Goal setting

Problems experienced

Patient’s goal:

‘Upcoming weekend, I am capable to use the deodorant during my ADL session in a comfortable way’
Hypothetico Deductive Examination

- Which underlying assumptions can be made about: ‘why’ the activity has not been performed correctly?

She is not satisfied about the way she manipulate the deodorant because of:

1. ......coordination?
2. ......praxis?
3. ......strength?
4. ......mobility?
5. ......planning?
Goal setting

Patient's goal:

'Next Friday, I want to remove the blanket as easy as possible using my affected hand.
Hypothetico Deductive Examination

- Which underlying assumptions can be made about: ‘why’ the activity has not been performed correctly?

She is not satisfied about the way she removes the blanket because of a lack of:
1. ……strength?
2. ……perception?
3. ……motor program?
4. ……coordination?
5. ……

Monday, 45 minutes post-session
Friday morning 10.30 AM post session

Introduction
- Task-oriented training
- Intensive and repetitive training
- Meaningful
- Challenging
- Specific
- Relevant

Developments
Practical considerations

1. Heterogeneity population and associated patterns of recovery of arm-hand skill performance
2. Lack of the patient’s involvement in arm and hand training
3. Difficulties to implement new developments swiftly in daily practice
4. The lack of adequate description and adaptation of treatment protocols for stroke survivors experiencing a broad variety of problems in daily life related to an impaired arm-hand.

4 solutions

1. Stratify patients with an impaired arm and hand into different levels of dexterity
2. Lack of the patient’s engagement towards arm-hand treatment may be overcome by using self-efficacy principles
3. Easy to replace modularly-built trainings schedules fitted in time blocks
4. Well-described program containing stepwise, comprehensible procedures fitting 80% of the stroke rehabilitation population

Concise Arm and Hand Rehabilitation Approach in Stroke

(CARAS)
PART 1
Taking care and prevention

PART 2
Task-oriented arm-hand skill performance training program

Program 1
Non-functional hand performance

Program 2
Gross motor grip performance

Program 3
Functional performance

Level of arm-hand impairment

UAT 0-1
Severe

UAT 2-3
Moderate

UAT 4-7
Mild

CARAS
Concise Arm and Hand Rehabilitation Approach in Stroke (CARAS) (Franck et al; Open Journal of Occupational Therapy, 2015)

Classification of arm-hand impairment level

Utrechtse Arm Hand Test (UAT)

- Non-functional hand performance
- Flexion synergy arm
- First distal selectivity, (palmair flexion wrist)
- Dorsal flexion fist and wrist / opening the hand
- Suitcase grasp
- Cylinder grasp:
- Tweezers grasp:
- Clumsy hand:

• Non-functional hand (no activity in arm and hand) (score: 0)
• Flexion synergy arm: (score: 1)
• First distal selectivity, (palmair flexion wrist) (score: 2)
• Dorsal flexion fist and wrist / opening the hand (score: 3)
• Suitcase grasp (score: 4)
• Cylinder grasp: (score: 5)
• Tweezers grasp: (score: 6)
• Clumsy hand: (score: 7)


Inclusions vs Exclusions

Inclusions:
- Clinically diagnosed with central paresis of the arm/hand at entry of the program (UAT 0 – 7)
- Ability to control sitting posture
- Medically stable

Exclusions:
- Patients with severe cognitive and/or behavioural disorders (i.e. not able to function in group-wise situations);
- Patients who are not able to control sitting posture;
- Inter-current medical problems, i.e. inflammations, open wounds;
- Patients with complex secondary arm-hand problems, like: severe edema and inflammations in shoulder region.
CARAS
Organisational structure

- Open group
- 1:3
- OT/PT/assist/other
- max 10 participants

Prognosis

Assessment phase

Assessment phase

Assessment phase

Program 1
Program 2
Program 3
Program 4
Program 5

Carries on

Level of arm-hand impairment

UAT 0-1
Severe

UAT 2-3
Moderate

UAT 4-7
Mild

CARAS

PART 1
Taking care and prevention

Program 1
No functional hand performance

PART 2
Task-oriented fine hand skill performance training program

Program 2
Excess making grip performance

Program 3
Partial hand performance


• Persons with a severely affected arm - hand
  - Education
  - Activate
  - Positioning
  - Using care equipment
  - Cosmetic aspects
  - Learn to take care
  - Maintaining taking care in post-rehabilitation phase

UAT 0 – 1
Program 1

Organisational Structure

- Education
- Exercises to maintain suppleness and pain free positioning in diverse circumstances and postures
- Stimulating exercises
- Applying mobility aids and care equipment
- Test

Enable patients to discover problem solving strategies
How to consult clinicians
Learn to adopt strategies from fellow patients

Program 1

Organisational Structure

Program 1

Monday 1 hour
Tuesday 1 hour
Wednesday 1 hour
Thursday 1 hour
Friday 0.5 hour

Frequency: 4.5 hour p/w
Duration: 6 weeks

Level of arm-hand impairment

UAT 0-1 Severe
UAT 2-3 Moderate
UAT 4-7 Mild

CARAS

PART 1
- Tackling everyday problems

PART 2
- Functional hand performance training program

Level of arm-hand impairment

UAT 0-1 Severe
UAT 2-3 Moderate
UAT 4-7 Mild

CARAS

PART 1
- Tackling everyday problems

PART 2
- Functional hand performance training program

Next Slide
Program 2
Gross motor grip performance

- Participants with a *moderately affected* arm - hand function
  - Passive and active fixation
  - Gross motor grips
  - Simple (bi)manual activities

- Education
- Take care and positioning

UAT 2 – 3

Program 3
Functional performance

- Participants with a *mildly affected* arm – hand
  - Functional tasks in daily life situations in-situ
  - Manipulation
  - Complex (b)manual activities

- Education
- Take care

UAT 4 – 7
CARAS
program 2 + 3

Theoretical background

1. Principles of self-efficacy
2. (Intensive) task-oriented training method

BREAK!
**Principles of Self-Efficacy**

**Speeding up self-efficacy to empower stroke patients in regaining full potential of their affected hand**

1. Recognize improvements in task performance; **mastery experience**
2. Observe and learn from improvements made by fellow patients regarding task performance; **vicarious experience**
3. Being encouraged or persuaded and ignore less successful performance; **verbal, social persuasion**
4. Experience improvements in arm hand skill performance and arm-hand function; **changes in physiological state**

---

**Mastery Experience**

*Using deodorant spray*

- Monday: 4
- Wednesday: 5
- Friday: 7

Identify small steps made towards goals. It is done by the patient herself which leads to a growing confidence and to maintain a positive trend regarding her perceived ability level.

*Van Rossum, 2004*

---

**Mastery Experience**

*Removal of blankets*

- Monday: 5
- Wednesday: 6
- Friday: 8

---

Bandura, 1994; Jones et al., 2006; Korpershoek, 2011
Observational practice can make unique and important contributions towards learning, especially when the observation is combined with physical practice.

**Vicarious Experience**

Shebliske et al., 1992

**Theoretical background**

**PART 2**

- Task-oriented arm-hand skill performance training program

**Program 2**

- Gross motor grip performance

**Program 3**

- Functional performance

1. Individual goal setting and individual training towards a meaningful, attainable, functional task

2. Module-based group training generalisation towards other, untrained tasks

**Monday!**

- Discuss homework assignments
- Goal setting
- Check quality of skills / activities
- Training / exercises
- Check quality of skills / activities
- Homework assignments

**Friday!**

- Discuss homework assignments
- Goal setting
- Check quality of skills / activities
- Training / exercises
- Check quality of skills / activities
- Homework assignments
Goal evaluation form

1. _____________________________________________
2. _____________________________________________
3. _____________________________________________
4. _____________________________________________
5. _____________________________________________
6. _____________________________________________

Scores:

0 Very easy to perform
1 Easy to perform
2 Quite easy to perform
3 Neither a problem to perform
4 Quite hard to perform
5 Hard to perform
6 Very hard to perform

Activities selected in which the participant wants to improve himself:

Program 2
Cross-hand grip performance

- Fixating bread while buttering
- Stabilizing vegetables while cutting
- Replace a chair towards the table
- Tapping a light switch
- Opening a door

Program 3
Functional performance

- Buttering bread
- Peeling potatoes
- Combing hair
- Sorting cutlery
- Using keys to open a door
- Typing

Prior to the start of the arm-hand training program, the participant extracts three to six activities that are both meaningful and challenging to him. Important characteristics of these activities are that they have to be used frequently and be directly related towards home-based activities in daily life of the participant.

The activities are rated by the patient on a six-point ordinal (Likert) scale varying from 'very easy to perform' to 'very hard to perform'.

Check the strategies used by the patient to accomplish functional skills
Consider which underlying sensory, motor, or cognitive factors constrain functional performance
Motor learning approach and appropriate practice conditions

Let the patient perform a daily task
Check the strategies used by the patient to accomplish functional skills
Consider which underlying sensory, motor, or cognitive factors constrain functional performance

Movement
Motor control
Task
Individual
Environment

Diagnosis
Problems
Activity-based goals

Observation and analysis

Functional level
 Strategies
 Function level

Posture and Movement check
Assessments

Task performance? What is the end result?
Which (internal) strategies are used to accomplish the task as efficiently as possible?
Which motor abilities are affected?
- Cognition?
- Strength
- Tone
- Coordination
- Mobility
- Perception/execution

Intraparenchymatous hemorrhage
Localisation: basal nuclei
XX – XX – 2016

- Using the deodorant in ADL
- Removal of blankets
- Using a towel to dry the body

No problems at all
Motor control

Observation and analysis

Content
• Aimed at the task (what)
• Aimed at performance level (how)

Focus of attention:
• External or internal focus

Notes:
Form
• Verbal - Non-verbal
• (haptic-video-photo-written - akoustic)

Content
• Knowledge of performance
• Knowledge of results

Timing
• During or after performance

Notes:
Organisation
environment
• Calm - lively

Organisation task
Simple - complex
Whole task - part-task
Limited number of degrees of freedom
• Open

Organisation practice
Massed - distributed
Blocked-random...

Notes:

Motor Learning
### Intervention

**Example: using knife and fork while eating / week 3**

- **Monday session**
  - Task-specific: carp_ext11_ext1, Kin_chain_ex1, Kin_chain_ex2
  - Functional_ex1, Functional_ex2, Task-specific

---

### CARAS Workbook

**2. Module-based group training**

- **Program 2**
  - Gross motor grip performance

- **Program 3**
  - Functional performance

#### Easy
- 50 exercises
- Glass race

#### Medium
- 50 exercises with a towel
- Fold an airplane
- Have a drink

#### Hard
- 50 exercises with plastic coffee cups
- Build a tower
- Handle a cardboard box
- Have a drink in a pub
- Have a drink in a pub
- Handle a cardboard box
- Spoonball
Results & Retention

<table>
<thead>
<tr>
<th></th>
<th>Pre - intervention</th>
<th>Post – intervention</th>
<th>Post – intervention (24 u)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(2 min)</td>
<td>4</td>
<td>5</td>
<td>(1.37)</td>
</tr>
<tr>
<td>(1.50)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Results

<table>
<thead>
<tr>
<th></th>
<th>Pre - intervention</th>
<th>Post – intervention (30 min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wednesday</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Friday</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

Results & Retention

Friday, 10.30 AM post-session
Break!

Adoption and Implementation of new developments

CARAS
Implementation of new developments

Program 3

Monday | Tuesday | Wednesday | Thursday | Friday
---|---|---|---|---
2 hours | 1 hour | 2 hours | 1 hour | 2 hours

Saturday:

60 minutes

60 minutes
(m) Constraint-induced Movement Therapy

**Program 1**
- Monday: 2 hours
- Tuesday: 1 hour
- Wednesday: 2 hours
- Thursday: 1 hour
- Friday: 2 hours

**Program 2**
- Monday: 1.5 hours
- Tuesday: 1 hour
- Wednesday: 1.5 hours
- Thursday: 1 hour
- Friday: 1.5 hours

CARAS adoption + implementation
- CARAS' gross motor grip performance training
- SaeboGlove
- Electrical Stimulation
- Stretch program combined with splinting

Methods
**Intervention**

2. Electrical Stimulation (*Microstim 2V2*)

ES electrodes were placed over both finger flexors (FDS/FDP) to secure finger flexion in order to produce a grasp movement.
Program 2
Gross motor grip performance

Intervention

- Patients (8) followed the CARAS gross motor grip performance program
- 1.5 hours per day, 3 days per week for six weeks

Methods

Subjects

<table>
<thead>
<tr>
<th>Patient</th>
<th>Gender</th>
<th>Age (year)</th>
<th>UAT</th>
<th>TR</th>
<th>FU</th>
<th>Post-stroke time (weeks)</th>
<th>Dominant side</th>
<th>Impaired side</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M</td>
<td>50</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>2</td>
<td>M</td>
<td>59</td>
<td>2</td>
<td>6</td>
<td>5</td>
<td>1</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>3</td>
<td>F</td>
<td>48</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>1</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>4</td>
<td>M</td>
<td>67</td>
<td>2</td>
<td>0</td>
<td>5</td>
<td>1</td>
<td>R</td>
<td>L</td>
</tr>
<tr>
<td>5</td>
<td>M</td>
<td>66</td>
<td>2</td>
<td>3</td>
<td>8</td>
<td>1</td>
<td>R</td>
<td>L</td>
</tr>
<tr>
<td>6</td>
<td>M</td>
<td>56</td>
<td>1</td>
<td>0</td>
<td>13</td>
<td>1</td>
<td>R</td>
<td>L</td>
</tr>
<tr>
<td>7</td>
<td>F</td>
<td>49</td>
<td>1</td>
<td>0</td>
<td>7</td>
<td>1</td>
<td>R</td>
<td>L</td>
</tr>
<tr>
<td>8</td>
<td>M</td>
<td>72</td>
<td>1</td>
<td>0</td>
<td>13</td>
<td>1</td>
<td>R</td>
<td>R</td>
</tr>
</tbody>
</table>

Mean (sd) of all 8 participants: 58.4 (9.2), 1.5, 1.1, 3.1 (3.2)

Results at the level of Capacity: Action Research Arm Test

<table>
<thead>
<tr>
<th>BL</th>
<th>TR</th>
<th>FU</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>11.3</td>
<td>26.3</td>
</tr>
</tbody>
</table>

Results at the level of Capacity: Action Research Arm Test
Responsibilities

Admission patients to CARAS
Admission patients to CARAS

Flowchart steps to secure reportage / assessments

Scientific framework

Results of CARAS

Changes in arm-hand function and arm-hand skill performance in patients after stroke during and after rehabilitation:

"Saving comparative data regarding ‘evidence-based therapy-as-usual’"

Results at the level of Function:
Fugl-Meyer Motor Assessment

Results at the level of Capacity:
Action Research Arm Test

Results at the level of Perceived performance:
Abilhand
Changes in actual arm-hand use in stroke patients during and after clinical rehabilitation

**Accelerometry**

![Graph showing changes in arm-hand use](graph.png)

- **Program 1**: Non-functional performance
- **Program 2**: Gross motor grip performance
- **Program 3**: Handedness performance

**Evaluation of XXXX adjunct to arm-hand rehabilitation in subacute stroke patients with a severely to moderately affected hand function**

- Admission
- Clinical discharge
- Rehabilitation phase
- Post-rehabilitation phase

**General conclusions**

- **Due to the small number of inclusion criteria**, CARAS targets a broad range of sub-acute stroke patients admitted to a rehabilitation centre.
- **CARAS’ explicit, practical and reproducible content** may guide therapists in structuring treatment of arm-hand rehabilitation post-stroke.
- **CARAS** is a well-described arm-hand therapy currently provided in a number of rehabilitation centres across the Netherlands.
- **A comprehensive clinimetric data set is available.** CARAS may serve as a ‘therapy-as-usual’ condition in future therapy development studies.
1. Heterogeneity and associated patterns of arm-hand recovery: stratified into 3 levels
2. Participants are enabled and have a certain locus of control concerning the treatment
3. Well-documented protocol fitting in 80% of stroke survivors in sub-acute phase of rehabilitation
4. Five steps to complete a well-defined task-oriented training
5. Quick implementation of new developments
6. Scientific framework to evaluate current therapy regime
h.franck@adelante-zorggroep.nl

han.franck@gmail.com

tel: 0031647155506

Questions

?