Spinal Cord Injury EDGE Task Force Outcome Measures Recommendations

Task Force Members:

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Task Force Objectives:

1. Develop documents for clinicians, educators, and researchers to use that identify common set of outcome measures across the continuum of care and type of injury in the SCI population.

2. Make recommendations for use of outcome measures in the SCI population in the clinical, academic and research settings

3. Assist clinicians, researchers, and educators to select use of outcome measures relative to the SCI population based on a thorough review of psychometric properties and clinical utility.

Task Force Process:

I. Day-long initial meeting at CSM February 2012 in Chicago, Illinois
   a. Agreement on OMs to consider
      i. Original list compiled from literature review, measures recommended by APTA Educational consensus group, measures recommended by SCI SIG, measures in Rehabilitation Measures Database
   b. Agreement on categories of outcome measures (OM) to consider across ICF
      i. Body Structure and Function
         1. Pain
         2. Cardiovascular/aerobic capacity
         3. Sensory Function
         4. Motor Function/Strength
         5. Muscle Tone
         6. Coordination
         7. ROM
      ii. Activity
         1. Gait
         2. Balance
         3. UE function
         4. Wheelchair Mobility
         5. ADLs
         6. Functional Mobility
      iii. Participation
         1. Community Function
         2. Domestic Life
         3. Health and Wellness
         4. Leisure/Recreational Activities
         5. Quality of Life
         6. Reintegration to Community
         7. Self Care
         8. Social Function
         9. Work
   c. Agreement on OMs to review
   d. Agreement on examination criteria for OMs which included a modification of original EDGE form developed by APTA Section on Research.
   e. Initial discussion of categories upon which to rate OMs. Final decision made in future conference call post CSM. Final recommendation categories:
      i. Acuity levels (acute, subacute, chronic)
      ii. AIS (motor complete and motor incomplete)
      iii. Recommend for inclusion in entry level PT curricula

1. Students learn to administer (Y/N)
2. Students exposed to measure (Y/N)

iv. Recommended for use in research studies (Y/N)

f. Discussion and modification of rating scale (see below for rating scale), primary areas for rating
   i. Strength of psychometrics
   ii. Clinical utility
g. Introduction to process for collaborating with Rehabilitation Measures Database (RMD)
   i. EDGE groups partnering with RMD (www.rehabmeasures.org).
   ii. As EDGE groups review an OM, task force members review the measure and the summaries in RMD (see primary review process below). If no summary in RMD, summary created by EDGE group.
   iii. EDGE document and RMD documents designed to be used together. EDGE document provides the recommendation with supporting comments and complete details of measure housed on RMD. RMD will continue to be updated.
h. Assignment of primary and secondary reviewers to final list of measures

II. Review Process
a. Primary Review – Primary reviewer reviews the OM and evaluates it for strength of psychometrics and clinical utility. Primary reviewer also reviews RMD summary and edits or adds additional info to it. Primary reviewer creates EDGE document.
b. Secondary Review – Secondary reviewer reviews work of primary reviewer, and they reach consensus on recommendations.
c. Task force consensus – All recommendations placed in a survey. Task force completes survey on whether they agree or disagree on ratings and why.
   i. Survey reviewed by Jennifer Kahn and Rachel Tappan; results of survey distributed to task force members for discussion and final consensus. (80% consensus required)

III. Final Results presented at CSM in San Diego, CA, January 2013

IV.

RATING SCALE (Note slight difference between SCI scale and scale used by MS and Stroke EDGE groups specific to rating of 2)

4	**Highly Recommend**	• excellent psychometrics in target population (e.g. valid and reliable with available data to guide interpretation) AND • excellent clinical utility (e.g. administration is ≤ 20 minutes, requires equipment typically found in the clinic, no copyright payment required, easy to score)
3	**Recommend**	• good psychometrics in target population (e.g. may lack information about reliability, validity, or available data to guide interpretation) AND • good clinical utility (e.g. administration/scoring > 20 minutes, may require additional equipment to purchase or construct)
2	**Reasonable to use, but limited study in target group**	• good or excellent psychometric data demonstrated in at least one population*, AND • good or excellent clinical utility (refer to above criteria) BUT • insufficient study in target population to support a stronger recommendation
1	**Do not Recommend**	• poor psychometrics (e.g. inadequate reliability or validity) AND/OR • limited clinical utility (e.g. extensive testing time, unusual or expensive equipment, ongoing costs to administer, etc.)

* a neurologic population that has some impairment similarities to the target group would be most helpful, but other groups such as older adults with balance impairment could also meet this criteria

List of Outcome Measures

1. **10 meter walk test (10MWT)**
2. **6 minute walk test (6MWT)**
3. **Action Research Arm Test (ARAT)**
4. **Activities Specific Balance Confidence Scale (ABC)**
5. **Ashworth Scale**
6. **Ashworth Scale, Modified (MAS)**
7. **Balance Evaluations Systems Test (BESTest)**
8. **Berg Balance Scale (BBS)**
9. **Bryce-Ragnarsson Pain Taxonomy**
10. **Capabilities of UE Functioning Instrument (CUE)**
11. **Classification for Chronic Pain in SCI**
12. **Community Integration Questionnaire (CIQ)**
13. **Craig Handicap Assessment and Reporting Technique (CHART)**
14. **Craig Hospital Inventory of Environmental Factors (CHIEF)**
15. **Donovan SCI Pain Classification**
16. **Dynamic Gait Index (DGI)**
17. **Falls Efficacy Scale (FES)**
18. **Functional Gait Assessment (FGA)**
19. **Functional Independence Measure (FIM)**
20. **Functional Reach Test (FRT) /Modified Functional Reach Test (mFRT)**
21. **Functional Tests for Persons who Self Propel a Manual Wheelchair (4FTPSMW)**
22. **Graded and Redefined Assessment of Sensibility Strength and Prehension (GRASSP)**
23. **Grasp and Release Test (GRT)**
24. **Hand Held Myometry/Myometry**
25. **High Level Mobility and Assessment Tool (HiMAT)**
26. **Impact on Participation and Autonomy Questionnaire (IPAQ)**
27. **International Spinal Cord Injury Pain Classification (ISCIP)**
28. **International Standards for Neurological Classification of Spinal Cord Injury, ASIA Impairment Scale (AIS)**
29. **Jebsen Hand Function Test**
30. **Life Satisfaction Questionnaire (LISAT-9)**
31. **Manual Muscle Test (MMT)**
32. **Multidimensional Pain Inventory SCI version**
33. **Needs Assessment Checklist (NAC)**
34. **Numeric Pain Rating Scale**
35. **Participation Assessment with Recombined Tools- Objective (PART-O)**
36. **Penn Spasm Frequency Scale**
37. **Physical Activity Recall Assessment for People with Spinal Cord Injury (PARA-SCI)**

38. **Quadriplegia Index of Function (QIF)**
39. **Quadriplegia Index of Function Short Form (QIF-SF)**
40. **Quality of Life Index (QLI, Ferrans and Powers)**
41. **Quality of Well Being**
42. **Reintegration to Normal Living Index (RNL)**
43. **Satisfaction with Life Scale (SWLS, Deiner Scale)**
44. **Short Form 36 (SF-36)**
45. **Sickness Impact Profile 68 (SIP 68)**
46. **Six Minute Arm Test (6-MAT)**
47. **Sollerman Hand Function Test**
48. **Spinal Cord Assessment Tool for Spastic Reflexes (SCATS)**
49. **Spinal Cord Independence Measure (SCIM) (SCIMII, SCIMIII)**
50. **Spinal Cord Injury Functional Ambulation Inventory (SCI-FAI)**
51. **Spinal Cord Injury Functional Ambulation Profile (SCI-FAP)**
52. **Spinal Cord Injury Lifestyle Scale (SCILS)**
53. **Spinal Cord Injury Spasticity Evaluation Tool (SCI-SET)**
54. **Tardieu Scale, Modified Tardieu Scale**
55. **Tetraplegia Hand Activity Questionnaire (THAQ)**
56. **Timed Up and Go Test (TUG)**
57. **Tool for assessing Mobility in Wheelchair-Dependent Paraplegics (Harvey Mobility Assessment Tool)**
58. **Toronto Rehabilitation Institute Hand Function Test**
59. **Van Lieshout Test Short Version (VLT-SV)**
60. **Walking Index For Spinal Cord Injury (WISCI, WISCI II)**
61. **Wheelchair Skills Test**
62. **Wheelchair Users Shoulder Pain Index (WUSPI)**
63. **World Health Organization Quality of Life-BREF (WHOQOL-BREF)**

Instrument name: 10 Meter Walk Test (10MWT)	
Reviewers: **Primary: Candy Tefertiller, PT, DPT, ATP, NCS** Secondary Reviewer: Jennifer H. Kahn, PT, DPT, NCS	**Date of review: 3/10/2012**
ICF domain (check all that apply): _____ Body function/structure __X____ Activity _____ Participation	

Construct/s measured (check all that apply):

Body structure and Function	Activity	Participation
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility _X_Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories

Category 1 - Acuity	4	3	2	1	Comments
Acute (0-3 mo)	X				
Subacute (3-6 mo)	X				
Chronic (>6 mo)	X				Responsiveness not demonstrated after 6 months in small sample of incomplete SCI possibly due to sample achieving normal walking speed at 6 months post injury[1];
Overall Comments:	Excellent psychometrics in acute and subacute SCI; Questionable responsiveness in chronic SCI population. Excellent clinical utility as this test requires very minimal time and resources.				

Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)			X		Potentially appropriate if able to ambulate
Motor Incomplete (AIS C and D)	X				Easily administered tool that has been shown to be valid, reliable and responsive in motor incomplete SCI population.[1-4]
Overall Comments:	Community dwelling individuals with chronic incomplete SCI demonstrated no difference when performing 10MWT in the natural community setting vs. indoor gymnasium[5]. No significant difference noted when comparing static and dynamic starts in chronic incomplete SCI[4]. Reference norms for comfortable and maximum walking speed of adults aged 20-79 years reported by age and gender and may be useful comparison for clinicians treating ambulatory individuals with motor incomplete SCI[6]. Recommend use of 10MWT in all patients who ambulate without physical assistance. Psychometric data diminished in studies when utilized for individuals who needed assistance to ambulate[3].				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	Quick and easy to administer along with good psychometric properties.
	X		X		

Research Use	**YES**	**NO**	**Comments**
Is this tool appropriate for use in intervention research studies?	X		98% of experts report it is a useful tool to measure walking speed in incomplete SCI, but 30% of experts also report the need for further validation and/or changes[7]

Additional information on this measure can be found on The Rehabilitation Measures Database at: 10 meter walk test (10MWT)

References

1. van Hedel HJ, Wirz M, Curt A. Improving walking assessment in subjects with an incomplete spinal cord injury: responsiveness. *Spinal Cord.* Jun 2006;44(6):352-356.

2. Lam T, Noonan VK, Eng JJ. A systematic review of functional ambulation outcome measures in spinal cord injury. *Spinal Cord.* Apr 2008;46(4):246-254.

3. van Hedel HJ, Wirz M, Dietz V. Assessing walking ability in subjects with spinal cord injury: validity and reliability of 3 walking tests. *Arch Phys Med Rehabil.* Feb 2005;86(2):190-196.

4. Scivoletto G, Tamburella F, Laurenza L, Foti C, Ditunno JF, Molinari M. Validity and reliability of the 10-m walk test and the 6-min walk test in spinal cord injury patients. *Spinal Cord.* Jun;49(6):736-740.

5. Olmos LE, Freixes O, Gatti MA, et al. Comparison of gait performance on different environmental settings for patients with chronic spinal cord injury. *Spinal Cord.* May 2008;46(5):331-334.

6. Bohannon RW. Comfortable and maximum walking speed of adults aged 20-79 years: reference values and determinants. *Age Ageing.* Jan 1997;26(1):15-19.

7. Jackson AB, Carnel CT, Ditunno JF, et al. Outcome measures for gait and ambulation in the spinal cord injury population. *J Spinal Cord Med.* 2008;31(5):487-499.

Instrument name: 6 Minute Walk Test (6MWT)	
Reviewers: **Primary: Candy Tefertiller, PT, DPT, ATP, NCS** Secondary: Jennifer Kahn, PT, DPT, NCS	**Date of review: 3/20/2012**
ICF domain (check all that apply): _____ Body function/structure ___X__ Activity _____ Participation	

Construct/s measured (check all that apply):

Body structure and Function	Activity	Participation
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility _X_Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories

Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3 mo)	X				
Subacute (3-6 mo) months)	X				
Chronic (>6mo)	X				Further research needed to determine responsiveness >6 months post injury.
Overall Comments:	Excellent psychometrics in acute and subacute SCI populations. Questionable responsiveness reported in chronic population when individuals recovered to normal walking speeds. Excellent clinical utility given very minimal time and resource requirements.				
Category 2 Complete vs.	**4**	**3**	**2**	**1**	**Comments:**

Incomplete					
Motor Complete (AIS A and B)			X		No evidence in motor complete SCI population, but potentially appropriate for those who are ambulatory.
Motor Incomplete (AIS C and D)	X				Easily administered tool that has been shown to be valid, reliable, and responsive in the motor incomplete SCI population [1-3]; 94% expert raters report useful tool that needs further validation[4] .
Overall Comments:	Excellent clinical utility in incomplete SCI population.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	Easily administered tool that has been shown to be valid, reliable, and responsive in the SCI population[1-3, 5].
	X		X		
Research Use	**YES**		**NO**		**Comments**
Is this tool appropriate for use in intervention research studies?	X				Significant difference noted in 6MWT demonstrated between long and short tracks; Demonstrates need for standardization in research[3].

Additional information on this measure can be found on The Rehabilitation Measures Database at: 6 minute walk test (6MWT)

References

1. van Hedel HJ, Wirz M, Curt A. Improving walking assessment in subjects with an incomplete spinal cord injury: responsiveness. *Spinal Cord.* Jun 2006;44(6):352-356.
2. van Hedel HJ, Wirz M, Dietz V. Assessing walking ability in subjects with spinal cord injury: validity and reliability of 3 walking tests. *Arch Phys Med Rehabil.* Feb 2005;86(2):190-196.
3. Scivoletto G, Tamburella F, Laurenza L, Foti C, Ditunno JF, Molinari M. Validity and reliability of the 10-m walk test and the 6-min walk test in spinal cord injury patients. *Spinal Cord.* Jun;49(6):736-740.

4. Jackson AB, Carnel CT, Ditunno JF, et al. Outcome measures for gait and ambulation in the spinal cord injury population. *J Spinal Cord Med.* 2008;31(5):487-499.
5. Lam T, Noonan VK, Eng JJ. A systematic review of functional ambulation outcome measures in spinal cord injury. *Spinal Cord.* Apr 2008;46(4):246-254.
6. Casanova C, Celli BR, Barria P, et al. The 6-min walk distance in healthy subjects: reference standards from seven countries. *Eur Respir J.* Jan;37(1):150-156.
7. Enright PL, Sherrill DL. Reference equations for the six-minute walk in healthy adults. *Am J Respir Crit Care Med.* Nov 1998;158(5 Pt 1):1384-1387.
8. Kim CM, Eng JJ, Whittaker MW. Level walking and ambulatory capacity in persons with incomplete spinal cord injury: relationship with muscle strength. *Spinal Cord.* Mar 2004;42(3):156-162.
9. Olmos LE, Freixes O, Gatti MA, et al. Comparison of gait performance on different environmental settings for patients with chronic spinal cord injury. *Spinal Cord.* May 2008;46(5):331-334.
10. van Hedel HJ, Wirz M, Dietz V. Standardized assessment of walking capacity after spinal cord injury: the European network approach. *Neurol Res.* Feb 2008;30(1):61-73.

Instrument name: Action Research Arm Test (ARAT)	
Reviewers: **Primary: Cara Weisbach, PT, DPT** Secondary: Wendy Romney, PT, DPT, NCS	**Date of review: 5/14/12**
ICF domain (check all that apply): ___X__ Body function/structure ___X___ Activity _____ Participation	

Construct/s measured (check all that apply):

Body structure and Function	Activity	Participation
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status __X_Coordination (non-equilibrium) _X__Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers __X_Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories

Category 1 – Acuity	4	3	2	1	Comments
Acute (0-3 mo)			X		
Subacute (3-6 mo)			X		
Chronic (>6 mo)			X		
Overall Comments:	No psychometric property data is published at this time for the SCI population. However excellent psychometrics in individuals with acute and chronic stroke.				

Category 2 Complete vs. Incomplete	4	3	2	1	Comments
Motor Complete (AIS A and B)			X		
Motor Incomplete (AIS C and D)			X		
Overall Comments:	No psychometric property data is published at this time for the SCI population. However excellent psychometrics in stroke.				

Entry-Level Criteria	Students should learn to administer tool		Students should be exposed to tool (e.g. to read literature)		Comments
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	Exposure of this measure is appropriate for the entry-level students in the neurological curriculum, however not specifically in the SCI curriculum, as it is frequently seen in the literature.
		X		X	

Research Use	YES	NO	Comments
Is this tool appropriate for use in intervention research studies?		X	Psychometric data should be established in the SCI population for valid use of this measure in SCI intervention research.

Additional information on this measure can be found on The Rehabilitation Measures Database at: Action Research Arm Test (ARAT)

References

Alexander MS, Anderson K, Biering-Sorensen F, et al. Outcome Measures in Spinal Cord Injury. *Spinal Cord*. 2009;47:582–591.

Harvey LA, Dunlop SA, Churilov L, Hsueh Y-SA, Galea MP. Early intensive hand rehabilitation after spinal cord injury ("Hands On"): a protocol for a randomised controlled trial. *Trials*. 2011;12:14.

Kalsi-Ryan S, Curt A, Fehlings MG, Verrier MC. Assessment of the Hand in Tetraplegia Using the Graded Redefined Assessment of Strength, Sensibility and Prehension (GRASSP). *Top Spinal Cord Inj Rehabil*. 2009;14:34–46.

Kalsi-Ryan S, Beaton D, Curt A, et al. The Graded Redefined Assessment of Strength Sensibility and Prehension: Reliability and Validity. *J Neurotraum*. 2012;29:905–914.

Zariffa J, Kapadia N, Kramer JLK, et al. Effect of a robotic rehabilitation device on upper limb function in a sub-acute cervical spinal cord injury population. *IEEE Int Conf Rehabil Robot*. 2011;2011:5975400.

Zariffa J, Kapadia N, Kramer J, et al. Relationship between clinical assessments of function and measurements from an upper-limb robotic rehabilitation device in cervical spinal cord injury. *IEEE Transactions on Neural Systems and Rehabilitation Engineering: A Publication of the IEEE Engineering in Medicine and Biology Society*. 2011. Available at: http://www.ncbi.nlm.nih.gov/pubmed/22203726. Accessed April 30, 2012.

Instrument name: Activities-Specific Balance Confidence Scale (ABC)	
Reviewers: **Primary: Phyllis Palma, PT, DPT** Secondary: Christopher Newman, PT, MPT, NCS	**Date of review: 05/12**
ICF domain (check all that apply): _____ Body function/structure ____X__ Activity ___X__ Participation	

Construct/s measured (check all that apply):		
Body structure and Function	**Activity**	**Participation**
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion __ _Somatosensation ___Other:	___Activities of Daily Living _X__Balance/falls ___Bed Mobility _X__Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	_X__Community function _X__Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories					
Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)			X		only appropriate at this stage if individual is living in the community.
Subacute (3-6mo)			X		
Chronic(>6mo)			X		
Overall Comments:	No studies specific to SCI, however psychometric data available in related neurologic populations (PD, CP, MS, vestibular) to support validity, reliability and interpretation of change.				
Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**

Motor Complete (AIS A and B)				X	potentially appropriate if individual is ambulatory, based on psychometrics in related neurological populations.
Motor Incomplete (AIS C and D)			X		
Overall Comments:	No studies specific to SCI, however psychometric data available in related neurologic populations to support validity, reliability and interpretation of change.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	Not recommended specifically in SCI curriculum.
		X		X	

Research Use	**YES**	**NO**	**Comments**
Is this tool appropriate for use in intervention research studies?		X	Recommend further research in SCI population; however, note that there is no self report balance confidence measure specific to SCI so this measure may be an option to capture this construct.

Additional information on this measure can be found on The Rehabilitation Measures Database at: Activities Specific Balance Confidence Scale (ABC)

References

Cattaneo DJ, Jonsdottir, Repetti S. Reliability of four scales on balance disorders in persons with multiple sclerosis. *Disabil Rehabil*. 2007; 29:1920-1925.

Steffen T, Seney M, Gross CR. Test-retest reliability and minimal detectable change on balance and ambulation tests, the 36-Item Short-Form Health Survey, and the Unified Parkinson Disease Rating Scale in people with parkinsonism. *Phys Ther*. 2008;88:733.

Talley KM, Wyman JF, et al. Psychometric properties of the activities-specific balance confidence scale and the survey of activities and fear of falling in older women. *J Am Geriatr Soc* 2008;56:328-333.

Opheim A, Jahnsen R, Olsson E, Stenghelle JK. Balance in relation to walking deterioration in adults with spastic bilateral cerebral palsy. *Phys Ther*. 2012; 92:279-288.

Dal Bello-Haas V, Klassen L, Sheppard MS, Metcalfe A. Psychometric Properties of Activity, Self-Efficacy, and Quality-of-Life Measures in Individuals with Parkinson Disease. *Physiother Can* 2011;63:47-57.

Instrument name: Ashworth Scale (AS)	
Reviewers: **Primary: Phyllis Palma, PT, DPT** Secondary: Christopher Newman, PT, MPT, NCS	**Date of review: March 2012**
ICF domain (check all that apply): _X__ Body function/structure _____ Activity _____ Participation	

Construct/s measured (check all that apply):		
Body structure and Function	**Activity**	**Participation**
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength _X_ Muscle tone (spasticity, spasms) ___Pain _X_ Range of motion __ Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___ Domestic Life ___ Health and wellness ___ Leisure/Recreational activities ___ Quality of life ___Reintegration to community ___ Social function ___Work ___Other:

Recommendation Categories					
Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)				X	
Sub-Acute (3-6mo)				X	
Chronic (>6 mo)				X	
Overall Comments:	The Ashworth Scale has little evidence available in any population with one study examining reliability in stroke. More evidence is available for the Modified Ashworth Scale, which should be considered instead of the Ashworth Scale.				
Category 2 – Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A or B)				X	
Motor Incomplete (AIS C or D)				X	

<table>
<tr><td>Overall Comments:</td><td colspan="4">The Ashworth Scale has little evidence available in any population with one study examining reliability in stroke. More evidence is available for the Modified Ashworth Scale, which should be considered instead of the Ashworth Scale.</td></tr>
<tr><td>Entry-Level Criteria</td><td colspan="2">Students should learn to administer tool</td><td colspan="2">Students should be exposed to tool (e.g. to read literature)</td><td>Comments</td></tr>
<tr><td rowspan="2">Should this tool be required for entry level curricula, specific to SCI content?</td><td>YES</td><td>NO</td><td>YES</td><td>NO</td><td rowspan="2"></td></tr>
<tr><td></td><td>X</td><td></td><td>X</td></tr>
<tr><td>Research Use</td><td colspan="2">YES</td><td colspan="2">NO</td><td>Comments</td></tr>
<tr><td>Is this tool appropriate for use in intervention research studies?</td><td colspan="2"></td><td colspan="2">X</td><td>Consider use of more quantitative methods of measurement of spasticity, especially when it is primary outcome of interest</td></tr>
<tr><td colspan="6">Additional information on this measure can be found at: Ashworth Scale</td></tr>
</table>

References

Haas BM, Bergstrom E, Jamous A, Bennie A. The inter rater reliability of the original and of the modified Ashworth scale for the assessment of spasticity in patients with spinal cord injury. *Spinal Cord*. 1996;34:560-564.

Hsieh JT, Wolfe DL, Miller C, Curt A. Spasticity outcome measures in spinal cord injury: psychometric properties and clinical utility. *Spinal Cord*. 2008;46:86-95.

Instrument name: Modified Ashworth Scale (MAS)	
Reviewers: **Primary: Phyllis Palma, PT, DPT** Secondary: Christopher Newman, PT, MPT, NCS	**Date of review: March 2012**
ICF domain (check all that apply): _X__ Body function/structure ___ Activity _____ Participation	

Construct/s measured (check all that apply):

Body structure and Function	Activity	Participation
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength _X__Muscle tone (spasticity, spasms) ___Pain __X_Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___ Domestic Life ___ Health and wellness ___ Leisure/Recreational activities ___ Quality of life ___Reintegration to community ___ Social function ___Work ___Other:

Recommendation Categories

Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3 mo)			X		
SubAcute (3-6 mo)			X		
Chronic (>6 mo)			X		
Overall Comments:	There is limited evidence in SCI to suggest adequate reliability and validity overall. However, more research is needed. Reliability in related neurologic populations is variable, but overall adequate. Available validity studies indicate adequate to excellent validity in SCI and other related populations. There is no data to guide interpretation in individuals with SCI or any related neurologic population.				
Category 2 Incomplete vs.	**4**	**3**	**2**	1	Comments

Complete					
Motor Complete (AIS A and B)			X		
Motor Incomplete (AIS C and D)			X		
Overall Comments:	There is limited evidence in SCI to suggest adequate reliability and validity overall. However, more research is needed. Reliability in related neurologic populations is variable, but overall adequate. Available validity studies indicate adequate to excellent validity in SCI and other related populations. There is no data to guide interpretation in individuals with SCI or any related neurologic population.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	Students will encounter this measure clinically and/or in the literature.
		X	X		

Research Use	**YES**	**NO**	**Comments**
Is this tool appropriate for use in intervention research studies?		X	Consider use of more quantitative methods of measurement of spasticity, especially when it is primary outcome of interest

Additional information on this measure can be found on The Rehabilitation Measures Database at Ashworth Scale, Modified (MAS)

References

Allison S, Abraham L. Correlation of quantitative measures with the modified Ashworth scale in the assessment of plantar flexor spasticity in patients with traumatic brain injury. *Journal of Neurology*. 1995;242(10):699-706.

Allison S, Abraham L., et al. Reliability of the Modified Ashworth Scale in the assessment of plantarflexor muscle spasticity in patients with traumatic brain injury. *International Journal of Rehabilitation Research*. 1996;19(1):67.

Blackburn M, van Vliet P, et al. Reliability of measurements obtained with the modified Ashworth scale in the lower extremities of people with stroke. *Physical Therapy*. 2006;82(1):25.

Bohannon, R. and Smith, M. Interrater reliability of a modified Ashworth scale of muscle spasticity. *Physical Therapy*. 1987;67(2):206.

Craven BC, Morris AR. Modified ashworth scale reliability for measurement of lower extremity spasticity among patients with SCI. *Spinal Cord.* 2010;48:207-213.

Haas B, Bergström E, Jamous A, Bennie A. The inter rater reliability of the original and of the modified ashworth scale for the assessment of spasticity in patients with spinal cord injury. *Spinal Cord.* 1996;34:560-564.

Craven BC, Morris AR. Modified Ashworth scale reliability for measurement of lower extremity spasticity among patients with SCI. *Spinal Cord*. 2010;48:207-213.

Gregson J, Leathley M, et al. Reliability of the Tone Assessment Scale and the modified Ashworth scale as clinical tools for assessing poststroke spasticity. *Archives of Physical Medicine and Rehabilitation.* 1999;80(9):1013-1016.

Haas B, Bergström E, et al. The inter rater reliability of the original and of the modified Ashworth scale for the assessment of spasticity in patients with spinal cord injury. *Spinal Cord*. 1996;34(9):560-564.

Hsieh JT, Wolfe DL, et al. Spasticity outcome measures in spinal cord injury: psychometric properties and clinical utility. *Spinal Cord.*2008;46(2):86-95.

Katz R, Rovai G, et al. Objective quantification of spastic hypertonia: correlation with clinical findings. *Archives of Physical Medicine and Rehabilitation*. 1992;73(4):339.

Lin F, Sabbahi M. Correlation of spasticity with hyperactive stretch reflexes and motor dysfunction in hemiplegia. Archives of Physical Medicine and Rehabilitation. 1999;80(5):526-530.

Tederko P, Krasuski M, et al. Reliability of clinical spasticity measurements in patients with cervical spinal cord injury." *Ortop Traumatol Rehabil*. 2007; 9:467-483.

Instrument name: Balance Evaluation Systems Test (BESTest)	
Reviewers: **Primary: Phyllis Palma, PT, DPT** Secondary: Christopher Newman, PT, DPT, NCS	**Date of review: 06/12**
ICF domain (check all that apply): __X___ Body function/structure ____X___ Activity _____ Participation	

Construct/s measured (check all that apply):		
Body structure and Function	**Activity**	**Participation**
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) _X__Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain _X__Range of motion ___Somatosensation _X__Other: Balance	___Activities of Daily Living __X_Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories					
Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)				X	
Subacute (3-6mo)				X	
Chronic (>6mo)			X		No data in SCI population, though good interrater reliability and test-retest reliability found with PD population; BESTest is more sensitive for identifying fallers when compared to FGA in PD; Mini-BESTest has better clinical utility with less time to administer; however less data
Overall Comments:	Acute and subacute populations not tested due to primarily				

	studied in PD population. Of note, this measure assists clinicians in identifying contributing factors to balance dysfunction, which can be helpful for clinical decision making for treatment.				
Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)			X		Appropriate if standing balance is a goal and/or ambulatory
Motor Incomplete (AIS C and D)			X		
Overall Comments:	Good psychometrics in PD population, but not yet studied in SCI population. Of note, this measure assists clinicians in identifying contributing factors to balance dysfunction, which can be helpful for clinical decision making for treatment.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	Of note, this measure assists clinicians in identifying contributing factors to balance dysfunction, which can be helpful for clinical decision making for treatment.
		X		X	

Research Use	**YES**	**NO**	**Comments**
Is this tool appropriate for use in intervention research studies?		X	

Additional information on this measure can be found on The Rehabilitation Measures Database at Balance Evaluations Systems Test (BESTest)

References

Duncan RP, Leddy AL, et al. Five times sit-to-stand test performance in Parkinson's disease. *Arch Phys Med Rehabil*. 2011**;**92:1431-1436.

Horak FB, Wrisley DM, Frank J. The Balance Evaluation Systems Test (BESTest) to differentiate balance deficits. *Phys Ther*. 2009;89:484-498.

Leddy AL, Crowner BE, et al. Utility of the Mini-BESTest, BESTest, and BESTest sections for balance assessments in individuals with Parkinson disease. 2011; *J Neurol Phys Ther.* 35:90-97.

Leddy AL, Crowner BE, et al. Functional gait assessment and balance evaluation system test: reliability, validity, sensitivity, and specificity for identifying individuals with Parkinson disease who fall. *Phys Ther*. 2011;91:102-113.

Instrument name: Berg Balance Scale (BBS)	
Reviewers: **Primary: Phyllis Palma, PT, DPT** Secondary: Christopher Newman, PT, MPT, NCS	**Date of review: 06/12**
ICF domain (check all that apply): _____ Body function/structure ___X___ Activity _____ Participation	

Construct/s measured (check all that apply):

Body structure and Function	Activity	Participation
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living __X_Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories

Category 1 - Acuity	4	3	2	1	Comments
Acute (0-3 mo)		X			
Subacute (3-6 mo)		X			
Chronic (>6 mo)		X			Excellent reliability and correlation with other mobility measures; however, no association between falls and BBS scores and unable to determine fallers from non fallers via Receiver Operating Characteristic (ROC) analysis.
Overall Comments:	Excellent validity, but reliability data in acute/subacute lacking.				

Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)			X		Appropriate if standing balance is a goal and/or individual is ambulatory
Motor Incomplete (AIS C and D)		X			Excellent validity and reliability data. In individuals with AIS D, ceiling effect; therefore recommend use with additional measure, such as 10MWT (Lemay 2010)
Overall Comments:					

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	
	X		X		
Research Use	**YES**		**NO**		**Comments**
Is this tool appropriate for use in intervention research studies?	X				

Additional information on this measure can be found on The Rehabilitation Measures Database at: Berg Balance Scale (BBS)

References

Lemay JF, Nadeau S. Standing balance assessment in ASIA D paraplegic and tetraplegic participants: concurrent validity of the berg balance scale. *Spinal Cord*. 2010;48:245-250.

Datta S, Lorenz DJ, et al. A multivariate examination of temporal changes in Berg Balance Scale items for patients with ASIA Impairment Scale C and D spinal cord injuries. *Arch Phys Med Rehabil*. 2010;90:1208-1217.

Ditunno, JF, Barbeau H, et al. Validity of the walking scale for spinal cord injury and other domains of function in a multicenter clinical trial. *Neurorehabil Neural Repair.* 2007;21:539-550.

Wirz M, Muller R, et al. Falls in persons with spinal cord injury: validity and reliability of the berg balance scale. *Neurorehabil Neural Repair*. 2010;24:70-77.

Instrument name: Bryce-Ragnarsson Pain Taxonomy	
Reviewers: **Primary: Rachel Tappan, PT, NCS** Secondary: Eileen Tseng, PT, DPT, NCS	**Date of review:** 3/11/12
ICF domain (check all that apply): _X____ Body function/structure _____ Activity _____ Participation	

Construct/s measured (check all that apply):		
Body structure and Function	**Activity**	**Participation**
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) _X__Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories					
Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)			X		
Subacute (3-6mo)			X		
Chronic (>6 mo)			X		
Overall Comments:	The Bryce-Ragnarsson Pain Taxonomy may be useful as a classification system for identifying types of pain after SCI. However, the clinical relevance of these pain subtypes has not been established with respect to the identification of the prognosis for improvement in the pain with or without treatment, the				

	identification of appropriate treatment for the pain, or the impact of the pain on quality of life after SCI. Also, the Bryce-Ragnarsson Pain Taxonomy is a system for classifying type of pain rather than a true outcome measure that can measure change in pain over time.				
Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)			X		
Motor Incomplete (AIS C and D)			X		
Overall Comments:	See comments in Category 1 above.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	
		X		X	
Research Use	**YES**		**NO**		**Comments**
Is this tool appropriate for use in intervention research studies?	X				Tool is appropriate for classification of pain. However, also consider using the International Spinal Cord Injury Pain (ISCIP) Classification.

Additional information on this measure can be found on The Rehabilitation Measures Database at: Bryce-Ragnarsson Pain Taxonomy

References

Bryce TN, Budh CN, Cardenas DD, et al. Pain after spinal cord injury: an evidence-based review for clinical practice and research. Report of the National Institute on Disability and Rehabilitation Research Spinal Cord Injury Measures meeting. *J Spinal Cord Med*. 2007;30:421-440.

Bryce TN, Dijkers MP, Ragnarsson KT, et al. Reliability of the Bryce/Ragnarsson spinal cord injury pain taxonomy. *J Spinal Cord Med.* 2006;29:118-132.

Instrument name: Capabilities of Upper Extremity (CUE)	
Reviewers: **Primary: Cara Weisbach, PT, DPT** Secondary: Wendy Romney, PT, DPT, NCS	**Date of review: 3/31/2012**
ICF domain (check all that apply): _____ Body function/structure ___X___ Activity _____ Participation	

Construct/s measured (check all that apply):		
Body structure and Function	**Activity**	**Participation**
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers __X_ Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories					
Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3 mo)			X		Studies performed to date are in individuals >1 year post injury. Further research needed.
Subacute (3-6 mo)			X		Studies performed to date are in individuals >1 year post injury. Further research needed.
Chronic (>6 mo)		X			
Overall Comments:	Specifically designed for use in assessment of upper limb function in individuals with tetraplegia, including proximal and distal upper				

	extremity tasks. Has also been used to assess hand function following hand surgery (Mulcahey, 2004). Clinical utility is decreased due to time to administer being ≥30 minutes.				
Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)		X			
Motor Incomplete (AIS C and D)		X			
Overall Comments:	Clinical utility is decreased due to time to administer being ≥ 30 minutes.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	In general, SCI UE function measures have limited data. Of available measures, this appears to be the best choice for student exposure.
		X	X		
Research Use	**YES**		**NO**		**Comments**
Is this tool appropriate for use in intervention research studies?	X				

Additional information on this measure can be found on The Rehabilitation Measures Database at: Capabilities of UE Functioning Instrument (CUE)

References

Marino RJ, Shea JA, Stineman MG. The capabilities of upper extremity instrument: reliability and validity of a measure of functional limitation in tetraplegia. *Arch Phys Med Rehabil*. 1998;79(12):1512–1521.

Mulcahey MJ, Betz RR, Kozin SH, Smith BT, Hutchinson D, Lutz C. Implantation of the Freehand System during initial rehabilitation using minimally invasive techniques. *Spinal Cord*. 2004:42:46–55.

Mulcahey MJ, Hutchinson D, Kozin S. Assessment of upper limb in tetraplegia: considerations in evaluation and outcomes research. *J Rehabil Res Dev*. 2007;44:91–102.

Post, M., Van Lieshout, G., Seelen, H., Snoek, G., IJzerman, M., & Pons, C. Measurement properties of the short version of the Van Lieshout test for arm/hand function of persons with tetraplegia after spinal cord injury. *Spinal Cord.* 2006:44:763-771.

Ragnarsson, K. T., Wuermser, L. A., Cardenas, D. D., & Marino, R. J. Spinal cord injury clinical trials for neurologic restoration: improving care through clinical research. *Amer J Phys Med Rehabil.* 2005:84:S77.

Rudhe C, van Hedel HJA. Upper extremity function in persons with tetraplegia: relationships between strength, capacity, and the Spinal Cord Independence Measure. *Neurorehabil Neural Repair*. 2009;23:413–421.

Instrument name: Classification for Chronic Pain in SCI/Cardenas Pain Classification	
Reviewers: **Primary: Rachel Tappan, PT, NCS** Secondary: Eileen Tseng, PT, DPT, NCS	**Date of review:** March 31, 2012
ICF domain (check all that apply): ____X_ Body function/structure _____ Activity _____ Participation	

Construct/s measured (check all that apply):		
Body structure and Function	**Activity**	**Participation**
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) _X__Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories					
Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)				X	
Subacute (3-6mo)				X	
Chronic(>6mo)				X	
Overall Comments:	The Classification for Chronic Pain in SCI/Cardenas Pain Classification is one of many systems developed prior to a recent meeting of experts in which a pain classification system for people with spinal cord injury was developed by expert consensus resulting in the ISCIP classification. There is limited evidence to support the use of this pain classification, and both the				

	International Spinal Cord Injury Pain Classification (ISCIP) and the Bryce-Ragnarsson Pain Taxonomy have more support in the literature. Also, this pain classification is a system for classifying type of pain rather than a true outcome measure that can measure change in pain over time.				
Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)				X	
Motor Incomplete (AIS C and D)				X	
Overall Comments:	See comments in Category 1 above.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	
		X		X	
Research Use	**YES**		**NO**		**Comments**
Is this tool appropriate for use in intervention research studies?			X		

Additional information on this measure can be found on The Rehabilitation Measures Database at: Classification for Chronic Pain in SCI

References

Bryce TN, Norrbrink BUdh C, Cardenas DD, et al. Pain after spinal cord injury: an evidence-based review for clinical practice and research. *J Spinal Cord Med*. 2007;30:421-440.

Cardenas DD, Felix ER. Pain after spinal cord injury: a review of classification, treatment approaches, and treatment assessment. *PM&R*. 2009;1:1077-1090.

Cardenas DD, Turner JA, Warms CA, Marshall HM. Classification of chronic pain associated with spinal cord injuries. *Arch Phys Med Rehabil*. 2002;83:1708-1714.

Instrument name: Community Integration Questionnaire (CIQ)	
Reviewers: **Primary: Candy Tefertiller, PT, DPT, ATP, NCS** Secondary: Jennifer Kahn, PT, DPT, NCS	**Date of review: 5/07/2012**
ICF domain (check all that apply): _____ Body function/structure _____ Activity ___X__ Participation	

Construct/s measured (check all that apply):		
Body structure and Function	**Activity**	**Participation**
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	_X_Community function _X__Domestic Life ___Health and wellness _X__Leisure/Recreational activities ___Quality of life _X__Reintegration to community ___Self Care _X__Social function _X__Work ___Other:

Recommendation Categories					
Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)			X		No data for acute population. Measure only appropriate following discharge from inpatient as it measures community reintegration.
Subacute (3-6 mo)			X		Corrigan et al evaluated this measure 3-6 months post d/c from inpatient rehab in BI population (did not give rehab timeframe); demonstrated clinical utility for measure of handicap except in home integration subscale.
Chronic(>6 mo)			X		
Overall Comments:	Limited psychometric information in SCI population, but sound psychometrics in BI population and excellent clinical utility.				

	Normative chronic SCI data available for comparison[2]. CIQ was significantly correlated with the CHART-SF subscales in chronic SCI and is relatively short and simple to administer. Limited evidence in SCI population limiting higher recommendation. CIQ II has been developed and focuses on ADLs similarly to the CIQ. However, the CIQ II not only asks how satisfied or dissatisfied the individual is with a particular activity, but also whether they would like to change and how important that change would be to them. The CIQ II has only been tested in the BI population limiting recommendation for SCI population at this time.				
Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)			X		
Motor Incomplete (AIS C and D)			X		
Overall Comments:	Considerations include the following in TBI population: Women score significantly higher on integration scores; Older subjects had lower CIQ scores overall; Increased education is related to higher CIQ total scores[3]. Needs further validation in SCI population[2].				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	Exposure to participation measure is valuable, but not specific to SCI.
		X		X	

Research Use	**YES**	**NO**	**Comments**
Is this tool appropriate for use in intervention research studies?		X	Needs more research specifically on psychometric properties in SCI before recommending as research tool in SCI population.

Additional information on this measure can be found on The Rehabilitation Measures Database at: Community Integration Questionnaire (CIQ)

References

1. Jensen MP, Hoffman AJ, Cardenas DD. Chronic pain in individuals with spinal cord injury: a survey and longitudinal study. *Spinal Cord.* Dec 2005;43(12):704-712.

2. Gontkovsky ST, Russum P, Stokic DS. Comparison of the CIQ and CHART Short Form in assessing community integration in individuals with chronic spinal cord injury: a pilot study. *NeuroRehabilitation.* 2009;24(2):185-192.

3. Kaplan CP. The Community Integration Questionnaire with new scoring guidelines: concurrent validity and need for appropriate norms. *Brain Inj.* Aug 2001;15(8):725-731.

4. Zhang L, Abreu BC, Gonzales V, Seale G, Masel B, Ottenbacher KJ. Comparison of the Community Integration Questionnaire, the Craig Handicap Assessment and Reporting Technique, and the Disability Rating Scale in traumatic brain injury. *J Head Trauma Rehabil.* Dec 2002;17(6):497-509.

5. Corrigan, J, Deming R. Psychometrics of the Community Integration Questionnaire. *J Head Trauma Rehabil*. 1995 ;10(4) :41-53.

Instrument name: Craig Handicap Assessment and Reporting Technique (CHART)	
Reviewers: **Primary: Candy Tefertiller, PT, DPT, ATP, NCS** Secondary: Jennifer Kahn, PT, DPT, NCS	**Date of review: 5-09-12**
ICF domain (check all that apply): _____ Body function/structure _____ Activity __X ___ Participation	

Construct/s measured (check all that apply):

Body structure and Function	Activity	Participation
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	_X__Community function _X__Domestic Life ___Health and wellness _X__Leisure/Recreational activities _X__Quality of life _X__Reintegration to community _X__Self Care _X__Social function _X__Work ___Other:

Recommendation Categories

Category 1 - Acuity	4	3	2	1	Comments
Acute (0-3mo)			X		No data in acute population, but SCI specific tool. Will not be applicable until person is discharged from a hospital setting.
Subacute (3-6mo)			X		No data in subacute population, but SCI specific tool. Will not be applicable until person is discharged from a hospital setting
Chronic (>6 mo)		X			Ceiling effects reported in 6-63% of individuals with Chronic SCI on subscales[1].
Overall Comments:	Excellent validity and reliability in Chronic SCI population, but may take up to 30 minutes to administer. Ceiling effects also seen in Chronic SCI with highest percentage seen in incomplete				

	and lower SCI level. The use of subscales rather than total score may give a more accurate picture of an individual's specific limitations. The test is free and available online and does not require any training. The CHART SF is comprised of a subset of CHART long form questions. Those questions included in the short form (SF) were found to be highly predictive of all subscales in the long form scoring except for a weaker correlation in the economic subscale (see CHART manual) and could potentially increase clinical utility given the reduction in time required to administer.				
Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)		X			
Motor Incomplete (AIS C and D)		X			Ceiling effects noted in all domains for Chronic SCI with a motor score >50[2]. Lower and incomplete SCI s demonstrated substantial ceiling effects on all subscales[2]
Overall Comments:	May be most appropriate for chronic motor complete injuries as substantial ceiling effects noted on all domains in individuals with higher motor scores.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	CHART is currently a well respected and frequently referenced participation outcome measure in chronic SCI. No training required to administer tool.
		X	X		
Research Use	**YES**		**NO**		**Comments**
Is this tool appropriate for use in intervention research studies?	X				Psychometrically sound and commonly used in chronic SCI studies to measure disability. Recommend further research on meaningful changes in scores to help guide

			interpretation of scores.
Additional information on this measure can be found on The Rehabilitation Measures Database at: Craig Handicap Assessment and Reporting Technique (CHART)			

References

1. Hall KM, Bushnik T, Lakisic-Kazazic B, Wright J, Cantagallo A. Assessing traumatic brain injury outcome measures for long-term follow-up of community-based individuals. *Arch Phys Med Rehabil.* Mar 2001;82(3):367-374.

2. Noonan VK, Miller WC, Noreau L. A review of instruments assessing participation in persons with spinal cord injury. *Spinal Cord.* Jun 2009;47(6):435-446.

3. Gontkovsky ST, Russum P, Stokic DS. Comparison of the CIQ and CHART Short Form in assessing community integration in individuals with chronic spinal cord injury: a pilot study. *NeuroRehabilitation.* 2009;24(2):185-192.

4. Tozato, F., Tobimatsu, Y., et al. (2005). "Reliability and validity of the Craig Handicap Assessment and Reporting Technique for Japanese individuals with spinal cord injury." Tohoku J Exp Med 205(4): 357-366.

5. Walker N, Mellick D, Brooks CA, Whiteneck GG. Measuring participation across impairment groups using the Craig Handicap Assessment Reporting Technique. *Am J Phys Med Rehabil.* Dec 2003;82(12):936-941.

6. Whiteneck GG, Charlifue SW, Gerhart KA, Overholser JD, Richardson GN. Quantifying handicap: a new measure of long-term rehabilitation outcomes. *Arch Phys Med Rehabil.* Jun 1992;73(6):519-526.

7. Whiteneck G, Brooks C, Charlifue S, Gerhart K, editors. Guide for the Use of CHART: Craig Handicap Assessment and Reporting Technique. Englewood, CO: Craig Hospital; 1992.

Instrument name: Craig Hospital Inventory of Environmental Factors (CHIEF)	
Reviewers: **Primary: Candy Tefertiller, PT, DPT, ATP, NCS** Secondary: Jennifer Kahn, PT, DPT, NCS	**Date of review: 5-09-12**

ICF domain (check all that apply):

_____ Body function/structure _____ Activity ___X__ Participation

Construct/s measured (check all that apply):

Body structure and Function	Activity	Participation
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	_X__Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life _X__Reintegration to community ___Self Care _X__Social function _X_Work _X__Other: environmental barriers

Recommendation Categories

Category 1 - Acuity	4	3	2	1	Comments
Acute (0-3mo)			X		Multi-centre study of community needs revealed no significant impact of environmental barriers in individuals with SCI 3-18 months post d/c[1].
Subacute (3-6mo)			X		
Chronic (>6mo)		X			Environmental factors found to be more strongly correlated to life satisfaction than to societal participation[2].
Overall Comments:	Good psychometrics in chronic SCI population. Good clinical utility given it takes 10-15 minutes to administer. Proxy utilization not recommended for this test. Interpretation of the work/school subscale is challenging as only those who are				

	currently employed/students can respond to this subscale. CHIEF-SF developed and reduced number of items but kept original 5 subscales to improve clinical utility. Further validation of CHIEF-SF is required, but the short form has been adopted by TBI and SCI Model systems for use over the long form.				
Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)		X			
Motor Incomplete (AIS C and D)		X			No differences reported in responses of motor complete and motor incomplete SCI population.
Overall Comments:	Test with good clinical utility and sound psychometrics designed to measure the frequency and magnitude of environmental barriers in individuals with chronic SCI[3]. This tool may assist clinicians in identifying environmental barriers that may be limiting an individual's life satisfaction as these reporting of environmental barriers have been more strongly correlated to life satisfaction than actual participation.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	Limited evidence and needs further support in acute and subacute populations.
		X		X	

Research Use	**YES**	**NO**	**Comments**
Is this tool appropriate for use in intervention research studies?		X	Needs further research including understanding how to apply tool to individuals not involved in work or school.

Additional information on this measure can be found on The Rehabilitation Measures Database at: Craig Hospital Inventory of Environmental Factors (CHIEF)

References

1. Kennedy P, Sherlock O, McClelland M, Short D, Royle J, Wilson C. A multi-centre study of the community needs of people with spinal cord injuries: the first 18 months. *Spinal Cord.* 2009;48(1):15-20.

2. Whiteneck G, Meade MA, Dijkers M, Tate DG, Bushnik T, Forchheimer MB. Environmental factors and their role in participation and life satisfaction after spinal cord injury. *Arch Phys Med Rehabil.* 2004;85(11):1793-1803.

3. Whiteneck GG, Harrison-Felix CL, Mellick DC, Brooks CA, Charlifue SB, Gerhart KA. Quantifying environmental factors: a measure of physical, attitudinal, service, productivity, and policy barriers. *Arch Phys Med Rehabil.* 2004;85(8):1324-1335.

4. Whiteneck GG, Gerhart KA, Cusick CP. Identifying environmental factors that influence the outcomes of people with traumatic brain injury. *J Head Trauma Rehabil.* 2004;19(3):191-204.

5. Whiteneck GG, Charlifue SW, Gerhart KA, Overholser JD, Richardson GN. Quantifying handicap: a new measure of long-term rehabilitation outcomes. *Arch Phys Med Rehabil.* 1992;73(6):519-526.

6. Han CW, Yajima Y, Lee EJ, Nakajima K, Meguro M, Kohzuki M. Validity and utility of the Craig Hospital Inventory of Environmental Factors for Korean community-dwelling elderly with or without stroke. *Tohoku J Exp Med.* 2005;206(1):41-49.

Instrument name: Donovan Spinal Cord Injury Pain Classification Scheme	
Reviewers: **Primary Reviewer: Rachel Tappan, PT, NCS** Secondary Reviewer: Eileen Tseng, PT, DPT, NCS	**Date of review:** 3/24/12
ICF domain (check all that apply): __x___ Body function/structure _____ Activity _____ Participation	

Construct/s measured (check all that apply):

Body structure and Function	Activity	Participation
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) _X__Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories

Category 1 - Acuity	4	3	2	1	Comments
Acute (0-3mo)				X	
Subacute (3-6mo)				X	
Chronic(>6mo)				X	
Overall Comments:	The Donovan Spinal Cord Injury Pain Classification Scheme is one of many systems developed prior to a recent meeting of experts in which a pain classification system for people with spinal cord injury was developed by expert consensus resulting in the ISCIP classification. There is limited evidence to support the use of this pain classification.				

	Also, this pain classification is a system for classifying type of pain rather than a true outcome measure that can measure change in pain over time.				
Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)				X	
Motor Incomplete (AIS C and D)				X	
Overall Comments:	See comments in Category 1 above.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	
		X		X	
Research Use	**YES**		**NO**		**Comments**
Is this tool appropriate for use in intervention research studies?			X		

Additional information on this measure can be found on The Rehabilitation Measures Database at: Donovan SCI Pain Classification

References

Donovan WH, Dimitrijevic MR, Dahm L, Dimitrijevic M. Neurophysiological approaches to chronic pain following spinal cord injury. Paraplegia. 1982;20:135-146.

Instrument name: Dynamic Gait Index (DGI)	
Reviewers: **Primary: Candy Tefertiller, PT, DPT, ATP, NCS** Secondary: Jennifer Kahn, PT, DPT, NCS	**Date of review: 5-06-2012**
ICF domain (check all that apply): _____ Body function/structure __X____ Activity _____ Participation	

Construct/s measured (check all that apply):

Body structure and Function	Activity	Participation
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living _X__Balance/falls ___Bed Mobility _X__Gait (include stairs) _X_High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories

Category 1 - Acuity	4	3	2	1	Comments
Acute (0-3mo)			X		Good psychometrics in acute CVA population[1]. No SCI specific data
Subacute (3-6mo)			X		Excellent correlation with 10MWT, and Postural Assessment Scale for Stroke (PASS) in subacute CVA[1]. No SCI data available.
Chronic(>6mo)			X		Excellent concurrent validity with Berg Balance Scale and moderate concurrent validity with ABC in chronic stroke[2] Moderate concurrent validity with BBS in chronic MS population[3] No SCI data available.
Overall Comments:	Good psychometrics neurologic populations, but no data				

	available in SCI. Good clinical utility but insufficient study in SCI population to support a stronger recommendation.				
Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)			X		Individuals need to be ambulatory to be appropriate for test.
Motor Incomplete (AIS C and D)			X		No data in SCI specific population.
Overall Comments:	Age and gender referenced normative data for asymptomatic adults available 30-89 available[4]. Two recent studies have utilized the DGI to assess dynamic balance in incomplete SCI even though the tool has not yet been validated in this population[5, 6]. Given that SCI specific dynamic balance measures are lacking, this tool may be an appropriate option when attempting to capture higher level balance deficits even though psychometrics not yet available in SCI population. Needs SCI specific data to warrant a higher recommendation.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	Fair to good psychometric properties in variety of neurologic populations so exposure would be beneficial but not SCI specific.
		X	X		

Research Use	**YES**	**NO**	**Comments**
Is this tool appropriate for use in intervention research studies?		X	Moderate to good psychometric properties in other populations, but no specific SCI data. Validation studies needed in target population prior to recommending in research.

Additional information on this measure can be found on The Rehabilitation Measures Database at: Dynamic Gait Index (DGI)

References

1. Lin JH, Hsu MJ, Hsu HW, Wu HC, Hsieh CL. Psychometric comparisons of 3 functional ambulation measures for patients with stroke. *Stroke.* Sep;41(9):2021-2025.

2. Jonsdottir J, Cattaneo D. Reliability and validity of the dynamic gait index in persons with chronic stroke. *Arch Phys Med Rehabil.* Nov 2007;88(11):1410-1415.

3. Cattaneo D, Regola A, Meotti M. Validity of six balance disorders scales in persons with multiple sclerosis. *Disabil Rehabil.* Jun 30 2006;28(12):789-795.

4. Vereeck L, Wuyts F, Truijen S, Van de Heyning P. Clinical assessment of balance: normative data, and gender and age effects. *Int J Audiol.* Feb 2008;47(2):67-75.

5. Fritz SL, Merlo-Rains AM, Rivers ED, et al. An intensive intervention for improving gait, balance, and mobility in individuals with chronic incomplete spinal cord injury: a pilot study of activity tolerance and benefits. *Arch Phys Med Rehabil.* Nov;92(11):1776-1784.

6. Day KV, Kautz SA, Wu SS, Suter SP, Behrman AL. Foot placement variability as a walking balance mechanism post-spinal cord injury. *Clin Biomech (Bristol, Avon).* Feb;27(2):145-150.

Instrument name: Falls Efficacy Scale (FES)	
Reviewers: **Primary: Phyllis Palma, PT, DPT** Secondary: Christopher Newman, PT, MPT, NCS	**Date of review: April 2012**
ICF domain (check all that apply): _____ Body function/structure ___X___ Activity __X___ Participation	

Construct/s measured (check all that apply):		
Body structure and Function	**Activity**	**Participation**
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	_X__Activities of Daily Living _X__Balance/falls _X__Bed Mobility _X__Gait (include stairs) _ __High Level mobility _X__Transfers _X__Upper Extremity Function _ __Wheelchair Mobility/skills ___Other:	___Community function _X__Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community _X__Self Care ___Social function ___Work ___Other:

Recommendation Categories					
Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)			X		
Subacute (3-6mo)			X		
Chronic (>6mo)			X		
Overall Comments:	Adequate to excellent reliability and validity along with data to guide interpretation available in geriatric populations. However, there is limited evidence specific to individuals with SCI.				
Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**

Motor Complete (AIS A and B)			X		
Motor Incomplete (AIS C and D)			X		Only one study found with FES specific to SCI; interobserver reliability was excellent, however not able to distinguish between fallers and non-fallers
Overall Comments:	Adequate to excellent reliability and validity along with data to guide interpretation available in geriatric populations. However, there is limited evidence specific to individuals with SCI.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	Not in SCI-specific curricula
		X		X	

Research Use	**YES**	**NO**	**Comments**
Is this tool appropriate for use in intervention research studies?		X	Recommend further research in SCI population; however, note that there is no self-report balance/falls confidence measure specific to SCI so this measure may be an option to capture this construct.

Additional information on this measure can be found on The Rehabilitation Measures Database at: Falls Efficacy Scale (FES)

References

Huang TT, Wang WS. Comparison of three established measures of fear of falling in community-dwelling older adults: psychometric testing. *Int J Nurs Stud* 2009;46:313-1319.

Wirz M, Muller R, et al. Falls in persons with spinal cord injury: validity and reliability of the Berg Balance Scale. *Neurorehabil Neural Repair.* 2010;24:70-77.

Kempen GI, Yardley L, et al. The Short FES-I: a shortened version of the falls efficacy scale-international to assess fear of falling. *Age Ageing* 2008;37:45-50.

Instrument name: Functional Gait Assessment (FGA)	
Reviewers: **Primary: Candy Tefertiller, PT, DPT, ATP, NCS** Secondary Reviewer: Jennifer H. Kahn, PT, DPT, NCS	**Date of review: 4/28/2012**
ICF domain (check all that apply): _____ Body function/structure ____X__ Activity _____ Participation	

Construct/s measured (check all that apply):

Body structure and Function	Activity	Participation
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living _X__Balance/falls ___ Bed Mobility _X_Gait (include stairs) _X__High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories

Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)			X		No data in SCI population
Subacute (3-6 months)			X		No data in SCI population
Chronic (>6 mo)				X	No data in chronic neurologic population has been reported.
Overall Comments:	Overall, moderate to good psychometric properties and low floor and ceiling effects in acute and subacute stroke population, but no SCI specific data and no chronic data[1]. Excellent clinical utility requiring little time and minimal resources.				
Category 2 Complete vs.	**4**	**3**	**2**	**1**	**Comments**

Incomplete					
Motor Complete (AIS A and B)			X		Individuals need to be ambulatory in order to be appropriate for test.
Motor Incomplete (AIS C and D)			X		
Overall Comments:	No testing completed in the SCI population but shows moderate to good psychometric properties in other neurologic populations assessing balance dysfunction. Minimal ceiling effects for both the DGI and FGA noted in the chronic stroke population with the FGA being slightly lower than the DGI. Further study is required for guidance on most appropriate measure in the SCI population.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	Fair to good psychometric properties in neurologic population, but not specific to SCI population so should not be taught as part of SCI curriculum.
		X	X		

Research Use	**YES**	**NO**	**Comments**
Is this tool appropriate for use in intervention research studies?		X	Moderate to good psychometric properties in other populations, but no literature in SCI population so validation studies are needed before recommending in research in SCI population.

Additional information on this measure can be found on The Rehabilitation Measures Database at: Functional Gait Assessment (FGA)

References

1. Lin JH, Hsu MJ, Hsu HW, Wu HC, Hsieh CL. Psychometric comparisons of 3 functional ambulation measures for patients with stroke. *Stroke.* Sep;41(9):2021-2025.

2. Wrisley DM, Kumar NA. Functional gait assessment: concurrent, discriminative, and predictive validity in community-dwelling older adults. *Phys Ther.* May;90(5):761-773.

3. Wrisley DM, Marchetti GF, Kuharsky DK, Whitney SL. Reliability, internal consistency, and validity of data obtained with the functional gait assessment. *Phys Ther.* Oct 2004;84(10):906-918.
4. Walker ML, Austin AG, Banke GM, et al. Reference group data for the functional gait assessment. *Phys Ther.* Nov 2007;87(11):1468-1477.

Instrument name: Functional Independence Measure (FIM)	
Reviewers: **Primary: Eileen Tseng, PT, DPT, NCS** Secondary: Rachel Tappan, PT, NCS	**Date of review: 05/2012**
ICF domain (check all that apply): _____ Body function/structure ___X ___ Activity ___ __ Participation	

Construct/s measured (check all that apply):		
Body structure and Function	**Activity**	**Participation**
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	_X _Activities of Daily Living ___Balance/falls _X_Bed Mobility _X_Gait (include stairs) ___High Level mobility _X_Transfers ___Upper Extremity Function _X_Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life __ _Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community __ _Self Care __ _Social function ___Work ___Other:

Recommendation Categories					
Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)		X			
Subacute (3-6mo)		X			Clinical utility decreases if administering entire FIM all at once; however, typically this measure is divided amongst different disciplines
Chronic (>6mo)		X			Clinical utility decreases if administering entire FIM all at once; however, typically this measure is divided amongst different disciplines
Overall Comments:	The FIM has been validated in all 3 acuity categories, however primarily in subacute and chronic acuity. Data to guide interpretation lacking in subacute and chronic acuity.				

Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)		X			
Motor Incomplete (AIS C and D)		X			
Overall Comments:	Significant ceiling and floor effects for motor scores in individuals with AIS A, B, and C (Hall et al. 1999), and ceiling effect found for cognitive subscale (Hall et al. 1999, Grey and Kennedy, 1993)				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	
	X		X		
Research Use	**YES**		**NO**		**Comments**
Is this tool appropriate for use in intervention research studies?	X				

Additional information on this measure can be found on The Rehabilitation Measures Database at: Functional Independence Measure (FIM)

References

Alexander M, Anderson K, et al. Outcome measures in spinal cord injury: recent assessments and recommendations for future directions. *Spinal Cord*. 2009;47(8):582-591.

Anderson K, Aito S, Atkins M, et al. Functional recovery measures for spinal cord injury: an evidence-based review for clinical practice and research. *J Spinal Cord Med. 2008;*31(2):133-144.

Dawson J, Shamley D, et al. A structured review of outcome measures used for the assessment of rehabilitation interventions for spinal cord injury. *Spinal Cord*. 2008;46(12):768-780.Ditunno JF, Barbeau H, Dobkin BH, et al. Validity of the Walking Scale for Spinal Cord Injury and other domains of function in a multicenter clinical trial. *Neurorehabil Neural Repair*. 2007;21:539-50.

Fujiwara T, Hara Y, Akaboshi K, Chino N. Relationship between shoulder muscle strength and functional independence measure (FIM) score among C6 tetraplegia. *Spinal Cord*. 1999;37:58-61.

Furlan J, Noonan V, Singh A, Fehlings M. Assessment of disability in patients with acute traumatic spinal cord injury: a systematic review of the literature. *J Neurotrauma*. 2011;28:1413-1430.

Grey N and Kennedy P. The Functional Independence Measure: a comparative study of clinician and self ratings. *Paraplegia.* 1993;31:457-461.

Hall KM, Cohen ME, Wright J, Call M, Werner P. Characteristics of the Functional Independence Measure in traumatic spinal cord injury. *Arch Phys Med Rehabil*. 1999;80:1471-6.

Kay E, Deutsch A, Chen D, Manheim L, Rowles D. Effects of etiology on inpatient rehabilitation outcomes in 65- to 74- year-old patients with incomplete paraplegia from a nontraumatic spinal cord injury. *PM R*. 2010;2(6):504-13.

Kucukdeveci A, Yavuzer G, Elhan A, Sonel B, Tennant A. Adaptation of the Functional Independence Measure for use in Turkey. *Clin Rehabil*. 2001;15:311-319.

Lawton G, Lundgren-Nilsson A, Biering-Sorensen F. Cross-cultural validity of FIM in spinal cord injury. *Spinal Cord*. 2007;44:746-752.

Masedo A, Hanley M, Jensen M, Ehde D, Cardenas D. Reliability and validity of a self-report FIM (FIM-SR) in persons with amputation or spinal cord injury and chronic pain. *Am J Phys Med Rehabil*. 2005;84:167-176.

Ottenbacher KJ, Hsu Y, Granger CV, Fiedler RC. The reliability of the Functional Independence Mesaure: a quantitative review. *Arch Phys Med Rehabil*. 1996;77:1226-32.

Saboe LA, Darrah J, Pain KS, Guthrie J. Early predictors of functional independence 2 years after spinal cord injury. *Arch Phys Med Rehabil*. 1997;78:644-50.

Segal ME, Ditunno JF, Staas WE. Interinstitutional agreement of individual functional independence measure (FIM) items measured at two sites on one sample of SCI patients. *Paraplegia*. 1993;31:622-631.

Yavuz N, Tezyurek M, et al. A comparison of two functional tests in quadriplegia: the quadriplegia index of function and the functional independence measure. *Spinal Cord*. 1998;36:832-837.

Instrument name: Function Reach Test (FRT) /Modified Functional Reach Test (mFRT)	
Reviewers: **Primary: Christopher Newman, PT, MPT, NCS** Secondary: Phyllis Palma, PT, DPT	**Date of review: May 2012**
ICF domain (check all that apply): _____ Body function/structure __X____ Activity _____ Participation	

Construct/s measured (check all that apply):

Body structure and Function	Activity	Participation
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living _X__Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories

Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3 mo)			X		
Subacute (3-6 mo)			X		
Chronic (> 6mo)			X		
Overall Comments:	For the FRT, no data is available in the SCI population. For the mRT, test-retest reliability, SEM, and MDC are established in the SCI population. More data is needed for both tests in the areas of reliability, validity and test interpretation in the SCI population. However, there is data available in reliability, validity and test interpretation for the FRT in related neurologic populations (stroke, Parkinson Disease) and in the elderly.				
Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**

Motor Complete (AIS A and B)			X		mFRT should be used unless the individual is able to stand without assistance, in which case the FRT may be used.
Motor Incomplete (AIS C and D)			X		
Overall Comments:	For the FRT, no data is available in the SCI population. For the mFRT, test-retest reliability, SEM, and MDC are established in the AIS A and B SCI population. More data is needed for both tests in the areas of reliability, validity and test interpretation in the SCI population. However, there is data available in reliability, validity and test interpretation for the FRT in related neurologic populations (stroke, Parkinson Disease) and in the elderly.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula?	**YES**	**NO**	**YES**	**NO**	
		X		X	

Research Use	**YES**	**NO**	**Comments**
Is this tool appropriate for use in intervention research studies?		X	More evidence for validity and reliability is needed in the SCI population before the FRT or mFRT would be appropriate for use in a SCI-specific intervention research study.

Additional information on this measure can be found on The Rehabilitation Measures Database at : Functional Reach Test (FRT) /Modified Functional Reach Test (mFRT)

References

Lynch SM, Leahy P, Barker SP. Reliability of measurements obtained with a modified functional reach test in subjects with spinal cord injury. *Phys Ther* 1998;78:128-133.

Sprigle S, Maurer C, Holowka M. Development of valid and reliable measures of postural stability. *J Spinal Cord Med.* 2007;30:40-49.

Instrument name: Functional Tests for Persons who Self-Propel a Manual Wheelchair (4FTPSMW)	
Reviewers: **Primary: Christopher Newman, PT, MPT, NCS** Secondary: Phyllis Palma, PT, DPT	**Date of review: April 2012**
ICF domain (check all that apply): ___Body function/structure __X____ Activity _____ Participation	

Construct/s measured (check all that apply):

Body structure and Function	Activity	Participation
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___ Somatosensation ___Other:	___Activities of Daily Living _X__ Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function _X__ Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories

Category 1 - Acuity	4	3	2	1	Comments
Acute (0-3 mo)				X	
Subacute (3-6 mo)				X	
Chronic (>6 mo)				X	

Overall Comments:	This outcome measure was designed as a tool for product comparison with regard to wheelchair set up (backrests and general seating components). One study available with excellent reliability and published MDC; however, sample size of two groups was ten, both samples of convenience with acuity levels not well described. No validity data for this measure.

Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)				X	
Motor Incomplete (AIS C and D)				X	
Overall Comments:	AIS level or complete vs incomplete not described in the original article describing the development of the outcome measure. No validity data for this measure. Per the originator of the outcome measure, (May), it was initially developed to determine appropriate seating and positioning only and not necessarily as an outcome measure to translate to functional capacity or ability directly.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	
		X		X	

Research Use	**YES**	**NO**	**Comments**
Is this tool appropriate for use in intervention research studies?		X	Not enough psychometrics to support use in research

Additional information on this measure can be found on The Rehabilitation Measures Database at: Functional Tests for Persons who Self Propel a Manual Wheelchair (4FTPSMW)

References

May LA, Butt C, Minor L, et al. Measurement reliability of functional tasks for persons who self-propel a manual wheelchair. *Arch Phys Med Rehabil.* 2003;84:578-583.

May LA, Butt C, Kolbinson K, et al. Wheelchair back-support options: functional outcomes for persons with recent spinal cord injury1. *Arch Phys Med Rehabil.* 2004;85:1146-1150.

Instrument name: Graded Redefined Assessment of Strength Sensibility and Prehension (GRASSP)	
Reviewers: **Primary: Cara Weisbach, PT, DPT** Secondary: Wendy Romney, PT, DPT, NCS	**Date of review: 5/4/2012**
ICF domain (check all that apply): ___X__ Body function/structure ___X___ Activity _____ Participation	

Construct/s measured (check all that apply):

Body structure and Function	Activity	Participation
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) _X__Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	_X__Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers __X_Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories

Category 1 – Acuity	4	3	2	1	Comments
Acute (0-3 mo)			X		No current studies published on psychometric properties in the acute population at this time.
Subacute (3-6 mo)			X		
Chronic (>6 mo)		X			
Overall Comments:	Recommended use when a change in neurological status is being assessed. The GRASSP international research and development team recommends use in the acute phase, however, no published literature to support this is available at this time.				

	Clinical utility is decreased secondary to cost of GRASSP kit (manual is free; however "kit" is $850) and increased time (~45 minutes) to complete measure.				
Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)		X			
Motor Incomplete (AIS C and D)		X			
Overall Comments:	Clinical utility is decreased secondary to cost of GRASSP kit and increased time (~45 minutes) to complete measure.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	Exposure is not recommended at this time due to use in a very small and specific population.
		X		X	
Research Use	**YES**		**NO**		**Comments**
Is this tool appropriate for use in intervention research studies?	X				More sensitive measure of sensation and strength domains for hand than ISNCSCI and looks at both impairment and function. Able to detect subtle neurologic changes.

Additional information on this measure can be found on The Rehabilitation Measures Database at: Graded and Redefined Assessment of Sensibility Strength and Prehension (GRASSP)

References

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Kalsi-Ryan S, Beaton D, Curt A, et al. The Graded Redefined Assessment of Strength Sensibility and Prehension: reliability and validity. *J Neurotrauma*. 2012;29(5):905–914.

Zariffa J, Kapadia N, Kramer JLK, et al. Effect of a robotic rehabilitation device on upper limb function in a sub-acute cervical spinal cord injury population. *IEEE Int Conf Rehabil Robot*. 2011;2011:5975400.

Zariffa J, Kapadia N, Kramer J, et al. Relationship between clinical assessments of function and measurements from an upper-limb robotic rehabilitation device in cervical spinal cord injury. *IEEE Transactions on Neural Systems and Rehabilitation Engineering: A Publication of the IEEE Engineering in Medicine and Biology Society*. 2011. Available at: http://www.ncbi.nlm.nih.gov/pubmed/22203726. Accessed April 30, 2012.

Instrument name: Grasp and Release Test (GRT)	
Reviewers: **Primary: Cara Weisbach, PT, DPT** Secondary: Wendy Romney, PT, DPT, NCS	**Date of review:** 4/13/2012
ICF domain (check all that apply): __X__ Body function/structure __X_ Activity _____ Participation	

Construct/s measured (check all that apply):

Body structure and Function	Activity	Participation
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) _X_Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers _X_Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories

Category 1 - Acuity	4	3	2	1	Comments
Acute (0-3mo)				X	
Subacute (3-6mo)				X	
Chronic(>6mo)				X	
Overall Comments:	No studies recorded for acute and subacute population. Earliest patients assessed were >6 months post injury. Poor clinical utility secondary to length of test (90-150 minutes) and specialized equipment required (fork with spring loaded piston).				

Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)				X	
Motor Incomplete (AIS C and D)				X	
Overall Comments:	Poor clinical utility secondary to length of test (90-150 minutes) and specialized equipment required (fork with spring loaded piston).				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	very small sub-set of individuals with tetraplegia and poor clinical utility
		X		X	

Research Use	**YES**	**NO**	**Comments**
Is this tool appropriate for use in intervention research studies?	X		For assessment of hand function following tendon transfer or implanted hand FES devices only.

Additional information on this measure can be found on The Rehabilitation Measures Database at: Grasp and Release Test (GRT)

References

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Spooren AIF, Janssen-Potten YJM, Post MWM, Kerckhofs E, Nene A, Seelen HAM. Measuring change in arm hand skilled performance in persons with a cervical spinal cord injury: responsiveness of the Van Lieshout Test. *Spinal Cord*. 2006;44(12):772–779.

Stroh-Wuolle, K. S., Van Doren, C. L., Thrope, G. B., Keith, M. W., & Peckham, P. H. Development of a quantitative hand grasp and release test for patients with tetraplegia using a hand neuroprosthesis. *J Hand Surg Am.* 1994:*19*(2):209-218.

Taylor P, Esnouf J, Hobby J. The functional impact of the Freehand System on tetraplegic hand function. Clinical Results. *Spinal Cord*. 2002;40(11):560–566.

Instrument name: Hand Held Myometry	
Reviewers: **Primary: Wendy Romney, PT, DPT, NCS** Secondary: Cara Weisbach, PT, DPT	**Date of review:** 4/5/12
ICF domain (check all that apply): __X__ Body function/structure _____ Activity _____ Participation	

Construct/s measured (check all that apply):

Body structure and Function	Activity	Participation
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) _X_Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories

Category 1 – Acuity	4	3	2	1	Comments
Acute (0-3mo)	X				
Subacute (3-6mo)	X				
Chronic(>6mo)	X				
Overall Comments:	Examiner may have difficulty stabilizing muscle or joint for strong individuals. Key muscle groups used in ASIA Impairment Scale were manually muscle tested in supine position per AIS standards. Limitation in SCI due to inability to use with muscle grades <3/5. Reliability, validity, and responsiveness data in SCI population.				

Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)	X				
Motor Incomplete (AIS C and D)	X				
Overall Comments:	Reliability, validity, and responsiveness data in SCI population.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	
	X		X		
Research Use	**YES**		**NO**		**Comments**
Is this tool appropriate for use in intervention research studies?	X				

Additional information on this measure can be found on The Rehabilitation Measures Database at: Hand Held Myometry/Myometry

References

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Noreau L, Vachon J. Comparison of three methods to assess muscular strength in individuals with spinal cord injury. *Spinal Cord.* Oct 1998;36:716-723.

Schwartz S, Cohen ME, Herbison GJ, Shah A. Relationship between two measures of upper extremity strength: manual muscle test compared to hand-held myometry. *Arch Phys Med Rehabil.* 1992;73:1063-1068.

Instrument name: High-Level Mobility Assessment Tool (Hi-Mat)	
Reviewers: **Primary: Eileen Tseng, PT, DPT, NCS** Secondary: Rachel Tappan, PT, NCS	**Date of review: 03/2012**
ICF domain (check all that apply): __X___ Body function/structure __X___ Activity _____ Participation	

Construct/s measured (check all that apply):

Body structure and Function	Activity	Participation
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status _X__Coordination (non-equilibrium) _X_Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility _X_Gait (include stairs) _X_High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories

Category 1 - Acuity	4	3	2	1	Comments
Acute (0-3mo)			X		
Subacute (3-6mo)			X		
Chronic (>6mo)			X		
Overall Comments:	The Hi-MAT has excellent validity and reliability in populations with acquired and traumatic brain injury, however, limited research has been published for individuals with spinal cord injury. There is no measure of this kind specific to SCI, so potentially a good option for high level functioning individuals.				

Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)			X		appropriate for individuals who are ambulatory
Motor Incomplete (AIS C and D)			X		
Overall Comments:	At this time, one study has been published that included individuals with spinal cord injury in the subject pool. The subjects with SCI were not categorized into AIS levels, however the individuals were able to participate in performing the items of the Hi-MAT. There is no measure of this kind specific to SCI, so potentially a good option for high level functioning individuals.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	While this scale is appropriate for inclusion in entry-level curricula for other patient populations, its use with individuals with SCI has not been studied.
		X		X	

Research Use	**YES**	**NO**	**Comments**
Is this tool appropriate for use in intervention research studies?		X	While this scale may be appropriate for use in studies of individuals with traumatic brain injury, its psychometrics should be further evaluated prior to using it in studies investigating interventions for spinal cord injury rehabilitation.

Additional information on this measure can be found on The Rehabilitation Measures Database at: High Level Mobility and Assessment Tool (HiMAT)

References

Williams G, Robertson V, et al. Measuring high-level mobility after traumatic brain injury. *Am J Phys Med Rehabil*. 2004;83(12):910-920.

Williams G, Robertson V, et al. The high-level mobility assessment tool (HiMAT) for traumatic brain injury. Part 1: Item generation. *Brain Inj*. 2005;19(11):925-932.

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Williams G, Hill B, Pallant J, Greewood K. Internal validity of the revised HiMAT for people with neurological conditions. *Clin Rehab.* 2011;0(0)1-7.

Instrument name: Impact on Participation and Autonomy Questionnaire (IPA)	
Reviewers: **Primary: Christopher Newman, PT,MPT, NCS** Secondary reviewer: Phyllis Palma, PT, DPT	**Date of review: 6.2012**
ICF domain (check all that apply): _____ Body function/structure _____ Activity _x____ Participation	

Construct/s measured (check all that apply):		
Body structure and Function	**Activity**	**Participation**
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	__x_Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	_x__Community function _x__Domestic Life ___Health and wellness _x__Leisure/Recreational activities _x__Quality of life ___Reintegration to community _x__Self Care _x__Social function _x__Work ___Other:

Recommendation Categories					
Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)			X		
Subacute (3-12mo)			X		
Chronic(>6mo)			X		

Overall Comments:	Only one study (Lund 2007) examined a population of only people with SCI. All other studies either did not include people with SCI or they had a sample of individuals with a variety of diagnoses including SCI. In these studies with heterogenous samples, test-retest reliability and internal consistency were found to be excellent; convergent validity and discriminant validity were adequate. However there was a ceiling effect and poor to adequate responsiveness (Noonan 2010, Cardol 2002). More research in a SCI-specific population is needed to give a

	higher recommendation in this group.				
Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)			X		
Motor Incomplete (AIS C and D)			X		
Overall Comments:	Only one study (Lund 2007) examined a population of only people with SCI. All other studies either did not include people with SCI or they had a sample of individuals with a variety of diagnoses including SCI. In these studies with heterogeneous samples, test-retest reliability and internal consistency were found to be excellent; convergent validity and discriminant validity were adequate. However there was a ceiling effect and poor to adequate responsiveness (Noonan 2010, Cardol 2002). More research in a SCI-specific population is needed to give a higher recommendation in this group.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	
		X		X	

Research Use	**YES**	**NO**	**Comments**
Is this tool appropriate for use in intervention research studies?		X	Recommend further research on psychometrics of IPA specific to SCI population. However, the IPA is an option for measurement of subjective aspects of participation.

Additional information on this measure can be found on The Rehabilitation Measures Database at: Impact on Participation and Autonomy Questionnaire (IPAQ)

References

Cardol M, de Haan RJ, van den Bos GA, et al.The development of a handicap assessment questionnaire: the Impact on Participation and Autonomy (IPA). *Clin Rehabil*. 1999;13:411-419.

Cardol M, de Haan RJ, de Jong BA, et al. Psychometric properties of the Impact on participation and autonomy questionnaire. *Arch Phys Med Rehabil*. 2001;82:210-216.

Cardol M, Beelen A, van den Bos GA, et al. Responsiveness of the Impact on Participation and Autonomy Questionnaire. *Arch Phys Med Rehabil*. 2002;83:1524-1529.

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Larsson Lund M, Nordlund A, Nygård L, et al. Perceptions of participation and predictors of perceived problems with participation in people with spinal cord injury. 2005; *J Rehabil Med*. 2005;37:3-8.

Magasi SR, Heinemann AW, Whiteneck GG. Participation following traumatic spinal cord injury: an evidence-based review for research*. J Spinal Cord Med*. 2008.;31:145-56.

Noonan VK, Kopec JA, Noreau L, et al., Comparing the reliability of five participation instruments in persons with spinal conditions*. J Rehabil Med*. 2010;42:735-43.

Noonan VW, Miller L, Noreau L. A review of instruments assessing participation in persons with spinal cord injur*y. Spinal Cord*. 2009;47:435-446.

Sibley A, Kersten P, Ward CD, et al. Measuring autonomy in disabled people: Validation of a new scale in a UK population*. Clin Rehabil*. 2006;20:793-803.

Instrument name: International Spinal Cord Injury Pain Classification (ISCIP)	
Reviewers: **Primary: Rachel Tappan, PT, NCS** Secondary: Eileen Tseng, PT, DPT, NCS	**Date of review:** March 31, 2012
ICF domain (check all that apply): __X___ Body function/structure _____ Activity _____ Participation	

Construct/s measured (check all that apply):		
Body structure and Function	**Activity**	**Participation**
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) _X__Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories					
Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3 mo)			X		
Subacute (3-6 mo)			X		
Chronic (>6 mo)			X		
Overall Comments:	The ISCIP may be useful as a classification system for identifying types of pain after SCI. However, the clinical relevance of these pain subtypes has not been established with respect to the identification of the prognosis for improvement in the pain with or without treatment, the identification of appropriate treatment for the pain, or the impact of the pain on quality of life after SCI.				

	Also, the ISCIP is a system for classifying type of pain rather than a true outcome measure that can measure change in pain over time.				
Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)			X		
Motor Incomplete (AIS C and D)			X		
Overall Comments:	See comments in Category 1 above				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	
		X		X	

Research Use	**YES**	**NO**	**Comments**
Is this tool appropriate for use in intervention research studies?	X		This tool classifies pain and cannot be used as a measure of change. While there is limited psychometric data available to support this classification system, expert consensus supports its use over the other available pain classification systems.

Additional information on this measure can be found on The Rehabilitation Measures Database at: International Spinal Cord Injury Pain Classification (ISCIP)

References

Bryce TN, Biering-Sorensen F, Finnerup NB, et al. International Spinal Cord Injury Pain Classification: part 1. Background and description. *Spinal Cord*. 2011; doi:10.10.1038/sc.2011.156.

Bryce TN, Biering-Sorensen F, Finnerup NB, et al. International Spinal Cord Injury Pain Classification: part 2. Initial validation using vignettes. *Spinal Cord*. 2012; doi: 10.1038/sc.2012.2

Instrument name: International Standards for Neurological Classification of Spinal Cord Injury, ASIA Impairment Scale (AIS)

Reviewers: **Primary: Cara Weisbach, PT, DPT** Secondary: Wendy Romney, PT, DPT, NCS	**Date of review: 4/6/2012**

ICF domain (check all that apply):

__X___ Body function/structure _____ Activity _____ Participation

Construct/s measured (check all that apply):

Body structure and Function	**Activity**	**Participation**
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) _X__Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion __X_Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories

Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)	X				
Subacute (3-6 mo)	X				
Chronic (>6 mo)	X				
Overall Comments:	Clinical utility is decreased by need for training prior to administering measure as well as potential length of time required to complete measure. However, the training is one of the strengths of this measure, as it ensures standardization. AIS score is based on the compilation of multiple sub-scores (UE				

	motor score, LE motor score and sensory scores). Use of the AIS motor scale in a 2-dimensional model (separate UEMS and LEMS) increases the predictive power of the AIS motor scale (Curt 1998, Graves 2006 and Marino 2004). Clinicians can use LEMS for prognostic information related to clinical decision making regarding walking outcomes and UEMS for hand function.				
Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)	X				
Motor Incomplete (AIS C and D)	X				
Overall Comments:	Appropriate for both as the AIS is the reference standard for determining motor complete vs incomplete injury. Clinicians can use LEMS for prognostic information related to clinical decision making regarding walking outcomes and UEMS for hand function.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	Due to the large number of studies completed with excellent psychometric properties of persons with acute, subacute and chronic SCI AIS A-E the AIS is highly recommended for use by Physical Therapists.
	X		X		
Research Use	**YES**		**NO**		**Comments**
Is this tool appropriate for use in intervention research studies?	X				
Additional information on this measure can be found on The Rehabilitation					

Measures Database at: International Standards for Neurological Classification of Spinal Cord Injury, ASIA Impairment Scale (AIS)

References

Cohen ME, Ditunno JF, Jr., Donovan WH, Maynard FM, Jr. A test of the 1992 International Standards for Neurological and Functional Classification of Spinal Cord Injury. *Spinal Cord* 1998;36:554-560.

Jonsson M, Tollback A, Gonzales H, Borg J. Inter-rater reliability of the 1992 international standards for neurological and functional classification of incomplete spinal cord injury. *Spinal Cord*. 2000;38:675-679.

Cifu DX, Seel RT, Kreutzer JS, McKinley WO. A multicenter investigation of age-related differences in lengths of stay, hospitalization charges, and outcomes for a matched tetraplegia sample. *Arch Phys Med Rehabil*. 1999;80:733-740

Clifton GL, Donovan WH, Dimitrijevic MM, Allen SJ, Ku A, Potts JR, Moody FG, Boake C, Sherwood AM, Edwards JV. Omental transposition in chronic spinal cord injury. *Spinal Cord*. 1996;34:193-203.

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Furlan JC, Fehlings MG, Tator CH, Davis AM. Motor and sensory assessment of patients in clinical trials for pharmacological therapy of acute spinal cord injury: Psychometric properties of the asia standards. *J Neurotrauma*. 2008;25:1273-1301

Graves DE, Frankiewicz RG, Donovan WH. Construct validity and dimensional structure of the asia motor scale. *J Spinal Cord Med*. 2006;29:39-45.

Marino RJ, Graves DE. Metric properties of the asia motor score: Subscales improve correlation with functional activities. *Arch Phys Med Rehabil*. 2004;85:1804-1810

Savic G, Bergstrom EMK, Frankel HL, Jamous MA, Jones PW. Inter-rater reliability of motor and sensory examinations performed according to american spinal injury association standards. *Spinal Cord*. 2007;45:444-451

van Hedel HJ, Dietz V. Walking during daily life can be validly and responsively

assessed in subjects with a spinal cord injury. *Neurorehabil Neural Repair*. 2009;23:117-124.

Instrument name: Jebsen-Taylor Hand Function Test	
Reviewers: **Primary: Cara Weisbach, PT, DPT** Secondary: Wendy Romney, PT, DPT, NCS	**Date of review:** 4/27/2012
ICF domain (check all that apply): __X___ Body function/structure ___X___ Activity _____ Participation	

Construct/s measured (check all that apply):

Body structure and Function	Activity	Participation
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) _X__Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	_X__Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers _X__Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories

Category 1 - Acuity	4	3	2	1	Comments
Acute (0-3mo)				X	One study in stroke population looking at responsiveness at 1-3 months.
Subacute (3-6mo)			X		
Chronic (>6 mo)			X		
Overall Comments:	Minimal psychometric testing done in SCI population with poor to adequate validity and responsiveness in other populations. It does have excellent reliability.				

Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)			X		
Motor Incomplete (AIS C and D)			X		
Overall Comments:	No differentiation in complete or incomplete.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	Test is no longer commonly used. Limitations in measuring specifically hand function due to reliance on proximal control with several of the items.
		X		X	

Research Use	**YES**	**NO**	**Comments**
Is this tool appropriate for use in intervention research studies?	X		Recommended for research with understanding that proximal function may influence hand function scores.

Additional information on this measure can be found on The Rehabilitation Measures Database at: Jebsen Hand Function Test

References

Agnew PJ, Maas F. Hand function related to age and sex. *Arch Phys Med Rehabil*. 1982;63:269–271.

Beebe JA, Lang CE. Relationships and responsiveness of six upper extremity function tests during the first six months of recovery after stroke. *J Neurol Phys Ther*. 2009;33:96–103.

Bovend'Eerdt T, Dawes H, Johansen-Berg H, Wade D. Evaluation of the Modified Jebsen Test of Hand Function and the University of Maryland Arm Questionnaire for Stroke. *Clin Rehabil*. 2004;18:195–202.

Colyer RA, Kappelman B. Flexor pollicis longus tenodesis in tetraplegia at the sixth cervical level. A prospective evaluation of functional gain. *J Bone Joint Surg Am*. 1981;63:376–379.

Davis Sears E, Chung KC. Validity and responsiveness of the Jebsen-Taylor Hand Function Test. *J Hand Surg Am*. 2010;35:30–37.

Hackel ME, Wolfe GA, Bang SM, Canfield JS. Changes in hand function in the aging adult as determined by the Jebsen Test of Hand Function. *Phys Ther*. 1992;72:373–377.

Jebsen RH, Taylor N, Trieschmann RB, Trotter MJ, Howard LA. An objective and standardized test of hand function. *Arch Phys Med Rehabil*. 1969;50:311–319.

Kinnucan E, Van Heest A, Tomhave W. Correlation of motor function and stereognosis impairment in upper limb cerebral palsy. *J Hand Surg*. 2010;35(8):1317–1322.

Smith BT, Mulcahey MJ, Triolo RJ, Betz RR. The application of a modified neuroprosthetic hand system in a child with a C7 spinal cord injury. Case report. *Spinal Cord*. 1992;30:598–606.

Taylor N, Sand PL, Jebsen RH. Evaluation of hand function in children. *Arch Phys Med Rehabil*. 1973;54:129–135.

Instrument name: Life Satisfaction Questionnaire – 9 (LiSAT-9) (LSQ)

Reviewers: **Primary: Jennifer H. Kahn, PT, DPT, NCS** Secondary: Candy Tefertiller, PT, DPT, ATP, NCS	**Date of review: 4/22/12**

ICF domain (check all that apply):

_____ Body function/structure _____ Activity __X__ Participation

Construct/s measured (check all that apply):

Body structure and Function	**Activity**	**Participation**
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function _X__Domestic Life ___Health and wellness _X__Leisure/Recreational activities _X_Quality of life ___Reintegration to community _X__Self Care _X__Social function _X__Work ___Other:

Recommendation Categories

Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)			X		All data in chronic SCI (at least >1 year), potentially limited utility at this time post injury. Measure only appropriate for individuals who have been discharged from the hospital setting.
Subacute (3-6mo)			X		See above
Chronic (>6mo)		X			

Overall Comments:					
Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)		X			
Motor Incomplete (AIS C and D)		X			
Overall Comments:	Includes satisfaction with life as a whole, but also includes specific domains, which may be helpful to use in rehabilitation to determine specific areas to intervene. Overall, evidence is somewhat limited and concerns with cross-cultural validity; however, it is brief and a good option to subjectively measure satisfaction with participation.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	Students should know to include participation measures in outcomes assessment; however, this measure is not widely used enough to warrant recommendation for students to learn.
		X		X	
Research Use	**YES**		**NO**		**Comments**
Is this tool appropriate for use in intervention research studies?	X				Caution should be used if study involves multicenter international sites as problems with cross cultural validity. Caution should be taken if a study involves using this tool in a retrospective analysis.

			However, a good option to subjectively measure satisfaction with participation.
Additional information on this measure can be found on The Rehabilitation Measures Database at: Life Satisfaction Questionnaire (LISAT-9)			

References

Dunn J, Sinnott KA, Nunnerly J, Scheuringer M. Utilisation of patient perspective to validate clinical measures of outcome following spinal cord injury. *Dis Rehabil.* 2009;31:967-975.

Geyh S, Fellinghauer BAG, Kirchberger I, Post MW. Cross-cultural validity of four quality of life scales in persons with spinal cord injury." *Health and Quality of Life Outcomes*. 2010;8:94.

Post MW. Measuring the subjective appraisal of participation with life satisfaction measures: bridging the gap between participation and quality of life measures. *Topics Spinal Cord Rehabil.* 2010;15:1-15.

Post MW, de Witte LP, et al. Predictors of health status and life satisfaction in spinal cord injury. *Arch Phys Med Rehabil*. 1998;79:395-401.

Post MW, van Leeuwen CM, van Koppenhagen CF, de Groot S. Validity of the life satisfaction questions, the life satisfaction questionnaire (LiSat-9), and the satisfaction with life scale(SWLS) in persons with spinal cord injury. *Arch Phys Med Rehabil.* 2012, doi:10.1016/j.apmr.3023.03.025.

van Koppenhagen CF, Post MW, van der Woude LH, de Witte LP, van Asbeck FW, de Groot S, van den Heuvel W, Lindeman E. Changes and determinants of life satisfaction after spinal cord injury: A cohort study in the netherlands. *Arch Phys Med Rehabil*. 2008;89:1733-1740.

Wood-Dauphinee S, Exner G, et al. Quality of life issues in patients with spinal cord injury-basic issues, assessment, and recommendations. *Restor Neurol Neurosci.* 2002;20:123-139.

Instrument name: Manual Muscle Test (MMT)	
Reviewers: **Primary: Wendy Romney, PT, DPT, NCS** Secondary: Cara Weisbach, PT, DPT	**Date of review:** 4/8/12
ICF domain (check all that apply): __X__ Body function/structure _____ Activity _____ Participation	

Construct/s measured (check all that apply):

Body structure and Function	Activity	Participation
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) _X__Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories

Category 1 - Acuity	4	3	2	1	Comments
Acute (0-3mo)		X			
Subacute (3-6mo)		X			
Chronic(>6mo)		X			
Overall Comments:	Adequate to excellent psychometric properties in patients with spinal cord injury. Excellent clinical utility. MMT less sensitive at detecting changes in strength with grades 3+, 4 and 4+/5, where hand held myometry more sensitive. (Herbison, 1996)				

Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)		X			
Motor Incomplete (AIS C and D)		X			
Overall Comments:					

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	
	X		X		
Research Use	**YES**		**NO**		**Comments**
Is this tool appropriate for use in intervention research studies?	X				MMT is less sensitive at detecting strength changes in 3+, 4 and 4+ ranges (Herbison, 1996) If possible, researchers should consider quantitative measures of strength.

Additional information on this measure can be found on The Rehabilitation Measures Database at: Manual Muscle Test (MMT)

References

Herbison GJ, Isaac Z, Cohen ME, & Ditunno, JF. Strength post-spinal cord injury: myometer vs manual muscle test. *Spinal Cord.* 1996;34:543-548.

Hislop H, Montgomery J. Daniels and Worthington: Muscle Testing: Techniques of Manual Examination, 8th Ed. Saunders, 2007.

Noreau L, & Vachon J. Comparison of three methods to assess muscular strength in individuals with spinal cord injury. *Spinal Cord.* 1998;36:716-723.

Schwartz S, Cohen M E, Herbison GJ, & Shah A. Relationship between two measures of upper extremity strength: manual muscle test compared to hand-held myometry *Arch of Phys Med Rehabil*. 1992;73:1063-1068.

Instrument name: Multidimensional Pain Inventory – Spinal Cord Injury Version (MPI-SCI)	
Reviewers: **Primary: Rachel Tappan, PT, NCS** Secondary: Eileen Tseng, PT, DPT, NCS	**Date of review:** March 31, 2012
ICF domain (check all that apply): __X___ Body function/structure _____ Activity ___X__ Participation	

Construct/s measured (check all that apply):		
Body structure and Function	**Activity**	**Participation**
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) _X__Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	_X__Community function _X__Domestic Life ___Health and wellness _X__Leisure/Recreational activities ___Quality of life _X__Reintegration to community ___Self Care _X__Social function ___Work ___Other:

Recommendation Categories					
Category 1 – Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)			X		
Subacute (3-6mo)			X		
Chronic (>6mo)		X			
Overall Comments:	The West Haven-Yale Multidimensional Pain Inventory (MPI) is a well-validated and commonly used instrument for measuring chronic pain in multiple populations. While the MPI-SCI (a modified version of the MPI specific to SCI) has not been as widely validated as the original MPI, the MPI-SCI is a useful tool for measuring pain severity and impact in people with SCI and pain with evidence to support its overall reliability and validity.				

Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)		X			
Motor Incomplete (AIS C and D)		X			
Overall Comments:	See comments in Category 1 section above.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	
		X	X		

Research Use	**YES**	**NO**	**Comments**
Is this tool appropriate for use in intervention research studies?	X		

Additional information on this measure can be found on The Rehabilitation Measures Database at: Multidimensional Pain Inventory SCI version

Note: The West Haven-Yale MPI and the MPI-SCI have been reviewed separately.

References

Bryce TN, Norrbrink Budh C, Cardenas DD, et al. Pain after spinal cord injury: an evidence-based review for clinical practice and research. *J Spinal Cord Med*. 2007;30:421-440.

Cruz-Almeida Y, Alameda G, Widerstom-Noga EG. Differentiation between pain-related interference and interference casued by the functional impairments of spinal cord injury. *Spinal Cord*. 2009;47:390-395.

Kerns RD, Turk DC, Rudy TE. The West Haven-Yale multidimensional pain inventory (WHYMPI). *Pain*. 1985;23:345-356.

Widerstrom-Noga EG, Cruz-Almeida Y, Martinez-Arizala A, Turk DC. Internal consistency, stability, and validity of the spinal cord injury version of the multidimensional pain inventory. *Arch Phys Med Rehabil*. 2006;87:516-523.

Widerstrom-Noga EG, Duncan R, Felipe-Cuervo E, Turk DC. Assessment of the impact of pain and impairments associated with spinal cord injuries. *Arch Phys Med Rehabi*l. 2002;83:395-404.

Instrument name: Needs Assessment Checklist (NAC)	
Reviewers: **Primary: Jennifer H. Kahn, PT, DPT, NCS** Secondary: Candy Tefertiller, PT, DPT, ATP, NCS	**Date of review: 3/1/12**
ICF domain (check all that apply): __X___ Body function/structure __X____ Activity __X___ Participation	

Construct/s measured (check all that apply):		
Body structure and Function	**Activity**	**Participation**
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength _X__Muscle tone (spasticity, spasms) _X_Pain _X__Range of motion ___Somatosensation __X_Other: bowel/bladder skin autonomic dysreflexia respiratory posture sexual function mood	_X_Activities of Daily Living ___Balance/falls ___Bed Mobility _X__Gait (include stairs) ___High Level mobility _X_Transfers ___Upper Extremity Function _X_Wheelchair Mobility/skills ___Other:	_X_Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life _X__Reintegration to community _X__Self Care ___Social function _X_Work _X__Other: driving

Recommendation Categories					
Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)		X			
Subacute (3-6mo)		X			Geared toward use in inpatient rehab to assist with discharge planning
Chronic(>6mo)			X		Measure is to assist with discharge planning needs. Could be appropriate if individual was in a level of care that had these needs, which is less likely at this stage post injury.

Overall Comments:	The NAC is an SCI specific measure that assists in goal setting and discharge planning. It is administered as an interview and takes approximately 60min. The NAC was designed as a multidisciplinary outcome tool and is a measure that should be used among the whole rehabilitation team. Of note, the NAC does not differentiate between physical independence and verbal independence.				
Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)		X			
Motor Incomplete (AIS C and D)		X			
Overall Comments:	See above comments. Overall, psychometrically reliable and valid tool measuring individual's perceived independence of rehabilitation outcomes, but currently no available data to guide interpretation.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	
		X		X	
Research Use	**YES**		**NO**		**Comments**
Is this tool appropriate for use in intervention research studies?			X		Potentially could be useful in research in an inpatient setting. Additional information on responsiveness would help make this measure more meaningful.

Additional information on this measure can be found on The Rehabilitation Measures Database at: Needs Assessment Checklist (NAC)

References

Berry C, Kennedy P. A psychometric analysis of the Needs Assessment Checklist (NAC). *Spinal Cord.* 2003;41(9): 490-501.

Dawson J, Shamley D, Jamous M. A structured review of outcome measures used for the assessment of rehabilitation interventions for spinal cord injury. *Spinal Cord*. 2008;46:768-780

Duff J, Evans MJ, et al. Goal planning: a retrospective audit of rehabilitation process and outcome. *Clin Rehabil*. 2004;18: 275-286.

Kennedy P, Evans M, et al. Comparative analysis of goal achievement during rehabilitation for older and younger adults with spinal cord injury. *Spinal Cord*. 2003;41:44-52.

Kennedy P, Hamilton LR. The needs assessment checklist: a clinical approach to measuring outcome. *Spinal Cord.* 1999;37:136-139.

Instrument name: Numeric Pain Rating Scale (NPRS)	
Reviewers: **Primary: Rachel Tappan, PT, NCS** **Secondary**: Eileen Tseng, PT, DPT, NCS	**Date of review:** 7/15/12
ICF domain (check all that apply): _X____ Body function/structure _____ Activity _____ Participation	

Construct/s measured (check all that apply):		
Body structure and Function	**Activity**	**Participation**
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) __X_Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories					
Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)		X			
Subacute (3-6mo)		X			
Chronic (>6mo)	X				
Overall Comments:	The NPRS has been studied in all three levels of acuity in people with SCI, with evidence suggesting adequate to excellent reliability and validity in people with SCI and other populations of people with pain. There is also evidence available to assist with the interpretation of change in NPRS for people with SCI. In addition, NPRS has a benefit over a Visual Analogue Scale as it can be performed verbally and therefore does not require intact hand				

	function, which is particularly relevant to people with SCI.				
Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)		X			
Motor Incomplete (AIS C and D)		X			
Overall Comments:	See comments in level of acuity.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	
	X		X		
Research Use	**YES**		**NO**		**Comments**
Is this tool appropriate for use in intervention research studies?	X				Based on a systematic review from the 2006 NIDRR SCI Measures Meeting, the 0-10 Point Numerical Rating Scale is recommended for use in clinical trials as the outcome measure for pain intensity after SCI. (Bryce et al., 2007)

Additional information on this measure can be found on The Rehabilitation Measures Database at: Numeric Pain Rating Scale

References

Bryce TN, Dijkers M. Assessment of pain after SCI in clinical trials. *Top Spinal Cord Inj Rehabil.*2006;11:50-68.

Bryce TN, Norrbrink Budh C, Cardenas DD, et al. Pain after spinal cord injury: an evidence-based review for clinical practice and research. J Spinal Cord Med. 2007;30:421-440.

Dijkers M. Comparing quantification of pain severity by verbal rating and numeric rating scales. J Spinal Cord Med. 2010;22:232-242.

Forchheimer MB, Richards S, Chiodo AE, Bryce TN, Dyson-Hudson TA. Cut point determination in the measurement of pain and its relationship to psychosocial and functional measures after traumatic spinal cord injury: a retrospective Model Spinal Cord Injury System analysis. *Arch Phys Med Rehabil*. 2011;92:419-424.

Hanley MA, Jensen MP, Ehde DM, et al. Clinically significant change in pain intensity ratings in persons with spinal cord injury or amputation. *Clin J Pain*. 2006;22:25-31.

Hanley MA, Masedo A, Jensen MP, Cardenas D, Turner JA. Pain interference in persons with spinal cord injury: classification of mild, moderate, and severe pain. *J Pain.* 2006b;7:129-133.

Instrument name: Participation Assessment with Recombined Tools- Objective (PART-O)	
Reviewers: **Primary: Candy Tefertiller, PT, DPT, ATP, NCS** Secondary: Jennifer Kahn, PT, DPT, NCS	**Date of review: 6-30-2012**
ICF domain (check all that apply): _____ Body function/structure _____ Activity ___X__ Participation	

Construct/s measured (check all that apply):		
Body structure and Function	**Activity**	**Participation**
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life _X__Reintegration to community ___Self Care __X_Social function __X_Work ___Other:

Recommendation Categories					
Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)				X	
Subacute (3-6mo)				X	
Chronic (>6mo)			X		
Overall Comments:	Relatively new participation measure with initial psychometrics focused in TBI population and developed by integrating components of three legacy measures: Craig Handicap Assessment and Reporting Technique (CHART), Community Integration Questionnaire (CIQ-2), and Participation Objective, Participation Subjective POPS. Initial studies support construct and concurrent validity in chronic TBI population but no data				

	available on responsiveness or test-retest reliability and very little data available in chronic SCI. Easily administered by phone with good clinical utility.				
Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)			X		
Motor Incomplete (AIS C and D)			X		
Overall Comments:	Adopted by TBI Model Systems as the measure of participation. This measures needs further testing in SCI population before recommending use over current SCI focused participation measures such as CHART and CHART-SF. Of note, a sister measurement, the PART-S, is under development to measure the subjective aspects of participation.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	
		X		X	
Research Use	**YES**		**NO**		**Comments**
Is this tool appropriate for use in intervention research studies?			X		Further psychometric data in SCI population required before recommending as a research tool.

Additional information on this measure can be found on The Rehabilitation Measures Database at: Participation Assessment with Recombined Tools- Objective (PART-O)

References

Bogner JA, Whiteneck GG, Corrigan JD, Lai JS, Dijkers MP, Heinemann AW. Comparison of scoring methods for the participation assessment with recombined tools-objective. *Arch Phys Med Rehabil.* 2011;92:552-563.

Whiteneck GG, Bogner JA, Heinemann AW. Advancing the measurement of participation. *Arch Phys Med Rehabil.* 2011;92:540-541.

Whiteneck GG, Dijkers MP, Heinemann AW, et al. Development of the participation assessment with recombined tools-objective for use after traumatic brain injury. *Arch Phys Med Rehabil.* 2011;92:542-551.

Instrument name: Penn Spasm Frequency Scale (PSFS)	
Reviewers: **Primary:** Christopher Newman, PT, MPT, NCS **Secondary reviewers:** Phyllis Palma, PT, DPT Jennifer Kahn, PT, DPT, NCS	**Date of review: April 2012**

ICF domain (check all that apply):

__X___ Body function/structure _____ Activity _____ Participation

Construct/s measured (check all that apply):

Body structure and Function	Activity	Participation
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength _X__Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories

Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)			X		
Subacute (3-6mo)			X		
Chronic (>6mo)			X		Majority of validity data conducted in individuals with chronic SCI.
Overall Comments:	Adequate validity with clinical measures of spasms/spasticity. No reliability data. Responsiveness not formally tested; however, studies using the PSFS have shown change following interventions. Important to include individual's perspective of spasms/spasticity in addition to clinical measures. Simple scale with excellent clinical utility. The PSFS does not take into account impact on function.				
Category 2	**4**	**3**	**2**	**1**	**Comments**

Complete vs. Incomplete					
Motor Complete (AIS A and B)			X		
Motor Incomplete (AIS C and D)			X		
Overall Comments:	Adequate validity with clinical measures of spasms/spasticity. No reliability data. Responsiveness not formally tested; however, studies using the PSFS have shown change following interventions. Important to include individual's perspective of spasms/spasticity in addition to clinical measures. Simple scale with excellent clinical utility. The PSFS does not take into account impact on function.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	Used frequently in SCI literature.
		X	X		

Research Use	**YES**	**NO**	**Comments**
Is this tool appropriate for use in intervention research studies?	X		Allows researchers to gain information on the patient's perspective on the extent of their spasms/spasticity. May need to be used in conjunction with other measures that indicate impact of spasms/spasticity on function. May work well alone if looking only at changing the frequency of spasms. Recommend standardization of a time frame identified with patient reporting that is more immediate vs general.

Additional information on this measure can be found on The Rehabilitation Measures Database at: Penn Spasm Frequency Scale

References

Adams MM, Ginis KAM, Hicks AL. The spinal cord injury spasticity evaluation tool: development and evaluation. *Arch Phys Med Rehabil.* 2007;88:1185-1192.

Benz EN, Hornby TG, Bode RK, Scheidt RA, Schmit BD. A physiologically based clinical measure for spastic reflexes in spinal cord injury. *Arch Phys Med Rehabil.*2005; 86:52-59.

Guillaume D, Van Havenbergh A, Vloeberghs M, Vidal J, Roeste G. A clinical study of intrathecal baclofen using a programmable pump for intractable spasticity. *Arch Phys Med Rehabil.* 2005;86:2165-2171.

Hornby TG, Rymer W, Benz EN. Windup of flexion reflexes in chronic human spinal cord injury: a marker for neuronal plateau potentials? *J Neurophys*. 2003;89:416-426.

Hsieh J, Wolfe D, Miller W, Curt A. Spasticity outcome measures in spinal cord injury: psychometric properties and clinical utility. *Spinal Cord.* 2008;46:86-95.

Priebe MM, Sherwood AM, Thornby JI, Kharas NF, Markowski J. Clinical assessment of spasticity in spinal cord injury: a multidimensional problem. *Arch Phys Med Rehabil.* 1996;77:713-716.

Instrument name: Physical Activity Recall Assessment for People with Spinal Cord Injury (PARA-SCI)	
Reviewers: **Primary: Jennifer H. Kahn, PT, DPT, NCS** Secondary: Candy Tefertiller, PT, DPT, ATP, NCS	**Date of review: 4/30/12**
ICF domain (check all that apply): __X___ Body function/structure ___X____ Activity __X___ Participation	

Construct/s measured (check all that apply):		
Body structure and Function	**Activity**	**Participation**
_X__Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	_X__Activities of Daily Living ___Balance/falls _X__Bed Mobility ___Gait (include stairs) ___High Level mobility _X_Transfers ___Upper Extremity Function _X__Wheelchair Mobility/skills ___Other:	_X__Community function _X__Domestic Life ___Health and wellness _X__Leisure/Recreational activities ___Quality of life ___Reintegration to community _X__Self Care ___Social function ___Work ___Other:

Recommendation Categories					
Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)				X	Not tested in acute SCI and response to exercise may be much different in the acute phase and would warrant further investigation.
Subacute (3-6mo)			X		
Chronic (>6mo)			X		
Overall Comments:	Measure must be purchased. Can capture activities that might be very demanding on individuals with SCI that are not captured with				

	general physical activity scales. Parts of the measure are validated, others are not or have poor validity; specifically, construct validity measured against strength and aerobic capacity showed weak relationships. Additionally, the measure does not show consistent ability to differentiate among individuals with SCI who have varying levels of physical activity.				
Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)			X		
Motor Incomplete (AIS C and D)			X		Populations studied include incomplete SCI who use a wheelchair for primary means of mobility.
Overall Comments:	Significant floor effect seen in heavy intensity activity group.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	
		X		X	
Research Use	**YES**		**NO**		**Comments**
Is this tool appropriate for use in intervention research studies?			Potentially use with caution		The PARA-SCI is a unique measure that researchers could use to measure or track physical activity designed specifically for individuals with SCI; however, it needs further studies on validity and responsiveness.

Additional information on this measure can be found on The Rehabilitation Measures Database at: Physical Activity Recall Assessment for People with Spinal Cord Injury (PARA-SCI)

References

Martin Ginis KA, Latimer AE, Hicks AL, Craven BC. Development and evaluation of an activity measure for people with spinal cord injury. *Medicine and Science in Sports and Exercise*. 2005;37:1099-1111

Latimer AE, Ginis KA, Craven BC, Hicks AL. The physical activity recall assessment for people with spinal cord injury: Validity. *Medicine and Science in Sports and Exercise*. 2006;38:208-216.

Instrument name: Quadriplegia Index of Function (QIF)	
Reviewers: **Primary: Eileen Tseng, PT, DPT, NCS** Secondary: Rachel Tappan, PT, NCS	**Date of review:** 04/2012
ICF domain (check all that apply): ____ Body function/structure ___X__ Activity ____ Participation	

Construct/s measured (check all that apply):		
Body structure and Function	**Activity**	**Participation**
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	_X__Activities of Daily Living ___Balance/falls _X__Bed Mobility ___Gait (include stairs) ___High Level mobility _X_Transfers _X_Upper Extremity Function _X_Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories					
Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)				X	
Subacute (3-6mo)				X	
Chronic (>6mo)				X	One study has been published for individuals >12 months post injury (Gresham, et al., 1986)
Overall Comments:	Yavuz, et al., (1998), reported a mean time from onset of injury of 20 weeks. Marino and Goin, (1999), reported a subject pool and Marino et al., (1993), reported subjects <12 months post injury. The QIF can take up to 30 minutes to administer, thereby				

	decreasing the clinical utility. Additionally, task force was unable to locate this measure decreasing rating from 3 to 1 for acute and subacute categories.				
Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)			X		
Motor Incomplete (AIS C and D)			X		
Overall Comments:	Gresham, et al., (1986), reported a subject pool of individuals with complete SCI. Marino RJ, Rider-Foster D, Maisel G, Ditunno JF., (1995), and Marino RJ, Goin JE., (1993), indicated completeness of injury using the Frankel classifications. Yavuz, et al., (1998), reported subjects with AIS A-D classification. Task force was unable to locate this measure, decreasing its rating from a 3 to a 1.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	The QIF is highly specific, therefore more advanced than required for entry-level curriculum. Additionally, task force was unable to locate this measure or obtain permission from authors.
		X		X	
Research Use	**YES**		**NO**		**Comments**
Is this tool appropriate for use in intervention research studies?	X				The QIF has been recommended by International Campaign for Cures of spinal cord injury Paralysis (ICCP) Clinical Guidelines Panel. (Steeves, et al. 2006)

Additional information on this measure can be found on The Rehabilitation Measures Database at: Quadriplegia Index of Function (QIF)

References

Alexander M, Anderson K, et al. Outcome measures in spinal cord injury: recent assessments and recommendations for future directions. *Spinal Cord*. 2009;47:582-591.

Anderson K, Aito S, Atkins M, et al. Functional recovery measures for spinal cord injury: an evidence-based review for clinical practice and research. *J Spinal Cord Med. 2008;*31:133-144.

Dawson J, Shamley D, et al. A structured review of outcome measures used for the assessment of rehabilitation interventions for spinal cord injury. *Spinal Cord*. 2008;46:768-780.

Furlan J, Noonan V, Singh A, Fehlings M. Assessment of disability in patients with acute traumatic spinal cord injury: a systematic review of the literature. *J Neurotrauma*. 2011;28:1413-1430.

Gresham G E, Labi ML, et al. The Quadriplegia Index of Function (QIF): sensitivity and reliability demonstrated in a study of thirty quadriplegic patients. *Paraplegia*. 1986;24(1):38-44.

Marino RJ, Huang M, Knght BS, Herbison GJ, Ditunno JF, Segal M. Assessing selfcare status in quadriplegia: comparsion of the quadriplegia index of function (AIF) and the functional independence measures (FIM). *Paraplegia*. 1993;31:225-233.

Marino RJ, Rider-Foster D, Maisel G, Ditunno JF. Superiority of motor level over single neurological level in categorizing tetraplegia. *Paraplegia*. 1995;33:510-513.

Marino RJ, Goin JE. Development of a short-form Quadriplegia Index of Function scale. *Spinal Cord*. 1999;37:289-296.

Steeves J, Lammertse D, Curt A, et al. Guidelines for the conduct of clinical trials for spinal cord injury (SCI) as developed by the ICCP panel: clinical trial outcome measures. *Spinal Cord.* 2006;45:206-221.

Yavuz N, Tezyurek M, et al. A comparison of two functional tests in quadriplegia: the quadriplegia index of function and the functional independence measure. *Spinal Cord*. 1998;36:832-837.

Instrument name: Quadriplegia Index Function- Short Form (QIF-SF)	
Reviewers: **Primary: Eileen Tseng, PT, DPT, NCS** Secondary: Rachel Tappan, PT, NCS	**Date of review:** 04/2012
ICF domain (check all that apply): _____ Body function/structure __X____ Activity _____ Participation	

Construct/s measured (check all that apply):		
Body structure and Function	**Activity**	**Participation**
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	_X_Activities of Daily Living ___Balance/falls _X_Bed Mobility ___Gait (include stairs) ___High Level mobility _X_Transfers _X_Upper Extremity Function _X_Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories					
Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)				X	
Subacute (3-6mo)				X	
Chronic (>6mo)				X	
Overall Comments:	At this time, validation studies have been performed with individuals in subacute (Marino, 1999) and chronic acuity (Snoek, 2008). Task force was unable to locate this measure, decreasing rating from 3 to 1 for subacute and chronic categories.				

Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)				X	
Motor Incomplete (AIS C and D)				X	
Overall Comments:	Spooren et al., (2006) included subjects with AIS A-D classifications. However, Marino and Goin, (1999) determined injury completeness with Frankel classifications of A-D, which also categorizes individuals based on motor function and sensory. Task force was unable to locate this measure, decreasing ratings from 3 to 1.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	The QIF is highly specific, therefore more advanced than required for entry-level curriculum. Additionally, task force was unable to locate this measure or obtain permission from authors.
		X		X	

Research Use	**YES**	**NO**	**Comments**
Is this tool appropriate for use in intervention research studies?	X		The SF-QIF has been utilized for intervention outcome studies (Spooren et al., 2008), however limited studies have been performed for SF-QIF reliability.

Additional information on this measure can be found on The Rehabilitation Measures Database at: Quadriplegia Index of Function - Short Form

References

Alexander M, Anderson K, et al. Outcome measures in spinal cord injury: recent assessments and recommendations for future directions. *Spinal Cord*. 2009;47(8):582-591.

Anderson K, Aito S, Atkins M, et al. Functional recovery measures for spinal cord injury: and evidence-based review for clinical practice and research. *J Spinal Cord Med.* 2008;31(2):133-144.

Marino, RJ, Goin JE. Development of a short-form Quadriplegia Index of Function scale. *Spinal Cord.* 1999:37(4);289-296.

Snoek GJ, IJzerman MJ, Post MW. Choice-based evaluation for the improvement of upper-extremity function compared with other impairments in tetraplegia. *Arch Phys Med Rehabil.* 2005;86(8):1623-1630.

Spooren AI, Janssen-Potten YJ, Post MW, Kerckhofs E, Nene A, Seelen HA. Measuring change in arm hand skilled performance in persons with a cervical spinal cord injury: responsiveness of the Van Lieshout Test. *Spinal Cord.* 2006;44(12):772-779.

Spooren AI, Janssen-Potten Y, Snoek G, Ijaerman M, Kerckhofs E, Seelen H. Rehabilitation outcome of upper extremity skilled performance in poersons with cervical spinal cord injuries. *J Rehab Med*. 2008;40:637-644.

Instrument name: Quality of Life Index, Spinal Cord Version (QLI-SCI)	
Reviewers: **Primary: Rachel Tappan, PT, NCS** Secondary: Eileen Tseng, PT, DPT, NCS	**Date of review:** 5/6/12
ICF domain (check all that apply): _____ Body function/structure _____ Activity __X___ Participation	

Construct/s measured (check all that apply):		
Body structure and Function	**Activity**	**Participation**
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function _X__Domestic Life _X__Health and wellness ___Leisure/Recreational activities _X__Quality of life ___Reintegration to community _X__Self Care _X__Social function _X__Work ___Other:

Recommendation Categories					
Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)			X		
Subacute (3-6mo)			X		
Chronic (>6mo)			X		
Overall Commen	While other versions of the Quality of Life Index (QLI) are validated and used extensively in other patient populations, the SCI version of the QLI requires				

ts:	more research to support its use over other available quality of life measures. In addition, the scoring of the instrument is complicated without the use of a computerized scoring system. Computer syntax needed for scoring the QLI-SCI automatically with SPSS-PC is available at the author's website at: http://www.uic.edu/orgs/qli/questionaires/pdf/spinalcordinjuryversionIII/Spinal3syntax.pdf.				
Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)			X		
Motor Incomplete (AIS C and D)			X		
Overall Comments:	See comments in Category 1				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	
		X		X	
Research Use	**YES**		**NO**		**Comments**
Is this			X		

tool appropriate for use in intervention research studies?			
Additional information on this measure can be found on The Rehabilitation Measures Database at: Quality of Life Index (QLI, Ferrans and Powers)			

References

Ferrans CE, Powers MJ. Quality of life index: development and psychometric properties. *ANS Adv Nurs Sci*. 1985;8:15-24.

May LA, Warren S. Measuring quality of life of persons with spinal cord injury: external and structural validity. *Spinal Cord*. 2002;40:341-350.

May LA, Warren S. Measuring quality of life of persons with spinal cord injury: substantive and structural validation. *Qual Life Res*. 2001;10:503-515.

Instrument name: Quality of Well Being (QWB) – original version (QWB) and Self-Administered version (QWB-SA)

Reviewers: **Primary: Rachel Tappan, PT, NCS** Secondary: Eileen Tseng, PT, DPT, NCS	**Date of review:** 5/9/12

ICF domain (check all that apply):

_____ Body function/structure _____ Activity __X___ Participation

Construct/s measured (check all that apply):

Body structure and Function	**Activity**	**Participation**
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	_X__Community function _X__Domestic Life _X__Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community _X__Self Care ___Social function _X__Work ___Other:

Recommendation Categories

Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)			X		
Subacute (3-6mo)			X		
Chronic (>6mo)			X		
Overall Comments:	The QWB and QWB-SA are unique in that they allow for calculation of quality-adjusted life years, e.g., for health policy analysis. However, more evidence is needed to be able to recommend the QWB or QWB-SA more strongly, in particular in the areas of score interpretation (e.g., meaningful change), test-retest reliability, and acute SCI.				

Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)			X		
Motor Incomplete (AIS C and D)			X		
Overall Comments:					

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	
		X		X	
Research Use	**YES**		**NO**		**Comments**
Is this tool appropriate for use in intervention research studies?	X				This measure may be particularly useful if the calculation of quality-adjusted life years is required.

Additional information on this measure can be found on The Rehabilitation Measures Database at: Quality of Well Being

References

Anderson JP, Kaplan RM, Berry CC, Bush JW, Rumbaut RG. Interday reliability of function assessment for a health status measure: the Quality of Well-being Scale. *Med Care*. 1989;27:1076-1084.

Andresen EM, Fouts BS, Romeis JC, Brownson CA. Performance of health related quality-of-life instruments in a spinal cord injured population. *Arch Phys Med Rehabil*. 1999;80:877-884.

Andresen EM, Rothenberg BM, Kaplan R. Performance of a self-administered mailed version of the Quality of Well-Being (QWB-SA) questionnaire among older adults. *Med Care*. 1998;36:1349-1360.

Fryback DG, Dunham NC, Palta M, Hanmer J, et al. U.S. norms for six generic health-related quality-of-life indexes from the national health measurement study. *Med Care.* 2007;45:1162-1170.

Fryback DG, Lawrence WF, Martin PA, Klein R, Klein BEK. Predicting Quality of Well-being scores from the SF-36: results from the Beaver Dam Health Outcomes Study. *Med Decis Making*. 1997:1. Doi: 10.1177/0272989X9701700101.

Stevens SL, Caputo JL, Fuller DK, Morgan DW. Physical activity and quality of life in adults with spinal cord injury. *J Spinal Cord Med*. 2008;31:373-378.

Instrument name: Reintegration to Normal Living Index (RNL)

Reviewers: **Primary: Rachel Tappan, PT, NCS** Secondary: Eileen Tseng, PT, DPT, NCS	**Date of review:** April 8, 2012

ICF domain (check all that apply):

_____ Body function/structure _____ Activity __x___ Participation

Construct/s measured (check all that apply):

Body structure and Function	Activity	Participation
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	_X__Community function _X__Domestic Life ___Health and wellness _X__Leisure/Recreational activities ___Quality of life _X__Reintegration to community _X__Self Care _X__Social function _X__Work ___Other:

Recommendation Categories

Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)			X		
Subacute (3-6mo)			X		
Chronic (>6mo)		X			
Overall Comments:	Most of the research that has been done on the RNLI has been in subjects with chronic stroke. SCI literature has been focused on the chronic population. No information is available regarding how to interpret the results or meaningful change in score.				

Category 2 Complete vs. Incomplete	4	3	2	1	Comments
Motor Complete (AIS A and B)		X			
Motor Incomplete (AIS C and D)		X			
Overall Comments:	See comments in Category 1				

Entry-Level Criteria	Students should learn to administer tool		Students should be exposed to tool (e.g. to read literature)		Comments
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	
		X	X		

Research Use	YES	NO	Comments
Is this tool appropriate for use in intervention research studies?	X		The available data suggests that the RNLI is a reasonable choice, though more evidence to support its use would be valuable.

Additional information on this measure can be found on The Rehabilitation Measures Database at: Reintegration to Normal Living Index (RNL)

References

Bluvol A, Ford-Gilboe M. Hope, health work and quality of life in families of stroke survivors. *J Adv Nurs*. 2004;48:322-332.

Daneski K, Coshall C, Tillingand K, Wolfe CDA. Reliability and validity of a postal version of the Reintegration to Normal Living Index, modified for use with stroke patients. *Clin Rehabil*. 2003;17:835-839.

Fox Harker W, Dawson DR, Boschen KA, Stuss, DT. A comparison of independent living outcomes following traumatic brain injury and spinal cord injury. *Int J Rehabil Res*. 2002;25:93-102.

HItzig SL, Escobar EM, Noreau L, Craven BC. Validation of the Reintegration to Normal Living Index for community-dwelling persons with chronic spinal cord injury. *Arch Phys Med Rehabil*. 2012;93:108-114.

May LA, Warren S. Measuring quality of life of persons with spinal cord injury: external and structural validity. *Spinal Cord*. 2002;40(7):341-350.

Pang MYC, Eng JJ, Miller WC. Determinants of satisfaction with community reintegration in older adults with chronic stroke: role of balance efficacy. *Phys Ther*. 2007;87:282-291.

Spitzer WO, Dobson AJ, Hall J, et al. Measuring the quality of life of cancer patients: a concise QL-index for use by physicians. *J Chronic Dis* 1981;34(12):585-597.

Tooth LR, McKenna KT, Smith M, O'Rourke PK. Reliability of scores between stroke patients and significant others on the Reintegration to Normal Living (RNL) Index. *Disabil Rehabil*. 2003;25:433-440.

Wood-Dauphinee SL, Opzoomer MA, Williams JL, et al. Assessment of global function: The Reintegration to Normal Living Index. *Arch Phys Med Rehabil*. 1988;69: 583-590.

Instrument name: Satisfaction with Life Scale (SWLS)	
Reviewers: **Primary: Wendy Romney, PT, DPT, NCS** Cara Weisbach, PT, DPT	**Date of review:** 6/19/12
ICF domain (check all that apply): _____ Body function/structure _____ Activity __X_ Participation	

Construct/s measured (check all that apply):		
Body structure and Function	**Activity**	**Participation**
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities _X_Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories					
Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)			X		
Subacute (3-6mo)			X		
Chronic (>6mo)		X			
Overall Comments:	Tested at follow-up greater than one year post injury in the National Spinal Cord Injury Database (NSCID) developed by the SCI model systems.				

Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)		X			
Motor Incomplete (AIS C and D)		X			
Overall Comments:					

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	This is a quick tool to measure satisfaction with life
		X	X		
Research Use	**YES**		**NO**		**Comments**
Is this tool appropriate for use in intervention research studies?	X				Intervention research studies where satisfaction with life may be impacted; however, use with caution as responsiveness and meaningful change have not been established for this measure.

Additional information on this measure can be found on The Rehabilitation Measures Database at: Satisfaction with Life Scale (SWLS, Deiner Scale)

References

Diener E, Emmons R, Larsen R, Griffen S. The satisfaction with life scale. *J Pers Assess*. 1985; 49: 71-5.

Dijkers M. Correlates of life satisfaction among persons with spinal cord injury. *Arch Phys Med Rehabil*. 1999; 80: 867-76.

Krause JS, Saunders LL, Reed KS, Coker J, Zhai Y, Johnson E. Comparsion of the Patient Health Questionnaire and the Older Adult Health and Mood Questionnaire for self-reported depressive symptoms after spinal cord injury. *Rehabil Psychol.* 2009; 54: 440-8.

Post MW, Christel M, van Leeuwen CF, Koppenhagen SD. Validity of the Life Satisfaction questions, the Life Satisfaction Questionnaire (LiSat-9) and the Satisfaction with Life Scale (SWLS) in persons with spinal cord injury. *Arch Phys Med Rehabil.* 2012, doi; 10.101/j.apmr.2012.03.025.

Instrument name: Medical Outcomes Study Short Form 36 (SF-36)	
Reviewers: **Primary: Wendy Romney, PT, DPT, NCS** Secondary: Cara Weisbach, PT, DPT	**Date of review:** 5/15/12
ICF domain (check all that apply): __X__ Body function/structure ___X__ Activity __X_ Participation	

Construct/s measured (check all that apply):		
Body structure and Function	**Activity**	**Participation**
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) _X_Pain ___Range of motion ___Somatosensation ___Other:	_X_Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills __Other	_X_Community function _X_Domestic Life _X_Health and wellness _X_Leisure/Recreational activities _X_Quality of life _X_Reintegration to community _X_Self Care _X_Social function _X_Work _x__Other : Emotional well-being, psychological/mental health

Recommendation Categories					
Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)				X	Consider if individual is in the community.
Subacute (3-6mo)			X		Data in related population of chronic SCI. Only appropriate if individual in in the community.
Chronic (>6mo)		X			
Overall Comments:	No study to date measure on persons less than 12 months post injury. There is a cost associated with the SF-36 which decreases its clinical utility.				

Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)		X			
Motor Incomplete (AIS C and D)		X			
Overall Comments:	Floor effects noted on SF-36 physical function domain due to inability to perform physical task for persons who require a wheelchair for mobility. The SF-36 walk-wheel modification was developed for persons who require a wheelchair for mobility (Lee et al, 2009).				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	
		X	X		

Research Use	**YES**	**NO**	**Comments**
Is this tool appropriate for use in intervention research studies?	X		

Additional information on this measure can be found on The Rehabilitation Measures Database at: Short Form 36 (SF-36)

References

Anderson EM, Fouts BS, Romeis JC, Brownson CA. (1999). Performance of health related quality of life instruments in spinal cord injured population. *Arch Phys Med Rehabil*, 80; 877-884.

Forchheimer M, McAweeney M, Tate DG. (2004). "Use of the SF-36 among persons with spinal cord injury." *Am J Phys Med Rehabil,* 83(5): 390-395.

Hill MR, Noonan VK, Sakakibara BM, Miller WC and the SCIRE research team. Quality of life instruments and definitions in individuals with spinal cord injury: a systematic review. *Spinal Cord.* 2010;48:438-450.

Lee BB, Simpson JM, King MT, Haran MJ, Marial O. The SF-36 walk-wheel: a simple modification of the SF-36 physical domain improves its responsiveness for measuring health status change in spinal cord injury. *Spinal Cord* 47: 50-55.

Lin, MR, Hwang HF, et al. (2007). Comparisons of the brief form of the World Health Organization Quality of Life and Short Form-36 for persons with spinal cord injuries. *Am J Phys Med Rehabil.* 2009;86:104-113.

Instrument name: Sickness Impact Profile-68 (SIP)	
Reviewers: **Primary: Wendy Romney, PT, DPT, NCS** Secondary: Cara Weisbach, PT, DPT	**Date of review**: 5/8/12
ICF domain (check all that apply): __X___ Body function/structure ___X___ Activity __X__ Participation	

Construct/s measured (check all that apply):		
Body structure and Function	**Activity**	**Participation**
_X__Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	_X_Activities of Daily Living _X__Balance/falls _X__Bed Mobility _X_Gait (include stairs) _X__High Level mobility _X_Transfers _X__Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	_X_Community function _X_Domestic Life _X_Health and wellness _X_Leisure/Recreational activities _X_Quality of life _X_Reintegration to community _X_Self Care _X_Social function _X_Work _X_Other: Emotional stability and psychological well-being, communication

Recommendation Categories					
Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)				X	
Subacute (3-6mo)		X			
Chronic (>6mo)		X			
Overall Comments:	Should be completed by people living in the community. Lacking reliability data in SCI.				

Category 2 Complete vs. Incomplete	4	3	2	1	Comments
Motor Complete (AIS A and B)		X			
Motor Incomplete (AIS C and D)		X			
Overall Comments:	Somatic autonomy and mobility control factors consist of questions about ambulation. Decreased content validity and floor effects may be seen with persons who are wheelchair dependent. Lacking reliability data in SCI.				

Entry-Level Criteria	Students should learn to administer tool		Students should be exposed to tool (e.g. to read literature)		Comments
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	
		X	X		
Research Use	**YES**		**NO**		**Comments**
Is this tool appropriate for use in intervention research studies?	X				

Additional information on this measure can be found on The Rehabilitation Measures Database at: Sickness Impact Profile 68 (SIP 68)

References

Nanda U, McLendon PM, Andresen EM, Armbrecht E. The sip68: An abbreviated sickness impact profile for disability outcomes research. *Qual Life Res*. 2003;12:583-595.

Post MW, DeBruin A, DeWitte L. (1996). The SIP68: a measure of health related functional status in rehabilitation medicine. *Arch Phys Med Rehabil*,77: 440-445

Post MW, Gerritsen J, Diederikst JP, DeWittet LP. Measuring health status of people who are wheelchair-dependent: Validity of the sickness impact profile 68 and the nottingham health profile. *Disabil Rehabil*. 2001;23:245-253.

Post MWM, Ros WJG, Schrijvers AJP. Impact of social support on health status and life satisfaction in people with a spinal cord injury. *Psychology & Health*. 1999;14:679-695.

Instrument name: Six Minute Arm Test (6-MAT)	
Reviewers: **Primary: Jennifer H. Kahn, PT, DPT, NCS** Secondary: Candy Tefertiller, PT, DPT, ATP, NCS	**Date of review: 5/6/12**
ICF domain (check all that apply): __X___ Body function/structure _____ Activity _____ Participation	

Construct/s measured (check all that apply):

Body structure and Function	Activity	Participation
_X_Aerobic capacity/endurance _X_ Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories

Category 1 - Acuity	4	3	2	1	Comments
Acute (0-3mo)				X	
Subacute (3-6mo)			X		
Chronic (> 6mo)			X		
Overall Comments:	Additional data needed on reliability and validity. However, this is a feasible option for clinicians to test cardiovascular fitness in the clinic that is safe and does not involve specialized equipment. Not tested in acute SCI and extremely limited evidence in subacute SCI. Given potential adjustments to physiologic response to exercise post SCI, recommend specific testing in acute population prior to				

	recommending.				
Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)			X		
Motor Incomplete (AIS C and D)			X		If using wheelchair for primary means of mobility
Overall Comments:	Instrument tested in individuals who use a wheelchair for daily mobility. In primary study, 29/30 subjects were motor complete; however, measure could be appropriate for any individual with SCI who uses a wheelchair for daily mobility.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	Students should be aware of need to address cardiovascular fitness in this population. Specific exposure to this tool would be reserved for those who specialize in SCI.
		X		X	

Research Use	**YES**	**NO**	**Comments**
Is this tool appropriate for use in intervention research studies?		X	Suggest use of gold standard of peak VO2, requiring equipment that researchers may have more access to. The 6 MAT is a good alternative clinically when more costly and time consuming equipment is not feasible.

Additional information on this measure can be found on The Rehabilitation Measures Database at: Six Minute Arm Test (6-MAT)

References

Hol AT, Eng JJ, Miller WC, et al. Reliability and validity of the six-minute arm test for the evaluation of cardiovascular fitness in people with spinal cord injury. *Arch Phys Med Rehabil.* 2007;88:489-495.

Tawashy AE, Eng JJ ,Krassioukov AC, Miller WC, Sproule S. Aerobic exercise duringearly rehabilitation for cervical spinal cord injury. *Phys Ther.* 2010;90:427-437.

Instrument name: Sollerman Hand Function Test

Reviewers: **Primary: Wendy Romney, PT, DPT, NCS** Seconary: Cara Weisbach, PT, DPT	**Date of review:** 3/26/12

ICF domain (check all that apply):

_____ Body function/structure __X___ Activity _____ Participation

Construct/s measured (check all that apply):

Body structure and Function	Activity	Participation
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	_X_Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers _X_Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories

Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)			X		
Subacute (3-6mo)			X		
Chronic (>6mo)			X		
Overall Comments:	Acuity information is missing from original Sollerman Hand Function Test study. Participants with tetraplegia were recruited before and after reconstructive hand or arm surgery. (Sollerman, 1995). Recommend further research.				

Category 2 Complete vs. Incomplete	4	3	2	1	Comments
Motor Complete (AIS A and B)			X		
Motor Incomplete (AIS C and D)			X		
Overall Comments:	Recommend further research.				

Entry-Level Criteria	Students should learn to administer tool		Students should be exposed to tool (e.g. to read literature)		Comments
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	
		X		X	
Research Use	**YES**		**NO**		**Comments**
Is this tool appropriate for use in intervention research studies?			X		Need additional studies to identify psychometric properties prior to intervention research.

Additional information on this measure can be found on The Rehabilitation Measures Database at: Sollerman Hand Function Test

References

Brogardh C, Persson AL, Sjolund BH. Intra- and inter-rater reliability of the Sollerman hand function test in patients with chronic stroke. *Dis Rehabil.* 2006; 29 (2), 145-154.

Fattal C. Motor capacities of upper limbs in tetraplegics: a new scale for the assessment of the results of functional surgery on upper limbs. *Spinal Cord. 2004; 42*(2), 80-90.

Sollerman C, & Ejeskar A. Sollerman hand function test. A standardised method and its use in tetraplegic patients. *Scand J Plast Reconstr Surg Hand Surg.* 1995; 29(2), 167-176.

Weng LY, Hsieh CL, Tung KY, et al. Excellent reliability of the Sollerman hand function test for patients with burned hands. *J Burn Care Re.* 2010; 31(6), 904-910.

Instrument name: Spinal Cord Assessment Tool for Spastic Reflexes (SCATS)	
Reviewers: **Primary: Phyllis Palma, PT, DPT** Secondary: Christopher Newman, PT, MPT, NCS Jennifer Kahn, PT, DPT, NCS	**Date of review: 06/12**
ICF domain (check all that apply): __X___ Body function/structure _____ Activity _____ Participation	

Construct/s measured (check all that apply):		
Body structure and Function	**Activity**	**Participation**
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength _X__Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories					
Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)			X		
Subacute (3-6mo)			X		
Chronic (>6mo)			X		
Overall Comments:	Lacking data on reliability and data to guide interpretation. Excellent validity established with Kinematic and EMG measures as well as adequate validity with measures for spasticity. One study, n=11-27, all individuals with chronic SCI, with the exception of 1 individual.				
Category 2 Complete vs.	**4**	**3**	**2**	**1**	**Comments**

Incomplete					
Motor Complete (AIS A and B)			X		
Motor Incomplete (AIS C and D)			X		
Overall Comments:	Subjects predominantly AIS A; however, all AIS levels represented in n=11-27. Lacking data on reliability and data to guide interpretation.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	
		X		X	

Research Use	**YES**	**NO**	**Comments**
Is this tool appropriate for use in intervention research studies?		X	Further psychometrics needed; however, this measure does provide unique information measuring spasms, multijoint versus single joint spasticity. If possible, researchers should utilize more quantitative measures of spasms/spasticty.

Additional information on this measure can be found on The Rehabilitation Measures Database at: Spinal Cord Assessment Tool for Spastic Reflexes (SCATS)

References

Benz EN, Hornby TG, Bode RK, et al. A physiologically based clinical measure for spastic reflexes in spinal cord injury. *Arch Phys Med Rehabil*. 2005;86:52-59.

Hsieh J, Wolfe D, Miller W, Curt A. Spasticity outcome measures in spinal cord injury: psychometric properties and clinical utility. *Spinal Cord.* 2008;46:86-95.

Instrument name: Spinal Cord Independence Measure (SCIM)	
Reviewers: **Primary: Eileen Tseng, PT, DPT, NCS** Secondary: Rachel Tappan, PT, NCS	**Date of review: 05/2012**
ICF domain (check all that apply): _____ Body function/structure __X____ Activity _____ __ Participation	

Construct/s measured (check all that apply):		
Body structure and Function	**Activity**	**Participation**
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	_X _Activities of Daily Living ___Balance/falls _X_Bed Mobility _X_Gait (include stairs) ___High Level mobility _X_Transfers ___Upper Extremity Function _X_Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life __ _Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community __ _Self Care __ _Social function ___Work ___Other:

Recommendation Categories					
Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)		X			
Subacute (3-6mo)		X			
Chronic (>6mo)		X			
Overall Comments:	Reliability and validity has been established for subjects of varying levels of acuity, however clinical utility is diminished. Studies have indicated increased time to administer (30-45 minutes by observation), no MDC or MCID have been established, and floor and ceiling effects have been noted in C1-C4 and T1-12, respectively.				

Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)		X			
Motor Incomplete (AIS C and D)		X			
Overall Comments:	Studies have included subjects with complete and incomplete injuries. See comments above				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	
		X	X		

Research Use	**YES**	**NO**	**Comments**
Is this tool appropriate for use in intervention research studies?	X		SCIM has been used to validate other measures (Berry and Kennedy, 2003) and in clinical trials (Popovic, et al.2006)

Additional information on this measure can be found on The Rehabilitation Measures Database at: Spinal Cord Independence Measure (SCIM) (SCIMII, SCIMIII)

References

Ackerman P., Morrison SA., McDowell S., Vazquez L. Using the Spinal Cord Independence Measure III to measure functional recovery in a post-acute spinal cord injury program. *Spinal Cord*. 2010;48:380-387.

Anderson K, Aito S, Atkins M, et al. Functional recovery measures for spinal cord injury: an evidence-based review for clinical practice and research. *J Spinal Cord Med. 2008;*31(2):133-144.

Berry C. and Kennedy P. A psychometric analysis of the Needs Assessment Checklist (NAC). *Spinal Cord* 2003;41(9):490-501.

BluvshteinV, FrontL, Itzkovich M, et al. SCIM III is reliable and valid in a separate analysis for traumatic spinal cord lesions. *Spinal Cord.* 2011;49:292–296.

Catz A., Itzkovich M., et al. SCIM-spinal cord independence measure: a new disability scale for patients with spinal cord lesions. *Spinal Cord* 1997;35:850-856.

Catz A, Itzkovich M, Steinberg F, et al. The Catz-Itzkovich SCIM: a revised version of the Spinal Cord Independence Measure. *Disabil Rehabil*. 2001;23:263-268.

Itzkovich M, Gelernter I, Biering-Sorensen F, et al. The Spinal Cord Independence Measure (SCIM) version III: reliability and validity in a multi-center international study. *Disabil Rehabil.* 2007;29(24):1926-1933.

Popovic MR, Thrasher TA, Adams ME, Takes V, Zivanovic V, Tonack MI. Functional electrical therapy: retraining grasping in spinal cord injury. *Spinal Cord*. 2006;44:143-151.

Rudhe C. and van Hedel H. J. A. Upper extremity function in persons with tetraplegia: relationships between strength, capacity, and the spinal cord independence measure. *Neurorehabil Neural Repair*. 2009;23:413.

Van Hedel H, Dokladal P, Hotz-Boendermaker S. Mismatch between investigator-determined and patient-reported independence after spinal cord injury: consequences for rehabilitation and trials. *Neurorehabil Neural Repair*. 2011;25:855-64.

Instrument name: Spinal Cord Injury Functional Ambulation Inventory (SCI-FAI)	
Reviewers: **Primary: Jennifer H. Kahn, PT, DPT, NCS** Secondary: Candy Tefertiller, PT, DPT, ATP, NCS	**Date of review: 3/10/12**
ICF domain (check all that apply): _____ Body function/structure __X____ Activity _____ Participation	

Construct/s measured (check all that apply):

Body structure and Function	Activity	Participation
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility _X__Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories

Category 1 - Acuity	4	3	2	1	Comments
Acute (0-3mo)		X			
Subacute (3-6 mo)		X			
Chronic (>6 mo)		X			

Overall Comments:	The SCI-FAI is composed of 3 subscales (gait parameters, assistive device, temporal distance). The sub-scales are not designed to be used as a single composite score, but rather, each is scored separately. However, responsiveness data only exists for the gait parameter subscale. The original article (Field Fote 2001) does not specify level of acuity, but rather only specifies incomplete SCI. Therefore, it is difficult to rate the above categories. Separate data (Lemay 2009) specified subjects with acute AIS D to warrant a rating.

Category 2 Complete vs. Incomplete	4	3	2	1	Comments
Motor Complete (AIS A and B)			X		Could quantify or describe gait in an individual who has a complete injury and is ambulatory, but there is no data for this population.
Motor Incomplete (AIS C and D)		X			
Overall Comments:	Improved reliability (excellent vs. adequate) when using videotaped analysis compared to live scoring				

Entry-Level Criteria	Students should learn to administer tool		Students should be exposed to tool (e.g. to read literature)		Comments
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	
		X		X	

Research Use	YES	NO	Comments
Is this tool appropriate for use in intervention research studies?		X	Additional data needed on responsiveness. Offers a perspective of gait kinematics that other measures do not, which may make this a reasonable choice, especially for clinical studies where more sophisticated quantitative equipment is not available.

Additional information on this measure can be found on The Rehabilitation Measures Database at: Spinal Cord Injury Functional Ambulation Inventory (SCI-FAI)

References

Dawson J, Shamley D, Jamous MA. A structured review of outcome measures used for the assessment of rehabilitation interventions for spinal cord injury. *Spinal Cord*. 2008;46:768-780.

Field-Fote EC, Fluet GG, Schafer SD, Schneider EM, Smith R, Downey PA, Ruhl CD. The spinal cord injury functional ambulation inventory (sci-fai). *J Rehabil Med*. 2001;33:177-181.

Lam T, Noonan V, Eng J. A systematic review of functional ambulation outcome measures in spinal cord injury. *Spinal Cord*. 2007;46:246-254.

Lemay J, Nadeau S. Standing balance assessment in asia D paraplegic and tetraplegic participants: Concurrent validity of the berg balance scale. *Spinal Cord*. 2009;48:245-250.

Instrument name: Spinal Cord Injury Functional Ambulation Profile (SCI FAP)	
Reviewers: **Primary: Jennifer H. Kahn, PT, DPT, NCS** Secondary: Candy Tefertiller, PT, DPT, ATP, NCS	**Date of review: 3/17/12**
ICF domain (check all that apply): _____ Body function/structure __X____ Activity _____ Participation	

Construct/s measured (check all that apply):		
Body structure and Function	**Activity**	**Participation**
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility _X_Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories					
Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)			X		No data in acute SCI
Subacute (3-6mo)			X		No data in subacute SCI
Chronic (> 6 mo)		X			No data to guide interpretation, variable time to administer 15-45 min, variety of equipment to set up
Overall Comments:	The SCI-FAP includes a variety of functional walking tests, beyond gait speed and level of assistance, although it incorporates both of those. This measure is useful for individuals with moderate walking ability and quantifies a variety of walking tasks specific to SCI. However, it can take >20 min to administer and can involve a				

	variety of equipment to set up.				
Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)			X		Not studied in individuals with complete injury; however, potentially appropriate for those who are ambulatory
Motor Incomplete (AIS C and D)		X			
Overall Comments:	Varying levels of physical assistance for walking and orthosis/bracing not considered when using this measure. Both can be documented in "comments" section of tool. Each of the tasks can be treated as an independent task as each task has been shown to have acceptable psychometrics.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	This is a new measure that is not yet widely used clinically or in the literature.
		X		X	

Research Use	**YES**	**NO**	**Comments**
Is this tool appropriate for use in intervention research studies?		X	Needs additional data on responsiveness to change.

Additional information on this measure can be found on The Rehabilitation Measures Database at: Spinal Cord Injury Functional Ambulation Profile (SCI-FAP)

References

Musselman K, Brunton K, Lam T, Yang J. Spinal cord injury functional ambulation profile: A new measure of walking ability. *Neurorehabil Neural Repair*. 2011;25:285-293.

Instrument name: Spinal Cord Injury Lifestyle Scale (SCILS)	
Reviewers: **Primary: Eileen Tseng, PT, DPT, NCS** Secondary: Rachel Tappan, PT, NCS	**Date of review:** 04/2012
ICF domain (check all that apply): _____ Body function/structure __X___ Activity __X__ Participation	

Construct/s measured (check all that apply):		
Body structure and Function	**Activity**	**Participation**
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	_X_Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life _X_Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community _X_Self Care _X_Social function ___Work ___Other:

Recommendation Categories					
Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)				X	
Subacute (3-6mo)				X	
Chronic (>6mo)				X	Excellent overall internal consistency, validity not well established with variable results, including some that are poor.
Overall Comments:	Behaviors are rated based on the 3 months prior to performing outcome measure therefore decreased utility for <3 months post injury. As the SCILS assess developed health behaviors after onset of SCI, individuals in subacute care may have decreased habitual				

	learned behaviors. Further evidence is required in order to make a stronger recommendation.				
Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)				X	
Motor Incomplete (AIS C and D)				X	
Overall Comments:	SCILS scores appear to be unrelated to level of injury of paraplegia or tetraplegia (Pruitt, et al. 1998). Further evidence is required in order to make a stronger recommendation.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	
		X		X	
Research Use	**YES**		**NO**		**Comments**
Is this tool appropriate for use in intervention research studies?			X		

Additional information on this measure can be found on The Rehabilitation Measures Database at: Spinal Cord Injury Lifestyle Scale (SCILS)

References

Bloemen-Vrencken JH, de Witte LP, Post MW, van den Heuvel WJ. Health behaviour of persons with spinal cord injury. *Spinal Cord.* 2007;45:243-249.

Pruitt SD, Wahlgren DR, Epping-Jordan JE, Rossi AL. Health behavior in persons with spinal cord injury: development and initial validation of an outcome measure. *Spinal Cord.* 1998;36:724-731.

Instrument name: Spinal Cord Injury Spasticity Evaluation Tool (SCI-SET)	
Reviewers: **Primary: Christopher Newman, PT, MPT, NCS** Secondary: Phyllis Palma, PT, DPT	**Date of review: March 2012**
ICF domain (check all that apply): ___X__ Body function/structure __X____ Activity __X___ Participation	

Construct/s measured (check all that apply):		
Body structure and Function	**Activity**	**Participation**
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength _X__Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	__X__Activities of Daily Living __X__Balance/falls __X_Bed Mobility __X_Gait (include stairs) ___High Level mobility __X_Transfers ___Upper Extremity Function __X_Wheelchair Mobility/skills ___Other:	___Community function _X___Domestic Life _X__Health and wellness _X___Leisure/Recreational activities _X__Quality of life ___Reintegration to community ___Self Care _X__Social function ___Work ___Other:

Recommendation Categories					
Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)			X		No studies in acute or subacute SCI; however 1 study available in chronic SCI which is a related population. Measure is appropriate if individual has been discharged from the hospital.
Subacute (3-6mo)			X		No studies in acute or subacute SCI; however 1 study available in chronic SCI which is a related population.
Chronic (>6mo)			X		Based upon one study with a sample of convenience.
Overall Comments:	The SCI-SET is a self-report measure of spasticity that incorporates the impact of spasticity on a person's life, both positive and negative. A single study with convenience sample of 61 investigated internal consistency, test-retest reliability, and				

	construct validity.				
Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)			X		
Motor Incomplete (AIS C and D)			X		
Overall Comments:	The SCI-SET is a self report measure of spasticity that incorporates the impact of spasticity on a person's life, both positive and negative. A single study with convenience sample of 61 investigated internal consistency, test-retest reliability, and construct validity and had individuals with both motor complete and incomplete injuries represented.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	Tool is a self report measure that recognizes the impact of spasticity/tone on an individual's life, both positive and negative. Might be able to guide treatment and focus intervention. Psychometrics are not strong enough, nor is it widely used at this point to warrant including it in the curriculum.
		X		X	
Research Use	**YES**		**NO**		**Comments**
Is this tool appropriate for use in intervention			X		This measure captures impact of spasticity/tone on a person's life and function,

research studies?			both positive and negative, something lacking in other measures of this construct. With further psychometric testing, this measure could be useful in research.
Additional information on this measure can be found on The Rehabilitation Measures Database at: Spinal Cord Injury Spasticity Evaluation Tool (SCI-SET)			

References

Adams MM, Ginis KA, Hicks AL. The spinal cord injury spasticity evaluation tool: development and evaluation. *Arch Phys Med Rehabil.* 2007;88:1185-1192.

Instrument name: Tardieu/ Modified Tardieu Scale	
Reviewers: **Primary: Christopher Newman, PT, MPT, NCS** Secondary: Jennifer Kahn, PT, DPT, NCS	**Date of review: April 2012**
ICF domain (check all that apply): __X__ Body function/structure _____ Activity _____ Participation	

Construct/s measured (check all that apply):		
Body structure and Function	**Activity**	**Participation**
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength _X__Muscle tone (spasticity, spasms) ___Pain _X__Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories					
Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)			X		
Subacute (3-6mo)			X		
Chronic(>6mo)			X		
Overall Comments:	Psychometrics of Tardieu and MTS have been tested in related neurologic populations, such as CVA, pediatric neuro (CP), and TBI. Elbow flexors and ankle plantar flexors have been studied the most.				
Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**

Motor Complete (AIS A and B)			X		
Motor Incomplete (AIS C and D)			X		
Overall Comments:	Psychometrics of Tardieu and MTS have been tested in related neurologic populations, such as CVA, pediatric neuro (CP), and TBI. Elbow flexors and ankle plantar flexors have been studied the most.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	Has not been studied in SCI population so should not be taught when learning spasticity assessment for individuals with SCI. Potential exposure of this measure warranted in other populations.
		X		X	

Research Use	**YES**	**NO**	**Comments**
Is this tool appropriate for use in intervention research studies?		X	There is no literature on the use of this measure in individuals with SCI. Therefore, do not recommend the use of this measure in the SCI population. Recommend more quantitative measures of spasticity for research if feasible.

Additional information on this measure can be found on The Rehabilitation Measures Database at: Tardieu Scale, Modified Tardieu Scale

References

Ansari NN, Haghdi S, et al. The Modified Tardieu Scale for the measurement of elbow flexor spasticity in adult patients with hemiplegia. *Brain Injury.* 2008;22:1007-1012.

Boyd R, Graham H. Objective measurement of clinical findings in the use of botulinum toxin type A for the management of children with cerebral palsy. *Eur J Neurol.* 1999;6:S23-35.

Fosang AL, Galea MP, et al. Measures of muscle and joint performance in the lower limb of children with cerebral palsy. *Dev Med Child Neuro*. 2003;45:664-670.

Haugh AB, Pandyan AD, et al. A systematic review of the Tardieu Scale for the measurement of spasticity. Disabil Rehabil. 2006;28:899-907.

Mehrholz J, Wagner K, et al. Reliability of the Modified Tardieu Scale and the Modified Ashworth Scale in adult patients with severe BI: A comparison study." *Clin Rehabil.* 2005;19:751-759.

Patrick E, Ada L. The Tardieu Scale differentiates contracture from spasticity whereas the Ashworth Scale is confounded by it. *Clini Rehabil*. 2006;20:173-182.

Platz T, Eickhof C, Nuyens G, Vuadens P. Clinical scales for the assessment of spasticity, associated phenomena, and function: a systematic review of literature. *Dis Rehabil*. 2005;27:7-18.

Yam WK, Leung MS. Interrater Reliability of Modified Ashworth Scale and Modified Tardieu Scale in children with spastic cerebral palsy. *J Child Neurol.* 2006*;*21: 1031-1035.

Instrument name: Tetraplegia Hand Activity Questionnaire (THAQ)	
Reviewers: **Primary: Wendy Romney, PT, DPT, NCS** Secondary: Cara Weisbach, PT, DPT	**Date of review:** 4/4/12
ICF domain (check all that apply): _____ Body function/structure __X___ Activity __X__ Participation	

Construct/s measured (check all that apply):

Body structure and Function	Activity	Participation
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	_X_ Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers _X_ Upper Extremity Function _X_ Wheelchair Mobility/skills ___Other:	___Community function _X_ Domestic Life ___Health and wellness _X_Leisure/Recreational activities ___Quality of life ___Reintegration to community _X_Self Care ___Social function _X_ Work ___Other:

Recommendation Categories

Category 1 - Acuity	4	3	2	1	Comments
Acute (0-3mo)				X	Useful for patients after return to home
Subacute (3-6mo)				X	
Chronic (>6mo)				X	
Overall Comments:	No study to date to determine psychometric properties. THAQ established by Delphi process using persons with tetraplegia as content experts for item generation. Based on activities in questionnaire may not be appropriate for inpatient (acute or subacute) population.				

Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)				X	
Motor Incomplete (AIS C and D)				X	
Overall Comments:	Questionnaire used for persons with hand dysfunction secondary to spinal cord injury. No study to date to determine psychometric properties				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	
		X		X	
Research Use	**YES**		**NO**		**Comments**
Is this tool appropriate for use in intervention research studies?			X		Need additional studies to identify psychometric properties prior to intervention research.

Additional information on this measure can be found on The Rehabilitation Measures Database at: Tetraplegia Hand Activity Questionnaire (THAQ)

References

Land NE, Odding E, Duivenvoorden HJ, Bergen MP, Stam HJ. Tetraplegia hand activity questionnaire (THAQ): the development, assessment of arm-hand function-related activities in tetraplegic patients with spinal cord injury. *Spinal Cord*. 2004; 42:294-301.

Instrument name: Timed Up and Go (TUG)	
Reviewers: **Primary: Jennifer H. Kahn, PT, DPT, NCS** Secondary: Candy Tefertiller, PT, DPT, ATP, NCS	**Date of review: 5/2/12**
ICF domain (check all that apply): _____ Body function/structure ___X____ Activity _____ Participation	

Construct/s measured (check all that apply):

Body structure and Function	Activity	Participation
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living _X_Balance/falls ___Bed Mobility _X_Gait (include stairs) ___High Level mobility _X__Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories

Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)	X				
Subacute (3-6 mo)	X				
Chronic (> 6mo)		X			minimal psychometric data in chronic SCI, validity but no reliability
Overall Comments:	Excellent clinical utility and reliability and validity. Minimal detectable change (MDC) available in SCI population to help guide interpretation of results (calculated in Lam); however, no data on responsiveness in SCI. Excellent correlations of TUG and 10MWT, however, relationship changes over time. Time needed to complete TUG decreases over time as compared to the 10MWT, most likely due to balance component of TUG (van Hedel 2008).				
Category 2	**4**	**3**	**2**	**1**	**Comments**

Complete vs. Incomplete					
Motor Complete (AIS A and B)			X		Minimal data in individuals with AIS A and B; however, appropriate for those who are ambulatory.
Motor Incomplete (AIS C and D)	X				
Overall Comments:	Improved reliability in individuals who perform the TUG within 40 seconds (van Hedel 2005). Improved validity with the WISCI II in individuals who do not require assistance. Use with caution in individuals with poorer walking ability. Subjects may familiarize with test and helpful to include a practice trial before collecting information to minimize learning effect of test.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	This measures spans multiple diagnoses
	X		X		
Research Use	**YES**		**NO**		**Comments**
Is this tool appropriate for use in intervention research studies?	X				Recommend further research on cut off scores for fall risk in SCI population as well as responsiveness data.

Additional information on this measure can be found on The Rehabilitation Measures Database at: Timed Up and Go Test (TUG)

References

Lam T, Noonan VK, Eng JJ, et al. A systematic review of functional ambulation outcome measures in spinal cord injury. *Spinal Cord.* 2008;46:246-254.

Lemay JF, Nadeau S. Standing balance assessment in ASIA D paraplegic and tetraplegic participants: concurrent validity of the Berg Balance Scale. *Spinal Cord.* 2010;48:245-250.

van Hedel HJ, Wirz M, Dietz V. Assessing walking ability in subjects with spinal cord injury: validity and reliability of 3 walking tests. *Arch Phys Med Rehabil.* 2005;89:190-196.

Van Hedel HJ, WIrz M, Dietz V. Standardizes assessment of walking capacity after spinal cord injury: the european network approach. *Neurol Res.* 2008;30:61-73.

Instrument name: Tool for Assessing Mobility in WC Dependent Paraplegics	
Reviewers: **Primary: Christopher Newman, PT, DPT, NCS** Secondary: Phyllis Palma, PT, DPT	**Date of review: April 2012**
ICF domain (check all that apply): _____ Body function/structure ___X___ Activity _____ Participation	

Construct/s measured (check all that apply):

Body structure and Function	Activity	Participation
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls _X_ Bed Mobility ___Gait (include stairs) _X_ High Level mobility _X_ Transfers ___Upper Extremity Function _X__ Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories

Category 1 - Acuity	4	3	2	1	Comments
Acute (0-3mo)				X	
Subacute (3-6mo)				X	
Chronic (>6mo)				X	

Overall Comments:	This outcome measure appears to have originated as the "Tool for Assessing Mobility in WC Dependent Paraplegics" and then developed into a measure called both the 5-AML and FIM-5. Scores reflect the initial study, which reported excellent interrater reliability in people with paraplegia due to chronic SCI but no other data to support use of the outcome measure. Further analysis of the new 5-AML appear to provide better support of the 5-AML use. The 5-AML removed the bed mobility

	portion of the assessment and is intended to supplement the current FIM scoring used for all rehab patients.				
Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)				X	
Motor Incomplete (AIS C and D)				X	
Overall Comments:	See comments in Category 1. Additional evidence in the areas of validity and responsiveness are required in order to recommend this outcome measure.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula?	**YES**	**NO**	**YES**	**NO**	
		X		X	

Research Use	**YES**	**NO**	**Comments**
Is this tool appropriate for use in intervention research studies?		X	

Additional information on this measure can be found on The Rehabilitation Measures Database at: Tool for assessing Mobility in Wheelchair-Dependent Paraplegics (Harvey Mobility Assessment Tool)

References

Fliess-Douer O, Vanlandewijck YC, Lubel Manor G, Van Der Woude LHV. A systematic review of wheelchair skills tests for manual wheelchair users with a spinal cord injury: towards a standardized outcome measure. *Clin Rehabil*. 2010;24:867.

Harvey LA, Batty J, Fahey A. Reliability of a tool for assessing mobility in wheelchair-dependent paraplegics. *Spinal Cord.* 1998;36:427-431.

Middleton J, Harvey L, Batty J, Cameron I, Quirk R, Winstanley J. Five additional mobility and locomotor items to improve responsiveness of the FIM in wheelchair-dependent

individuals with spinal cord injury. *Spinal Cord.* 2005; *44*:495-504.

Mortenson WB, Miller WC, Auger C. Issues for the selection of wheelchair-specific activity and participation outcome measures: a review. *Arch Phys Med Rehabil.* 2008;89:1177-1186.

Kilkens OJE, Post MWM, Dallmeijer AJ, Seelen, HAM, van der Woude LHV. Wheelchair skills tests: a systematic review. *Clin Rehabil.* 2003;17:418-430.

Instrument name: Toronto Rehabilitation Institute Hand Function Test

Reviewers: **Primary: Wendy Romney, PT, DPT, NCS** Secondary: Cara Weisbach, PT, DPT	**Date of review:** 4/5/12

ICF domain (check all that apply):

__X__ Body function/structure ___X__ Activity _____ Participation

Construct/s measured (check all that apply):

Body structure and Function	**Activity**	**Participation**
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) _X__ Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers _X_ Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories

Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)				X	
Subacute (3-6mo)				X	
Chronic (>6mo)				X	

Overall Comments:	Recommend additional research in target population. No published reliability or validity study to date. Requires instrumented equipment with dynamometers.

Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)				X	
Motor Incomplete (AIS C and D)				X	
Overall Comments:	Recommend additional research in target population. No published reliability or validity study to date. Requires instrumented equipment with dynamometers.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	
		X		X	
Research Use	**YES**		**NO**		**Comments**
Is this tool appropriate for use in intervention research studies?			X		

Additional information on this measure can be found on The Rehabilitation Measures Database at: Toronto Rehabilitation Institute Hand Function Test

References

Kapadic NM, Zivanovic V, Furlan JC, Craven BC, McGillivray C, & Popovic MR. Functional electrical stimulation therapy for grasping in traumatic incomplete spinal cord injury: randomized control trial. *Artificial Organs,* 2011; 35(3), 212-216.

Popovic MR, Contway C. Rehabilitation engineering laboratory hand function test for functional electrical stimulation assisted grasping. *Proceedings of the 8th International Functional Electrical Stimulation Society Conference, Brisbane*. *Australia*, 2003; 231–234.

Popovic MP, Thrasher TA, Zivanovic V, Takaki J, Hajek V. Neuroprosthesis for retraining reaching and grasping functions in severe hemiplegic patients. *Neuromodulation*. 2005; 8(1), 58-72.

Instrument name: Van Lieshout Test Short Version (VLT-SV)	
Reviewers: **Primary: Wendy Romney, PT, DPT, NCS** Secondary: Cara Weisbach, PT, DPT	**Date of review:** 3/26/12
ICF domain (check all that apply): __X__ Body function/structure __X_ Activity _____ Participation	

Construct/s measured (check all that apply):

Body structure and Function	Activity	Participation
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) _X_Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers _X_Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories

Category 1 - Acuity	4	3	2	1	Comments
Acute (0-3mo)				X	
Subacute (3-6mo)				X	
Chronic (>6mo)				X	
Overall Comments:	SCI EDGE task force, in partnership with Rehabilitation Measures Database, was unable to locate this measure. Therefore, rated as 1 due to poor clinical utility. If we had been able to locate this measure, it would have received a 2 for acute and subacute SCI, and a 3 for chronic SCI. Recommend further research with acute				

	population. May have to purchase additional equipment and manual to complete outcome measure.				
Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)				X	
Motor Incomplete (AIS C and D)				X	
Overall Comments:	SCI EDGE task force, in partnership with Rehabilitation Measures Database, was unable to locate this measure. Therefore, rated as 1 due to poor clinical utility. If we had been able to locate this measure, it would have received a 3 for motor complete and incomplete.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	
		X		X	
Research Use	**YES**		**NO**		**Comments**
Is this tool appropriate for use in intervention research studies?	X				Assuming measure can be located.

Additional information on this measure can be found on The Rehabilitation Measures Database at: Van Lieshout Test Short Version (VLT-SV)

References

Post MWM, Van Leishout G, et al. Measurement properties of the short version of the Van Lieshout test for arm/hand function of persons with tetraplegia after spinal cord injury. *Spinal Cord*. 2006;44:763-771.

Spooren AIF, Janssen-Potten YJM, et al. Measuring change in arm hand skilled performance in personals with a cervical spinal cord injury: responsiveness of the Van Lieshout Test. *Spinal Cord*. 2006;44:772-779.

Instrument name: Walking Index for Spinal Cord Injury (WISCI, WISCI II)	
Reviewers: **Primary: Jennifer H. Kahn, PT, DPT, NCS** Secondary: Candy Tefertiller, PT, DPT, ATP, NCS	**Date of review: 4/18/12**
ICF domain (check all that apply): _____ Body function/structure __X____ Activity _____ Participation	

Construct/s measured (check all that apply):		
Body structure and Function	**Activity**	**Participation**
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility _X_Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories					
Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)	X				
Subacute (3-6mo)		X			In a sub group of patients with higher level walking ability early post injury, the WISCI may be less sensitive to change after 3 months while 10Meter walk test and 6min walk test will continue to detect change in walking ability. However, WISCI II has been shown to maintain its concurrent validity with walking speed and 6min up to 12 months.
Chronic (>6mo)		X			
Overall Comments:	In those with higher walking ability, the WISCI II is less sensitive				

	to change than the 10m or 6min; however, it considers assistive devices and bracing and is therefore a recommended complement to the timed tests. In chronic SCI, a difference of 1 WISCI II level is considered a "real" difference.				
Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)		X			Data collected reflects sampling of individuals who are AIS A or B and ambulatory.
Motor Incomplete (AIS C and D)	X				Ceiling effect in individuals with AIS D. Decreased validity in lower functioning individuals (correlations with timed walking tests), but more sensitive to change in lower functioning individuals.
Overall Comments:	See above comments. Recommend using with the 10MWT. Be cautious of ceiling effects in individuals with AIS D. Max WISCI shown to be higher than self selected WISCI; gait speed lower for the Max WISCI vs. self selected WISCI (Kim 2007)				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	The WISCI is widely used in SCI literature and students should encounter the measure during their entry-level education.
		X	X		

Research Use	**YES**	**NO**	**Comment**
Is this tool appropriate for use in intervention research studies?	X		This tool was primarily designed for use in clinical trials. It can show change, but it can also serve to categorize or classify participants.

Additional information on this measure can be found on The Rehabilitation

Measures Database at: Walking Index For Spinal Cord Injury (WISCI, WISCI II)

References

Burns AS, Chip Coward M, Ditunno Jr JF, Marino RJ. The relationship of ambulatory speed and efficiency to walking index for spinal cord injury (WISCI) level in chronic spinal cord injury (SCI).

Dittuno PL, Ditunno JF, Jr. Walking index for spinal cord injury (WISCI II): Scale revision. *Spinal Cord*. 2001;39:654-656

Ditunno JF, Jr., Barbeau H, Dobkin BH, Elashoff R, Harkema S, Marino RJ, Hauck WW, Apple D, Basso DM, Behrman A, Deforge D, Fugate L, Saulino M, Scott M, Chung J. Validity of the walking scale for spinal cord injury and other domains of function in a multicenter clinical trial. *Neurorehabil Neural Repair*. 2007;21:539-550

Ditunno JF, Jr., Ditunno PL, Graziani V, Scivoletto G, Bernardi M, Castellano V, Marchetti M, Barbeau H, Frankel HL, D'Andrea Greve JM, Ko HY, Marshall R, Nance P. Walking index for spinal cord injury (WISCI): An international multicenter validity and reliability study. *Spinal Cord*. 2000;38:234-243

Jackson AB, Carnel CT, Ditunno JF, Read MS, Boninger ML, Schmeler MR, Williams SR, Donovan WH. Outcome measures for gait and ambulation in the spinal cord injury population. *J Spinal Cord Med*. 2008;31:487-499.

Kim MO, Burns AS, Dittuno JF, Marino RJ. The assessment of walking capacity using the walking index for spinal cord injury: self selected versus maximal levels. *Arch Phys Med Rehabil.* 2007;88:762-767.

Lam T, Noonan VK, Eng JJ, et al. A systematic review of functional ambulation outcome measures in spinal cord injury. *Spinal Cord.* 2008;46:246-254.

Lemay JF, Nadeau S. Standing balance assessment in ASIA D paraplegic and tetraplegic participants: concurrent validity of the Berg Balance Scale. *Spinal Cord*. 2005;48:245-250.

Marino RJ, Scivoletto G, Patrick M, Tamburella F, Read MS, Burns AS, Hauck W, Ditunno Jr J. Walking index for spinal cord injury version 2 (WISCI-II) with repeatability of the 10-m walk time: Inter-and intrarater reliabilities. *American Journal of Physical Medicine & Rehabilitation*. 2010;89:7

Morganti B, Scivoletto G, Ditunno P, Ditunno JF, Molinari M. Walking index for spinal cord injury (WISCI): Criterion validation. *Spinal Cord*. 2005;43:27-33

Scivoletto G, Romanelli A, Mariotti A, Marinucci D, Tamburella F, Mammone A, Cosentino E, Sterzi S, Molinari M. Clinical factors that affect walking level and performance in chronic spinal cord lesion patients. *Spine*. 2008;33:259-264

van Hedel HJ, Wirz M, Dietz V. Assessing walking ability in subjects with spinal cord injury: Validity and reliability of 3 walking tests. *Arch Phys Med Rehabil*. 2005;86:190-196

van Hedel H, Wirz M, Curt A. Improving walking assessment in subjects with an incomplete spinal cord injury: Responsiveness. *Spinal Cord*. 2006;44:352-356

van Hedel HJ, Dietz V, Curt A. Assessment of walking speed and distance in subjects with an incomplete spinal cord injury. *Neurorehabil Neur Rep.* 2007;21:295-301.

van Hedel HJ, Wirz M, Dietz V. Standardized assessment of walking capacity after spinal cord injury: The european network approach. *Neurol Res*. 2008;30:61-73.

Instrument name: Wheelchair Skills Test (WST)	
Reviewers: **Primary: Phyllis Palma, PT, DPT, Rachel Tappan, PT, NCS** Secondary: Christopher Newman, PT, MPT, NCS	**Date of review: 10/21/2012**
ICF domain (check all that apply): _____ Body function/structure ___X___ Activity _____ Participation	

Construct/s measured (check all that apply):

Body structure and Function	Activity	Participation
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers __X_Upper Extremity Function __X_Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories

Category 1 - Acuity	4	3	2	1	Comments
Acute (0-3mo)			X		
Subacute (3-6mo)			X		
Chronic (>6mo)		X			Generally excellent test-retest, interrater and intrarater reliability in people with chronic SCI. One study found poor test-retest reliability in the Safety Subscale, however this was likely related to decreased variability in the data. Adequate validity. Ceiling effect present for Safety Subscale. Rating of 3 related to WST for manual wheelchair users.

					More evidence related to the use of the versions of the WST for people using power wheelchairs and for caregivers is required
Overall Comments:	While there is good support for the WST for manual wheelchair users and people with chronic SCI in the literature, there is little to no data available for the WST forms for power wheelchair users or for caregivers in any population. A questionnaire version of the WST also exists; however, more research is required to establish its psychometric properties. The most recent version is 4.1				
Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)			X		
Motor Incomplete (AIS C and D)			X		
Overall Comments:	While there is good support for the WST for manual wheelchair users and people with chronic SCI in the literature, there is little to no data available for the WST forms for power wheelchair users or for caregivers in any population. In general, studies did not list AIS categories, but these determinations may not be relevant to performance in this domain/construct. The most recent version is 4.1				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula?	**YES**	**NO**	**YES**	**NO**	While it should not be required for SCI-specific entry level curricula due to limited psychometric data, the WST may be a useful teaching tool when instructing students in wheelchair skills.
		X		X	
Research Use	**YES**		**NO**		**Comments**
Is this tool appropriate for use	X				The performance scale of the WST is appropriate for

in intervention research studies?			measuring manual wheelchair skills in people with chronic SCI. It is recommended that further research be done to examine the psychometric properties of the WST as described for people using power wheelchairs and for caregivers.
Additional information on this measure can be found on The Rehabilitation Measures Database at: Wheelchair Skills Test			

References

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Instrument name: Wheelchair User's Shoulder Pain Index (WUSPI)	
Reviewers: **Primary: Rachel Tappan, PT, NCS** Secondary: Eileen Tseng, PT, DPT, NCS	**Date of review:** 3/17/12
ICF domain (check all that apply): __X___ Body function/structure _____ Activity _____ Participation	

Construct/s measured (check all that apply):		
Body structure and Function	**Activity**	**Participation**
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) _X__Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	___Community function ___Domestic Life ___Health and wellness ___Leisure/Recreational activities ___Quality of life ___Reintegration to community ___Self Care ___Social function ___Work ___Other:

Recommendation Categories					
Category 1 - Acuity	**4**	**3**	**2**	**1**	**Comments**
Acute (0-3mo)			X		
Subacute (3-6mo)			X		
Chronic (>6mo)		X			
Overall Comments:	Only one study has been performed on the WUSPI in people with acute SCI. All other research has been with people with chronic injuries.				
Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**

Motor Complete (AIS A and B)		X			
Motor Incomplete (AIS C and D)		X			
Overall Comments:	Most of the research on the WUSPI does not indicate specific information about severity of injury. However, this measure is appropriate only for people who are wheelchair users in either category.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	The specific nature of this tool makes it appropriate for a subgroup of people with SCI (people with shoulder pain related to wheelchair use). More general pain measures have been recommended for exposure.
		X		X	

Research Use	**YES**	**NO**	**Comments**
Is this tool appropriate for use in intervention research studies?	X		The WUSPI is a unique outcome measure specific to shoulder pain in people who use wheelchairs as a primary means of locomotion. Further research recommended, particularly for acute and subacute populations.

Additional information on this measure can be found on The Rehabilitation Measures Database at: Wheelchair Users Shoulder Pain Index

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Instrument name: World Health Organization Quality of Life-BREF (WHOQOL-BREF)	
Reviewers: **Primary: Rachel Tappan, PT, NCS** Secondary: Eileen Tseng, PT, DPT, NCS	**Date of review:** 5/2/12
ICF domain (check all that apply): _____ Body function/structure _____ Activity __X___ Participation	

Construct/s measured (check all that apply):

Body structure and Function	Activity	Participation
___Aerobic capacity/endurance ___Cardiovascular/pulmonary status ___Coordination (non-equilibrium) ___Motor Function/Strength ___Muscle tone (spasticity, spasms) ___Pain ___Range of motion ___Somatosensation ___Other:	___Activities of Daily Living ___Balance/falls ___Bed Mobility ___Gait (include stairs) ___High Level mobility ___Transfers ___Upper Extremity Function ___Wheelchair Mobility/skills ___Other:	_X__Community function _X__Domestic Life _X__Health and wellness _X__Leisure/Recreational activities _X__Quality of life ___Reintegration to community _X__Self Care _X__Social function _X__Work _x__Other: Environmental Factors (one of the Contextual Factors in the ICF model)

Recommendation Categories

Category 1 - Acuity	4	3	2	1	Comments
Acute (0-3mo)			X		
Subacute (3-6mo)			X		
Chronic (>6mo)	X				
Overall Comments:	The WHOQOL-BREF has been validated in a wide variety of populations. While the WHOQOL-BREF is not specific to people with SCI, it has been found to have excellent reliability and adequate to excellent validity in people with chronic SCI with little ceiling and floor effects. There is also some evidence suggesting				

	that it is responsive in people with chronic SCI.				
Category 2 Complete vs. Incomplete	**4**	**3**	**2**	**1**	**Comments**
Motor Complete (AIS A and B)	X				
Motor Incomplete (AIS C and D)	X				
Overall Comments:	The WHOQOL-BREF has been validated in a wide variety of populations. While the WHOQOL-BREF is not specific to people with SCI, it has been found to have excellent reliability and adequate to excellent validity in people with complete and incomplete SCI with little ceiling or floor effects. There is also some evidence suggesting that it is responsive in people with SCI.				

Entry-Level Criteria	**Students should learn to administer tool**		**Students should be exposed to tool (e.g. to read literature)**		**Comments**
Should this tool be required for entry level curricula, specific to SCI content?	**YES**	**NO**	**YES**	**NO**	Reliable and valid QOL measure in multiple populations, including SCI.
		X	X		

Research Use	**YES**	**NO**	**Comments**
Is this tool appropriate for use in intervention research studies?	X		

Additional information on this measure can be found on The Rehabilitation Measures Database at: World Health Organization Quality of Life-BREF (WHOQOL-BREF)

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