Upper Limb Activity: Overview

Overview
The ability to use both upper limbs is essential to being efficient and effective with daily living activities. The assessment of the involved upper extremity should result in a task-orientated management plan to restore function or promote compensation/adaptation for lost function (Woodson, 2002). Often a variety of approaches are used rather than a single approach in order to manage the complex upper limb problems of stroke survivors. Management should encompass interventions directed towards specific impairments (such as sensation, strength, contracture, spasticity) as well as structured training and practise to utilise any voluntary control for functional tasks (Shumway-Cook and Woollacot, 2010).

A distinction can be made between arm function (proximal control at the shoulder and elbow) and hand function (distal control of the wrist and fingers for dexterity). These two functions are under separate control mechanisms from a neurological point of view and therefore can be trained separately as part practice. However in the real world the two occur synergistically and therefore also require training as a whole (Shumway-Cook and Woollacot, 2010).

NSF Guideline

6.3.5 Upper Limb Activity
a) People with difficulty using their upper limb(s) should be given the opportunity to undertake as much tailored practice of upper limb activity (or components of such tasks) as possible. Interventions which can be used routinely include:
- constraint-induced movement therapy in selected people (Grade A: Langhorne et al. 2009)
- repetitive task-specific training (Grade B: French et al. 2007)
- mechanical assisted training. (Grade B: Merholz et al. 2008)

b) One or more of the following interventions can be used in addition to those listed above:
- mental practice (Grade B: Langhorne et al. 2009)
- EMG biofeedback in conjunction with conventional therapy (Grade C: Langhorne et al. 2009; Meilink et al. 2008)
- electrical stimulation (Grade C: Langhorne et al. 2009)
- mirror therapy (Grade C: Yavuzer et al. 2008; Dohle et al. 2009; Altschuler et al. 1999)
- bilateral training (Grade C: Stewart et al. 2006)

Suggested Assessment
Assessment of the upper extremity should include an assessment of voluntary movement, consideration of mechanical and physiological impairments which may be affecting movement (such as limitations in range of motion, pain, shoulder subluxation, tone), the quality of movement (including strength, co-ordination and endurance, sensation) and functional ability (Woodson, 2002). Assessment should also include consideration of

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other impairments which may be impacting on movement (such as cognitive, perceptual, language and visual factors), along with salient sociodemographic and pre-morbid factors.

An assessment of the following specific or general upper limb functional abilities may include:*

- Fine motor control
  - 9 hole peg test (Oxford Grice et al, 2003),
  - Preston grooved pegboard (Ruff and Parker, 1993)
  - Purdue Pegboard (Lafayette Instrument Company, 1979)
- Functional upper limb assessment
  - Chedoke Arm and Hand Inventory (Barreca et al, 2005)
  - Action Research Arm Test (van der Lee et al, 2001)
  - Fugl-Meyer Assessment of Motor Function (Fugl-Meyer, 1975)
  - Motor Assessment Scale: upper limb and hand items (Carr et al, 1985)
  - Jebsen Test of Hand Function (Bovend’Eerdt et al, 2003)
  - Motor Activity Log (Shumway-Cook and Woollacott, 2001)

For individual impairment assessments refer to specific sheets.

*Please note these assessments are not necessarily designed specifically for the stroke population.

Practice Suggestions

Current recommendations to improve upper limb activity post stroke include the use of task-specific training. This involves the systematic and repetitive practise of functional tasks that can be performed within the stroke survivor’s level of available voluntary movement (Winstein et al, 2004). The ideas of constraint induced therapy can be combined with task specific training, where the less affected upper limb is constrained or restricted to allow the more affected limb to function, thus overcoming the issues of learned non-use (Van Peppen et al, 2004). With appropriate clients practice of tasks using mirror therapy and mental practice have proven effectiveness (Langhorne et al. 2009; Yavuzer et al. 2008; Dohle et al. 2009; Altschuler et al. 1999).

Emerging techniques requiring higher level technology include EMG biofeedback in conjunction with conventional therapy (Langhorne et al. 2009; Meilink et al, 2008) and robot-assisted practise (Merholz et al. 2008).

Electrical stimulation has been shown to improve impairment but not necessarily activity (Langhorne et al. 2009). There is conflicting evidence for bilateral retraining but on balance can be trialled with justification from the evidence (Stewart et al. 2006). Neurodevelopmental therapy (Gelber et al, 1995) and sensory integration therapy (Jongbloed et al, 1989) have been reported to be no more effective than an orthopaedic approach in improving upper limb activity.
Considerations

Upper limb rehabilitation post stroke is often more complex, time consuming and long term than other areas. Resource issues often mean upper limb rehabilitation is truncated, however this may be misplaced given the importance of upper limb activity and the effectiveness of emerging techniques that are not as resource intensive.

Readings


