

B. The Principles of Stroke Rehabilitation

Robert Teasell MD FRCPC, Andrew McClure

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B1. Stroke Recovery

B1.1 Defining Recovery and Time Course Post-Stroke

B1.1.1 Defining Different Types of Recovery

Q1. What is the difference between neurological recovery and functional recovery?

B1.1.2 Mechanisms of Neurological Recovery

Neurological recovery is defined as recovery of neurological impairments and is often the result of brain recovery/reorganization.

Q2. Describe some the mechanisms which account for neurological recovery after a stroke.

B1.2 Time Course of Recovery

Q1. Describe the time course of stroke recovery.

Q2. Which factor has the greatest influence the time course of recovery post stroke?

B1.3 Mechanism of Reorganization Post Stroke

Case Study

A 62 year old male developed a MCA infarct which has primarily affected the motor cortex, resulting in hemiplegia. At the time of admission to stroke rehabilitation he had some distal movements of his affected leg and no movements of his affected arm.

Q1. Describe reorganization of the affected hemisphere post-stroke in association with motor recovery.

B2. Stroke Rehabilitation Triage

B2.1 Stroke Severity

Q1. Describe the three bands of stroke severity?

Q2. Which of the three bands does not usually require in-patient rehabilitation?

Q3. Which of the three bands is most likely to benefit from and be admitted to stroke rehabilitation?

Ontario Stroke Rehabilitation Consensus Panel Standard 7

Standard #7 of the Ontario Stroke Rehabilitation Consensus Panel has noted, “Stroke survivors will receive the appropriate intensity and duration of clinically relevant therapies across that care continuum based on individual need and tolerance. (Evidence Level 1); (adapted from HSFO BPG 13 and CSS BPR 5.3).

Mild Stroke: Stroke survivors discharged to the community will be provided with ambulatory services for one hour of each appropriate therapy, two to five times per week, as tolerated by the patient and as indicated by patient need. If only one discipline is required (e.g., speech-language pathology), then the stroke survivor will be provide with that one service. (Evidence Level 3)

Moderate Stroke: Survivors of a moderate stroke will receive a minimum of one hour of direct therapy time for each relevant core therapy, with an individualized treatment plan, for a minimum of five days a week, by the interprofessional stroke team based on individual need and tolerance. (Evidence Level 3)

Severe Stroke: Survivors of a severe stroke who are Rehab Ready will receive the frequency and duration of therapy that can be tolerated; the interprofessional team will increase the frequency and duration as tolerance improves to a minimum target of one hour of direct therapy time for each relevant core therapy, with an individualized treatment plan, for a minimum of five days per week, by the interprofessional stroke team based on individual need and tolerance. (Evidence Level 1)”

B3. Admission to Stroke Rehabilitation

Canadian Stroke Strategy Standards: Recommendation 5.1 Initial Stroke Rehabilitation Assessment (Lindsay et al. 2008)

All persons with stroke should be assessed for their rehabilitation needs.

- i. All people admitted to hospital with acute stroke should have an initial assessment by rehabilitation professionals as soon as possible after admission [Evidence Level A] (RCP), preferably within the first 24 to 48 hours [Evidence Level C] (NZ).
- ii. All people with acute stroke with any residual stroke-related impairments who are not admitted to hospital should undergo a comprehensive outpatient assessment(s) for functional impairment, which includes a cognitive evaluation, screening for depression, screening of fitness to drive, as well as functional assessments for potential rehabilitation treatment [Evidence Level A] (RCP), preferably within 2 weeks [Evidence Level C].
- iii. Clinicians should use standardized, valid assessment tools to evaluate the patient's stroke-related impairments and functional status [Evidence Level C] (ASA, RCP-P). See complete guideline for a table of recommended tools.
- iv. Survivors of a severe or moderate stroke should be reassessed at regular intervals for their rehabilitation needs [Evidence Level C] (HSFO).

Note: Outpatient rehabilitation includes day hospital, outpatient ambulatory care and home-based rehabilitation.

Case Study

A 52 year old male is referred to rehabilitation after being admitted to an acute neurological service with a diagnosis of stroke. This gentleman had atrial fibrillation and had suffered a moderate sized infarct involving the left hemisphere 5 days previously. He was left with a right hemiplegia, with only some proximal motor recovery in the lower extremity and no motor recovery of the upper extremity. He also presented with a significant expressive or Broca's aphasia.



Q1. How would you assess this gentleman for admission to a stroke rehabilitation unit?

Q2. What would be your criteria for admission to a stroke rehabilitation unit?

Case Study (continued)

This man has a supportive family (wife is working, 2 grown daughters) and lives in a large town about 50 miles or 80 kilometers away with a community hospital and an 8 bed general rehabilitation unit.

Q3. What are the pros and cons of being rehabilitated close to home?

Q4. Describe those elements of a stroke rehabilitation unit necessary for its success.

Case Study (continued)

The patient is eager to begin rehabilitation but anticoagulation has just been initiated and the nurse manager expresses concerns about the "heaviness" (requiring a lot of nursing care) of the patient.

Q5. What would be your advice regarding admitting the patient to rehabilitation as soon as possible?

Case Study (continued)

The patient's wife approaches you, concerned about her husband entering into a rigorous exercise program so soon after his stroke.

Q6. What would you advise entering into a rigorous exercise program soon after his stroke?

Reference

Lindsay P, Bayley M, Hellings C, Hill M, Woodbury E, Phillips S. Canadian best practice recommendations for stroke care (updated 2008). CMAJ 2008; 179 (12): S1.

B4. The Efficacy of Stroke Rehabilitation

B4.1 Stroke Rehabilitation Units

Canadian Stroke Strategy Recommendation 5.2: Provision of Inpatient Stroke Rehabilitation (Lindsay et al. 2008)

All patients with stroke who are admitted to hospital and who require rehabilitation should be treated in a comprehensive or rehabilitation stroke unit by an interdisciplinary team [Evidence Level A] (AU-R).

i. Post-acute stroke care should be delivered in a setting in which rehabilitation care is formally coordinated and organized [Evidence Level A] (ASA).

ii. All patients should be referred to a specialist rehabilitation team on a geographically defined unit as soon as possible after admission [Evidence Level A] (RCP). Pediatric acute and rehabilitation stroke care should be provided on a specialized pediatric unit [Evidence Level B] (RCP-P).

iii. Post-acute stroke care should be delivered by a variety of treatment disciplines, experienced in providing post-stroke care, to ensure consistency and reduce the risk of complications [Evidence Level C] (RCP).

iv. The interdisciplinary rehabilitation team may consist of a physician, nurse, physical therapist, occupational therapist, speech-language pathologist, psychologist, recreation therapist, patient and family/caregivers [Evidence Level A] (ASA). For children, this would also include educators and child-life workers. This "core" interdisciplinary team should consist of appropriate levels of these disciplines, as identified by the Stroke Unit Trialists' Collaboration [Evidence Level B] (AHA-P, SIGN 64).

v. The interdisciplinary rehabilitation team should assess patients within 24 to 48 hours of admission and develop a comprehensive individualized rehabilitation plan which reflects the severity of the stroke and the needs and goals of the stroke patient [Evidence Level C] (HSFO, NZ).

vi. Patients with moderate or severe stroke who are rehabilitation ready and have rehabilitation goals should be given an opportunity to participate in inpatient stroke rehabilitation [Evidence Level A] (HSFO).

vii. Stroke unit teams should conduct at least one formal interdisciplinary meeting per week to discuss the progress and problems, rehabilitation goals and discharge arrangements for patients on the unit [Evidence Level B] (SIGN 64). Individualized rehabilitation plans should be regularly updated based on patient status reviews [Evidence Level C].

viii. Clinicians should use standardized, valid assessment tools to evaluate the patient's stroke-related impairments and functional status [Evidence Level B] (ASA, RCP).

ix. Where admission to a stroke rehabilitation unit is not possible, a less optimal solution is inpatient rehabilitation on a mixed rehabilitation unit (i.e., where interdisciplinary care is provided to patients disabled by a range of disorders including stroke) [Evidence Level B] (SIGN 64).

Case Study

A 75 year old gentleman suffered a large left MCA stroke and is transferred to your larger center for assessment and treatment. The neurologist asks you for a rehabilitation opinion. The patient comes from a small town about an hour away. His family resides in your center. The small town has a 10 bed general rehabilitation unit. The other option is a 20 bed stroke rehabilitation unit in your center. The patient's wife lives with him while one of the daughters lives in the city where your center is located and visits regularly.

Q1. You are asked by the neurologist and the family as to where this gentleman should go for his stroke rehabilitation. What would you recommend?

Case Studies

You are asked to do a review of a number of stroke rehabilitation units.

Case A

The manager tells you that they have a specialized stroke rehabilitation unit which consists of a team of stroke rehabilitation therapists assessing and treating stroke patients who are interspersed on the general medical unit. The team meets weekly to coordinate and manage the stroke patients.

Case B

The manager tells you that they have a specialized stroke rehabilitation unit which consists of 12 beds, placed together with a dedicated stroke rehabilitation team of nurses and therapists attached largely to that unit. The therapists tend to rotate to different services but when they spend their 3 months on the stroke rehabilitation unit they see only stroke rehabilitation patients.

Case C

The manager tells you they have a specialized stroke rehabilitation unit with geographically defined beds and dedicated stroke rehabilitation therapists. When you review their hospital data you notice they rehabilitated 15 stroke rehabilitation patients last year.

Q2. Which one of these is a stroke rehabilitation unit?

- Case A
- Case B
- Case C
- Case B and C
- None of the Above

Q3. Describe the evidence for stroke rehabilitation units.

B4.2 Combined Acute and Subacute Stroke Rehabilitation Units

Case Study

You are again asked to do a review of a stroke rehabilitation unit. In this case, the stroke rehabilitation unit has been combined with the acute stroke unit so that patients are admitted to the acute stroke unit and remain on that same unit from their initial admission to the hospital with their acute stroke to their community discharge once their stroke rehabilitation is over. As a combined acute-subacute stroke unit they have interdisciplinary and dedicated nursing and therapy staffing and have 20 dedicated beds all geographically localized together.

Q1. Describe the evidence for combined acute and subacute stroke rehabilitation units.

Reference

Lindsay P, Bayley M, Hellings C, Hill M, Woodbury E, Phillips S. Canadian best practice recommendations for stroke care (updated 2008). CMAJ 2008; 179 (12): S1.

B5. Elements of Stroke Rehabilitation Care

Recommendation 5.3 Components of Inpatient Stroke Rehabilitation (Lindsay et al. 2008)

All patients with stroke should begin rehabilitation therapy as early as possible once medical stability is reached [Evidence Level A] (ASA).

- i. Patients should receive the intensity and duration of clinically relevant therapy defined in their individualized rehabilitation plan and appropriate to their needs and tolerance levels [Evidence Level A] (HSFO, RCP).
- ii. Stroke patients should receive, through an individualized treatment plan, a minimum of 1 hour of direct therapy by the interprofessional stroke team for each relevant core therapy, for a minimum of 5 days per week based on individual need and tolerance [Evidence Level A] (EBRSR), with duration of therapy being dependent on stroke severity [Evidence Level C] (EBRSR).
- iii. The team should promote the practice of skills gained in therapy into the patient's daily routine in a consistent manner [Evidence Level A] (RCP).
- iv. Therapy should include 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 [Evidence Level A] (SCORE).
- v. Stroke unit teams should conduct at least one formal interdisciplinary meeting per week at which patient problems are identified, rehabilitation goals set, progress monitored and support after discharge planned [Evidence Level B] (SIGN 64).
- vi. The care management plan should include a predischarge needs assessment to ensure a smooth transition from rehabilitation back to the community. Elements of discharge planning should include a home visit by a health care professional, ideally before discharge, to assess home environment and suitability for safe discharge, determine equipment needs and home modifications, and begin caregiver training for how the patient will manage activities of daily living and instrumental activities of daily living in their environment [Evidence Level C].

B5.1 Impact of Care Pathways and Guidelines

Case Study

A new stroke rehabilitation program is being initiated in your center. The centerpiece of the new program will be a 15 bed stroke rehabilitation unit. The new coordinator of this

program wants you to assist with setting up an integrated care pathway, "to ensure that patients are managed according to best evidence."

Q1. Describe the evidence supporting integrated care pathways for stroke rehabilitation.

B5.2 Timing of Stroke Rehabilitation

Case Studies

Case Study A

You are asked to see a 53 year old patient in acute care who has had a moderately large Rt MCA infarct 5 days previously. He has a left hemiplegia and evidence of some left sided neglect. He is alert and the MMSE is 28/30 and his MOCA is 30/30. He has no history of previous medical problems and his acute neurological investigations are complete. You determine that he is rehabilitation ready. It is the Wednesday before a long weekend and the coordinator is reluctant to admit the Thursday or Friday before the holidays. The neurologist is keen to have the patient discharged out of his acute care unit as the demand for the acute stroke beds is high.

Case Study B

A 75 year old female is admitted with a large subcortical infarct in a left MCA territory 7 days previously. She has a right hemiplegia and a partial expressive aphasia. She is alert, responds to 2-3 step commands. She has severe dysphagia and requires an NG feeding tube. It has been determined she will require a G-J feeding tube but the radiologist is backed up and cannot insert it for a week. It is an unwritten policy on the stroke rehabilitation unit that all tests and procedures be done prior to admission to the stroke rehabilitation unit to avoid the hassle and cost (to the rehabilitation unit) of having the patient transported back to the acute care hospital for the procedure.

Q1. What should be your response?

Q2. Describe the evidence for early stroke rehabilitation.

B5.3 Intensity of Therapy

Case Studies

Case Study A.

A 65 year old female was admitted to the stroke rehabilitation unit after having a moderate sized Lt MCA infarct 9 days previously. She has been on the rehabilitation unit for 4 weeks. Her daughter has noted on several occasions that her mother is often not in therapy, that sessions are often shortened because she is transported to the therapist treatment area late, therapy sessions are often inexplicably cancelled, there is no therapy during patient "education" sessions and "team rounds" and there is no treatment on weekends or holidays. She is concerned that with discharge in another 2 weeks that her mother won't have gotten the therapy she needs and wants to know if the discharge date can be extended.

Case Study B.

A 55 year old male was admitted to the stroke rehabilitation unit after suffering a moderate subcortical infarct which caused paresis of his right arm and an expressive aphasia. His family expressed frustration that he had missed two weeks of speech therapy because the therapist was on holidays and there was no replacement. They would like his length of stay to be extended an additional two weeks to make up the difference.

Case Study C.

An 80 year old female admitted to the stroke rehabilitation unit 10 days after suffering a large Rt MCA infarct is missing half her therapy sessions because she is "tired". Her son, who is very supportive, is concerned that the therapists may be pushing her too hard.

Q1. Should you be concerned?

Q2. What evidence is there for weekend therapy?

Q3. On a rehabilitation unit, how much of a patient's time is spent in therapeutic or interactive activities?

Q4. What is the impact of allowing therapists the ability to dictate their own therapy schedules?

Q5. Describe the durability of rehabilitation gains.

Reference

Lindsay P, Bayley M, Hellings C, Hill M, Woodbury E, Phillips S. Canadian best practice recommendations for stroke care (updated 2008). CMAJ 2008; 179 (12): S1.

B6. The Importance of Task-Specific Training

Q1. *Describe the importance of task-specific training.*

B7. Outpatient Therapy

Recommendation 5.4 Outpatient and Community Based Rehabilitation (Lindsay et al. 2008)

After leaving hospital, stroke survivors must have access to specialized stroke care and rehabilitation services appropriate to their needs (acute and/or inpatient rehabilitation) [Evidence Level A] (RCP).

- i. Early supported discharge services and transition planning should be provided by a well-resourced, coordinated specialist interdisciplinary team with age-appropriate expertise. These are an acceptable alternative to extended in-hospital rehabilitation and can reduce the length of hospital stay for selected patients [Evidence Level A] (SIGN 64). Patients requiring early supported discharge services should not be referred to generic (nonspecific) community services [Evidence Level A] (RCP).
- ii. People who have difficulty in activities of daily living, including self-care, productivity and leisure, should receive occupational therapy or multidisciplinary interventions targeting activities of daily living [Evidence Level A] (AU) [Evidence Level C for pediatrics].
- iii. Multifactorial interventions provided in the community, including an individually prescribed exercise program, may be provided for people who are at risk of falling, in order to prevent or reduce the number and severity of falls [Evidence Level A] (AU).
- iv. People with difficulties in mobility should be offered an exercise program and monitored throughout the program [Evidence Level B] (MacKay-Lyons and Howlett 2005, Pang et al. 2006).
- v. Patients with aphasia should be taught supportive conversation techniques [Evidence Level A] (EBRSR).
- vi. Patients with dysphagia should be offered swallowing therapy and opportunity for reassessment as required [Evidence Level A] (Singh and Hamdy 2006).
- vii. Children affected by stroke should be offered advice on and treatment aimed at achieving play, self-care, leisure and school-related skills that are developmentally relevant and appropriate in their home, community and school environments [Evidence Level B] (Kirton et al. 2008, RCP-P).

Q1. Describe the importance of outpatient therapy.

Reference

Lindsay P, Bayley M, Hellings C, Hill M, Woodbury E, Phillips S. Canadian best practice recommendations for stroke care (updated 2008). CMAJ 2008; 179 (12): S1.

B8. Classifying Outcomes Post-Stroke

Case Study

A 58 year old married woman is admitted to a stroke rehabilitation unit with a large right hemispheric stroke. As a consequence she presents with a left hemiplegia, left neglect and a left homonymous hemianopsia. She had trouble with swallowing and was initially put on a modified diet. She was initiated into a stroke rehabilitation program and continued for 6 weeks. During this time she was unable to ambulate but eventually progressed to the point where she was able to ambulate with one person assist and a quad cane. She required some assistance with her toilet transfers and getting in and out of bed. She was completely dependent for grooming, eating and dressing but by the end of rehabilitation was able to all of the above with set up only with the exception of pulling up her pants which required assistance. She required ongoing assistance with bathing. She was initially incontinent of bladder at night but on rehabilitation became fully continent. At the time of discharge she was able to manage a regular diet. Unfortunately, because of persistent neglect and left homonymous hemianopsia she was unable to drive and was unable to return to work. There were difficulties getting about her own home because it was a split level home with 4 step access and she had trouble getting out of the house because her spouse needed to continue to work.

Q1. Describe the revised World Health Organization Classification of Functioning and Disability.

Q2. Describe the impairments or bodily dysfunctions for this case.

Q3. Describe the disabilities or activity limitations for this case.

Q4. Describe the handicaps or participation limitations for this case.

Reference

Lindsay P, Bayley M, Hellings C, Hill M, Woodbury E, Phillips S. Canadian best practice recommendations for stroke care (updated 2008). CMAJ 2008; 179 (12): S1.