An Evidence Based Occupational Therapy Toolkit
for Assessment and Treatment of the Upper Extremity Post Stroke

Brenda Semenko, Leyda Thalman,
Emily Ewert, Renee Delorme, Suzanne Hui, Heather Flett, Nicole Lavoie

(Winnipeg Health Region Occupational Therapy Upper Extremity Working Group)
(bsemenko@hscc.mb.ca)

April 2015
# Table of Contents:

<table>
<thead>
<tr>
<th>Section Number</th>
<th>Section Name</th>
<th>Page Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>Acknowledgements</td>
<td>4</td>
</tr>
<tr>
<td>2.0</td>
<td>Introduction</td>
<td>5</td>
</tr>
<tr>
<td>3.0</td>
<td>A Model for Upper Extremity Assessment and Treatment Post Stroke</td>
<td>6</td>
</tr>
<tr>
<td>4.0</td>
<td>Screening Guidelines</td>
<td>7</td>
</tr>
<tr>
<td>4.1</td>
<td>Screening Questions</td>
<td>8</td>
</tr>
<tr>
<td>5.0</td>
<td>Determining Upper Extremity Level Guidelines</td>
<td>9</td>
</tr>
<tr>
<td>6.0</td>
<td>Assessment Guidelines</td>
<td>10</td>
</tr>
<tr>
<td>6.1</td>
<td>Assessment Matrix</td>
<td>11</td>
</tr>
<tr>
<td>6.1.1</td>
<td>• Motor Function</td>
<td>12</td>
</tr>
<tr>
<td>6.1.2</td>
<td>• Coordination</td>
<td>12</td>
</tr>
<tr>
<td>6.1.3</td>
<td>• Strength</td>
<td>12</td>
</tr>
<tr>
<td>6.1.4</td>
<td>• Range of Motion</td>
<td>13</td>
</tr>
<tr>
<td>6.1.5</td>
<td>• Tone</td>
<td>13</td>
</tr>
<tr>
<td>6.1.6</td>
<td>• Pain</td>
<td>13</td>
</tr>
<tr>
<td>6.1.7</td>
<td>• Sensation</td>
<td>14</td>
</tr>
<tr>
<td>6.1.8</td>
<td>• Edema</td>
<td>14</td>
</tr>
<tr>
<td>7.0</td>
<td>Goal Setting Guidelines</td>
<td>15</td>
</tr>
<tr>
<td>8.0</td>
<td>Treatment Guidelines</td>
<td>16</td>
</tr>
<tr>
<td>8.1</td>
<td>Treatment Matrix</td>
<td>17</td>
</tr>
<tr>
<td>8.1.1</td>
<td>• Task Specific Training Guidelines</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>• Arm Activity List A</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>• Arm Activity List B</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>• Treatment Contract</td>
<td>23</td>
</tr>
<tr>
<td>8.1.2</td>
<td>• Constraint Induced Movement Therapy</td>
<td>24</td>
</tr>
<tr>
<td>8.1.3</td>
<td>• Functional Dynamic Orthoses</td>
<td>25</td>
</tr>
<tr>
<td>8.1.4</td>
<td>• Functional Electrical Stimulation</td>
<td>26</td>
</tr>
<tr>
<td>8.1.5</td>
<td>• Mental Imagery</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>• Mental Imagery Sample Script</td>
<td>28</td>
</tr>
<tr>
<td>8.1.6</td>
<td>• Joint Protection and Supports</td>
<td>29</td>
</tr>
<tr>
<td>8.1.6a</td>
<td>• Positioning and Supporting the Arm in Lying and in Sitting</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>• Bed &amp; Chair Positioning Following a Stroke – Right</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>• Bed &amp; Chair Positioning Following a Stroke – Left</td>
<td>31</td>
</tr>
<tr>
<td>8.1.6b</td>
<td>• Positioning and Supporting the Arm during Transfers and Mobility</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>• Sling Me?</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>• Positioning Devices</td>
<td>34</td>
</tr>
<tr>
<td>8.1.6c</td>
<td>• Positioning and Supporting the Hand</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>• Splint Instructions</td>
<td>37</td>
</tr>
<tr>
<td>8.1.6d</td>
<td>• Shoulder Girdle Taping</td>
<td>38</td>
</tr>
<tr>
<td>8.1.7</td>
<td>• Spasticity Management</td>
<td>39</td>
</tr>
<tr>
<td>8.1.8</td>
<td>• Supplementary Training Programs</td>
<td>40</td>
</tr>
<tr>
<td>Section Number</td>
<td>Section Name</td>
<td>Page Number</td>
</tr>
<tr>
<td>----------------</td>
<td>--------------------------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>8.1.9</td>
<td>▪ Mirror Therapy</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td>➢ Mirror Therapy Sample Script</td>
<td></td>
</tr>
<tr>
<td>8.1.10</td>
<td>▪ Sensory Stimulation and Re-training</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>➢ Sensory Re-training Practical Examples</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>➢ Safety Tips for Decreased Sensation</td>
<td>45</td>
</tr>
<tr>
<td>8.1.11</td>
<td>▪ Range of Motion and Strength Training</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>➢ Self-Range of Motion Exercises for the Arm</td>
<td>47</td>
</tr>
<tr>
<td>8.1.12</td>
<td>▪ Edema Management</td>
<td>58</td>
</tr>
<tr>
<td>8.1.13</td>
<td>▪ Virtual Reality</td>
<td>59</td>
</tr>
<tr>
<td>9.0</td>
<td>Reassessment Guidelines</td>
<td>60</td>
</tr>
<tr>
<td>10.0</td>
<td>References</td>
<td>61</td>
</tr>
</tbody>
</table>
1.0 Acknowledgements:

The Winnipeg Health Region Occupational Therapy Upper Extremity Working Group would like to acknowledge and thank the following individuals for their contributions to this document:

Daniel Doerksen
Denali Enns
Laura Foth
Glen Gray
Sherie Gray
Danielle Harling
Shayna Hjartarson
Michelle Horkoff
Sue Lotocki
Mona Maida
Linda Merry Lambert
Sharon Mohr
Cristabel Nett
Louise Nichol
Teresa Ouellette
Meghan Scarff
Kristel Smith
Marlene Stern
Ted Stevenson
Kaleigh Sullivan
Laura Wisener
2.0 Introduction:

Stroke is a common neurological medical condition. “Every year, approximately 60,000 people with stroke and transient ischemic attack are treated in Canadian hospitals . . . [and there are] some 315,000 Canadians living with the effects of stroke” (Lindsay et al., 2014, p. 4). Stroke impacts an individual’s ability to participate in former activities and life roles. Occupational therapists provide assessment and treatment to increase independence in self-care, productivity, and leisure activities, and frequently work with clients recovering from stroke. The literature on stroke rehabilitation is continually evolving; therefore, occupational therapists must be knowledgeable about evidence based practice and apply it within their practice settings.

The most recent edition of the Canadian Best Practice Recommendations for Stroke Care was released in July 2013 and provides recommendations for stroke rehabilitation “that starts at the time of the stroke event and continues as long as required for each individual to achieve their maximum potential recovery” (Dawson, Knox, McClure, Foley, & Teasell, 2013, p. 4). The upper extremity sections of the Recommendations are of significant value to occupational therapists who frequently work with clients to maximize upper extremity function post stroke. Occupational therapists have noted variations in upper extremity rehabilitation practice between sites and programs in Winnipeg, Manitoba, and have identified the need for increased knowledge to improve the consistency of practice across the stroke rehabilitation continuum of care.

A working group was created in an attempt to consistently implement the upper extremity sections of the Canadian Best Practice Recommendations for Stroke Care into daily clinical practice. A group of occupational therapists from the Winnipeg Health Region collaborated to create a practical toolkit for occupational therapists working in acute, rehabilitation, outpatient, and community settings. Although this toolkit was developed specifically for occupational therapists, it is hoped that it will also be of benefit to physiotherapists, rehabilitation assistants, and other healthcare professionals working on upper extremity recovery post stroke. Several occupational therapists and physiotherapists provided feedback throughout various stages of the toolkit development.

This toolkit includes: a model for upper extremity management, a list of upper extremity assessment considerations and tools, and a list of specific upper extremity treatments, including practical resources. The toolkit was informed by the 2013 Canadian Best Practice Recommendations for Stroke Care and the 2013 Evidence Based Review of Stroke Rehabilitation, as well as expertise from Winnipeg occupational therapists across practice settings. The purpose of this toolkit is to improve the consistency of implementing best practice management of the upper extremity following stroke. It provides information to assist occupational therapists with clinical decision making as they assess, treat and educate clients recovering from stroke. The affected upper extremity has been categorized into low, intermediate or high levels to guide occupational therapists with selecting appropriate assessment tools and treatments. Occupational therapists still need to consider their client’s physical status, cognition, perception, affect, and motivation, as well as their physical and social environments when implementing the resources in this toolkit.

The evidence for upper extremity rehabilitation post stroke continues to emerge. It is critical that occupational therapists are knowledgeable about the most recent evidence as well as the recommendations and resources available to promote optimal upper extremity function throughout the stroke rehabilitation continuum of care.
3.0 A Model for Upper Extremity Assessment and Treatment Post Stroke

A model was developed to illustrate a recommended process for management of the upper extremity (UE) post stroke. This process includes an approach to screening, assessment, and treatment with each step of the model further described in this toolkit.
4.0 Screening Guidelines:

The Canadian Best Practice Recommendation for Stroke Care 4.1 states “the interprofessional team should assess patients within 48 hours of admission to hospital and formulate a management plan [Evidence Level B]” (Casaubon & Suddes, 2013, p. 13).

An initial screen of upper extremity function is crucial at all points of the rehabilitation continuum of care. The screen will determine further assessments required, assist with goal setting, and assist with the choice of specific upper extremity treatments to best promote recovery and prevent complications (e.g. pain, contractures, and edema). The following page is an example of some initial screening questions. Questions should be modified based on the individual client’s presentation.
4.1 Screening Questions:

Determine dominant upper extremity.
Compare affected side to less affected side.

**Subluxation:**
Feel for shoulder subluxation.
Feel position of scapula on ribcage (both with and without arm movement).

**Motor Function:**
“Can you shrug your shoulders towards the ceiling and down?”
“Can you squeeze your shoulder blades together?”
“Can you pretend you are giving someone a hug?”
“Can you raise your arm in front of you towards the ceiling?” (thumb up)
“Can you raise your arm to the side?” (palm up)
“Can you put your hand behind your back?”
“Can you put your hand behind your head?”
“Can you touch your chin with your hand? Then straighten your elbow out?”
“Can you turn your palm up and down?” (elbow at 90°)
“Can you move your wrist up and down?”
“With your palm down, can you move your wrist from side to side?”
“Can you make a fist? Can you open your hand all the way?”
“Squeeze both my hands as hard as you can.” (are they equal bilaterally?)
“Can you touch your thumb to each fingertip slowly?”
“Can you spread your fingers apart and then bring them together?”
“Can you keep your fingers straight while bending them only at the large knuckles?” (metacarpophalangeal joints)

If client is unable to perform the motor tasks as requested above, look at gravity reduced / eliminated positions (e.g. side lying, supine, occupational therapist supporting limb) and/or passive range of motion as appropriate. Observe for changes in tone with movement.

**Pain:**
“Do you have any pain at rest? Do you have any pain with movement?”
Note for any pain with passive or active movement.

**Sensation:**
While rubbing your fingers along the palmar and then the dorsal surfaces of the client’s hands and forearms, ask “Does this side feel the same as this?” (compare right and left sides).
“Do you have any numbness or tingling in your arm?”

**Edema:**
Note edema in fingers and/or hand.

**Functional Use:**
“Do you use your arm throughout the day?”
“Are you able to use your arm for feeding, grooming, washing, dressing, etc.?”
“What activities are you finding difficult to do with your arm?”
5.0 Determining Upper Extremity Level Guidelines:

Upper extremity movement and function varies considerably post stroke. These variations between clients will require the use of different assessment tools and treatments.

The Chedoke-McMaster Stroke Assessment (CMSA) (Gowland et al., 1995) arm and hand sections have been used to help categorize the affected upper extremity into low, intermediate or high levels. These levels can act as a starting point for assessment and treatment planning and can assist occupational therapists with clinical decision making, with the overall goal to progress the client to the next level. The table below can be used to help determine which level a client may best represent. Clients may not “fit cleanly” into a single level (e.g. CMSA hand level 6 with arm level 2). Once the most appropriate level has been determined, occupational therapists should use the corresponding Assessment and Treatment Matrices to guide their therapeutic intervention with the client.

<table>
<thead>
<tr>
<th>Determinants</th>
<th>Low Level Arm</th>
<th>Intermediate Level Arm</th>
<th>High Level Arm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chedoke-McMaster Stroke Assessment</td>
<td>▪ Arm stage 1 – 2</td>
<td>▪ Arm stage 3 – 5</td>
<td>▪ Arm stage 6 – 7</td>
</tr>
<tr>
<td></td>
<td>▪ Hand stage 1 – 2</td>
<td>▪ Hand stage 3 – 5</td>
<td>▪ Hand stage 6 – 7</td>
</tr>
<tr>
<td>Arm Movement and Function</td>
<td>▪ Incompletely selective movements (small amplitude, non-functional)</td>
<td>▪ Biomechanical and muscle imbalances with incompletely selective movements</td>
<td>▪ Selective movements but lacks strength, dexterity, or coordination necessary for “normal” function</td>
</tr>
<tr>
<td></td>
<td>▪ Primarily used for stabilization tasks</td>
<td>▪ Transitioning from stabilization to manipulation tasks</td>
<td>▪ Primarily used for manipulation tasks with emphasis on speed, accuracy, and quality of movements</td>
</tr>
</tbody>
</table>

(Adapted from: Stevenson & Thalman, 2007)
6.0 Assessment Guidelines:

The Canadian Best Practice Recommendation for Stroke Care 5.2.2 states “clinicians should use standardized, valid assessment tools to evaluate the patient’s stroke-related impairments, functional activity limitations, and role participation restrictions [Evidence Level C]. Tools should be adapted for use in patients with communication differences or limitations due to aphasia” (Dawson, Knox, McClure, Foley, & Teasell, 2013, p. 24).

There are many upper extremity assessment tools available for use with clients post stroke. After the screening is completed and the upper extremity level has been determined, the following Assessment Matrix can then be used to help occupational therapists determine appropriate assessment tools for their clients.

The intent is not to use all of the assessment tools with each client but to choose assessments that will be the most valuable in measuring change in that individual. Assessment tools may vary depending on the availability and relevance to the practice setting.

The assessments listed in the Assessment Matrix are categorized according to their use with low, intermediate and high level upper extremities post stroke. The list is not all-inclusive.
### 6.1 Assessment Matrix:

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Low Level Arm</th>
<th>Intermediate Level Arm</th>
<th>High Level Arm</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>6.1.2 Coordination</strong></td>
<td></td>
<td>- Box and Block Test &lt;br&gt; - Nine Hole Peg Test &lt;br&gt; - Finger-Nose Test &lt;br&gt; - Rapid Alternating Movement Test</td>
<td>- Box and Block Test &lt;br&gt; - Nine Hole Peg Test &lt;br&gt; - Finger-Nose Test &lt;br&gt; - Rapid Alternating Movement Test</td>
</tr>
<tr>
<td><strong>6.1.3 Strength</strong></td>
<td>- Manual muscle testing &lt;br&gt; - Grip &lt;br&gt; - Pinch (lateral, tripod)</td>
<td>- Manual muscle testing &lt;br&gt; - Grip &lt;br&gt; - Pinch (lateral, tripod)</td>
<td>- Manual muscle testing &lt;br&gt; - Grip &lt;br&gt; - Pinch (lateral, tripod)</td>
</tr>
<tr>
<td><strong>6.1.4 Range of Motion (ROM)</strong></td>
<td>- Sitting, side lying, and/or supine: &lt;br&gt; - Active ROM &lt;br&gt; - Active assisted ROM &lt;br&gt; - Passive ROM</td>
<td>- Sitting, side lying, and/or supine: &lt;br&gt; - Active ROM &lt;br&gt; - Active assisted ROM &lt;br&gt; - Passive ROM</td>
<td>- Sitting and/or standing: &lt;br&gt; - Active ROM</td>
</tr>
<tr>
<td><strong>6.1.5 Tone</strong></td>
<td>- Modified Ashworth Scale</td>
<td>- Modified Ashworth Scale</td>
<td>- Modified Ashworth Scale</td>
</tr>
<tr>
<td><strong>6.1.7 Sensation</strong></td>
<td>- Light touch / Monofilaments &lt;br&gt; - Hot and cold &lt;br&gt; - Proprioception</td>
<td>- Light touch / Monofilaments &lt;br&gt; - Hot and cold &lt;br&gt; - Proprioception &lt;br&gt; - Stereognosis</td>
<td>- Light touch / Monofilaments &lt;br&gt; - Hot and cold &lt;br&gt; - Proprioception &lt;br&gt; - Stereognosis</td>
</tr>
<tr>
<td><strong>6.1.8 Edema</strong></td>
<td>- Circumference &lt;br&gt; - Volume</td>
<td>- Circumference &lt;br&gt; - Volume</td>
<td>- Circumference &lt;br&gt; - Volume</td>
</tr>
</tbody>
</table>
6.1.1 Motor Function

Fugl-Meyer Assessment – Upper Extremity (FMA-UE):

Action Research Arm Test (ARAT):
http://strokengine.ca/assess/module_arat_intro-en.html

Chedoke Arm and Hand Activity Inventory (CAHAI):
There are four different versions of this assessment tool. Select the version that would be best suited for the client’s upper extremity level.

Jebsen Hand Function Test:
http://strokengine.ca/assess/module_jhft_intro-en.html

Wolf Motor Function Test:

Functional use in daily activities:
Assess client’s ability to spontaneously incorporate their upper extremity into their self-care, productivity and leisure activities.

6.1.2 Coordination

Box and Block Test (BBT):

Nine Hole Peg Test (NHPT):

Finger-Nose Test (test for dysmetria):
In sitting, have client move his index finger from his nose to the occupational therapist’s index finger (which is placed an arm’s length away from client). Record number of repetitions in 10 seconds. Observe quality of movement and compare to less affected side.

Rapid Alternating Movement Test (test for dysdiadochokinesis):
In sitting, have client alternate between supination and pronation arm movements, while his hand is supported on his thigh or on his other hand. Record number of repetitions in 10 seconds. Observe quality of movement and compare to less affected side.

6.1.3 Strength

Manual Muscle Testing:
For manual muscle testing protocols, please see:
Grip Strength:

For further information regarding grip strength assessment, please see:

Pinch Strength:
For further information regarding pinch strength assessment, please see:

### 6.1.4 Range of Motion

For passive and active range of motion measurement protocols, please see:

Goniometry is the preferred method to measure range of motion and should be used to evaluate goals that are targeted towards an increase in range of motion. Range of motion via goniometry must also be used to determine appropriateness for splinting and to measure outcomes of splinting.

### 6.1.5 Tone

Modified Ashworth Scale:

A client’s positioning (sitting versus supine) should be consistent over time when measuring tone. It is important to determine and document tonal differences with changes in position and activity. Clinical observations of changes in tone are important.

### 6.1.6 Pain

The Canadian Best Practice Recommendation for Stroke Care 5.5.3 states: “causes of shoulder pain may be due to the hemiplegia itself, injury or acquired orthopedic conditions due to compromised joint and soft tissue integrity” (Dawson, Knox, McClure, Foley, & Teasell, 2013, p. 47).

The Canadian Best Practice Recommendation for Stroke Care 5.5.3 states: “the assessment of the painful hemiplegic shoulder should include evaluation of tone, strength, changes in length of soft tissues, alignment of joints of the shoulder girdle and orthopedic changes in the shoulder [Evidence Level C]” (Dawson, Knox, McClure, Foley, & Teasell, 2013, p. 47).
It is important to consider the following when assessing pain: a) present at rest and/or with activity, b) specific location, c) quality (e.g. sharp, burning, radiating, etc.), and d) position of the upper extremity. Be sure to differentiate pain from “stretch” and “stiffness”. This information will help determine the cause of pain and guide treatment.

Visual Analogue Scale:
There are a variety of visual analogue scales for pain. Ensure you use a consistent scale over time when measuring pain. The following link has several examples of scales:

Chedoke McMaster Stroke Assessment – Shoulder Pain:

6.1.7 Sensation:
For sensation testing protocols please see:

Occupational therapists can consider more in depth sensory assessments, such as:
- Nottingham Sensory Assessment Revised
  http://www.nottingham.ac.uk/medicine/about/rehabilitationageing/publishedassessments.aspx
- Fugl-Meyer Assessment – Upper Extremity (FMA-UE)

Monofilaments are the preferred method to objectively measure light touch. For monofilament protocols, please see: http://www.htherapy.co.za/user_images/splinting/Monofilaments.pdf

6.1.8 Edema
For descriptions of edema assessment methods, please see:
7.0 Goal Setting Guidelines:

It is important to identify goals to assist with planning upper extremity treatment and to determine a client’s progress. Goals should be made in collaboration with the client to ensure tasks chosen are meaningful and that the client and the occupational therapist are working toward the same outcomes.

The Canadian Occupational Performance Measure (COPM) can be used to help a client identify occupational performance issues, which can then be translated into functional goals. The COPM is a client centered outcome measure that determines change over time in a client’s self-perception of their occupational performance issues (Law, Baptiste, Carswell, McColl, Polatajko & Pollock, 2014).

SMART goal setting is a method of setting goals which are: Specific, Measureable, Attainable, Realistic and Time-Based. It clearly identifies a client’s goals and clarifies when goal attainment has been achieved. SMART goal setting can be combined with the COPM. A copy of the SMART goals can be provided to the client. Some examples of SMART goals include:

- Client will zip up winter jacket independently with right hand in 2 weeks.
- Client will eat all meals independently with left hand using built up utensils in 4 weeks.
- Client will increase Box and Block Test score to 21 (25%) in 4 weeks.

The following resources may assist with goal setting:

- Canadian Occupational Performance Measure
  [http://www.thecopm.ca](http://www.thecopm.ca)
- SMART Goals
  [https://ehealth.heartandstroke.ca/HeartStroke/HWAP2/Goals.aspx](https://ehealth.heartandstroke.ca/HeartStroke/HWAP2/Goals.aspx)
- “Goal Setting 101”
8.0 Treatment Guidelines:

The Canadian Best Practice Recommendation for Stroke Care 5.5.1 states: “patients should engage in training that is meaningful, engaging, progressively adapted, task-specific and goal-oriented in an effort to enhance motor control and restore sensorimotor function [Evidence Level: Early-Level A; Late-Level A]. Training should encourage the use of patients’ involved affected limb during functional tasks and be designed to simulate partial or whole skills required in activities of daily living . . . [Evidence Level: Early-Level A; Late-Level A]” (Dawson, Knox, McClure, Foley, & Teasell, 2013, p. 38).

There are many options available for upper extremity treatment post stroke. Based on the upper extremity screening and assessment results as well as the client’s goals, specific treatments should be chosen that best suit the client’s upper extremity level. Treatment activities should be task specific, meaningful to the client, and easily graded so optimal challenge can be maintained. Specific treatments may vary depending on availability and relevance to the practice setting. In all practice settings, the client’s body position and trunk stability as well as the environmental set-up need to be considered to maximize upper extremity function. It is also important to educate the client regarding the purpose of the specific treatments being used. Education may enhance client engagement in the treatment process which may then contribute to improved outcomes.

Although the optimal goal of upper extremity rehabilitation is to promote motor recovery and function of the affected upper extremity, at times assistive devices and compensatory strategies may need to be incorporated temporarily to enable participation. It is important to note that compensatory behavioral changes “can also be maladaptive and interfere with improvements in function that could be obtained using rehabilitative training” (Kleim & Jones, 2008, p. S226); therefore early instruction in compensatory strategies may be detrimental to learning new skills with the affected arm and interfere with improvements in function that could be obtained through upper extremity rehabilitation. The Canadian Best Practice Recommendation for Stroke Care 5.5.1 states: “adaptive devices . . . designed to improve safety and function should be used if other methods of performing specific functional tasks are not available or tasks cannot be learned [Evidence Level C]” (Dawson, Knox, McClure, Foley, & Teasell, 2013, p. 39). Compensatory strategies and the use of equipment should be frequently re-evaluated and weaned as appropriate.

The specific treatments listed in the Treatment Matrix are categorized according to their use with low, intermediate and high level upper extremities post stroke. The list is not all-inclusive. Practical tools are included for several treatments identified in the Treatment Matrix.
### 8.1 Treatment Matrix:

#### 8.1.1 Task specific training

“the repeated, challenging practice of functional, goal-oriented activities” (Lang & Birkenmeier, 2014, p. xi), should be utilized with all treatment modalities. Occupational therapists should strive for increased intensity and number of repetitions of upper extremity use. The optimal number of repetitions is unknown; however, studies suggest that “hundreds of repetitions of task-specific practice may be required to optimize function post stroke” (Birkenmeier, Prager, & Lang, 2010, p. 620).

<table>
<thead>
<tr>
<th>Specific Treatments</th>
<th>Low Level Arm</th>
<th>Intermediate Level Arm</th>
<th>High Level Arm</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.1.2 Constraint Induced Movement Therapy (CIMT)</td>
<td>• Work toward minimal active movement requirements for CIMT program</td>
<td>• Work toward minimal active movement requirements for CIMT program</td>
<td>• Refer to traditional or modified CIMT program as available</td>
</tr>
<tr>
<td>8.1.3 Functional Dynamic Orthoses (e.g. SaeboFlex and SaeboReach)</td>
<td>• Work toward minimal active and passive movement requirements for functional dynamic orthosis</td>
<td>• Use functional dynamic orthosis with goal of two 45 minute sessions per day, followed by functional activities without orthosis</td>
<td>• Wean from functional dynamic orthosis</td>
</tr>
</tbody>
</table>
| 8.1.4 Functional Electrical Stimulation (FES) | • Target wrist extensor and forearm muscles while engaged in task specific activities  
• Consider using to reduce or prevent shoulder subluxation | • Target wrist extensor and forearm muscles while engaged in task specific activities | |
| 8.1.5 Mental Imagery | • Use as an adjunct to other treatments  
• Use as homework | • Use as an adjunct to other treatments  
• Use as homework | • Use as an adjunct to other treatments  
• Use as homework |
### 8.1 Treatment Matrix (continued)

<table>
<thead>
<tr>
<th>Specific Treatments</th>
<th>Low Level Arm</th>
<th>Intermediate Level Arm</th>
<th>High Level Arm</th>
</tr>
</thead>
</table>
| **8.1.6 Joint Protection and Supports** | - Educate regarding handling and joint protection when sitting, lying, and mobilizing  
- Use slings with caution and only with frequent re-evaluation to ensure active movement is not restricted and tone is not increasing  
- Assess need for custom or pre-fabricated splint | - Wean slings and/or splints  
- Consider shoulder girdle taping | - Consider shoulder girdle taping |
| **8.1.7 Spasticity Management** | - Refer to physiatrist / spasticity clinic for medical management if required  
- Strengthen antagonist muscles post-injection  
- Assess need for custom or pre-fabricated splint | - Refer to physiatrist / spasticity clinic for medical management if required  
- Strengthen antagonist muscles post-injection | - Refer to physiatrist / spasticity clinic for medical management if required  
- Strengthen antagonist muscles post-injection |
| **8.1.8 Supplementary Training Programs** | - Use portions of Level 1 of Graded Repetitive Arm Supplementary Program (GRASP)  
- Provide individualized home program with daily homework book | - Use Levels 1-3 of GRASP  
- Provide individualized home program with daily homework book | - Provide individualized home program with daily homework book |
| **8.1.9 Mirror Therapy** | - Use as an adjunct to other treatments  
- Use as homework | - Use as an adjunct to other treatments  
- Use as homework | - Use as an adjunct to other treatments  
- Use as homework |
| **8.1.10 Sensory Stimulation and Re-training** | - Implement protective sensation teaching  
- Encourage weight bearing positions  
- Encourage use of vision during functional activities | - Encourage use in functional activities  
- Transition from use of vision during functional activities to activities with vision occluded as safety permits | - Encourage use in functional activities  
- Advance to activities with vision occluded as safety permits |
### 8.1 Treatment Matrix (continued)

<table>
<thead>
<tr>
<th>Specific Treatments</th>
<th>Low Level Arm</th>
<th>Intermediate Level Arm</th>
<th>High Level Arm</th>
</tr>
</thead>
</table>
| **8.1.11 Range of Motion (ROM) and Strength Training** | ▪ Maintain / increase ROM through:  
  ➢ Facilitation of active movement by therapist  
  ➢ Progression from bilateral to unilateral activities  
  ➢ Active assisted ROM in sitting, supine, or gravity reduced positions  
  ➢ Passive ROM  
  ➢ Self-ROM  
  ▪ Use strength training through available ROM including use of mobile arm support as indicated  
  ▪ Do not use pulleys | ▪ Maintain / increase ROM through:  
  ➢ Active ROM while providing verbal and/or tactile cueing  
  ➢ Progression from bilateral to unilateral activities  
  ➢ Active assisted ROM in sitting, supine, or gravity reduced positions  
  ➢ Passive ROM  
  ➢ Self-ROM  
  ▪ Use strength training through available ROM  
  ▪ Do not use pulleys | ▪ Maintain / increase ROM through:  
  ➢ Active ROM while providing verbal and/or tactile cueing  
  ▪ Use strength training through available ROM  
  ▪ Monitor carefully if using pulleys |
| **8.1.12 Edema Management** | ▪ Encourage active, active-assisted and passive movement  
  ▪ Consider retrograde massage  
  ▪ Educate regarding positioning and elevation  
  ▪ Use compression techniques  
  ▪ Assess need for custom or pre-fabricated splint | ▪ Encourage active movement  
  ▪ Consider retrograde massage  
  ▪ Educate regarding positioning and elevation  
  ▪ Use compression techniques | ▪ Encourage active movement  
  ▪ Consider retrograde massage  
  ▪ Educate regarding positioning and elevation  
  ▪ Use compression techniques |
| **8.1.13 Virtual Reality** | ▪ Use as an adjunct to other treatments  
  ▪ Use as homework | ▪ Use as an adjunct to other treatments  
  ▪ Use as homework | ▪ Use as an adjunct to other treatments  
  ▪ Use as homework |
8.1.1 Task Specific Training Guidelines:

- Choose engaging tasks based on client’s goals that will translate into self-care, productivity, and leisure activities.
- Repetition is important. “Massed practice (several hours of exercise) of the affected arm” (Sirtori, Corbetta, Moja, & Gatti, 2009, p. 2) should be encouraged.
- Can refer to it as “rehearsing a task”, do it over and over again.
- The “task” should be simple but still hard enough to challenge the client and encourage active problem solving.
- The client will make little corrections every time they attempt the task until the task gets smoother.
- Consider use of an arm activity list (see pages 21 and 22 – Arm Activity List A could be appropriate for a low-intermediate level arm; Arm Activity List B could be appropriate for an intermediate-high level arm).
- Consider use of a journal with tasks to be done each day.
- Consider use of a treatment contract (see page 23) to encourage accountability.  

(Adapted from: Harley, 2013)

Examples of tasks for each upper extremity level:

Low Level:

- Encourage weight bearing during activities of daily living.
- Work on bilateral grasp, e.g. drink from bottle, eat finger food, wash face, etc.
- Use the affected upper extremity as a stabilizer:
  - Against the body (or a table), e.g. carry clothes to hamper, hold purse while taking wallet out, carry newspaper against chest.
- Use the affected hand as a stabilizer:
  - To “hold” objects in hand (gross grasp or pinch), e.g. hold a water bottle to open it, hold a toothbrush while applying toothpaste with the other hand, hold a container of food while eating with the other hand.

Intermediate Level:

- Use the affected upper extremity as much as possible, e.g. eat finger food, use utensils (build up as needed), pour water, stack/wash dishes, brush hair, wring out washcloths, do up zippers, fold towels, turn pages, etc.
- Teach lateral pinch (thumb over index PIP joint) e.g. hold bottom of zipper, hold envelope while opening. Concentrate on release of pinch before taking object from hand.
- Focus on ulnar component of grasp and maintaining wrist extension during grasp/release of daily objects.
- Work on in-hand manipulation, e.g. separate coins, wring out washcloths, etc.

High Level:

- Focus on individual goals.
- Make the intermediate tasks harder, focusing on isolating movements, e.g. practice keyboarding, practice handwriting, use calculator, etc.
- Increase intensity and number of repetitions.
- Encourage use of affected upper extremity as much as possible in all daily tasks.
- Practice thumb work, e.g. pick up coins, use remote control, practice texting, use flashlight, etc.
ARM ACTIVITY LIST A

Name: ___________________________________________

Add a new activity every day / week.
“2 hands” refers to interlocking grip as needed.
“Under arm” refers to holding item between upper arm and side of body.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Action</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position hand on table in view</td>
<td>Hold food with fork when cutting</td>
<td></td>
</tr>
<tr>
<td>Hold toothpaste</td>
<td>Carry a newspaper (under arm)</td>
<td></td>
</tr>
<tr>
<td>Hold deodorant</td>
<td>Carry a towel (under arm)</td>
<td></td>
</tr>
<tr>
<td>Pull up blankets (2 hands)</td>
<td>Carry a purse / wallet (under arm)</td>
<td></td>
</tr>
<tr>
<td>Use call bell</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pick up water bottle (2 hands)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eat finger food (2 hands)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hold washcloth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wash face (2 hands)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brush teeth (2 hands)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hold towel with hand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dry self (2 hands)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wipe table</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hold paper down when writing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hold bowl/plate when eating</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apply wheelchair brakes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use a fork / spoon to eat</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Occupational Therapist: ___________________________ Phone: ___________________________

(Adapted from: Thalman, 2002)
ARM ACTIVITY LIST B

Name: ___________________________________________

Add a new activity every day / week.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Left</th>
<th>Right</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fill out menu</td>
<td>Put on shoes</td>
<td></td>
</tr>
<tr>
<td>Use call bell</td>
<td>Put on socks</td>
<td></td>
</tr>
<tr>
<td>Pull up covers</td>
<td>Pour liquids</td>
<td></td>
</tr>
<tr>
<td>Turn on light switches</td>
<td>Use fork</td>
<td></td>
</tr>
<tr>
<td>Drink from a cup</td>
<td>Use spoon</td>
<td></td>
</tr>
<tr>
<td>Eat finger food</td>
<td>Use knife</td>
<td></td>
</tr>
<tr>
<td>Turn pages in a book / magazine</td>
<td>Hold phone while talking</td>
<td></td>
</tr>
<tr>
<td>Brush teeth</td>
<td>Dial phone</td>
<td></td>
</tr>
<tr>
<td>Brush hair</td>
<td>Open fridge</td>
<td></td>
</tr>
<tr>
<td>Turn on / off faucets</td>
<td>Use computer mouse / keyboard</td>
<td></td>
</tr>
<tr>
<td>Wash self with washcloth</td>
<td>Practice handwriting</td>
<td></td>
</tr>
<tr>
<td>Flush toilet</td>
<td>Open doors</td>
<td></td>
</tr>
<tr>
<td>Wipe self</td>
<td>Unload dishwasher</td>
<td></td>
</tr>
<tr>
<td>Pull pants up and down</td>
<td>Put away groceries</td>
<td></td>
</tr>
<tr>
<td>Do up zippers / buttons</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wipe table</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Take clothes out of closet / drawer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hang up clothes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Occupational Therapist: _________________________ Phone: _________________________

(Adapted from: Thalman, 2002)
Treatment Contract

I agree to perform all homework, as developed with my occupational therapist(s) to the best of my ability. I agree to keep a record in my homework book and bring it to all therapy appointments.

The goals we have agreed to work on until _________________ are as follows:

(dd/mm/yy)

1. ______________________________________________________

2. ______________________________________________________

3. ______________________________________________________

___________________________  _______________________
Client                        Occupational Therapist

___________________________  _______________________
                                      Date

WRHA Occupational Therapy Upper Extremity Working Group 2015
8.1.2 Constraint Induced Movement Therapy

The Canadian Best Practice Recommendation for Stroke Care 5.5.1 states: “traditional or modified constraint-induced movement therapy (CIMT) should be used for a select group of patients who demonstrate at least 20 degrees of active wrist extension and 10 degrees of active finger extension, with minimal sensory or cognitive deficits.

- Traditional CIMT refers to a two-week training regimen consisting of six hours of intensive upper-extremity training coupled with restraint of the unaffected arm for at least 90 percent of waking hours [Evidence Level: Between 3 and 6 months-Level A; Late-Level A].
- Traditional CIMT, where therapy is provided for more than 2 hours/day, should not be used within the first month following stroke [Evidence Level A].
- Modified CIMT most often refers to a less intense program which varies in terms of time of constraint, intensity of associated therapy, and duration of intervention (weeks). Modified CIMT may be initiated in the first month following stroke in appropriate patients [Evidence Level: Early-Level A; Late-Level A]” (Dawson, Knox, McClure, Foley, & Teasell, 2013, p. 38 & 39).

Principles of CIMT:

- Use the more affected upper extremity in frequent, intense, massed practice tasks.
- Adapt the tasks for optimal challenge.
- Use consistent “coaching” of client by occupational therapist, rehabilitation assistant or trained family member (as able).
- Constrain the less affected upper extremity with a mitt or splint for up to 90% of waking hours (as negotiated between client and occupational therapist).
- Focus on transfer of skills to daily tasks (use of treatment contract and homework).

For information regarding the CIMT program in Winnipeg, please contact the Health Sciences Centre Occupational Therapy Department at 204-787-2786. Prior to acceptance into a CIMT program or in the absence of a formal CIMT program, occupational therapists should incorporate CIMT principles into a client’s daily therapy sessions and home programs as early as possible.
8.1.3 Functional Dynamic Orthoses

The Canadian Best Practice Recommendation for Stroke Care 5.5.1 states: “functional dynamic orthoses are an emerging therapy tool that may be offered to patients to facilitate repetitive task specific training [Evidence Level C]” (Dawson, Knox, McClure, Foley, & Teasell, 2013, p. 39).

Using a dynamic wrist hand orthosis, that positions the wrist and hand functionally and assists with finger/thumb extension, may enable participation in repetitive task oriented activities not otherwise possible. After the orthosis is removed in the daily training sessions, continued use of the upper extremity in grasp/release and functional activities is recommended.

For eligibility criteria and information on Saebo functional dynamic orthoses, please see http://www.saebo.com/.

Handouts are being developed to assist with screening for, assessing and treating with the SaeboFlex and SaeboReach orthoses. These handouts are based on the Saebo arm training program guidelines. Occupational therapists must be trained in order to prescribe and use Saebo orthoses with their clients. Trained occupational therapists can contact the toolkit authors for Saebo handout information.
8.1.4 Functional Electrical Stimulation

The Canadian Best Practice Recommendation for Stroke Care 5.5.1 states: “Functional Electrical Stimulation (FES) targeted at the wrist and forearm muscles should be used to reduce motor impairment and improve function [Evidence Level: Early-Level A; Late-Level A]” (Dawson, Knox, McClure, Foley, & Teasell, 2013, p. 38).

The Canadian Best Practice Recommendation for Stroke Care 5.5.1 states: “for patients with a flaccid arm (i.e., Chedoke-McMaster Stroke Assessment < 3) electrical stimulation should be considered [Evidence Levels: Early- Level B; Late- Level B]” (Dawson, Knox, McClure, Foley, & Teasell, 2013, p. 39).

The Evidence-Based Review of Stroke Rehabilitation states: “there is moderate (Level 1b) evidence that neuromuscular electrical stimulation can reduce spasticity and improve motor function in the upper extremity” (Foley, Mehta, Jutai, Staines, & Teasell, 2013, p. 96).

The Evidence-Based Review of Stroke Rehabilitation states: “there is strong (Level 1a) evidence that FES treatment improves upper extremity function in chronic stroke” (Foley, Mehta, Jutai, Staines, & Teasell, 2013, p. 117).

FES should be combined with task specific treatment activities whenever possible. Some examples of treatment activities to combine with FES of the wrist extensors are:

- Use the back of the hand to move a cup from one place to another on a table.
- Wrap the hand around a cup when the muscle stimulation is off; let go of the cup when the muscle stimulation is on.
- Work on sit to stand using both arms on armrests of a chair. When the muscle stimulation comes on, work on straightening wrist and pushing into standing position.
- Use with the SaeboFlex orthosis to facilitate wrist / finger extension during the release of therapy balls, water bottle, cup, etc.

Some examples of treatment activities to combine with FES of the shoulder girdle are:

- Perform shoulder shrugs when the muscle stimulation is on.
- Place hand on ball or pillow beside body and push down when the muscle stimulation is on.

Prior to providing this intervention, occupational therapists need to be trained regarding the use, protocols and contraindications for functional electrical stimulation.
8.1.5 Mental Imagery

The Canadian Best Practice Recommendation for Stroke Care 5.5.1 states: “following assessment to determine if a patient is a suitable candidate, patients should be encouraged to engage in mental imagery to enhance upper-limb, sensorimotor recovery [Evidence Level: Early-Level A; Late-Level B]” (Dawson, Knox, McClure, Foley, & Teasell, 2013, p. 38).

Page (2001) states “. . . mental practice is a technique by which CVA patients can simulate repeated practice using the affected arm. In so doing, activations occur as if the arm were actually being utilized, which may restore some level of function in patients’ affected limbs” (p. 60).

Mental imagery is best done in a quiet environment so distractions are minimized. The client can be instructed in progressive muscle relaxation techniques, which can be done prior to the mental imagery to improve focus. Imagery is often done either immediately before or after practicing actual movements of the affected upper extremity. The client can be instructed to imagine all of the steps of a successful functional activity. The affected upper extremity should be placed in the correct position for the start of the movement that is to be imagined. The occupational therapist provides specific written instructions or a voice recording describing the activity to be imagined, including the specific upper extremity movements required to complete the task, the number of repetitions or the duration of the activity. Mental imagery can be done several times a day. The imagery script should be graded as the client improves.

Mental imagery scripts can be composed for many different activities depending on the client’s goals. Examples include:

- Picking up a pen and positioning it in the hand for writing
- Reaching for a towel and drying the other arm with it
- Grabbing a tissue and bringing it up to the nose
- Squeezing water out of a washcloth
- Wiping a counter with a towel
- Using a knife to spread peanut butter onto bread
- Throwing a ball

For an example of a mental imagery script, see page 28.
Mental Imagery Sample Script:

Activity: Reaching for a Cup

Today we are going to imagine that you are reaching for a cup that is sitting on a table in front of you. The cup is half full with water.

- See yourself sitting up tall in an armchair with your arm on the armrest.
- Bring your arm forward slowly toward the table in front of you.
- Straighten your elbow as you reach for the cup.
- Open your fingers and thumb as your hand approaches the cup on the table.
- Think about opening your fingers and thumb just wide enough to go around the cup.
- Grasp the cup gently between your fingers and thumb.
- Squeeze your fingers and thumb hard enough to lift the cup slightly off the table without spilling it.

Repeat this imagery task 10 times before moving onto the next imagery task.


8.1.6 Joint Protection and Supports

The Canadian Best Practice Recommendation for Stroke Care 5.5.3 states: “joint protection strategies should be used during the early or flaccid stage of recovery to prevent or minimize shoulder pain. These include: a) Positioning and supporting the arm during rest [Evidence Level B]. b) Protecting and supporting the arm during functional mobility [Evidence Level C]. c) Protecting and supporting the arm during wheelchair use by using a hemi-tray or arm trough [Evidence Level C].” (Dawson, Knox, McClure, Foley, & Teasell, 2013, p. 47).

8.1.6a Positioning and Supporting the Arm in Lying and in Sitting

The Canadian Best Practice Recommendation for Stroke Care 5.5.3 states: “patients and staff should be educated to correctly handle the involved arm [Evidence Level A]. For example, excessive traction should be avoided during assisted movements such as transfers [Evidence level C].” (Dawson, Knox, McClure, Foley, & Teasell, 2013, p. 47).

The Evidence-Based Review of Stroke Rehabilitation states: “the muscles around the hemiplegic shoulder are often paralyzed, initially with flaccid tone and later with associated spasticity. Careful positioning of the shoulder serves to minimize subluxation and later contractures as well as possibly promote recovery, while poor positioning may adversely affect symmetry, balance and body image” (Mehta, Teasell, & Foley, 2013, p. 18).

Optimal positioning in lying and sitting should maximize pain free degrees of shoulder abduction and external rotation while maintaining shoulder joint alignment.

For an example of bed and chair positioning handouts, see pages 30 and 31.
CLIENT’S NAME: ____________________________________________

Affected side (shaded): **RIGHT**

**BED & CHAIR POSITIONING FOLLOWING A STROKE**

**Lying on affected side**
- Position affected shoulder so that shoulder blade lies flat and arm appears slightly forward from trunk
- Place unaffected leg forward on one or two pillows
- Place a pillow behind back and ensure that they are not lying directly on hip bone

**Lying on unaffected side**
- Position affected shoulder forward with arm supported on pillow
- Place pillow(s) between legs
- Place a pillow behind back and ensure that they are not lying directly on hip bone

**Lying on back (if desired)**
- Place pillow behind affected shoulder blade
- Place affected hand on pillow above heart level
- Place pillow beneath affected hip and/or beneath both knees (optional)

**Sitting up**
- Ensure client sits well back in the centre of chair or wheelchair
- Place arms well forward onto two pillows on table or arm board if available
- Ensure feet are flat on floor or footrests

ENSURE THAT YOU ASK CLIENT “ARE YOU COMFORTABLE?”

If you have any questions, please contact your Occupational Therapist or Physiotherapist

Name: ____________________________________________ Phone: ________________________

(Adapted from: Chest Heart and Stroke Scotland, 2012)
BED & CHAIR POSITIONING FOLLOWING A STROKE

CLIENT’S NAME: ____________________________________________  Affected side (shaded): LEFT

Lying on affected side**

- Position affected shoulder so that shoulder blade lies flat and arm appears slightly forward from trunk
- Place unaffected leg forward on one or two pillows
- Place a pillow behind back and ensure that they are not lying directly on hip bone

Lying on unaffected side

- Position affected shoulder forward with arm supported on pillow
- Place pillow(s) between legs
- Place a pillow behind back and ensure that they are not lying directly on hip bone

Lying on back (if desired)

- Place pillow behind affected shoulder blade
- Place affected hand on pillow above heart level
- Place pillow beneath affected hip and/or beneath both knees (optional)

Sitting up

- Ensure client sits well back in the centre of chair or wheelchair
- Place arms well forward onto two pillows on table or arm board if available
- Ensure feet are flat on floor or footrests

ENSURE THAT YOU ASK CLIENT “ARE YOU COMFORTABLE?”

If you have any questions, please contact your Occupational Therapist or Physiotherapist

Name: ________________________________  Phone: ____________________________

(Adapted from: Chest Heart and Stroke Scotland, 2012)
8.1.6b Positioning and Supporting the Arm during Transfers and Mobility

The Canadian Best Practice Recommendation for Stroke Care 5.5.3 states: “during the flaccid stage slings can be used to prevent injury; however, beyond the flaccid stage the use of slings remains controversial [Evidence Level C]” (Dawson, Knox, McClure, Foley, & Teasell, 2013, p. 47).

The Evidence-Based Review of Stroke Rehabilitation states: “arm slings are often used in the initial stages following a stroke to support the affected arm. However, their use is controversial and they can have disadvantages in that they encourage flexor synergies, inhibit arm swing, contribute to contracture formation and decrease body image causing the patient to further avoid using that arm. However, a sling remains the best method of supporting the flaccid hemiplegic arm while the patient is standing or transferring. Ada et al. (2005) conducted a systematic Cochrane review evaluating the benefit of shoulder slings and supports, and concluded that there is insufficient evidence that these devices reduce or prevent shoulder subluxation following a stroke” (Mehta, Teasell, & Foley, 2013, p. 20).

It is important that all positioning and supportive devices are evaluated each visit and that a client is not discharged from an occupational therapist’s caseload without a plan in place for re-evaluation.

If a sling is required for short term use during ambulation and transfers, occupational therapists should provide education regarding the purpose of the sling, donning methods, potential benefits and risks of use, and the plan for monitoring use of and discontinuation of the sling. To determine if a client may benefit from a sling for short term use, see page 33.

For information on various upper extremity positioning devices, see page 34.
Sling Me?

If other options for supporting the upper extremity have been ruled out, a sling could be used. Slings should **NEVER** be left on while in bed or sitting up. Slings are **NOT** for long-term use and need to be continually **REASSESSED**. The following checklist may help determine if a sling is truly the best option for supporting the upper extremity.

<table>
<thead>
<tr>
<th></th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decreased Tone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute Edema</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute Pain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decreased sensation / perception / cognition (risk of trauma)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 10 degrees of active shoulder movement in any plane</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caregivers need reminder to not pull on arm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Adapted from: Thalman, 2008)

If you have multiple “yes” responses, you could consider providing a sling short-term, then re-evaluate at each visit. Sling use can lead to pain as well as decreased passive and active range of motion due to immobilization. There is insufficient evidence for the use of slings solely for the prevention or reduction of subluxation. A client **SHOULD NOT** be discharged from caseload with a sling without a plan for immediate follow-up by an occupational therapist.
## Positioning Devices

<table>
<thead>
<tr>
<th>Positioning Devices</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
</table>
| Arm Boards (half lap tray or arm trough) | - Protects and supports a low tone upper extremity during wheelchair use  
- Places upper extremity in view of client  
- Hand is “free” for functional activity | - Upper extremity may be at risk of trauma secondary to falling off of the arm board; strapping is not advised due to possibility of impingement  
- Requires height adjustable armrests on a wheelchair to obtain ideal position |
| GivMohr Sling | - Distal support promotes weight bearing | - Hand is not “free” for functional activity  
- Hand piece can be uncomfortable  
- Hand piece may cause skin breakdown  
- Difficult to don/doff independently |
| Omo Neurexa Sling (Otto Bock) | - Hand is “free” for functional activity | - May reinforce dependent edema of upper extremity  
- Difficult to position sling for optimal shoulder joint position (e.g. humeral head elevation)  
- Difficult to don/doff independently |
| Hemi Sling | | - Hand is not “free” for functional activity  
- Encourages flexor synergy patterns  
- Contributes to the development of contractures  
- Restricts active and passive movement  
- Inhibits arm swing  
- May impact functional balance and ambulation  
- Difficult to don/doff independently |
| Other (e.g.: pocket, belt, shoulder bag, waist pouch) | - Low cost  
- Readily available  
- Easy transition from support to functional use of arm | - Trial and error for optimal support and position |
8.1.6c Positioning and Supporting the Hand

The Canadian Best Practice Recommendation for Stroke Care 5.5.2 states: “spasticity and contractures can be prevented or treated by antispastic pattern positioning, range-of-motion exercises, and/or stretching [Evidence Levels: Early- Level C; Late-Level C]. Routine use of splints is not recommended [Evidence Levels: Early-Level A; Late-Level B]” (Dawson, Knox, McClure, Foley, & Teasell, 2013, p. 44).

Occupational therapists should assess each client individually to determine if splinting would be beneficial to promote function, manage spasticity, prevent contracture, and/or assist with positioning for pain and/or edema management. Splinting should always be seen as an adjunct to active task practice and movement retraining.

The goal of splinting “should be about maintaining the improvement of range of motion and soft tissue integrity” (Bondoc & Harmeyer, 2013, p. 11). “If muscles are biomechanically imbalanced, and soft tissues shortened, functional motor recovery will be very challenging for the client” (Bondoc & Harmeyer, 2013, p. 12).

Splinting Considerations:
- “For acute stroke survivors, 35° of wrist extension with MCP’s, PIP’s and DIP’s in neutral” is recommended (Saebo Inc., 2013, p. 37).
- “For chronic stroke survivors, start with the wrist in flexion and finger joints in neutral. Passively extend the wrist until resistance is felt (fingers begin to curl). This is the initial wrist position for splinting (“catch one” or resistance, R1)” (Saebo Inc., 2013, p. 37). “The wrist may be extended to a greater angle as long as the digits are maintained in composite extension to achieve optimal stretch of the wrist and finger flexors” (Bondoc & Harmeyer, 2013, p. 11).
- The thumb should be positioned “in abduction and extension” (Bondoc & Harmeyer, 2013, p.11).
- Occupational therapists should monitor for tingling in the fingers (thumb, index, middle and ring fingers) if splinting the wrist in flexion, as the median nerve may be compressed. If median nerve compression neuropathy occurs, wrist may need to be moved out of flexed position, sacrificing finger extension.
- Occupational therapists should “constantly monitor the progression of the client’s hand by evaluating the range of motion, soft tissue and joint play, and the type of volitional control the client has regained” (Bondoc & Harmeyer, 2013, p. 11). Occupational therapists should also monitor skin integrity.
- Occupational therapists should consider splinting with a flexible material that allows fingers to move through flexion with increases in tone (e.g. Aquaplast 3/32), in order to provide a stretch to the long finger and wrist flexors while maintaining joint integrity.
- Serial splinting could be used to progressively increase range of motion (e.g. elbow, forearm, wrist and/or fingers).
Splinting that provides joint support to facilitate function may also be considered (e.g. opponens splint or dorsal wrist cock-up splint) (Bondoc & Harmeyer, 2013).

The SaeboStretch is one option available for clients who are able to achieve at least neutral wrist extension with all finger joints in composite extension. Occupational therapists must be trained in order to prescribe and use Saebo orthoses with their clients. For eligibility criteria and information on SaeboStretch orthoses, please see www.saebo.com.

Ensure education is provided regarding wearing schedules and precautions when a client is provided with a splint. Occupational therapists should monitor the effectiveness of the splint in regards to the specific goals and adjust or discharge the splint as required. Additional information should be provided at the time of discharge, if the client still requires the use of a splint. For an example of a splint instructions handout, please see page 37.
Splint Instructions

PURPOSE OF YOUR SPLINT:
- The splint prescribed was made for you to:
  - Stretch your hand, wrist and/or fingers
  - Support your hand, wrist and/or fingers
  - Prevent contractures (i.e. permanent joint stiffness)
  - Reduce swelling
  - Reduce pain
  - Promote function
  - Stabilize your ___________ joint
  - Other:_________________________________________________________

WEARING SCHEDULE:
- Your splint should be worn ___________________________________________________________________

CARE OF YOUR SPLINT:
- Do not expose your splint to heat sources including a radiator, a stove, the sun, an open flame, hot water or a closed car on a hot day.
- Wash your splint daily with lukewarm water and mild soap. If the straps are removable, they can be hand-washed and laid flat to dry. Splint liners can also be hand-washed and laid flat to dry.

POSSIBLE SPLINT CONCERNS:
- If you notice any of the following issues below, please contact your occupational therapist and discontinue wearing your splint until you are reassessed.
  - Redness or irritation of your skin
  - Pain or numbness in your wrist, hand, or fingers
  - Your fingers or hand are turning blue (circulation is decreased)
  - The splint no longer fits correctly
  - The splint is broken
  - Changes in your finger joints are starting to occur, such as:

Note: If you are no longer followed by an occupational therapist, you will need to obtain a new Occupational Therapy referral from your primary healthcare provider.

Occupational Therapist: _________________________ Phone: _________________________

(Adapted from: Health Sciences Centre Occupational Therapy Department, 2013)
8.1.6d Shoulder Girdle Taping

The Evidence-Based Review of Stroke Rehabilitation states: “strapping the hemiplegic shoulder does not appear to improve upper limb function, but may reduce pain” (Mehta, Teasell, & Foley, 2013, p. 24).

The Evidence-Based Review of Stroke Rehabilitation states: “strapping the hemiplegic shoulder is used as a method to prevent or reduce the severity of shoulder subluxation and may provide some sensory stimulation” (Mehta, Teasell, & Foley, 2013, p. 22).

There are various taping techniques that are used on the shoulder girdle that seek to optimize alignment and reduce pain (e.g. McConnell approach, Tri-pull).
8.1.7 Spasticity Management

The Canadian Best Practice Recommendation for Stroke Care 5.5.2 states: “chemodenervation using botulinum toxin can be used to increase range of motion and decrease pain for patients with focal and/or symptomatically distressing spasticity [Evidence Levels: Early-Level C; Late-Level A]” (Dawson, Knox, McClure, Foley, & Teasell, 2013, p. 44).

The Evidence-Based Review of Stroke Rehabilitation states: “botulinum works by weakening spastic muscles through selectively blocking the release of acetylcholine at the neuromuscular junction. The benefits of botulinum injections are generally dose-dependent and last approximately 2 to 4 months (Bakheit et al. 2001; Brashear et al. 2002; Francisco et al. 2002; Simpson et al. 1996; Smith et al. 2000)” (Foley, Mehta, Jutai, Staines, & Teasell, 2013, p. 84).

The Evidence-Based Review of Stroke Rehabilitation states: “there is strong (Level Ia) evidence that treatment with BTX [botulinum toxin] alone or in combination with therapy significantly decreases spasticity in the upper extremity in stroke survivors” (Foley, Mehta, Jutai, Staines, & Teasell, 2013, p. 93).

The United Kingdom’s National Guidelines for Spasticity in Adults: Management using Botulinum Toxin states: “it is important to:

- Assess the need for orthotics / splinting or review existing orthoses as appropriate once the clinical effect of muscle weakening is observed (usually 7–14 days post-injection) and ensure there is a system to review the orthotics / splinting provision, provide new orthoses as required and assess patient compliance.
- Provide patient education on stretching regimes and guidance on participating in activities . . .” (Royal College of Physicians, British Society of Rehabilitation Medicine, Chartered Society of Physiotherapy, Association of Chartered Physiotherapists Interested in Neurology, 2009, p. 21).

A review of arm function, including range of motion and tone, prior to injection will assist with treatment planning and monitoring of outcomes.

It is best to combine botulinum toxin with therapy:

- Occupational therapists should communicate with the physiatrist regarding functional goals, outcome of previous injections and treatment plan.
- Post injection, therapy and home programs can focus on strengthening the antagonist muscles as new movement may now be possible. Active movement training can often be progressed.
- “Splinting provides a prolonged stretch to a muscle and, when used together with BT [botulinum toxin], aims to improve muscle length, correct and prevent contractures and maximise function” (Royal College of Physicians, British Society of Rehabilitation Medicine, Chartered Society of Physiotherapy, Association of Chartered Physiotherapists Interested in Neurology, 2009, p. 21).
- Splints to help improve range of motion of the elbow, forearm, wrist, and hand as well as functional splints can be considered. Refer to pages 35 and 36 for splinting considerations.
- Splints should be reassessed frequently, including wrist and finger angles, resistance of springs on dynamic splints, wearing schedule, skin integrity, and tolerance as well as changes in functional ability.
- Functional electrical stimulation may be used post injection to antagonist muscle groups.
8.1.8 Supplementary Training Programs

The Canadian Best Practice Recommendation for Stroke Care 5.5.1 states: “therapists should provide supplementary training programs aimed at increasing the active movement and functional use of the affected arm between therapy sessions, e.g. Graded Repetitive Arm Supplementary Program (GRASP) suitable for use during hospitalization and at home [Evidence Level: Early-Level A, Late-Level C] . . . The GRASP protocol suggests that the program be delivered for one hour per day, six days per week [Evidence Level: Early-Level A, Late-Level C]” (Dawson, Knox, McClure, Foley, & Teasell, 2013, p. 38).

The GRASP program requires palpable or grade 1 wrist extension and active scapular elevation. A client who is unable to partially open the hand is not appropriate for the GRASP program. (Eng, Harris, Dawson, & Miller, 2012). Please see the following resource for more details: http://neurorehab.med.ubc.ca/grasp/.

Supplementary training programs should be provided so that strengthening, range of motion and functional activities completed in therapy can be practiced between therapy sessions with the goal of increasing the intensity and the number of repetitions being done.

Consider the use of a daily homework log or journal as a way of recording activities done at home, and to increase compliance and accountability.
8.1.9 Mirror Therapy

The Canadian Best Practice Recommendation for Stroke Care 5.5.1 states: “mirror therapy may be appropriate for select patients to improve ADLs, reduce pain, and improve visual spatial neglect [Evidence Level A]” (Dawson, Knox, McClure, Foley, & Teasell, 2013, p. 39).

The Evidence-Based Review of Stroke Rehabilitation states: “mirror therapy is a technique that uses visual feedback about motor performance to improve rehabilitation outcomes. It has been adapted from its original use for the treatment of phantom limb pain as a method to “re-train the brain” as a means to enhance upper-limb function following stroke and to reduce pain. In mirror therapy, patients place a mirror beside the unaffected limb, blocking their view of the affected limb, creating the illusion that both limbs are working normally. It is believed that by viewing the reflection of the unaffected arm in the mirror that it may act as a substitute for the decreased or absent proprioceptive input” (Foley, Mehta, Jutai, Staines, & Teasell, 2013, p. 60).

Mirror therapy involves the client placing their affected hand and forearm inside the mirror box and their unaffected hand and forearm in front of the mirror. The client is then directed to perform a movement with their unaffected hand and to simultaneously attempt to copy the movement with their hidden affected hand. The client should be looking at the image in the mirror while attempting to move the affected hand.

A “mirror box” can be purchased (e.g. http://www.mirrorboxtherapy.com/). Alternatively, mirror boxes can be made by bending cardboard into an inverted V (large enough for the affected hand to fit under) or by using a box with a mirror attached on one side. Homemade versions have been effectively used with many clients.

Mirror therapy can be provided as homework. Occupational therapists should provide specific written instructions for the client, including the number of repetitions or duration of the activity. For an example of a mirror therapy script, see page 42.
Mirror Therapy Sample Script:

Watch the mirror as you complete the activities. Make sure you are trying to do these activities with your affected (right / left) hand at the same time. Do these exercises 2 – 3 times a day. Go slowly!

1. Make a fist and then open your hand fully. Repeat 15 times.
2. Pretend to play the piano, pushing each finger on the table one at a time. Continue for 2 minutes.
3. Touch your thumb to the tip of each finger. Repeat 15 times for each finger.
4. Place a washcloth on the table. Wipe the table in a circular motion, back and forth, and up and down, for 2 minutes.
5. Place a water bottle on the table. Grasp it with your hand, lift it up 2 inches, place it back on the table and then let go. Repeat this 15 times.
6. Place 5 coins on the table. Pick them up one at a time until they are all in your palm. Place them back on the table, one at a time, using your thumb with your index and middle fingertips. Repeat entire process 3 times.
8.1.10  Sensory Stimulation and Re-training

The Canadian Best Practice Recommendation for Stroke Care 5.5.1 states: “sensory stimulation (e.g., TENS, acupuncture, muscle stimulation, biofeedback) for the upper extremity may be offered to select patients to improve sensory motor function [Evidence Level A]” (Dawson, Knox, McClure, Foley, & Teasell, 2013, p. 39).

The Evidence-Based Review of Stroke Rehabilitation states: “sensorimotor impairment is associated with slower recovery following stroke; therefore, therapies to increase sensory stimulation may help to improve motor performance” (Foley, Mehta, Jutai, Staines, & Teasell, 2013, p. 30).

An occupational therapist involved in sensory retraining should:
- Educate client / caregiver regarding the purpose of sensation, safety concerns, and upper extremity protection.
- Modify the environment for safety (e.g. adjust water temperature).
- Introduce varied textures and sensations (e.g. wash cloth, rice, macaroni).
- Use different weights, sizes, and shapes of objects to promote discrimination.
- Use vision as a compensatory strategy, progressing to occluding vision if able and if safety permits.

For sensation re-training practical examples, see page 44.

For safety tips that can be used with clients with decreased sensation, see page 45.
Sensation Re-training Practical Examples

1. Take a washcloth and rub it over your affected hand in a circular motion (include forearm too as necessary). Repeat this for 10 minutes. Keep watching the cloth and try to “feel” it on your skin.

2. Lightly tap your affected hand with your less affected hand from your forearm to your fingertips. Repeat for 10 minutes.

3. Use your affected fingertips to trace a textured maze (e.g. Velcro, string, cotton balls, felt, etc.) with your eyes opened or closed.

4. Clap your hands together at shoulder level. Make sure you hear a loud “clap”. Repeat 10 times.

5. Place a butter knife on the table in front of you. Pick it up using only your affected hand. Get the butter knife in a good position to cut, and then tap the table with the tip of it as if you are cutting (or have an item to actually cut, e.g. theraputty). Put the knife down on the table. Repeat 10 times making sure that you have the correct grip each time you pick up the knife.

6. Place a pen or straw in your affected hand, holding it at the bottom. Work your way to the top of the pen using only your fingertips. Repeat up and down 10 times.

7. Put 5 coins in your pocket. Use your affected hand to pull them out in order from smallest to largest. Repeat 2 times.

8. Get a dark colored cloth bag. Place various items inside of it (screw, button, paperclip, spoon, safety pin, coins, etc.), with a list of each item written out. Choose an item from the list and try to find it in the bag one at a time. Keep track of how many you can find correctly each day.

9. Place a variety of items in a bowl of rice, macaroni, beans, or cereal, and remove them one at a time with your eyes opened or closed.
Safety Tips For Decreased Sensation

After a stroke you may have decreased sensation (feeling) in certain areas of your body, especially your hands and feet. Decreased sensation means that you may have more difficulty feeling pain, pressure, and temperature, making you more at risk of injuring yourself. The following are tips on how to prevent common injuries and increase safety:

- Use your less affected hand to check water temperature (e.g. before having a shower or washing the dishes).
- Label water faucet handles for hot and cold (e.g. red for hot and blue for cold).
- Use your less affected hand to handle sharp, hot or cold objects.
- Look at the position of your affected arm:
  - When your affected arm is actively performing a task (e.g. look before reaching into a cutlery drawer to ensure you do not cut your hand on a knife).
  - When your affected arm is at rest (e.g. look to ensure your hand is not in close proximity to the stove element).
- Protect your affected arm during hot and cold seasons:
  - Wear mittens in cold weather to prevent frost bite.
  - Apply sunscreen in warmer weather to prevent sun burn.
- Ensure you are not holding items too tightly which can damage your skin.
- Check your skin daily to ensure there are no pressure (red / darker) areas. Report any changes to your healthcare provider.
8.1.11 Range of Motion and Strength Training

The Canadian Best Practice Recommendation for Stroke Care 5.5.3 states: “active range of motion should be increased gradually in conjunction with restoring alignment and strengthening weak muscles in the shoulder girdle [Evidence Level B]” (Dawson, Knox, McClure, Foley, & Teasell, 2013, p. 47).

The Canadian Best Practice Recommendation for Stroke Care 5.5.3 states: “the arm should not be moved beyond 90 degrees of shoulder flexion or abduction, unless the scapula is upwardly rotated and the humerus is laterally rotated [Evidence Level A]” (Dawson, Knox, McClure, Foley, & Teasell, 2013, p. 47).

The Canadian Best Practice Recommendation for Stroke Care 5.5.3 states: “overhead pulleys should not be used [Evidence Level A]” (Dawson, Knox, McClure, Foley, & Teasell, 2013, p. 47).

The Canadian Best Practice Recommendation for Stroke Care 5.5.2 states: “the presence of spasticity should not limit the use of strength training in the arm [Evidence Level: Early – C, Late – C]” (Dawson, Knox, McClure, Foley, & Teasell, 2013, p. 44).

The Evidence-Based Review of Stroke Rehabilitation states: “there is strong (Level 1a) evidence that strength training increases grip strength following stroke” (Foley, Mehta, Jutai, Staines, & Teasell, 2013, p. 23).

The Evidence-Based Review of Stroke Rehabilitation states: “early passive shoulder range of motion, and supporting and protecting the involved shoulder, in the initial flaccid stage are regarded as important steps to reduce the development of shoulder pain” (Mehta, Teasell, & Foley, 2013, p. 18).

Active range of motion should be encouraged as early as possible. Active assisted range of motion describes the client initiating maximal active movement with their affected upper extremity; the movement is then completed by either the client using their less affected upper extremity to assist their affected upper extremity or by the occupational therapist providing assistance. Occupational therapists should consider the use of gravity reduced positions to facilitate active movement (e.g. supine, side-lying).

Passive range of motion should be provided by occupational therapists or trained caregivers to help maintain full joint range of motion and to prevent contractures.

Self-range of motion is often provided to clients as homework to maintain or improve joint range of motion. Self-range may not be appropriate if the client does not have the cognitive abilities to carry out recommendations independently and safely.

For an example of a self-range of motion program, please see page 47.
Self-Range of Motion Exercises for the Arm

What is self-range?
Self-range of motion exercises can be used after a stroke when one arm or hand is unable to perform exercises on its own. During self-range, the less affected arm is used to help the affected arm or hand through the desired movement.

Why is it important?
It is important to move the affected arm to keep the muscles mobile and the joints flexible. Other benefits may include:

- Prevention of stiffness
- Improved movement within the joint
- Improved sensory and body awareness
- Reduced swelling

Most importantly, self-range of motion exercises can help make daily activities (e.g.: dressing, grooming) easier.

General Guidelines

- Participate in these exercises at least _________ time(s) a day.
- Keep movements slow and controlled; avoid rapid and jerky movements.
- Hold each position for at least 5 seconds, or as indicated by your therapist.
- Do not “overdo it”; do not force the movement.
- Exercises will cause a stretch but should not cause sharp pain.
- If exercises cause sharp pain, stop until you are able to speak to your therapist.

If you have any questions, contact your therapist_________________ at_________________.

(Revised with permission. Copyright 2002, Ohio State University Wexner Medical Centre, Columbus, Ohio, Patient Education.)
**Shoulder Flexion**

Starting position:  □ Lying on back  □ Lying on less affected (right / left) side  □ Sitting

Repeat ________ times.

1. Begin by:
   □ Interlocking your fingers with your affected (right/left) thumb on top.
   □ Holding your wrist to support your affected (right/left) arm.
2. Raise your arms forward and up to shoulder height.
3. Try to keep both elbows straight.
4. Lower your arms slowly.

(Revised with permission. Copyright 2002, Ohio State University Wexner Medical Centre, Columbus, Ohio. Patient Education.)

WRHA Occupational Therapy Upper Extremity Working Group 2015
**Shoulder Abduction / Adduction**

Starting position:  ☐ Lying on back  ☐ Sitting

Repeat ________ times.

1. Support the elbow, forearm and wrist of your affected arm (right/left) with your less affected arm (right/left), as if holding a baby.
2. Move your arms to the right, away from your body. The goal is to get your elbow to reach shoulder height.
3. Move your arms to the left, away from your body. The goal is to get your elbow to reach shoulder height.
4. Attempt to move your arms only, without moving the rest of your upper body.

(Revised with permission. Copyright 2002, Ohio State University Wexner Medical Centre, Columbus, Ohio. Patient Education.)

WRHA Occupational Therapy Upper Extremity Working Group 2015
Shoulder Internal / External Rotation

Starting position:  ☐ Lying on back  ☐ Lying on less affected (right / left) side  ☐ Sitting

Repeat ________ times.

1. Begin by:
   ☐ Interlocking your fingers with your affected (right/left) thumb on top.
   ☐ Holding your wrist to support the affected (right/left) arm.
2. Keep your elbows bent and close to the sides of your body.
3. Use your less affected (right/left) arm to move your affected (right/left) arm across your body. Keep the elbow of your affected (right/left) arm bent and close to your side.
4. Use your less affected (right/left) arm to move your affected (right/left) arm away from your body. Keep the elbow of your affected (right/left) arm bent and close to your side.


Elbow Flexion / Extension

Starting position:  ☐ Lying on back  ☐ Lying on less affected (right / left) side  ☐ Sitting

Repeat _______ times.

1. Begin by:
   ☐ Interlocking your fingers with your affected (right/left) thumb on top.
   ☐ Holding your wrist to support your affected (right/left) arm.
2. Bend your elbows to bring your hands toward your chest. Try to touch your chin.
3. Straighten your elbows. Attempt to straighten both elbows fully.

(Revised with permission. Copyright 2002, Ohio State University Wexner Medical Centre, Columbus, Ohio, Patient Education.)

WRHA Occupational Therapy Upper Extremity Working Group 2015
Forearm Supination / Pronation

Starting position: □ Lying on back □ Lying on less affected (right / left) side □ Sitting

Repeat ________ times.

1. Begin by:
   □ Interlocking your fingers with your affected (right/left) thumb on top.
   □ Holding your wrist to support the affected (right/left) arm.
2. Keep your affected (right/left) elbow bent and close to the side of your body, with your hands pointing forward.
3. Use your less affected (right/left) arm to rotate your affected (right/left) arm so the palm faces upward.
4. Use your less affected (right/left) arm to rotate your affected (right/left) arm so the palm faces downward.
Wrist Flexion / Extension

Starting position:  ☐ Lying on back  ☐ Lying on less affected (right / left) side  ☐ Sitting

Repeat ________ times.

1. Begin by:
   ☐ Interlocking your fingers with your affected (right/left) thumb on top.
   ☐ Holding your wrist to support the affected (right/left) arm.
2. Keep your elbows bent and close to the side of your body, with your hands pointing forward.
3. Use your less affected (right/left) hand to bend your affected (right/left) wrist to the left.
4. Use your less affected (right/left) hand to bend your affected (right/left) wrist to the right.

(Revised with permission. Copyright 2002, Ohio State University Wexner Medical Centre, Columbus, Ohio. Patient Education.)

WRHA Occupational Therapy Upper Extremity Working Group 2015
Wrist Radial / Ulnar Deviation

Starting position: ☐ Lying on back  ☐ Lying on less affected (right / left) side  ☐ Sitting

Repeat ________ times.

1. Begin by:
   ☐ Interlocking your fingers with your affected (right/left) thumb on top.
   ☐ Holding your wrist to support the affected (right/left) arm.
2. Keep your elbows bent and close to the side of your body, with your hands pointing forward.
3. Use your less affected (right/left) hand to bend the affected (right/left) wrist so your hand moves toward your chest.
4. Use your less affected (right/left) hand to bend your affected (right/left) wrist so your hand moves away from your chest.
Finger Flexion / Extension

Starting position:  ☐ Lying on back  ☐ Lying on less affected (right / left) side  ☐ Sitting

Repeat ________ times.

1. Begin by placing your affected (right/left) arm on your lap or a table.
2. Use your less affected (right/left) hand to bend all the fingers of your affected (right/left) hand until your fingertips touch your palm.
3. Use your less affected (right/left) hand to open all the fingers of your affected (right/left) hand so they are straight.

(Revised with permission. Copyright 2002, Ohio State University Wexner Medical Centre, Columbus, Ohio. Patient Education.)

WRHA Occupational Therapy Upper Extremity Working Group 2015
Thumb Flexion / Extension

Starting position:  ☐ Lying on back  ☐ Lying on less affected (right / left) side  ☐ Sitting

Repeat ________ times.

1. Begin by placing your affected (right/left) arm on your lap or a table.
2. Use your less affected (right/left) hand to move your affected (right/left) thumb to touch the base of your little finger.
3. Use your less affected (right/left) hand to move your affected (right/left) thumb away from your hand.

(Revised with permission. Copyright 2002, Ohio State University Wexner Medical Centre, Columbus, Ohio. Patient Education.)

WRHA Occupational Therapy Upper Extremity Working Group 2015
Thumb Abduction

Starting position:  ☐ Lying on back  ☐ Lying on less affected (right / left) side  ☐ Sitting

Repeat ________ times.

1. Begin by placing your affected (right/left) arm on your lap or a table.
2. Use your less affected (right/left) hand to move your affected (right/left) thumb away from your palm (stretch thumb and index finger apart).
8.1.12 Edema Management

The Canadian Best Practice Recommendation for Stroke Care 5.5.3 states: “hand edema may be reduced by:  a) Active, active-assisted, or passive range of motion exercises in conjunction with arm elevation [Evidence Level C]. b) Retrograde massage [Evidence Level C] . . .” (Dawson, Knox, McClure, Foley, & Teasell, 2013, p. 48).

“Active and active-assisted extremity movement patterns produce muscular contractions that assist venous and lymphatic return of the fluid” (Ryerson & Levit, 1997, p. 771).

In general, elevating the upper extremity with the hand above the heart can be beneficial in edema management. When sitting or lying down, pillows can be used to assist with positioning the hand (Kasch & Walsh, 2013).

“Despite a lack of evidence for the efficacy of light retrograde massage in stroke patients . . . it is often used in clinical practice and . . . consensus exists about many components of the treatment method” (Jackson, van Teijlingen & Bruce, 2012, p. 549).

“Compression bandaging may have benefits in the management of edema after stroke” (Gustafsson, Walter, Bower, Slaughter, & Hoyle, 2014, p. 203). Compression gloves, sleeves, and wrapping for finger edema (e.g. Coban) can be used and monitored frequently.

Splints may be considered and trialled to manage hand edema in the low level arm post stroke, however they need to be frequently evaluated. They should not be long term interventions or used during the day if they interfere with active movement. Refer to splinting considerations on pages 35 and 36 as needed. Provide client handout regarding splint instructions on page 37 as needed.

A combination of interventions is typically used for edema management.
8.1.13 Virtual Reality

The Canadian Best Practice Recommendation for Stroke Care 5.5.1 states: “where available, virtual reality techniques, using both immersive techniques (such as virtual reality) and non-immersive techniques (such as video games), can be used as an adjunct to other rehabilitation therapies as a means to provide additional opportunities for repetition, intensity and task-oriented training [Evidence Level B]” (Dawson, Knox, McClure, Foley, & Teasell, 2013, p. 39).

Examples of non-immersive systems are the Nintendo Wii and the SaeboReJoyce.

Further research continues to emerge in this developing area of upper extremity rehabilitation.
9.0 Reassessment Guidelines:

It is important to frequently reassess a client’s upper extremity function to monitor progress and modify treatment plans. Reassessment helps to determine if a client’s goals have been met or need to be revised. Reassessment can include re-administering initial assessment tools and reviewing SMART goals with the client, as well as evaluating use of the upper extremity in activities of daily living. Treatment plans may be modified based on reassessment results.
10.0 References:


Health Sciences Centre Occupational Therapy Department. (2013). *Splinting discharge instructions* [Client handout], Winnipeg, MB, Canada.


doi: 10.1002/14651858.CD004433.pub2

Stevenson, T., & Thalman, L. (2007). *Rehabilitation of the hemiparetic upper extremity* [Lecture notes], School of Medical Rehabilitation, University of Manitoba, Winnipeg, MB, Canada.

Thalman, L. (2002). *Arm activity list* [Client handout], St. Boniface General Hospital Occupational Therapy Department, Winnipeg, MB, Canada.