Upper Limb Activity: Task Specific Training

Overview

Task-specific training can be defined as the systematic and repetitive practice of functional tasks that can be performed within the stroke survivor’s level of available voluntary motion (Winstein et al, 2004). The training specificity aspect is based on the idea that performance improvements occur most readily when training closely resembles the specific activity for which improved performance is desired.

Functional tasks or occupationally-based tasks are hypothesised to improve performance because they are inherently motivating, have meaning, and provide feedback on task execution (Carr and Shepherd, 2000). If task-specific exercise and training is carried out, then transfer into real life situations is more likely to occur, and motor performance will improve as a result. Principles of motor-relearning are utilised: tasks are progressed in difficulty to keep the participants challenged, motivated and engaged (Carr and Shepherd, 2000).

Research

A Cochrane review in 2007 (French et al.) found no overall effect for repetitive task specific training on arm or hand function, though a later systematic review by Langhorne et al (2009) found a positive effect for TST on arm function. This is also confirmed by an RCT in 2008 which demonstrated that people with severe paresis could significantly improve arm function after training with a low cost non-robotic device, and that the improvement was maintained at follow-up. A training schedule that involves initial trunk restraint coupled with TST has been shown to improve arm function and reduce compensations (three RCTs - Woodbury et al. 2009; Michaelsen 2004 and 2006).

Application

The original principles for task-specific training in stroke rehabilitation included (Carr and Shepherd, 2000):

- **Identification of goal:** communicate the goal via verbal instruction and demonstration. Use concrete tasks. The goal should be meaningful and worthwhile, reasonably hard yet attainable.
- **Feedback:** Information about the achievement of the goal will be immediately available to the stroke survivor, verbal feedback can be given from the therapist, biofeedback and augmented feedback can be used. Accurate feedback and increased amounts of feedback improve learning.
- **Practice:** Including mental practice (rehearsal, visualisation), repetition, part and whole practice.
- **Transfer of learning:** ensure different contexts and environments are used (constant and variable practice).

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More recently the authors of a review of task specific training (Hubbard et al. 2009) have proposed five key features that should be incorporated into any clinical decision-making:

- task-specific training should be **relevant** to the patient/client and to the context;
- be **randomly** assigned;
- be **repetitive** and involve massed practice;
- aim towards **reconstruction** of the whole task;
- and be **reinforced** with accurate and timely feedback.

Utilising task-specific training to optimise upper limb outcomes:

- consider the use of the trunk in reaching training – for example constraining negative compensatory trunk motion (anterior) can facilitate more efficient, repeatable and accurate reaching trajectories at the shoulder and elbow (Woodbury et al. 2009, Michaelsen et al. 2004, 2006)
- Intensive practice of a variety of tasks using different objects. Even if the stroke survivor has limited control over the shoulder, exercises and task practice can be given for the hand and fingers with the upper limb supported on a table.
- If there is limited control at the shoulder, simple non-robotic devices such as SMART arm (which allows controlled forward reach on a mobile gantry: Barker et al. 2008) are effective to practice the basic elements of shoulder control in the presence of dense proximal paresis.
- Whilst separate training for the proximal (reaching and stabilising) functions versus the hand shaping, grasp and release functions can occur, ultimately the two should be practiced together (whole practice).
- Practice should involve bimanual actions as well as uni-manual, as the upper limbs need to be able to be used in conjunction with each other in order to be effective.

**Considerations**

Task-specific training requires:

- A functional level of cognition and motivation – the stroke survivor needs to be able to understand the instructions and the task, pay attention, problem solve and respond to feedback.
- A higher level of available voluntary movement than other approaches (except in the case of the devices such as the SMART arm).
Readings


