"The Clinical Advantage" TM

Hybrid Neurological Strength and Functional Task Performance Plan for the Patient with Hemiparesis

Author: Natalie Thompson, PT

> Contributor: Dave Wilcox, OTR/L

BIODEX

About the Authors:

Natalie Thompson, PT

Natalie Thompson is a 1992 graduate of SUNY at Stony Brook with a dual degree in Biology and Physical Therapy. She has a background in clinical, managerial and educational settings. Natalie has practiced for ten years in orthopedics with specialized training from the McKenzie Institute and Institute of Physical Art. Since 2001, she has focused on working with neurologically impaired patients. Natalie was a hands on manager for United Cerebral Palsy for six years, after which she began treating young children up to five years of age. She was an adjunct teaching assistant for Stony Brook University in the Physical Therapy program. Currently, Natalie works for Biodex as a Clinical Administrator and Applied Clinician. She remains a part time treating clinician and consultant working with children up to three years of age.

David Wilcox, OTR/L

David Wilcox, OTR/L is an experienced clinician that has worked in the field of occupational therapy for more than 18 years. David started his career in 1998 at Moss Rehabilitation Hospital in Philadelphia treating an array of diagnoses such as traumatic brain injury, stroke, spinal cord injury, cardiac, pulmonary, and orthopedic conditions. He expanded his role from treating clinician to student supervisor, guest lecturer, mentor, and adjunct professor with specific focus on neuroscience and cognition.

David has been associated with Biodex since 2010, and recently joined the team in a full-time role. As a clinical educator, he provides operational in-services, continuing education accredited courses and workshops, and ongoing clinical support for Biodex's line of physical medicine and rehabilitation products.

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Biodex Rehabilitative Performance Plan | Functional Task Performance Plan

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1. Overview

Introduction

Upper extremity hemiparesis is a persistent physical disability and is a significant barrier to independence. Although it is a recognized problem, there is little evidence demonstrating the most effective rehabilitation plan to restore function. Prominent manifestations of hemiparesis include impaired inter-segmental coordination, hyperreflexia or spasticity, and weakness.

There is growing evidence suggesting that weakness plays a more suggestive role in impaired motor function following stroke compared to traditional theories. Although studies of the effects of strength training for upper extremity hemiparesis are relatively new, current evidence is supporting the benefits of strengthening as it relates to improved overall motor function and activity participation (Patten et al., 2013 and Patten et al., 2006).

The Biodex Upper Extremity Hemiparetic attachments, comprised of lightweight carbon-fiber, are designed to be on the cutting edge of new technology and methodology for treating those with upper extremity hemiparesis.

About the Plan

This plan is termed hybrid as it combines two distinct therapeutic steps; **Isokinetic Strengthening**, and **Functional Task Performance**.

Before starting, patients who qualify to participate must first complete 10–15 minutes of stretching and range of motion. This is followed by performing strength training regimens for 35 minutes using the upper extremity composite attachments on the Biodex System 3 or System 4. Once strength training is complete, patients move on to the third and final aspect of the plan; Functional Task Practice (FTP). This takes place for the remaining 28-30 minutes of the session.

This plan is designed for those patients demonstrating upper extremity (UE) hemiparesis as a result of CVA. The direction of intervention is based on the patient examination, evaluation, and specified patient goals. Therapeutic goals are set and correlate with the specific muscle groups to be strengthened as well as dictate the functional task activities. All three elements; passive range of motion/stretching, isokinetic strengthening, and functional task performance combined in this plan are paramount.

The desired end result of this hybrid plan is directed towards assisting patients in regaining their independence as well as restoring their ability to participate in activities that are important to them. The premise of this guideline utilizes current motor learning principles and task-oriented training to gain neuromuscular control.

General Considerations

- · Use of this protocol is not a substitute for sound clinical judgment.
- Tests and measures are proposed to determine minimal criteria to participate. However, additional tests or measures may be required.
- Patient inclusion in the interventions described in the plan must depend on the clinician's interpretation of an individual patient's status.

Minimal Criteria

- Patients should be able to "comprehend, provide decisional consent, learn, and follow three-step commands.
- Patients should have intact scapulohumeral rhythm and glenohumeral joint integrity. Therapists may use various forms of palpation during the initial clinical examination and clinically-indicated reassessments when range of motion, whether passive and/or active, is assessed.
- Patients should have "freedom of significant upper extremity joint pain, range of motion (ROM) limitations, and/or sensory deficits as revealed by clinical examination.
- · Patients should demonstrate the following in their upper extremity with hemiparesis:
 - · Shoulder:
 - · Shoulder flexion/extension

· Elbow flexion/extension

Manual Muscle Test (MMT): 3-/5 (50 to 100 percent range of motion against gravity).

- Wrist extension: At least 10° of active wrist extension three times within one minute.
- $\cdot\,$ Digits: At least 10° of thumb abduction and 10° of active finger extension of any two digits, three times within one minute.
- Patients should demonstrate a maximum score of "3" (considerable increase in muscle tone, passive movement is difficult) on the Modified Ashworth Scale (MAS).

2. The Isokinetic Strengthening Component

A successful rehabilitative treatment program begins with establishing precise baseline measurements. Performing the initial evaluation with the utilization of objective testing measures, good listening, and accurate documentation assist the clinician in finding the primary area(s) of where a patient's greatest weaknesses lie. Once the impairments are identified, the treatment plan can be established. When performing the hybrid neurological strengthening and functional task performance plan, it must first be determined if the patient meets the criteria to participate. The guidelines for inclusion are stated below:

- $\cdot~$ The patient must have a minimum 3- grade on the MMT scale.
- \cdot The patient must have good shoulder integrity as well good scapula stability.
- $\cdot~$ The patient must have a maximal score of 3 on the MAS scale.

Once motor function and cognition have been defined, the therapeutic goals must be identified. The following goals are consistent throughout the Hybrid Neurological Strength and FTP Plan. There are seven goals from which to choose. Two to three goals should be selected coinciding with the weak movement patterns to be rehabilitated.

The goals are as follows:

- · Establish normal scapulothoracic humeral rhythm and stability
- · Incorporate movements against gravity
- · Incorporate shoulder external rotation
- · Incorporate bimanual movements
- · Incorporate weight bearing through UE in shoulder ER, wrist/finger extension
- · Incorporate reaching and manipulation through goal directed activities
- · Incorporate controlled elbow movement

Strength training is performed on the Biodex dynamometer. Eccentric and concentric activities are used to train the upper extremity. There are five total patterns from which to choose:

- \cdot Shoulder abduction/adduction
- · Shoulder flexion/extension
- \cdot Should external/internal rotation
- · Transverse plane elbow flexion/extension
- \cdot Wrist extension/flexion

Four of the above patterns are selected to satisfy the variables of the protocol and align with the chosen activity category. The joint patterns are determined relative to the patient's area of greatest deficit as well as being based on the patient's goals and abilities.

The Biodex strength training protocols have been created for clinicians using the upper extremity hemiparetic attachments and is integrated with the dynamometer software via an update.

- Select the appropriate training stage (1-4 weeks, 5-8 weeks, or 8-12 weeks) relative to what week the patient is at within the 12 week training regime.
- Select the four protocols based on chosen activity category, the joint movement and muscles being strengthened. Within each joint movement activity, there will be one eccentric training exercise and two concentric exercises with two different speeds.

Prior to starting the Hybrid Plan:

- $\cdot\,$ Confirm that the plan specific protocols have been added to your Biodex dynamometer software, and then familiarize yourself with these protocols.
- Familiarize yourself with each of the upper extremity hemiparetic attachments and how each specific joint is setup (see below).

System 3 and 4 Upper Extremity Hemiparetic Attachments

Shoulder: Flexion/Extension Abduction/Adduction	
Shoulder: Internal/External Rotation	Contraction of the second seco
Elbow: Flexion/Extension	a la
Wrist: Flexion/Extension	

How to Set Up the Upper Extremity Hemiparetic Attachments

Shoulder: Flexion/Extension





Quick Reference:

Dynamometer Orientation: 0 - 15°

Dynamometer Tilt: 0 - 10° **Seat Orientation:** 0 - 30°

Seat back Tilt: 70 - 85°

Axis of Rotation: Compromise axis is acromial process in the sagittal plane.

Ready Position: Full extension

Required Attachment: UE Hemiparetic Shoulder Attachment

Optional: Foot rest (to aid in maintaining proper positioning, included with System 3 and System 4).

Optional: Foot rest (to aid in maintaining Shoulder: Abduction/Adduction

Quick Reference: Dynamometer Orientation: 35° Dynamometer Tilt: 0 - 10° Seat Orientation: 60°

Seat back Tilt: 70 - 85°

Axis of Rotation: Axis of rotation for this pattern approximates

the axis of the acromioclavicular joint, which connects the distal end of the clavicle to the anterior medial portion of the acromial process.

Ready Position: Full adduction

Required Attachment: UE Hemiparetic Shoulder Attachment

Optional: Foot rest (to aid in maintaining proper positioning, included with System 3 and System 4).





Shoulder: External/Internal Rotation In The Modified Neutral Position





Quick Reference Dynamometer Orientation: 0° Dynamometer Tilt: 50°

Seat Orientation: 0°

Seat back Tilt: 55 - 85°

Axis of Rotation: Axis alignment is longitudinal through the head of the shaft of the humerus in a horizontal plane.

Ready Position: Full internal rotation.

Required Attachment: UE Hemiparetic Elbow/Shoulder Attachment

Optional: Foot rest (to aid in maintaining proper positioning, included with System 3 and System 4).

Elbow: Extension/Flexion (Seated, Gravity Neutral):







Dynamometer Orientation: 20 - 30°

Dynamometer Tilt: 80 - 90°

Seat Orientation: 20 - 30°

Seat back Tilt: 85°

Axis of Rotation: Passes through the center of the trochlea and the capitulum bisecting the longitudinal axis of the shaft of the humerus.

Ready Position: Full flexion

Required Attachment: UE Hemiparetic Elbow/Shoulder Attachment

Optional: Foot rest (to aid in maintaining proper positioning, included with System 3 and System 4).





Wrist: Extension/Flexion (Seated, Gravity, Neutral)



Quick Reference Dynamometer Orientation: 0° Dynamometer Tilt: 90° Seat Orientation: 15° Seat back Tilt: 85°

Elbow Flexion: 70 - 90 $^{\circ}$





Axis of Rotation: Axis of rotation for this pattern lies between the proximal row of the carpals, at the capitate bone, and at the radius at the radiocarpal joint.

Ready Position: Full flexion.

Required Attachments: UE Hemiparetic Wrist Attachment and Wrist Stabilizer, Limb Support (Limb support is included in standard System 3 and System 4 attachments).

Optional: Foot rest (to aid in maintaining proper positioning, included with System 3 and System 4).

3. The Functional Task Practice Component

The therapist selects four task-oriented activity categories from the nine listed below. These activities should coincide with the patient's impairments identified upon the initial evaluation or reassessment. The goals and priorities of the patient should also be given significant weight when choosing the four FTP activity categories. The FTP portion of the plan is performed for approximately 28-30 minutes.

Activity Category:

- Water task
- \cdot Catch release
- · Drawing/writing
- · Tool task
- · Laundry/dressing
- · Sport
- · Feeding
- Board games/cards
- · Computer tasks

These nine activity categories reinforce the specific muscles that require strengthening via the isokinetic training on the dynamometer. They are broken down into therapeutic tasks, and then into either low- or high-level functional activities. Not only will strength levels improve with isokinetic training, but also with the performance of repetitive task engagement. Strengthening occurs via motor learning and specific task training.

NOTE: Please familiarize yourself with the *Functional Task Practice* chart on the following page.

Functional Task Practice

Therapeutic Goals	Activity Category	Example Therapeutic Activity Low Level High Level	
1. Establish normal scapulothoracic humeral rhythm and stability	1. Water task	Sliding hand away from body to reach cup. Lifting empty cup one inch above surface of table, T8 height.	Placing full cup water on shelf at eye level. Pouring full cups into empty cups at same level.
2. Incorporate movement against gravity	2. Catch/release	Lifting ball from surface at T12 height, dropping into bucket T8 height.	Catching hook and loop fastener ball on hook and loop fastener pad within arm's reach, shoulder height. Throw-back ten feet.
3. Incorporate shoulder ER and stretch to long fingers	3. Drawing/ writing	Using a marker, place dots in predrawn circles, horizontal surface, T8 height.	Writing block letters on vertical paper surface at eye level.
4. Incorporate bilateral hand movement	4. Tool task	Standing at the door and reaching to turn knob to open/close door.	Using screwdriver to place/remove screws at shoulder height.
5. Incorporate weight bearing through UE in shoulder ER, wrist ext., and finger ext. Also incorporate reaching and manipulation through hand-directed movements	5. Laundry/ dressing	Smoothing out a wrinkled towel on a horizontal surface at T6 height.	Placing articles of clothing on hangers; hanging them on a bar at eye level.
	6. Sport	Tossing/hitting a balloon back/forth with therapist.	Playing balloon badminton using racket to hit balloon over net.
	7. Feeding	Gripping cup and lifting towards face to attempt to take sip of water.	Carry a tray of cups filled ¾ with water using contralateral arm. Removing cups with opposite hand.
	8. Board games/ cards	Sliding cards along table at T6 height to place them in appropriate category according to game rules.	Placing/retrieving Jenga pieces to avoid knocking over tower of wooden blocks.
6. Incorporate controlled elbow movement	9. Computer task	Playing computer tracking game ("Brickles Plus") at lowest level of play, using adaptation for poor grip.	Playing computer tracking game ("Brickles Plus") at higher level of play, not allowing arm to rest.

Hybrid Neurological Strength and Functional Task Performance Plan for the Patient with Hemiparesis

4. Implementing the Plan

Before Starting

Stretching and Range of Motion

Passive and active assistive range of motion helps to prevent joint contractures and maintains joint flexibility for persons with a hemiparetic upper extremity. Passive stretching to end range limit can allow the tissues to resume the original resting length.

Active stretching techniques are used to assist with lengthening shortened contractile and noncontractile soft tissue. The end goal is to facilitate increased range of motion, prevent joint contractures, and muscle shortening. Movement of the extremities also promotes circulation of blood. As always, precautions are needed with regard to a painful extremity, joint integrity, joint laxity, and edema. Range of motion and stretching activities should be performed through pain free movements, and encompassing all joint movements tolerated. Patients status post CVA can perform the exercises alone or with the guidance of a clinician.

Session Length

Each session is designed to last a total of 75 minutes. This time incorporates standard stretching and range of motion exercises performed before beginning the isokinetic strengthening and functional task practice portions of the overall rehabilitative performance plan.

- \cdot 15 minutes of range of motion and strengthening
- 35 minutes of Isokinetic strengthening using UE hemiparetic attachments
- · 28 minutes of functional task practice

Frequency

This protocol should be performed three times per week for 12 weeks. The strengthening aspect of the protocol changes at week five and nine as the patient gains strength and control. It is recommended that the strengthening portion of the protocol be completed in its entirety. Dynamometer training impacts neural strength and greatly assists with retraining new pathways. This will result in improved movement patterns in the involved extremity. Due to potential insurance limitations or time restrictions, the range of motion (ROM) and Functional Task Practice (FTP) activities can be guided by trained non-clinical staff or independently by the patient. If not completed in clinic, the FTP activities can also be performed as a Home Exercise Program (HEP).

Directions

As indicated above, the therapist uses the findings on the initial evaluation to determine two to three therapeutic goals. As shown in the FTP chart, the goals therapists can select from are:

- · Establish normal scapulothoracic humeral rhythm and stability.
- · Incorporate movement against gravity.
- · Incorporate shoulder ER and stretch to long fingers.
- · Incorporate bimanual hand movement.
- Weight bearing through UE in shoulder ER, wrist extension, and finger extension. Also incorporate reaching and manipulation through goal-directed movements.
- · Incorporate controlled elbow movements.

The therapist then selects four out of the nine therapeutic activity categories in which their patient participates in that best coincides with the patient's impairments and therapeutic goals. To assist the therapist in selecting the appropriate activities, movement requirements to perform each task have been added. As shown in the FTP chart, they are:

- Water task
- · Catch release
- · Drawing/writing
- Tool task
- · Laundry/dressing
- · Sport
- \cdot Feeding
- · Board games/cards
- · Computer tasks

Step 1: Isokinetic Strengthening

Following the initial stretching and range of motion procedure, the therapist runs the isokinetic strengthening that coincides with the selected therapeutic activities through the use of the Biodex dynamometer and UE hemiparetic attachments.

Step 2: Functional Task Practice

The patient engages in each of the four selected activities for seven minutes, for a total of 28-30 minutes, including transition time. Note, there are two levels of challenge within each activity. Depending on the patient's abilities, the therapist has a choice of low- and high-level challenges.

NOTE: It is imperative to initiate this plan with 15 minutes of range of motion and stretching activities. There are numerous beneficial effects of a warm-up, including a decreased risk of injury, increased blood flow to tissue and muscles, and improved overall muscle performance.

Therapeutic Activity #1: Water Task

Overview

Pouring water and lifting cups at various heights depending on patient's ability level.

Upper extremity requirements to participate in the water task activity relative to this plan:

- Normal scapulothoracic humeral rhythm and stability needed during shoulder flexion.
- · Movement against gravity.
- · Bimanual hand movements.
- · Controlled elbow movement.
- \cdot Shoulder internal and external rotation as well as stretch to long fingers.
- · Reaching and manipulation through hand directed movements.

Step 1: Isokinetic Strengthening

Strengthening the movements required for the task using UE hemiparetic attachments (35 minutes).

Exercise	Repetitions	Week 1-4	Week 5-8	Week 9-12
Shoulder flexion/ extension	Set 1: 10 reps Set 2: 10 reps Set 3: 10 reps	Eccentric: 30°/sec Concentric: 30 °/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec
Shoulder internal/ external rotation	Set 4: 10 reps Set 5: 10 reps Set 6: 10 reps	Eccentric: 30°/sec Concentric: 30°/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec
Transverse plane elbow flexion/ extension	Set 7: 10 reps Set 8: 10 reps Set 9: 10 reps	Eccentric: 30°/sec Concentric: 30°/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec
Wrist extension/ flexion	Set 10: 10 reps Set 11: 10 reps Set 12: 10 reps	Eccentric: 30°/sec Concentric: 30 °/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec

IMPORTANT: Make note of when the protocol was initiated as "week 1" and choose appropriate training speed at week five and nine accordingly.

Step 2: Functional Task Practice

Seven minutes (28-30 minutes total with four activities combined). The therapist selects low- or high-level activity based on patient ability level.



Therapeutic Activity #2: Catch/Release

Overview

Lifting/dropping or catching/throwing a ball depending on patient's ability level.

Upper extremity requirements to participate in the catching/releasing activity relative to this plan:

- · Normal scapulothoracic humeral rhythm and stability needed during shoulder flexion.
- \cdot Movement against gravity. In addition with shoulder flexion, abduction and adduction is required.
- · Bimanual hand movements.
- · Controlled elbow movement.
- \cdot Shoulder internal and external rotation as well as stretch to long fingers.
- · Reaching and manipulation through hand directed movements.

Step 1: Isokinetic Strengthening

Strengthening the movements required for the task using UE hemiparetic attachments (35 minutes).

Exercise	Repetitions	Week 1-4	Week 5-8	Week 9-12
Shoulder flexion/ extension	Set 1: 10 reps Set 2: 10 reps Set 3: 10 reps	Eccentric: 30°/sec Concentric: 30°/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec
Shoulder internal/ external rotation	Set 4: 10 reps Set 5: 10 reps Set 6: 10 reps	Eccentric: 30°/sec Concentric: 30°/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec
Transverse plane elbow flexion/ extension	Set 7: 10 reps Set 8: 10 reps Set 9: 10 reps	Eccentric: 30°/sec Concentric: 30°/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec
Wrist extension/ flexion	Set 10: 10 reps Set 11: 10 reps Set 12: 10 reps	Eccentric: 30°/sec Concentric: 30°/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec

IMPORTANT: Make note of when the protocol was initiated as "week 1" and choose appropriate training speed at week five and nine accordingly.

Step 2: Functional Task Practice

Seven minutes (28-30 minutes total with four activities combined). The therapist selects low- or high-level activity based on patient ability level.



Therapeutic Activity #3: Drawing/Writing

Overview

Using a marker, placing dots/drawing circles, or writing block letters depending on the patient's ability level.

Upper extremity requirements to participate in the drawing/writing activity relative to this plan:

- Normal scapulothoracic humeral rhythm and stability needed during shoulder flexion.
- $\cdot\,$ Bimanual hand movements.
- · Movement against gravity.
- · Controlled elbow movement.
- · Shoulder internal and external rotation as well as stretch to long fingers.
- · Reaching and manipulation through hand-directed movements, including wrist extension.
- Weight bearing through UE in shoulder ER wrist extension, finger extension if stroke affected non-dominant side.

Step 1: Isokinetic Strengthening

Strengthening the movements required for the task using UE hemiparetic attachments (35 minutes).

Exercise	Repetitions	Week 1-4	Week 5-8	Week 9-12
Shoulder flexion/ extension	Set 1: 10 reps Set 2: 10 reps Set 3: 10 reps	Eccentric: 30°/sec Concentric: 30°/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90 °/sec Concentric: 120°/sec
Shoulder internal/ external rotation	Set 4: 10 reps Set 5: 10 reps Set 6: 10 reps	Eccentric: 30°/sec Concentric: 30°/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec
Transverse plane elbow flexion/ extension	Set 7: 10 reps Set 8: 10 reps Set 9: 10 reps	Eccentric: 30°/sec Concentric: 30°/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec
Wrist extension/ flexion	Set 10: 10 reps Set 11: 10 reps Set 12: 10 reps	Eccentric: 30°/sec Concentric: 30 °/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90 °/sec Concentric: 120°/sec

IMPORTANT: Make note of when the protocol was initiated as "week 1" and choose appropriate training speed at week five and nine accordingly.

Step 2: Functional Task Practice

Seven minutes (28-30 minutes total with four activities combined). The therapist selects low- or high-level activity based on patient ability level.

Step 2a: Low level Using marker to place dots in predrawn circles, horizontal surface, T8 height.	
Step 2b: High level Writing block letters on vertical paper surface at eye level height.	AD

Therapeutic Activity #4: Tool Task

Overview

Turning a door knob or opening and closing a door or using a screwdriver to place and remove screws depending on the patient's ability level.

Upper extremity requirements to participate in the tool task activity relative to this plan:

- · Normal scapulothoracic humeral rhythm and stability needed during shoulder flexion.
- · Movement against gravity. In addition to shoulder flexion, abduction and adduction is required.
- · Controlled elbow movement.
- \cdot Shoulder internal and external rotation as well as stretch to long fingers, including wrist extension.
- · Reaching and manipulation through hand directed movements.

Step 1: Isokinetic Strengthening

Strengthening the movements required for the task using UE hemiparetic attachments (35 minutes).

Exercise	Repetitions	Week 1-4	Week 5-8	Week 9-12
Shoulder flexion/ extension	Set 1: 10 reps Set 2: 10 reps Set 3: 10 reps	Eccentric: 30°/sec Concentric: 30 °/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec
Shoulder internal/ external rotation	Set 4: 10 reps Set 5: 10 reps Set 6: 10 reps	Eccentric: 30°/sec Concentric: 30°/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec
Transverse plane elbow flexion/ extension	Set 7: 10 reps Set 8: 10 reps Set 9: 10 reps	Eccentric: 30°/sec Concentric: 30°/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec
Wrist extension/ flexion	Set 10: 10 reps Set 11: 10 reps Set 12: 10 reps	Eccentric: 30°/sec Concentric: 30°/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec

IMPORTANT: Make note of when the protocol was initiated as "week 1" and choose appropriate training speed at week five and nine accordingly.

Step 2: Functional Task Practice

Seven minutes (28-30 minutes total with four activities combined). The therapist selects low- or high-level activity based on patient ability level.



Therapeutic Activity #5: Laundry/Dressing

Overview

Smoothing out a wrinkled towel or placing clothes on a hanger and hanging them up depending on patient's ability level.

Upper extremity requirements to participate in the laundry/dressing activity relative to this plan:

- Normal scapulothoracic humeral rhythm and stability needed during shoulder flexion.
- Shoulder abduction/adduction.
- $\cdot\,$ Bimanual hand movements.
- · Movement against gravity.
- · Controlled elbow movement.
- \cdot Shoulder internal and external rotation as well as stretch to long fingers.
- · Reaching and manipulation through hand directed movement.

Step 1: Isokinetic Strengthening

Strengthening the movements required for the task using UE hemiparetic attachments (35 minutes).

Exercise	Repetitions	Week 1-4	Week 5-8	Week 9-12
Shoulder flexion/ extension	Set 1: 10 reps Set 2: 10 reps Set 3: 10 reps	Eccentric: 30°/sec Concentric: 30 °/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90 °/sec Concentric: 120°/sec
Shoulder abduction/ adduction	Set 4: 10 reps Set 5: 10 reps Set 6: 10 reps	Eccentric: 30°/sec Concentric: 30°/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90 °/sec Concentric: 120°/sec
Shoulder internal/ external rotation	Set 7: 10 reps Set 8: 10 reps Set 9: 10 reps	Eccentric: 30°/sec Concentric: 30°/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90 °/sec Concentric: 120°/sec
Transverse plane elbow flexion/ extension	Set 10: 10 reps Set 11: 10 reps Set 12: 10 reps	Eccentric: 30°/sec Concentric: 30°/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90 °/sec Concentric: 120°/sec

IMPORTANT: Make note of when the protocol was initiated as "week 1" and choose appropriate training speed at week five and nine accordingly.

Step 2: Functional Task Practice

Seven minutes (28-30 minutes total with four activities combined). The therapist selects low- or high-level activity based on patient ability level.



Therapeutic Activity #6: Sport

Overview

Tossing/hitting a balloon or playing balloon badminton using a racket depending on the patient's ability level.

Upper extremity requirements to participate in the sport task relative to this plan:

- Normal scapulothoracic humeral rhythm and stability needed during shoulder flexion.
- · Shoulder abduction/adduction.
- \cdot Shoulder internal and external rotation as well as stretch to long fingers.
- · Movement against gravity.
- · Controlled elbow movement.
- · Reaching and manipulation through hand directed movement.

Step 1: Isokinetic Strengthening

Strengthening the movements required for the task using UE hemiparetic attachments (35 minutes).

Exercise	Repetitions	Week 1-4	Week 5-8	Week 9-12
Shoulder flexion/ extension	Set 1: 10 reps Set 2: 10 reps Set 3: 10 reps	Eccentric: 30°/sec Concentric: 30 °/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90 °/sec Concentric: 120°/sec
Shoulder abduction/ adduction	Set 4: 10 reps Set 5: 10 reps Set 6: 10 reps	Eccentric: 30°/sec Concentric: 30 °/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90 °/sec Concentric: 120°/sec
Shoulder internal/ external rotation	Set 7: 10 reps Set 8: 10 reps Set 9: 10 reps	Eccentric: 30°/sec Concentric: 30°/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec
Transverse plane elbow flexion/ extension	Set 10: 10 reps Set 11: 10 reps Set 12: 10 reps	Eccentric: 30°/sec Concentric: 30°/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90 °/sec Concentric: 120°/sec

IMPORTANT: Make note of when the protocol was initiated as "week 1" and choose appropriate training speed at week five and nine accordingly.

Step 2: Functional Task Practice

Seven minutes (28-30 minutes total with four activities combined). The therapist selects low- or high-level activity based on patient ability level.



Therapeutic Activity #7: Feeding

Overview

Gripping a cup and attempting to sip water or carrying a tray of cups filled with water and removing them depending on patient's ability level.

Upper extremity requirements to participate in the laundry/dressing activity relative to this plan:

- · Normal scapulothoracic humeral rhythm and stability needed during shoulder flexion.
- · Bimanual hand movements.
- \cdot Shoulder internal and external rotation as well as stretch to long fingers.
- · Movement against gravity.
- · Controlled elbow movement.
- · Reaching and manipulation through hand directed movement.

Step 1: Isokinetic Strengthening

Strengthening the movements required for the task using UE hemiparetic attachments (35 minutes).

Exercise	Repetitions	Week 1-4	Week 5-8	Week 9-12
Shoulder flexion/ extension	Set 1: 10 reps Set 2: 10 reps Set 3: 10 reps	Eccentric: 30°/sec Concentric: 30°/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90 °/sec Concentric: 120°/sec
Shoulder internal/ external rotation	Set 4: 10 reps Set 5: 10 reps Set 6: 10 reps	Eccentric: 30°/sec Concentric: 30°/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90 °/sec Concentric: 120°/sec
Transverse plane elbow flexion/ extension	Set 7: 10 reps Set 8: 10 reps Set 9: 10 reps	Eccentric: 30°/sec Concentric: 30°/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec
Wrist extension/ flexion	Set 10: 10 reps Set 11: 10 reps Set 12: 10 reps	Eccentric: 30°/sec Concentric: 30 °/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90 °/sec Concentric: 120°/sec

IMPORTANT: Make note of when the protocol was initiated as "week 1" and choose appropriate training speed at week five and nine accordingly.

Step 2: Functional Task Practice

Seven minutes (28-30 minutes total with four activities combined). The therapist selects low- or high-level activity based on patient ability level.



Therapeutic Activity #8: Board Game/Cards

Overview

Sliding cards along a table or placing/retrieving Jenga pieces to avoid knocking tower of wooden blocks over, depending on patient's ability level.

Upper extremity requirements to participate in the laundry/dressing activity relative to this plan:

- · Normal scapulothoracic humeral rhythm and stability needed during shoulder flexion.
- \cdot Shoulder internal and external rotation as well as stretch to long fingers.
- · Movement against gravity.
- · Controlled elbow movement.
- · Reaching and manipulation through hand directed movement, including wrist extension.

Step 1: Isokinetic Strengthening

Strengthening the movements required for the task using UE hemiparetic attachments (35 minutes).

Exercise	Repetitions	Week 1-4	Week 5-8	Week 9-12
Shoulder flexion/ extension	Set 1: 10 reps Set 2: 10 reps Set 3: 10 reps	Eccentric: 30°/sec Concentric: 30°/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90 °/sec Concentric: 120°/sec
Shoulder internal/ external rotation	Set 4: 10 reps Set 5: 10 reps Set 6: 10 reps	Eccentric: 30°/sec Concentric: 30°/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec
Transverse plane elbow flexion/ extension	Set 7: 10 reps Set 8: 10 reps Set 9: 10 reps	Eccentric: 30°/sec Concentric: 30°/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec
Wrist extension/ flexion	Set 10: 10 reps Set 11: 10 reps Set 12: 10 reps	Eccentric: 30°/sec Concentric: 30°/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90 °/sec Concentric: 120°/sec

IMPORTANT: Make note of when the protocol was initiated as "week 1" and choose appropriate training speed at week five and nine accordingly.

Step 2: Functional Task Practice

Seven minutes (28-30 minutes total with four activities combined). The therapist selects low- or high-level activity based on patient ability level.



Therapeutic Activity #9: Computer Task

Overview

Playing computer tracking game (Brickles Plus) at lowest level or highest level, not allowing proximal arm to rest, depending on patient's ability level.

Upper extremity requirements to participate in the laundry/dressing activity relative to this plan:

- · Normal scapulothoracic humeral rhythm and stability needed during shoulder flexion.
- \cdot Shoulder internal and external rotation as well as stretch to long fingers.
- · Movement against gravity.
- · Controlled elbow movement.
- \cdot Reaching and manipulation through hand directed movement, including wrist extension.
- Weight bearing in shoulder external rotation, wrist extension.

Step 1: Isokinetic Strengthening

Strengthening the movements required for the task using UE hemiparetic attachments (35 minutes).

Exercise	Repetitions	Week 1-4	Week 5-8	Week 9-12
Shoulder flexion/ extension	Set 1: 10 reps Set 2: 10 reps Set 3: 10 reps	Eccentric: 30°/sec Concentric: 30 °/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90 °/sec Concentric: 120°/sec
Shoulder internal/ external rotation	Set 4: 10 reps Set 5: 10 reps Set 6: 10 reps	Eccentric: 30°/sec Concentric: 30°/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec
Transverse plane elbow flexion/ extension	Set 7: 10 reps Set 8: 10 reps Set 9: 10 reps	Eccentric: 30°/sec Concentric: 30°/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec
Wrist extension/ flexion	Set 10: 10 reps Set 11: 10 reps Set 12: 10 reps	Eccentric: 30°/sec Concentric: 30 °/sec Concentric: 60°/sec	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec	Eccentric: 60°/sec Concentric: 90 °/sec Concentric: 120°/sec

IMPORTANT: Make note of when the protocol was initiated as "week 1" and choose appropriate training speed at week five and nine accordingly.

Step 2: Functional Task Practice

Seven minutes (28-30 minutes total with four activities combined). The therapist selects low- or high-level activity based on patient ability level.



5. Utilizing the Rehab Session Summary Report

Generating the Report

The **Rehab Session Summary Report** is generated via the Biodex dynamometer software and is an appropriate report to utilize when testing a patient with a diagnosis of CVA with resultant UE hemiplegia. To generate a report:

- Select **Report** from the left column, then select **Rehab Session Summary** from the **Choose Report** list. The item will be highlighted.
- With **Rehab Session Summary** highlighted, select on **Print Preview** to go to the **Rehab Session Summary Report Selection** screen.
- 9 Θ ¥Ø X Close Pres 2 🟌 Summary of TEST information Report Generation-C RIGHT (Involved) Subject: ID: Paul Stahmar □ Progress Reports Paul Stahman 11111 Bilateral Isometric Knee Extension/Flexion AHAY/TOWARD CLEFT 3 🖉 Protocol: et ROM Joint: Pattern: traction: 4 🔜 Choose Report: Choose Options: Report Involved: Right Session: 10/17/2016 2:17:02 PM Graphical Evaluation General Evaluation Comprehensive Evaluation Multiple Angle Compariso Narrative Cover Letter ■ Window isokinetic data 翻 SET SIDE POSITION Torque vs. Position Graph Curve I Use Metric Units RIGHT RIGHT 90 60 F Print as Unilateral ■ Monochrome Comments-Print All Reports Report Wizard Print Preview Print × Rehab Session Summary Report Selectio Jable Eversive Darks Select Data to Graph 10/17/2016: TEST: BI: KNEE: EXT/FLX: ISOM: AWAY/TOWARD: 90, 60, 30 10/17/2016: TEST: BI: KNEE: EXT/FLX: ISOK: CON/CON: 240/240, 300/300 F Strength ROM □ Pain Dther 1 C Other 2 C Other 3 C Other 4 ADD ALL -> Selected Protocols Involved ↓ Uninvolved Option Graph Legend NUM
- Select the tests to be included in the report.

NOTE: There must be at least two separate tests to create the rehab summary progress report. Select the desired protocol, then click **ADD** --> add the protocol data to the report. Click **Add All** --> to select all protocols.

- After selecting protocols, choose the type of data to graph. Up to five data types can be selected from the **Select Data to Graph** checklist.
- To compare range of motion and torque values between the involved side and the uninvolved side, select the **Uninvolved** check box. Involved is checked as the default.
- To save these values for future use, select **Save Settings**.
- Select **Continue** to process the graph data and generate the open the rehab **Session Summary Graph** screen.

The previously selected protocol data is then presented in an editable data grid. In addition to the ability to modify the standard data values of range of motion and strength, additional quantifiable data can be manually logged into the report. This includes pain levels, muscle endurance, tone, and isolated movement patterns. These values can be compared to each test entered into the report.



Hybrid Neurological Strength and Functional Task Performance Plan for the Patient with Hemiparesis

6. Training Logs

The following pages contain blank worksheets for each of the nine functional task activities outlined above. Each worksheet can be copied for use as needed.

Clinician:

Week 1 Start Date:

Therapeutic Activity #1: Water task

Weeks 1-4

S=Session

Exercise	Set	Mode	S 1	S2	S 3	S 4	S 5	S 6	S 7	S 8	S 9	S10	S11	S12
Shoulder flexion/ extension	1: 10 reps 2: 10 reps 3: 10 reps	Eccentric: 30°/sec Concentric: 30°/sec Concentric: 60°/sec												
Shoulder internal/ external rotation	4: 10 reps 5: 10 reps 6: 10 reps	Eccentric: 30°/sec Concentric: 30 °/sec Concentric: 60°/sec												
Transverse plane elbow flexion/ extension	7: 10 reps 8: 10 reps 9: 10 reps	Eccentric: 30°/sec Concentric: 30 °/sec Concentric: 60°/sec												
Wrist extension/ flexion	10: 10 reps 11: 10 reps 12: 10 reps	Eccentric: 30°/sec Concentric: 30°/sec Concentric: 60°/sec												

Weeks 5-8

Exercise	Set	Mode	S 1	S2	S 3	S 4	S 5	S 6	S 7	S 8	S 9	S10	S11	S12
Shoulder flexion/ extension	1: 10 reps 2: 10 reps 3: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												
Shoulder internal/ external rotation	4: 10 reps 5: 10 reps 6: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												
Transverse plane elbow flexion/ extension	7: 10 reps 8: 10 reps 9: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												
Wrist extension/ flexion	10: 10 reps 11: 10 reps 12: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												

Weeks 9-12

Exercise	Set	Mode	S 1	S2	S 3	S 4	S 5	S6	S 7	S 8	S 9	S10	S11	S12
Shoulder flexion/ extension	1: 10 reps 2: 10 reps 3: 10 reps	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec												
Shoulder internal/ external rotation	4: 10 reps 5: 10 reps 6: 10 reps	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec												
Transverse plane elbow flexion/ extension	7: 10 reps 8: 10 reps 9: 10 reps	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec												
Wrist extension/ flexion	10: 10 reps 11: 10 reps 12: 10 reps	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec												

Clinician: _

Week 1 Start Date: ____

Therapeutic Activity #2: Catch/Release

Weeks 1-4

S=Session Exercise Set Mode **S**1 **S2 S**3 **S4 S5 S6 S7 S**8 **S9** S10 S11 S12 Eccentric: 30°/sec Shoulder 1:10 reps flexion/ 2:10 reps Concentric: 30 °/sec extension 3: 10 reps Concentric: 60°/sec Shoulder 4: 10 reps Eccentric: 30°/sec internal/ 5: 10 reps Concentric: 30 °/sec external 6: 10 reps Concentric: 60°/sec rotation Transverse Eccentric: 30°/sec 7: 10 reps plane elbow 8: 10 reps Concentric: 30 °/sec flexion/ 9: 10 reps Concentric: 60°/sec extension Wrist 10: 10 reps Eccentric: 30°/sec 11: 10 reps extension/ Concentric: 30 °/sec flexion 12: 10 reps Concentric: 60°/sec

Weeks 5-8

Exercise	Set	Mode	S 1	S2	S 3	S 4	S 5	S6	S 7	S 8	S 9	S10	S11	S12
Shoulder flexion/ extension	1: 10 reps 2: 10 reps 3: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												
Shoulder internal/ external rotation	4: 10 reps 5: 10 reps 6: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												
Transverse plane elbow flexion/ extension	7: 10 reps 8: 10 reps 9: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												
Wrist extension/ flexion	10: 10 reps 11: 10 reps 12: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												

Weeks 9-12

Exercise	Set	Mode	S 1	S2	S 3	S 4	S 5	S 6	S 7	S 8	S 9	S10	S11	S12
Shoulder flexion/ extension	1: 10 reps 2: 10 reps 3: 10 reps	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec												
Shoulder internal/ external rotation	4: 10 reps 5: 10 reps 6: 10 reps	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec												
Transverse plane elbow flexion/ extension	7: 10 reps 8: 10 reps 9: 10 reps	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec												
Wrist extension/ flexion	10: 10 reps 11: 10 reps 12: 10 reps	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec												

Clinician:

Week 1 Start Date:

Therapeutic Activity #3 Drawing/Writing

Weeks 1-4													S=Se	ssion
Exercise	Set	Mode	S 1	S 2	S 3	S 4	S 5	S 6	S 7	S 8	S 9	S10	S11	S12
Shoulder flexion/ extension	1: 10 reps 2: 10 reps 3: 10 reps	Eccentric: 30°/sec Concentric: 30 °/sec Concentric: 60°/sec												
Shoulder internal/ external rotation	4: 10 reps 5: 10 reps 6: 10 reps	Eccentric: 30°/sec Concentric: 30 °/sec Concentric: 60°/sec												
Transverse plane elbow flexion/ extension	7: 10 reps 8: 10 reps 9: 10 reps	Eccentric: 30°/sec Concentric: 30 °/sec Concentric: 60°/sec												
Wrist extension/ flexion	10: 10 reps 11: 10 reps 12: 10 reps	Eccentric: 30°/sec Concentric: 30°/sec Concentric: 60°/sec												

Weeks 5-8

Exercise	Set	Mode	S 1	S2	S 3	S 4	S 5	S6	S 7	S 8	S 9	S10	S11	S12
Shoulder flexion/ extension	1: 10 reps 2: 10 reps 3: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												
Shoulder internal/ external rotation	4: 10 reps 5: 10 reps 6: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												
Transverse plane elbow flexion/ extension	7: 10 reps 8: 10 reps 9: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												
Wrist extension/ flexion	10: 10 reps 11: 10 reps 12: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												

Weeks 9-12

Exercise	Set	Mode	S 1	S2	S 3	S 4	S 5	S 6	S 7	S 8	S 9	S10	S11	S12
Shoulder flexion/ extension	1: 10 reps 2: 10 reps 3: 10 reps	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec												
Shoulder internal/ external rotation	4: 10 reps 5: 10 reps 6: 10 reps	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec												
Transverse plane elbow flexion/ extension	7: 10 reps 8: 10 reps 9: 10 reps	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec												
Wrist extension/ flexion	10: 10 reps 11: 10 reps 12: 10 reps	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec												

Clinician: _

S=Session

Week 1 Start Date: ____

Therapeutic Activity #4 Tool Task

Weeks 1-4

Exercise Set Mode **S**1 **S2 S**3 **S4 S5 S6 S7 S**8 **S9** S10 S11 S12 Shoulder 1:10 reps Eccentric: 30°/sec flexion/ 2:10 reps Concentric: 30 °/sec extension 3: 10 reps Concentric: 60°/sec Shoulder 4: 10 reps Eccentric: 30°/sec internal/ 5: 10 reps Concentric: 30 °/sec external 6: 10 reps Concentric: 60°/sec rotation Transverse 7: 10 reps Eccentric: 30°/sec plane elbow 8: 10 reps Concentric: 30 °/sec flexion/ 9: 10 reps Concentric: 60°/sec extension Wrist 10: 10 reps Eccentric: 30°/sec 11: 10 reps Concentric: 30 °/sec extension/ flexion 12: 10 reps Concentric: 60°/sec

Weeks 5-8

Exercise	Set	Mode	S 1	S2	S 3	S 4	S 5	S6	S 7	S 8	S 9	S10	S11	S12
Shoulder flexion/ extension	1: 10 reps 2: 10 reps 3: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												
Shoulder internal/ external rotation	4: 10 reps 5: 10 reps 6: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												
Transverse plane elbow flexion/ extension	7: 10 reps 8: 10 reps 9: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												
Wrist extension/ flexion	10: 10 reps 11: 10 reps 12: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												

Weeks 9-12

Exercise	Set	Mode	S 1	S 2	S 3	S 4	S 5	S6	S 7	S 8	S 9	S10	S11	S12
Shoulder flexion/ extension	1: 10 reps 2: 10 reps 3: 10 reps	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec												
Shoulder internal/ external rotation	4: 10 reps 5: 10 reps 6: 10 reps	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec												
Transverse plane elbow flexion/ extension	7: 10 reps 8: 10 reps 9: 10 reps	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec												
Wrist extension/ flexion	10: 10 reps 11: 10 reps 12: 10 reps	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec												

Clinician: ____

Week 1 Start Date:

Therapeutic Activity #5: Laundry/Dressing

Weeks 1-4													S=Se	ssion
Exercise	Set	Mode	S 1	S 2	S 3	S 4	S 5	S 6	S 7	S 8	S 9	S10	S11	S12
Shoulder flexion/ extension	1: 10 reps 2: 10 reps 3: 10 reps	Eccentric: 30°/sec Concentric: 30°/sec Concentric: 60°/sec												
Shoulder abduction/ adduction	4: 10 reps 5: 10 reps 6: 10 reps	Eccentric: 30°/sec Concentric: 30°/sec Concentric: 60°/sec												
Shoulder internal/ external rotation	7: 10 reps 8: 10 reps 9: 10 reps	Eccentric: 30°/sec Concentric: 30 °/sec Concentric: 60°/sec												
Transverse plane elbow flexion/ extension	10: 10 reps 11: 10 reps 12: 10 reps	Eccentric: 30°/sec Concentric: 30 °/sec Concentric: 60°/sec												

Weeks 5-8

Exercise	Set	Mode	S 1	S2	S 3	S 4	S 5	S 6	S 7	S 8	S 9	S10	S11	S12
Shoulder flexion/ extension	1: 10 reps 2: 10 reps 3: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												
Shoulder abduction/ adduction	4: 10 reps 5: 10 reps 6: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												
Shoulder internal/ external rotation	7: 10 reps 8: 10 reps 9: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												
Transverse plane elbow flexion/ extension	10: 10 reps 11: 10 reps 12: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												

Weeks 9-12

Exercise	Set	Mode	S 1	S2	S 3	S 4	S 5	S6	S 7	S 8	S 9	S10	S11	S12
Shoulder flexion/ extension	1: 10 reps 2: 10 reps 3: 10 reps	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec												
Shoulder abduction/ adduction Shoulder internal/	4: 10 reps 5: 10 reps 6: 10 reps 7: 10 reps 8: 10 reps	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec Eccentric: 60°/sec Concentric: 90°/sec												
rotation	9: 10 reps	Concentric: 120°/sec												
Transverse plane elbow flexion/ extension	10: 10 reps 11: 10 reps 12: 10 reps	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec												

Clinician: _____

S=Session

Week 1 Start Date:

Therapeutic Activity #6: Sport

Weeks 1-4

Exercise	Set	Mode	S 1	S 2	S 3	S 4	S 5	S6	S 7	S 8	S 9	S10	S11	S12
Shoulder flexion/ extension	1: 10 reps 2: 10 reps 3: 10 reps	Eccentric: 30°/sec Concentric: 30 °/sec Concentric: 60°/sec												
Shoulder abduction/ adduction	4: 10 reps 5: 10 reps 6: 10 reps	Eccentric: 30°/sec Concentric: 30°/sec Concentric: 60°/sec												
Shoulder internal/ external rotation	7: 10 reps 8: 10 reps 9: 10 reps	Eccentric: 30°/sec Concentric: 30 °/sec Concentric: 60°/sec												
Transverse plane elbow flexion/ extension	10: 10 reps 11: 10 reps 12: 10 reps	Eccentric: 30°/sec Concentric: 30°/sec Concentric: 60°/sec												

Weeks 5-8

Exercise	Set	Mode	S 1	S2	S 3	S 4	S 5	S 6	S 7	S 8	S 9	S10	S11	S12
Shoulder flexion/ extension	1: 10 reps 2: 10 reps 3: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												
Shoulder abduction/ adduction	4: 10 reps 5: 10 reps 6: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												
Shoulder internal/ external rotation	7: 10 reps 8: 10 reps 9: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												
Transverse plane elbow flexion/ extension	10: 10 reps 11: 10 reps 12: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												

Weeks 9-12

Exercise	Set	Mode	S 1	S2	S 3	S 4	S 5	S6	S 7	S 8	S 9	S10	S11	S12
Shoulder flexion/ extension	1: 10 reps 2: 10 reps 3: 10 reps	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec												
Shoulder abduction/ adduction Shoulder internal/ external rotation	4: 10 reps 5: 10 reps 6: 10 reps 7: 10 reps 8: 10 reps 9: 10 reps	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec												
Transverse plane elbow flexion/ extension	10: 10 reps 11: 10 reps 12: 10 reps	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec												

Clinician: _

S=Session

Week 1 Start Date: ____

Therapeutic Activity #7 Feeding

Weeks 1-4

Exercise Set Mode **S**1 **S2 S**3 **S4 S5 S6 S7 S**8 **S9** S10 S11 S12 Shoulder 1:10 reps Eccentric: 30°/sec flexion/ 2:10 reps Concentric: 30 °/sec extension 3: 10 reps Concentric: 60°/sec Shoulder 4: 10 reps Eccentric: 30°/sec internal/ 5: 10 reps Concentric: 30 °/sec external 6: 10 reps Concentric: 60°/sec rotation Transverse 7: 10 reps Eccentric: 30°/sec plane elbow 8: 10 reps Concentric: 30 °/sec flexion/ 9: 10 reps Concentric: 60°/sec extension Wrist 10: 10 reps Eccentric: 30°/sec 11: 10 reps Concentric: 30 °/sec extension/ flexion 12: 10 reps Concentric: 60°/sec

Weeks 5-8

Exercise	Set	Mode	S 1	S2	S 3	S 4	S 5	S 6	S 7	S 8	S 9	S10	S11	S12
Shoulder flexion/ extension	1: 10 reps 2: 10 reps 3: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												
Shoulder internal/ external rotation	4: 10 reps 5: 10 reps 6: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												
Transverse plane elbow flexion/ extension	7: 10 reps 8: 10 reps 9: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												
Wrist extension/ flexion	10: 10 reps 11: 10 reps 12: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												

Weeks 9-12

Exercise	Set	Mode	S 1	S2	S 3	S 4	S 5	S 6	S 7	S 8	S 9	S10	S11	S12
Shoulder flexion/ extension	1: 10 reps 2: 10 reps 3: 10 reps	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec												
Shoulder internal/ external rotation	4: 10 reps 5: 10 reps 6: 10 reps	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec												
Transverse plane elbow flexion/ extension	7: 10 reps 8: 10 reps 9: 10 reps	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec												
Wrist extension/ flexion	10: 10 reps 11: 10 reps 12: 10 reps	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec												

Clinician: ____

Week 1 Start Date: _____

Therapeutic Activity #8 Board Game/Cards

Weeks 1-4													S=Se	ssion
Exercise	Set	Mode	S 1	S2	S 3	S 4	S 5	S6	S 7	S 8	S 9	S10	S 11	S12
Shoulder flexion/ extension	1: 10 reps 2: 10 reps 3: 10 reps	Eccentric: 30°/sec Concentric: 30 °/sec Concentric: 60°/sec												
Shoulder internal/ external rotation	4: 10 reps 5: 10 reps 6: 10 reps	Eccentric: 30°/sec Concentric: 30 °/sec Concentric: 60°/sec												
Transverse plane elbow flexion/ extension	7: 10 reps 8: 10 reps 9: 10 reps	Eccentric: 30°/sec Concentric: 30 °/sec Concentric: 60°/sec												
Wrist extension/ flexion	10: 10 reps 11: 10 reps 12: 10 reps	Eccentric: 30°/sec Concentric: 30°/sec Concentric: 60°/sec												

Weeks 5-8

Exercise	Set	Mode	S 1	S 2	S 3	S 4	S 5	S 6	S 7	S 8	S 9	S10	S11	S12
Shoulder flexion/ extension	1: 10 reps 2: 10 reps 3: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												
Shoulder internal/ external rotation	4: 10 reps 5: 10 reps 6: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												
Transverse plane elbow flexion/ extension	7: 10 reps 8: 10 reps 9: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												
Wrist extension/ flexion	10: 10 reps 11: 10 reps 12: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												

Weeks 9-12

Exercise	Set	Mode	S 1	S 2	S 3	S 4	S 5	S 6	S 7	S 8	S 9	S10	S11	S12
Shoulder flexion/ extension	1: 10 reps 2: 10 reps 3: 10 reps	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec												
Shoulder internal/ external rotation	4: 10 reps 5: 10 reps 6: 10 reps	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec												
Transverse plane elbow flexion/ extension	7: 10 reps 8: 10 reps 9: 10 reps	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec												
Wrist extension/ flexion	10: 10 reps 11: 10 reps 12: 10 reps	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec												

Clinician: _

S=Session

Week 1 Start Date: ____

Therapeutic Activity #9 Computer Task

Weeks 1-4

Exercise Set Mode **S**1 **S2 S**3 **S4 S5 S6 S7 S**8 **S9** S10 S11 S12 Shoulder 1:10 reps Eccentric: 30°/sec flexion/ 2:10 reps Concentric: 30 °/sec extension 3: 10 reps Concentric: 60°/sec Shoulder 4: 10 reps Eccentric: 30°/sec internal/ 5: 10 reps Concentric: 30 °/sec external 6: 10 reps Concentric: 60°/sec rotation Transverse 7: 10 reps Eccentric: 30°/sec plane elbow 8: 10 reps Concentric: 30 °/sec flexion/ 9: 10 reps Concentric: 60°/sec extension Wrist 10: 10 reps Eccentric: 30°/sec 11: 10 reps Concentric: 30 °/sec extension/ flexion 12: 10 reps Concentric: 60°/sec

Weeks 5-8

Exercise	Set	Mode	S 1	S2	S 3	S 4	S 5	S6	S 7	S 8	S 9	S10	S11	S12
Shoulder flexion/ extension	1: 10 reps 2: 10 reps 3: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												
Shoulder internal/ external rotation	4: 10 reps 5: 10 reps 6: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												
Transverse plane elbow flexion/ extension	7: 10 reps 8: 10 reps 9: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												
Wrist extension/ flexion	10: 10 reps 11: 10 reps 12: 10 reps	Eccentric: 45°/sec Concentric: 60°/sec Concentric: 90°/sec												

Weeks 9-12

Exercise	Set	Mode	S 1	S2	S 3	S 4	S 5	S 6	S 7	S 8	S 9	S10	S11	S12
Shoulder flexion/ extension	1: 10 reps 2: 10 reps 3: 10 reps	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec												
Shoulder internal/ external rotation	4: 10 reps 5: 10 reps 6: 10 reps	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec												
Transverse plane elbow flexion/ extension	7: 10 reps 8: 10 reps 9: 10 reps	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec												
Wrist extension/ flexion	10: 10 reps 11: 10 reps 12: 10 reps	Eccentric: 60°/sec Concentric: 90°/sec Concentric: 120°/sec												

Hybrid Neurological Strength and Functional Task Performance Plan for the Patient with Hemiparesis

7. Bibliography

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Biodex Medical Systems, Inc. 20 Ramsey Road, Shirley, New York, 11967-4704, Tel: 800-224-6339 (Int'l 631-924-9000), Fax: 631-924-9338, Email: info@biodex.com, www.biodex.com