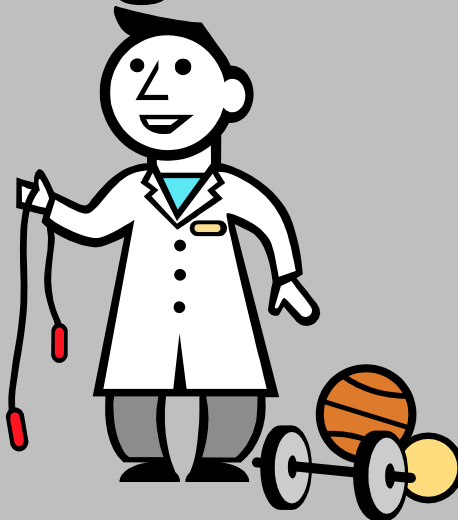


Robot Assisted Training for the Upper Limb after Stroke

RATULS

Enhanced upper limb therapy 2: **How to deliver the programme**



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1. Purpose of this document

This document describes how to deliver the enhanced upper limb therapy programme being used in the RATULS study. It is intended to serve as a reference and resource guide for clinicians delivering the enhanced upper limb therapy programme. For a summary of the RATULS enhanced upper limb therapy programme, see 'Enhanced upper limb therapy 1: programme overview'.

2. Initial therapy session (session 1)

The first session of the enhanced upper limb therapy programme covers an initial assessment followed by goal setting/activity choice and initial therapy. It should be carried out by a senior therapist in conjunction with a therapy assistant.

2.1. Introduction

The therapy session should begin with a description of what will be involved in the RATULS enhanced upper limb therapy programme.

2.2. Assessment

A standard upper limb assessment should be completed to establish motor impairment and other neurological deficits that may impact on the participant's upper limb function. The therapist should pay particular attention to:

- Selective movement
- Passive range of movement
- Muscle tone
- Proprioception
- Sensation
- Compensations
- Pain
- Coordination
- Associated reactions

In addition, any inattention should be noted.

A discussion of the participant's upper limb rehabilitation needs and identification of important goals should follow. Up to four rehabilitation goals should be agreed.

Suggested goal choices can be found in 'Enhanced upper limb therapy 3: warm up stretches, goal choices and activity flowcharts'. Whilst it is anticipated that this goal list will cover many participant choices, it is acceptable for alternative goals to be set at local discretion by the senior therapist.

Following agreement of up to four goals, activities to practise should be determined. For goals chosen from the enhanced therapy list, associated 'whole-task' and 'part-task' activity choices are provided in step by step flowcharts. Whole-task activity practice consists of practising all the components of the task in sequence. Part-task activity practice consists of practising a specific part of a task. Part-task practice is appropriate if a participant has difficulty with a specific part of a task as it will enable them to focus on this particular aspect independently to completing the task as a whole. Choice of a whole-task or part-task activity for each goal is therefore dependent on participant ability. If any activities within the whole-task or part-task flowcharts are not suitable for a participant, they can be adapted at the discretion of a senior therapist.

If a goal is chosen which is not included within the enhanced therapy goal list, it will be necessary for a senior therapist to give appropriate advice on activities to practise for this goal, to the therapy assistant.

2.3. Warm-up stretching

Gentle stretching of soft tissues and mobilisation of joints can be performed, if necessary, to focus attention on the affected upper limb prior to practising rehabilitation activities. However, as the focus of the therapy sessions should be activity practice working towards the participant goals, warm-up stretching should be kept to a minimum. Example warm up stretches can be found in 'Enhanced upper limb therapy 3: Warm-up stretches, goal choices and activity flowcharts'. Different stretches may be used at the discretion of a senior therapist. Warm up stretches should be demonstrated to both the participant and the therapy assistant.

2.4. Core treatment

A short therapy session to introduce both the participant and the therapy assistant to the tasks the participants will be working through in the following 4 weeks, should next be undertaken.

The senior therapist should ensure that both the therapy assistant and participant are familiar with the tasks by demonstration and supervision of practice. In this session and other subsequent therapy sessions, the order to practise the selected tasks and the time to spend on each task are at local discretion and according to a participant's rehabilitation priorities.

During activity practice, the number of repetitions of each task need to be counted and recorded.

What is a repetition?

- For whole task practice, completion of the whole task (from the beginning to the end of the flowchart) counts as one repetition, i.e. from the start position to a return to the start position or to completion of the task (if different from the start position).
- For part task practice completion of the *component* of the task counts as one repetition.

(Note: a continuous task (e.g. walking while carrying a plate) should be interpreted as a discrete task for the upper limb and repetitions should be counted as such (e.g. picking a plate up, carrying it and putting it down again = 1 repetition).

Number of repetitions should be recorded within the 'Enhanced upper limb therapy: participant goal and therapy record'.

Can stretching count as activity practice?

If a 'stretch' is embedded into an active task (e.g. reaching out to touch/ grasp an object), the repetitions of that stretch/task should be recorded as activity practice. However, if a stretch is passive (i.e. this is not a voluntary, active action on behalf of the patient but a manoeuvre undertaken by the therapist) this does not count as activity practice and the repetitions should NOT be recorded.

In the RATULS enhanced upper limb therapy programme, the senior therapist goal review sessions are at the end of week 4 (session 12) and end of week 8 (session 24). This means that appropriate guidance regarding progression of therapy will need to be provided for a therapy assistant delivering the therapy sessions three times per week.

Where activities to practise have been chosen from the 'Enhanced upper limb therapy 3: warm up stretches, goal choices and activity flowcharts', the activities are designed such that following accomplishment of a 'part-task' activity participants progress to practise the next 'part-task' activity in the step by step flowchart. Should a 'whole-task' activity be accomplished before a goal review session, the flowcharts include suggestions for adaptations to the activities for further practise and progression. If a goal is chosen which is not included within the enhanced therapy goal list, it will be necessary for the senior therapist to give appropriate advice on activities to practise and how to progress therapy, to the therapy assistant.

In addition, the following should be considered and appropriate guidance given regarding practising activities over the next four weeks:

For each activity, once the participant knows what to do and they demonstrate a basic ability, try to make the activity more engaging and stimulating, e.g. by:

- Including *variations* in the task (e.g. different sizes and shapes of objects, different start-and end positions, different speeds). This is known as variable practice. Variable practice enables the participant to translate what they learn during therapy sessions more easily to a wider range of activities of daily living (ADL).
- Doing tasks in a *different order* within a therapy session. So rather than doing five repetitions of one activity followed by five repetitions of another task and so on (known as blocked practice), mix up the order in which the participant undertakes each task (known as random practice). This may seem counter-intuitive, but random practice encourages deeper learning. Random practice also allows for a more 'real-life' situation where the order of events is more

likely to be mixed rather than blocked. This enables better translation of what a participant has learned during therapy into ADL.

Ensure the programme is sufficiently intensive. To achieve functional improvement after stroke, a few hundred repetitions are required each session^[1]. Therefore, in this study we should aim – where possible – to include a few hundred repetitions in each session.

2.5. Summary and feedback

This should consist of a participant's own evaluation of their performance followed by therapist feedback. This discussion is to encourage a participant to think about what they have learned, and what they need to focus on in the next session.

2.6. Study paperwork

Accurate completion of paperwork is a crucial part of research.

All sessions should be recorded in the document titled 'Enhanced upper limb therapy: participant goals and therapy record'. In addition, a second document entitled 'Enhanced upper limb therapy: activity flowchart for optional goals or activity adaptations' exists to record activities for optional goals and any adaptations to the pre-specified activity flowcharts (found in 'Enhanced upper limb therapy 3: warm up stretches, goal choices and activity flowcharts'). Section 6 below shows how these documents should be completed. In summary, the following must be documented for session 1:

- the (up to four) goals that have been selected
 - if a goal has been selected from the pre-specified list, please document this by its number as listed in 'Enhanced upper limb therapy 3: warm up stretching, goal choices and activity flowcharts' (e.g. D1).
 - If an alternative goal has been chosen ('optional goal'), this should be written out free text and labelled as 'OG 1' (optional goal 1). If more than one optional goal has been chosen these should also be written

out and then labelled as OG 2, OG 3, etc. For example: 'Using a knife and fork – OG1'

- whether whole-task or part-task activity practice has been chosen, for each goal
- where part-task practice has been chosen for a pre-specified goal, the start position on the relevant flowchart should be recorded (indicated by the number in the flowchart box e.g. W1.02 (see 'Enhanced upper limb therapy 3: warm up stretching, goal choices and activity flowcharts')
- where an optional goal has been chosen details of the activities to practice, the starting task and tasks for progression should be recorded (this should be in the document entitled 'Enhanced upper limb therapy: activity flowchart for optional goal or goal adaptations')
- any adaptations to the pre-specified activity flowcharts which are being made (this should be in the document entitled 'Enhanced upper limb therapy: activity flowchart for optional goal or goal adaptations')
- any guidance about progression for the pre-specified activity flowcharts should be detailed in the session notes. Where an optional goal is being used or pre-specified activities have been adapted, progression guidance should be documented on the document entitled 'Enhanced upper limb therapy: activity flowchart for optional goals or activity adaptations'.
- the therapy record which includes
 - the goals worked on (record as D1, OG1, etc)
 - the number of repetitions of the task which has been practised for each goal. The total number of repetitions should be recorded.
 - the duration of the entire session
 - the duration of activity practice
 - the treating senior therapist's name, and signature
 - the date
 - a notes section to record any important aspects of therapy, e.g. if a participant has achieved a part-task activity and should commence at the next part-task in the flowchart in the next therapy session, this should be recorded here.

The 'Enhanced upper limb therapy: participant goal and therapy record' also includes an optional section to record an upper limb assessment, should this be useful to the senior therapist.

3. Four week and eight week review sessions (sessions 12 and 24)

Review sessions should be carried out at the end of week 4 (session 12) and the end of week 8 (session 24). The aim of the review sessions is to assess a participant's progress with the programme, and review goals and activities. The review sessions should be carried out by a senior therapist in conjunction with a therapy assistant.

3.1. Introduction

The session should begin with a discussion about progress towards the goals and practising the activities to date.

3.2. Reassessment

An upper limb reassessment should be completed to establish current motor impairment and other neurological deficits that may impact on the participant's upper limb function. The therapist should pay particular attention to:

- Selective movement
- Passive range of movement
- Muscle tone
- Proprioception
- Sensation
- Compensations
- Pain
- Coordination
- Associated reactions

In addition, any inattention should be noted.

A review of upper limb rehabilitation goals should take place. New goals may be selected if previous goals have been achieved, or existing goals may be modified e.g. increasing/decreasing difficulty. Activities choices should also be reviewed accordingly e.g. this may include change from part task practice to whole task practice.

3.3. Warm-up stretching

Gentle stretching of soft tissues and mobilisation of joints can be performed, if necessary, prior to practising rehabilitation activities. However, as the focus of the therapy sessions should be activity practice working towards the participant goals, warm-up stretching should be kept to a minimum. Stretches may be modified at the discretion of a senior therapist. Warm up stretches should be demonstrated to both the participant and the therapy assistant.

3.4. Core treatment

A short therapy session to introduce both the participant and the therapy assistant to the revised tasks the participants will be working through in the following four weeks, should next be undertaken.

The senior therapist should ensure that both the therapy assistant and participant are familiar with the tasks by demonstration and supervision of practice. Guidance on how to progress tasks over the next four weeks should also be given.

As previously, the order to practise the selected tasks and the time to spend on each task are at local discretion and according to a participant's rehabilitation priorities. Repetitions of tasks need to be counted and recorded.

3.5. Summary and feedback

This should consist of a participant's own evaluation of their performance followed by therapist feedback. This discussion is to encourage a participant to think about what they have learned, and what they need to focus on in the next session.

3.6. Study paperwork

The 'Enhanced upper limb therapy: participant goal and therapy record' and 'Enhanced upper limb therapy: activity flowchart for optional goals or activity adaptations' should be completed as appropriate.

The following must be documented:

- whether a participant has achieved their goals
- the (up to four) goals to work towards
- whole-task/part task activity choice (including completion of additional activity flowcharts using 'Enhanced upper limb therapy: activity flowchart for optional goals or activity adaptations' as appropriate)
- any further information/guidance (included in the session notes or on the activity flowchart for optional goals or activity adaptations).
- the therapy record which includes:
 - the goals worked on
 - the number of repetitions of the task which has been practised for each goal
 - the duration of the entire session
 - the duration of activity practice
 - the treating senior therapist's name, and signature
 - the date
 - any notes.

4. Final therapy session (session 36)

The final therapy session should be performed by a senior therapist in conjunction with a therapy assistant. The aim of this session is to conclude the RATULS enhanced upper limb therapy programme. It includes further activity practice followed by feedback and advice for the future.

4.1. Introduction

The session should begin with a discussion about progress towards the goals and practising the activities to date.

4.2. Warm-up stretching

As previously, warm up stretches can be performed where necessary before practising activities.

4.3. Core treatment

Final activity practice should take place focussing on any areas of particular importance to the participant. Suggestions for activities to practise at home or advice about further rehabilitation services can be made if appropriate. Advice about maintaining current upper limb function in the longer term should also be included.

4.4. Summary and feedback

A final feedback discussion should be held. This should include discussion of a participant's own evaluation of their performance and therapist feedback.

Feedback on the thoughts on the content and structure of the enhanced upper limb therapy programme is sought from the participant as part of the enhanced upper limb rehabilitation therapy log.

4.5. Study paperwork

The appropriate sections in the 'Enhanced upper limb therapy: participant goal and therapy record' must be completed.

The following must be documented:

- whether a participant has achieved their goals
- the therapy record which includes:
 - the goals worked on
 - the number of repetitions of the task which has been practised for each goal
 - the duration of the entire session
 - the duration of activity practice
 - the treating senior therapist's name, and signature
 - the date
 - any notes.
- feedback given to participant about progress over the programme
- further advice given regarding maintaining upper limb function (e.g. home exercises).

5. Therapy sessions

Excluding the sessions discussed above, there are 32 other therapy sessions within the enhanced upper limb therapy programme. These sessions are designed to be carried out by a therapy assistant but can be conducted by a qualified therapist according to local staff availability. The aim of these therapy sessions is to practise activities to work towards the goals selected at the initial therapy session or the therapy review sessions.

5.1. Introduction

At the beginning of each therapy session, the therapy assistant should review a participant's previous session notes as a reminder of the goals and activities selected and progress to date.

A discussion should be held regarding which of the selected goals/activities the participant would like to work on at this session. The order to practise each activity and the time to spend on each activity is according to local discretion. A participant need not practise the activities for all four chosen goals in each session.

5.2. Warm-up stretching

Gentle stretching of soft tissues and mobilisation of joints can be performed, if agreed at the initial/ review sessions, to focus attention on the affected upper limb prior to practising rehabilitation activities. However, as the focus of the therapy sessions should be activity practice working towards the participant goals, warm-up stretching should be kept to a minimum. Example warm up stretches can be found in 'Enhanced upper limb therapy 3: Warm-up stretches, goal choices and activity flowcharts'.

5.3. Core treatment

Following warm up stretching (where appropriate), practise of selected activities should commence. The activity flowcharts in 'Enhanced upper limb therapy 3: Warm-up stretches, goal choices and activity flowcharts' or the 'Enhanced upper limb therapy: activity flowchart for optional goals or activity adaptations' should be used to guide practice. The flowcharts are designed as a therapy aid rather than a definitive instruction on how to provide therapy. Guidance and advice from the senior therapist should always be followed.

The following principles should also be considered when delivering therapy:

1. Demonstration

Explain a task to the participant and show them first what to do. Then ask them to undertake/ lead the task with their non-affected side. This is to ensure that the participant has a clear understanding of what to do before they start repeating it with their more affected side. This also enables the non-affected arm to "teach" the affected arm. Following this practise with the non-affected side, commence practice with the affected side.

2. Progressing practice

The RATULS enhanced upper limb therapy programme is split into three, 4 week therapy blocks. To enable participants to achieve the goals set at the beginning of a block, it is important to progress treatment; mindless repetition is not effective.

For part-task activities, once the part task has been accomplished, the participant should progress onto the next part-task in the flowchart.

For whole task activities, the flowcharts also include suggestions for modifications to the activities for further practice and progression.

In addition, the following should be considered:

For each activity, once the participant knows what to do and they demonstrate a basic ability, try to make the activity more engaging and stimulating, e.g. by:

- Including *variations* in the task (e.g. different sizes and shapes of objects, different start-and end positions, different speeds). This is known as variable practice. Variable practice enables the participant to translate what they learn during therapy sessions more easily to a wider range of ADL.
- Doing tasks in a *different order* within a therapy session. So rather than doing five repetitions of one activity followed by five repetitions of another task and so on (known as blocked practice), mix up the order in which the participant undertakes each task (known as random practice). This may seem counter-intuitive, but random practice encourages deeper learning. Random practise also allows for a more ‘real-life’ situation where the order of events is more likely to be mixed rather than blocked. This enables better translation of what a participant has learned during therapy into ADL.

3. Intensity of practice

Ensure the programme is sufficiently intensive. To achieve functional improvement after stroke, a few hundred repetitions are required each session^[1]. Therefore, in this study we should aim – where possible – to include a few hundred repetitions in each session.

4. Monitoring compensatory movements

It is important to monitor so-called “compensatory movements” during practice. These are movements that compensate for those that the participant finds difficult. The reasons why some movements may be difficult include muscle weakness, stiffness, pain or a mix of these. Compensatory movements are often unintentional and people are often unaware that they are “compensating”. Compensatory movements tend to be used in order to achieve a goal (e.g. reach for an object). Common compensatory movements when using the affected arm after stroke are:

- Moving the trunk forward or sideways when reaching. This may be due to difficulty lifting the arm forwards or sideways, and/or difficulty extending the elbow and/or wrist.
- Lifting the shoulder girdle on the affected side when reaching with the affected arm. The participant may attempt to complete a task by lifting the shoulder girdle instead of their arm.

Why is it important to monitor compensatory movements? When practising a task, it is not only about how many repetitions, but also about how well they are executed. In order to achieve the best outcomes, participants need to practise those movement(s) that they find difficult and minimise compensatory movements. Using compensatory movements may mean that a participant does not optimally practice the movement(s) they find difficult.

How to avoid compensatory movements? Before a participant starts to practise a task, it is important to remind them of the optimal posture for practice. Instructions such as “keep your body upright” (to avoid compensatory trunk movement), “keep your shoulders down” (to avoid compensatory shoulder girdle movement) may help. Should compensatory movements arise during practice, a participant should be made aware of these before they attempt again. In some cases, a task may need to be adapted (e.g. a shorter reach, a lighter object) if compensatory movements continue. However, some compensatory movements are likely to take place as practice is meant to be difficult, and with training they are likely to diminish.

5. Equipment

Many activities involve the use of functional objects (e.g. mug, comb, item of clothing). This enhances carry-over of the practice into real life. Where chosen activities require items individual to a participant, they should be asked to bring in their items to use (e.g. comb/brush, specific garments, adapted cutlery). More generic objects should be available in the routine therapy setting (including mugs, cups, containers etc.).

Recording activity practice

During activity practice, the number of repetitions of each task needs to be counted and recorded:

- For whole task practice, completion of the whole task (beginning to end of flowchart) counts as one repetition.
- For part task practice completion of the *component* of the task counts as one repetition.

- If a mixture of whole and part task practice is being used then count the repetitions as above and add the repetitions for each task together to give a total for that goal.

Can stretching count as activity practice?

If a 'stretch' is embedded into an active task (e.g. reaching out to touch/ grasp an object), the repetitions of that stretch/task should be recorded as activity practice. However, if a stretch is passive (i.e. this is not a voluntary, active action on behalf of the patient but a manoeuvre undertaken by the therapist) this does not count as activity practice and the repetitions should NOT be recorded.

5.4. Summary and feedback

At the end of each session, a participant should be asked for comments on their performance and the therapist should also give some feedback. This discussion is to encourage the participant to think about what they have learned, and what they need to focus on in the next session.

5.5. Study paperwork

Accurate completion of paperwork is a crucial part of research.

In the document titled 'Enhanced upper limb therapy: participant goals and therapy record' the following must be documented for each session:

- the therapy record which includes:
 - the goals worked on (record as D1, OG1, etc)
 - the number of repetitions of the task which have been practised for each goal. The total number of repetitions should be recorded.
 - the duration of the entire session
 - the duration of activity practice
 - the treating therapist/therapy assistant's name and signature
 - the date
 - in the notes section any important aspects of therapy should be recorded. E.g. if a participant has achieved a part-task activity and should commence at the next part-task in the flowchart in the next therapy session, this should be recorded here.

In therapy sessions 11, 23 and 35, participant progress should also be documented:

- whether whole-task or part-task activities have been practised
- the starting and finishing position on the part-task flowchart (if appropriate)
- whether each goal has been achieved

6. Senior therapist session summaries

6.1. Session 1: initial therapy session

[Total Duration: 60 minutes]

1. **Introduction** [5 minutes]
 - Description of RATULS enhanced therapy programme

2. **Assessment** [15 minutes]
 - Upper limb assessment
 - Goal setting and activity choice

3. **Warm-up stretching (if necessary)** [2-5 minutes]
 - Warm-up stretches and mobilisation of joints

4. **Core treatment** [30 minutes]

Activity practice

- Familiarise participant and therapy assistant with tasks
- Supervise activity practice

5. **Summary and feedback** [5 minutes]
 - Discuss participant's own evaluation of performance
 - Provide feedback

6. **Study paperwork** [throughout session]
 - Complete appropriate section of 'Enhanced upper limb therapy: Participant goal and therapy record' and, if relevant, 'Enhanced upper limb therapy: activity flowchart for optional goals or activity adaptations'.

6.2. Sessions 12 and 24: Review sessions

[Total Duration: 60 minutes]

1. **Introduction** [5 minutes]
 - Review of participant progress

2. **Reassessment** [15 minutes]
 - Upper limb assessment
 - Goal setting and activity choice

3. **Warm-up stretching (if necessary)** [2-5 minutes]
 - Warm-up stretches and mobilisation of joints

4. **Core treatment** [30 minutes]

Activity practise

 - Familiarise participant and therapy assistant with tasks
 - Supervise activity practice

5. **Summary and feedback** [5 minutes]
 - Discuss participant's own evaluation of performance
 - Provide feedback

6. **Study paperwork** [throughout session]
 - Complete appropriate section of 'Enhanced upper limb therapy: Participant goal and therapy record' and, if relevant, 'Enhanced upper limb therapy: activity flowchart for optional goals or activity adaptations'.

6.3. Session 36: Final therapy session

[Total Duration: 60 minutes]

1. Introduction [5 minutes]

- Review progress from previous session (session 35)
- Discuss activities to practise this session

2. Warm-up stretching (if necessary) [2-5 minutes]

- Warm-up stretches and mobilisation of joints

3. Core treatment [30 minutes]

Activity practice

Continue activity practice

4. Summary and feedback [20 minutes]

- Review goals and progress over entire programme
- Discuss participant's own evaluation of performance over entire programme
- Provide advice on longer term maintenance of upper limb function (e.g. home based exercises, local facilities)

5. Study paperwork [throughout session]

- Complete appropriate section of 'Enhanced upper limb therapy: Participant goal and therapy record'

7. Therapy assistant session summaries

[Total Duration: 60 minutes]

1. Introduction

[5 minutes]

- Review progress from previous session
- Discuss activities to practise this session

2. Warm-up stretching (if agreed at initial/review session) [2-5 minutes]

- Warm-up stretches and mobilisation of joints

3. Core treatment

[45 minutes]

Activity practice

Continue activity practice

4. Summary and feedback

[5 minutes]

- Discuss participant's own evaluation of performance
- Provide feedback

6. Study paperwork

[throughout session]

- Complete appropriate section of 'Enhanced upper limb therapy: Participant goal and therapy record'.

Please note: for session 11, session 23 and session 35, participant progress should also be recorded. (In: 'Enhanced upper limb therapy: Participant goal and therapy record' section 'goal setting and review documentation', page 3)

8. Recording therapy - participant goal and therapy record

Accurate completion of paperwork is a crucial part of research. The data recorded in the paperwork is necessary to describe the treatment participants receive during this therapy programme. This will be used to compare the dose of therapy received by participants in the enhanced therapy group and the robot-assisted training group.

Two documents are used to record the therapy programme:

1. Enhanced upper limb therapy: participant goal and therapy record.
2. Enhanced upper limb therapy: activity flowchart for optional goals or activity adaptations.

Document 1: Enhanced upper limb therapy: participant goal and therapy record.

Each participant will have a therapist-held participant goal and therapy record (figure 1).

NHS
National Institute for
Health Research

Newcastle
University

Robot Assisted Training for the Upper Limb after Stroke

RATULS

Enhanced upper limb therapy:
Participant goal and therapy record

Participant ID Study centre number

□ □ □ □ □ □ □

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Figure 1: Front page of the participant goal and therapy record

The following information should be entered at each session (figure 2):

- the session number
- the date
- the goals worked on (record as D1, OG1, etc)
- the number of repetitions of the task which have been practised for each goal
- the duration of the entire session
- the duration of activity practice
- the treating therapist/therapy assistant's name and signature

There is also a notes section which should be used to document important parts of a session which are not collected in the information described above. For example, if a participant has achieved a part-task activity and should commence at the next part-task in the flowchart in the next therapy session, this should be recorded here.

In addition, the participant ID should be added on each page.

Therapy record						
Participant ID: <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>						
Session number: Date: ___/___/20___ Session duration: ___ mins	Goal 1	Goal 2	Goal 3	Goal 4	Session notes	
	Repetitions	Repetitions	Repetitions	Repetitions		
	Therapist name: _____		Signature: _____	Duration of activity practice: ___ mins		
	Goal 1	Goal 2	Goal 3	Goal 4		
	Repetitions	Repetitions	Repetitions	Repetitions		
Session number: Date: ___/___/20___ Session duration: ___ mins	Goal 1	Goal 2	Goal 3	Goal 4	Session notes	
	Repetitions	Repetitions	Repetitions	Repetitions		
	Therapist name: _____		Signature: _____	Duration of activity practice: ___ mins		
	Goal 1	Goal 2	Goal 3	Goal 4		
	Repetitions	Repetitions	Repetitions	Repetitions		
Session number: Date: ___/___/20___ Session duration: ___ mins	Goal 1	Goal 2	Goal 3	Goal 4	Session notes	
	Repetitions	Repetitions	Repetitions	Repetitions		
	Therapist name: _____		Signature: _____	Duration of activity practice: ___ mins		
	Goal 1	Goal 2	Goal 3	Goal 4		
	Repetitions	Repetitions	Repetitions	Repetitions		
Session number: Date: ___/___/20___ Session duration: ___ mins	Goal 1	Goal 2	Goal 3	Goal 4	Session notes	
	Repetitions	Repetitions	Repetitions	Repetitions		
	Therapist name: _____		Signature: _____	Duration of activity practice: ___ mins		
	Goal 1	Goal 2	Goal 3	Goal 4		
	Repetitions	Repetitions	Repetitions	Repetitions		

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Figure 2: Example therapy session page of the participant goal and therapy record

An example of the completed paperwork is shown in figure 3.

Therapy record						
Participant ID: 53414						
Session number: 1 Date: 04/08/2015 Session duration: 60 mins	Goal 1	Goal 2	Goal 3	Goal 4	Session notes For goal F1 practice progressed from position F1.03 to F1.04	
	W2	F1	Og1-Using a knife	PCI Brushing hair		
	Repetitions	Repetitions	Repetitions	Repetitions		
	95	85	78	102		
Therapist name: HELEN BOONWORTH		Signature: [Signature]		Duration of activity practice: 45 mins		
Session number: Date: / /20 Session duration: mins	Goal 1	Goal 2	Goal 3	Goal 4	Session notes	
	Repetitions	Repetitions	Repetitions	Repetitions		
	Therapist name:		Signature:			Duration of activity practice: mins
Session number: Date: / /20 Session duration: mins	Goal 1	Goal 2	Goal 3	Goal 4	Session notes	
	Repetitions	Repetitions	Repetitions	Repetitions		
	Therapist name:		Signature:			Duration of activity practice: mins
Session number: Date: / /20 Session duration: mins	Goal 1	Goal 2	Goal 3	Goal 4	Session notes	
	Repetitions	Repetitions	Repetitions	Repetitions		
	Therapist name:		Signature:			Duration of activity practice: mins

Figure 3: Example of a completed therapy record for one session

At the initial therapy session and sessions 12 and 24, the upper limb assessment can be documented (figure 4): This is located on pages 16, 17 and 18 of the document.

Upper limb assessment			
Upper limb assessment to be completed by senior therapist			
Session number: _____			
Side of body affected by current stroke: _____			
Prompts:			
<ul style="list-style-type: none"> • Selective movement • Passive range of movement 		<ul style="list-style-type: none"> • Muscle tone • Compensations 	
		<ul style="list-style-type: none"> • Proprioception • Associated reactions 	
		<ul style="list-style-type: none"> • Pain 	
Shoulder		Wrist	
Elbow		Hand	
Inattention / other comments:			

<small>RATULS Enhanced upper limb therapy: Participant goal and therapy record v4: 4th August 2015</small>			
			<small>Page 17 of 18</small>
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Figure 4: Example of the upper limb assessment record.

Goal choices and selection of whole-task/part-task practice plus goal attainment are recorded on page 3 'goal setting and review documentation' section (figure 5).

Goal setting and review documentation

Participant ID:

Goal setting and review documentation																					
Session 1	Goal 1				Goal 2				Goal 3				Goal 4								
Week 1 Initial session	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)					
Session number:	Goal 1				Goal 2				Goal 3				Goal 4								
Progress since week 1	Current Position			Part of task (? / ?)	Achieved (Y/N)			Current Position			Part of task (? / ?)	Achieved (Y/N)			Current Position			Part of task (? / ?)	Achieved (Y/N)		
Session number:	Goal 1				Goal 2				Goal 3				Goal 4								
Week 1 Review session	Week 1 Goal 1 Achieved (Y/N)				Week 1 Goal 2 Achieved (Y/N)				Week 1 Goal 3 Achieved (Y/N)				Week 1 Goal 4 Achieved (Y/N)								
Week 4 Review session	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)					
Session number:	Goal 1				Goal 2				Goal 3				Goal 4								
Progress since week 4	Current Position			Part of task (? / ?)	Achieved (Y/N)			Current Position			Part of task (? / ?)	Achieved (Y/N)			Current Position			Part of task (? / ?)	Achieved (Y/N)		
Session number:	Goal 1				Goal 2				Goal 3				Goal 4								
Week 8 Review session	Week 4 Goal 1 Achieved (Y/N)				Week 4 Goal 2 Achieved (Y/N)				Week 4 Goal 3 Achieved (Y/N)				Week 4 Goal 4 Achieved (Y/N)								
Week 8 Review session	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)					
Session number:	Goal 1				Goal 2				Goal 3				Goal 4								
Progress since week 8	Current Position			Part of task (? / ?)	Achieved (Y/N)			Current Position			Part of task (? / ?)	Achieved (Y/N)			Current Position			Part of task (? / ?)	Achieved (Y/N)		
Final session	Week 8 Goal 1 Achieved (Y/N)				Week 8 Goal 2 Achieved (Y/N)				Week 8 Goal 3 Achieved (Y/N)				Week 8 Goal 4 Achieved (Y/N)								

Figure 5: Example of the goal setting and review documentation.

At the initial session, and sessions 12 and 24 (week 4 and week 8 review respectively), the goal choice and type of activity practice should be recorded. The following should be documented:

- the (up to four) goals that have been selected
 - if a goal has been selected from the pre-specified list, please document this by its number as listed in 'Enhanced upper limb therapy 3: warm up stretching, goal choices and activity flowcharts' (e.g. D1).
 - If an alternative goal has been chosen ('optional goal'), this should be written out free text and labelled as 'OG 1' (optional goal 1). If more than one optional goal has been chosen these should also be written out and then labelled as OG 2, OG 3, etc. For example: 'Using a knife and fork – OG1'.
- whether whole-task or part-task activity practice has been chosen, for each goal.
- where part-task practice has been chosen for a pre-specified goal, the start position on the relevant flowchart should be recorded (indicated by the number in the flowchart box e.g. W1.02)
- for part task practice it is optional to record how many parts of a task exist and where the participant should begin on that task. E.g. if a task has 5 parts and the participant should begin on part 2 then for the initial session 'part of task' is 2/5.

An example of the completed paperwork is shown in figure 6.

Goal setting and review documentation																
Participant ID: 5 3 4 1 4																
Session 1	Goal 1				Goal 2				Goal 3				Goal 4			
Week 1 Initial session	W2 - Washing hands				F1 - Drinking from mug				CG1 - using knife				PCI - Brushing hair			
	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)
	✓					✓	F1.03	1/8	✓					✓	PCI.02	2/6
Session number:	Goal 1				Goal 2				Goal 3				Goal 4			
Progress since week 1	Current Position		Part of task (? / ?)	Achieved (Y/N)	Current Position		Part of task (? / ?)	Achieved (Y/N)	Current Position		Part of task (? / ?)	Achieved (Y/N)	Current Position		Part of task (? / ?)	Achieved (Y/N)
Session number:	Goal 1				Goal 2				Goal 3				Goal 4			
Week 4 Review session	Week 1 Goal 1 Achieved (Y/N)				Week 1 Goal 2 Achieved (Y/N)				Week 1 Goal 3 Achieved (Y/N)				Week 1 Goal 4 Achieved (Y/N)			
	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)
Session number:	Goal 1				Goal 2				Goal 3				Goal 4			
Progress since week 4	Current Position		Part of task (? / ?)	Achieved (Y/N)	Current Position		Part of task (? / ?)	Achieved (Y/N)	Current Position		Part of task (? / ?)	Achieved (Y/N)	Current Position		Part of task (? / ?)	Achieved (Y/N)
Session number:	Goal 1				Goal 2				Goal 3				Goal 4			
Week 8 Review session	Week 4 Goal 1 Achieved (Y/N)				Week 4 Goal 2 Achieved (Y/N)				Week 4 Goal 3 Achieved (Y/N)				Week 4 Goal 4 Achieved (Y/N)			
	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)
Session number:	Goal 1				Goal 2				Goal 3				Goal 4			
Progress since week 8	Current Position		Part of task (? / ?)	Achieved (Y/N)	Current Position		Part of task (? / ?)	Achieved (Y/N)	Current Position		Part of task (? / ?)	Achieved (Y/N)	Current Position		Part of task (? / ?)	Achieved (Y/N)
Final session	Week 8 Goal 1 Achieved (Y/N)				Week 8 Goal 2 Achieved (Y/N)				Week 8 Goal 3 Achieved (Y/N)				Week 8 Goal 4 Achieved (Y/N)			

Figure 6: Example session 1 completed goal setting and review documentation.

At sessions 11, 23, and 35, participant progress should be recorded to assist with the next review session. This is progress since week 1, progress since week 4 and progress since week 8 respectively. The following should be documented:

- where part-task practice was chosen for a pre-specified goal, the current position on the relevant flowchart should be recorded (indicated by the number in the flowchart box e.g. W1.02)
- for part task practice It is optional to record how many parts of a task have been completed. E.g. if a task has 5 parts and the participant has begun on part 2 (as specified in their goal setting session) but has progressed to part 4 then 'part of task' is 4/5.
- whether each goal has been achieved

An example of the completed paperwork is shown in figure 7.

At the review sessions (12 and 24), in addition to the goal setting information described above (page 29), achievement of goals from the previous four weeks should be recorded. An example of the completed paperwork is shown in figure 8.

Goal setting and review documentation

Participant ID: 5 3 4 1 4

Goal setting and review documentation																
Goal 1				Goal 2				Goal 3				Goal 4				
Session 1	W2 - washing hands				F1 - Drinking from mug				Og1 - using knife				PC1 - Brushing hair			
Week 1 Initial session	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)
	✓				✓		F1.05 1/8		✓				✓		PC1.02 2/6	
Session number: 11	Goal 1				Goal 2				Goal 3				Goal 4			
Progress since week 1	Current Position	Part of task (? / ?)	Achieved (Y/N)		Current Position	Part of task (? / ?)	Achieved (Y/N)		Current Position	Part of task (? / ?)	Achieved (Y/N)		Current Position	Part of task (? / ?)	Achieved (Y/N)	
	—	—	Y		F1.08 6	8/8	Y		—	—	N		PC1.05	5/6	N	
Session number:	Goal 1				Goal 2				Goal 3				Goal 4			
Week 4 Review session	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)
Session number:	Goal 1				Goal 2				Goal 3				Goal 4			
Progress since week 4	Current Position	Part of task (? / ?)	Achieved (Y/N)		Current Position	Part of task (? / ?)	Achieved (Y/N)		Current Position	Part of task (? / ?)	Achieved (Y/N)		Current Position	Part of task (? / ?)	Achieved (Y/N)	
Session number:	Goal 1				Goal 2				Goal 3				Goal 4			
Week 8 Review session	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)
Session number:	Goal 1				Goal 2				Goal 3				Goal 4			
Final session	Current Position	Part of task (? / ?)	Achieved (Y/N)		Current Position	Part of task (? / ?)	Achieved (Y/N)		Current Position	Part of task (? / ?)	Achieved (Y/N)		Current Position	Part of task (? / ?)	Achieved (Y/N)	
Session number:	Goal 1				Goal 2				Goal 3				Goal 4			
Final session	Week 8 Goal 1 Achieved (Y/N)				Week 8 Goal 2 Achieved (Y/N)				Week 8 Goal 3 Achieved (Y/N)				Week 8 Goal 4 Achieved (Y/N)			

Figure 7: Example session 11 (progress since week 1) completed goal setting and review documentation.

Goal setting and review documentation

Participant ID: 5 3 4 1 4

Goal setting and review documentation																
Goal 1				Goal 2				Goal 3				Goal 4				
Session 1	W2 - Washing hands				F1 - Drinking from mug				CG1 - using knife				PC1 - Brushing hair			
Week 1 Initial session	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)
	✓					✓	Fl.03 1/8		✓				✓	PC1.02 2/6		
Session number: 11	Goal 1			Goal 2			Goal 3			Goal 4						
Progress since week 1	Current Position	Part of task (? / ?)	Achieved (Y/N)	Current Position	Part of task (? / ?)	Achieved (Y/N)	Current Position	Part of task (? / ?)	Achieved (Y/N)	Current Position	Part of task (? / ?)	Achieved (Y/N)	Current Position	Part of task (? / ?)	Achieved (Y/N)	
	/	/	Y	Fl.086	8/8	Y	-	-	N	PC1.05	5/6	N				
Session number: 12	Goal 1				Goal 2				Goal 3				Goal 4			
Week 4 Review session	CG2 - Washing dishes				D1 - Closing a zip				CG1 - using knife				PC1 - Brushing hair			
Week 4 Review session	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)	Whole (tick)	Part (tick)	Current Position	Part of task (? / ?)
	✓				✓				✓				✓	PC1.05 5/6		
Session number: Progress since week 4	Goal 1			Goal 2			Goal 3			Goal 4						
	Current Position	Part of task (? / ?)	Achieved (Y/N)	Current Position	Part of task (? / ?)	Achieved (Y/N)	Current Position	Part of task (? / ?)	Achieved (Y/N)	Current Position	Part of task (? / ?)	Achieved (Y/N)	Current Position	Part of task (? / ?)	Achieved (Y/N)	
Session number: Week 8 Review session	Goal 1				Goal 2				Goal 3				Goal 4			
Final session	Week 8 Goal 1 Achieved (Y/N)				Week 8 Goal 2 Achieved (Y/N)				Week 8 Goal 3 Achieved (Y/N)				Week 8 Goal 4 Achieved (Y/N)			

Figure 8: Example session 12 (week 4 review session) completed goal setting and review documentation.

At session 36, achievement of goals should be recorded on the goal setting and review documentation, the therapy record should be completed and the senior therapist is required to give feedback to the participant about their progress over the enhanced upper limb therapy programme. Further advice should also be given regarding maintaining upper limb function (e.g. home exercises). This should be documented (figure 9).

Final session feedback and advice	
Participant ID:	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
Feedback given to participant about progress over the programme	
<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	
Further advice given regarding maintaining upper limb function (e.g home exercises)	
<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	
<small>RATULS Enhanced upper limb therapy: Participant goal and therapy record v4: 4th August 2015 © RATULS study team 2015</small>	
<small>Page 13 of 18</small>	

Figure 9: Example of the final session feedback and advice documentation.

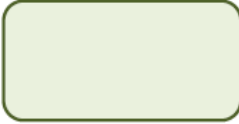
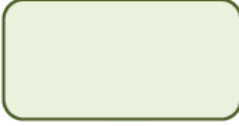

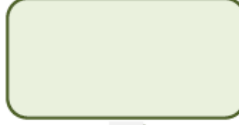
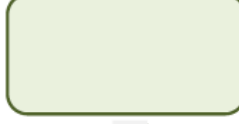
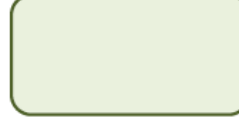
Document 2: Enhanced upper limb therapy: activity flowchart for optional goals or activity adaptations

The blank activity flowcharts (see figure 10) should be used to document activities to practice for optional goals and can be used to show adaptations to the pre-specified activity flowcharts. In addition, there are spaces to include any further information or guidance that should be followed in the therapy sessions.

RATULS Enhanced upper limb therapy: Activity flowchart for optional goals or activity adaptations

Participant ID:

Goal number: _____ Goal name: _____ Part/whole task activity: _____

	Further information/guidance
↓	
	Further information/guidance
↓	
	Further information/guidance
↓	
	Further information/guidance
↓	
	Further information/guidance
↓	
	Further information/guidance

RATULS Enhanced upper limb therapy: activity flowchart for optional goals or activity adaptations v1: 22nd June 2015 Page 1 of 1
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Figure 10: Example of an activity flowchart for optional goals or activity adaptations.

9. Participant attendance

The RATULS enhanced upper limb therapy programme is designed to be followed session by session. However, it is inevitable that some participants will be unavailable for some sessions.

If a participant misses a session, this can be 'made up' according to local capacity. For example, if a participant was due to attend session 10 on Wednesday but was unavailable, if capacity allowed, the participant could attend for session 10 on Thursday instead.

If capacity does not allow a session to be 'made up', the session is lost. If a session is lost, this should be documented using a 'did not attend record' (see figure 11).

RATULS Trial	Centre Number	Patient ID	Did not attend record
	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Robot Assisted Training for the Upper Limb after Stroke (RATULS)			
Did not attend record			
Patient ID	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		
Robot assisted training	<input type="checkbox"/>		
Enhanced upper limb therapy	<input type="checkbox"/>		
Number of missed sessions	<input type="checkbox"/> <input type="checkbox"/>		
Reason for not attending (if known):			
<hr/>			
<hr/>			
<hr/>			
<hr/>			
<hr/>			
<hr/>			
<hr/>			
Name _____	Date ___/___/20___		
Signed _____			
RATULS Did not attend record v2: 22 nd May 2015			
Page 1 of 1			

Figure 11: Example of a did not attend record.

The only exception to this guidance is when a participant is unavailable to attend a scheduled 'review' session (session 12 or 24). In this case, if this session cannot be 'made up', the review session should be held when the participant can next attend and a later therapy session should be lost. This is because it will be necessary to conduct the review sessions to progress treatment.

10. Enhanced upper limb therapy documents

This Enhanced upper limb therapy 2: How to deliver the programme manual is part of a series of documents developed to describe the RATULS enhanced therapy programme. The other documents in this series are:

- Enhanced upper limb therapy 1: Programme overview
- Enhanced upper limb therapy 3: Warm-up stretches, goal choices and activity flowcharts

11. RATULS co-ordinating centre

For further information please contact the RATULS co-ordinating team:

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Phone: 0191 2086779

Or refer to the RATULS website: <http://research.ncl.ac.uk/ratuls/>

12. References

1. Birkenmeier, R.L., E.M. Prager, and C.E. Lang, Neurorehab Neural Repair, Translating animal doses of task-specific training to people with chronic stroke in 1-hour therapy sessions: a proof-of-concept study. 2010. **24**(7): p. 620-35.

This enhanced upper limb therapy manual has been produced by Dr Helen Bosomworth with input from Miss Lianne Brkic, Mrs Lydia Aird, Dr Lisa Shaw and Professor Frederike van Wijck.

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