2023. www.nice.org.uk/guidance/ng236.

A. POST-STROKE UPPER LIMB REHABILITATION

Impaired upper limb function is a common complication encountered after stroke. Approximately 50-80% of individuals with stroke will experience loss of upper extremities function, which may persist after a year.

The approach to neurorehabilitation of the upper limb requires multimodal interventions, performed in a high-intensity and task specific manner.

Management and recovery often take place over several months or years and must be considered in the context of other impairments including presence of spasticity, apraxia, neglect, impaired tactile sensation, pain and other concurrent stroke complications.

1. GENERAL PRINCIPLES

1.1 Patients should engage in training that is meaningful, engaging, repetitive, progressively adapted, task-specific and goal-oriented to enhance motor control and restore sensorimotor function [Evidence Level: Early-Level A; Late-Level A].

1.2 Training should encourage the use of patients' affected limbs during functional tasks and be designed to simulate partial or whole skills required in activities of daily living (e.g. folding, buttoning, pouring, and lifting) [Evidence Level: Early-Level A; Late-Level A].

2. SPECIFIC THERAPIES

2.1 **Range of motion exercises** (passive and active assisted) that includes placement of the upper limb in a variety of appropriate and safe positions within the patient's visual field should be provided. [Evidence Level C].

2.2 Suitable patients should be encouraged to engage in **mental practice/ mental imagery** to enhance upper-limb, sensorimotor recovery [Evidence Level: Early-Level A; Late-Level B]. Mental practice involves repetitive cognitive rehearsal of intended physical movements without actually attempting to move the limbs physically. This stimulates neuroplasticity to promote recovery as neuroimaging studies have demonstrated that overlapping brain areas which are activated in mental practice are similar to those activated in actual physical movement.

2.3 **Mirror therapy** should be considered as an adjunct to motor therapy for patients with very severe paresis. It may help to improve upper extremity motor function and ADLs. [Evidence Level: Early-Level A; Late-Level A].

2.4 **Neuromuscular or Functional Electrical Stimulation** targeted at the wrist and forearm muscles should be considered to reduce motor impairment and improve arm and hand function. [Evidence Level: Early-Level A; Late-Level A].

2.5 **Conventional or modified constraint-induced movement therapy** (CIMT) should be considered for a select group of patients who demonstrate at least 20 degrees of active wrist extension and 10 degrees of active finger extension, with minimal sensory deficits and appropriate cognitive level. [Evidence Level: Early-Level A; Late-Level A].

2.6 Effective CIMT should comprise of three main components: 'Shaping' via intensive graded practice, constraint-use of the non-paretic arm for a specific treatment duration, and transfer training package to learn the use of the paretic arm in a real-world environment.

2.7 Targeted practical time duration is between for 3-4 hours for modified CIMT (mCIMT), and 6 hours a day for 2 weeks for the conventional/ original CIMT protocol.

2.8 **Strength training** should be considered for persons with mild to moderate upper extremity impairment for improvement in grip strength [Evidence Level: Early-Level A; Late-Level A), as long as strength training does not aggravate tone or pain [Evidence Level A].

2.9 **Virtual reality**, including both immersive technologies (e.g. head mounted or robotic interfaces) and non-immersive technologies (e.g. gaming devices) can be used as adjunct tools to other rehabilitation therapies to provide additional opportunities for engagement, feedback, repetition, intensity and task-oriented training [Evidence Level: Early-Level A; Late-Level A].

2.10 **Robotics** (e.g. mechanically assisted arm training) may be used to improve upper limb function for stroke survivors with mild to severe arm weakness.

2.11 **Non-invasive brain stimulation,** including repetitive transcranial magnetic stimulation (rTMS) and transcranial direct current stimulation (tDCS) could be considered as an adjunct to upper extremity therapy [Evidence Level A (rTMS); Evidence Level B (tDCS)].

2.12 Practise pearl - Kinesio tape can be used by trained practitioners to reduce shoulder subluxation, improve motor function of the upper limb and ADLs in patients with hemiplegic shoulder pain.

3. OTHER TREATMENT APPROACHES

3.1 Stroke patients who are able and motivated to follow regimes independently or with the assistance of a caregiver, should be considered for **self-directed upper limb rehabilitation** to increase frequency of practice in addition to usual therapy.

3.2 **Supplementary training programs** aimed at increasing the active movement and functional use of the affected arm between therapy sessions, e.g. Graded Repetitive Arm Supplementary Program (GRASP) can be offered to patients for hospital or home-use.

3.3 Patients who are unable to produce any voluntary muscle activity in the affected upper limb, the patient (and caregiver) should be taught **compensatory techniques** and be provided with adaptive equipment to enable basic ADLs. [Evidence Level B]. It is reasonable to continue teaching compensatory techniques until the patient can manage basic ADLs independently or until recovery of active movement occurs [Evidence Level C].

3.4 **Adaptive devices** designed to improve safety and function may be considered if other methods of performing specific functional tasks are not available or tasks cannot be learned [Evidence Level C].

3.5 **Functional dynamic orthoses** may be offered to patients to facilitate repetitive task-specific training [Evidence Level B].

4. NOT RECOMMENDED

4.1 The following practice is not recommended or does not show additional benefit in upper limb stroke recovery.

4.2 **Bilateral arm training** is not recommended over unilateral arm training to improve upper limb motor function [Evidence Level A].

B. MANAGEMENT OF SHOULDER PAIN & COMPLEX REGIONAL PAIN SYNDROME (CRPS) FOLLOWING STROKE.

Hemiplegic shoulder pain affects 30-65% of people with stroke and is often associated with upper limb weakness, glenohumeral subluxation and restricted range of shoulder movement (Kumar et al, 2022). (British Guidelines)

Shoulder pain and subluxation are associated with reduced function and recovery of the upper limb. This interferes with rehabilitation, and results in higher rates of depression and poorer quality of life. (Adey-Wakeling et al, 2016; Paolucci et al, 2016). (British Guidelines)

The precise aetiology of shoulder pain is unknown, but it is often associated with subluxation of the joint and, in the later stages, spasticity. Shoulder subluxation is not always associated with pain and the two may have different causes. Addressing shoulder subluxation is a priority in order to optimise upper limb motor recovery, and manage spasticity and pain. [2023] (British Guidelines)

Prevention of Hemiplegic Shoulder Pain and Subluxation i.e. Hemiplegic shoulder care and positioning:

i. Early flaccid stage of recovery is when the shoulder joint is vulnerable. Joint protection strategies are designed to prevent or minimize shoulder pain and injury. These strategies include.:

   a. Positioning and supporting the arm during rest [Evidence Level B].

   b. Protecting and supporting the arm during functional mobility; avoid pulling on the affected arm [Evidence Level C].

   c. Protecting and supporting the arm during wheelchair use; examples include using a hemi-tray, arm trough, or pillow [Evidence Level C].

   d. Sling is used only in the flaccid stage as it may discourage arm use, inhibit arm swing, contribute to contracture formation, and decrease body image [Evidence Level C].

ii. Education should be given to healthcare staff, patients and family to correctly protect, position, and handle the involved arm, [Evidence Level A].

iii. The following practices are no longer recommended or do not show additional benefit:

a. Overhead pulleys should not be used [Evidence Level A].

b. The arm should not be moved passively beyond 90 degrees of shoulder flexion or abduction, unless the scapula is upwardly rotated and the humerus is laterally rotated [Evidence Level B].

1. ASSESSMENT OF HEMIPLEGIC SHOULDER PAIN

1.1. Patients should regularly be asked about shoulder pain. [2016] British Guidelines

1.2. The assessment of the painful hemiplegic shoulder could include evaluation of tone, active movement, changes in length of soft tissues, alignment of joints of the shoulder girdle, trunk posture, levels of pain, orthopaedic changes in the shoulder, and impact of pain on physical and emotional health [Evidence Level C].

2. MANAGEMENT OF HEMIPLEGIC SHOULDER PAIN

2.1. Treatments for hemiplegic shoulder pain related to limitations in range of motion may include **gentle** stretching and mobilization techniques, and typically involves increasing external rotation and abduction. [Evidence Level B].

2.2. Active range of motion should be increased gradually in conjunction with restoring alignment and strengthening weak muscles in the shoulder girdle [Evidence Level B].

2.3. Taping of the affected shoulder has been shown to reduce pain [Evidence Level A].

2.4. If there are no contraindications, analgesics (such as ibuprofen or narcotics) can be considered for pain relief on an individual case basis [Evidence Level C].

2.5. Injections of botulinum toxin into the subscapularis and pectoralis muscles could be used to treat hemiplegic shoulder pain thought to be related to spasticity [Evidence Level B].

2.6. Subacromial corticosteroid injections can be used in patients when pain is thought to be related to injury or inflammation of the subacromial region (rotator cuff or bursa) in the hemiplegic shoulder [Evidence level B].

3. HAND OEDEMA

3.1 For patients with hand oedema, the following interventions may be considered:

a) Active, active-assisted, or passive range of motion exercises [Evidence Level C].

b) When at rest, the arm should be elevated if possible [Evidence level C].

c) Retrograde massage [Evidence Level C].

d) Gentle grade 1-2 mobilizations for accessory movements of the hand and fingers [Evidence Level C].

3.2 There is insufficient evidence for or against compression garments, e.g. compression gloves [Evidence Level C].

4. COMPLEX REGIONAL PAIN SYNDROME (CRPS) (ALSO KNOWN AS SHOULDER-HAND SYNDROME OR REFLEX SYMPATHETIC DYSTROPHY

4.1 Prevention: Active, active-assisted, or passive range of motion exercises can be used to prevent CRPS [Evidence Level C].

4.2 Diagnosis: Should be based on clinical findings including pain and tenderness of metacarpophalangeal and proximal interphalangeal joints and can be associated with oedema over the dorsum of the fingers, trophic skin changes, hyperaesthesia, and limited range of motion [Evidence Level C].

4.3 A triple phase bone scan (which demonstrates increased periarticular uptake in distal upper extremity joints) can be used to assist in diagnosis. [Evidence Level C].

4.4 Management: An early course of oral corticosteroids, starting at 30 – 50 mg daily for 3 - 5 days, and then tapering doses over 1 – 2 weeks can be used to reduce swelling and pain [Evidence Level B].

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