Canadian Best Practice Recommendations for the Rehabilitation of Persons after Stroke

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Objectives

- To introduce the SCORE project
- To describe the process of developing the SCORE evidence-based recommendations (EBRs),
- To place the recommendations within the context of the Canadian Stroke Strategy
- To summarize the recommendations for rehabilitation of the arm and leg and walking,
- To suggest treatment protocols to accompany these recommendations
Process of Developing the Canadian Recommendations for Stroke Rehabilitation

The Canadian Stroke Network (CSN)

- funded by the Canadian Centres of Excellence Program in 1999, was renewed for a second 7 years in June 2006 with an increased budget

- CSN Mission: “to reduce the impact of stroke on Canadians through collaborations that create valuable new knowledge in stroke; to ensure the best knowledge is applied; and to build Canadian capacity in stroke.”

Dr. Antoine Hakim, O.C.
Director of the CSN
Neurologist and Professor, University of Ottawa

www.ulaval.ca
Process of Developing the Canadian Recommendations for Stroke Rehabilitation

5 Themes:

I. Prevention
II. Acute Treatment of Stroke
III. Minimizing Stroke Damage
IV. Recovery and Rehabilitation
V. Knowledge Translation

* In second 7-year cycle, KT was integrated across all activities instead of as a separate theme
Process of Developing the Canadian Recommendations for Stroke Rehabilitation

- 1999-2001 essentially investigator-driven, albeit centered on multi-centre clinical studies
- 2002 Spring meeting: brainstorming of theme members at a special meeting organized by theme leader Dr Nancy Mayo in Montreal
- Type of projects that could only be done with the support of a network
- Emergence of consensus for a KT-related project
- Working Group met 4 times in Ottawa to formulate the project for submission to CSN competition
WORKING GROUP 2002

N. Mayo (PT)  
McGill U.

R. Teasell (MD)  
U. West. Ont.

S.W-Dauphinee (PT)  
McGill U.

J. Jutai (Psych)  
U. West. Ont.

M. Bayley (MD)  
U. of Toronto

M. Harrison (RN)  
Queen’s U.

I. Graham (Soc.)  
U. Ottawa

C. Richards (PT)  
U. Laval

KT experts
Objectives: Stroke Canada Optimization of Rehabilitation Through Evidence (SCORE) project

- To develop a nationwide network of academic rehabilitation centres to implement evidence-based practice
- To determine strategic priorities in stroke rehabilitation research
- To develop evidence-based practice recommendations (EBRs) for stroke rehabilitation in three treatment areas where the scientific evidence and clinical impact is strongest
- To implement these recommendations at pilot sites across the country to lead into an RCT on KT.
CSN FUNDING FOR SCORE in Spring of 2003

Funding Partners:

- Fonds de recherché en santé du Québec (FRSQ)
- Heart and Stroke Foundation
- Ministry of Health and Long Term Care of Ontario
- Lawson Research Institute London
- Réseau provincial de recherche en adaptation-réadaptation (REPAR)
- St Joseph’s Health Care London
- Toronto Rehabilitation Institute
Mandate of Expert Panel

- Expert Panel convened for 2 days (October 2003)
- Made use of the Evidence Based Review of Stroke Rehabilitation (EBRSR)
- Quality of Life factors post stroke (Mayo et al, 2002)
- Results of a survey of frontline providers
- Panel`s expertise
- Deliverables were to Identify
  - Top 5 Stroke Rehabilitation research priorities
  - Top 3 Knowledge Translation areas.
Identification of areas for **Research Priorities and Knowledge Translation (KT)**

### Research Priorities
1. Community based support to enhance/sustain community reintegration after stroke
2. Rehabilitation for persons with severe stroke
3. The ideal timing/intensity of aphasia therapy
4. Benefits of cognitive/perceptual rehabilitation
5. The ideal timing and intensity of interdisciplinary rehabilitation for persons with mild / moderate stroke

### Knowledge Translation
1. Lower Extremity and Gait Rehabilitation
2. Upper Extremity Rehabilitation
3. Assessments of the stroke rehabilitation client to identify risk and potential sources of harm including pressure ulcers, dysphagia, falls, cognition and depression
1. Identify a Clinical Area to promote Best Practice
2. Establish an interdisciplinary guideline evaluation group
3. Establish a Guideline Appraisal Process
4. Search and retrieve guidelines
5. Guidelines Assessment
6. Adaptation of guidelines for local use
7. External Review – Practitioner and policy maker feedback; expert peer review
8. Finalize local guideline
9. Official endorsement and adoption of local guideline
10. Scheduled review and revision of local guideline

(Graham et al, JOGNN, 2002)
2. Establish an interdisciplinary guideline evaluation group

- SCORE Consensus Panels
- 3 groups of experts (PT, OT, SLP, MD (physiatry, psychiatry, neurology), Psych., Epid., Motor Control, KT) in stroke rehabilitation brought together in January of 2004 and March of 2004 to develop the EBRs
- EBRSR used to identify latest evidence on each topic
- Expert Panels review recommendations – select and update
3. Establish a guideline appraisal process

- Establish inclusion criteria for Clinical Practice Guidelines (CPGs)
  - 1997-2003, English or French, evidenced based, developed by > 1 author, contain specific recommendations

- Chose AGREE (Appraisal of Guidelines REsearch and Evaluation) appraisal instrument
  - Consists of 23 likert scale items organized in 6 domains:
    1. Scope and Purpose
    2. Stakeholder Involvement
    3. Rigour of Development
    4. Clarity of Presentation
    5. Applicability
    6. Editorial Independence
## 4. Search and Retrieve guidelines

<table>
<thead>
<tr>
<th>Name of Guideline</th>
<th>Group</th>
<th>Year</th>
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<tbody>
<tr>
<td>1 Recommendations for Stroke management</td>
<td>European Stroke Initiative (ESI)</td>
<td>Updated 2003</td>
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<tr>
<td>2 VA/DoD CPG for the management of stroke rehabilitation in the primary care setting</td>
<td>Department of Veterans Affairs/Department of Defense U.S. Army (United States) (VaDoD)</td>
<td>February 2003</td>
</tr>
<tr>
<td>3 National Clinical Guidelines for Stroke</td>
<td>Royal College of Physicians, London UK (RCP)</td>
<td>Updated 2002; Scheduled review 2004</td>
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<tr>
<td>4 Management of Patients with Stroke 64: Rehabilitation, Prevention and Management of Complication and discharge planning</td>
<td>Scottish Intercollegiate Guidelines Network (SIGN 64)</td>
<td>Updated November 2002</td>
</tr>
<tr>
<td>5 Best Practice guidelines for stroke care</td>
<td>Heart and Stroke Foundation of Ontario (HSF)</td>
<td>2002</td>
</tr>
<tr>
<td>6 Management of the Post Stroke Arm and Hand</td>
<td>Heart and Stroke Foundation of Ontario (HSF A&amp;H)</td>
<td>2001</td>
</tr>
<tr>
<td>7 The Italian Guidelines for Stroke prevention</td>
<td>The Stroke Prevention and Educational Awareness Diffusion (SPREAD) Collaboration (Italy)</td>
<td>2000</td>
</tr>
<tr>
<td>8 Management of Patients with stroke 13: Assessment, Investigation, immediate management and secondary prevention</td>
<td>Scottish Intercollegiate Guidelines Network (SIGN 13)</td>
<td>1997 (Scheduled to be updated 2004)</td>
</tr>
<tr>
<td>9 Post-stroke Rehabilitation CPG #16</td>
<td>Agency for Health Care Policy and Research (AHCPR) (United States)</td>
<td>1995 – Disclaimer not to be used for clinical practice at this time.</td>
</tr>
<tr>
<td>10 The Ottawa Panel Evidence Based Clinical Practice Guidelines on post stroke physical rehabilitation interventions</td>
<td>Ottawa Methods Group</td>
<td>2003 – still in progress</td>
</tr>
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</table>
5. Guidelines Assessment (Quality and Content)

RESULTS: Domain 1 Scope and Purpose

1. The overall objective(s) of the guideline is (are) specifically described.
2. The clinical question(s) covered by the guideline is (are) specifically described.
3. The patients to whom the guideline is meant to apply are specifically described.
Practice Guidelines Evaluation and Adaptation Cycle

1. Identify a Clinical Area to promote Best Practice
2. Establish an interdisciplinary guideline evaluation group
3. Establish a Guideline Appraisal Process
4. Search and retrieve guidelines
5. Guidelines Assessment
6. Adaptation of guidelines for local use
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(Graham et al, JOGNN, 2002)
Recommendations and Protocols for Rehabilitation of the Arm, the Leg, and Walking
The Canadian Stroke Strategy

- Initiated under the leadership of the Canadian Stroke Network and the Heart and Stroke Foundation of Canada.
- Brings together a multitude of stakeholders and partners to work toward developing and implementing a coordinated and integrated approach to stroke prevention, treatment, rehabilitation and community reintegration in every province and territory in Canada.

- It provides a framework to facilitate the widespread adoption of evidence-based best practices across the continuum of stroke care, focusing at 2 levels:
  - National level: creation of working groups to address priority initiatives supports provincial and territorial work
  - Provincial / territorial level where implementation of best practices in stroke prevention, treatment, rehabilitation and community reintegration occurs at the front lines of health care.
National Platforms to Support Provincial/Territorial/Regional Strategies

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<td>Public Awareness</td>
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<td>Best Practice Guidelines and Standards of Care</td>
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<td>Professional Development</td>
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<td>Information/Evaluation</td>
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<td>Coordinated Research</td>
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The Canadian Stroke Strategy

Finding answers. For life.  
À la conquête de solutions.
Implementation of SCORE EBRs

- **SCORE Pilot Project:**
  - 5 sites beginning in 2005:
    - Halifax, Charlottetown, Quebec City, Montreal, Vancouver

- **SCORE-IT RCT Implementation Project:**
  - 20 sites across Canada
  - Started 2007-2010 (in data analysis phase)
Best Practices for Stroke Rehabilitation

- Canadian Best Practice Recommendations for Stroke Care: (Lindsay et al. *CMAJ* 2008;178:1418-25)

- CSN: Stroke Canada Optimization of Rehabilitation by Evidence (SCORE) Project: Evidence Based Recommendations
  

- Evidence Based Review of Stroke Rehabilitation (EBRSR)
  

- StrokEngine (Korner-Bitensky and SCORE team)
  
  [http://www.strokengine.ca/](http://www.strokengine.ca/)
Stroke Canada Optimization of Rehabilitation through Evidence (SCORE) Levels of Evidence

- **A**  At least one randomized controlled trial, meta-analysis, or systematic review.

- **B**  At least one cohort comparison, case studies or other type of experimental study.

- **C**  Expert opinion, experience of a consensus panel

- **NE**  No evidence provided.
Acronyms of clinical practice guidelines used in SCORE recommendations

AHCP | Agency for Health Care and Policy Research (USA)
HSF | Heart and Stroke Foundation
OPEBCPG | Ottawa Panel Evidence-Based Clinical Practice Guidelines
RCP | Royal College of Physicians
SIGN | Scottish Intercollegiate Guidelines Network
SPREAD | Stroke Prevention and Educational Awareness Diffusion
VADoD | Veterans Affairs and Department of Defence
SCORE | Stroke Canada Optimization of Rehabilitation through Evidence
General Recommendations for Stroke Rehabilitation

- Patients admitted to hospital for an acute stroke should be treated in a stroke unit by an interdisciplinary team (adapted from SIGN 64 2.1 Level A)

- A full interdisciplinary assessment should be undertaken for each patient to define: nature of event, need for investigation, management, need for rehabilitation (Adapted from SIGN 13 3.2.2 Level C) and plan for discharge (SCORE Level C)

- The rehabilitation program should be guided by specific and realistic goals developed by rehab, team with the patient and family (Adapted from VaDoD R-2 Level C)
General Recommendations for Stroke Rehabilitation

- Formal **interdisciplinary meetings** should be conducted regularly to review the situation **(Adapted from SIGN 64 3.1.2 Level A)**
- **Patients and caregivers** should have an early active **involvement** in rehabilitation process **(SIGN 64 3.1.1 Level B)**;
- Comprehensive **caregiver training and education** is recommended **(Adapted from SPREAD R9.11b Level C)**
Recommendations for the Rehabilitation of both the Upper and Lower Extremities

- Restorative therapy
  - ? **When** should it start (early / later)
  - ? Ideal **intensity** per day? per week
  - ? **Type** of therapeutic approach
  - ? **Modalities** that favour recovery
  - ? Protocols

- Taking into consideration the patient’s status
Timing of Therapy

- **Restorative therapy post stroke should start as early as tolerated and increase gradually as the medical condition permits.** (SCORE Level C, Ottawa Panel 1.57 Level A)
Persons with a stroke (n=435) admitted for rehabilitation \(\leq 30 \text{ days}\) post-stroke (first) have a better functional recovery (regardless of the initial deficit) and a shorter length of stay than those admitted 31-150 days post-stroke (Salter et al, 2006).

Richards et al, 2009
Intensity of Therapy

- The patient should receive as much therapy as can be provided and find tolerable. (Adapted from RCP 4.5b Level A)

- While the evidence suggests that more therapy is better (Ottawa Panel 1.17/1.30 Level A), the optimal amount of therapy is not known.

- SCORE Panel recommends at least 2 hours (SCORE Level C) of individualized direct therapy with a PT, OT or delegate for the arm and leg per day (Level B) during the sub-acute phase (SCORE Level B).
INTENSITY OF LEG AND ARM TRAINING AFTER PRIMARY MIDDLE-CEREBRAL ARTERY STROKE: A RANDOMISED TRIAL

101 Pts acute stroke: 3 groups (30 min /day + 1.5 h / wk ADL)
1. Additional 30 min 5 days/wk for UE for 20 wks (task-oriented)
2. Additional 30 min 5 days/wk for LE for 20 wks (task-oriented)
3. Contrained in pneumatic splints for 30 min 5 days/ wk for 20 wks

- ADL abilities (Barthel Index) are greater in the 2 groups receiving 50 hours of additional therapy.
- The effects are greater before 12 weeks …supporting a therapeutic approach that is early and intense.

(Kwakkel et al, The Lancet, 1999)
SCORE Recommendations: Type of Therapy

- Exercise and functional training should be directed to enhance motor control for **restoring functional abilities** *(Adapted from SPREAD R9.13 Level A, Ottawa Panel 3.8 Level A)*

- Engage in **repetitive and intense use of novel tasks** that challenge the patient to acquire necessary motor skills to use the involved limb during **functional tasks and activities** *(Adapted from HSF-AH 6.1 Level A)*
SCORE Recommendations: Type of Therapy

- **Task-specific training** is recommended to improve performance of selected tasks of the lower extremity. *(Adapted from SIGN 64 4.2.1-Level B; Ottawa Panel 3.1 Level A)*

- Therapy directed at **postural control** should be included in the therapy program *(SCORE Level C)*;

- **An extra 11-13 reps/day of sit to stand** should be included in the therapy program *(SCORE Level A)*
Support for Task-Oriented Training

- Practice that changes the brain:
- To learn a new task need:
  - complexity
  - ++ repetitions
  - attention

Changes in cortical mapping subsequent to training (Nudo et al, 1997)
Practice and Brain Plasticity

Evidence of enlargement of the cortical areas of the finger flexors and extensors after intense practice in young healthy adults (Pascual-Leone et al., 1995)
Promoting cerebral reorganization with training after stroke

10 principles of experience-dependent neural plasticity

1. Use it or lose it
2. Use it and Improve it
3. Specificity
4. Repetition Matters
5. Intensity Matters
6. Time Matters
7. Salience Matters
8. Age matters
9. Transference
10. Interference

- Recovery promoted by repetitive practice of functionally relevant tasks with appropriate feedback at the right time...
- Need to strengthen key muscles and movement patterns in task-relevant patterns
SCORE Recommendations for Lower Extremity Rehabilitation

- Body weight support treadmill training may be used in selected clients. The literature is inconclusive as yet (SCORE Level C)

- Gait re-education with or without treadmill walking should be offered to improve walking ability (Adapted from RCP 9.6.1b, Level B; Ottawa Panel Level B or A)

- Use of appropriate Assistive Technology
Treadmills are not essential to offer optimal task-oriented training (Richards et al, 2004; Nielson et al, 2001).

Why not consider the use of a treadmill with or without BWS as a means of increasing task-specific practice in combination with varied overground walking practice.

Walking on a treadmill has advantages and disadvantages when compared to overground walking.

BWSTT may enable lower-functioning individuals or those with marked spasticity to undertake earlier walking practice (Hesse et al, 1995; 1999; Barbeau & Visintin, 2003; Dean et al, 2010).
Task-Oriented Therapy for the Upper Extremity

- A variety of task-specific exercises can be organized to respond to the patient`s needs, interest and ability
- The tasks can be organized in a circuit with 5 min dedicated to each task (Blennerhassett & Dite, 2004)
- The practice of bilateral movements can be done with specialized equipment or with the hands joined (Mudie MH & Matyas TA, 1996)
Perturbations induites par le mouvement au cours d’un entraînement orienté vers la tâche (ajustements posturaux anticipatoires: APA)

Activités orientées vers un but à l’aide d’objets ou de cibles dans un environnement varié pour promouvoir les APA

Adapté de Carr & Shepherd
Increase practice time with circuit training

1. Reaching for objects beyond arm’s length in different directions in sitting
2. Sit-to-stand from various chair heights
3. Stepping forwards, backwards, and sideways onto blocks of various heights
4. Heel lifts in standing
5. Reaching for objects in standing including down to the floor with the base of support constrained and with feet parallel and in tandem conditions
6. Reciprocal leg flexion and extension using the Kinetron in standing
7. Walking on a treadmill
8. Standing up from a chair, walking a short distance and returning to the chair
9. Walking over various surfaces and obstacles
10. Walking over slopes and stairs
## Appendix — Components of the mobility intervention

<table>
<thead>
<tr>
<th>Task</th>
<th>Target</th>
<th>Description and progression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warm-up</td>
<td>ROM and flexibility</td>
<td>Marching on the spot, arm lifts, ankle circles, stretching of the trunk, thigh, and calf muscles.</td>
</tr>
<tr>
<td>Step-ups</td>
<td>Balance</td>
<td>Five minutes of placing each foot alternately on a step, progressing to stepping onto a step (step-ups), to a higher step, and to decreasing UE support; time divided evenly between leading with right versus left foot.</td>
</tr>
<tr>
<td>Balance beam</td>
<td>Balance</td>
<td>Five minutes of walking forwards, sideways, and backwards between two parallel lines, 20 cm apart, progressing to using one line, to using a balance beam, and finally to lateral stepping on the floor, feet crossing over in front or in back, and then alternating.</td>
</tr>
<tr>
<td>Kicking ball</td>
<td>Balance</td>
<td>Five minutes of kicking a ball against a wall, progressing to decreasing UE support, to increasing the distance from the wall, to kicking to a target, and to dribbling the ball around pilons; time divided evenly between kicking with right versus left foot.</td>
</tr>
<tr>
<td>Stand up and walk</td>
<td>Balance, LE strength, walking</td>
<td>With four standard armchairs placed at four corners of a square, 5 min of repeatedly standing up and walking to the chair directly in front, sitting, then standing up and walking to the chair on the left, etc., progressing from using arms to not using arms, and to decreasing the seat height.</td>
</tr>
</tbody>
</table>
Cont’d: Protocol recommended by SCORE (Salbach N. et al, 2004)

<table>
<thead>
<tr>
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<th>Description and progression</th>
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</thead>
<tbody>
<tr>
<td>Obstacle course</td>
<td>Walking balance</td>
<td>Five minutes of stepping over an obstacle, stepping onto, along, and down from an aerobics step, walking over a mat, up a ramp, and returning, progressing by increasing the height and number of obstacles, and from completing the course walking forwards to walking backwards.</td>
</tr>
<tr>
<td>Treadmill</td>
<td>Walking endurance</td>
<td>Ten minutes of walking at a comfortable pace, progressing from using arms to not using arms, by increasing treadmill speed, and by adding an inclination.</td>
</tr>
<tr>
<td>Walk and carry</td>
<td>Walking balance</td>
<td>Five minutes of continuous walking carrying a grocery bag, progressing to carrying a bag in each hand, to increasing the weight of the bag, to carrying a laundry basket, and to stopping on command.</td>
</tr>
<tr>
<td>Speed walk</td>
<td>Walking endurance</td>
<td>Five minutes of continuous walking at maximum speed, progressing to running.</td>
</tr>
<tr>
<td>Walk backwards</td>
<td>Walking</td>
<td>Five minutes of continuously walking backwards, progressing from receiving physical assistance to receiving no assistance.</td>
</tr>
<tr>
<td>Stairs</td>
<td>LE strength</td>
<td>Five minutes of going up and down a flight of stairs, progressing from taking one step at a time to taking alternating steps, from using to not using the handrail, and to achieving a greater number of flights.</td>
</tr>
</tbody>
</table>

ROM, range of motion; UE, upper extremity; LE, lower extremity.
Consider the use of constraint-induced therapy for a select group of patients – that is patients with 20 degrees of wrist extension and 10 degrees of finger extension, who have minimal sensory or cognitive deficits.

To date, the only demonstrated benefit occurs in patients who received 6 to 8 hours of daily training for at least 2 weeks. (Score Level A) Adapted from VaDoD S-61)
StrokEngine:
Constraint-Induced Therapy (CIT)

- Analysis of 10 RCTs; 7 of good quality that evaluated the efficacy of CIT (the less affected UE is restrained 90% of the time awake; therapy 6 hrs / day for the more affected UE, for 2 weeks) or modified CIT (restriction 6 hrs / day and 30 min of therapy / day for 2 weeks) compared to other therapies at different phases of rehabilitation .

- The results support the efficacy of CIT or the modified version as a therapeutic approach to the UE post-stroke.

- The functional benefits appear to be confined to patients having voluntary movements of the wrist and arm.
There is insufficient evidence to recommend for or against NDT in comparison to other treatment approaches for motor retraining following an acute stroke. (VaDoD S-8)
Endurance Training

- Following appropriate **medical evaluation**: patients in the post-acute phase should participate regularly in an **aerobic exercise program** that is designed with consideration of the patient’s co-morbidities and functional limitations. *(Adapted from VaDoD N-1 Level B; Ottawa panel 2.1, Level A)*

- Regular PT and OT treatments 2-14 weeks post-stroke do not sufficiently stress the cardiovascular system to induce a training effect. *(MacKay-Lyons MJ & Makrides L. Arch Phys Med Rehabil 2002;83:1378-83)*
Decreased functional endurance as measured by the 6MinWT in persons with chronic stroke

- Comparison of persons with chronic stroke and age-matched healthy persons
- Note the shorter distance walked even in the persons post-stroke who walked fast

Dean, Richards & Malouin, 2001
Endurance training

- There is strong evidence that cardiovascular training post stroke improves the level of physical fitness and gait performance (EBRSR)
- Emerging evidence that endurance-type training can enhance recovery of function and improve cognition
- Precautions to be taken
**SCORE recommendations regarding spasticity**

- **Spasticity** in the arm or leg should not limit the use of strength training (Adapted from RCP 9.3.4b Level C)
  - Strength training (isokinetic, treadmill, weights) does not lead to increased spasticity (Sharpe & Brouwer, 1999; Enghardt et al, 1995; Teixeira-Salmela et al, 2001; Smith et al, 1999)

- Need for task-specific strengthening
  - Muscle strengthening can improve the ability to generate force; BUT improvement in strength does not necessarily transfer to improved walking ability...ie not task-specific (Eng & Tang, 2007)
SCORE recommendations regarding spasticity

- Spasticity and contractures should be treated/prevented by antispastic pattern positioning, range-of-motion exercises, stretching and/or splinting. (AHCPR p.73 Level C)

- In patients with disabling or symptomatically distressing spasticity (RCP 9.3.4b) consider use of tizanidine and/or oral baclofen for spasticity resulting in pain, poor skin hygiene or decreased function. Tizanidine should be used specifically for chronic stroke patients. (Adapted from VaDoD S-9.2 Level B)
SCORE recommendations regarding spasticity

- For post-acute stroke patients with focal and symptomatically distressing spasticity consider use of Botox injection to increase ROM and decrease pain (Adapted from RCP 9.3.5a Level A).

- Recommend against diazepam or other benzodiazepines during stroke recovery period due to possible deleterious effects on recovery, in addition to deleterious sedation side effects. (VaDoD S-9.3 Level B)
Lower Extremity: Assistive Technology

- Recommend that wheelchair prescriptions be based on careful assessment of the patient and the environment in which the wheelchair will be used. (VaDoD N-2.4 Level C)

- Assess the need for special equipment on an individual basis; once provided, equipment should be evaluated on a regular basis. (RCP 9.6.3a Level B)

- Although ankle foot orthosis may help some patients with foot drop, they should not be used routinely without proper assessment prior to prescription and follow-up to establish their effectiveness in the individual. (SIGN 4.2.5 Level A)
Lower Extremity: Assistive Technology

- Lower extremity orthotic devices should be considered if ankle or knee stabilization is needed to help the patient walk. Prefabricated bracing can be used initially, and more expensive customized bracing reserved for patients who demonstrate a long-term need. (AHCPR p.72 Level C)

- Use adaptive devices for safety and function if other methods of performing the task are not available or cannot be learned. (Adapted from VaDoD N-2.1 Level C)

- Walking assistive devices may be used to help with mobility, efficiency and safety, when needed. (Adapted from VaDoD N-2.5 Level C)
Management of the Shoulder

- Close collaboration with the nursing personnel
- Importance of teaching proper positioning in the bed, sitting and wheelchair to patient and family
- Teach that concept of «no pain no gain» is false
Prevention of Shoulder Pain

- The presence of pain in stroke patients should be identified early and treated appropriately. (SIGN 64 4.9 NE)

- Identify factors that cause or exacerbate shoulder pain. (HSF-AH 2.1 Level C)
The following interventions to prevent shoulder pain should be considered:

- i) use of foam supports (RCP 9.4.2aii Level A, Ottawa Panel 9.15 Level A)
- ii) passive assisted movement within the pain-free range (SCORE Level C)
- iii) position and support the limb to minimize pain (SCORE Level C, Ottawa Panel 9.14 Level A)
- iv) protect the limb during functional mobility tasks (Adapted from HSF AH 2.3b Level C)
- v) teach patient to respect the pain. (HSF-AH 2.3c Level C)
- vi) facilitate active movement of the upper limb and trunk (HSF-AH 2.3d Level C)
- vii) use some means of external support to protect the upper limb during wheelchair use (e.g. hemi tray, arm trough) (HSF-AH 5.1g Level C)
- viii) with analgesics (SCORE Level C)
Encourage joint protection and minimize joint trauma:

- a. careful handling of the upper limb during functional activities. *(Level B)*

- b. shoulder should not be passively moved beyond 90 degrees of flexion and abduction unless the scapula is upwardly rotated and the humerus is laterally rotated. *(Level A)*

- c. **inappropriate to use overhead pulleys** because they appear to contribute to shoulder tissue injury. *(Level A, Ottawa Panel 2.38 Level A)*

- d. use of some means of external support to protect the upper limb (e.g. sling, pocket, by therapist) in Chedoke Stage 1 or 2 only during transfers and mobility. *(Level C, Ottawa Panel 9.14 Level A) (Adapted from HSF-AH 1.1)*
Prevention of Shoulder Pain

- Maintain a comfortable, pain-free mobile arm and hand by instructions to the individuals or groups overseen by professional rehabilitation clinicians in an institutional or community setting that **teach the patient and caregiver to perform self-range of motion exercises.** (Adapted from HSF-AH 5.1b Level C)

- To prevent shoulder pain **educate staff and carers** about correct handling of the hemiplegic arm. (Adapted from RCP 9.4.2iv Level B)

- Instruct on **proper positioning** to reduce pain while sleeping. (Adapted from HSF-AH 3.3e Level C)
Consider the following interventions to treat shoulder pain:

i) Improve ROM through gentle stretching and mobilization techniques focusing especially on external rotation and abduction, as a means of preventing frozen shoulder and shoulder-hand-pain syndrome. (Level B)

ii) Modalities: Ice, heat and soft tissue massage (Level C)

iii) Strengthening (Level C) (Adapted from VaDoD S-11.3, C,D,F)
ROM and Modalities

- Maintain a comfortable, pain-free, mobile arm and hand: encourage caregiver supervised self-range of motion exercises in the home. Continue to identify task or movement characteristics that increase shoulder pain. (Adapted from HSF-AH 5.1c Level C)

- Reduction of hand oedema by:
  - i) active self-range of motion exercises in conjunction with elevation (HSF-AH 8.2d Level C) to gain full range of movement of the fingers, thumb and wrist.
  - ii) retrograde massage. (HSF-AH 1.3b Level C)
  - iii) gentle grade 1-2 mobilizations for accessory movements of the hand and fingers. (HSF-AH 8.2b Level C)
  - iv) cold water immersion (B) or contrast baths (C). (HSF-AH 8.2e Level B/C)
Recommendations for Upper and Lower Extremity Rehabilitation

- Functional electrical stimulation (FES) should be considered for use in improving muscle force, strength and function (gait) in selected patients. FES must not be assumed to have sustained effects (Adapted from SIGN 4.2.6 Level A)

- FES may reduce shoulder subluxation in the short term (i.e. mean 5 weeks) but not in the long-term in patients with Chedoke stages 1 and 2 recovery of upper extremity. (Adapted from HSF AH7.3 Level A)
Recommendations for Upper and Lower Extremity Rehabilitation

- Functional Electrical Stimulation (FES) used alone for the wrist and forearm can reduce motor impairment and improve functional motor recovery. (SCORE Level A, Ottawa Panel 10.3 Level A)

- FES may increase pain free ROM of lateral rotation of the shoulder. (SCORE Level A)
Recommendations for Rehabilitation (Mental Practice)

- Enhance sensory-motor recovery in the upper limb by using **visual imagery**. (HSF-AH 1.2c Level C)

- There is strong evidence that **mental practice** can improve motor and ADL performance following stroke. (EBRSR)

- Evidence to support **mental practice** for re-learning ADL and functional abilities (Level 2a) and lower extremity function (Level 3) StrokEngine

  - Studies in 2008 and later not included
Mental Practice as an Adjunct to Physical Practice

Pascual-Leone et al, 1995

Physical practice

Control

Practice 2 hrs/ day

Mental Practice

Control

Priming
Added value of combining mental practice (MP) with a small amount of physical practice (PP): A pilot study
(Malouin et al, JNPT 2009, 33: 195-202)

- **MP group** that had a mean of 119 physical repetitions + 157.6 min of mental rehearsals for a total of 1100 mental repetitions of R-S: had **significant improvement in loading of paretic leg**
- **Cog group** that had a mean of 124 physical repetitions and 160.3 min of cognitive tasks (e.g. Mental arithmetic): had **no improvement**
- **NOT group** that did not train: **no improvement**

- Persons post-stroke (n=12) were randomized into 3 groups; 2 groups practiced the task of rising from a chair and sitting down (R-S) during 12 sessions over 4 weeks
- **Group MP**: practiced series of combined PP & MP : 1PP & 10 MP (R-S) x 10
- **Group Cog**: practiced series of combined 1PP & Cog tasks x 10
- **Group Not**: no practice (control)

**Eval.**: pre- and post- training and at F-up 3 weeks later
Main outcome measure: net vertical force; % limb-loading
Mental Practice for UE training (RCT, n=32)

- MP group (30 min) + PP (30 min) 2 x wk x 6 wks: subjects state that they have increased use of affected UE in ADLs
- Relax. Group (30 min) + PP (30 min) 2 x wk x 6 wks: subjects do not report more spontaneous use of UE in ADLs

Mecanisms?
- MP promotes increased use of UE?
- Cortical reorganization?

Page et al., 2007
Recommendations for Rehabilitation

- There is moderate evidence that virtual reality treatment improves locomotor function in the chronic stages of stroke. (EBRSR)

- Evidence for use of VR for gait rehabilitation: acquisition of community ambulation and living skills. (StrokEngine Level 1b)
Cognition and Walking Competency

- Even though up to 65% of stroke survivors have new onset or worsening of cognitive deficits after stroke that interfere with functional recovery.
- The impact of cognitive deficits on walking competency, have been largely ignored.
  - Functional cognition defined: “as the ability to accomplish everyday activities that rely heavily on cognitive abilities.” Donavan et al, 2008
- Impairments in memory may impede the relearning of motor skills.
Example of a collision in *Park Stroll*
VR Training in *Train Station*
Three myths

1) Strength training increases spasticity
2) Endurance training should be avoided
3) The NDT (« Bobath ») approach is the therapy of choice
4) No pain no gain in shoulder range of movement and function
Other Recommendations in the Canadian Stroke Strategy

- Outpatient rehabilitation and follow-up of persons with stroke living in the community
- Evaluation of dysphagia
- Screening for depression
- Cognitive evaluation
Welcome to StrokEngine. This site focuses on Physical and Occupational Therapy interventions for stroke. Information is derived from quality articles, websites and systematic reviews. All have been reviewed using a systematic process.

Instructions for searching... Click on any topic below. You will see three buttons. Click on the one that best suits your needs: Quick Review, In Depth Review or Family/Patient Info.

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Bienvenue sur Info AVC. Ce site présente les interventions de physiothérapie et d’ergothérapie pour les personnes ayant subit un AVC. L’information est synthétisée à partir d’études de haute qualité, de consensus et de revues systématiques. L’inventaire des écrits a été effectuée de façon systématique.

**Instruction pour faire la recherche...**


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“Click”
Welcome to StrokEngine-Assessments. This site focuses on Physical and Occupational Therapy assessments for stroke. Information is derived from quality articles, websites and systematic reviews.

Click here for StrokEngine

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Thank You / Merci