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Task Force Members

Kirsten Potter, PT, DPT, MS, NCS -- Chair
Northwestern University
Chicago, IL

Diane D. Allen, PhD, PT
University of California San Francisco/ San Francisco State University
San Francisco, CA

Susan E. Bennett, PT, DPT, EdD, NCS, MSCS
University of Buffalo, SUNY
Buffalo, NY

Kathleen Brandfass, MS, PT
University of Pittsburgh Medical Center
Pittsburg, PA

Evan Cohen, PT, MA, PhD, NCS
University of Medicine and Dentistry of New Jersey, and Rutgers, the State University of New Jersey
Stratford, NJ

Gail L. Widener, PT, PhD
Samuel Merritt University
Oakland, CA

Amy M. Yorke, PT, NCS
The University of Michigan-Flint
Flint, MI

Student volunteer
Jessica Therlonge, SPT
University of Medicine and Dentistry of New Jersey, & Rutgers, the State University of New Jersey
Stratford, NJ

Objectives:

1. Develop evidence-based recommendations for OMs for clinical practice, education, and/or research
2. Develop instructions sheets outlining administration and scoring procedures for each OM
3. Identify needs for future research on OM for individuals with MS

Taskforce Process:

1. Day-long initial meeting at CSM February 2011 in New Orleans
    a. Agreement on categories of OMs to consider, across the ICF spectrum
        i. Body structure and function
            1. Aerobic capacity and endurance
            2. Ataxia
            3. Cardiovascular / pulmonary status
            4. Coordination (non-equilibrium)
            5. Dizziness/vestibular
            6. Fatigue
            7. Flexibility
            8. Muscle performance
            9. Muscle tone
            10. Pain
            11. Posture
            12. Sensory integration
            13. Somatosensation
        ii. Activity
            1. Balance/falls
            2. Bed mobility
            3. Gait
            4. Reach and grasp
            5. Transfers
            6. Wheelchair skills

iii. Participation
1. Health and wellness
2. Home management
3. Leisure
4. Quality of life
5. Role function
6. Shopping
7. Social function
8. Work

b. Agreement on OMs to consider
c. Agreement of Examination Criteria for OM review → use of EDGE template developed by EDGE taskforce, Section on research APTA and used by StrokEDGE group
i. Decided to focus OM reviews, and all ratings/recommendations, on the clinical utility and strength of psychometric data specific to individuals with MS
d. Development of instructions sheets
e. Assignment of OMs and identification of 1^0 and 2^0 reviewers for each OM

2. Primary reviewer completed EDGE document and instruction sheets for all assigned measures
3. Primary and secondary reviewer reach consensus on recommendations reported in EDGE document
4. All task force members complete consensus survey based on recommendations
5. Survey reviewed by Kirsten Potter and Evan Cohen; results of survey and recommendations distributed to all task force members for discussion and final consensus
6. Final recommendations submitted to Neurology Section Board of Directors in December, 2011 and presented to membership at CSM, February, 2012 in Chicago

List of Outcome Measures

Maximal Inspiratory Pressure (MIP) and Maximal Expiratory Pressure (MEP)	108 – 109	X		
Maximal Oxygen Uptake: VO_2 max and VO_2 peak	110 – 111	X		
Modified Ashworth Scale	112 – 113	X		
Modified Fatigue Impact Scale	114 – 115	X	X	
Motion Sensitivity Test	116 – 119	X		
Movement Ability Measure	120 – 131	X		
Multi-component Fatigue Scale	132 – 133	X	X	X
Multiple Sclerosis Functional Composite	134 – 136	X	X	
Multiple Sclerosis Impact Scale (MSIS – 29)	137 – 140			X
MS International Quality of Life Questionnaire	141 – 143			X
Multiple Sclerosis Quality of Life (MS- QOL 54)	144 – 145		X	X
Multiple Sclerosis Quality of Life Inventory	146 – 148	X	X	X
Multiple Sclerosis Spasticity Scale (MSSS – 88)	149 – 150	X	X	X
Neuropathic Pain Scale	151 – 152	X		
Nottingham Sensory Assessment	153 – 155	X		
Patient-specific Functional Scale	156 – 157		X	X
Physiologic Cost Index	158 – 159	X		
Rivermead Assessment of Sensorimotor Performance	160 – 163	X		
Rivermead Mobility Index	164 – 165		X	
Scale for the Assessment and Rating of Ataxia (SARA)	166 – 167	X	X	
Scripps Neurological Rating Scale	168 – 169	X		
Semmes-Weinstein Monofilaments	170 – 172	X		
Short Form Health Survey of the Medical Outcomes Study (SF – 36)	173 – 175			X
Static Standing Balance Test	176 – 177	X		
Tardieu Scale for Assessing Spasticity	178 – 179	X		
Timed 25-Foot Walk	180 – 181		X	
Timed Up & Go (TUG) with Cognitive & Manual	182 – 184		X	
Tinetti Falls Efficacy Scale	185 – 188		X	X
Tinetti Performance Oriented Mobility Assessment	189 – 194		X	
Trunk Control Test	195 – 196		X	
Trunk Impairment Scale	197 – 201	X	X	
Visual Analog Scale - Fatigue	202 – 204	X		

INSTRUMENT NAME: 12 Minute Walk / Run

REVIEWER: Gail L. Widener, PhD, PT

GENERAL INFORMATION:

- The 12 minute run test developed by Cooper[1,2] is used to assess cardiovascular fitness in normal, healthy people. Normal ranges for adults are available to estimate $VO_{2\ max}$ and rate fitness, calculators on the internet make these assessments easy.

EQUIPMENT NEEDED:

- Stopwatch/timer, 100 m level track with 3 m intervals marked on track

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: 12 minutes to complete test. Variables are put into a calculator that estimates VO2 max and rates fitness. Calculators are available on the internet (see below).

General Rules:

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Definitions:

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Instructions:

- Walk/run as far as you can in 12 minutes.

Scoring:

- Scored as the distance walked in 12 minutes. Cooper uses this information to estimate VO_2 max

INTERPRETATION GUIDELINES:

- On-line calculator: http://www.exrx.net/Calculators/MinuteRun.html

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WEB BASED RESOURCES / INFORMATION:

- On-line calculator: http://www.exrx.net/Calculators/MinuteRun.html

REFERENCES:

1 Cooper, KH. A means of assessing maximal oxygen intake. *JAMA*. 1968;203:201-204.
2 Cooper KH. The new aerobics. New York, Evans. 1976.

INSTRUMENT NAME: 12-Item MS Walking Scale (MSWS-12)

REVIEWER: Diane D. Allen, PhD, PT

GENERAL INFORMATION:

- The 12-item multiple sclerosis walking scale (MSWS-12) is a self-report measure of the impact of MS on the individual's walking ability.[1] The original scoring provides options 1-5 for each item, with 1 meaning no limitation and 5 meaning extreme limitation to the gait-related item. In version 2, three items are scored 1-3, and nine items are scored 1-5.
- This instrument has been included in the gait outcome measures recommended by the consensus conference of the Consortium of Multiple Sclerosis Centers, November 2007.[2]

EQUIPMENT NEEDED:

- MSWS-12 scale, pen/pencil

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: 10 minutes or less

General Rules:

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Definitions:

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Instructions:

12-Item MS Walking Scale (MSWS-12)

• These questions ask about *limitations to your walking* due to MS *during the past 2 weeks.*

• For each statement, please *circle* the *one* number that best describes your degree of limitation.

• Please answer *all* questions even if some seem rather similar to others, or seem irrelevant to you.

• *If you cannot walk at all,* please tick this box. □

TABLE

In the past two weeks, how much has your MS …	**Not at all**	**A little**	**Moderately**	**Quite a bit**	**Extremely**
1. Limited your ability to walk?	1	2	3	4	5
2. Limited your ability to run?	1	2	3	4	5
3. Limited your ability to climb up and down stairs?	1	2	3	4	5
4. Made standing when doing things more difficult?	1	2	3	4	5
5. Limited your balance when standing or walking?	1	2	3	4	5
6. Limited how far you are	1	2	3	4	5

TABLE					
In the past two weeks, how much has your MS …	**Not at all**	**A little**	**Moderately**	**Quite a bit**	**Extremely**
able to walk?					
7. Increased the effort needed for you to walk?	1	2	3	4	5
8. Made it necessary for you to use support when walking indoors (e.g., holding on to furniture, using a stick, etc.)?	1	2	3	4	5
9. Made it necessary for you to use support when walking outdoors (e.g., using a stick, a frame, etc.)?	1	2	3	4	5
10. Slowed down your walking?	1	2	3	4	5
11. Affected how smoothly you walk?	1	2	3	4	5
12. Made you concentrate on your	1	2	3	4	5

TABLE					
In the past two weeks, how much has your MS …	**Not at all**	**A little**	**Moderately**	**Quite a bit**	**Extremely**
walking?					

Please check that you have circled ONE number for EACH question

Scoring:

- All items are scored 1-5. Scores on the 12 items are summed. To transform to a 0-100 scale,[5] the minimum score of 12 is subtracted from the sum; the result is divided by 48 (for version 1) and then multiplied by 100.

INTERPRETATION GUIDELINES:

- Higher scores indicate greater impact of MS on walking.

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WEB BASED RESOURCES / INFORMATION:

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REFERENCES:

1. Hobart JC, Riazi A, Lamping DL, Fitzpatrick R, Thompson AJ. Measuring the impact of MS on walking ability: the 12-item MS Walking Scale (MSWS-12). *Neurol.* 2003;60:31-36.
2. Hutchinson B, Forwell SJ, Bennett S, Brown T, Karpatkin H, Miller D. Toward a consensus on rehabilitation outcomes in MS: gait and fatigue: report of a CMSC Consensus Conference, November 28--29, 2007. *Int J MS Care.* 2009;11(2):67-78.

INSTRUMENT NAME: 2 Minute Walk Test

REVIEWER: Amy M. Yorke, PT, NCS

GENERAL INFORMATION:

- The 2 Minute Walk Test (MWT) is a submaximal measure of gait velocity and endurance – distance walked in 2 minutes
- Other versions include different time duration of test (3, 5, 6, 10, and 12 minutes)
- Minute walk tests have been used in various patient populations (e.g., neuromuscular, cardiopulmonary, peripheral vascular disease, cancer, amputation)

EQUIPMENT NEEDED:

- Stopwatch
- Two small cones to mark the turnaround point
- A chair that can be easily moved along the walking course
- Measuring device (e.g. calibrated wheel with counter or a digital measuring wheel)
- Pulse oximeter

ADMINISTRATION INSTRUCTIONS:

Time to administer and score:

- Two practice walks have been recommended prior to measurements secondary to initial training effects[1,2]
- 2 minutes, plus additional time needed for instructions and practice trials (if utilized)

General Rules:

- The 2MWT is a simple test that requires an approximately 100-ft, quiet, indoor, flat, straight rectangular hallway.
- Patient is allowed to wear regular footwear and an assistive device and/or orthotic
- Measurement of HR[3,4], respiratory rate[4,5], SaO_2[4,5], rating of perceived dyspnea (RPD)[4,5] and rating of perceived exertion (RPE)[4,5]

Definitions:

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Instructions:

- Standardized verbal encouragement may be given at 30-second intervals[6-7] or may not be given[4-5]
- Patient may be instructed to "walk at your comfortable pace"[6-8] or "walk as far as you can"[3] or "walk as fast as you can, but walk safely"[6]

- For safety, a therapist may stand and guard the patient closely without impacting gait speed[3,6-7]
- After completion of the test, the distance walked and the number and duration of rests during the 2 minutes should be measured
- Rest breaks in between trials ranged from up to 2 minutes[8] to at least 30 minutes[4] in between trials

INTERPRETATION GUIDELINES:

- Longer distance walked indicates better performance
- Patient's value can be compared to normative data

Normative Data:

- In a group of 50 patients with MS, those patients with EDSS scores 1.5-4.0 ambulated 173 m ± 31 (40-172). Patients with EDSS scores 4.5-6.5 ambulated 104 m ± 41 (40-172).[9]

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- Not applicable

WEB BASED RESOURCES / INFORMATION:

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1. Butland RJA, Pang J, Gross ER, Woodcock AA, Geddes DM. Two-, six-, and 12-minute walking tests in respiratory disease. *BMJ.* 1982;284:1607-1707.
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INSTRUMENT NAME: 5-Time Sit to Stand

REVIEWER: Susan E. Bennett, PT, DPT, EdD, NCS, MSCS

GENERAL INFORMATION:

- Timed test of 5 repetitions of standing up and sitting down as quickly as possible when rising from a chair. It is a performance based multi-dimensional task that is a measure of both balance and lower extremity strength.

EQUIPMENT NEEDED:

- 43 cm high chair (the height originally used, studies have used chairs with varying heights), stopwatch

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: Short, usually less than 1 minute, but it depends on the ability of the patient.

General Rules:

- Subjects start by crossing their arms on their chest, sitting with their back against the chair.
- Investigator instructs the subject to stand fully upright and to avoid touching the back of the chair during each repetition.

Definitions:

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Instructions:

- Tester states: I want you to stand up and sit down 5 times as quickly as you can when I say 'Go'.
- Timing begins when the tester says 'Go' and stops when the subject's buttocks touch the chair on the fifth repetition.

Scoring: Recorded in seconds

Normative Data

- 23-60 y/o = 15.3 seconds (Whitney)
- 60-69 = 11.4 seconds (Bohannon)
- 70-79= 12.6 seconds (Bohannon)
- >80 y/o = 14.8 seconds (Bohannon)
- 12.1 sec male & 12.2 sec female (Lord)

INTERPRETATION GUIDELINES:

- The FTSS limit value in predicting moderate cognitive impairment was set at 15 seconds by a sensitivity analysis (negative predictive value =86%). Negative association of FTSS with global cognitive performance. Achieving FTSS in less than 15 seconds made unlikely the existence of a moderate cognitive impairment. (Annweiler)
- Elderly subjects needed more than 15 seconds to complete the test and had a 74% greater risk of recurrent falls then those who took less time. (Buatois)
- A FTSST change of >/= 2.3 seconds was identified as a cut off score that provided the best discrimination of sensitivity (67.7%) and specificity (66.2%) for identification of patients that made clinical improvement. (Meretta)
- Adult patients with balance and/or vestibular disorders showed a responsiveness-treatment coefficient of 0.58 for the FTSST indicating moderate responsiveness. (Meretta)
- Cutoff score of 15 was predictive for fallers in the elderly. (Buatois)
- Appears to be more useful with younger subjects.
- Does not take into account coordination, proprioception or tone.
- Patients with an EDSS score of 0.0-7.5 should be considered to use this outcome measure.

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WEB BASED RESOURCES / INFORMATION:

- http://ptjournal.apta.org/content/85/10/1034.full#T1

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1. Whitney S, Wrisley D, Marchetti G, et al. Clinical Measurement of Sit-to Stand Performance in People with Balance Disorders: Validity of Data for the Five-Times-Sit-to Stand Test. Physical Therapy. 2005 October;85(10): 1034-1045.
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INSTRUMENT NAME: 6 Minute Walk Test

REVIEWER: Kirsten Potter, PT, DPT, MS, NCS

GENERAL INFORMATION:

- The 6 Minute Walk Test (MWT) is a submaximal measure of gait velocity and durance – distance walked in 6 minutes
- Other versions include different time duration of test (2, 3, 5, 10, and 12 minutes)
- Minute walk tests have been used in various patient populations (e.g., neuromuscular, cardiopulmonary, peripheral vascular disease, cancer, amputation)

EQUIPMENT NEEDED:

- Stopwatch
- Two small cones to mark the turnaround point
- A chair that can be easily moved along the walking course
- Worksheets on a clipboard
- Sphygmomanometer

ADMINISTRATION INSTRUCTIONS:

Detailed instructions are provided in the American Thoracic Society: Guidelines for the Six-Minute Walk Test.[1]

Time to administer and score:

- 6 minutes to administer the test plus time to set up the environment and provide instructions to the patient

General Rules:

- The 6MWT is a simple test that requires a 100-ft, quiet, indoor, flat, straight rectangular hallway. The walking course must be 30m in length. The length of the 30m corridor must be marked by colored tape at every 3m. The turnaround must be marked with a cone. Some studies have used 20 and 50m corridors
- The patient should:
    - Wear comfortable clothing
    - Wear appropriate walking shoes
    - Use their usual walking aids during the test
- The patient should be encouraged to:
    - Wear comfortable clothing

  - Wear appropriate walking shoes
  - Use their usual walking aides during the test (cane, walker, etc.)
  - Take their usual medications
  - Avoid engaging in vigorous exercise 2 hours prior to testing
- Goldman et al[2] found a lack of a practice effect when administering the 6 MWT to individuals with MS, indicating one trial is sufficient

Definitions:

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Instructions:

- Do not provide a "warm-up" period.
- For at least 10 minutes before the beginning of the test, the client should sit in a chair located near the starting position. During this time, the clinician should review the contraindications, the appropriateness of the client's clothing and shoes, and complete the first part of the worksheet (see below). ("ATS statement: guidelines for the six-minute walk test," 2002)[1]

- The following elements should be present on the 6MWT worksheet and report:
  Lap counter: __ __ __ __ __ __ __ __ __ __ __ __ __ __ __
  Patient name: _____ Patient ID# _____
  Walk # _____ Tech ID: _____ Date: _____
  Gender: M F Age: ____ Race: ____ Height: ___ft ____in, ____ meters
  Weight: _____ lbs, _____kg Blood pressure: _____ / _____
  Medications taken before the test (dose and time): _____
  Supplemental oxygen during the test: No Yes, flow _____ L/min, type _____
  Baseline End of Test
  Time ___:___ ___:___
  Heart Rate _____ _____
  Dyspnea ____ ____ (Borg scale)
  Fatigue ____ ____ (Borg scale)
  SpO2 ____ % ____%
  Stopped or paused before 6 minutes? No, Yes, reason: _____
  Other symptoms at end of exercise: angina, dizziness hip, leg, or calf pain
  Number of laps: ____ (_60 meters) _ final partial lap: _____ meters _
  Total distance walked in 6 minutes: _____ meters
  Predicted distance: _____ meters Percent predicted: _____%
  Tech comments:
  Interpretation (including comparison with a pre-intervention 6MWT).

- A lap counter (or pen and paper) should be used to note the number of laps that the client is able to walk during the 6 minutes.

According to the American Thoracic Society (ATS) protocol, patients should be instructed in the following way:

- "The object of this test is to walk as far as possible for 6 minutes. You will walk back and forth in this hallway. Six minutes are a long time to walk, so you will be exerting yourself. You will probably get out of breath or become exhausted. You are permitted to slow down, to stop, and to rest as necessary. You may lean against the wall while resting, but resume walking as soon as you are able. You will be walking back and forth around the cones. You should pivot briskly around the cones and continue back the other way without hesitation. Now I'm going to show you. Please watch the way I turn without hesitation.
- Demonstrate by walking one lap yourself. Walk and pivot around a cone briskly. Then say:
  "Are you ready to do that? I will write down each time you turn around at this starting line. Remember that the object is to walk as far as possible for 6 minutes, but don't run or jog. Start now or whenever you are ready."
- The patient should be positioned at the starting line. The clinician should stand near the starting line during the test. As soon as the patient starts to walk, the timer should be started.
- No conversations should take place during the walk. An even tone of voice should be used when providing the standard phrases of encouragement (see below). The patient should be supervised. The clinician should remain focused and not lose count of the laps.
- After the first minute, the patient should be told the following (in an even tone):
  "You are doing well. You have 5 minutes to go.
- When the timer shows 4 minutes remaining, the patient should be told the following:
  "Keep up the good work. You have 4 minutes to go."
- When the timer shows 3 minutes remaining, the patient should be told the following:
  "You are doing well. You are halfway done."
- When the timer shows 2 minutes remaining, the patient should be told the following:
  "Keep up the good work. You have only 2 minutes left."
- When the timer shows only 1 minute remaining, the patient should be told the following:
  "You are doing well. You have only 1 minute to go."

Other words of encouragement or body language (eg. to speed up) should not be used.

The test should be discontinued if the patient experiences:

- Chest pain
- Intolerable dyspnea
- Leg cramps
- Staggering (unusual in nature)
- Diaphoresis
- Pale or ashen appearance

Upon completion of the test:

- Clients should be asked to rate their post walk dyspnea and overall fatigue levels using the Borg scale.
- The following should be asked: "What, if anything, kept you from walking farther?"
- If using a pulse oximeter, measure SpO2 and pulse rate from the oximeter and then remove the sensor.
- The number of laps should be recorded on the worksheet.
- The total distance walked, rounded to the nearest meter, should be calculated and recorded on the worksheet.
- The client should be congratulated for good effort and should be offered a drink of water (if not on a liquid restricted diet due to dysphagia).

Scoring:

- The lap counter or pen and paper should be used to note the number of laps that the patient is able to walk during the 6MWT.
- Distance walked, and the number and duration of rests during the 6 minutes should be measured.
- Scores range from 0 meters or feet for patients who are non-ambulatory to the maximum biological limits for normal healthy individuals (approximately 900 meters or 2953 feet).

INTERPRETATION GUIDELINES:

- Longer distance walked indicates better performance
- Patient's value can be compared to normative data

Normative Data:

- Reference data in 53 healthy subjects aged 50 – 85 = 631±93 m; males walked 84 m greater than females; variability in walking distance related to subject height, age, and weight[3]
- Reference data in 65 people of Asian descent, mean age = 65: 624 m for males and 541 m for females[4]
- 6MWT values for 10 healthy individuals aged 36 – 69 (= 683 m; range 630 – 720 m).[5]
- Reference values for 6 MWT according to age and gender:[6]

Men:
Aged 20 – 40 (n = 19): 800 ± 83 m
Aged 41 – 60 (n = 12): 671 ± 56 m
Aged 61 – 80 (n = 10): 687 ± 89 m

Women:
Aged 20 – 40 (n = 15): 699 ± 37 m
Aged 41 – 60 (n = 13): 670 ± 85 m
Aged 61 – 80 (n = 10): 583 ± 53 m

- 6 MWT distances (mean in meters, SD, 95% CI) for community dwelling independent elders according to age and gender:[7]

Age 60 – 69:
Male (n=15): 572 m; SD = 92; CI = 521 – 623
Female (n=22): 538 m; SD = 92; CI = 497 – 579

Age 70 – 79:
Male (n=14): 527 m; SD = 85; CI = 478 – 575
Female (n=22): 471 m; SD = 75; CI = 440 - 507

Age 80 – 89:
Male (n=8): 417 m; SD = 73; CI = 356 – 478
Female (n=15): 392 m; SD = 85; CI = 345 – 440

- Median distance walked during 6MWT = 576 m for males (median age 59.5 years) and 494 m for females (median age 62.0 years); reference equations to predict total distance walked during 6MWT in healthy adults:[8]

Men: 6MWD = (7.57 x $height_{cm}$) – (5.02 x age) – (1.76 x $weight_{cm}$) – 309 m
Alternate equation using BMI:

6 Minute Walk Test

6MWD = 1,140 m - (5.61 x BMI) – (6.94 x age)
To determine lower limit (using either equation), subtract 153

Women: 6MWD = (2.11 x $height_{cm}$) – (2.29 x $weight_{cm}$) – (5.78 x age) + 667 m
Alternate equation using BMI:
6MWD = 1,017 m - (6.24x BMI) – (5.83 x age)
To determine lower limit (using either equation), subtract 139

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WEB BASED RESOURCES / INFORMATION:

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INSTRUMENT NAME: 9-Hole Peg Test (9HPT)

REVIEWER: Kathleen Brandfass, MS PT

GENERAL INFORMATION:

- 9HPT is timed test of upper extremity fine motor function.

EQUIPMENT NEEDED:

- 9HPT apparatus (available through the Rolyan 9 Hole Peg Test disturbed by Smith and Nephew Inc.) , stop watch.

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: 5 to 10 minutes

General Rules:

- Both dominant and non-dominant hands are tested. Dominant hand is tested first. The apparatus is placed on a table with the well positioned on the side of the hand to tested

Definitions:

- 9HPT scores are based on the time it takes to complete the test activity.

Instructions:

- Administrator instructs the person performing the test to pick up the 9 pegs individually from the well and place the pegs one at a time into the holes and return them individually to the well.

Scoring:

- Timing is initiated when the person touches the first peg and is stopped when the person places the last peg back in the container. Test for each hand repeated twice.

INTERPRETATION GUIDELINES:

- Time is recorded for two successful trials; if person is unable to complete trial this is recorded by the test administrator.
- Healthy Sample Norms: (Grice et al, 2003)

Mean and Standard Deviation of Male (*n* = 314) & Female Participant's (*n* = 389)					
Male					
Age	***n***	**mean -right**	**mean -left**	**SD -right**	**SD -left**
21–25	41	16.41	17.5	1.65	1.73

26–30	32	16.88	17.84	1.89	2.22
31–35	31	17.54	18.47	2.70	2.94
36–40	32	17.71	18.62	2.12	2.30
41–45	30	18.54	18.49	2.88	2.42
46–50	30	18.35	19.57	2.47	2.69
51–55	25	18.9	19.84	2.37	3.10
56–60	25	20.90	21.64	4.55	3.39
61–65	24	20.87	21.60	3.50	2.98
66–70	14	21.23	22.29	3.29	3.71
71+	25	25.79	25.95	5.60	4.54
All Male	**314**	**18.99**	**19.79**	**3.91**	**3.66**
Female					
21–25	43	16.04	17.21	1.82	1.55
26–30	33	15.90	16.97	1.91	1.77
31–35	32	16.69	17.47	1.70	2.13
36–40	35	16.74	18.16	1.95	2.08
41–45	37	16.54	17.64	2.14	2.06
46–50	45	17.36	17.96	2.01	2.30
51–55	42	17.38	18.92	1.88	2.29
56–60	31	17.86	19.48	2.39	3.26
56–60	31	17.86	19.48	2.39	3.26
61–65	29	18.99	20.33	2.18	2.76
66–70	31	19.90	21.44	3.15	3.97
71+	31	22.49	24.11	6.02	5.66
All Female	**389**	**17.67**	**18.91**	**3.17**	**3.44**

COPYRIGHT INFORMATION:

- none

WEB BASED RESOURCES / INFORMATION:

National MS Society web site: **www.nmss.org**

REFERENCES:

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INSTRUMENT NAME: Activities-specific Balance Confidence Scale

REVIEWER: Amy M. Yorke, PT, NCS

GENERAL INFORMATION:

- 16 item questionnaire rating confidence on a continuous scale from 0-100% performing a variety of in home and community based functional activities.[1]

EQUIPMENT NEEDED:

- Score sheet

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: 10-15 minutes

General Rules:

- May be self-report or administered by a tester

Definitions:

Instructions:

- Patient is requested to rate each item on a scale from 0-100% with 0% = "no confidence" and 100% = "completely confident" in their ability to maintain balance and remain steady when completing each of the 16 items.

Activities-specific Balance Confidence Scale

For each of the following activities, please indicate your level of self-confidence by choosing a corresponding number from the following rating scale:

0%	10	20	30	40	50	60	70	80	90	100%
No Confidence										Completely Confident

"How confident are you that you can maintain your balance and remains steady when you…"

1. _____ Walk around the house
2. _____ Up and down stairs
3. _____ Pick up slipper from floor
4. _____ Reach at eye level
5. _____ Reach up on tiptoes
6. _____ Stand on chair to reach
7. _____ Sweep floor
8. _____ Walk outside to nearby car
9. _____ Get in/out car
10. _____ Walk across parking lot
11. _____ Up and down ramp
12. _____ Walk in crowded mall
13. _____ Walk in crowd/bumped
14. _____ Escalator holding on
15. _____ Escalator not holding rail
16. _____ Walk on icy sidewalk

Total:_____/16=_____

Scoring:

- Each item is rated on a continuous scale (0-100%) of confidence.
- Higher scores indicate greater balance confidence.
- Scores for each item are to be added and divide the total by 16 to give a final average score

INTERPRETATION GUIDELINES:

- The final score ranges from 0-100%
- Lower scores indicate lower level of confidence while higher score indicate higher level of confidence

COPYRIGHT INFORMATION:

WEB BASED RESOURCES / INFORMATION:

REFERENCES:

1. Powell LE, Myers AM. The Activities-specific Balance Confidence (ABC) Scale. *Journal of Gerontology.* 1995;50A(1):M28-M34.

INSTRUMENT NAME: Balance Evaluation Systems Test (BESTest)

REVIEWER: Kirsten Potter, PT, DPT, MS, NCS

GENERAL INFORMATION:

- Developed to assist with identifying the underlying postural control systems responsible for poor functional balance[1]
- 6 underlying systems are examined and comprise the BESTest subsections: I: biomechanical constraints (5 items), II: stability limits / verticality (3 items), III: anticipatory postural adjustments (5 items), IV: postural responses (5 items), V: sensory orientation (2 items), and VI: stability in gait (7 items)
- More information can be found at http://www.bestest.us/about.html
- A mini-BESTest has been developed; 14 items from 4 of the original 6 sections of the BESTest (Anticipatory – Transitions; Postural Responses, Sensory Organization; Dynamic Gait) [2]

EQUIPMENT NEEDED:

- Stop watch
- Measuring tape mounted on wall for Functional Reach test
- Approximately 60 cm x 60 cm (2 X 2 ft) block of 4-inch, medium-density, Tempur® foam
- 10 degree incline ramp (at least 2 x 2 ft) to stand on
- Stair step, 15 cm (6 inches) in height for alternate stair tap
- 2 stacked shoe boxes for obstacle during gait
- 2.5 Kg (5-lb) free weight for rapid arm raise
- Firm chair with arms with 3 meters in front marked with tape for Get Up and Go test
- Masking tape to mark 3 m and 6 m lengths on the floor for Get Up and Go

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: 20 - 30 minutes in trained raters (Mini-BESTest: 10 – 15 minutes)

General Rules:

- BESTest rules included in the e-appendix in Horak et al[1] and online at http://www.bestest.us/BESTest.pdf
- Mini-BESTest rules included in the appendix in Franchignoni et al[2] and online at http://www.bestest.us/miniBESTest.pdf

Definitions:

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Instructions:

- The BESTest criteria and score sheet may be found at http://www.bestest.us/BESTest.pdf
- The mini Bestest criteria and score sheet may be found at http://www.bestest.us/miniBESTest.pdf

Scoring:

- 27 tasks; some items consisting of 2 to 4 sub-items; total of 36 item grouped into 6 systems
- Each item scored on a 4-level, ordinal scale from 0 (worst performance) to 3 (best performance)
- Total score and subtest scores are obtained and provided as a percentage of the total score
- Mini-BESTest scored on a 3-point ordinal scale from 0 (severe) to 2 (normal)

INTERPRETATION GUIDELINES:

-

COPYRIGHT INFORMATION:

- The BESTest and mini BESTest are copyrighted.
- The BESTest criteria and score sheet may be found at http://www.bestest.us/BESTest.pdf
- The mini Bestest criteria and score sheet may be found at http://www.bestest.us/miniBESTest.pdf

WEB BASED RESOURCES / INFORMATION:

- Information on the BESTest and Mini BESTest may be found at http://www.bestest.us/about.html
- The BESTest DVD can be purchased for $200.00 at http://www.bestest.us/purchasing.html

REFERENCES:

1. Horak FB, Wrisley DM, Frank J, Horak FB, Wrisley DM, Frank J. The Balance Evaluation Systems Test (BESTest) to differentiate balance deficits. *Phys Ther.* May 2009;89(5):484-498.
2. Franchignoni F, Horak F, Godi M, et al. Using psychometric techniques to improve the Balance Evaluation Systems Test: the mini-BESTest. *J Rehabil Med.* Apr;42(4):323-331.

INSTRUMENT NAME: Berg Balance Scale

REVIEWER: Diane D. Allen, PhD, PT

GENERAL INFORMATION:

- 14-item test of (mostly) standing balance, originally generated[1] and validated[2] for determining risk for falling in elderly people, with a cut-off score of <45 out of 56 associated with increased risk of falling[3]; now used to assess balance in many populations; translated into many languages.
- Does not include balance during gait or fall history.

EQUIPMENT NEEDED:

- Chair with arm rests (plus one other chair without arms or mat table for transfers), 6 inch stepstool, yard stick, tape measure, paper, pencil, object to pick up (slipper), stopwatch

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: 20-30 minutes

General Rules:

-

Definitions:

-

Instructions:

Berg Balance Scale

Please document each task and/or give instructions as written. When scoring, please record the lowest response category that applies for each item.

In most items, the subject is asked to maintain a given position for a specific time. Progressively more points are deducted if:

- the time or distance requirements are not met
- the subject's performance warrants supervision
- the subject touches an external support or receives assistance from the examiner

Subject should understand that they must maintain their balance while attempting the tasks. The choices of which leg to stand on or how far to reach are left to the subject. Poor judgment will adversely influence the performance and the scoring.

Equipment required for testing is a stopwatch or watch with a second hand, and a ruler or other indicator of 2, 5, and 10 inches. Chairs used during testing should be a reasonable height. Either a step or a stool of average step height may be used for item # 12.

_____ 1. SITTING TO STANDING
Instructions: Please stand up. Try not to use your hand for support.
(4) - Able to stand without using hands and stabilize independently
(3) - Able to stand independently using hands
(2) - Able to stand using hands after several tries
(1) - Needs minimal aid to stand or stabilize
(0) - Needs moderate or maximal assist to stand

_____ 2. STANDING UNSUPPORTED
Instructions: Please stand for two minutes without holding on.
(4) - Able to stand safely for 2 minutes
(3) - Able to stand 2 minutes with supervision
(2) - Able to stand 30 seconds unsupported
(1) - Needs several tries to stand 30 seconds unsupported
(0) - Unable to stand 30 seconds unsupported
If a subject is able to stand 2 minutes unsupported, score full points for sitting unsupported. Proceed to item #4.

_____ 3. SITTING WITH BACK UNSUPPORTED BUT FEET SUPPORTED ON FLOOR OR ON A STOOL
Instructions: Please sit with arms folded for 2 minutes.
(4) - Able to sit safely and securely for 2 minutes
(3) - Able to sit 2 minutes under supervision
(2) - Able to able to sit 30 seconds
(1) - Able to sit 10 seconds
(0) - Unable to sit without support 10 seconds

_____ 4. STANDING TO SITTING
Instructions: Please sit down.
(4) - Sits safely with minimal use of hands
(3) - Controls descent by using hands
(2) - Uses back of legs against chair to control descent
(1) - Sits independently but has uncontrolled descent
(0) - Needs assist to sit

_____ 5. TRANSFERS
Instructions: Arrange chair(s) for pivot transfer. Ask subject to transfer one way toward a seat with armrests and one way toward a seat without armrests. You may use two chairs (one with and one without armrests) or a bed and a chair.
(4) - Able to transfer safely with minor use of hands
(3) - Able to transfer safely definite need of hands
(2) - Able to transfer with verbal cuing and/or supervision
(1) - Needs one person to assist
(0) - Needs two people to assist or supervise to be safe

_____ 6. STANDING UNSUPPORTED WITH EYES CLOSED
Instructions: Please close your eyes and stand still for 10 seconds.
(4) - Able to stand 10 seconds safely
(3) - Able to stand 10 seconds with supervision
(2) - Able to stand 3 seconds
(1) - Unable to keep eyes closed 3 seconds but stays safely
(0) - Needs help to keep from falling

_____ 7. STANDING UNSUPPORTED WITH FEET TOGETHER
Instructions: Place your feet together and stand without holding on.
(4) - Able to place feet together independently and stand 1 minute safely
(3) - Able to place feet together independently and stand 1 minute with supervision
(2) - Able to place feet together independently but unable to hold for 30 seconds
(1) - Needs help to attain position but able to stand 15 seconds feet together
(0) - Needs help to attain position and unable to hold for 15 seconds

_____ 8. REACHING FORWARD WITH OUTSTRETCHED ARM WHILE STANDING

Instructions: Lift arm to 90 degrees. Stretch out your fingers and reach forward as far as you can. (Examiner places a ruler at the end of fingertips when arm is at 90 degrees. Fingers should not touch the ruler while reaching forward. The recorded measure is the distance forward that the fingers reach while the subject is in the most forward lean position. When possible, ask subject to use both arms when reaching to avoid rotation of the trunk.)

(4) - Can reach forward confidently 25 cm (10 inches)
(3) - Can reach forward 12 cm (5 inches)
(2) - Can reach forward 5 cm (2 inches)
(1) - Reaches forward but needs supervision
(0) - Loses balance while trying/requires external support

_____ 9. PICK UP OBJECT FROM THE FLOOR FROM A STANDING POSITION

Instructions: Pick up the shoe/slipper, which is place in front of your feet.

(4) - Able to pick up slipper safely and easily
(3) - Able to pick up slipper but needs supervision
(2) - Unable to pick up but reaches 2-5 cm (1-2 inches) from slipper and keeps balance independently
(1) - Unable to pick up and needs supervision while trying
(0) - Unable to try/needs assist to keep from losing balance or falling

_____ 10. TURNING TO LOOK BEHIND OVER LEFT AND RIGHT SHOULDERS WHILE STANDING

Instructions: Turn to look directly behind you over toward the left shoulder. Repeat to the right. Examiner may pick an object to look at directly behind the subject to encourage a better twist turn.

(4) - Looks behind from both sides and weight shifts well
(3) - Looks behind one side only other side shows less weight shift
(2) - Turns sideways only but maintains balance
(1) - Needs supervision when turning
(0) - Needs assist to keep from losing balance or falling

_____ 11. TURN 360 DEGREES

Instructions: Turn completely around in a full circle. Pause. Then turn a full circle in the other direction.

(4) - Able to turn 360 degrees safely in 4 seconds or less
(3) - Able to turn 360 degrees safely one side only 4 seconds or less
(2) - Able to turn 360 degrees safely but slowly
(1) - Needs close supervision or verbal cuing
(0) - Needs assistance while turning

_____ 12. PLACE ALTERNATE FOOT ON STEP OR STOOL WHILE STANDING UNSUPPORTED

Instructions: Place each foot alternately on the step/stool. Continue until each foot has touched the step/stool four times.

(4) - Able to stand independently and safely and complete 8 steps in 20 seconds
(3) - Able to stand independently and complete 8 steps in > 20 seconds
(2) - Able to complete 4 steps without aid with supervision
(1) - Able to complete > 2 steps needs minimal assist
(0) - Needs assistance to keep from falling/unable to try

_____ 13. STANDING UNSUPPORTED ONE FOOT IN FRONT

Instructions: (DEMONSTRATE TO SUBJECT) Place one foot directly in front of the other. If you feel that you cannot place your foot directly in front, try to step far enough ahead that the heel of your forward foot is ahead of the toes of the other foot. (To score 3 points, the length of the step should exceed the length of the other foot and the width of the stance should approximate the subject's normal stride width.)

(4) - Able to place foot tandem independently and hold 30 seconds
(3) - Able to place foot ahead independently and hold 30 seconds
(2) - Able to take small step independently and hold 30 seconds
(1) - Needs help to step but can hold 15 seconds
(0) - Loses balance while stepping or standing

_____ 14. STANDING ON ONE LEG

Instructions: Stand on one leg as long as you can without holding on.

(4) - Able to lift leg independently and hold > 10 seconds
(3) - Able to lift leg independently and hold 5-10 seconds
(2) - Able to lift leg independently and hold ≥ 3 seconds
(1) - Tries to lift leg unable to hold 3 seconds but remains standing independently.
(0) - Unable to try of needs assist to prevent fall

Maximum Score = 56

Scoring:

- The score is the sum of the numbers given for all 14 items.

INTERPRETATION GUIDELINES:

- Max score 56; score of below 45 may be associated with high fall risk.[4] For higher functioning samples, a score below 55 may be associated with higher fall risk.[5]

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- Published scale.[1]

WEB BASED RESOURCES / INFORMATION:

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REFERENCES:

1. Berg K, Wood-Dauphinee S, Williams JI. Measuring balance in the elderly: Preliminary development of an instrument. *Physiother Can.* 1989;41:304.
2. Berg K, Wood-Dauphinee SL, Williams JI, Maki BE. Measuring balance in the elderly: Validation of an instrument. *Can J of Pub Health.* 1992;83:S7-11.
3. Bogle Thorbahn LD, Newton RA. Use of the Berg Balance Test to predict falls in elderly persons. *Phys Ther.* 1996;76(6):576-585.
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5. Nilsagard Y, Lundholm C, Denison E, Gunnarsson LG. Predicting accidental falls in people with multiple sclerosis--a longitudinal study. *Clin Rehabil.* 2009;23:259-269.

INSTRUMENT NAME: Bioesthesiometer

REVIEWER: Gail L. Widener, PhD, PT

GENERAL INFORMATION:

- The bioesthesiometer is an instrument designed to measure vibration perception threshold (VPT). Was initially designed to measure vibration to aid in diagnosis of peripheral neuropathy in persons with diabetes mellitus.

EQUIPMENT NEEDED:

- Biothesiometer, vibratron available through several sources

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: 5-10 minutes depending on number of sites tested

General Rules:

- The probe is applied to the body while gradually increasing the amplitude until the vibration is detected. Conversely, the amplitude can be slowly lowered to record the amplitude at which vibration sense is lost.

Definitions:

-

Instructions:

- Tell me when you first begin to feel a vibration, tell me when the vibration sense goes away

Scoring:

- Threshold is the value at which VPT is first perceived.

INTERPRETATION GUIDELINES:

- Included with equipment

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WEB BASED RESOURCES / INFORMATION:

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REFERENCES:

INSTRUMENT NAME: Box and Blocks Test

REVIEWER: Evan Cohen, PT, MA, PhD, NCS

GENERAL INFORMATION:

- The Box and Blocks Test (BBT) is a test of manual dexterity.

EQUIPMENT NEEDED:

- A Box and Blocks testing unit
  - The wooden box with two equally-sized compartments separated by a 15.2 cm high divider
  - 150 wooden blocks (1”-square)
  - A stopwatch or timer

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: The test for each hand takes one minute.

General Rules:

- Please see the article by Mathiowetz et al cited below for detailed instructions.

Definitions:

- N/A

Instructions:

- The patient has one minute to move as many blocks as possible, one at a time, from one compartment to the other.

Scoring:

- The score is the number of blocks transferred, with a score recorded separately for each hand.

INTERPRETATION GUIDELINES:

- Normative data is available.

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- N/A

WEB BASED RESOURCES / INFORMATION:

- Box and Block test kits are available at http://www.pattersonmedical.com/app.aspx?cmd=get_product&id=79848 and other rehabilitation equipment sellers.

REFERENCES:

1. Mathiowetz V, Volland G, Kashman N, Weber K. Adult norms for the Box and Block Test of manual dexterity. *Am J Occup Ther.* Jun 1985;39(6):386-391.

INSTRUMENT NAME: Brief Fatigue Index / Inventory

REVIEWER: Gail L. Widener, PhD, PT

GENERAL INFORMATION:

- The Brief Fatigue Inventory (BFI) was developed to quickly measure severity of fatigue in people with cancer.[1] The BFI has been translated and validated in several languages (Japanese, German, Korean, Chinese, Taiwanese, French)[2-7] and disease groups (brain tumors, OA, RA, chronic illness).[8-11]BFI was evaluated in people post stroke, but because people did not complete the tool it was deemed unfeasible to use.[12]

EQUIPMENT NEEDED:

- Questionnaire

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: 5-10 minutes to administer and score

General Rules:

- Can be completed via self-report, interview or interactive voice recording system.

Definitions:

-

Instructions:

- Can be completed via self-report, interview or interactive voice recording system.

Scoring:

- Consists of nine items that look at fatigue in the past that are rated on a 0-10 numeric rating scale. Average score of the items completed. Test can be scored with as few as 5 out of 9 questions answered.[1]

INTERPRETATION GUIDELINES:

- 0 is no fatigue or does not interfere and 10 is bad fatigue or completely interferes with activity/work.

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WEB BASED RESOURCES / INFORMATION:

- http://www.mdanderson.org/education-and-research/departments-programs-and-labs/departments-and-divisions/symptom-research/symptom-assessment-tools/brief-fatigue-inventory-bfi.html (fee applies for use in clinical research trials)

REFERENCES:

1. Mendoz TR, Wang XS, Cleeland CS, Morrissey M, Johnson BA, Wendt JK, Huber SL. The rapid assessment of fatigue severity in cancer patients: use of the brief fatigue inventory. *Cancer.* 1999;85:1186-1196.
2. Okuyama T, Wang ZS, Akechi T, Mendoza TR, Hosaka T, Cleeland CS, Uchitomi Y. Validation study of the Japanese version of the brief fatigue inventory. *J Pain Symptom Manage.* 2003; 25(2):106-117.
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8. Wolfe F. Fatigue assessments in rheumatoid arthritis: comparative performance of visual analog scales and longer fatigue questionnaires in 7760 patients. *J Rheumatol.* 2004; 31:1896-1902.
9. Whitehead L. The measurement of fatigue in chronic illness: a systematic review of unidimensional and multidimensional fatigue measures. *J Pain Symptom Manage.* 2009;37(10): 107-128.
10. Murphy SL, Lynden AK, Smith DM, Dong Q, Koliba JF. Effects of a tailored activity pacing intervention on pain and fatigue for adults with osteoarthritis. *AJOT.* 2010;64:869-876.
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12. Mead G, Lunch J, Grieg C, Young A, Lewis Sharpe M. Evaluation of fatigue scales in stroke patients. *Stroke.* 2007; 38: 2090-2095.

INSTRUMENT NAME: Canadian Occupational Performance Measure

REVIEWER: Diane D. Allen, PhD, PT and Susan E. Bennett, PT, DPT, EdD, NCS, MSCS

GENERAL INFORMATION:

- Client-centered tool designed to detect client self-perceptions of performance and satisfaction in self-care, productivity, and leisure over time.[1] This measure is designed to measure individualized patient goal achievement. It has been translated into 24 languages and is used in over 35 countries.

EQUIPMENT NEEDED:

- None

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: 17-40 minutes

General Rules:

- Administration of the COPM consists of a semi-structured interview of the patient by the therapist to elicit the activities that a patient wants or needs or is expected to perform, and then negotiation of goals for intervention to address the activities identified. The process is semi-structured because the therapist provides examples of activities in each of three domains (self-care, productivity, leisure) and the patient identifies which are relevant, which he or she can perform, and how satisfied he or she is with the performance. The therapist and patient then weight each activity for its importance, and the score is based on importance, ability, and satisfaction. Re-assessment repeats the scoring and can determine if additional problems have emerged.

Definitions:

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Instructions:

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Scoring:

- The five most important self-identified problems with self-care, productivity, or leisure activities form the scale items. The patient is asked to rate each on a scale of 1 – 10 in terms of a) ability to perform the activity (1 = not able to 10 = able to perform with excellence) and b) satisfaction with their present performance (1 = not satisfied to 10 =

extremely satisfied). Item ratings are multiplied by their corresponding importance rating to determine baseline scores for each activity (ranging from 0 – 100). Satisfaction and performances scores for all activities summed separately and then divided by the number of rated activities (usually 5). Interviewer may need to supplement information gathered during interview through other means such as observation, administration of special tests, and assessment of patient environments.[2]

INTERPRETATION GUIDELINES:

- Summary performance and satisfaction scores are used as the basis for comparisons over time.

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WEB BASED RESOURCES / INFORMATION:

- The 4th edition of the Canadian Occupational Performance Measure (COPM), measurement forms, self-instructional program (video and workbook) are available from the Canadian Association of Occupational Therapists (CAOT) at https://www.caot.ca/ebusiness/source/orders/index.cfm?task=0
  The manual and 100 forms currently costs $52.45 from the CAOT website.

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INSTRUMENT NAME: Clinical Test for Sensory Interaction on Balance (CTSIB)

REVIEWER: Amy M. Yorke, PT, NCS

GENERAL INFORMATION:

- Developed to systematically test the influence of visual, vestibular, and somatosensory input in standing balance that does not require computerized equipment[1]
- Standing balance is assessed under 6 different somatosensory and visual conditions[1-2]
    - Condition 1: Firm surface, eyes open
    - Condition 2: Firm surface, eyes closed
    - Condition 3: Firm surface, eyes open with visual conflict dome
    - Condition 4: Foam surface, eyes open
    - Condition 5: Foam surface, eyes closed
    - Condition 6: Form surface, eyes open with visual conflict dome
- Modified CTSIB eliminates conditions 3 and 6 (visual conflict) since no difference was found in scores between conditions 2 and 5 and conditions 5 and 6[3]

EQUIPMENT NEEDED:

- Stopwatch
- Foam surface
- Paper lantern (for conditions 3 and 6)

ADMINISTRATION INSTRUCTIONS:

Time to administer and score:

- If all trials completed approximately 15-20 minutes[3-4]
- Three trials of all conditions of mod CTSIB completed within 10 minutes without patient taking break [5]

General Rules:

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Definitions:

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Instructions:

- Patient is requested to stand erect without moving, look straight ahead, as long as possible or until trial is over. Patient is not allowed to use an assistive device.
    - Foot position
        - Together or in tandem[2]
        - No difference noted with feet together versus feet apart[9]

        - No difference noted with shoes on or shoes off[11]
    - Arm position
        - Across chest[2,4,6,8]
        - Across waist[3]
- Complete six conditions
    - Condition 1: Firm surface, eyes open
    - Condition 2: Firm surface, eyes closed
    - Condition 3: Firm surface, eyes open in dome (visual conflict)
    - Condition 4: Foam surface, eyes open
    - Condition 5: Foam surface, eyes closed
    - Condition 6: Foam surface, eyes open in dome (visual conflict)
- One[3] , three [2,6], and five[4] trials, up to 30 seconds/trial of each condition are performed
- Testing discontinued when 30 seconds is reached[2,6]
- Timing stops if patient moves arms, legs, or feet[6]

Scoring:

- Record time and visual observation of movement as objective measures[1-2]; can also record normal (completed 30 second trial) or abnormal (did not successfully complete 30 second trial)[7]

Clinical Test for Sensory Interaction on Balance

	Condition 1 (eyes open, firm surface)	Condition 2 (eyes closed, firm surface)	Condition 3 (visual conflict, firm surface)	Condition 4 (eyes open, foam surface)	Condition 5 (eyes closed, foam surface)	Condition 6 (visual conflict, foam surface)
Trial 1 (sec)						
Trial 2 (sec)						
Trial 3 (sec)						
Sum (sec)						
Movement Strategy						

INTERPRETATION GUIDELINES:

- Timing of trials can be added up together to attain one score depending upon number of conditions completed and number of trials completed with each condition
- Results can also be as normal (≥30 seconds) or abnormal (<30 seconds)

COPYRIGHT INFORMATION:

- Not applicable

WEB BASED RESOURCES / INFORMATION:

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INSTRUMENT NAME: Disease Steps

REVIEWER: Susan E. Bennett, PT, DPT, EdD, NCS, MSCS

GENERAL INFORMATION:

- Disease steps is not designed to replace the EDSS or other more detailed scales of neurologic function in MS, but rather to provide neurologists with a simple measure of disease progression. It is predominantly based on the Expanded Disability Status Scale, but is reported to demonstrate increased sensitivity for measuring progression in patients with MS who use unilateral support

EQUIPMENT NEEDED:

- No equipment is needed, just an area for the patient to walk.

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: Not reported, however is based on the EDSS, therefore approximately the same amount of time.

General Rules:

- Is scored by a neurologist or health care provider (nurse practitioner or physician's assistant)

Definitions:

- 0 = Normal; functionally normal with no limitations on activity or lifestyle. Patients may have a minor abnormality on examination such as nystagmus or an extensor plantar. The course is relapsing-remitting with a return to baseline with or without treatment. These patients are not treated with any ongoing symptomatic therapy for MS.

- 1 = Mild disability; mild symptoms or signs. These patients have mild but definite findings such as sensory abnormalities, mild bladder impairment, minor incoordination, weakness, or fatigue. There is no visible abnormality of gait. The pattern of disease is relapsing-remitting, but patients may not have a full return to baseline following attacks. These patients may use ongoing symptomatic therapy such as amantadine, baclofen, or oxybutynin.

- 2 = Moderate disability; the main feature is a visibly abnormal gait, but patients do not require ambulation aids. The pattern of disease is relapsing-remitting or progressive.

- 3 = Early cane; intermittent use of cane (or other forms of unilateral support including splint, brace, or crutch). These patients use unilateral support primarily for longer

distances, but are able to walk at least 25 feet without it. The pattern of disease is relapsing-remitting or progressive.

- 4 = Late cane; these patients are dependent on a cane or other forms of unilateral support and cannot walk 25 feet without such support (eg, these patients may hang on to furniture inside their homes or touch the wall when walking in clinic). Patients may use a scooter for greater distances (e.g. malls). The pattern of disease is relapsing-remitting or progressive.

- *5* = Bilateral support; patients require bilateral support to walk 25 feet (eg, two canes or two crutches or a walker). They may use a scooter for greater distances. The pattern of disease is relapsing-remitting or progressive.

- 6 = Confined to wheelchair; patients are essentially confined to a wheelchair or scooter. They may be able to take a few steps but are unable to ambulate 25 feet, even with bilateral support. They may show further progression including worsening hand function or inability to transfer independently.

- U = Unclassifiable; this category is used for patients who do not fit the above classification (eg, significant cognitive or visual impairment, overwhelming fatigue, or significant bowel or bladder impairment in an otherwise minimally impaired patient).

Instructions:

- No specific instructions, the examiner observes the patient ambulating.

Scoring:

- As described above

INTERPRETATION GUIDELINES:

- As described above

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- NA

WEB BASED RESOURCES / INFORMATION:

- http://www.neurology.org/content/45/2/251.full.pdf+html?sid=69c8c163-8a99-4c22-aa21-291dd3316bf0

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INSTRUMENT NAME: Dizziness Handicap Inventory

REVIEWER: Amy M. Yorke, PT, NCS

GENERAL INFORMATION:

- 25 item multidimensional questionnaire that quantified a person's perception of disability and handicap in three subscales: physical, emotional, and functional[1]
- Scores range from 0-100 where 100 indicates the highest level of perceived disability and handicap

EQUIPMENT NEEDED:

- Score sheet

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: Approximately 10 minutes

General Rules:

- Self-report survey in which the respondent answers "always", "sometimes", or "never" to a listing of 25 questions

Definitions:

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Instructions: Patient is requested to answer 25 questions "always", "sometimes", or "never" as it pertains to their dizziness or balance problem only.

Dizziness Handicap Inventory

The purpose of this scale is to identify difficulties that you may be experiencing because of your dizziness. Please mark "always", "sometimes" or "never" for each question. Answer each question as it pertains to your dizziness or balance problem only.

	Always	Sometimes	Never
P1. Does looking up increase your problem?			
E2. Because of your problem, do you feel frustrated?			
F3. Because of your problem, do you restrict your travel for business or recreation?			
P4. Does walking down the aisle of a supermarket increase your problem?			
F5. Because of your problem, do you have difficulty getting into or out of bed?			
F6. Does your problem significantly restrict your participation in social activities such as going out to dinner, going to the movies, dancing or to parties?			
F7. Because of your problem, do you have difficulty reading?			
P8. Does performing more ambitious activities like sports, dancing, household chores such as sweeping or putting dishes away increase your problem?			
E9. Because of your problem, are you afraid to leave your home without having someone accompany you?			
E10. Because or your problem, have you been embarrassed in front of others?			
P11. Do quick movements of your head increase your problem?			
F12. Because of your problem, do you avoid heights?			
P13. Does turning over in bed increase your problem?			
F14. Because of your problem, is it difficult for you to do strenuous housework or yard work?			
E15. Because of your problem, are you afraid people may think you are intoxicated?			
F16. Because of your problem, is it difficult for you to go for a walk by yourself?			

	Always	Sometimes	Never
P17. Does walking down a sidewalk increase your problem?			
E18. Because of your problem, is it difficult for you to concentrate?			
F19. Because of your problem, is it difficult for you to walk around the house in the dark?			
E20. Because of your problem, are you afraid to stay home alone?			
E21. Because of your problem, do you feel handicapped?			
E22. Has your problem placed stress on your relations with members of your family or friends?			
E23. Because of your problem, are you depressed?			
F24. Does your problem interfere with your job or household responsibilities?			
P25. Does bending over increase your problem?			

Scoring: Each item is answered with a "Never" (0 points), "Sometimes" (2 points), or "Always" (4 points).

INTERPRETATION GUIDELINES:

- Scores range from 0-100 can be further subdivided into three subscales: physical (7 items, maximum 28 points), functional (9 items, maximum 36 points), and emotional (9 items, maximum 36 points). The higher the score, the greater the perceived handicap.

COPYRIGHT INFORMATION:

- Not applicable

WEB BASED RESOURCES / INFORMATION:

REFERENCES:

1. Jacobson GP, Newman CW. The development of the dizziness handicap inventory. *Arch otolaryngol Head Neck Surg.* 1990;116:424-427.

INSTRUMENT NAME: Dynamic Gait Index

REVIEWER: Kirsten Potter, PT, DPT, MS, NCS

GENERAL INFORMATION:

- The DGI was developed as a measure to assess and document a patient's ability to respond to changing task demands during walking[1]
- It is appropriate for use in ambulatory / high functioning individuals and patients with vestibular and other neurological disorders
- 8 items that vary the walking task by changing walking speeds, walking with head turning, turning and stopping, walking over and around obstacles, and ascending / descending stairs
- Scoring focuses on changes in balance or changes in gait patterns during the various walking tasks

EQUIPMENT NEEDED:

- Scoring form
- Level walking area at least 20 feet in length
- Stopwatch
- Shoe box
- 2 cones (to serve as obstacles in walking pathway)
- Stairs with railing

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: 15 minutes

General Rules:

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Definitions:

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Dynamic Gait Index

Instructions:

1. Gait level surface

Instructions: walk at your normal speed from here to the next mark (20')
Grading: Mark the lowest category which applies.

- (3) Normal: Walks 20', no assistive devices, good speed, no evidence for imbalance, normal gait pattern.
- (2) Mild impairment: Walks 20', uses assistive devices, slower speed, mild gait deviation.
- (1) Moderate impairment: Walks 20', slow speed, abnormal gait pattern, evidence for imbalance.
- (0) Severe impairment: Cannot walk 20' without assistance, severe gait deviations, or imbalance.

2. Change in gait speed

Instructions: Begin walking at your normal pace (for 5'), when I tell you "go," walk as fast as you can (for 5'). When I tell you "slow," walk as slowly as you can (for 5').
Grading: Mark the lowest category that applies.

- (3) Normal: Able to smoothly change walking speed without loss of balance or gait deviation. Shows a significant difference in walking speeds between normal, fast, and slow speeds.
- (2) Mild impairment: Is able to change speed but demonstrates mild gait deviations, or no gait deviations but unable to achieve a significant change in velocity, or uses an assistive device.
- (1) Moderate impairment: Makes only minor adjustments to walking speed, or accomplishes a change in speed with significant gait deviations, or changes speed but loses significant gait deviations, or changes speed but loses balance but is able to recover and continue walking.
- (0) Severe impairment: Cannot change speeds, or loses balance and has to reach for wall or be caught.

3. Gait with horizontal head turns

Instructions: Begin walking at your normal pace. When I tell you to "look right," keep walking straight, but turn your head to the right. Keep looking to the right until I tell you, "look left," then keep walking straight and turn your head to the left. Keep your head to the left until I tell you, "look straight," then keep walking straight, but return your head to the center.

Grading: Mark the lowest category which applies.

(3) Normal: Performs head turns smoothly with no change in gait

(2) Mild impairment: Performs head turns smoothly with slight change in gait velocity, i.e., minor disruption to smooth gait path or uses walking aid.

(1) Moderate impairment: Performs head turns with moderate change in gait velocity, slows down, staggers but recovers, can continue to walk.

(0) Severe impairment: Performs task with severe disruption of gait, i.e., staggers outside 15" path, loses balance, stops, reaches for wall.

4. Gait with vertical head turns

Instructions: Begin walking at your normal pace. When I tell you to "look up," keep walking straight, but tip your head and look up. Keep looking up until I tell you "look down." Then keep walking straight and turn your head down. Keep looking down until I tell you, "look straight," then keep walking straight, but return your head to the center.

Grading: Mark the lowest category that applies.

(3) Normal: Performs head turns with no change in gait.

(2) Mild impairment: Performs task with slight change in gait velocity i.e., minor disruption to smooth gait path or uses walking aid.

(1) Moderate impairment: Performs task with moderate change in gait velocity, slows down, staggers but recovers, can continue to walk.

(0) Severe impairment: Performs task with severe disruption of gait, i.e., staggers outside 15" path, loses balance, stops, reaches for wall.

5. Gait and pivot turn

Instructions: Begin walking at your normal pace. When I tell you, "turn and stop," turn as quickly as you can to face the opposite direction and stop.

Grading: Mark the lowest category that applies.

(3) Normal: Pivot turns safely within 3 seconds and stops quickly with no loss of balance.

(2) Mild impairment: Pivot turns safely in > 3 seconds and stops with no loss of balance.

(1) Moderate impairment: Turns slowly, requires verbal cuing, requires several small steps to catch balance following turn and stop.

(0) Severe impairment: Cannot turn safely, requires assistance to turn and stop.

6. Step over obstacle

Instruction: Begin walking at your normal speed. When you come to the shoe box, step over it, not around it, and keep walking.

Grading: Mark the lowest category that applies.

(3) Normal: Is able to step over box without changing gait speed; no evidence for imbalance.

(2) Mild impairment: Is able to step over box, but must slow down and adjust steps to clear box safely.

(1) Moderate impairment: Is able to step over box but must stop, then step over. May require verbal cuing.

(0) Severe impairment: Cannot perform without assistance.

7. Step around obstacles

Instructions: Begin walking at your normal speed. When you come to the first cone (about 6') away), walk around the right side of it. When you come to the second cone (6' past first cone), walk around it to the left.

Grading: Mark the lowest category that applies.

(3) Normal: Is able to walk around cones safely without changing gait speed; no evidence of imbalance.

(2) Mild impairment: Is able to step around both cones, but must slow down and adjust steps to clear cones.

(1) Moderate impairment: Is able to clear cones, walks into one or both cones, or requires physical assistance.

(0) Severe impairment: Unable to clear cones, walks into one or both cones, or requires physical assistance.

8. Steps

Instructions: Walk up these stairs as you would at home (i.e., using the rail if necessary. At the top, turn around and walk down.

Grading: Mark the lowest category that applies.

(3) Normal: Alternating feet, no rail.

(2) Mild impairment: Alternating feet, must use rail.

(1) Moderate impairment: Two feet to a stair, must use rail.

(0) Severe impairment: Cannot do safely.

Scoring:

- Total DGI scores range from 0 – 24

INTERPRETATION GUIDELINES:

- In individuals with MS, a cut of > 12 is predictive of falling (sensitivity = 45% and specificity = 85%)[2]
- Normative values:[3]

Decade	Mean	SD	Range
3	24.0	0.2	23-24
4	24.0	0.2	23-24
5	23.9	0.4	22-24
6	23.9	0.4	22-24
7	23.2	0.9	21-24
8	22.0	2.0	13-24

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WEB BASED RESOURCES / INFORMATION:

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3. Vereeck L, Wuyts F, Truijen S, et al. Clinical assessment of balance: normative data, and gender and age effects. *Int J Audiol.*2008;47(2):67-75.

INSTRUMENT NAME: Expanded Disability Status Scale (EDSS) & Kurtzke Functional Systems Score (FSS)

REVIEWER: Kirsten Potter, PT, DPT, MS, NCS

GENERAL INFORMATION:

- The EDSS was first reported by Kurtzke in 1983[1] and is based on the FSS, originally developed as the Disability Status Scale (DSS) in 1955. The DSS was subsequently modified to the FSS.
- The FSS is based on 8 functional central nervous system (FS) components: pyramidal, cerebellar, brain stem, sensory, bowel/bladder, visual, cerebral and other. Each of these systems is independent from the others, but collectively they represent all neurological impairment seen in MS.[1]
- The EDSS/FSS is completed by a physician (usually a neurologist) and is considered to be the gold standard measure for individuals with MS.

EQUIPMENT NEEDED:

- FSS and EDSS forms
- Pen or pencil

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: 15 to 20 minutes

General Rules:

- While the measure is largely performance based, Lechner-Scott et al[2] developed and tested a version of the EDSS administered via phone that can be administered to the patient or caregiver

Definitions:

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Instructions:

- PDF forms for the EDSS and FSS may be obtained through the National Multiple Sclerosis Society webpage at http://www.nationalmssociety.org/for-professionals/researchers/clinical-study-measures/fss-and-edss/index.aspx

Expanded Disability Status Scale	
0.0	Normal Neurological Exam
1.0	No disability, minimal signs on 1 FS
1.5	No disability, minimal signs on 2 of 7 FS
2.0	Minimal disability in 1 of 7 FS
2.5	Minimal disability in 2 FS
3.0	Moderate disability in 1 FS; or mild disability in 3 - 4 FS, though fully ambulatory
3.5	Fully ambulatory but with moderate disability in 1 FS and mild disability in 1 or 2 FS; or moderate disability in 2 FS; or mild disability in 5 FS
4.0	Fully ambulatory without aid, up and about 12hrs a day despite relatively severe disability. Able to walk without aid 500 meters
4.5	Fully ambulatory without aid, up and about much of day, able to work a full day, may otherwise have some limitations of full activity or require minimal assistance. Relatively severe disability. Able to walk without aid 300 meters
5.0	Ambulatory without aid for about 200 meters. Disability impairs full daily activities
5.5	Ambulatory for 100 meters, disability precludes full daily activities
6.0	Intermittent or unilateral constant assistance (cane, crutch or brace) required to walk 100 meters with or without resting
6.5	Constant bilateral support (cane, crutch or braces) required to walk 20 meters without resting
7.0	Unable to walk beyond 5 meters even with aid, essentially restricted to wheelchair, wheels self, transfers alone; active in wheelchair about 12 hours a day
7.5	Unable to take more than a few steps, restricted to wheelchair, may need aid to transfer; wheels self, but may require motorized chair for full day's activities
8.0	Essentially restricted to bed, chair, or wheelchair, but may be out of bed much of day; retains self care functions, generally effective use of arms
8.5	Essentially restricted to bed much of day, some effective use of arms, retains some self care functions
9.0	Helpless bed patient, can communicate and eat
9.5	Unable to communicate effectively or eat/swallow
10.0	Death due to MS

Functional Systems Scores

Pyramidal Functions

0 - Normal
1 - Abnormal signs without disability
2 - Minimal disability
3 - Mild to moderate paraparesis or hemiparesis; severe monoparesis
4 - Marked paraparesis or hemiparesis, moderate quadriparesis; or monoplegia
5 - Paraplegia, hemiplegia, or marked quadriparesis
6 – Quadriplegia
V - Unknown

Cerebellar Functions

0 - Normal
1 - Abnormal signs without disability
2 - Mild ataxia
3 - Moderate truncal or limb ataxia
4 - Severe ataxia in all limbs
5 - Unable to perform coordinated movements due to ataxia
V - Unknown
X is used throughout after each number when weakness (grade 3 or worse on pyramidal) interferes with testing.

Brainstem Functions

0 - Normal
1 - Signs only
2 - Moderate nystagmus or other mild disability
3 - Severe nystagmus, marked extraocular weakness, or moderate disability of other cranial nerves
4 - Marked dysarthria or other marked disability
5 - Inability to swallow or speak
V - Unknown

Sensory Function

0 - Normal
1 - Vibration or figure-writing decrease only in one or two limbs
2 - Mild decrease in touch or pain or position sense, and/or moderate decrease in vibration in one or two limbs; or vibratory (c/s figure writing) decrease alone in three or four limbs
3 - Moderate decrease in touch or pain or position sense, and/or essentially lost vibration in one or two limbs; or mild decrease in touch or pain and/or moderate decrease in all proprioceptive tests in three or four limbs
4 - Marked decrease in touch or pain or loss of proprioception, alone or combined, in one or two limbs; or moderate decrease in touch or pain and/or severe proprioceptive decrease in more than two limbs
5 - Loss (essentially) of sensation in one or two limbs; or moderate decrease in touch or pain and/or loss of proprioception for most of the body below the head
6 - Sensation essentially lost below the head
V - Unknown

Bowel and Bladder Function

0 - Normal
1 - Mild urinary hesitance, urgency, or retention
2 - Moderate hesitance, urgency, retention of bowel or bladder, or rare urinary incontinence
3 - Frequent urinary incontinence
4 - In need of almost constant catheterization (and constant use of measures to evacuate stool)
5 - Loss of bladder function
6 - Loss of bowel and bladder function
V - Unknown

Visual Function

0 - Normal
1 - Scotoma with visual acuity (corrected) better than 20/30
2 - Worse eye with scotoma with maximal visual acuity (corrected) of 20/30.20/59
3 - Worse eye with large scotoma, or moderate decrease in fields, but with maximal visual acuity (corrected) of 20/60.20/99
4 - Worse eye with marked decrease of fields and maximal visual acuity (corrected) of 20/100.20/200; grade 3 plus maximal acuity of better eye of 20/60 or less
5 - Worse eye with maximal visual acuity (corrected) less than 20/200; grade 4 plus maximal acuity of better eye of 20/60 or less
6 - Grade 5 plus maximal visual acuity of better eye of 20/60 or less
V - Unknown
X is added to grades 0 – 6 for presence of temporal pallor

Cerebral (or Mental) Functions

0 - Normal
1 - Mood alteration only (does not affect EDSS score)
2 - Mild decrease in mentation
3 - Moderate decrease in mentation
4 - Marked decrease in mentation (chronic brain syndrome - moderate)
5 - Dementia or chronic brain syndrome, severe or incompetent
V - Unknown

Scoring:

- The EDSS is scored on a 1 – 10 scale (1 = normal neurological exam {all grade – in functional systems; cerebral grade 1 acceptable}) to 10 (death due to MS)[1]
- Each of the 8 items is scored on an ordinal clinical rating scale from 0 - 5 or 0 - 6. An expert system, using a computer system to compute EDSS scores semi-automatically, has been developed, but doesn't appear to be commonly discussed in the literature with exception of an article by Gaspari et al;[3] more information can be found at http://www.cs.unibo.it/~gaspari/www/aedss/whatis.html
- A calculator version, able to be used by personal digital assistants and computers, is also available and may be downloaded/purchased through iTunes, AndroLib, AppBrain, PC World, Android, among others

INTERPRETATION GUIDELINES:

- Amato et al[4] reported that while a change in 1 point on the FSS is often accepted as clinically important change, this may reflect variability (due to limited reliability) rather than actual change; thus, they recommend a change of ≥ 2 as a more reliable indication of clinical change
- In stable patients, scores on EDSS varied within 1 point, indicating that changes of at least 1 point for EDSS < 6.0 and 0.5 points for EDSS > 6.0 be considered to represent reliable change[5]

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WEB BASED RESOURCES / INFORMATION:

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1. Kurtzke JF. Rating neurologic impairment in multiple sclerosis: an expanded disability status scale (EDSS). *Neurology.*1983;33(11):1444-1452.
2. Lechner-Scott J, Kappos L, Hofman M, et al. Can the Expanded Disability Status Scale be assessed by telephone? *Mult Scler.*2003;9(2):154-159.
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4. Amato MP, Fratiglioni L, Groppi C, Siracusa G, Amaducci L. Interrater reliability in assessing functional systems and disability on the Kurtzke scale in multiple sclerosis. *Arch Neurol.*1988;45(7):746-748.
5. Schwid SR, Goodman AD, McDermott MP, Bever CF, Cook SD. Quantitative functional measures in MS: what is a reliable change? *Neurology.*2002;58(8):1294-1296.

INSTRUMENT NAME: Fatigue Descriptive Scale (FDS)

REVIEWER: Kathleen Brandfass, MS PT

GENERAL INFORMATION:

- FDS is a 5 category interview- based scale used to assess fatigue in Multiple Sclerosis (MS) in three areas: fatigue associated with asthenia (fatigue at rest), fatigue with exercise and fatigue with worsening symptoms.

EQUIPMENT NEEDED:

- FDS form

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: 15 to 20 minutes

General Rules:

- Scale is scored for initiative, modality, severity, frequency and presence or absence of Uhthoff's phenonmenon.

Definitions:

- Scale Domains: Fatigue, role function, social function, work and temperature

Instructions:

- Questions asked by interviewer
- Responses scored by interviewer

Scoring:

- Formula: Total= initiative x (modality+ frequency + severity) + Uhthoff's.
- Range is 0-3 for most questions.

INTERPRETATION GUIDELINES:

- Total for entire scale possible 17 points.
- The lower score the less fatigue related disability

COPYRIGHT INFORMATION:

- Score sheet and instructions available in original article by Iriate (6)

WEB BASED RESOURCES / INFORMATION:

- J. Iriarte, Avda Pio XII 36, Pamplona 31008, Spain

REFERENCES:

1. Iriate J, de Castro P. Fatigue Descriptive Scale in MultipleSclerosis (Abstract) Neurologia. 1993 ;8 : 346.
2. Iriarte J, de Castro P. Proposal of a new scale for assessing fatigue in patients with multiple Sclerosis. Neurologia. 1994; 9 :96-100
3. Iriarte J, Carreno M, de Castro P. Fatigue and functional system involvement in multiple sclerosis . Neurologia. 1996; 11: 210-215.
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11. Dittner A, Wessely S, Brown R. The assessment of fatigue A practicle guide for clinicians and researchers. Journal of Psychosomatic Research. 2004; 56: 157-170.
12. Benito-Leon J, Martinez-Martin P, Frades B, Martinez-Gines M,m de Andres C, Meca-Lallana J, Antigu

INSTRUMENT NAME: Fatigue Scale for Motor and Cognitive Functions (FSMC)

REVIEWER: Gail L. Widener, PhD, PT

GENERAL INFORMATION:

- The FSMC[1] is a 20-item scale developed as a measure of cognitive and motor fatigue for people with MS (pwMS). Instructions refer to a general time frame rather than a fixed time frame. This measure has been translated into 20 languages.[1]

EQUIPMENT NEEDED:

- Questionnaire

ADMINISTRATION INSTRUCTIONS:

Time to administer and score:

- 5-10 minutes to complete and score

General Rules:

- Self-report

Definitions:

-

Instructions:

- "The following questionnaire is about problems in everyday life which are directly associated with an extreme form of tiredness (fatigue). This extreme form of tiredness refers to an overwhelming state of lethargy, exhaustion and lack of energy which come on abruptly and is unrelated to any obvious external causes. It does not mean the sort of isolated episodes which everyone might experience in the course of the day, after exertion or after a sleepless night!
  Please read each statement carefully. Then decide to what extent each statement applied to you and your everyday life. Please try not to base your answers on the way you are feeling at the moment; instead try to give us a picture of the way you feel in normal day-to-day life. Please put a cross in the appropriate circle (only one cross per statement please!)"

Scoring:

- Total score (20 point), with cognitive (10 items) and motor (10 items) subscales

INTERPRETATION GUIDELINES:

-

COPYRIGHT INFORMATION:

- Questionnaire is available as supplemental materials in the Penner et al., 2005 article.[1]

WEB BASED RESOURCES / INFORMATION:

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REFERENCES:

1. Penner IK, Raselli C, Stocklin M, Opwis K, Kappos L, Calabrese P. The fatigue scale for motor and cognitive functions (FSMC): validation of a new instrument to assess multiple sclerosis-related fatigue. *Mult Scler.* 2009;15(12):1509-1517.

INSTRUMENT NAME: Four Square Step Test

REVIEWER: Evan Cohen, PT, MA, PhD, NCS

GENERAL INFORMATION:

- The FSST is a timed test of multidirectional stepping ability.

EQUIPMENT NEEDED:

- Four sticks/canes (90 cm length by 2.5 cm height)
- Stopwatch/timer

ADMINISTRATION INSTRUCTIONS:

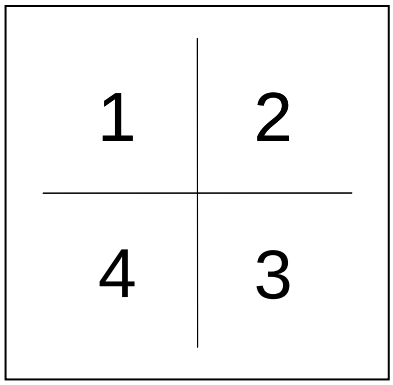
Time to administer and score: Less than five minutes

General Rules:

- The four sticks/canes are laid on the floor at 90-degree angles to one another to create a cross/plus-sign pattern. Quadrants are numbered as identified in the image below

Definitions:

Instructions:



The individual begins by standing in square 1, facing square 2. The individual is instructed to step as fast as possible into each square in the following sequence: 2, 3, 4, 1, 4, 3, 2, 1. Timing begins with first contact of the foot into square 2 and finishes when both feet return to square 1. The individual is given the following instructions: "Try to complete the sequence as fast as possible without touching the sticks. Both feet must make contact with the floor in each square. If possible, face forward during the entire sequence"[1]. The sequence is then demonstrated to the individual. The individual then performs one practice trial and two timed trials.

Scoring:

- The score is the best (lowest) time (in seconds) of the two measured trials.

INTERPRETATION GUIDELINES:

- A FSST time of ≥ 16.9 seconds had a positive predictive value of 81% and a negative predictive value of 53% for future falls in a group of 76 PWMS (EDSS range 3.0-6.5)[2]

COPYRIGHT INFORMATION:

- **N/A**

WEB BASED RESOURCES / INFORMATION:

- N/A

REFERENCES:

1. Dite W, Temple VA. A clinical test of stepping and change of direction to identify multiple falling older adults. *Archives of Physical Medicine & Rehabilitation.* Nov 2002;83(11):1566-1571.
2. Nilsagard Y, Lundholm C, Denison E, Gunnarsson LG. Predicting accidental falls in people with multiple sclerosis -- a longitudinal study. *Clinical Rehabilitation.* Mar 2009;23(3):259-269.

INSTRUMENT NAME: Fullerton Advanced Balance Scale (FABS)

REVIEWER: Gail L. Widener, PhD, PT

GENERAL INFORMATION:

- A multidimensional balance assessment developed for use with higher functioning independent older adults.[1-3] 10 performance-based activities that are scored on a 5-point ordinal scale (0-4).

EQUIPMENT NEEDED:

- Stop watch; 36" ruler; pen or pencil; 6" bench; metronome; 2 airex pads and one or more 12 inch lengths of non-slip material

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: 10-12 minutes

General Rules:

-

Definitions:

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Instructions:

- Instructions for each item in the test are well described in the Test Administration Instructions; downloadable from website listed below.

Scoring:

- 10 items scored 0-4 (0=unable, 4=best performance)
- Total test score of 40 points
- There are no subscales

INTERPRETATION GUIDELINES:

- http://hhd.fullerton.edu/csa/CenterProducts/centerproducts_assessment.htm; download interpretation form

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WEB BASED RESOURCES / INFORMATION:

- http://hhd.fullerton.edu/csa/CenterProducts/centerproducts_assessment.htm; can download the instruction sheets, score sheet, interpretation form.

REFERENCES:

1 Rose DJ, Lucchese N, Wiersma LD. Development of a multidimensional balance scale for use with functionally independent older adults. *Arch Phys Med Rehabil.* 2006; 87:1478-1485.

2 Hernandez D, Rose DJ. Predicting which older adults will or will not fall using the Fullerton advanced balance scale. *Arch Phys Med Rehabil.* 2008; 89:2309-2315.

3 Westlake KP, Culham EG. Sensory-specific balance training in older adults: effect on proprioceptive reintegration and cognitive demands. *Phys Ther.* 2007;87(10):1274-1283

INSTRUMENT NAME: Function in Sitting Test (FIST)

REVIEWER: Susan E. Bennett, PT, DPT, EdD, NCS, MSCS

GENERAL INFORMATION:

- Performance based, 14-item balance measure aimed at comprehensive, specific, efficient, and functional assessment of sitting balance.

EQUIPMENT NEEDED:

- Standard hospital bed
- Step stool

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: Less than 15 minutes

General Rules:

- For the bedside assessment of sitting balance in acute post-stroke adults with moderate to severe neurologic impairment.
- Can be used for patients post-stroke in an acute facility or inpatient rehab.

Definitions:

-

Instructions:

- The patient sits at the edge of a standard hospital bed with the proximal thigh (1/2 femur length) supported by the bed. Hips and knees are bent to approximately 90 degrees flexion with both feet flat on the floor or on a stool. Patients are guarded throughout the test to prevent injury or falls.
- 14 items are assessed:
  - Static sitting
  - Nod no
  - Sitting, eyes closed
  - Anterior nudge
  - Posterior nudge
  - Lift uninvolved foot
  - Reach behind with uninvolved arm
  - Lateral nudge
  - Forward reach
  - Lateral reach with uninvolved arm
  - Pick up object from floor

- Posterior scoot
- Anterior scoot
- Lateral scoot

Scoring:

- 14 items scored 0-4 (0= complete assistance, 4= independent)
- Total test score of 56
- There are no subscales
- Client must perform all 14 items on the test

INTERPRETATION GUIDELINES:

- Has not been used in the MS population as of yet.
- Limited research available. Further testing with larger sample sizes and follow up reviews are needed.
- Has only been tested in an acute post-stroke population, with moderate to severe disability.
- Ceiling effects in people with post-neurological insult that have higher levels of functional skills. For example people with standing and ambulation ability.

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WEB BASED RESOURCES / INFORMATION:

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REFERENCES:

1) Gorman SL, Radtka S, Melnick ME, et al. Development and validation of the Function in Sitting Test in adults with acute stroke. *J Neurol Phys Ther*. 2010 Sep;34(3): 150-60.

INSTRUMENT NAME: Functional Assessment of Multiple Sclerosis

REVIEWER: Amy M. Yorke, PT, NCS

GENERAL INFORMATION:

- Quality of life instrument of for use in people with MS[1]
- Consists of 59 items (44 of which are scored) in six quality of life domains[1]
    - Mobility (7 items)
    - Symptoms (7 items)
    - Emotional well-being (7 items)
    - General Contentment (7 items)
    - Thinking/Fatigue (9 items)
    - Family/Social Well-being (7 items)
- Additional Concerns subscale (15 items) consists of items that fall outside the six domains but that may provide further clinical value[1]
- Persons completing the tool answer items on a 5 point Likert scale with "0" meaning "not at all" to "4" meaning "very much"
- Embedded within the FAMS is a 28-item cancer quality of life questionnaire[1]
  Higher scores indicate better quality of life[1,2]

EQUIPMENT NEEDED:

- Score Sheets

ADMINISTRATION INSTRUCTIONS:
Detailed instructions are provided by http://www.facit.org/FACITOrg

Time to administer and score:

- 20 minutes

General Rules:

Definitions:

Instructions: Person with MS is asked to mark the response as it applies to their life in the past 7 days.

Scoring:

- FAMS Total score (range 0-176) is derived by adding the Mobility (range 0-28), Symptoms (range 0-28), Emotional Well-Being (0-28), General Contentment (range 0-28), Thinking and Fatigue (range 0-36), and Family/Social Wellbeing (range 0-28)[1]
- Additional Concerns (range 0-56) are not included in the total FAMS score[1]
- For guidelines on handling missing data and scoring option, refer to the FAMS Administration and Scoring Guidelines found online at www.facit.org

FAMS Version 4

Below is a list of statements that other people with your illness have said are important. **Please circle or mark one number per line to indicate your response as it applies to the <u>past 7 days</u>.**

	MOBILITY	**Not at all**	**A little bit**	**Some-what**	**Quite a bit**	**Very much**
GP3	Because of my physical condition, I have trouble meeting the needs of my family	0	1	2	3	4
GF1	I am able to work (include work at home)	0	1	2	3	4
An6	I have trouble walking	0	1	2	3	4
ITU3	I have to limit my social activity because of my condition	0	1	2	3	4
CNS5	I have strength in my legs	0	1	2	3	4
MS1	I have trouble getting around in public places	0	1	2	3	4
MS2	I have to take my condition into account when making plans	0	1	2	3	4

	SYMPTOMS	**Not at all**	**A little bit**	**Some-what**	**Quite a bit**	**Very much**
GP2	I have nausea	0	1	2	3	4
GP4	I have pain	0	1	2	3	4
GP6	I feel ill	0	1	2	3	4
HI12	I feel weak all over	0	1	2	3	4
BRM1	I have pain in my joints	0	1	2	3	4
MS3	I am bothered by headaches	0	1	2	3	4
MS4	I am bothered by muscle pains	0	1	2	3	4

Please circle or mark one number per line to indicate your response as it applies to the <u>past 7 days</u>.

	EMOTIONAL WELL-BEING	**Not at all**	**A little bit**	**Some-what**	**Quite a bit**	**Very much**
GE1	I feel sad	0	1	2	3	4
GE3	I am losing hope in the fight against my illness	0	1	2	3	4
GF3	I am able to enjoy life	0	1	2	3	4
MS5	I feel trapped by my condition	0	1	2	3	4
MS6	I am depressed about my condition	0	1	2	3	4
MS7	I feel useless	0	1	2	3	4
MS8	I feel overwhelmed by my condition	0	1	2	3	4

	GENERAL CONTENTMENT	**Not at all**	**A little bit**	**Some-what**	**Quite a bit**	**Very much**
GF2	My work (include work at home) is fulfilling	0	1	2	3	4
GF4	I have accepted my illness	0	1	2	3	4
GF6	I am enjoying the things I usually do for fun	0	1	2	3	4
GF7	I am content with the quality of my life right now	0	1	2	3	4
MS9	I am frustrated by my condition	0	1	2	3	4
Sp5	I feel a sense of purpose in my life	0	1	2	3	4
HI6	I feel motivated to do things	0	1	2	3	4

Please circle or mark one number per line to indicate your response as it applies to the <u>past 7 days</u>.

	THINKING AND FATIGUE	Not at all	A little bit	Some-what	Quite a bit	Very much
GP1	I have a lack of energy	0	1	2	3	4
An2	I feel tired	0	1	2	3	4
An3	I have trouble starting things because I am tired	0	1	2	3	4
An4	I have trouble finishing things because I am tired	0	1	2	3	4
MS10	I need to rest during the day	0	1	2	3	4
HI9	I have trouble remembering things	0	1	2	3	4
HI8	I have trouble concentrating	0	1	2	3	4
MS11	My thinking is slower than before	0	1	2	3	4
MS12	I have trouble learning new tasks or directions	0	1	2	3	4

	FAMILY/SOCIAL WELL-BEING	Not at all	A little bit	Some-what	Quite a bit	Very much
GS1	I feel close to my friends	0	1	2	3	4
GS2	I get emotional support from my family	0	1	2	3	4
GS3	I get support from my friends	0	1	2	3	4
GS4	My family has accepted my illness	0	1	2	3	4
GS5	I am satisfied with family communication about my illness	0	1	2	3	4
MS13	My family has trouble understanding when my condition gets worse	0	1	2	3	
MS14	I feel “left out” of things	0	1	2	3	4

Please circle or mark one number per line to indicate your response as it applies to the <u>past 7 days</u>.

	ADDITIONAL CONCERNS	Not at all	A little bit	Some-what	Quite a bit	Very much
GP5	I am bothered by side effects of treatment	0	1	2	3	4
GP7	I am forced to spend time in bed	0	1	2	3	4
GS6	I feel close to my partner (or the person who is my main support)	0	1	2	3	4
GS7	I am satisfied with my sex life	0	1	2	3	4
GE2	I am satisfied with how I am coping with my illness	0	1	2	3	4
GE4	I feel nervous	0	1	2	3	4
GE6	I worry that my condition will get worse	0	1	2	3	4
GF5	I am sleeping well	0	1	2	3	4
MS15	Heat worsens my symptoms	0	1	2	3	4
BL1	I have trouble controlling my urine	0	1	2	3	4
BL2	I urinate more frequently than usual	0	1	2	3	4
BRM2	I am bothered by the chills	0	1	2	3	4
BRM3	I am bothered by fevers (episodes of high body temperature)	0	1	2	3	4
MS16	I am bothered by muscle spasms	0	1	2	3	4

INTERPRETATION GUIDELINES: Higher scores indicate higher quality of life

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- License for use of any English version of a FACIT measure is granted free of charge.
- Investigators are required to notify FACIT of any related reports or publications as they are published

WEB BASED RESOURCES / INFORMATION:

- http://www.facit.org/FACITOrg

REFERENCES:

1. Cella DF, Dineen K, Arnason B, Reder A, Webster KA, Karabatsos G, Chang C, Lloyd S, Mo F, Stewart J, Stefoski D. Validation of the functional assessment of multiple sclerosis quality of life instrument. *Neurology.* 1996;47(1):129-139.
2. Webster K, Cella D, Yost K. The functional assessment of chronic illness therapy (FACIT) measurement system: properties, applications, and interpretation. *Health and Quality of Life Outcomes.* 2003;1:79.

INSTRUMENT NAME: Functional Gait Assessment

REVIEWER: Kirsten Potter, PT, DPT, MS, NCS

GENERAL INFORMATION:

- The FGA is based on the Dynamic Gait Index. It was developed to overcome problematic issues related to the DGI (e.g., ceiling effect; lack of clear administration and scoring procedures)[1]
- 10 items, 7 of which were included in the DGI, plus 3 new items (gait with narrow base of support; ambulating backwards; gait with eyes closes)

EQUIPMENT NEEDED:

- A marked 6-m (20-ft) walkway that is marked with a 30.48-cm (12-in) width
- Scoring form
- Stopwatch
- Shoe box
- Stairs with railing

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: 15 – 20 min.

General Rules:

- Grading: Mark the highest category that applies.

Definitions:

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Instructions:

-

Functional Gait Assessment **Maximum Score = 30**

1. GAIT LEVEL SURFACE
Instructions: *Walk at your normal speed from here to the next mark (6 m [20 ft]).*

(3) Normal—Walks 6 m (20 ft) in less than 5.5 seconds, no assistive devices, good speed, no evidence for imbalance, normal gait pattern, deviates no more than 15.24 cm (6 in) outside of the 30.48-cm (12-in) walkway width.

(2) Mild impairment—Walks 6 m (20 ft) in less than 7 seconds but greater than 5.5 seconds, uses assistive device, slower speed, mild gait deviations, or deviates 15.24–25.4 cm (6–10 in) outside of the 30.48-cm (12-in) walkway width.

(1) Moderate impairment—Walks 6 m (20 ft), slow speed, abnormal gait pattern, evidence for imbalance, or deviates 25.4 – 38.1 cm (10–15 in) outside of the 30.48-cm (12-in) walkway width. Requires more than 7 seconds to ambulate 6 m (20 ft).

(0) Severe impairment—Cannot walk 6 m (20 ft) without assistance, severe gait deviations or imbalance, deviates greater than 38.1 cm (15 in) outside of the 30.48-cm (12-in) walkway width or reaches and touches the wall.

2. CHANGE IN GAIT SPEED
Instructions: *Begin walking at your normal pace (for 1.5 m [5 ft]). When I tell you "go," walk as fast as you can (for 1.5 m [5 ft]). When I tell you "slow," walk as slowly as you can (for 1.5 m [5 ft]).*

(3) Normal—Able to smoothly change walking speed without loss of balance or gait deviation. Shows a significant difference in walking speeds between normal, fast, and slow speeds. Deviates no more than 15.24 cm (6 in) outside of the 30.48-cm (12-in) walkway width.

(2) Mild impairment—Is able to change speed but demonstrates mild gait deviations, deviates 15.24–25.4 cm (6–10 in) outside of the 30.48-cm (12-in) walkway width, or no gait deviations but unable to achieve a significant change in velocity, or uses an assistive device.

(1) Moderate impairment—Makes only minor adjustments to walking speed, or accomplishes a change in speed with significant gait deviations, deviates 25.4–38.1 cm (10–15 in) outside the 30.48-cm (12-in) walkway width, or changes speed but loses balance but is able to recover and continue walking.

(0) Severe impairment—Cannot change speeds, deviates greater than 38.1 cm (15 in) outside 30.48-cm (12-in) walkway width, or loses balance and has to reach for wall or be caught.

3. GAIT WITH HORIZONTAL HEAD TURNS

Instructions: *Walk from here to the next mark 6 m (20 ft) away. Begin walking at your normal pace. Keep walking straight; after 3 steps, turn your head to the right and keep walking straight while looking to the right. After 3 more steps, turn your head to the left and keep walking straight while looking left. Continue alternating looking right and left every 3 steps until you have completed 2 repetitions in each direction.*

(3) Normal—Performs head turns smoothly with no change in gait. Deviates no more than 15.24 cm (6 in) outside 30.48-cm (12-in) walkway width.

(2) Mild impairment—Performs head turns smoothly with slight change in gait velocity (eg, minor disruption to smooth gait path), deviates 15.24–25.4 cm (6–10 in) outside 30.48-cm (12-in) walkway width, or uses an assistive device.

(1) Moderate impairment—Performs head turns with moderate change in gait velocity, slows down, deviates 25.4–38.1 cm (10–15 in) outside 30.48-cm (12-in) walkway width but recovers, can continue to walk.

(0) Severe impairment—Performs task with severe disruption of gait (eg, staggers 38.1 cm [15 in] outside 30.48-cm (12-in) walkway width, loses balance, stops, or reaches for wall).

4. GAIT WITH VERTICAL HEAD TURNS

Instructions: *Walk from here to the next mark (6 m [20 ft]). Begin walking at your normal pace. Keep walking straight; after 3 steps, tip your head up and keep walking straight while looking up. After 3 more steps, tip your head down, keep walking straight while looking down. Continue alternating looking up and down every 3 steps until you have completed 2 repetitions in each direction.*

(3) Normal—Performs head turns with no change in gait. Deviates no more than 15.24 cm (6 in) outside 30.48-cm (12-in) walkway width.

(2) Mild impairment—Performs task with slight change in gait velocity (e.g., minor disruption to smooth gait path), deviates 15.24–25.4 cm (6–10 in) outside 30.48-cm (12-in) walkway width or uses assistive device.

(1) Moderate impairment—Performs task with moderate change in gait velocity, slows down, deviates 25.4–38.1 cm (10–15 in) outside 30.48-cm (12-in) walkway width but recovers, can continue to walk.

(0) Severe impairment—Performs task with severe disruption of gait (e.g., staggers 38.1 cm [15 in] outside 30.48-cm (12-in) walkway width, loses balance, stops, reaches for wall).

5. GAIT AND PIVOT TURN
Instructions: *Begin with walking at your normal pace. When I tell you, "turn and stop," turn as quickly as you can to face the opposite direction and stop.*

(3) Normal—Pivot turns safely within 3 seconds and stops quickly with no loss of balance.

(2) Mild impairment—Pivot turns safely in _3 seconds and stops with no loss of balance, or pivot turns safely within 3 seconds and stops with mild imbalance, requires small steps to catch balance.

(1) Moderate impairment—Turns slowly, requires verbal cueing, or requires several small steps to catch balance following turn and stop.

(0) Severe impairment—Cannot turn safely, requires assistance to turn and stop.

6. STEP OVER OBSTACLE
Instructions: *Begin walking at your normal speed. When you come to the shoe box, step over it, not around it, and keep walking.*

(3) Normal—Is able to step over 2 stacked shoe boxes taped together (22.86 cm [9 in] total height) without changing gait speed; no evidence of imbalance.

(2) Mild impairment—Is able to step over one shoe box (11.43 cm [4.5 in] total height) without changing gait speed; no evidence of imbalance.

(1) Moderate impairment—Is able to step over one shoe box (11.43 cm [4.5 in] total height) but must slow down and adjust steps to clear box safely. May require verbal cueing.

(0) Severe impairment—Cannot perform without assistance.

7. GAIT WITH NARROW BASE OF SUPPORT
Instructions: *Walk on the floor with arms folded across the chest, feet aligned heel to toe in tandem for a distance of 3.6 m [12 ft]. The number of steps taken in a straight line are counted for a maximum of 10 steps.*

(3) Normal—Is able to ambulate for 10 steps heel to toe with no staggering.

(2) Mild impairment—Ambulates 7–9 steps.

(1) Moderate impairment—Ambulates 4–7 steps.

(0) Severe impairment—Ambulates less than 4 steps heel to toe or
cannot perform without assistance.

8. GAIT WITH EYES CLOSED
Instructions: *Walk at your normal speed from here to the next mark (6 m [20 ft]) with your eyes closed.*

(3) Normal—Walks 6 m (20 ft), no assistive devices, good speed, no evidence of imbalance, normal gait pattern, deviates no more than 15.24 cm (6 in) outside 30.48-cm (12-in) walkway width. Ambulates 6 m (20 ft) in less than 7 seconds.

(2) Mild impairment—Walks 6 m (20 ft), uses assistive device, slower speed, mild gait deviations, deviates 15.24–25.4 cm (6–10 in) outside 30.48-cm (12-in) walkway width. Ambulates 6 m (20 ft) in less than 9 seconds but greater than 7 seconds.

(1) Moderate impairment—Walks 6 m (20 ft), slow speed, abnormal gait pattern, evidence for imbalance, deviates 25.4–38.1 cm (10–15 in) outside 30.48-cm (12-in) walkway width. Requires more than 9 seconds to ambulate 6 m (20 ft).

(0) Severe impairment—Cannot walk 6 m (20 ft) without assistance, severe gait deviations or imbalance, deviates greater than 38.1 cm (15 in) outside 30.48-cm (12-in) walkway width or will not attempt task.

9. AMBULATING BACKWARDS
Instructions: *Walk backwards until I tell you to stop.*

(3) Normal—Walks 6 m (20 ft), no assistive devices, good speed, no evidence for imbalance, normal gait pattern, deviates no more than 15.24 cm (6 in) outside 30.48-cm (12-in) walkway width.

(2) Mild impairment—Walks 6 m (20 ft), uses assistive device, slower speed, mild gait deviations, deviates 15.24–25.4 cm (6–10 in) outside 30.48-cm (12-in) walkway width.

(1) Moderate impairment—Walks 6 m (20 ft), slow speed, abnormal gait pattern, evidence for imbalance, deviates 25.4–38.1 cm (10–15 in) outside 30.48-cm (12-in) walkway width.

(0) Severe impairment—Cannot walk 6 m (20 ft) without assistance, severe gait deviations or imbalance, deviates greater than 38.1 cm (15 in) outside 30.48-cm (12-in) walkway width or will not attempt task.

10. STEPS
Instructions: *Walk up these stairs as you would at home (ie, using the rail if necessary). At the top turn around and walk down.*

Grading: Mark the highest category that applies.
(3) Normal—Alternating feet, no rail.

(2) Mild impairment—Alternating feet, must use rail.

(1) Moderate impairment—Two feet to a stair; must use rail.

(0) Severe impairment—Cannot do safely.

Scoring:

- Scoring focuses on changes in balance or changes in gait patterns during the various walking tasks
- Instructions for each item are included on the scoring form
- Each item is scored from 0 – 3; scores range from 0 (worst performance) to 30 (best performance)

INTERPRETATION GUIDELINES:

- Although not tested in MS, the FGA is predictive of falls in Parkinson's disease and community dwelling older adults
- Parkinson's disease at cut off score ≤ 15/30 for predicting falls: sensitivity = 0.72 and specificity = 0.78; post-test probability with test ≤ cut off value = 59.6%; post-test probability with test > cut off value = 14.1%; LR+ = 3.24 (95% CI = 1.86 – 5.65); LR - = 0.36 (95% CI = 0.19 – 0.69) [2]
- Community dwelling older adults: at cut off of ≤ 22 for predicting prospective falls: sensitivity = 100%, specificity = 72%, + LR = 3.6, - LR = 0.0, + predictive value = 43%, - predictive value = 100%[3]

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WEB BASED RESOURCES / INFORMATION:

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3. Wrisley DM, Kumar NA. Functional Gait Assessment: Concurrent, discriminative, and predictive validity in community-dwelling older adults. *Phys Ther.*2010;90(5):761-773.

INSTRUMENT NAME: Functional Independence Measure (FIM)

REVIEWER: Kirsten Potter, PT, DPT, MS, NCS

GENERAL INFORMATION:

- FIM(TM) is a trademark of the Uniform Data System for Medical Rehabilitation, a division of UB Foundation Activities, Inc.

Uniform Data System for Medical Rehabilitation
270 Northpointe Parkway, Suite 300
Amherst, New York 14228
(716) 817-7800 FAX (716) 568-0037
email: info@udsmr.org
Web site: http://www.udsmr.org

- The FIM is a generic measure used to rate the amount of assistance required to perform basic activities of daily living.
- 18 items: 13 for FIM – motor scale and 5 for FIM – social-cognitive scale

Motor Domain:

1. Self-care (6 items)
   - Eating
   - Grooming
   - Bathing
   - Dressing-upper body
   - Dressing-lower body
   - Toileting
2. Sphincter control (2 items)
   - Bladder management
   - Bowel management
3. Transfers (3 items)
   - Bed/chair/wheelchair
   - Toilet
   - Tub/shower
4. Locomotion (2 items)
   - Walk/wheelchair
   - Stairs

Cognitive Domain:

5. Communication (2 items)
   - Comprehension
   - Expression

6. Social cognition (3 items)
- Social interaction
- Problem solving
- Memory

EQUIPMENT NEEDED:
- Any items that the subject uses to carry out their activities of daily living.

ADMINISTRATION INSTRUCTIONS:
Time to administer and score: 30-45 minutes

General Rules:
-

Definitions:
-

Instructions:
- Please refer to the following websites for obtaining FIM scoring software and training.

Scoring:
- All items are measured on a 7-point scale ranging from 1 (total assistance) to 7 (complete independence).
- Total FIM scores range from 18 – 126; Motor –FIM subscale ranges 13 – 91; Cognitive – FIM subscale range 5 – 35.
- Refer to the website below for obtaining FIM scoring software and training.

INTERPRETATION GUIDELINES:
-

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WEB BASED RESOURCES / INFORMATION:
- More information about the FIM can be found at: http://www.udsmr.org/WebModules/FIM/Fim_About.aspx

REFERENCES:

INSTRUMENT NAME: Functional Reach

REVIEWER: Kirsten Potter, PT, DPT, MS, NCS and Kathleen Brandfass, MS, PT

GENERAL INFORMATION:

- FR measures the distance of an individual's maximal forward reach from a fixed position while standing.[1]
- There are variations on FR in the literature: lateral FR,[2, 3] seated FR,[4-6] multi-directional reach test,[7] and one versus two arm FR.[8]
- These instructions focus on the standing forward reach test.

EQUIPMENT NEEDED:

- Yardstick
- Velcro or tape (to secure yardstick to wall)

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: 1-5 minutes

General Rules:

-

Definitions:

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Instructions:

- Individual stands next to a wall; yardstick secured at shoulder height. Person is perpendicular to yardstick with shoulder flexed to 90 degrees hand in fist. Person instructed to reach as far forward as possible without lifting heels or taking a step.
- Reach recorded from the position of the third metacarpal head on the yardstick. Test usually includes practice trial.
- Test can include 2-3 trials with average reported.

Scoring:

- Distance reached is recorded, in inches. Several studies have also reported results in centimeters.

INTERPRETATION GUIDELINES:

- Not available in MS, but are available for other patient populations.

Normative data:

- Men: mean FR (SD): age 20 – 40 = 16.7" (1.9); 41 – 69 = 14.9" (2.2); 70 – 89 = 13.2" (1.6)[1]
- Women: mean FR (SD): age 20 – 40 = 14.6"(2.2); 41 – 69 = 13.8" (2.2); 70 – 89 = 10.5" (3.5)[1]

Responsiveness:

- In Parkinson's disease: MDC_{95} = 9 cm[9] and SDD = 11.5 cm[10]
- In mild to moderate Alzheimer's disease: MDC_{95} = 3.15[11]
- In male veterans aged 40 – 105, responsiveness index = 0.97[12]

Predictive validity:

- 217 community dwelling males. Identified fallers from non-fallers: reported scores in inches
  0 inches- 8 times more likely to have 2 falls in 6 months as compared to person with 10 inch reach.
  FR< or equal to 6 inches: 4 times more likely to have 2 falls in 6 months as compared to person with 0 inch reach.
  FR > 6 inches but < 10 inches 2 times more likely to have 2 falls[13]

Sensitivity/Specificity:

- In 54 community dwelling individuals over the age of 65: sensitivity 63%/specificity 59% using 25 cm cut off to identify multiple fallers vs non multiple fallers[14]
- 30 community dwelling fallers using<18.5 cm as fall risk; able to identify falls: sensitivity- 75%/ specificity 67% (95% CI)[15]

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WEB BASED RESOURCES / INFORMATION:

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REFERENCES:

1. Duncan PW, Weiner DK, Chandler J, Studenski S. Functional reach: a new clinical measure of balance. *Journal of Gerontology.*1990;45(6):M192-197.
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14. Dite W, Temple VA. A clinical test of stepping and change of direction to identify multiple falling older adults. *Arch Phys Med Rehabil.*2002;83(11):1566-1571.
15. Thomas JI, Lane JV. A pilot study to explore the predictive validity of 4 measures of falls risk in frail elderly patients. *Arch Phys Med Rehabil.*2005;86(8):1636-1640.

INSTRUMENT NAME: Goal Attainment Scale or Scaling (GAS)

REVIEWER: Evan Cohen, PT, MA, PhD, NCS

GENERAL INFORMATION:

- GAS is a tool by which the PWMS (and/or along with the clinician) identifies a baseline standard of several tasks that the person deems important and achievable with therapy, then sets and prioritizes individualized, measurable goals against which to grade change. Change is graded using a 5-point scale.

EQUIPMENT NEEDED:

- Pen and paper, and equipment to measure chosen outcomes

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: 15-20 minutes to set appropriate goals with more time required if cognitive impairments are present. Additional time will then be required to test/measure these goals.

General Rules:

- The patient is typically asked to identify 3-5 goals.

Definitions:

-

Instructions:

Step 1: Identify the goals

Interview the subject to identify problem areas and establish an agreed set of priority "personal goals" to be achieved by an agreed date. Set goals should follow the SMART principle so are specific, measurable, attainable, realistic, and timely.

Step 2: Weight the goals

The chosen goals are then weighted by "importance" (determined by the participant/family) and the degree of "difficulty" (judged by the treating team). These are each graded on a scale of 0–3:

- 0 = not at all important/difficult
- 1 = a little important/difficult
- 2 = moderately important/difficult
- 3 = very important/difficult

The weight of each goal is the multiplicand of importance and difficulty: weight=importance x difficulty.

Step 3: Define the Expected Outcome
The 'expected outcome' is the most probable level of achievement if the subject receives the expected treatment. The level of achievement is rated on one of two 5-point scales. If the PWMS has some ability to perform the task at baseline, then the scale of expected outcomes are set as follows:

- A lot better than expected = +2
- A little better than expected = +1
- Achieved as expected = 0
- No change = -1
- Worse = -2

If the PWMS has no ability to perform the task at baseline (i.e. no possible declination), then goal achievement is measured as follows:

- A lot better than expected = +2
- A little better than expected = +1
- Achieved as expected = 0
- Partially achieved = -1
- No change = -2

Step 4: Scoring baseline
In order to allow for deterioration, baseline scores for each goal are allocated on admission as "–1" unless no clinically plausible worse outcome is possible, in which case a score of "–2" is given.

INTERPRETATION GUIDELINES:
The outcome score for each goal is rated at the appointed review date, judging actual performance against the pre-defined levels. This process should be done with the participant and/or family. The measure of attainment level over time is computed as T-score with a mean equal to 50 and a standard deviation of 10. A formula for this calculation was published by Kiresuk and Sherman[2]. Alternatively, a scoring spreadsheet for both scale versions can be downloaded from the website listed under the Web Based Resources heading, below.

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- N/A

WEB BASED RESOURCES / INFORMATION:

- www.marson-and-associates.com/GAS/goal_attainment_scaling_excel.html

REFERENCES:

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INSTRUMENT NAME: Guy's Neurological Disability Scale

REVIEWER: Susan E. Bennett, PT, DPT, EdD, NCS, MSCS

GENERAL INFORMATION:

- A comprehensive multidimensional clinical disability scale designed to assess the wide range of disability in patients with multiple sclerosis. It is a questionnaire driven by patient interview and can be applied by any health care personnel. (Sharrack 2, Hoogervorst)

EQUIPMENT NEEDED:

- Questionnaire, writing utensil

ADMINISTRATION INSTRUCTIONS:

Time to administer and score:

- 4 min 30 seconds to 7 min 37 seconds (Sharrack 2)
- 9 minutes +/- 3, with an additional 5 minutes for scoring (Rossier)
- 5-10 minutes (Fraser)

General Rules:

- Patient must be able to communicate effectively with interviewer.

Definitions:

- Of the three dimensions of the World Health Organization disablement model, disability is thought to be the main disease consequence, which has a direct and practical relevance to patients as it determines their ability to perform their various daily activities.
- The GNDS is based on the concept that disability in multiple sclerosis is multi-dimensional and can be considered in several separate categories.

Instructions:

- The patient is interviewed on 12 categories of disability that affect patients with Multiple Sclerosis. Any health care professional can administer the questionnaire.

Scoring:

- Questionnaire with 12 separate categories with an interview and scoring section. The questions are directed to assess the disability in the previous one month.
- The disability subscales are:
    - Cognition
    - Mood

  - Vision
  - Speech
  - Swallowing
  - Upper limb function
  - Lower Limb Function
  - Bladder Function
  - Bowel Function
  - Sexual Function
  - Fatigue
  - 'Others'
- Each subscale is assessed using four to eight questions and for each question the patient must answer yes or no. In four sections (memory, mobility, speech, mood) there are also questions asking the opinion of another person.
- Severity for each subscale is graded from 0 (normal function) to 5 (total loss of function) based according to severity and impact on the individual. The total GNDS score is the sum of the 12 separate scores ranging between 0 (no disability) and 60 (maximum possible disability).

INTERPRETATION GUIDELINES:

- Patient must be able to communicate efficiently to participate.
- There may be difficulties with some patients that have severe impairment in one skill.
- Can be used with patients with an EDSS score ranging from 0.0-9.5. It has been tested in patients with score ranging from 0.0-7.5.
- Self report covering a very wide range of areas. Could be used in conjunction with other performance based measures.

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WEB BASED RESOURCES / INFORMATION:

- http://msj.sagepub.com.gate.lib.buffalo.edu/content/5/4/223.full.pdf+html

REFERENCES:

1. Sharrack B, Hughes R. Scale Development and Guy's Neurological Disability Scale. J Neurol. 1999 (246:226.
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INSTRUMENT NAME: Hauser Ambulation Index or Ambulation Index

REVIEWER: Susan E. Bennett, PT, DPT, EdD, NCS, MSCS

GENERAL INFORMATION:

- The AI is a rating scale developed by Hauser et al (1983) to assess mobility by evaluating the time and degree of assistance required to walk 25 feet. Scores range from 0 (asymptomatic and fully active) to 10 (bedridden). The patient is asked to walk a marked 25-foot course as quickly and safely as possible. The examiner records the time and type of assistance (e.g., cane, walker, crutches) needed

EQUIPMENT NEEDED:

- Stopwatch

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: Administration time will vary depending upon the ability of the patient. Total administration time should be approximately 1-5 minutes.

General Rules:

- The AI is administered in person by a trained examiner. The examiner need not be a physician or nurse.

Definitions:

- NA

Instructions:

- The patient is asked to walk a marked 25-foot course as quickly and safely as possible. The examiner records the time and type of assistance (e.g., cane, walker, crutches) needed.

Scoring:
0 = Asymptomatic; fully active.
1 = Walks normally, but reports fatigue that interferes with athletic or other demanding activities.
2 = Abnormal gait or episodic imbalance; gait disorder is noticed by family and friends; able to walk 25 feet (8 meters) in 10 seconds or less.
3 = Walks independently; able to walk 25 feet in 20 seconds or less.

4 = Requires unilateral support (cane or single crutch) to walk; walks 25 feet in 20 seconds or less.
5 = Requires bilateral support (canes, crutches, or walker) and walks 25 feet in 25 seconds or less; *or* requires unilateral support but needs more than 20 seconds to walk 25 feet.
6 = Requires bilateral support and more than 20 seconds to walk 25 feet; may use wheelchair* on occasion.
7 = Walking limited to several steps with bilateral support; unable to walk 25 feet; may use wheelchair* for most activities.
8= Restricted to wheelchair; able to transfer self independently.
9 = Restricted to wheelchair; unable to transfer self independently.

INTERPRETATION GUIDELINES:

- The use of a wheelchair may be determined by lifestyle and motivation. It is expected that patients in Grade 7 will use a wheelchair more frequently then those in Grades 5 or 6. Assignment of a grade in the range of 5 to 7, however, is determined by the patient.s ability to walk a given distance, and not by the extent to which the patient uses a wheelchair.

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WEB BASED RESOURCES / INFORMATION:

- http://www.nationalmssociety.org/for-professionals/researchers/clinical-study-measures/ai/index.aspx

REFERENCES:

1. Hauser SL, Dawson DM, Lehrich JR, Beal MF, Kevy SV, Propper RD, Mills JA,Weiner HL. Intensive immunosuppression in progressive multiple sclerosis. A randomized, three arm study of high-dose intravenous cyclophosphamide, plasma exchange, and ACTH.N Engl J Med. 1983 Jan 27;308(4):173-80.

INSTRUMENT NAME: High Level Mobility Assessment Tool (HiMat)

REVIEWER: Kirsten Potter, PT, DPT, MS, NCS and Kathleen Brandfass, MS, PT

GENERAL INFORMATION:

- The HiMAT was developed to quantify high level mobility outcomes following traumatic brain injury (TBI), but is reported to have potential applicability for patients with other neurological conditions, particularly in young adults[1]
- The HiMAT requires independent ambulation without an assistive device. It is reported to be suitable for patients with varying cognitive abilities.[2]
- 13 item scale including walking forward, walk backwards, walk on toes, walk over obstacle, running, skipping, hop, bounding (on more and less effected leg), and ascending/descending stairs.
- A revised 8-item HiMAT measure (no stair items) has been studied;[3] this instructions sheet will focus on the 13-item HiMAT

EQUIPMENT NEEDED:

- Stop watch
- Tape measure
- House brick or similar sized block
- 20-m walkway
- Flight of 14 stairs

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: 5 to 15 minutes

General Rules:

- Walking: The middle 10m of a 20m trial is timed.
- Walk backward: As for walking.
- Walk on toes: As for walking. Any heel contact during the middle 10m is recorded as a fail.
- Walk over obstacle: As for walking. A house brick is placed across the walkway at the mid-point. Patients must step over the brick without contacting it. A fail is recorded if patients step around the brick or make contact with the brick.
- Run: The middle 10m of a 20m trial is timed. A fail is recorded if patients fail to have a consistent flight phase during the trial.
- Skipping: The middle 10m of a 20m trial is timed. A fail is recorded if patients fail to have a consistent flight phase during the trial.
- Hop forward: Patients stand on their more affected leg and hop forward. The time to hop10m meters is recorded.

- Bound (affected). A bound is a jump from one leg to the other with a flight phase. Patients stand behind a line on their less affected leg, hands on hips, and jump forward landing on their more affected leg. Each bound is measured from the line to the heel of the landing leg. The average of three trials is recorded.
- Bound (less-affected). Patients stand behind a line on their more affected leg, hands on hips, and jump forward landing on their less affected leg. The average of three trials is recorded.
- Up stairs: Patients are asked to walk up a flight of 14 stairs as they normally would and at their normal speed. The trial is recorded from when the patient starts until both feet are at the top. Patients who use a rail or a non-reciprocal pattern are scored on Up Stairs Dependent. Patients who ascend the stairs reciprocally without a rail are scored on Up Stairs Independent and get an additional 5 points in the last column of Up Stairs Dependent.
- Down stairs: As for Up stairs.

Definitions:

-

Instructions:

- Subject suitability: The HiMAT is appropriate for assessing people with high-level balance and mobility problems. The minimal mobility requirement for testing is independent walking over 20m without gait aids. Orthoses are permitted.
- Patients are allowed 1 practice trial for each item.
- Patients are instructed to perform at their maximum safe speed except for the bounding and stair items.

Hi Level Mobility Assessment Tool (Hi Mat)							
ITEM	Performance	0	1	2	3	4	5
WALK	sec	x	> 6.6	5.4-6.6	4.3-5.3	< 4.3	x
WALK BACKWARD	sec		>13.3	8.1-13.3	5.8-8.0	< 5.8	x
WALK ON TOES	sec		> 8.9	7.0 - 8.9	5.4-6.9	< 5.4	x
WALK OVER OBSTACLE	sec		> 7.1	5.4-7.1	4.5-5.3	< 4.5	x
RUN	sec		> 2.7	2.0-2.7	1.7-1.9	< 1.7	x
SKIP	sec		> 4.0	3.5-4.0	3.0-3.4	< 3.0	x
HOP FORWARD (AFFECTED)	sec		> 7.0	5.3-7.0	4.1-5.2	< 4.1	x
BOUND (AFFECTED)	1) cm 2) 3)		< 80	80-103	104-132	> 132	x
BOUND (LESS-AFFECTED)	1) cm 2) 3)		< 82	82-105	106-129	> 129	x
UP STAIRS DEPENDENT (Rail **OR** not reciprocal: if not, score 5 and rate below)	sec		>22.8	14.6-22.8	12.3-14.5	<12.3	x
UP STAIRS INDEPENDENT (No rail **AND** reciprocal: if not score 0 and rate above)	sec		> 9.1	7.6-9.1	6.8-7.5	< 6.8	
DOWN STAIRS DEPENDENT (Rail **OR** not reciprocal: if not score 5 and rate below)	sec		>24.3	17.6-24.3	12.8-17.5	<12.8	x
DOWN STAIRS INDEPENDENT (No rail **AND** reciprocal: if not score 0 and rate above)	sec		> 8.4	6.6-8.4	5.8-6.5	< 5.8	x
SUBTOTAL							

TOTAL HiMAT SCORE /54

Scoring:

- All times and distances are recorded in the 'performance' column. The corresponding score for each item is then circled and each column is then subtotaled. Subtotals are then added to calculate the HiMAT score13 items summed; possible total score 54.
- Performance is noted in time (in seconds) or distance and then each item is converted to a score of 1 – 4 (exception: a 1 – 5 point scale is used for stair items)[2, 4]
- Patients are asked to perform each task at his/her maximum safe speed except for the bounding and stair items

INTERPRETATION GUIDELINES:

Not reported in MS, but is available in other patient populations.

Normative data:

- In healthy young males, aged 18 – 25 years: median HiMAT score = 54/54 (inter-quartile range 53-54)[4]
- In healthy young females, aged 18 – 25 years: median HiMAT score = 51/54 (inter-quartile range =48-53)[4]

Responsiveness:

- In TBI, MDC_{95}: improvement by 4 points or deterioration by 2 points[5, 6]
- In TBI, SEM = 1.36[5]; effect size > 1.08 and 1.89 (calculated via modified Liang and Liang methods, respectively)[6]

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WEB BASED RESOURCES / INFORMATION:

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6. Williams G, Robertson V, Greenwood K, et al. The concurrent validity and responsiveness of the high-level mobility assessment tool for measuring the mobility limitations of people with traumatic brain injury. *Arch Phys Med Rehabil.*2006;87(3):437-442.

INSTRUMENT NAME: Maximal Inspiratory and Expiratory Pressure (MIP and MEP, respectively)

REVIEWER: Evan Cohen, PT, MA, PhD, NCS

GENERAL INFORMATION:

- MIP and MEP, also called PI_{max} and PE_{max}, respectively, are indirect measures of strength of the inspiratory and expiratory respiratory muscles. Pressure is measured at the mouth during maximal inspiratory or expiratory effort. It is typically reported either as a raw value of pressure, or as the percentage of predicted values.

EQUIPMENT NEEDED:

- Mouthpieces and tubing, and a pressure measurement device connected to an analog or digital recorder.

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: Anecdotally, a single testing session to collect MIP and MEP values on a naïve patient/client (including equipment setup and patient orientation) runs approximately 30 to 60 minutes.

General Rules:

- MIP and MEP are indirect measures of respiratory muscle strength. They are dependent on the person's motivation, and on the person putting forth consistent, maximal effort during the testing procedure to ensure accurate measurement. It has been suggested that two practice sessions are conducted before a recorded measurement to ensure reliability.

Definitions:

-

Instructions:

- Instructions are specific to the pressure measurement device used for testing. MIP is typically measured at the starting point of lung residual volume, and MEP is typically measured at the starting point of total lung capacity.

Scoring:

- Is device specific, but is generally measured in pressure values of cm of H20, and can be reported as raw values or as a percentage of predicted values.

INTERPRETATION GUIDELINES:

- Formulae are available for calculating expected values in healthy adults. [1, 2] A number of studies have measured values in PWMS. [3-7]

COPYRIGHT INFORMATION:

- N/A

WEB BASED RESOURCES / INFORMATION:

- N/A

REFERENCES:

1. American Thoracic Society/European Respiratory S. ATS/ERS Statement on respiratory muscle testing. *Am J Respir Crit Care Med*. Aug 15 2002;166(4):518-624.
2. Evans JA, Whitelaw WA. The assessment of maximal respiratory mouth pressures in adults. *Respir Care*. Oct 2009;54(10):1348-1359.
3. Fry DK, Pfalzer LA, Chokshi AR, Wagner MT, Jackson ES. Randomized control trial of effects of a 10-week inspiratory muscle training program on measures of pulmonary function in persons with multiple sclerosis. *J Neurol Phys Ther.* Dec 2007;31(4):162-172.
4. Gosselink R, Kovacs L, Ketelaer P, Carton H, Decramer M. Respiratory muscle weakness and respiratory muscle training in severely disabled multiple sclerosis patients. *Archives of Physical Medicine & Rehabilitation.* Jun 2000;81(6):747-751.
5. Mutluay FK, Gurses HN, Saip S. Effects of multiple sclerosis on respiratory functions. *Clinical Rehabilitation.* Jun 2005;19(4):426-432.
6. Smeltzer SC, Skurnick JH, Troiano R, Cook SD, Duran W, Lavietes MH. Respiratory function in multiple sclerosis. Utility of clinical assessment of respiratory muscle function. *Chest.* Feb 1992;101(2):479-484.
7. Tantucci C, Massucci M, Piperno R, Betti L, Grassi V, Sorbini CA. Control of breathing and respiratory muscle strength in patients with multiple sclerosis. *Chest.* Apr 1994;105(4):1163-1170.

INSTRUMENT NAME: Maximal Oxygen Uptake: $VO_{2\ max}$ and $VO_{2\ peak}$

REVIEWER: Evan Cohen, PT, MA, PhD, NCS

GENERAL INFORMATION:

- Maximal oxygen uptake ($VO_{2\ max}$) is a widely reported measure of aerobic fitness. $VO_{2\ max}$ is assessed during a graded maximal exercise test. $VO_{2\ max}$ is the point at which oxygen uptake no longer increases (or increases only marginally) with an increase in workload. In the case that a plateau in oxygen uptake is never reached, this is a submaximal exercise test in which $VO_{2\ peak}$ is recorded. $VO_{2\ peak}$ has been used to predict $VO_{2\ max}$ based on published formulas.

EQUIPMENT NEEDED:

- $VO_{2\ max}$ is most accurately measured during a maximal exercise test with an open-circuit spirometer. The test is conducted on a treadmill or ergometer. Computerized systems are typically used. Data is collected and can provide a printout of test results. [1]
- Submaximal exercise tests can be used to measure $VO_{2\ peak}$ and/or estimate $VO_{2\ max}$. Please see the review by Noonan & Dean[2] for an overview of equipment required for some of these tests.

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: Approximately one hour is required for setup and orientation, the exercise test (~15-20 minutes), and a cool down period.

General Rules:

- Specific rules and instructions for different tests of maximal or peak oxygen uptake can be found either in the ACSM Manual[1] or in a review article by Noonan & Dean[2], both cited below.

Definitions:

- N/A

Instructions:

- N/A

Scoring:

- See references

INTERPRETATION GUIDELINES:

- $VO_{2\ max}$ values and their percentile rankings by gender and age grouping can be found in the ACSM guidelines[1]

COPYRIGHT INFORMATION:

- N/A

WEB BASED RESOURCES / INFORMATION:

- N/A

REFERENCES:

1. *ACSM's Guidelines for Exercise Testing and Prescription*. 8th ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2010.
2. Noonan V, Dean E. Submaximal exercise testing: clinical application and interpretation. *Phys Ther.* Aug 2000;80(8):782-807.

INSTRUMENT NAME: Modified Ashworth Scale

REVIEWER: Susan E. Bennett, PT, DPT, EdD, NCS, MSCS

GENERAL INFORMATION:

- The MAS measures spasticity in patients with lesions of the central nervous system by testing resistance to passive movement about a joint with varying degrees of velocity. Scoring range from 0-5.

EQUIPMENT NEEDED:

- Treatment table or bed

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: Administration time will vary depending on how many muscles are tested. Time per muscle group should be about one minute.

General Rules:

- Not reported

Definitions:

- NA

Instructions:

- Patient is asked to relax while examiner moves the extremity

Scoring:

- 0 No increase in muscle tone
- 1 Slight increase in muscle tone, manifested by a catch and release or by minimal resistance at the end of the range of motion when the affected part(s) is moved in flexion or extension
- 1+ Slight increase in muscle tone, manifested by a catch, followed by minimal resistance throughout the remainder (less than half) of the ROM
- 2 More marked increase in muscle tone through most of the ROM, but affected part(s) easily moved
- 3 Considerable increase in muscle tone, passive movement difficult
- 4 Affected part(s) rigid in flexion or extension

INTERPRETATION GUIDELINES:

- Not reported

COPYRIGHT INFORMATION:

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WEB BASED RESOURCES / INFORMATION:

- http://www.rehabmeasures.org/PDF%20Library/Modified%20Ashworth%20Scale%20Instructions.pdf

REFERENCES:

1. Bohannon RX, Smith ME. Interrater reliability of a Modified Ashworth Scale of muscle spasticity. Phys Ther 1987:67:206-207

INSTRUMENT NAME: Modified Fatigue Impact Scale (MFIS)

REVIEWER: Gail L. Widener, PhD, PT

GENERAL INFORMATION:

A modification of the Fatigue Impact Scale,[1] created during development of the MS Quality of Life Inventory (MSQLI)[2] assesses, via self-report, the effects of fatigue on physical, cognitive and psychosocial functioning in people with MS (pwMS). There are 21 items, with an abbreviated version that includes 5 items.

- A recent study using Rasch analysis of the measure claims that the affects of fatigue on physical and cognitive function are the only ones measured and that the total score should not be used.[3]

EQUIPMENT NEEDED:

- Questionnaire

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: 5-10 minutes for full version, 2-3 minute for abbreviated version

General Rules:

- Self report questionnaire, but can be used as an interview for people with visual or upper extremity dysfunction

Definitions:

-

Instructions:

- There are 21 items, with an abbreviated version that includes 5 items.

Scoring:

- Each item is rated on a 5-point likert scale (0-4). Total score (0-84) and subscales for physical (0-36), cognitive (0-40) and psychosocial functioning (0-8). The 5 item version is scored (0-20). Higher numbers indicate greater fatigue.

INTERPRETATION GUIDELINES:

- Self-report questionnaire. Rietberg et al.[5] suggest that due to low response to change, measures should be repeated multiple times rather than only pre-post assessments.

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WEB BASED RESOURCES / INFORMATION:

- Questionnaire available through the NMSS website: www.nationalmssociety.org/for-professionals/researchers/clinical-study-measures/msqli/index.aspx
- pdf downloaded from the above website includes instructions for scoring

REFERENCES:

1 Fisk JD, Ritvo PG, Ross L, et al. Measuring the functional impact of fatigue: initial validation of the fatigue impact scale. *Clin Infect Dis.* 1994;18 (Suppl 1): S79-S83.
2. Fischer JS, LaRocca NG, Miller DM, Ritvo PG, Andrews H, Paty DW. Recent developments in the assessment of quality of life in multiple sclerosis. *Mult Scler.* 1999;5(4):251-259.
3. Mills RJ, Young CA, Pallant JF, Tennant A. Rasch analysis of the modified fatigue impact scale (MFIS) in multiple sclerosis. *J Neurol Neurosurg Psychiatry*. 2010;81:1049-1051.
4. Kos D, Kerckhops E, Nagels G, Hooghe BDD, Duquet W. Assessing fatigue in multiple sclerosis: Dutch modified fatigue impact scale. *Acta Neurol Belg.* 2003;103:185-191.
5. Rietberg MB, Van Wegen EEH, Kwakkel G. Measuring fatigue in patients with multiple sclerosis: reproducibility, responsiveness and concurrent validity of three Dutch self-report questionnaires. *Disabil Rehabil.* 2010;32(22):1870-1876.

INSTRUMENT NAME: Motion Sensitivity Test

REVIEWER: Amy M. Yorke, PT, NCS

GENERAL INFORMATION:

- Evaluates symptoms of motion provoked dizziness by moving the patient in 16 different positions.[1]
- Developed to be used as a basis to develop an individualized exercise program for patients that have motion provoked dizziness[1-4]

EQUIPMENT NEEDED:

- Score sheet
- Stop watch
- Plinth or mat table for patient to lie on

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: Approximately 15 minutes

General Rules:

- Patient needs to be able to quantify subjective complaints of dizziness and differentiate changes in symptoms with movement

Definitions:

-

Instructions:

- Patient rates symptoms on a scale of 0 (no symptoms) to 5 (severe symptoms) at baseline
- Intensity of symptoms on a scale of 0 (no symptoms) to 5 (severe symptoms) is recorded after every movement
- Duration (seconds) of symptoms is timed and recorded until the intensity returns to baseline after every movement
- Movements are as follows:
    - Sit to supine
    - Roll supine to left
    - Roll supine to right
    - Supine to sit
    - Left Dix-Hallpike position
    - Return to sit from left Dix-Hallpike position
    - Right Dix-Hallpike position

- Return to sit rom right Dix-Hallpike position
- Sitting, head tipped to left knee
- Head up from left knee
- Sitting, head tipped to right knee
- Head up from right knee
- Sitting, turn head horizontally 5 times
- Sitting, turn head vertically 5 times
- Standing, turn 180° to the right
- Standing, turn 180° to the left

MOTION SENSITIVITY TEST

	Intensity* (0-5)	**D**uration (seconds) 5-10 secs=1 point 11-30secs=2 points >30 secs=3 points	Score **(I + D)**
Baseline Symptoms			
1. Sitting to supine			
2. Supine to left side			
3. Supine to right side			
4. Supine to sitting			
5. Left Dix-Hallpike			
6. Return to sit from left Dix-Hallpike			
7. Right Dix-Hallpike			
8. Return to sit from right Dix-Hallpike			
9. Sitting, head tipped to left knee			
10. Head up from left knee			
11. Sitting, head tipped to right knee			
12. Head up from right knee			
13. Sitting, turn head horizontally 5 times			
14. Sitting, move head vertically 5 times			
15. Standing, turn 180 degrees to right			
16. Standing, turn 180 degrees to left			
TOTAL SCORE			
MSQ			

- MSQ=Total score x # of positions with symptoms
- 20.48
- *When scoring, make sure to use ***the change in intensity*** if baseline symptoms exist.

Scoring:

- Baseline symptoms (if any) are subtracted from the intensity of symptoms immediately after every movement
- Duration (seconds) of symptoms is timed and recorded until the intensity returns to baseline after every movement
- Duration of symptoms is assigned a point score (0-4 seconds = 0, 5-10 seconds = 1, 11-29 seconds = 2, > 30 seconds = 3).
- The intensity (if any change from baseline, range 1-5) and duration scores (0-3) are added together for each of the 16 positions
- A Motion Sensitivity Quotient (MSQ) is calculated by multiplying the number of positions that provoked symptoms (change in baseline) by the total of the intensity and duration scores, and divided by 2048 (maximum possible score)

INTERPRETATION GUIDELINES: MSQ of 0 means no symptoms and 100 means severe, continuous symptoms with all movements

COPYRIGHT INFORMATION:

- Not applicable

WEB BASED RESOURCES / INFORMATION:

REFERENCES:

1. Smith-Wheelock M, Shepard NT, Telian SA. Physical therapy program for vestibular rehabilitation. *The American Journal of Otology*. 1991;12(3):218-225.
2. Shepard NT, Telian SA. Programmatic vestibular rehabilitation. *Otolaryngol Head Neck Surg.* 1995;112:173-182.
3. Shepard NT, Telian SA, Smith-Wheelock M, Raj A. *Vestibular and balance rehabilitation therapy.* 1993;102:198-205.
4. Shepard NT, Telian SA, Smith-Wheelock M. Habituation and balance retraining therapy. *Neurologic Clinics.* 1990;8(2):459-475.
5. Akin F., Davenport MJ. Validity and reliability of the Motion Sensitivity Test. *Journal of Rehabilitation Research and Development.* 2003 40;(5): 415-422.

INSTRUMENT NAME: Movement Ability Measure

REVIEWER: Kirsten Potter, PT, DPT, MS, NCS

GENERAL INFORMATION:

- Based on the Movement Continuum Theory[1] which identifies 6 dimensions of movement: flexibility, strength, accuracy, speed, adaptability, and endurance
- The MAM allows subjects to interpret movement as a whole or to differentiate movement into the dimensions within the context of their own life
- Applicable to a broad range of subjects across movement ability levels and those with/without pathological conditions

EQUIPMENT NEEDED:

- MAM form
- Pen or pencil
- Can also be completed online at http://movementability.com/

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: 20 minutes to administer

General Rules:

- A proxy may complete the MAM for individuals who do not read English or for those lacking the physical capability to complete the measure

Definitions:

-

Instructions:

- "Each box has 6 statements ordered from highest to lowest ability. In each box, choose the statement that comes closest to your usual ability to move now, and the statement that comes closes to the ability you would like to have even if you had to work hard for it."[2]
- "Mark 1 number on the left (Now) and 1 number on the right (Would Like) in each box."[2]

Movement Ability Measure

Each box has six statements ordered from highest to lowest ability. In each box, choose the statement that comes closest to your usual ability to move now, this week, and the statement that comes closest to the ability you would like to have even if you had to work hard for it.

Mark **one** number on the left (Now) AND **one** number on the right (Would Like) in **each** box.

Now		Would Like
6	I move so easily that I can stretch or reach extra far compared to others.	**6**
5	I move easily enough for all my normal tasks plus free time and play activities.	**5**
4	I move easily enough to do all my normal tasks but not more.	**4**
3	I move with difficulty in my normal tasks because of stiffness or tightness.	**3**
2	I have so much stiffness or tightness that I need special equipment or help to do some of my normal tasks.	**2**
1	Stiffness or tightness keeps me from doing most of my daily care.	**1**

Now		Would Like
6	I am so strong that I can lift or carry extra heavy loads.	**6**
5	I am strong enough for all my normal tasks plus free time and play activities.	**5**
4	I am strong enough to do all my normal tasks but not more.	**4**
3	I have difficulty with my normal tasks because of weakness.	**3**
2	I am so weak that I need special equipment or help to do some of my normal tasks.	**2**
1	Weakness keeps me from doing most of my daily care.	**1**

Now		Would Like
6	I can move so accurately in my direction and timing that I can reach an extra small or moving target at just the right moment.	**6**
5	I move with good direction and timing enough for all my normal tasks plus free time and play activities.	**5**
4	I move with good direction and timing enough to do all my normal tasks but not more.	**4**
3	I have difficulty with my normal tasks because of misdirection or poor timing.	**3**
2	I have so much misdirection and poor timing that I need special equipment or help to do some of my normal tasks.	**2**
1	Misdirection and poor timing keep me from doing most of my daily care.	**1**

Mark **one** number on the left and **one** number on the right in **each** box.

Now		Would Like
6	I can move so fast that I can usually reach a goal extra quickly.	**6**
5	I move fast enough to put on a burst of speed when sometimes needed for free time and play activities.	**5**
4	I move fast enough to do all my normal tasks but not more.	**4**
3	I have difficulty completing my normal tasks because of slowed movement.	**3**
2	I move so slowly that I need special equipment or help to do some of my normal tasks.	**2**
1	Slowness keeps me from doing most of my daily care.	**1**

Now		Would Like
6	I can sense (see, hear, feel) and adjust movements to the changes around me so well that I can drive or balance myself in extra challenging conditions.	**6**
5	I can sense and adjust movements to the conditions around me enough for all my normal tasks plus free time and play activities.	**5**
4	I can sense and adjust movements to changes in conditions (objects, floor, clothes) enough to do all my normal tasks but not more.	**4**
3	I have difficulty with my normal tasks because I have difficulty sensing changes in conditions around me and adjusting movement accordingly.	**3**
2	I have so much trouble sensing things and adjusting my movements that I need special equipment, help, or special set-up to do some normal tasks.	**2**
1	Trouble sensing and adjusting keeps me from doing most of my daily care.	**1**

Now		Would Like
6	I can sustain movement so long that I can do long periods of very physical activity regularly.	**6**
5	I can sustain movement long enough for all my normal tasks plus free time and play activities.	**5**
4	I can sustain movement long enough to do all my normal tasks but not more.	**4**
3	I have difficulty with my normal tasks because I need to stop and take rests.	**3**
2	I have to stop and rest so frequently that I need special equipment or help to do some of my normal tasks.	**2**
1	Needing to stop and rest keeps me from finishing most of my daily care.	**1**

Mark **one** number on the left and **one** number on the right in **each** box.

Now		Would Like
6	I use my exceptional ability to bend, straighten, and twist often in contests or performances.	**6**
5	I can bend and twist enough in my body for a highly physical lifestyle.	**5**
4	I can bend and twist enough for normal physical activity.	**4**
3	I have had to limit my activities because I find it hard to bend or twist.	**3**
2	My body is a little creaky or hard to move so I have to have help from tools or other people for some of my activities.	**2**
1	People have to do many activities for me because I cannot bend, straighten, or twist enough to do things for myself.	**1**

Now		Would Like
6	I use my exceptional strength often in contests or performances.	**6**
5	I am strong enough for a highly physical lifestyle.	**5**
4	I am strong enough for normal physical activity.	**4**
3	I have had to limit my activities because I'm not strong enough for them.	**3**
2	My movements aren't very strong so I have to have help from tools or other people for some of my activities.	**2**
1	People have to do many activities for me because I'm not strong enough to do things for myself.	**1**

Now		Would Like
6	I use the exceptional exactness of my movement often in contests or performances.	**6**
5	I move exactly enough for a lifestyle requiring a lot of precise control.	**5**
4	I move exactly enough for normal precision in activities.	**4**
3	I have had to limit my activities because my movements are sometimes clumsy or uncontrolled.	**3**
2	My movements are a little clumsy so I have to have help from tools or other people to do some activities without hurting myself.	**2**
1	People have to do many activities for me because my movements are too clumsy or uncontrolled to allow me to do things for myself.	**1**

Mark **one** number on the left and **one** number on the right in **each** box.

Now		Would Like
6	I use my exceptionally rapid movement often in contests or performances.	**6**
5	I can move rapidly enough for a highly physical lifestyle.	**5**
4	I can move rapidly enough for normal physical activities.	**4**
3	I have had to limit my activities because I don't move rapidly enough to finish them in a timely fashion.	**3**
2	My movements take a long time so I have to have help from tools or other people for some activities that have a time limit.	**2**
1	People have to do many activities for me because I can't move rapidly enough to do things for myself.	**1**

Now		Would Like
6	I use my exceptional ability to note obstacles and move around them often in contests or performances.	**6**
5	I can move around obstacles enough for a highly physical lifestyle.	**5**
4	I can move around obstacles enough for normal physical activities.	**4**
3	I have had to limit my activities because I can't sense obstacles very well and move around them when I need to.	**3**
2	I don't always sense and move around obstacles well, so I have to have help from tools or other people sometimes to avoid injury.	**2**
1	People have to do many activities for me because I can't sense and move around obstacles enough to do things for myself.	**1**

Now		Would Like
6	I use my exceptional endurance often in contests or performances.	**6**
5	I have enough endurance for a highly physical lifestyle.	**5**
4	I have enough endurance for normal physical activities.	**4**
3	I have had to limit my activities because I tire quickly.	**3**
2	I get tired so I need help from tools or other people to get some lengthy tasks done.	**2**
1	People have to do many activities for me because I get too tired to do things for myself.	**1**

Mark **one** number on the left and **one** number on the right in **each** box.

Now		Would Like
6	Excellent joint mobility allows me to do things most people find too hard.	**6**
5	My joints are mobile enough for ordinary life skills plus anything else I want.	**5**
4	My joints are just mobile enough for all of my ordinary life skills to be easy.	**4**
3	I sometimes lack the joint mobility for ordinary life skills to be easy.	**3**
2	My lack of joint mobility means people have to help me with some life skills regularly.	**2**
1	Joint immobility results in my needing help for most of what I want to do.	**1**

Now		Would Like
6	Excellence at making forceful movements allows me to push, pull, or lift when most people find it too hard.	**6**
5	I can make forceful enough movements for ordinary life skills plus anything else I want to do.	**5**
4	I can put just enough force in my movements for all of my ordinary life skills to be easy.	**4**
3	I sometimes cannot put enough force in my movements for ordinary life skills to be easy.	**3**
2	My inability to make forceful movements means people have to help me with some life skills regularly.	**2**
1	Lack of force in my movements results in my needing help for most of what I want to do.	**1**

Now		Would Like
6	Excellent control over direction and timing of my movement allows me to do things with an accuracy most people find too hard to attain.	**6**
5	I can control the direction and timing of my movements enough for ordinary life skills plus anything else I want to do.	**5**
4	I can control the direction and timing of my movements just enough for all of my ordinary life skills to be easy.	**4**
3	I sometimes cannot control the timing and direction of my movements enough for ordinary life skills to be easy.	**3**
2	My inability to control the direction and timing of my movement means people have to help me with some life skills regularly.	**2**
1	Lack of control over the direction and timing of my movement results in my needing help for most of what I want to do.	**1**

Mark **one** number on the left and **one** number on the right in **each** box.

Now		**Would Like**
6	Excellence in my ability to keep going allows me to continue in a task or activity when most people find it too hard to go on.	**6**
5	I can keep going in my activity just long enough for ordinary life skills plus anything else I want to do.	**5**
4	I can keep going just long enough for all of my ordinary life skills to be easy.	**4**
3	I sometimes can't keep going long enough for ordinary life skills to be easy.	**3**
2	My inability to keep going means people have to help me with some life skills regularly.	**2**
1	Inability to keep going results in needing help for most of what I want to do.	**1**

Now		**Would Like**
6	Excellence at reacting to my surroundings allows me to steer or balance well when most people find it too hard to do.	**6**
5	I react to my surroundings enough for ordinary life skills plus anything else I want to do.	**5**
4	I react to my surroundings just enough for all of my ordinary life skills to be easy.	**4**
3	I sometimes cannot react to my surroundings enough for ordinary life skills to be easy.	**3**
2	My inability to react to my surroundings means people have to help me with some life skills regularly.	**2**
1	Inability to react to my surroundings results in my needing help for most of what I want to do.	**1**

Now		**Would Like**
6	Excellent control over speeding up and slowing down allows me to set or change pace or rhythm when most people would lose control.	**6**
5	I can control speeding up or slowing down enough for ordinary life skills plus anything else I want to do in the time I want to do it.	**5**
4	I control my speeding up and slowing down just enough for all of my ordinary life skills to be easy and safe.	**4**
3	I sometimes cannot control my speeding up or slowing down enough for ordinary life skills to be easy or safe.	**3**
2	My inability to control my speeding up or slowing down means people have to help me with some life skills regularly.	**2**
1	Inability to control speeding up or slowing down results in my needing help for most of what I want to do.	**1**

Movement Ability Measure

Mark **one** number on the left and **one** number on the right in **each** box.

Now	Mark **one** number on the left and **one** number on the right in **each** box.	Would Like
6	My range of motion is like that of a star athlete or great performer.	**6**
5	My range of motion lets me move easily through both usual and non-routine activities.	**5**
4	I have enough range of motion for all my daily activities.	**4**
3	My range of motion is limited at times, but I can usually do what I need to.	**3**
2	My lack of range of motion limits me so that I need help with some usual daily activities.	**2**
1	My range of motion is so poor that helpers have to do most of my daily activities for me.	**1**

Now		Would Like
6	My strength is like that of a star athlete or great performer.	**6**
5	My strength lets me do both usual and non-routine activities.	**5**
4	I have enough strength for all my daily activities.	**4**
3	My strength is limited at times, but I can usually do what I need to do.	**3**
2	My lack of strength limits my movement so that I need help with some usual daily activities.	**2**
1	My strength is so poor that helpers have to do most of my daily activities for me.	**1**

Now		Would Like
6	My coordination is like that of a star athlete or great performer.	**6**
5	My coordination lets me do both usual and non-routine activities.	**5**
4	I have enough coordination for all my daily activities.	**4**
3	My coordination is limited at times, but I can usually do what I need to do.	**3**
2	My lack of coordination limits me so that I need help with some usual daily activities.	**2**
1	My coordination is so poor that helpers have to do most of my daily activities for me.	**1**

Mark **one** number on the left and **one** number on the right in **each** box.

Now		Would Like
6	I can move as swiftly as a star athlete or great performer.	**6**
5	My ability to move swiftly lets me do both usual and non-routine activities.	**5**
4	I have enough swiftness of movement for all my daily activities.	**4**
3	I can't move very swiftly at times, but I can usually do what I need to do.	**3**
2	My lack of ability to move swiftly limits me so that I need help with some usual daily activities.	**2**
1	My movement speed is so low that helpers have to do most of my daily activities for me.	**1**

Now		Would Like
6	I can sense and change direction as fast as a star athlete or great performer.	**6**
5	My ability to sense a problem while moving and then change directions lets me do both usual and non-routine activities.	**5**
4	I can sense and change directions enough for all my daily activities.	**4**
3	I cannot sense and change my direction very well at times, but I can usually do what I need to do.	**3**
2	My inability to sense a problem while moving and then change directions limits me so that I need help with some usual daily activities.	**2**
1	My ability to sense and change directions is so poor that helpers have to do most of my daily activities for me.	**1**

Now		Would Like
6	My stamina is like that of a star athlete or great performer.	**6**
5	My stamina lets me do both usual and non-routine activities.	**5**
4	I have enough stamina for all my daily activities.	**4**
3	My stamina is limited at times, but I can usually do what I need to do.	**3**
2	My lack of stamina limits me so that I need help with some usual daily activities.	**2**
1	My stamina is so poor that helpers have to do most of my daily activities for me.	**1**

Please check that you have marked one level for "Now" and one level for "Would Like" in each box.

Scoring:

- 24 items in total: 4 items representing each of the 6 dimensions[2]
- Each item consists of 6 statements indicating levels of movement ability from low (score of 1) to high (score of 6) capability
- For each item, respondents provide 2 ratings on the 1 – 6 scale: current (i.e., how they move now) and preferred (i.e., how they would like to move) movement capability
- Raw score ranges from 24 – 144 (higher scores indicating better perceived ability)
- MAM form available http://movementability.com/ provides automatic scoring

Movement Ability Measure

Score Sheet

Page	Item Number	NOW Responses: Flexibility	Strength	Accuracy	Speed	Adaptability	Endurance	WOULD LIKE Responses: Flexibility	Strength	Accuracy	Speed	Adaptability	Endurance
1	1												
	2												
	3												
	4												
2	1												
	2												
	3												
	4												
3	1												
	2												
	3												
	4												
4	1												
	2												
	3												
	4												
5	1												
	2												
	3												
	4												
6	1												
	2												
	3												
	4												
Now Totals													

Sum of NOW responses across all dimensions

_____

Sum of Would Like responses across all dimensions

_____

Movement Ability Levels	Range for Total NOW Responses*
Moves Competitively	121-144
Moves for Normal Activities Plus Extra	94-120
Moves for Normal Activities	73-93
Moves with Difficulty, but Can Do It	46-72
Moves Some, Needs Help	28-45
Needs Someone Else to Do For	24-27

*assuming no items unanswered

INTERPRETATION GUIDELINES:

- Higher scores on the MAM indicate better perceived ability

COPYRIGHT INFORMATION:

- MAM form and scoring sheet provided by MAM developer, Diane Allen, PT, PhD.
- The Movement Ability Measure (MAM) is the property of the author. The MAM may be used royalty-free by permission from the author (ddallen@sfsu.edu).

WEB BASED RESOURCES / INFORMATION:

- http://movementability.com/

REFERENCES:

1. Allen DD. Proposing 6 dimensions within the construct of movement in the movement continuum theory. *Phys Ther.*2007;87(7):888-898.
2. Allen DD. Validity and reliability of the movement ability measure: a self-report instrument proposed for assessing movement across diagnoses and ability levels. *Phys Ther.*2007;87(7):899-916.

INSTRUMENT NAME: Multi-component Fatigue Scale (a.k.a. Physical and Cognitive Fatigue scale)

REVIEWER: Evan Cohen, PT, MA, PhD, NCS

GENERAL INFORMATION:

- The MFS is essentially two separate descriptive scales: one for cognitive fatigue, and one for physical fatigue.

EQUIPMENT NEEDED:

- The questionnaire

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: Estimated to be 5 minutes.

General Rules:

- This is a paper and pen questionnaire of self-perceived fatigue, and should be completed by the patient rather than a proxy.

Definitions:

- N/A

Instructions:

- PWMS answer the series of questions: seven for the cognitive fatigue scale and eight for the physical fatigue scale.

Scoring:

- At baseline, items are measured on a scale of 1 (not at all) to 5 (a great deal). At follow-up, questions are altered slightly so that the PWMS rates the perceived change compared to a previous rating on a scale of 1 (much less) to 5 (much more), where a score of 3 indicates no change in fatigue. [1]

INTERPRETATION GUIDELINES:

- Paul et al do not describe scoring of the tool. [1] It appears that the raw score for each question in the cognitive fatigue battery are summed for a total cognitive fatigue score, and the raw score for each question in the physical fatigue battery are summed for a total physical fatigue score. It seems that differences can be examined between individual item change scores or between overall scale change scores, with higher change scores indicating greater/worse fatigue.

COPYRIGHT INFORMATION:

- N/A

WEB BASED RESOURCES / INFORMATION:

- N/A

REFERENCES:

1. Paul, R.H., Beatty, W.W., Schneider, R. (1998) Cognitive and Physical Fatigue in Multiple Sclerosis: Relations Between Self-Report and Objective Performance. *Applied Neuropsychology 5*(3) 143-148.

INSTRUMENT NAME: Multiple Sclerosis Functional Composite - MSFC

REVIEWER: Kathleen Brandfass MS PT

GENERAL INFORMATION:

- The MSFC was designed by the National Multiple Sclerosis Task Force to measure three component functions affecting MS: ambulation/lower extremity function, upper extremity function and cognitive function. The tests chosen by the task force included: the 25 foot walk test (25FWT), the 9-Hole Peg test (9HPT), and the 3 version of the Paced Auditory Serial Addition Test (PASAT-3).

EQUIPMENT NEEDED:

- Marked 25 foot walkway; stop watch.
- 9 Hole Peg test (available through- the Rolyan)
- 9-Hole Peg Test is a one-piece molded plastic model that is distributed by Smith & Nephew, Inc. (Rehabilitation Division); One Quality Drive; PO Box 1005;Gemantown, WI 53022-8205; Phone: (800) 558-8633; FAX: (800) 545-7758.); stop watch.
- PASAT-3 (PASAT audiocassette tapes or CDs are available through: Stephen Rao, Ph. D. ; Section of Neuropsychology; MCW Clinic at Froedtert; 9200 W. Wisconsin Avenue; Milwaukee, WI 53226; e-mail: srao@mcw.edu).

ADMINISTRATION INSTRUCTIONS:

Time to administer and score:

Time to administer MSFC test may vary on the ability of the individual tested- total time approximately 30 minutes.

25FWT: 3 trials 25 foot walk. Assistive device may be used; approximately 3 minutes each trial.

9-HPT: Pegs are positioned in a well on the board; pegs placed individually into holes on the board and returned one by one back to the well . Initial position of the board is midline and well is positioned towards the hand being tested. 2 trials each dominant and non-dominant hand- approximately 5 minutes

PASAT-3: Single digits are presented every 3 seconds; the individual must add each new digit to the one presented before it. The test score is the number of correct answers (out of 60 possible) in each trial. An audiocassette tape or CD player, audiocassette tape or CD with PASAT stimuli, clipboard and PASAT Record Forms needed to administer the test.

General Rules:

- Detailed rules from the Administration and Scoring Manual from the National MS Society

Definitions:

- Detailed definitions for 25FWT; 9HPT, and PASAT-3 from the Administration and Scoring Manual from the National MS Society.

Instructions:

- Detailed instruction for administration of the MSFC test Administration and Scoring Manual from the National MS Society.

Scoring:

- The results from each of these three tests are transformed into Z-scores and averaged to yield a composite score for each patient at each time point.

INTERPRETATION GUIDELINES:

- Refer to the MSFC Manual and Administration Guidelines from the National MS Society

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WEB BASED RESOURCES / INFORMATION:

- National MS Society: http://www.nationalmssociety.org/for-professionals/researchers/clinical-study-measures/msfc/index.aspx.

REFERENCES:

1. Fisher JS, Jak AJ, Kniker JE, Rudick RA, Cutter G. Multiple Sclerosis Functional Composite (MSFC): Administration and Scoring Manual: National Multiple Sclerosis Society; 2001: http://www.nationalmssociety.org/for-professionals/researchers/clinical-study-measures/msfc/index.aspx. Accessed August 2, 2011.
2. Cohen JA, Fischer JS, Bolibrush DM, et al. Intrarater and interrater reliability of the MS functional composite outcome measure. *Neurology.* Feb 22 2000;54(4):802-806.
3. Solari A, Radice D, Manneschi L, Motti L, Montanari E. The multiple sclerosis functional composite: different practice effects in the three test components. *J Neurol Sci.* Jan 15 2005;228(1):71-74.
4. Cohen JA, Cutter GR, Fischer JS, et al. Use of the multiple sclerosis functional composite as an outcome measure in a phase 3 clinical trial. *Arch Neurol.* Jun 2001;58(6):961-967.
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6. Hobart J, Kalkers N, Barkhof F, Uitdehaag B, Polman C, Thompson A. Outcome measures for multiple sclerosis clinical trials: relative measurement precision of the Expanded Disability Status Scale and Multiple Sclerosis Functional Composite. *Mult Scler.* Feb 2004;10(1):41-46.
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10. Kragt JJ, Thompson AJ, Montalban X, et al. Responsiveness and predictive value of EDSS and MSFC in primary progressive MS. *Neurology.* Mar 25 2008;70(13 Pt 2):1084-1091.
11. Rudick RA, Cutter G, Baier M, et al. Use of the Multiple Sclerosis Functional Composite to predict disability in relapsing MS. *Neurology.* May 22 2001;56(10):1324-1330.
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13. Kalkers NF, Bergers L, de Groot V, et al. Concurrent validity of the MS Functional Composite using MRI as a biological disease marker. *Neurology.* Jan 23 2001;56(2):215-219.
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15. Fisher E, Rudick RA, Cutter G, et al. Relationship between brain atrophy and disability: an 8-year follow-up study of multiple sclerosis patients. *Mult Scler.* Dec 2000;6(6):373-377.
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17. McGuigan C, Hutchinson M. The multiple sclerosis impact scale (MSIS-29) is a reliable and sensitive measure. *J Neurol Neurosurg Psychiatry.* Feb 2004;75(2):266-269.
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INSTRUMENT NAME: Multiple Sclerosis Impact Scale (MSIS-29)

REVIEWER: Diane D. Allen, PhD, PT

GENERAL INFORMATION:

- The multiple sclerosis impact scale (MSIS-29) is a 29-item self-report measure with 20 items associated with a physical scale and 9 items with a psychological scale.[1] Items ask about the impact of MS on day-to-day life in the past two weeks. All items have 5 response options: 1 “not at all” to 5 “extremely”. Each of the two scales are scored by summing the responses across items, then converting to a 0-100 scale where 100 indicates greater impact of disease on daily function (worse health).

EQUIPMENT NEEDED:

- MSIS-29 scale, pen/pencil

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: 10-15 minutes

General Rules:

-

Definitions:

-

Instructions:

Multiple Sclerosis Impact Scale (MSIS-29)

- The following questions ask for your views about the impact of MS on your day-to-day life **during the past two weeks**
- For each statement, please **circle** the **one** number that **best** describes your situation
- Please answer **all** questions

In the past two weeks, how much has your MS limited your ability to...		Not at all	A little	Moderately	Quite a bit	Extremely
1.	**Do physically demanding tasks?**	1	2	3	4	5
2.	**Grip things tightly (e.g. turning on taps)?**	1	2	3	4	5
3.	**Carry things?**	1	2	3	4	5

In the past two weeks, how much have you been bothered by...		Not at all	A little	Moderately	Quite a bit	Extremely
4.	**Problems with your balance?**	1	2	3	4	5
5.	**Difficulties moving about indoors?**	1	2	3	4	5
6.	**Being clumsy?**	1	2	3	4	5
7.	**Stiffness?**	1	2	3	4	5
8.	**Heavy arms and/or legs?**	1	2	3	4	5
9.	**Tremor of your arms or legs?**	1	2	3	4	5
10.	**Spasms in your limbs?**	1	2	3	4	5
11.	**Your body not doing what you want it to do?**	1	2	3	4	5
12.	**Having to depend on others to do things for you?**	1	2	3	4	5

Please check that you have answered all the questions before going on to the next page

In the past two weeks, how much have you been bothered by...		Not at all	A little	Moderately	Quite a bit	Extremely
13.	**Limitations in your social and leisure activities at home?**	1	2	3	4	5
14.	**Being stuck at home more than you would like to be?**	1	2	3	4	5
15.	**Difficulties using your hands in everyday tasks?**	1	2	3	4	5
16.	**Having to cut down the amount of time you spent on work or other daily activities?**	1	2	3	4	5
17.	**Problems using transport (e.g. car, bus, train, taxi, etc.)?**	1	2	3	4	5
18.	**Taking longer to do things?**	1	2	3	4	5
19.	**Difficulty doing things spontaneously (e.g. going out on the spur of the moment)?**	1	2	3	4	5
20.	**Needing to go to the toilet urgently?**	1	2	3	4	5
21.	**Feeling unwell?**	1	2	3	4	5
22.	**Problems sleeping?**	1	2	3	4	5
23.	**Feeling mentally fatigued?**	1	2	3	4	5
24.	**Worries related to your MS?**	1	2	3	4	5
25.	**Feeling anxious or tense?**	1	2	3	4	5
26.	**Feeling irritable, impatient, or short tempered?**	1	2	3	4	5
27.	**Problems concentrating?**	1	2	3	4	5
28	**Lack of confidence?**	1	2	3	4	5
29.	**Feeling depressed?**	1	2	3	4	5
Please check that you have circled ONE number for EACH question						
© 2000 Neurological Outcome Measures Unit, 4th Floor Queen Mary Wing, NHNN, Queen Square, London WC1N 3BG, UK						

Scoring:

- Sum the scores across all items, subtract by the number of items, divide by the total possible, then multiply by 100. Thus, for the physical items (1-20) assuming all items have a response: sum, subtract 20, divide by 80, and multiply by 100. And for the psychological items (21-29) assuming all items have a response: sum, subtract 9, divide by 36, multiply by 100.
- A Version 2 has been developed and is under investigation. Version 2 has 4 response options for all items.[2]

INTERPRETATION GUIDELINES:

- The two scales are distinct and should not be combined.
- The items ask for the impact of MS on daily life in the past 2 weeks. Sensitivity to change will be limited in short intervals.

COPYRIGHT INFORMATION:

WEB BASED RESOURCES / INFORMATION:

-

REFERENCES:

1. Hobart J, Lamping D, Fitzpatrick R, Riazi A, Thompson A. The Multiple Sclerosis Impact Scale (MSIS-29): a new patient-based outcome measure. *Brain.* 2001;124(Part 5):962-973.
2. Hobart J, Cano S. Improving the evaluation of therapeutic interventions in multiple sclerosis: the role of new psychometric methods. *Health Technology Assessment.* 2009;13(12):1-200.

INSTRUMENT NAME: MS International Quality of Life Questionnaire (MusiQoL)

REVIEWER: Kirsten Potter, PT, DPT, MS, NCS

GENERAL INFORMATION:

- A 31-item self-administered, multi-dimensional, health related quality of life (QOL) measure designed specifically for individuals with MS, developed in consultation with individuals with MS[1]
- 9 dimensions of QOL: activities of daily living (ADL, 8 items); psychological well-being (PWB, 4 items); symptoms (SPT, 3 items); friends relationships (RFr, 4 items); family relationships (RFa, 3 items), satisfaction with health care (RHCS, 3 items); sentimental and sexual life (SSL, 2 items), coping (COP, 2 items), and rejection (REJ, 2 items)[1]

EQUIPMENT NEEDED:

- Questionnaire
- Pen/pencil

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: 10 minutes on average

General Rules:

-

Definitions:

-

Instructions: Questionnaire reported in Simeoni et al[1]

For each question, check the response that is closest to your feelings. Due to your MS, during the past four weeks, have you…

1. Had difficulty walking or moving outside?
2. Had difficulty with outdoor activities: i.e., shopping, going out to a movie..?
3. Had difficulty walking or moving around at home?
4. Been troubled by your balance or walking problems?
5. Had difficulty with leisure activities at home: i.e., do-it-yourself, gardening…?
6. Had difficulty with your occupational activities: i.e., integration, interruption, limitation…?
7. Been quickly tired?
8. Been short of energy?

9. Felt anxious?
10. Felt depressed or gloomy?
11. Felt like crying?
12. Felt nervous or irritated by a few things or situations?
13. Been troubled by loss of memory?
14. Had difficulty concentrating: i.e., when reading, watching a film, following a discussion…?
15. Been troubled by your vision: worsened or unpleasant?
16. Experienced unpleasant feelings: i.e., hot, cold…?
17. Talked with your friends?
18. Felt understood by your friends?
19. Felt encouraged by your friends?
20. Talked with your spouse/partner or your family?
21. Felt understood by your spouse/partner or your family?
22. Felt encouraged by your spouse/partner or your family?
23. Felt satisfied with your love life?
24. Felt satisfied with your sex life?
25. Felt that your situation is unfair?
26. Felt bitter?
27. Been upset by the stares of other people?
28. Been embarrassed when in public?
29. Been satisfied with the information on your disease or the treatment giving by the doctors, nurses, psychologists…. taking care of your MS?
30. Felt understood by the doctors, nurses, psychologists…. taking care of your MS?
31. Been satisfied with your treatments?

Scoring:

- Scored on a 6-point likert scale:
  - 1 = never/not
  - 2 = rarely/a little
  - 3 = sometimes/somewhat
  - 4 = often/a lot
  - 5 = always/very much
  - 6 = not applicable[1]
- Negatively worded item scores are reversed so that higher scores indicate higher levels of QOL
- Dimension scores and a total score are computed as follows:[1] a score for each dimension is obtained by computing the mean of the item scores within the dimension; if less than half of the items are missing, the mean of the non-missing items is substituted for the missing items; all dimension scores are linearly transformed to a 0 –

100 scale; a global index score (range: 0 – 100) is computed as the mean of the dimension scores

INTERPRETATION GUIDELINES:

-

COPYRIGHT INFORMATION:

-

WEB BASED RESOURCES / INFORMATION:

-

REFERENCES:

1. Simeoni M, Auquier P, Fernandez O, et al. Validation of the Multiple Sclerosis International Quality of Life questionnaire. *Mult Scler.*2008;14(2):219-230.

INSTRUMENT NAME: Multiple Sclerosis Quality of Life-54 Items (MSQOL-54)

REVIEWER: Diane D. Allen, PhD, PT

GENERAL INFORMATION:

- The MSQOL-54 is a multidimensional health-related quality of life measure that combines both generic and MS-specific items into a single instrument.[1]
- The generic items are from the SF-36 to which 18 items were added to provide more information regarding MS-specific issues.[2] No overall summary score is used: the MSQOL-54 consists of 12 subscales, two combined summary scores, and two single-item measures. The subscales are: physical function, role limitations-physical, role limitations-emotional, pain, emotional well-being, energy, health perceptions, social function, cognitive function, health distress, overall quality of life, and sexual function. The summary scores are the physical health composite summary and the mental health composite summary. The single item measures are satisfaction with sexual function and change in health.
- The MSQOL-54 is a structured, self-report questionnaire that the patient can generally complete with little or no assistance. It may also be administered by an interviewer. However, patients with visual or upper extremity impairments may need to have the MSQOL-54 administered as an interview. Interviewers should be trained in basic interviewing skills and in the use of this instrument.

EQUIPMENT NEEDED:

- Scale, pen/pencil/computer

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: 11-18 minutes to take; 5-10 minutes to score.

General Rules:

-

Definitions:

-

Instructions:

- See below for website to download scale and scoring instructions.

Scoring:

- There is no single overall score for the MSQOL-54. Two summary scores - **physical health** and **mental health** - can be derived from a weighted combination of scale scores.

There are 12 subscales: **physical function, role limitations-physical, role limitations-emotional, pain, emotional well-being, energy, health perceptions, social function, cognitive function, health distress, overall quality of life**, and **sexual function**. Sub-scale scores require a scoring key because of reverse scoring on some items. There are also two single-item measures: **satisfaction with sexual function and change in health.**

INTERPRETATION GUIDELINES:

- Validity is limited if there is a high percentage of missing data, such as in the two sexual scales.[3]

COPYRIGHT INFORMATION:

- The MSQOL-54 can be found in (Vickrey et al, 1995). Download the MSQOL-54 administration forms and scoring instructions (PDF). For permission to use the MSQOL-54, please contact Dr. Barbara Vickrey at bvickrey@ucla.edu.
- More detailed information concerning the SF-36 and related instruments can be found on the QualityMetric website.

WEB BASED RESOURCES / INFORMATION:

- Information on this page comes from the NMSS website:

http://www.nationalmssociety.org/for-professionals/researchers/clinical-study-measures/msqol-54/index.aspx

REFERENCES:

1. Vickrey BG, Hays RD, Harooni R, Myers LW, Ellison GW. A health-related quality of life measure for multiple sclerosis. *Qual Life Res.* 1995;4:187-206.
2. Vickrey BG, Hays RD, Genovese BJ, Myers LW, Ellison GW. Comparison of a generic to disease-targeted health-related quality of life measures for multiple sclerosis. *J Clin Epidemiol.* 1997;50:557-569.
3. Freeman JA, Hobart JC, Thompson AJ. Does adding MS-specific items to a generic measure (the SF-36) improve measurement? *Neurol.* 2001;57:68-74.

INSTRUMENT NAME: Multiple Sclerosis Quality of Life Inventory

REVIEWER: Amy M. Yorke, PT, NCS

GENERAL INFORMATION:

- MSQLI is a battery of tests consisting of 138 items organized into 10 individual scales providing a quality of life measure that is both generic and MS-specific.[1]
    - Health Status Questionnaire (SF-36): 36 items
    - Modified Fatigue Impact Scale (MFIS): 21 items*
    - MOS Pain Effects Scale (PES): 6 items
    - Sexual Satisfaction Scale (SSS): 5 items
    - Bladder Control Scale (BLCS): 4 items
    - Bowel Control Scale (BWCS): 5 items
    - Impact of Visual Impairment Scale (IVIS): 5 items
    - Perceived Deficits Questionnaire (PDQ): 20 items*
    - Mental Health Inventory (MHI): 18 items*
    - MOS Modified Social Support Survey (MSSS): 18 items*
- Several of the individual scales have been supplied in both a full length and abbreviated version* reducing the number of items to 81.[1]
- Assesses current health status from the patient's perspective.[1]

EQUIPMENT NEEDED: Score sheets

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: 45 minutes

General Rules:

- Self-administered, can be given by interview

Scoring:

- Follow instructions in *Multiple Sclerosis Quality of Life Inventory: A User's Manual* found at http://www.nationalmssociety.org/for-professionals/researchers/clinical-study-measures/msqli/download.aspx?id=260

INTERPRETATION GUIDELINES:

- MSQLI does not provide one single number to summarize quality of life
- Each scale is scored separately, representing a different aspect of quality of life[1]
    - Health Status Questionnaire (SF-36): Score range 0-100, higher score indicating better health
        - Physical Functioning: Score range 0-100

- Role-Physical: Score range 0-100
- Bodily Pain: Score range 0-100
- General Health: Score range 0-100
- Vitality: Score range 0-90
- Social Functioning: Score range 12.5-100
- Role-Emotional: Score range 0-100
- Mental Health: Score range 0-100
- Physical Component Summary Score: Score range 13.6-61.9
- Mental Component Summary Score: Score range 15.6-70.0

- Modified Fatigue Impact Scale (MFIS): Score range 0-100, higher scores indicate greater impact of fatigue on patients' activities. Can be broken down into 3 subscales
  - Physical Subscale, score range 0-36
  - Cognitive Subscale, score range 0-40
  - Psychosocial Subscale, score range 0-84
- MOS Pain Effects Scale (PES): Score range 6-30 with higher scores indicating a greater impact of pain on a patient's mood and behavior
- Sexual Satisfaction Scale (SSS): Score range 4-24, higher score indicate greater problems with sexual satisfaction
- Bladder Control Scale (BLCS): Scores range 0-22, higher scores indicating greater bladder problems
- Bowel Control Scale (BWCS): Scores range 0-25, higher scores indicating greater bowel control problems
- Impact of Visual Impairment Scale (IVIS): Scores range 0-15, higher scores indicate greater impact of visual problems on daily activities
- Perceived Deficits Questionnaire (PDQ): Scores ranges 0-80 with higher scores indicate greater perceived cognitive impairment. Can be broken down into 4 subscales:
  - Attention/concentration, score range 0-20
  - Retrospective Memory, score range 0-20
  - Prospective Memory, score range 0-20
  - Planning/Organization, score range 0-20
- Mental Health Inventory (MHI): Score range 0-100, with higher scores indicating better mental health. Can be broken down into 4 subscales:
  - Anxiety, score range 0-100
  - Depression, score range 0-100
  - Behavioral Control, score range 0-100
  - Positive Affect, score range 0-100

- MOS Modified Social Support Survey (MSSS): Score range 0-100 with higher scores indicating greater perceived support. Can be broken down into 4 subscales:
  - Tangible Support, score range 0-100
  - Emotional/Information Support, score range 0-100
  - Affectionate Support , score range 0-100
  - Positive Social Interaction, score range 0-100

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WEB BASED RESOURCES / INFORMATION:

- http://www.nationalmssociety.org/for-professionals/researchers/clinical-study-measures/msqli/download.aspx?id=260

REFERENCES:

1. National Multiple Sclerosis Society: *Multiple Sclerosis Quality of Life Inventory: A User's Manual.* Available at http://www.nationalmssociety.org/for-professionals/researchers/clinical-study-measures/msqli/download.aspx?id=260. Accessed July 2011.

INSTRUMENT NAME: Multiple Sclerosis Spasticity Scale (MSSS - 88)

REVIEWER: Kirsten Potter, PT, DPT, MS, NCS and Kathi Brandfass, MS, PT

GENERAL INFORMATION:

- The MSSS-88[1] is a self report measure designed to capture the individual's perception of disease related spasticity on daily life. It assesses the impact of spasticity on various aspects of body function/structure, activity, and participation.
- Eight subscales: muscle stiffness, pain/discomfort, muscle spasms, activities of daily living, walking, body movements, emotional health, and social functioning.

EQUIPMENT NEEDED:

- Questionnaire
- Pen/pencil

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: Not indicated, but is rather lengthy.

General Rules:

-

Definitions:

-

Instructions:

- The copyrighted questionnaire is available at http://brain.oxfordjournals.org/content/suppl/2006/04/12/awh675.DC1/awh675supp.pdf

Scoring:

- 88 item questionnaire; 4 response options: 1- not bothered, 2- a little bothered, 3- moderately bothered, 4- extremely bothered.
- Three methods for scoring:
    - 1- Sum entire questionnaire to generate an ordinal level total score. Missing responses can be with the mean score if 50% or more of items completed
    - 2-Compute subscale scores individually
    - 3-Utilize Rasch analysis software

INTERPRETATION GUIDELINES:

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COPYRIGHT INFORMATION:

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WEB BASED RESOURCES / INFORMATION:

- http://brain.oxfordjournals.org/content/suppl/2006/04/12/awh675.DC1/awh675supp.pdf

REFERENCES:

1. Hobart JC, Riazi A, Thompson AJ, et al. Getting the measure of spasticity in multiple sclerosis: the Multiple Sclerosis Spasticity Scale (MSSS-88). *Brain.*2006;129(Pt 1):224-234.

INSTRUMENT NAME: Neuropathic Pain Scale (NPS)

REVIEWER: Kirsten Potter, PT, DPT, MS, NCS and Kathleen Brandfass, MS, PT

GENERAL INFORMATION:

- Developed to assess distinct pain qualities associated with neuropathic pain (described in an introduction to the measure and intended to facilitate an understanding of how pain may present sensations differently and how unpleasantness differs from intensity)[1]
- The scale includes 11 items of neuropathic pain: two items that describe global aspects of pain (intensity and unpleasantness), eight items that describe specific pain qualities (sharp, hot, dull, cold, sensitive, itchy, deep, and surface) and one item asking the individual to describe the temporal sequence of pain
- The NPS was developed for patients with neuropathic pain due to a variety of conditions (e.g., diabetic neuropathy, complex regional pain syndrome, and peripheral mononeuropathy) and it has been used for patients with MS

EQUIPMENT NEEDED:

- NPS scale
- Pen/pencil

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: 5-10 minutes

General Rules:

Definitions:

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Instructions:

- Instructions and the NPS questionnaire are provided in the original article by Galer et al[1]
- The NPS questionnaire may also be obtained at: http://www.painedu.org/Downloads/tools/NeuropathyPainScale.pdf

Scoring:

- Except for the descriptive question, the 10 items are scored on a 0 to 10 scale. Individual items are scored as well as total score[1, 2]
- To measure the multidimensional aspects of neuropathic pain, Galer et al[3] combined items to form four different NPS composite scores: the NPS 10 (sum of all 10 NPS items, on a 0 – 100 scale), NPS 8 (a standardized average score of all NPS items except intensity and unpleasant, normalized to a range of 0 – 100), NPS nonallodynic (NPS NA: a

standardized average score defined as the sum of the scores of all 8 sub-items no including allodynia/hyperalgesia {i.e., other than skin sensitivity and surface pain} normalized to a range of 0 – 100 point), and NPS 4 (a standardized average score of the sum of scores of 4 descriptors – sharp, hot, dull, and deep pain, normalized to a range of 0 – 100)

INTERPRETATION GUIDELINES:

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WEB BASED RESOURCES / INFORMATION:

- The NPS questionnaire may also be obtained at: http://www.painedu.org/Downloads/tools/NeuropathyPainScale.pdf

REFERENCES:

1. Galer BS, Jensen MP. Development and preliminary validation of a pain measure specific to neuropathic pain: the Neuropathic Pain Scale. *Neurology.*1997;48(2):332-338.
2. Rog DJ, Nurmikko TJ, Friede T, et al. Validation and reliability of the Neuropathic Pain Scale (NPS) in multiple sclerosis. *Clin J Pain.*2007;23(6):473-481.
3. Galer BS, Jensen MP, Ma T, et al. The lidocaine patch 5% effectively treats all neuropathic pain qualities: results of a randomized, double-blind, vehicle-controlled, 3-week efficacy study with use of the neuropathic pain scale. *Clin J Pain.*2002;18(5):297-301.

INSTRUMENT NAME: Nottingham Sensory Assessment (NSA)

REVIEWER: Gail L. Widener, PhD, PT

GENERAL INFORMATION:

- Nottingham Sensory Assessment (NSA) is a standardized scale to measure initial proprioception, two point discrimination and stereognosis in people post stroke and monitor change over time. Many items in the initial scale (1991) were found to be unreliable.[1] The scale was shortened, revised and retested in 1998 (rNSA).[2] The rNSA test was further standardized with more specific instructions in 2006 (EmNSA)[3] resulting in improved reliability scores.

EQUIPMENT NEEDED:

- Cotton ball, *neurotip, test tubes of hot water and cold water, talcum powder, blindfold, 3 coins of different denominations (dime, nickel, quarter), pencil, pen, comb, scissors, sponge, wash cloth, cup, glass. (translated objects found in England to those found in the US) *Neurotips are sterile single use neurological examination pins that avoid the risk of infection and skin puncture.

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: 60 minutes depending on the client's level on sensory deficit

General Rules:

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Definitions:

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Instructions:

- "The patient should be assessed in sitting and in a suitable state of undress (ideally in shorts and underwear, without compressions stockings). It should be ensured the patient is comfortable and in a quiet area with no distractions. Each test is described and demonstrated to the patient before he or she is blindfolded. The blindfold is removed regularly throughout the test to avoid the patient becoming disoriented.
- The body area to be tested is as marked on the body chart (included in the instruction sheet – see below for web access). Apply the test sensation to the test area, to the left and right side in a random order. The patient is asked to indicate, either verbally or by a boy movement, whenever he or she feels the test sensation.
- Each part of the body is assessed three times for each of the tests.

- Presence of a reflex does not count as awareness of sensation, though this should be commented on in the comment box."

Scoring:
If the patient has problems communicating begin testing light touch, pressure and pinprick sensations.
EmNSA: For tactile sensation (light touch, pressure, pinprick, temperature, tactile localization, bilateral simultaneous touch are each scored according to this)→
0 - *Absent* -fails to identify the test sensation on 3 trials
1 - *Impaired* - identifies the test sensation, but not on all 3 trials in each region of the body or feels duller
2 - *Normal* - correctly identifies the test sensation on 3 trials
9 – *Unable to test*

For kinesthesia →
0 - *Absent*- no appreciable movement taking place.
1 –*Appreciation of movement taking place* – patient indicates on each movement that a movement takes place by the direction is incorrect.
2 –*Direction of movement sense* – patient is able to appreciate and mirror the direction of the test movement taking place each time, but is inaccurate in its new position.
3 – *Joint position sense* – accurately mirrors the test movement within 10^0 of the new test position.
9 – *Unable to test*

For stereognosis →
2 – *Normal* – item is correctly named or matched.
1 - *Impaired* – some features of object identified or attempts at descriptions of objects.
0 – *Absent* – unable to identify the object in any manner.
9 – *Unable to test.*

INTERPRETATION GUIDELINES:

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WEB BASED RESOURCES / INFORMATION:

- *www.nottingham.ac.uk/iwho/documents/nsa_instructions_revised.pdf*

REFERENCES:

1. Lincoln NB, Crow JL, Jackson JM, Waters GR, Adams SA, Hodgson P. The unreliability of sensory assessments. *Clin Rehabil.* 1991; 5:273-282.
2. Lincoln NB, Jackson JM, Adams SA. Reliability and revision of the Nottingham sensory assessment for stroke patients. *Physiother.* 1998; 84(8):358-365.
3. Stolk-Hornsveld F, Crow JL, Hendriks EP, van der Baan R, Harmeling-van der Wal BC. The Erasmus MC modifications to the Nottingham sensory assessment: a reliable somatosensory assessment measure for patients with intracranial disorders. *Clin Rehabil.* 2006;20:160-172.

INSTRUMENT NAME: Patient-specific Functional Scale

REVIEWER: Evan Cohen, PT, MA, PhD, NCS

GENERAL INFORMATION:

- The Patient-specific Functional Scale (PSFS) is a patient-specific tool with patient-determined outcomes. Upon initial administration of the PSFS, the individual identifies activities perceived as difficult due to their health condition. The patient then rates the level of difficulty for each of the identified activities For follow-up measurements, the patient is asked to rate the current level of difficulty with the same activities.

EQUIPMENT NEEDED:

- PSFS form or blank paper and a writing implement. The form can be found in the article by Stratford et al referenced below.

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: Approximately 4-6 minutes.

General Rules:

- Clients should be included in deciding what goals are important to pursue and determine how meaningful those goals are to them.

Definitions:

- N/A

Instructions:

- Upon initial administration of the PSFS, the individual identifies up to five activities perceived as difficult due to their health condition. The patient then rates the level of difficulty for each of the identified activities on a scale from 0 (unable to perform the activity) to 10 (able to perform the activity at the "pre-injury" level. The tool's creators suggest changing "pre-injury" to a term appropriate for the individual being tested.[1] For follow-up measurements, the patient is asked to rate the current level of difficulty with the same activities.

Scoring:

- Scores can be used for each patient identified goal or an average score for all patient identified goals.

INTERPRETATION GUIDELINES:

- Higher scores indicate greater improvement.

COPYRIGHT INFORMATION:

- N/A

WEB BASED RESOURCES / INFORMATION:

- N/A

REFERENCES:

1. Stratford PW, Gill C, Westaway MD, Binkley JM. Assessing Disability and Change on Individual Patients: A Report of a Patient Specific Measure. *Physiotherapy Canada.* Fall 1995;47(4):258-263.

INSTRUMENT NAME: Physiological Cost Index

REVIEWER: Gail L. Widener, PhD, PT

GENERAL INFORMATION:

- The Physiological Cost Index (PCI) is an estimate of energy expenditure. The concept was initially developed to measure change in energy expenditure for people with rheumatoid arthritis in drug trials,[1] it has since been validated in other groups of people.[2-3]

EQUIPMENT NEEDED:

- Stopwatch or timing device, score form for recording heart rates, heart rate monitor, treadmill or track.

ADMINISTRATION INSTRUCTIONS:

Time to administer and score:

- Depending on the ability of the person, it could be anything from 4-10 minutes.

General Rules:

- Measure the HR response while walking at a self-selected rate for about 4 minutes (for steady state). The PCI equation gives the heart beats per meter walked.

Definitions:

-

Instructions:

- Time it takes to walk at a preferred pace on a treadmill or a track to reach non-steady state or steady state (approximately 4 minutes).[4] Heart rate is monitored and recorded every 10-30 seconds throughout walk. Resting HR is established prior to walking by taking HR every 10 seconds for 2 minutes after 5 minutes of rest. Velocity of walk is recorded. No set instructions are noted. Each article used a slightly different way of performing the walking, however all used the equation under scoring to measure PCI.

Scoring:

- Scored as heart beats per meter using this equation:

$$\text{PCI (beats/meter)} = \frac{\text{HR walk} - \text{HR rest (beats per min)}}{\text{Velocity (meters/min)}}$$

INTERPRETATION GUIDELINES:

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WEB BASED RESOURCES / INFORMATION:

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REFERENCES:

1. Steven MM, Capell HA, Sturrock RD, MacGregor J. The physiological cost of gait (PCG): a new technique for evaluating non-steroidal anti-inflammatory drugs in rheumatoid arthritis. *Br J Rheumatol*. 1983;22:141-145.
2. Rose J, Gamble, JG, Burgos A, Medeiros J, and Hassle WL. Energy expenditure index of walking for normal children and children with cerebral palsy. *Devel Med and Child Neurol*. 1990; 32: 33-340
3. Bailey MJ, and Ratcliffe CM. Reliability of physiological cost index measurements in walking normal subjects using steady-state, non-steady state and post exercise heart rate recording. *Physiother*. 1995; 81: 618-623.
4. Graham RC, Smith NM, White CM. The reliability and validity of the physiological cost index in healthy subjects while walking on 2 different tracks. *Arch Phys Med Rehabil*. 2005;86:2041-2046.

INSTRUMENT NAME: Rivermead Assessment of Somatosensory Performance

REVIEWER: Diane D. Allen, PhD, PT

GENERAL INFORMATION:

- The RASP is a multi-modal sensory tool that tests 5 sensations (sharp/dull discrimination, surface pressure, tactile localization, temperature discrimination, joint movement and movement discrimination), and 2 secondary sensations (bilateral touch discrimination and two-point discrimination). Sensation is tested on the face, hand and foot.

EQUIPMENT NEEDED:

In an effort to improve reliability of sensory testing, custom equipment were developed for the test, including the

- "neurometer" – a pen shaped device that allows consistent amount of pressure to be applied to an area,
- "neurotemp" which has temperature displays standardization of temperature stimuli, and the
- "two-point neurodiscriminator" - a 4-pointed fixed distance discriminator used to test 2-point discrimination on the finger pads
- Although customized of equipment may improve reliability, the tools are only available commercially.

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: 20-45 minutes depending on the client's level on sensory deficit

General Rules:

-

Definitions:

-

Instructions:

Test requires special equipment. The full testing manual and equipment are available commercially:

The Thames Valley Test Company
7–9 The Green, Flempton
Bury St Edmunds, Suffolk IP28 6EL UK
(http://www.tvtc.com/tvtc/index.html)

Scoring:

"Sham" tests (no stimuli applied) are first done using 2 subtests. If the client responds that they feel stimuli during the "sham" tests, it is concluded that the client is not reliable and testing does not proceed.

For each stimulus correctly identified, a score of 1 is assigned. Within each test area, a client can score a maximum of 6.

Normative performance and suggestive cut-off scores for each sub-test are below.[1]

- Table 2b: Sharp/dull discrimination – normative performance and impairment cutoff

Subtest 1 Sharp/dull discrimination	Control performance Left side (n = 50)	Right side (n = 46)
Max score (30)		
Mean	26.6	26.5
s.d.	2.6	2.5
Range	18–30	21–30
Suggested Impairment cutoff	less than 22	

- Table 3b: Surface touch – normative performance and impairment cutoff

Subtest 2 Surface pressure touch	Control performance left side (n = 50)	right side (n = 50)
Max score (30)		
Mean	29.9	29.9
s.d.	0.3	0.7
Range	28–30	25–30
Suggested Impairment cutoff	less than 29	

- Table 4b: Surface localization – normative performance and impairment cutoff

Subtest 3 Surface localization	Control performance Left side (n = 50)	Right side (n = 50)
Max score (30)		
Mean	29.9	29.8
s.d.	0.4	1.1
Range	27–30	22–30
Suggested Impairment cutoff	less than 29	less than 28

- Table 6a: Two-point discrimination – index finger performance controls

Subtest 5 Reliable Two-point discrimination					
Right hand controls (n = 48)			Left hand-controls (n = 49)		
3mm	4mm	5mm	3 mm	4 mm	5 mm
16	18	14	18	15	16

Table 7b: Temperature discrimination–normative performance and impairment cutoff

Subtest 6 Temperature discrimination	Controls Left side(n = 48)	Right side(n = 48)
Max score (30)		
Mean	28.4	28.6
s.d.	1.7	1.8
Range	24–30	23–30
Suggested Impairment cutoff	less than 25	

-

Table 8b: Proprioceptive movement discrimination – normative performance and impairment cutoff

Subtest 7a Proprioception movement discrimination	Controls RBD Left side affected (n = 50)	LBD Right side affected (n = 50)
Max score (30)		
Mean	29.9	30
s.d.	0.8	0.1
Range	24–30	29–30
Impairment cutoff	less than 28	less than 30

-

Table 9b: Proprioceptive direction discrimination – normative performance and impairment cutoff

Subtest 7b Proprioception direction discrimination	Controls Left side (n = 50)	Right side (n = 50)
Max score (30)		
Mean	29.8	29.8
s.d.	0.9	0.9
Range	24–30	24–30
Impairment cutoff	less than 28	

-

INTERPRETATION GUIDELINES:

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Rivermead Assessment of Somatosensory Performance

Authors:

1. Charlotte E Winward
   Rivermead Rehabilitation Center, Oxford
2. Professor Peter *V.* Halligan
   Department of Psychology, University of Card iff
3. Professor Derick T Wade
   Rivermead Rehabilitation Center, Oxford

WEB BASED RESOURCES / INFORMATION:

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REFERENCES:

1. Winward CE, Halligan PW, Wade DT. Rivermead Assessment of Somatosensory Performance. Suffolk, England: Thames Valley Test Company Limited; 2000.

INSTRUMENT NAME: Rivermead Mobility Index (RMI)

REVIEWER: Kirsten Potter, PT, DPT, MS, NCS

GENERAL INFORMATION:

- The Rivermead Mobility Index (RMI) was developed for individuals with head injury and stroke, and is based on the gross function subscale of the Rivermead Motor Assessment
- The RMI was developed to meet the following characteristics: a focus on disability, simple and quick to administer; able to be used in hospital and home settings; span a wide range of reduction in mobility (turning over in bed to running), be sensitive to clinically relevant change, and have known reliability[1]
- The original version of the RMI included two scales: RMI Fundamental (RMI – F) which included common activities that are typically independent of choice, culture, or class (e.g., turning over in bed) and RMI Elective (RMI – E) which examines "elective" mobility tasks (e.g., shopping and gardening); the RMI Elective was found to have inadequate reliability and validity, thus was not included in the final version of the RMI; the RMI – F is now known as the RMI[1]

EQUIPMENT NEEDED:

- Questionnaire
- Pen/pencil

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: < 5 minutes[2]

General Rules:

- With exception of question 5 (which asks that the patient stand unsupported for 10 seconds), the RMI can be completed by the patient or a proxy

Definitions:

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Instructions:[1]

1. Turning over in bed: Do you turn over from your back to your side without help?
2. Lying to sitting: From lying to sitting, do you get up to sit on the edge of the bed on your own?
3. Sitting balance: Do you sit on the edge of the bed without holding on for 10 seconds?
4. Sitting to standing: Do you stand up (from any chair) in less than 15 seconds, and stand there for 15 seconds (using hands, and with an aide if necessary)?

5. Standing unsupported: Observe standing for 10 seconds without any aid.
6. Transfer: Do you manage to move from bed to chair and back without any help?
7. Walking inside, with an aid if needed: Do you walk 10 metres, with an aid if necessary, but with no standby help?
8. Stairs: Do you manage a flight of stairs without help?
9. Walking outside (even ground): Do you walk around outside, on pavements without help?
10. Walking inside, with no aid: Do you walk 10 metres inside with no caliper, splint, or aid, and no standby help?
11. Picking off floor: If you drop something on the floor, do you manage to walk 5 metres, pick it up and then walk back?
12. Walking outside (uneven ground): Do you walk over uneven ground (grass, gravel, dirt, snow, ice, etc.) without help?
13. Bathing: Do you get in/out of bath or shower unsupervised and wash self?
14. Up and down four steps: Do you manage to go up and down four steps with no rail, but using an aid if necessary?
15. Running: Do you run 10 metres without limping in four seconds? (fast walk is acceptable).

Scoring:

- Each question/item is scores as 0 = No or 1 = Yes

INTERPRETATION GUIDELINES:

- Scores range from 0 (lowest) to 15 (best)

COPYRIGHT INFORMATION:

- Although copyrighted, it is reported to be acceptable to reproduce provided the source is acknowledged (http://www.medicaleducation.co.uk/resources/Rivmob.pdf)[1]

WEB BASED RESOURCES / INFORMATION:

- Above.

REFERENCES:

1. Collen FM, Wade DT, Robb GF, Bradshaw CM. The Rivermead Mobility Index: a further development of the Rivermead Motor Assessment. *Int Disabil Stud.*1991;13(2):50-54.
2. Hsieh CL, Hsueh IP, Mao HF. Validity and responsiveness of the rivermead mobility index in stroke patients. *Scand J Rehabil Med.*2000;32(3):140-142.

INSTRUMENT NAME: Scale for the Assessment and Rating of Ataxia (SARA)

REVIEWER: Susan E. Bennett, PT, DPT, EdD, NCS, MSCS

GENERAL INFORMATION:

- Performance – based assessment of ataxia based on observation of patient performing 8 tasks.

EQUIPMENT NEEDED:

- Stop watch
- 10 meter walkway
- Examination table

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: Median Time 14 minutes (Schmitz- Hubsch)

General Rules:

8 items graded with a total score ranging from 0 (no ataxia) to 40 (severe ataxia)

- Gait
- Stance
- Sitting
- Speech disturbances
- Finger chase
- Nose-finger test
- Fast alternating hand movements
- Heel-shin slide
    - All limb kinematic functions are rated independently for both sides and arithmetic mean of both sides is included in the total score.

Definitions:

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Instructions:

- Patient must perform or attempt to perform all items of the test

Scoring:

- Total score ranging from 0 (no ataxia) to 40 (severe ataxia)
- Gait (score 0-8)
- Stance (score 0-6)
- Sitting (score 0-4)

- Speech disturbances (score 0-6)
- Finger chase (score 0-4)
- Nose-finger test (score 0-4)
- Fast alternating hand movements (score 0-4)
- Heel-shin slide (score 0-4)

INTERPRETATION GUIDELINES:

- SARA only rates ataxia-related symptoms and does not consider non-ataxia symptoms that often occur in patients with SCA. Therefore, it is possible that disease severity in certain diseases with extracerebellar features might not be faithfully reflected in the SARA score. SARA is not an ideal clinical instrument to detect disease onset. (3)
- No research performed with patients that have Multiple Sclerosis.

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WEB BASED RESOURCES / INFORMATION:

http://www.ataxia-study-group.net/html/about/ataxiascales/sara/SARA.pdf

REFERENCES:

1. Burk K, Malzing U, Wolf S, et al. Comparison of Three Clinical Rating Scales in Friedreich Ataxia (FRDA). *Movement Disorders*. 24(12): 1779-1784, 2009.
2. Schmitz-Hubsch T, Fimmers R, Rakowicz M, et al. Responsiveness of different rating instruments in spinocerebellar ataxia patients. *Neurology*. 74(8): 678-684, February 2010.
3. Schmitz-Hubsch T, Tezenas du Montcel S, Baliko L, et al. Scale for the assessment and rating of ataxia- development of a new clinical scale. *Neurology*. 66 (11): 1717- 1720, June 13, 2006.
4. Weyer A, Abele M, Schmitz-Hubsch T, et al. Reliability and Validity of the Scale for the Assessment and Rating of Ataxia: A Study in 64 Ataxia Patients. Movement Disorders 22(11): 1633-1637, 2007.
5. Yabe I, Matsushima M, Soma H, et al. Usefulness of the Scale for Assessment and Rating of Ataxia (SARA). *Journal of the Neurological Sciences.* 266(2008) 164- 166.

INSTRUMENT NAME: Scripps Neurological Rating Scale (SNRS)

REVIEWER: Gail L. Widener, PhD, PT

GENERAL INFORMATION:

- The Scripps Neurological Rating Scale (SNRS)[1] was developed as a measure of neurologic function (impairment) in people with multiple sclerosis (pwMS) administered by a physician. The scale is based on findings of the standard neurologic examination with added subjective categories of sexual, bowel and bladder dysfunction. Amato et al.[2] describe the scale as having an arbitrary weighting system without precise guidelines. This scale has been used in drug studies.[6]

EQUIPMENT NEEDED:

- Equipment required for a standard neurologic exam performed by a physician

ADMINISTRATION INSTRUCTIONS:

Time to administer and score:

- No information is given

General Rules:

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Definitions:

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Instructions:

- No specific instructions are given. The internet connection below includes the form that should be used with this examination.

Scoring:

- Range is -10 to 100 points, 100 means neurologically intact. Components of the exam (total points for each) include mentation and mood (10), cranial nerves associated with eyes (21), lower cranial nerves (5), motor (20), deep tendon reflexes (8), Babinski (4), sensory (12), cerebellar (10), gait (10); points for bowel, bladder and sexual functioning (up to 10) are subtracted from the total of the components above.

INTERPRETATION GUIDELINES:

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WEB BASED RESOURCES / INFORMATION:

- https://www.cebp.nl/vault_public/filesystem/?ID=1429
- cebp.nl/vault_public/filesystem/?ID=1429

REFERENCES:

1. Sipe JC. Knobler RL, Braheny SL, Rice GP, Panich HS, Oldstone MB. A neurologic rating scale (NRS) for use in multiple sclerosis. *Neurol.* 1984;34:1368-1372.
2. AmatoMP, Portaccio E. Clinical outcome measures in multiple sclerosis. *J Neurol Sci.* 2007;259:118-122.
3. Sharrack B, Hughes RAC, Soudain S, Dunn G. The psychometric properties of clinical rating scales used in multiple sclerosis. *Brain.* 1999;122:141-159.
4. Sipe JC, Romine JS, Koziol JA, McMillan R, Zyroff J, Beutler E. Claribine in treatment of chronic progressive multiple sclerosis. *Lancet.* 1994;344(8914): 9-14.
5. Kozial JA, Lucero A, Sipe JC, Romine JS, Beutler E. Responsiveness of the Scripps neurologic rating scale during a multiple sclerosis clinical trial. *Can J Neurol Sci.* 1999;26:283-289.
6. Walker JE, Giri SN, Margolin SB. A double-blind, randomized, controlled study of oral pirfenidone for treatment of seconday progressive multiple sclerosis. *Mult Scler.* 2005; 11:149-158.

INSTRUMENT NAME: Semmes-Weinstein Monofilaments

REVIEWER: Diane D. Allen, PhD, PT

GENERAL INFORMATION:

- Semmes-Weinstein monofilaments are slender fibers of different stiffness which, when pressed end-wise against the skin just until the fiber bends, can test light touch sensory (a.k.a. cutaneous pressure) thresholds.[1] A five piece Semmes-Weinstein monofilament set (2.83, 3.61, 4.31, 4.56, and 6.65 log force; equivalent to forces in grams of 0.07, 0.4, 2, 4, 447, respectively[2]) (North Coast Medical, Morgan Hill, CA) is typically used at designated locations of the body[3]; a 20 piece set is also available. The 2.83 filament is considered to represent "normal" sensitivity in most areas of the body, and the 6.65 filament is considered to represent a loss of protective sensation.[1] The most slender (smallest, most flexible) monofilament sensed at each location is recorded and given an ordinal score, using a defined scale.[4, 5] The values for each site are averaged to produce a composite sensory score, where a score of 0 represents normal somatosensation, and a score of 4 represents marked somatosensory loss (e.g., the ability to sense only deep pressure at each location).
- The Semmes-Weinstein monofilaments are a standardized development of von Frey hairs

EQUIPMENT NEEDED:

- five piece Semmes-Weinstein monofilament set (2.83, 3.61, 4.31, 4.56, and 6.65 log force) (North Coast Medical, Morgan Hill, CA)

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: about 15 minutes

General Rules:

-

Definitions:

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Instructions:

At the specified location where light-touch sensation is in question (e.g., face, hands, feet), press the tip of a fiber of given length and diameter against the skin at right angles; the force of application increases as long as the researcher continues to advance the probe, until the fiber bends. After the fiber bends, continued advance creates more bend, but not more force of application. This makes it possible for the researcher using a hand-held probe to apply a reproducible force, within a wide tolerance, to the skin surface. The patient says yes or no to

"sham" or actual fiber touches to the skin. Different fiber sizes are used if patient cannot feel the smallest fiber.
A procedure for an 8-piece set used for the plantar surfaces of people with MS started with testing of a middle-thickness fiber; if the individual could sense the touch, then the fiber that was three increments away towards the more slender end of the scale was used. If that fiber could not be sensed, then a fiber two increments more stiff was used. The next choice would be one increment away, thus honing in on the threshold. The threshold was defined as the lightest fiber that could be sensed more than 50% of the time, if all stiffer fibers could be sensed 100% of the time.[6]

Scoring:

- Each filament size is assigned an ordinal score. Patient is scored according to the size of monofilament they can detect.[7]
- Normal = 0 (patient can feel filament 2.83)
- Diminished light touch (patient can feel filament 3.61) = 1
- Diminished protective sensation (patient can feel filament 4.31) = 2
- Loss of protective sensation (patient can feel filament 6.65)=3
- Unable to feel the largest filament (6.65) = 4
- This score is then averaged across the number of sites that sensation is tested.

INTERPRETATION GUIDELINES:

- Results do not directly predict function. This test only reveals the force of the smallest detectable filament; some researchers advise against reporting the results using descriptors such as "diminished light touch," for instance.[7]

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WEB BASED RESOURCES / INFORMATION:

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INSTRUMENT NAME: Short Form Health Survey of the Medical Outcome Study (SF-36)

REVIEWER: Susan E. Bennett, PT, DPT, EdD, NCS, MSCS

GENERAL INFORMATION:

- Generic measurement developed to measure health-related quality of life in patients and healthy persons. Consists of 8 sub-scales that are often used separately as outcome measures of various aspects of health-related-quality of life. It measures two main health concepts: physical and mental.

EQUIPMENT NEEDED:

- Pencil
- Survey

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: 30 minutes

General Rules:

- Patient has to have the ability to adequately fill out the questionnaire, or have a proxy assist in completion.

Definitions:

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Instructions:

- Patient or proxy has to fill out the questionnaire accurately.

Scoring:

- Nominal (yes/no) or ordinal scale, each response given a number of points.
- Each of the items are weighted and therefore software used to compile scores
- 8 sub-scales, all items are coded and transformed into percentage ranging from 0 (poor health) to 100 (optimal health)
    - Physical functioning (10 items)
    - Role limitations because of physical health (4 items)
    - Bodily pain (2 items)
    - Social functioning (2 items)
    - General mental health covering psychological distress and well-being (5 items)
    - Role limitations because of emotional problems (3 items)
    - Vitality, energy or fatigue (4 items)
    - General health perceptions (5 items)

- Change in health status in the past year (1 item)

INTERPRETATION GUIDELINES:

- Physical functioning in the SF-36 negatively and significantly correlated with duration of MS from onset (r= -0.37; p < 0.001) (Krokavcova)
- In patients with relapse remitting MS there was a relative risk of 1.9 (95% CI, 1.0 to 3.5) for experiencing a worsening EDSS score between those who evaluated their health as poor or fair versus those who evaluated their health as good, very good, or excellent. (Nortvedt 2)
- In an MS population a significant floor effect was seen in those people who walked with an aid (14.2%) and those who used wheelchairs (67.8%). (Riazi)
- There was a nine-fold decrease in physical function scores between patients with MS who walked independently and those who used a wheelchair. (Riazi)
- Less physically disabled individuals had significantly higher scores (p<0.05) on all SF- 36
- Is not a needs assessment tool, requires further investigation for actual management.
- Has limited validity as a measure of mental health in multiple sclerosis. Evidence shows that it underestimates the impact of multiple sclerosis on mental health.
- Patient variability
- Large floor and ceiling effects that do not differentiate between the dimensions of the disease (Freeman)
- Small effect size shows the responsiveness of the SF-36 to be poor in evaluating the effectiveness of inpatient rehabilitation in people with moderate to severe disability. (Freeman)

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WEB BASED RESOURCES / INFORMATION:

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INSTRUMENT NAME: Static Standing Balance Test

REVIEWER: Susan E. Bennett, PT, DPT, EdD, NCS, MSCS

GENERAL INFORMATION:
Performance based timed test with 5 conditions to measure static balance of an individual.

EQUIPMENT NEEDED:
Stopwatch

ADMINISTRATION INSTRUCTIONS:
Time to administer and score: Approximately 10 minutes for all tests

General Rules:
Performance is measured in a variety of stance positions without hand support and is quantified by means of a stop watch. Two trials should be performed for each task up to a maximum of 30 seconds.
Patients are asked to perform the follow standing tasks

(I) feet apart, with feet placed 10cm apart
(2) Feet together
(3) Stride stance, with feet placed 10cm apart and with the toes of the rear foot in line with the heel of the front foot
(4) Tandem stance, with one foot directly in front of the other with the heel of the front foot in contact with the toes of the rear foot; and
(5) Single leg stance, with the subject standing on one leg.

Stride and tandem stances should be tested twice--once with the right foot in front and once with the left foot in the front position.

Single leg stance should also be measured twice-once with subjects standing on the right leg, and once with subjects standing on the left leg.

All conditions except for the single leg stance can also be tested with eyes closed.

Definitions:

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Instructions:

- Patients should be instructed to look straight ahead and keep their arms down by their side during the testing time of a maximum of 30 seconds. The examiner says “go” at the

start of timing and "stop" at the completion of the test. The timer should also be stopped if patients lost their balance, altered their foot position or during single leg stance, brace their leg against stance leg. The time on the stopwatch when the examiner says "stop" is recorded. A counter or parallel bars as well as close supervision should be utilized for safety reasons.

Scoring: Time is measured to the nearest hundredth of a second on stopwatch for both trials should be recorded.

INTERPRETATION GUIDELINES:

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REFERENCES:

INSTRUMENT NAME: Tardieu Scale for Assessing Spasticity

REVIEWER: Susan E. Bennett, PT, DPT, EdD, NCS, MSCS

GENERAL INFORMATION:

- A clinical measure of spasticity that assesses and compares the response of the muscle to passive movement at both slow and fast speeds.

EQUIPMENT NEEDED:

- Hand held goniometer

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: About 1 minute or less per muscle or joint being measured

General Rules:

- Grading is performed at the same time of day, in a constant position of the body for a given limb. The patient is sitting for upper limbs and supine for lower limbs.
- Velocity to stretch: V1: as slow as possible, V2: speed of limb falling under gravity, V3: as fast as possible (faster than the rate of the natural drop of the limb segment under gravity). V1 is used to measure the passive range of motion, V2 and V3 are used to rate spasticity.

Definitions:

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Instructions:

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Scoring:

- Grading of stretch reflex: 0 = no spasticity up to 4 severe spasticity
- X is the spasticity angle this is determined by Xv1 (angle of arrest at slow speed) – Xv2 (angle of catch at fast speed). This reflects the velocity-dependent stretch reflex.
- Y is the spasticity grade, which is an ordinal variable grading scale, measuring the gain of the muscle reaction to fast stretch (V3). (Gracies)
- Modified Tardieu scale, two resulting joint angles are measured by goniometer: the R1 angle which is the 'angle of catch' after a fast velocity stretch, and the R2 angle defined as the passive joint range of movement following a slow velocity stretch. The R2–R1 value indicates the level of dynamic contracture in the joint. (Mackey)

INTERPRETATION GUIDELINES:

- Only one instance of it being used in an adult population with mediocre results.
- With adult patients results may be skewed secondary to weight of the limbs, and difficulty performing the tests.
- Needs further testing into the validity and reliability of the scale.

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INSTRUMENT NAME: Timed 25-Foot Walk

REVIEWER: Diane D. Allen, PhD, PT

GENERAL INFORMATION:

- The Timed 25-foot walk (T25FW) is one of a number of measures of gait velocity. Similar measures include timed walks of 10 meters[1] or 30 feet. The instructions may be for self-selected walking speed or fastest safe walking speed. Time may be recorded manually with a stop watch or via more mechanized equipment such as photocells. Frequently, the course is set so that the individual walks a total of 35 feet (14 meters[1]): 5 feet (or 2 meters) prior to the beginning of the timed course and 5 feet (or 2 meters) after the end of the timed course, to minimize the acceleration/deceleration period within the recorded time.

EQUIPMENT NEEDED:

- Measured distance for a walking course and a stop watch or other timing device.

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: Seconds

General Rules:

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Definitions:

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Instructions:

- A straight, level walking course is clearly marked, with 5 feet allowed before and after the 25 foot course for acceleration and deceleration. The participant is instructed to walk to the end of the entire course "at normal speed" (for comfortable or self-selected or normal gait speed) or "as fast as you can safely" (for fast gait). Record the number of seconds it takes to walk the 25 foot course (excluding the time it takes to accelerate and decelerate before and after the 25 feet). Record whether the participant had a practice walk before recording, and whether the score is for a single trial, the best of 2-3 trials, or the mean of 2-3 trials. (Instructions when used as part of the Multiple sclerosis functional composite are to walk "as quickly as possible, but safely"; the score is the mean of 2 trials.)

Scoring:

- Scored in seconds: higher numbers mean slower gait speed.

- When converted to velocity in meters/second or centimeters/second, higher numbers mean faster gait speed.

INTERPRETATION GUIDELINES:

- Normative data for healthy males, females in different decades between ages 20 and 70 have been published for the 25-foot walk at comfortable (130-146 cm/sec) and maximum (175-253 cm/sec) speeds.[2]
- Median T25FW in 64 healthy controls (age 38.6 years, SD 11.8) was 4.4 seconds (SD = .6 seconds).[3]

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WEB BASED RESOURCES / INFORMATION:

- http://www.nationalmssociety.org/for-professionals/researchers/clinical-study-measures/t25-fw/index.aspx

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INSTRUMENT NAME: Timed Up and Go (TUG)

REVIEWER: Susan E. Bennett, PT, DPT, EdD, NCS, MSCS

GENERAL INFORMATION:

- Performance based measure of dynamic balance. The subject stands up from a chair, walks 3m, then turns around walks back to the chair sits down. Subject is timed from the moment their pelvis lifts off of the chair and timing is stopped when the pelvis reaches the chair again.
- Timed up and go cognitive involves adding a cognitive task (subtracting 3 from a random number between 20 and 100) while performing the Timed Up and Go.
- Timed up and go manual involves performing the Timed Up and Go while holding a full cup of water.

EQUIPMENT NEEDED:

- Stopwatch
- 47-cm-high chair with arm and back supports
- Cone
- Tape

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: 1-2 minutes

General Rules:

- Subject starts sitting in a chair that is not against a wall.
- Assistive devices are allowed and must be documented, however physical assistance is not allowed.
- No proxy participation available.

Definitions:

-

Instructions:

- The subject stands up from the chair, walks 3m, turns around a cone or a marked piece of tape and walks back to the chair and sits down. Subjects are told to perform this as quickly and as safely as possible. Assistive devices are allowed and must be documented, however physical assistance is not allowed.
- TUG manual – same but carrying a full cup of water, seconds recorded
- TUG cognitive – same but doing calculations while performing the task, seconds recorded

Scoring:

- The test is measured in seconds.
- Mean best score in patients with MS = 13.9 seconds with a SD of 6.2 seconds (Nilsagard 2)

INTERPRETATION GUIDELINES:

- For the TUG 23-24% improvement of 30-31% deterioration establishes a genuine change for the individual. (Nilsgard 2)
- The TUG showed no statistical or clinical significance between fallers and non-fallers with MS. (Cattaneo)
- Times of greater than or equal to 13.5 seconds have been related to increased risk of falling in older adults (Schoppen)
- Does not take into account a wide variety of activities, and pays no attention to the quality of the movement, or where a subject encountered difficulty. (Cattaneo)
- Subject must be able to walk and transfer without assistance (floor effect).
- May not give sufficient information to guide the choice of intervention, even though it can be useful in assessing the effect of such treatment. (Botolfsen)

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WEB BASED RESOURCES / INFORMATION:

- http://www.unmc.edu/media/intmed/geriatrics/nebgec/pdf/frailelderlyjuly09/toolkits/timedupandgo_w_norms.pdf
- http://www.saskatoonhealthregion.ca/pdf/03_Timed%20Up%20and%20Go%20procedure.pdf
- http://www.rheumatology.org/practice/clinical/clinicianresearchers/outcomes-instrumentation/TUG.asp

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INSTRUMENT NAME: Tinetti Falls Efficacy Scale (FES)

REVIEWER: Kathleen Brandfass, MS PT

GENERAL INFORMATION:

- FES 10 item questionnaire administered to assess the contribution of fear of falling on the person's physical performance.

EQUIPMENT NEEDED:

- FES form

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: 10 minutes

General Rules:

- Person is instructed to answer the on a 1 to 10 scale

Definitions:

- Assess Activities of Daily Living, Balance, Functional Mobility and Participation.

Instructions:

- Person is instructed to answer each question from 1= extreme confidence to 10 = no confidence.

Instructions to clinician: (Repeat for each activity): How confident/sure are you that you can (ask activity below) without falling?

If subject responds, e.g., I don't do that, rephrase question as follows: But if you were able to do it, what do you think your ability to do the task would be?

Tinetti Falls Efficacy Scale

_____ 1. Clean house (sweep or dust)

_____ 2. Get dressed and undressed

_____ 3. Prepare simple meals (not involving carrying hot or heavy objects)

_____ 4. Take a bath or shower

_____ 5. Simple shopping

_____ 6. Get in and out of a chair

_____ 7. Go up and down stairs

_____ 8. Walk around the neighborhood

_____ 9. Reach into cabinets

_____ 10. Hurry to answer the phone

_____ Total FES Score

Scoring:

Scoring: 0 --> 10
0- not confident at all
5-fairly confident
10-completely confident

Score pertains to the patient's perception of being able to complete the task without falling.

INTERPRETATION GUIDELINES:

- FES is a 10-item rating scale to assess confidence in performing daily activities. Each item is rated from 1 = extreme confidence to 10 = no confidence at all.
- Total possible points 0 to 100. Higher scores indicate greater fear of falling

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WEB BASED RESOURCES / INFORMATION:

Dr. Mary E. Tinetti
Associate Professor
Yale University School of Medicine
33 Cedar Street, PO Box 333
New Haven, CT 06510

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INSTRUMENT NAME: Tinetti Performance Oriented Mobility Assessment (POMA)

REVIEWER: Kirsten Potter, PT, DPT, MS, NCS

GENERAL INFORMATION:

- The POMA was developed as a measure to screen older adults for balance and gait impairments; Tinetti aimed to develop a measure that was feasible for use (i.e., required no equipment and no training to master), was reliable and sensitive to significant changes, and reflected position changes and gait maneuvers used during daily activities[1]
- Has also been used for patients with various conditions (including Parkinson's disease, Amyotrophic Lateral Sclerosis, normal pressure hydrocephalus, and stroke, among others); a generic measure, hence has utility for many patient populations
- Various versions of the POMA exist, with variations for both the name of the test and means of scoring; this review focuses on the 16 item, 28-point version of the POMA (see Compendium of Instructions for the POMA form)[2]
- Total POMA consists of 16 items: 9 balance (POMA – B) and 7 gait (POMA – G) items.

EQUIPMENT NEEDED:

- Hard armless chair
- Stopwatch or wristwatch
- 15 ft walkway

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: 10-15 minutes

General Rules:

- See below

Definitions:

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Instructions:

- For balance tests: Subject is seated in hard, armless chair. The following maneuvers are tested.
- For gait tests: Initial Instructions: Subject stands with examiner, walks down hallway or across room, first at "usual" pace, then back at "rapid, but safe" pace (using usual walking aids)

Tinetti Performance Oriented Mobility Assessment

1.	**Sitting Balance**	Leans or slides in chair	=0
		Steady, safe	=1
2.	**Arises**	Unable without help	=0
		Able, uses arms to help	=1
		Able without using arms	=2
3.	**Attempts to Arise**	Unable without help	=0
		Able, requires > 1 attempt	=1
		Able to rise, 1 attempt	=2
4.	**Immediate Standing Balance** (first 5 seconds)		
		Unsteady (swaggers, moves feet, trunk sway)	=0
		Steady but uses walker or other support	=1
		Steady without walker or other support	=2
5.	**Standing Balance**		
		Unsteady	=0
		Steady but wide stance(medial heals > 4 inches apart) and uses cane or other support	=1
		Narrow stance without support	=2

6. **Nudged** (subject at maximum position with feet as close together as possible, examiner pushes lightly on subject's sternum with palm of hand 3 times)

	Begins to fall	=0
	Staggers, grabs, catches self	=1
	Steady	=2

7. **Eyes Closed** (at maximum position of item 6)

	Unsteady	=0
	Steady	=1

8.	**Turing 360 Degrees**	Discontinuous steps	=0
		Continuous steps	=1
		Unsteady (grabs, staggers)	=0
		Steady	=1

9. **Sitting Down**

Unsafe (misjudged distance, falls into chair)	=0
Uses arms or not a smooth motion	=1
Safe, smooth motion	=2

BALANCE SCORE: _____/16

10. **Initiation of Gait** (immediately after told to "go"

Any hesitancy or multiple attempts to start	=0
No hesitancy	=1

11. **Step Length and Height**

Right swing foot	
Does not pass left stance foot with step	=0
Passes left stance foot	=1
Right foot does not clear floor completely with step	=0
Right foot completely clears floor	=1
Left swing foot	
Does not pass right stance foot with step	=0
Passes right stance foot	=1
Left foot does not clear floor completely with step	=0
Left foot completely clears floor	=1

12. **Step Symmetry**

Right and left step length not equal (estimate)	=0
Right and left step length appear equal	=1

13. **Step Continuity**

Stopping or discontinuity between steps	=0
Steps appear continuous	=1

14. **Path** (estimated in relation to floor tiles, 12-inch diameter; observe excursion of 1 foot over about 10 ft. of the course)

Marked deviation	=0
Mild/moderate deviation or uses walking aid	=1
Straight without walking aid	=2

15. **Trunk**

Marked sway or uses walking aid	=0
No sway but flexion of knees or back or spreads arms out while walking	=1
No sway, no flexion, no use of arms, and no use of walking aid	=2

16. **Walking Stance**

Heels apart	=0
Heels almost touching while walking	=1

GAIT SCORE = _____/12
BALANCE SCORE = _____/16 **TOTAL SCORE (Gait + Balance) = _____/28**

Scoring:

- A three-point ordinal scale, ranging from 0-2. "0" indicates the highest level of impairment and "2" the individual's independence.
- Total Balance Score = 16
- Total Gait Score = 12
- Total Test Score = 28

INTERPRETATION GUIDELINES:

- Predictive values for fall risk have not been reported in MS, but are reported in Parkinson's disease: at cut off score < 20, sensitivity = 76%, specificity = 66%, positive predictive value = 39%, negative predictive value = 91%, positive likelihood ratio = 2.25 and 2.4 (for falls within past week and 6 months, respectively), negative likelihood ratio = 0.37 and 0.49 (for falls within past week and 6 months, respectively)[3]
- Predictive values for assistive device use have not been reported in MS, but has been reported in older adults (14.6% with stroke): at cut off score = 12, POMA – B is significant predictor of need for assistive device[4]
- MDC values are not reported in MS, but are reported in older adults: for individual assessments, MDC_{95} = 5.0; for group assessments, $MDC_{95\ group}$ = 0.8[5]
- Reference values exist for older adults: Mean POMA scores for individuals aged 65 – 79 male = 26.21 ± 3.40, female 25.16 ± 4.30 and for those ≥ 80 years of age male = 23.29 ± 6.02, female = 17.20 ± 8.32[6]

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WEB BASED RESOURCES / INFORMATION:

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INSTRUMENT NAME: Trunk Control Test

REVIEWER: Susan E. Bennett, PT, DPT, EdD, NCS, MSCS

GENERAL INFORMATION:

- Performance-based assessment of four simple aspects of trunk movement.

EQUIPMENT NEEDED:

- Bed or mat table
- Stopwatch
- Stepstool

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: 5 minutes or less (Collin)

General Rules:

- 4 item test (minimum score 0 to maximum score 100), obtained by the addition of the scores of the four movements:
- (T1): rolling from a supine position to the weak side
- (T2): rolling to the strong side
- (T3): sitting up from laying down
- (T4): balance in the sitting position with the feet off the ground for at least 30 seconds
- Client must attempt all 4 activities.

Definitions:

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Instructions:

- The patient lies supine on the bed and is asked to roll to the weak side, roll to the strong side, sit up from lying down, and sit in a balanced position on the edge of the bed, with the feet off the ground for a minimum of 30 seconds.

Scoring:

- 0 points: unable to do without assistance, unable to hold for 30 seconds
- 12 points: able to do so using non-muscular help or in an abnormal style; uses arms to steady self when sitting
- 25 points: able to complete task normally (Collin)

INTERPRETATION GUIDELINES:

- TCT is not useful in the planning of treatment, and it gives no information regarding quality of performance.
- Does not take into account spasticity, sensory loss, or apraxia.
- Was not a valid test measure in elderly patients following an acute illness and bed rest.
- Has a large ceiling effect.
- Only has been proven valid and reliable in an acute post stroke patient population.

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WEB BASED RESOURCES / INFORMATION:

- http://www.ncbi.nlm.nih.gov/pmc/articles/PMC488133/pdf/jnnpsyc00517-0036.pdf

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INSTRUMENT NAME: Trunk Impairment Scale (TIS)

REVIEWER: Kirsten Potter, PT, DPT, MS, NCS

GENERAL INFORMATION:

- The Trunk Impairment Scale (TIS) was developed to measure motor impairment of the trunk after stroke.[1] It has since been used for patients with Parkinson's disease, brain injury, and MS.
- Version 2.0 of the TIS[2] (not discussed further in this review) has been developed based on a Rasch analysis in patients post-stroke; the static sitting balance subscale was dropped from the scale due to a ceiling effect and poor fit within the Rasch model

EQUIPMENT NEEDED:

- Pen/pencil
- Bed or treatment table
- Stopwatch may be useful for timed items

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: 10 minutes[3]

General Rules:[1]

- Starting position is the same for all items (patient sitting on the edge of the bed or treatment table without back and arm support). The thighs should be in full contact with the bed/table, the feet are hip width apart and placed flat on the floor, knee angle at 90^{o}, the arms resting on the legs, and head/trunk in midline.
- The patient can be corrected between attempts.
- The test items are explained verbally and may be demonstrated.
- If the patient scores 0 on the first item (static sitting balance: starting position), the TIS score is 0.
- For patients with MS, on static sitting balance item #3 (patient crosses unaffected leg over the hemiplegic leg), the patient should cross the stronger leg (determined via manual resistance by therapist) over the weaker leg; if no difference in strength is found, the patient may select which leg to use for crossing the legs[3]

Definitions:

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Instructions:

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Scoring: **Trunk Impairment Scale**

Static sitting balance

1. Starting position	Patient falls or cannot maintain starting position for 10 seconds without arm support Patient can maintain starting position for 10 seconds *If score= 0, then TIS total score=0*	□ 0 □ 2
2. Starting position Therapist crosses the unaffected leg over the hemiplegic leg	Patient falls or cannot maintain sitting position for 10 seconds without arm support Patient can maintain sitting position for 10 seconds	□ 0 □ 2
3. Starting position Patient crosses the unaffected leg over the hemiplegic leg (see general rules – above- for administration of this item with patients with MS)	Patient falls Patient cannot cross the legs without arm support on bed or table Patient crosses the legs but displaces the trunk more than 10 cm backwards or assists crossing with the hand Patient crosses the legs without trunk displacement or assistance	□ 0 □ 1 □ 2 □ 3
	Total static sitting balance	**/7**

Dynamic sitting balance

1. Starting position Patient is instructed to touch the bed or table with the hemiplegic elbow (by shortening the hemiplegic side and lengthening the unaffected side) and return to the starting position	Patient falls, needs support from an upper extremity or the elbow does not touch the bed or table Patient moves actively without help, elbow touches bed or table *If score= 0, then items 2 and 3 score 0*	□ 0 □ 1
2. Repeat item 1	Patient demonstrates no or opposite shortening/lengthening Patient demonstrates appropriate shortening/lengthening *If score= 0, then item 3 scores 0*	□ 0 □ 1

3. Repeat item 1	Patient compensates. Possible compensations are: (1) use of upper extremity, (2) contralateral hip abduction, (3) hip flexion (if elbow touches bed or table further then proximal half of femur), (4) knee flexion, (5) sliding of the feet Patient moves without compensation	□ 0 □ 1
4. Starting position Patient is instructed to touch the bed or table with the unaffected elbow (by shortening the unaffected side and lengthening the hemiplegic side) and return to the starting position	Patient falls, needs support from an upper extremity or the elbow does not touch the bed or table Patient moves actively without help, elbow touches bed or table *If score= 0, then items 5 and 6 score 0*	□ 0 □ 1
5. Repeat item 4	Patient demonstrates no or opposite shortening/lengthening Patient demonstrates appropriate shortening/lengthening *If score= 0, then item 6 scores 0*	□ 0 □ 1
6. Repeat item 4	Patient compensates. Possible compensations are: (1) use of upper extremity, (2) contralateral hip abduction, (3) hip flexion (if elbow touches bed or table further then proximal half of femur), (4) knee flexion, (5) sliding of the feet Patient moves without compensation	□ 0 □ 1
7. Starting position Patient is instructed to lift pelvis from bed or table at the hemiplegic side (by shortening the hemiplegic side and lengthening the unaffected side) and return to the starting position	Patient demonstrates no or opposite shortening/lengthening Patient demonstrates appropriate shortening/lengthening *If score= 0, then item 8 scores 0*	□ 0 □ 1
8. Repeat item 7	Patient compensates. Possible compensations are: (1) use of upper extremity, (2) pushing off with the ipsilateral foot (heel loses contact with the floor) Patient moves without compensation	□ 0 □ 1
9. Starting position	Patient demonstrates no or opposite shortening/lengthening	□ 0

Patient is instructed to lift pelvis from bed or table at the unaffected side (by shortening the unaffected side and lengthening the hemiplegic side) and return to the starting position	Patient demonstrates appropriate shortening/lengthening *If score= 0, then item 10 scores 0*	□ 1
10. Repeat item 9	Patient compensates. Possible compensations are: (1) use of upper extremities, (2) pushing off with the ipsilateral foot (heel loses contact with the floor) Patient moves without compensation	□ 0 □ 1
	Total dynamic sitting balance	**/10**

Co-ordination

1. Starting position Patient is instructed to rotate upper trunk 6 times (every shoulder should be moved forward 3 times), first side that moves must be hemiplegic side, head should be fixated in starting position	Hemiplegic side is not moved three times e 0 Rotation is asymmetrical Rotation is symmetrical *If score= 0, then item 2 scores 0*	□ 0 □ 1 □ 2
2. Repeat item 1 within 6 seconds	Rotation is asymmetrical Rotation is symmetrical	□ 0 □ 1
3. Starting position Patient is instructed to rotate lower trunk 6 times (every knee should be moved forward 3 times), first side that moves must be hemiplegic side, upper trunk should be fixated in starting position	Hemiplegic side is not moved three times Rotation is asymmetrical Rotation is symmetrical *If score= 0, then item 4 scores 0*	□ 0 □ 1 □ 2
4 Repeat item 3 within 6 seconds	Rotation is asymmetrical e 0 Rotation is symmetrical	□ 0 □ 1
	Total co-ordination	**/6**

Total Trunk Impairment Scale score **/23**

INTERPRETATION GUIDELINES:

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INSTRUMENT NAME: Visual Analog Scale - Fatigue

REVIEWER: Kirsten Potter, PT, DPT, MS, NCS and Kathleen Brandfass, MS, PT

GENERAL INFORMATION:

- The VAS serves as a single item self-report of fatigue
- The VAS has been used in multiple patient populations, including MS

EQUIPMENT NEEDED:

- Scale
- Pen/pencil

ADMINISTRATION INSTRUCTIONS:

Time to administer and score: 5-15 minutes dependent on individual scale use

General Rules:

- Dependent on scale used, but in general the patient marks a line along the VAS to indicate fatigue level

Definitions:

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Instructions:

- Various versions of VAS – fatigue have been reported, including:

1) 0-10 scale: 0 = fatigue no problem to 10 = fatigue major problem;[1, 2] see article by Khanna et al[1] for copy of VAS

2) 100 mm line: left end of the scale = not tired at all to right end = extremely tired[3-5]

3) 50 mm line: left= fatigue worsened as much as possible to right = fatigue completely relieved[6]

4) 0-10 scale: 0 = greatest fatigue to 10 = less fatigue[7]

5) 0-100 mm line; three separate VAS-F scales; each is rating according to left = no influence at all to right = a lot of influence:[8]

VAS-1: Impact on Daily Life- How much influence does fatigue have on your daily life (the everyday life at home and work) and on your relationships?

VAS-2: Impact on Self Care Activities- How much influence does fatigue have on daily activities, like grooming and dressing, etc?

VAS-3: Impact on Household and Occupation- How much influence does fatigue have on household or occupational activities?

VAS_1	How much influence does fatigue have on your daily life (the everyday life at home and at work) and on your relationships? no influence at all ——————— a lot of influence*
VAS_2	How much influence does fatigue have on daily activities, like grooming and dressing etc.? no influence at all ——————— a lot of influence*
VAS_3	How much influence does fatigue have on household or occupational activities? no influence at all ——————— a lot of influence*

6) 18 individual 0-100 mm lines. 13 –fatigue subscales, 5- energy subscales. Left no difficulty to right extremely affected (see article for form)[9]

Scoring:

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INTERPRETATION GUIDELINES:

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