Stratification Program for Upper Extremity Function of Stroke patients in Rehabilitation Stroke Unit in Occupational Therapy Department of Tuen Mun Hospital.

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Strokes affect thousands of people worldwide leaving sufferers with disabilities affecting their daily activities. The upper extremity motor deficit is one of the functional challenges in post stroke patients (R.K.Garg, Sharma, Monika, G.G.,2012).

In rehabilitation training, the dosage of activity-related arm training undertaken has been suggested to be a critical factor contributing to successful rehabilitation after stroke. The intervention should focuses on use of the affected arm in specific, meaningful and appropriately challenging functional tasks (S.H.Kleim, G.B.Brauer.,2008).

But there is a considerable amount of inactive time both within and outside of therapy during acute hospitalization and in-patient rehabilitation (Foley et al, 2012).

In our clinical practice, the challenges are how to provide services with high intensity and good quality for our stroke patients? Any new service delivery models?
Conventionally, therapy took place in Integrated Rehabilitation Area (IRA) as facilities in wards for training are limited. Patients in need of therapy > capacity. Therefore some patients may not attend training in IRA daily.

**Patients with different levels of upper limb impairment in rehab wards**

**Rehab area with**
- Limited capacity
- Different therapy equipment for patients with different levels / needs.

**Stroke Rehabilitation Ward**

**Integrated Rehabilitation Area**
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Dosage of arm activity training is important, then how to provide daily intervention to our patients?

Limited space in integrated rehabilitation area to accommodate all stroke patients

How to increase assistants’ competence and efficiency

Better utilization of ward area for therapeutic training for selected patient group
The Hong Kong version of the Functional Test for the Hemiplegic Upper Extremity (FTHUE-HK) is adopted as the stratification tool. It is a standardized upper limb assessment of stroke patient in Hospital Authority settings. The assessment includes seven functional levels of upper limb for stroke patients. High sensitivity and specificity for test items within each functional level. Satisfactory inter-rater agreement on both testing procedure and functional level.
Functional Test for Hemiplegic Upper Extremity

**Level 1:** Nil active movement over upper limb, or trace shoulder movement

- Associate reactions
- Hand into lap

**Level 2:** Some beginning voluntary motion of shoulder and elbow

- Arm clearance during shirt tuck
- Hold a pouch

**Level 3:** Mass flexion pattern in shoulder 30-60° and elbow 60-100°, with gross grasp of 3-5 pounds

**Level 4:** Mass flexion >60° at shoulder and >100° at elbow, some elbow extension and with 3-5 pounds gross grasp and some of lateral pinch

- Blocks and box
- Eat with a spoon

**Level 5:** Start to combine strong flexion and strong mass extension pattern, >5 pounds of grasp; >3 pounds lateral pinch and some release

- Stabilize a jar
- Simulate wringing a rag

**Level 6:** Isolated control in shoulder, elbow and wrist against gravity. Full extension of shoulder, elbow, wrist and fingers. Controlled & Coordinated movement may be sluggish

- Box on shelf
- Drink from glass

**Level 7:** Isolated control of all upper extremity musculature with good coordination

- Key turning
- Use chopsticks
- Clip cloth peg

**Actions:**
- Associate reactions
- Hand into lap
- Arm clearance during shirt tuck
- Hold a pouch
- Stabilize a jar
- Simulate wringing a rag
- Blocks and box
- Eat with a spoon
- Box on shelf
- Drink from glass
- Key turning
- Use chopsticks
- Clip cloth peg
Severe impairment
FTHUE 1 and 2

Moderate impairment
FTHUE 3 and 4

Mild impairment
FTHUE 5, 6, 7

Training venue:
Ward base training

Training venue:
Integrated Rehabilitation Area

Training venue:
Integrated Rehabilitation Area

Training objectives:
- Individual bedside activities of daily living training with proper position of UL.
- Reduce the time for transfer and portering from ward to Rehab Area.
- Patient is able to receive daily intervention at ward.

More quota are available in IRA training session because of patients with severe impairment would remain in ward to receive intervention.
- Patients is able to receive daily intervention in IRA.

Designated assistants can be more competent to operate and set up the equipment so as to increase the efficiency in service delivery.

Functional Test for Hemiplegic Upper Extremity (HK-version)
**Stratify Level: Severe impairment of upper extremity**

**Level 1**: Nil active movement over upper limb, or trace shoulder movement

**Level 2**: Trace shoulder and elbow movement

Individual bedside activities of daily living training will be implemented in wards. Emphasis will be on proper position, support of upper limb and weight bearing activities during ADL training and seating system prescription.

- **Trunk control training** with proper positioning of affected limb
- **Seating system** with upper limb support
- **Appropriate positioning**
Stratify level: Severe impairment of upper extremity

- Encourage sit out of bed in ward daily, careful handling of the upper limb during functional activities
- Encourage early functional training if patients’ medical condition is stabilized
- Sitting tolerance is less than 1 hour, patient can still receive daily intervention, reduce the burden of portering and transfer
- Proper positioning in feeding
- ADL training room inside ward
- Weight bearing of affected upper limb
- Facilitation during grooming task
Mirror therapy is a technique that uses visual feedback about motor performance.

Stratify Level: Severe impairment of upper extremity

Eqip equipment to facilitate ward base training, training venue move from IRA to ward, to create a therapeutic environment for severe impairment group.

Sensory Watch can be use for neglect training and increase limb awareness.

Self made training activity.
Engaging and empower patients and their carers to enhance their active participation in the management of ADL tasks.

Splintage regime

Extended Hour Rehabilitation in rehab ward, education to ward staff for the proper position and prevention of complication.
For clients with moderate impairments, who also demonstrate high motivation and active participation in training, repetitive and high intensity training program will be provided in integrated rehabilitation area.

There is level 1a evidence that task-related practice may be superior to conventional training at improving upper extremity motor function.

Through designation of training tasks, OT assistants are able to focus and develop operation skills.

The time for equipment set up greatly reduced by practice makes perfect.
Stratify Level: Moderate impairment of upper extremity

- Patient’s sitting tolerate more than 1 hour
- Vital sign stable and FTHUE level 3 or above
- No symptoms of dizziness or pain
- Patient is motivated towards training program
Modified constraint-induced Movement Therapy mCIMT

- CIMT are restraint of the unaffected arm and increase practice/use of the affected hand (Fritz et al. 2005).
- CIMT is designed to overcome learned non-use by promoting neuroplasticity and use-dependent cortical reorganization (Taub et al. 1999).
- Compared to conventional therapy, mCIMT has been found to have greater improvements in upper extremity motor functional and functional independence (Lin et al. 2007; Page et al. 2008)
Robotic training will allow the patient to achieve a task, repetitive goal orientated practice requiring attention. Tasks can be adjusted to provide success at the limit of performance. The VR/games are motivating and varied and less boring. This can allow intensive and safe training.

Computer enhanced upper extremity activities, task relevance and feedback.
**EMG-driven Robotics for Hand Function**

In clinical practice, stroke survivors who completed rehabilitation training, they may gain motor recovery on proximal joint, but very limited in hand and fingers. So we move on to use EMG-driven Robotics in our Stroke Unit in 2015.

Device that helps patients regain hand mobility through motor relearning. It facilitates muscle re-education by both amplifying and rewarding a patient with desired motion in concert with his own signal.
Stratify Level: Moderate impairment of upper extremity

Individual facilitation techniques

Toucher—Movement Therapy, eye hand coordination training, range of motion training, trunk stability and cross Mid-line training
Stratify Level: Mild impairment of upper extremity

**Level 5:** Start to combine mass flexion and extension pattern with gross grasp and some release

**Level 6:** Isolated control in the shoulder, elbow, and wrist against gravity. Coordinated movement may be sluggish.

**Level 7:** Isolated control of all upper extremity musculature with good coordination
Stratify Level: Mild impairment of upper extremity

Hand functional training in ADL tasks
Stratify Level: Mild impairment of upper extremity

Virtual reality in fine hand manipulation task in ADL

Repetitive task training with motivating games with various grip and pinch prehension patterns.
Results of the Stratification Program

Ward base training

- Severe impairment
- Moderate impairment
- Mild impairment

Integrated Rehabilitation Area

- Severe impairment
- Moderate impairment
- Mild impairment

After stratification, severe impairment patients can receive daily training in ward base activities.

Moderate and mild impairment patients can attend IRA training daily. Range of activities can be more focus.
Results of the Stratification Program

Structure

Ward equipped with appropriate equipment for early rehab for severe impairment group

Integrated rehab area: equipment focus on moderate / mild impairment groups
### Results of the Stratification Program

**Process**
- Clear criteria for different training group
- Reduce portering time and time in scheduling.
- Increased training opportunities for patients

Commencing early functional training rehabilitation can once patients’ acute condition is stabilized

Assigned Assistants develop competence and proficiency in equipment set up and operation. Increase efficiency both therapist and supporting staff

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Stratify the stroke patients’ upper limb training needs so as they can receive intervention at the right time during their care journey. To adopt by using a standardized upper limb assessment.