C. Motor Recovery Post Stroke Educational Supplement

Robert Teasell MD FRCPC, Andrew McClure, Manuel Murie-Fernandez MD

23 pages

C1. Assessment of Motor Function Post Stroke

C1.1 Assessments of Motor Function Post Stroke

Case Study

A 65 year old male suffers a left hemispheric stroke and presents with a right hemiplegia. At the time of his admission to rehabilitation 2 weeks later he still presents with weakness on his right side, he is a two person pivot transfer with returning tone.

Q1. Name some commonly used assessments of motor function post stroke.

Answers

Some commonly used assessments of motor function post stroke include:

1. The Berg Balance Score
2. Chedoke-McMaster Stages of Motor Impairment
3. Clinical Outcomes Variable Scale (COVS)

C1.2 The Berg Balance Score

Q2. Describe the Berg Balance Score including its strengths and limitations.

Answers

1. Assessment of balance.
2. 14 items from 0-4 per item for maximum score of 56.
3. Score < 45 is at risk of falling.
4. Measure static and dynamic balance – little equipment, space or training needed.
5. Decreased sensitivity early on among severe stroke patients.

Q3. Describe the Benefits of the Berg Balance Score in Terms of Prognosis of Stroke?

Answers

1. On the positive side, not many stroke patients have received maximum scores on admission to rehabilitation.
2. Often correlates well with functional mobility gains on rehabilitation.
3. On the negative site, there is decreased sensitivity in the early stages of stroke for severely affected patients as there is only one item related to balance in the sitting position.

Case Study (continued)

The 65 year old male who suffered a left hemispheric stroke responds well to rehabilitation and after extensive rehabilitation he is up walking with a cane. His Berg Balance score is 42/56.

Q4. What are the Implications of a Berg Balance Score of 42/56 with Regard to Risk of Falling? What Level of Assistance Should He Require?

Answer

1. Berg Balance score less than 45 means the patient is at significant risk of falling.
2. He will likely only require supervision and his cane while walking or transfering.

C1.3 The Chedoke-McMaster Stages of Motor Impairment

Q5. Describe the Chedoke-McMaster Stages of Motor Impairment.

Answers

1. The Chedoke-McMaster Stroke Assessment Scale (CMSA) physical impairment has 6 dimensions: shoulder pain, postural control, arm, hand, leg and foot movements.
2. Each dimension is rated on a 7-point scale corresponding to Brunnstrom's 7 stages of motor recovery (where 1 = flaccid paralysis & 7 = normal).
3. The CMSA is primarily an assessment of mobility.
4. CMSA also has a disability inventory which consists of a gross motor index (10 items) and a walking index (5 items).
5. With the exception of the 2-minute walk test, items are scored according to the same 7 point scale as the FIM (1 = total assistance, 7 = total independence).

Q6. Describe the 7 Brunnstrom Stages of Motor Recovery.

Answer

1. Flaccid paralysis. No reflexes.
2. Some spastic tone. No voluntary movement. Synergies elicited through facilitation.
3. Spasticity is marked. Synergistic movements may be elicited voluntarily.
4. Spasticity decreases. Synergistic movements predominate.
5. Spasticity wanes. Can move out of synergies although synergies still present.

6. Coordination and movement patterns near normal. Trouble with more rapid complex movements.
7. Normal

C1.4 Clinical Outcomes Variables Scale (COVS)

Q7. Describe the COVS Assessment Tool Including Strengths and Weaknesses.

1. Designed to assess functional mobility status.
2. 13-items selected in so as to be representative of outcomes associated with a regular physiotherapy caseload within the general rehabilitation population.
3. Each item receives a score from 1-7 with a composite score of 13-91.
4. Provides detail in areas of mobility not assessed by functional assessments such as FIM.
5. Monitors motor tasks retrained by physiotherapists and includes use of assistive devices and ability to negotiate environmental barriers.
6. Overall, good reliability and user friendly.

C2. Prognosis for Motor Recovery

Q1. Describe the two most important factors which predict motor recovery and describe their role.

Answers

1. Stroke severity: The most important predictive factor which reduces the capacity for brain reorganization.
2. Age: Younger patients do better than older patients.

C3. Strength Training Post Stroke

Q1. What is the evidence that strength training improves outcomes following stroke?

Answers

1. There is mixed evidence that strength training improves outcomes post stroke. Some of the studies were positive while others were not.

C4. Balance Retraining Post Stroke

Q1. Is balance is a predictor of mobility post stroke?

Answers
1. Improvement in balance has been identified as the strongest predictor of distance walked.

Q2. What evidence is there to treat balance problems post stroke.

Answers
1. There are a number of treatments which have been shown to improve balance.
2. These therapy approaches are highly variable and include visual feedback, platform training, strength training and cycle training. All have been shown to have an impact on outcomes.

C5. The Bobath Approach / Neurodevelopmental Technique of Motor Therapy

C5.1 The Bobath Approach

Case Study

A 70 year female suffered a large hemispheric stroke with a significant hemiplegia. On admission to rehabilitation 14 days following the onset of the stroke the patient has shown some improvement, with no recovery in the upper extremity and CMS of 3 in the leg and 2 in the foot. The therapists enter you into a discussion about the use of the Bobath technique and its use in this case.

Q1. Describe the Bobath Approach/Neurodevelopmental Technique for the therapy of stroke patients.

Answers
1. Bobath Approach/Neurodevelopmental Technique (Bobath 1978)
2. The goal of NDT is to normalize tone, to inhibit primitive patterns of movement, and to facilitate automatic, voluntary reactions and subsequent normal movement patterns.

3. Based on the concept that pathologic movement patterns (limb synergies and primitive reflexes) must not be used for training because continuous use of these pathologic pathways may make it too readily available at the expense of the normal pathways.
4. The goal is to suppress abnormal muscle patterns before normal patterns are introduced
5. Mass synergies are avoided, although they may strengthen weak, unresponsive muscles, because these reinforce abnormally increased tonic reflexes, spasticity.
6. Abnormal patterns modified at proximal key points of control (e.g., shoulder and pelvic girdle).

C5.2 Neurodevelopmental Approaches to Motor Recovery Post Stroke

Q2. Describe the various Neurodevelopmental Approaches to Motor Recovery Post Stroke

Answer
1. Bobath
2. Brunnstrom's Movement Therapy
3. Proprioceptive Neuromuscular Facilitation

C5.3 The Evidence Supporting Neurodevelopmental/Bobath Thearpy

Q3. The physical and occupational therapists on the rehabilitation team have been trained in neurodevelopmental therapy (NDT), in particular the Bobath technique. What is the evidence with regard to using NDT in the treatment of the hemiparetic upper extremity following a stroke?

Answer
1. Strong evidence that NDT is not superior to other approaches.
2. Moderate evidence that Motor Relearning Program (task-specific training) results in short-term improvements in motor functioning and shorter lengths of hospital stay when compared to NDT.

C6. Task-Specific Therapy

C6.1 Task-Specific Training for Mobility

Q1. Why is Task-Specific Training for Mobility Being Increasingly Recommended?

Answers

1. Task-specific training has been shown to be associated with improved gait-specific outcomes.
2. Task-specific training has been shown to have longer-lasting cortical reorganization.

C6.2 Motor Relearning Program

Q2. Describe the Motor Relearning Program (Carr and Kenney 1992, Carr et al. 1985).

Answers
1. Based on cognitive motor relearning theory.
2. Goal is for the patient to relearn how to move functionally and how to problem solve during attempts at new tasks.
3. Instead of emphasizing repetitive performance of a specific movement for improving skill, it teaches general strategies for solving motor problems.
4. Emphasizes functional training of specific tasks, such as standing and walking, and carryover of those tasks.

C7. Treadmill Training and Partial Weight Support

C7.1 Treadmill Training

Q1. What Evidence is there for the Effectiveness of Treadmill Training in the Absence of Partial Body Weight Support?

Answer
1. The evidence does not support it as necessarily more effective than standard gait training.

C7.2 Treadmill Training and Partial Body Weight Support

Q2. What evidence is there for the effectiveness of treadmill training and partial body weight support?

Answers
1. The evidence of PBWS and treadmill training is mixed but the weight of the evidence is moving towards supporting PBWS.
2. Is supported by the general trend towards task-specific therapies.
3. Does require some equipment and can be therapist intensive.

C8. Functional Electrical Stimulation in the Lower Extremity

Q1. Describe the use of functional electrical stimulation (FES) in the lower extremity.

Answer

1. FES of the common peroneal nerve has been used to enhance ankle dorsiflexion during the swing phase of gait.
2. Although weak ankle dorsiflexion with plantarflexion hypertonicity is typically corrected by an ankle foot orthosis, FES may be a suitable alternative for highly motivated patients who are able to walk independently or with minimal assistance.
3. Although not widely used or available, there is growing evidence that FES combined with gait training improves hemiplegic gait.

C9. Rehabiliation of the Upper Extremity

C9.1 Motor Recovery in Severe Stroke

Nakayama et al. (1994) reported that of stroke patients with severe arm paresis, with little or no movement at hospital admission, 14% make a complete motor recovery while 30% make a partial recovery. The odds of recovery for this patient, with no recovery at 14 days post-stroke, are less than that reported by Nakayama.

Q1. For the severely affected hemiplegic upper extremity should the therapists continue to treat the upper extremity with a goal of maximizing recovery or palliate the upper extremity, minimizing contractures and pain?

Answers

1. Barreca et al. (2001) recommended patients with a Chedoke-MacMaster score of less than 4 have a poor prognosis – should focus on palliation with minimizing contractures and pain.

C10. Constraint-Induced Movement Therapy

Case Study

A 44-year-old man suffered a significant intracerebral hemorrhage with a right hemiplegia and right sensory loss to the point of the right arm having no sensation. He experienced a significant motor recovery in his right upper extremity including the hand but failed to use his right hand (he was right hand dominant) because of the significant and nearly complete sensory loss. Six weeks following the onset of his stroke, the uninvolved arm was subsequently restrained, initially for 4 hours in the mornings and progressing over the next week to 8-10 hours per day. Upon restraining the uninvolved arm and continuing with rehabilitation therapies he exhibited a dramatic recovery in the use of his right arm and hand. The upper extremity function test improved from 31/99 to 70/99 over 3.5 weeks. The 9-hole modified peg test improved from 210.3 seconds to 38.6 seconds over 3 weeks. Grip strength improved from 11 to 19 kg while lateral pinch strength improved from 4.0 to 6.0 kg over 2 weeks. Chedoke-McMaster Stroke Assessement Score for Motor Recovery did not improve over the course of treatment (6/7).

Q1. Describe CIMT and the criteria necessary for him to be considered for CIMT.

Answers

1. CIMT is designed to reduce functional deficits in the more affected upper extremity.
2. The key features of CIMT are restraint of the unaffected hand/arm and increased practice/use of the affected hand/arm.
3. It is designed to overcome learned non-use by promoting cortical reorganization (Taub et al. 1999).
4. CIMT works best for patients with active wrist and hand movements.

Q2. What is the evidence for CIMT post-stroke for the upper extremity?

1. Based on the results from two RCTs, there is conflicting evidence of benefit of CIMT in comparison to traditional therapies in the acute stage of stroke.
2. Based on the results from 12 RCTs, there is strong evidence of benefit of CIMT in comparison to traditional therapies in the chronic stage of stroke. Benefits appear to be confined to stroke patients with some active wrist and hand movements, particularly those with sensory loss and neglect.
3. The most compelling evidence in favour of a benefit of CIMT comes from the EXCITE trial (Wolf et al. 2006), an RCT that assigned 222 patients who were between 3 and 9 months post stroke to receive either CIMT (n=106) or usual care (no treatment, home care or outpatient programs) (n=116). The CIMT group wore a mitt on the less-affected hand while performing repetitive task practice and behavioural shaping with the hemiplegic hand. The CIMT group significantly improved on the Wolf Motor Function Test (log performance time,

functional ability 0-5 scale ($p<0.001$), the Motor Activity Log (MAL) Amount of Use ($p<0.001$) and the MAL Quality of Movement ($p<0.001$) and caregiver MAL (Wolf et al. 2006).

C11. Mental Practice

Q1. What is mental practice and what is the evidence that it is useful in post-stroke recovery?

Answers

1. Mental imagery involves rehearsing a specific task or series of tasks mentally before actually performing the task.
2. The theory is stored motor plans for executing movements can be accessed and reinforced during mental practice
3. There is strong evidence that mental practice can improve upper extremity function and ADLs following stroke.

C12. Spasticity Post Stroke

C12.1 Spasticity of the Hemiplegic/Hemiparetic Limbs Post Stroke

Q1. Describe spasticity post-stroke.

Answer

Spasticity Post-Stroke Definition:

- Usually seen days to weeks post-ischemic stroke.
- Usually follows classic upper extremity flexor and lower extremity extensor patterns during ambulation.
- Velocity-dependent resistance to passive movement of affected muscles at rest.

Q2. Describe one positive aspect of spasticity on a stroke patient.

Answer

Positive Aspect of Spasticity in Stroke:

- Allows hemiplegic patient to weight-bear on affected leg during stance phase.

Q3. Describe a number of potential treatments for spasticity in a patient with upper motor neuron syndrome.

Answers

Potential Treatments for Spasticity in UMN Disorder:

- Conservative Treatment: stretching, splints/orthotics, serial casting, electrical stimulation, local application of cold.
- Medications: benzodiazepine, baclofen, dantrolene, tizmidine.
- Injections: Bo-Tox and phenol.
- Intrathecal Baclofen.
- Surgical procedures.

C12.2 Spasticity in the Hemiplegic Lower Extremity

Case Study

A 38 year old male was admitted to hospital with a large left MCA infarct. CT scan showed a dense left MCA infarct, which was felt to be cardioembolic in etiology. 3 weeks after admission to acute care and following the onset of his stroke he was admitted to the rehabilitation unit. He required set-up assistance with his meals and tolerated a minced, honey-fluid diet. He required one person to assist him with dressing, grooming and bathing. He required in-and-out catheterizations for urinary retention. He was able to complete a 2 person pivot transfer despite problems with his dynamic balance. The patient could stand only in the parallel bars and used a manual wheelchair with a laptray for mobility. He was unable to communicate verbally but was able to gesture to make his needs known. Premorbidly he was quite active and was fully employed.

This gentleman was eventually able to ambulate independently with a cane. However, he had problems with a spastic hemiplegic gait. He tended to walk on his toes with his ankle/foot in plantar inversion which was only partially compensated for by an ankle-foot orthosis. This would make his gait more inefficient, causing him to circumduct to clear the foot and sometimes throwing him off balance.

Q4. When Should One Treat Spasticity of Hemiplegic Lower Extremity?

Answers

1. Spasticity in the hemiplegic lower extremity is generally not treated.
2. Primary treatment is for spastic equinovarus, caused by spasticity of the gastrocnemius and tibialis posterior muscles.

Q5. What treatment options are available for spasticity in the lower extremity?

Answers

1. Typical treatment options include antispastic medication, orthotic devices (splints), physical therapy, neurolysis with alcohol, phenol or botulinum toxin, as well as surgical options (Deltombe et al. 2004).

Case Study (continued)

The patient has heard about botulinum toxin as a "cure" for spasticity and wants to know if it will help with the spasticity in his lower leg.

Q6. Explain to the patient the mechanism and goals of Botulinum toxin treatment (BT) in the lower extremity.

Answers

1. Botulinum toxin works by weakening spastic muscles by blocking the neuromuscular junction.
2. Works for up to 6 months.
3. In lower extremity most treatment is focused on spastic equinovarus deformity.
4. Primary goals of treatment are improvement in gait velocity and quality, reduced pain and improved posture.

Q7. Describe the impact of botulinum toxin in the spastic lower extremity.

Answer

1. Botulinum toxin in the lower extremity has been shown to reduce spasticity but not necessarily function.

Q8. What are some of the common indications for use of botulinum toxin in the spastic lower extremity, which muscles are commonly involved and what is the functional impact of these spastic muscles?

Answers

1. Hip adductors (adductor longus/brevis/magnus) to reduce scissoring thighs and improve hygiene.
2. Flexed knee (hamstrings/gastrocnemius) to improve swing step length.
3. Extended knee (gluteus medius/quadriceps) to improve knee flexion on early swing phase.
4. Equinovarus foot (gastrocsoleus/tibialis posterior) to improve dorsiflexion and eversion.
5. Extended big toe (extensor hallucis longus) to reduce hyperextension and improve ability to wear shoes.

C12.3 Spasticity in the Hemiplegic Upper Extremity

Case Study (continued)

The patient notes that when he walks his arm goes up into forward flexed posture, with prominent spastic flexion of the elbow and wrist. He finds this posture bothersome, it gets in the way of his dressing, it makes him appear more disabled and can be bothersome by the end of the day.

Q9. Describe the benefits of botulinum toxin in improving function in the spastic upper extremity.

Answers

1. Botulinum toxin has been shown to reduce spasticity in the upper extremity.
2. However, botulinum toxin has not been shown to necessarily improve function likely because underlying weakness more than spasticity results in the limitation of function.
3. Modest improvements in the dressing, grooming and eating on the Barthel Index score have been reported following botulinum toxin injections.

Q10. What are some of the common indications for use of botulinum toxin in the spastic upper extremity, which muscles are commonly involved and what is the functional impact of these spastic muscles?

Answers

1. Adducted/internally rotated shoulder (subscapularis/pectoralis major) to improve on adduction and internally rotated shoulder tightness/contracture and pain.
2. Flexed elbow (brachioradialis/biceps/brachialis) to make ADLs and hygiene easier as well as improve cosmesis.
3. Pronated forearm (pronator quadratus/pronator teres) to improve hand orientation.
4. Flexed wrist (flexor carpi radialis/brevis/ulnaris/extrinsic finger flexors) to improve ADLs and reduce pain.
5. Clenched fist (flexor digitorum profundus/sublimis) to improve hygiene.

6. Thumb in palm deformity (adductor pollicis/flexor pollicis longus/thenar group) to improve thumb for key grasp.

Case Study (continued)

In particular, this patient notes that when he walks his arm goes up into forward flexed posture, with prominent spastic flexion of the elbow.

Q11. The patient specifically asks if botulinum toxin will improve the appearance of his spastic elbow flexion which becomes more prominent when he ambulates. Which of the muscles would you inject?

Answer

1. Botulinum toxin into the elbow flexors (brachioradialis, biceps and brachialis muscles) has been shown to reduce spasticity. It may not last and will likely not be associated with significant functional improvement although it will improve the cosmetic effect.

C13. Hemiplegic Shoulder Pain

C13.1 The Early Flaccid Upper Extremity

Case Study

A 75-year old gentleman suffers a moderately severe left middle cerebral artery territory stroke and is admitted to an acute stroke unit. As a rehabilitation clinician you are asked to assess him two days following admission. You notice that he has a flaccid left upper extremity.

Q1. You are asked to immediately provide a management plan for the upper extremity designed to protect the affected shoulder.

Answers

1. Flaccid hemiplegic arm at 2 days post stroke
2. Careful positioning of the hemiplegic shoulder toward abduction, external rotation and flexion of the shoulder.

3. Ensure the flaccid arm is continuously supported when the patient is sitting or transferring – use arm trough, lap tray or arm sling.
4. Avoid pulling on the flaccid arm during transfers.
5. Very gentle range of motion exercises with physiotherapy.

C13.2 The Later Spastic Upper Extremity

Case Study (continued)

The same patient is admitted to the rehabilitation unit within 10 days of suffering their moderate-sized left middle cerebral artery infarct. On examining his shoulder he has no motor movement involving the upper extremity apart from being able to shrug his shoulder. Passively you are able to forward flex his shoulder to 90 degrees, externally rotate it to a full 90 degrees with mild discomfort. He has reasonably good internal rotation and abduction is restricted to 100 degrees. Clinical examination of this gentleman's shoulder also reveals mild subluxation of the shoulder joint.

Three weeks later the physiotherapist comments that this gentleman is suffering from quite significant shoulder pain. You examine him and his physical examination has changed. He has made some mild motor recovery in that he now has a Chedoke McMaster Outcome Score of 3 in the arm, and 2 in the hand. His tone has increased significantly involving the upper extremity. He is now able to only obtain 70 degrees of abduction, 40 degrees of external rotation with significant pain at end range, particularly when it is held in the end range adducted position (70 degrees) and he still had reasonably good internal rotation. The patient himself does not express himself well but when you ask him if it hurts he points to his right anterior shoulder. Treatment with anti-inflammatory drugs and Tylenol #3's do not appear to be assisting him and the nurses report that pain is beginning to keep him up at night and that they find him quite restless.

Q2. What are the possible pathophysiological causes of this gentleman's pain?

Answers

1. Shoulder contracture (due to subscapularis/pectoralis hypertonicity)
2. Shoulder subluxation
3. Rotator cuff disorder
4. Fracture

Q3. Assuming he has had no pain premorbidly and little pain at time of admission, what is the most likely cause of this gentleman's pain?

Answer

1. Most likely cause is spasticity – muscle imbalance (subscapularis and pectoralis hypertonicity) – shoulder contracture.

Q4. Describe a management plan for this gentleman's pain.

Management:

- X-ray if history of fall
- Analgesics
- Support the arm
- Gentle ROM exercises
- Botulinum toxin injection if shoulder tightness and pain persists

Case Study (continued)

The therapist asks if it would be appropriate to try functional electrical stimulation.

Q5. What would you advise regarding the use of functional electrical stimulation?

Answer

At present there is conflicting evidence that FES reduces pain, improves function and reduces subluxation following stroke. One study suggested it may be harmful; other studies have shown a benefit.

Case Study (continued)

The patient tells you that the shoulder pain is increasing and the therapist has been particularly aggressive, trying to get him to stretch out his tight shoulder even though it is very painful at the time.

Q6. What would you advise with the overaggressive therapist and the progressively increasing shoulder pain?

Answer

1. The therapist needs to discontinue the aggressive therapy, particularly if painful during the process.

Q7. What is the evidence for using botulinum toxin to treat this gentleman's painful hemiplegic shoulder?

1. Based on the results of 3 studies there is conflicting evidence as to the benefit of using botulinum toxin to reduce hemiplegic shoulder pain.
2. However, options are limited and side effects minimal for use of botulinum toxin for the hemiplegic shoulder.

C14. Case Study: Post-Stroke Motor Recovery

Case Study

63 year old female was admitted with a right middle cerebral infarct, involving the frontal lobe, as a consequence of a cardiac emboli. As a consequence she is suffering from a right hemiparesis. At the time of admission to the stroke rehabilitation unit, 14 days after the onset of her stroke, she was admitted with a Berg Balance score of only 8/56; the patient is still experiencing a largely flaccid hemiplegia with Chedoke McMaster Staging scores on the right side of 1/7 in the hand and arm, 1/7 in the leg and 1/7 in the foot, and 1/7 for posture. There were no sensory problems noted.

Q1. The patient asks you what the potential for recovery of the upper extremity is. What is your response?

Answer

1. Prognosis for recovery of upper extremity is poor as patient has a largely flaccid upper extremity with essentially no motor recovery at 14 days.

Q2. The occupational therapist asks you how they should manage the hemiplegic upper extremity. Should they continue to treat the upper extremity with a goal of maximizing recovery or palliate the upper extremity, minimizing contractures and pain?

Answers

1. Barreca (2001) recommended patients with a Chedoke-MacMaster score of less than 4 have a poor prognosis – should focus on palliation of minimizing contractures and pain.

Case Study (continued)

The patient improves with rehabilitation. Although there is only limited recovery in her upper extremity she improves in her lower extremity to a CMS of 3 in her leg and 2 in her foot. She is able to ambulate, albeit with a spastic gait, a cane, and supervision. Unfortunately, because her ankle/foot keeps going into plantarflexion she has trouble clearing her foot or getting her heel down on the ground. The outpatient physiotherapist thinks that she would be a good candidate for botulinum toxin injections.

Q3. Explain to the patient the mechanism and goals of Botulinum toxin treatment (BT) in the lower extremity.

Answers

1. Botulinum toxin works by weakening selected spastic muscles by selectively blocking the neuromuscular junction.
2. It works for up to 6 months.
3. The goal is to selectively block the spastic gastrocsoleus and tibialis posterior muscles to eliminate the plantarflexion deformity and allow for greater ease of ambulation with less effort and greater gait velocity.

Q4. Describe the benefits of botulinum toxin in improving function in the spastic upper extremity.

Answers

1. Botulinum toxin has been shown to reduce spasticity in the upper extremity.
2. However, botulinum toxin has not been shown to necessarily improve function likely because underlying weakness more than spasticity results in the limitation of function.
3. Modest improvements in the dressing, grooming and eating on the Barthel Index score have been reported following botulinum toxin injections.

C15. Case Study: Lower Extremity and Mobility

Case Study

A 38 year old male was admitted to hospital with a large left MCA infarct. CT scan showed a dense left MCA infarct, which was felt to be cardioembolic in etiology. 3 weeks after admission to acute care and following the onset of his stroke he was admitted to the rehabilitation unit. He required set-up assistance with his meals and tolerated a minced, honey-fluid diet. He required one person to assist him with dressing, grooming and bathing. He required in-and-out catheterizations for urinary retention. He was able to complete a 2 person pivot transfer despite problems with his dynamic balance. The patient could stand only in the parallel bars and used a manual wheelchair with a laptray for mobility. He was unable to communicate verbally but was able to gesture to make his needs known. Premorbidly he was quite active and fully employed.

Case Study (continued)

Initial assessment on the stroke rehabilitation unit reveals the following:

	Admission 3 weeks post-stroke
2 Minute Walk Test	*Not walking*
Berg Balance Scale	*5/56*
COVS	*30/91*
CMS Right Leg	*1/7*
CMS Right Foot	*1/7*
Postural Control	*4/7*
CMS Arm	*1/7*
CMS Hand	*1/7*
Sensation Right Side	*Decreased*

Q1. Try to predict this gentleman's clinical course. Presuming no medical complications will he walk again and if so how much assistance is he likely to require.

Answer

1. Given this gentleman's age, he will likely return to walking with an aid and supervision or one person assist.

Q2. The Question of whether this patient would benefit from partial body-weight support and treadmill training early on arises. Discuss the evidence for benefits of this treatment approach and any potential drawbacks.

Answers

1. The evidence of PBWS and treadmill training is mixed but the weight of the evidence is moving towards supporting PBWS.
2. Is supported by the general trend towards task-specific therapies.
3. Does require some equipment and can be therapist intensive.

Case Study (continued)

This patient remained on the rehabilitation unit for almost 3 months. He was discharged to home with the help of his spouse.

	Admission	***Discharge***
2 Minute Walk Test	*Not walking*	*60 meters*
Greatest Distance Walked Before Requiring a Rest	*-*	*525 meters*
Time to Walk Greatest Distance	*-*	*22 min, 42 sec*
Assistance Required	*-*	*Supervision for walking*
Walking Device Used	*-*	*Single point cane*
Berg Balance Scale	*5/56*	*51/56*
COVS	*30/91*	*75/91*
CMS Right Leg	*1/7*	*4/7*
CMS Right Foot	*1/7*	*2/7*
Postural Control	*4/7*	*5/7*
CMS Arm	*1/7*	*2/7*
CMS Hand	*1/7*	*2/7*
Sensation Right Side	*Decreased*	*Decreased*

Q3. What is the risk of this gentleman falling based on the Berg Balance Score?

Answer

1. This patient has a low risk of falling despite limited motor recovery in the lower extremity.
2. Berg Balance Score is 51/56 with any score greater than 45 indicating a much lower risk of falling

Q4. This gentleman showed a marked improvement in terms of ambulation and mobility despite only modest improvements in his Chedoke McMaster or Brunnstrom recovery stages. What factors would account for this improvement?

Answers

1. The patient was young.
2. Improvements in balance (51/56 on the Berg), likely because he was young and fit premorbidly, helped to compensate for the modest motor recovery.
3. Sufficient recovery was seen in the all important proximal leg muscles which help to propel the leg forward.
4. The increased tone that comes with recovery is associated with increased extensor tone in the lower extremity which helps to facilitate walking, especially be locking the knee in this case.

C16. Case Study: Upper Extremity Post-Stroke

Case Study

A 67 year old male suffered a small subcortical left hemispheric stroke, with subsequent right hemiparesis. He was admitted to rehabilitation 14 days following the onset of his stroke. The Chedoke McMaster Score of the lower extremity was 5 in the leg, 3 in the foot, 5 in the arm, and 2 in the hand.

Q1. The occupational therapist is new and has not done much in the way of stroke rehabilitation in the past. She asks you how they should manage the hemiplegic upper extremity. How aggressively should she treat the upper extremity?

Answer

1. Given that the arm is a CMS 5 in the arm and only 2 in the hand, nevertheless treatment should be a more aggressive restorative program geared towards regaining function in the affected upper extremity.

Q2. Your patient tells you that he knows he is going to improve because he frequently imagines moving his arm. What can you tell him about mental practice?

Answers

1. There is strong evidence that mental practice may improve upper extremity motor and ADL performance following stroke.

2. Mental practice is designed to access and reinforce stored motor plans for executing movements

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