CANADIAN STROKE BEST PRACTICE RECOMMENDATIONS

MOOD, COGNITION AND FATIGUE FOLLOWING STROKE

Table 3A: Summary of Selected Validated Screening and Assessment Tools for Post-Stroke Fatigue

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This table provides a summary of the psychometric properties of a selected set of screening and assessment tools that have been validated for use in persons following stroke, or frequently reported in the stroke literature. This list is not exhaustive, rather it highlights the more commonly used and validated tools. It is recommended that these tools be considered as first line options for all stroke services.

Assessment Tool and Link	# of Items	Response Format	Total Score	Stroke-specific reliability/validity	Interpretation of Scores*	Sensitivity/Specificity for PSF
Fatigue Severity Scale (FSS) http://www.scireproject.com/sites/default/files/worksheet_fatigue_severity_scale_fss.docx	9	Self-report Each item is scored on a scale from 1 (disagree) to 7 (agree) with each statement	9-63	**Internal consistency**: Nadarajah et al. 2017 found that the FSS had excellent internal consistency for both stroke patients and healthy controls (Cronbach's α > 0.90). Likewise, Ozyemisci-Taskiran et al. (2019) found similar results with a Cronbach's α or 0.93. **Test-retest reliability:** The FSS scale demonstrated excellent for both stroke and healthy controls with interclass coefficient (ICC) of 0.93 (95% CI: 0.88 to 0.96) and 0.93 (95% CI: 0.82 to 0.94), respectively. **Criterion validity:** Lerdal et al. (2011) found that the SFF has adequate criterion validity with a Cronbach's α of 0.86. **Concurrent Validity**: Nadarajah et al. (2017) found that the FSS scale had good concurrent validity with the VAS-Fatigue (all r > 0.60, p < 0.01) and moderate validity with the SF36-vitatlity scale (r = 0.32, p = 0.02) *Lerdal et al. found that items 1 and 2 in the FSS should not be used in a mean score, and that a seven item FSS (FSS-7) demonstrated better validity and reliability, and likely more sensitive for measuring change in fatigue. Ozyemisci-Taskiran, et al. (2019) however, found that the ICC values for individual items of the FSS were good expect for item 6.	A score of ≥36 is suggestive of the need for further assessment	There are no studies examining the sensitivity and specificity of the FSS in the stroke population. Anton et al. found that among male patients with motor complete SCI in tertiary care, the area under the curve (AUC) was 0.80. Assuming a FSS cut-score of 4 to indicate significant fatigue and a WAS-F score of over 6 to indicate severe fatigue: • Sensitivity = 75% • Specificity = 67%

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Multidimensional Fatigue Symptom Inventory (MFSI)	83	Self report Each item is rated on a 5-point scale indicating how true each statement was for the respondent during the last week (0=not at all; 4=extremely).	0-332	**Internal consistency:** Among stroke patients, the MFSI demonstrated a Cronbach's α of 0.91 and 0.93 for first and second interviews, respectively. (Mead et al. 2007) **Test-retest reliability:** Among stroke patients, the MSFI demonstrated moderate to good test-retest reliability across scale items, with Kappa (*k)* ranging from 0.48 (95% CI: 0.27 to 0.69) to 0.69 (95% CI: 0.53 to 0.85) (Mead et al. 2007). For total score, the ICC was 0.76 (95% CI: 0.55 to 0.87) **Interrater reliability:** Among stroke patients, The MSFI demonstrated very good interrater reliability across scale items with *k* ranging from 0.82 (85% CI: 0.63 to 1.00) to 0.92 (95% CI: 0.83 to 1.00). For total score, the ICC was 0.88 (95% CI: 0.78 to 0.93) **Convergent construct validity:** Among stroke patients, the convergent construct validity of the MFSI was high. The construct validity for MFSI was higher was when measured against the SF-36v2 (r= -0.47, p <0.001)	Higher scores indicate more fatigue	There are no studies examining the sensitivity and specificity of the MFSI in the stroke population. Stein et al. (1998) found that the MFSI was sensitive to fatigue, accurately discriminating cancer patients from control subjects and between patients with varying levels of performance status.
SF-36v2	36	35 items are rated on a Likert scale with varying number of response categories. Vitality component is used to measure fatigue in stroke patients	0-100%	**Internal consistency:** Among stroke patients, the SF36v2 demonstrated a Cronbach's α of 0.76 and 0.78 for first and second interviews, respectively. (Mead et al. 2007) **Test-retest reliability:** Among stroke patients, the SF36v2 demonstrated fair to moderate test-retest reliability across scale items, with *k* ranging from 0.35 (95% CI: 0.07 to 0.63) to 0.47 (95% CI: 0.25 to 0.70) (Mead et al.2007). For total score, the ICC was 0.51 (95% CI: 0.27 to 0.69)	Higher vitality indicates less fatigues	There are no studies examining the sensitivity and specificity of the SF-36v2 in the stroke population.

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		(Dorman et al.1999)		**Interrater reliability:** Among stroke patients, The SF36v2 demonstrated good to very good interrater reliability across scale items with *k* ranging from 0.72 (85% CI: 0.45 to 0.99) to 0.89 (95% CI: 0.75 to 1.00). For total score, the ICC was 0.92 (95% CI: 0.86 to 0.96) **Convergent construct validity:** Among stroke patients, the convergent construct validity of the SF-36v2 was high. The construct validity was lower when compared against the FAS (r = -0.41, p = 0.003) and the MFSI (r = -0.47, p <0.001)		
Profile of Mood States-fatigue subscale (POMS-fatigue)	7	Self-report Items are rated on a 5-point Likert scale indicating how one has been feeling during the past week, including today (0 = not at all; 4 = extremely)	0-28	**Internal consistency:** Among stroke patients, the POMS-Fatigue demonstrated a Cronbach's α of 0.89 and 0.88 for first and second interviews, respectively. (Mead et al. 2007) **Test-retest reliability:** Among stroke patients, the MSFI demonstrated moderate to good test-retest reliability across scale items, with Kappa (*k*) ranging from 0.45 (95% CI: 0.19 to 0.72) to 0.61 (95% CI: 0.42 to 0.80) (Mead et al.2007). For total score, the ICC was 0.74 (95% CI: 0.56 to 0.85) **Interrater reliability:** Among stroke patients, The MSFI demonstrated good to very good interrater reliability across scale items with *k* ranging from 0.71 (85% CI: 0.45 to 0.97) to 0.89 (95% CI: 0.75 to 1.00). For total score, the ICC was 0.84 (95% CI: 0.72 to 0.91) **Convergent construct validity:** Among stroke patients, the convergent construct validity of the POMS-fatigue was high. The construct validity was higher was	Higher scores on the POMS-fatigue reflect a greater agreement with the mood state during the past week.	There are no studies examining the sensitivity and specificity of the FSS in the stroke population.

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				when measured against the SF-36v2 (r= -0.58, p <0.001) (Mead et al.2007). The POMS-fatigue has been found to be correlated with other measures of fatigue including the Functional Assessment of Cancer Therapy fatigue subscale (r=-0.74 p<0.05), the revised Piper Fatigue Scale (r=0.75, p=0.01) ad the Lee Fatigue Scale (r=0.78, p<0.01) (Yellen et al 1997; Lee et al. 1991) *Systematic review of fatigue questionnaires in across multiple disease states recommended the use of POMS-F for the stroke population (Elbers et al.2012)		
Fatigue Assessment Scale (FAS)	10 items	Self report Each item is answered using a five-point Likert scale ranging from 1 (never) to 5 (always). Items 4 and 10 are reverse-scored	Total scores range from 10 to 50	**Internal consistency:** Among the non-stroke population, scale developer Michielsen et al. (2003) found then internal consistency to be 0.90. Among stroke patients, Cronbach's α for first and second interview were 0.58 and 0.62, respectively (Mead et al. 2007) **Test-Retest reliability:** Among stroke patients, kappa values across scales items ranged from fair to good, with a interclass correlation coefficient for total test-retest of 0.77 (95% CI: 0.62 to 0.86). (Mead et al.2007) **Concurrent validity:** Results of the scale correlated highly with the fatigue-related subscales of the Checklist Individual Strength among non-stroke patients. (Michielsen et al.2003) **Convergent construct validity:** Construct validity was ranged from fair to good against the SF-36v2 (r=-0.41, p=0.003), POMS (r=0.59, p < 0.001) and MFSI (r=0.71, p < 0.001)	The low score of 10 is indicative of the lowest level of fatigue, and 50 indictive of the highest level of fatigue. No potential cut-off for fatigue was noted in the original development of the scale. (Michielsen et al. 2003) A cut-off score of ≥24 is proposed for classifying post-stroke fatigue (Cummings et al.2017) FAS-3: With a possible range of 3 to 15, a cut-off score of ≥8 is indicative of post-stroke fatigue.	Among stroke patients, using a cut-off score of ≥24 yielded an area under the curve (AUC) of 0.83 (95% CI: 0.71 to 0.94) with a sensitivity and specificity of 0.84 and 0.67, respectively. (Cummings et al.2017) **FAS-3** At a cut-off of ≥8, AUC was 0.81 (95% CI: 0.73 to 0.89) with a sensitivity and specificity of 0.83 and 075, respectively. (Cummings et al. 2017)

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				FAS-3 Post hoc analysis of the scale among stroke patients found that 3 scale items were most predictive of fatigue: "I am bothered by fatigue"; "I get tried very quickly"; and "Physically, I feel exhausted." The FAS-3 score was derived by aggregating the scores on these items. (Cummings et al. 2017)		

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