MEASURING ONCOLOGY NURSING-SENSITIVE PATIENT OUTCOMES:
MEASUREMENT SUMMARY

FATIGUE

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Table(s) of tools to measure oncology nursing-sensitive patient outcome: Fatigue

These tables include tools specifically designed to measure fatigue in which there was evidence of reliability and validity in oncology patients. It does not include items or subscales from other multi-dimensional symptom or quality of life scales such as the Profile of Mood States, Symptom Distress Scale, Brief Symptom Inventory, or Functional Assessment of Cancer Therapy.

Table A. Description of Tools

Name of tool	Author/Year	Domains or Factors	# of Items	Scaling	Scoring	Language
Brief Fatigue Inventory (BFI)	Mendoza et al., 1999	Severity and impact of fatigue	9	0–10 11-point Likert scale	A global fatigue score can be obtained by averaging all the items on the BFI Severity of fatigue: sum of three items Impact of fatigue: sum of six items	English, German, Japanese, Chinese-Taiwan version
Cancer Fatigue Scale	Okuyama et al., 2000	Physical, affective, and cognitive fatigue	15	1–5 5-point Likert scale	Summed to yield three subscale scores	Japanese, English, Persian
Cancer-Related Fatigue Distress Scale	Holley, 2000	Consequences of fatigue that cause distress: physical, social, psychological, cognitive, spiritual	20	0–10 11-point Likert scale	Summed to yield one total distress score	English

Name of tool	Author/Year	Domains or Factors	# of Items	Scaling	Scoring	Language
Fatigue Severity Scale	Krupp, LaRocca, Muir-Nash, & Steinberg, 1989	Impact of fatigue on daily functioning	10	1–7 for nine items 7-point Likert scale One item is 100 mm VAS	A global fatigue severity score can be obtained by mean of nine items. Overall fatigue is measured by the one item VAS.	English
Fatigue Symptom Inventory (FSI)	Hann et al., 1998	Severity, frequency, daily pattern of fatigue, and its perceived interference with quality of life	13	0–10 11-point Likert scale	The inference ratings can be summed to obtain a total perceived interference score.	English
Lee Fatigue Scale	Lee et al., 1991	Fatigue, energy	18	VAS rescaled to 0–10 numeric scale	Subscale and total scores are the sums of items.	English
Multidimensional Assessment of Fatigue	Belza, 1995	Severity, distress, interference, timing	16	14 items are 100 mm VAS, modified to 10-point numerical scale, and two items are multiple choice	Global Fatigue Index, 0–500 (sum the severity and distress items, add the item mean for interference items, add the product of the categorical score on frequency multiplied by 2.5)	English
Multidimensional Fatigue Inventory	Smets, Garssen, Bonke, & De Haes, 1995	General fatigue, physical fatigue, mental fatigue, reduced motivation and reduced activity	20	1–5 5-point Likert scale	Each subscale includes four items; the score of each dimension of fatigue can be obtained by sum of four items.	English, Dutch, Swedish, French
Multidimensional FSI (MFSI)	Stein, Martin, Hann, & Jacobsen, 1998	Principal manifestations of fatigue: rational subscale: global, somatic, affective, cognitive, and behavioral aspects Empirical subscale: general,	83 (MFSI) 30 (MFSI-SF)	0–4 5-point Likert scale	The MFSI can be scored for both the rationally derived and empirically derived scales; each subscale is scored by summing of the items; however, five items in the rationally derived scale need to be	English

Name of tool	Author/Year	Domains or Factors	# of Items	Scaling	Scoring	Language
		physical, emotional, mental, and vigor aspects Short Form (SF): general, physical, emotional, mental, vigor aspects			reversed scored (item 21, 39, 69, 70, 81).	
PedsQL Multidimensional Fatigue Scale Acute Version	Varni et al., 2002	General fatigue, sleep-rest fatigue, cognitive fatigue	18	0–4 5-point Likert scale for child self-report and parent proxy-report	Items are reverse scored and linearly transferred to a 0–100 scale; higher scores indicate less fatigue.	English
Piper Fatigue Scale (Revised)	Piper et al., 1998	Behavioral/severity, affective, sensory, cognitive/mood	22	0–0 11-point numerical self-report, five open-ended	Responses are averaged for subscale and total scores.	English
Rhoten Fatigue Scale	Rhoten, 1979	Fatigue	1	11-point self-rating graphic VAS with verbal anchors on each end	Single item	English
Schwartz Cancer Fatigue Scale (revised)	Schwartz & Meek, 1999	Physical and perceptual fatigue	6	1–5 5-point Likert scale	Each subscale (three items) is summed; total sum ranges from 6–30.	English

Table B. Psychometric Properties of Tools

Name of Tool	Populations*	Reliability and Validity	Sensitivity	Clinical Utility	Comment
Brief Fatigue Inventory (BFI)	1. 305 adult inpatients and outpatients with a variety of cancer diagnosis and 290 healthy group, 81% Caucasian (Mendoza et al., 1999) 2. 252 adults with a variety of cancer diagnosis in outpatient clinics in Japan (Okuyama et al., 2003) 3. 22 adults with chronic cancer-related and 95 noncancer-related pain treated in a tertiary pain center in Germany (Radbruch et al., 2003)	*Reliability* 1.Internal consistency: Cronbach's alpha coefficient = 0.89 to 0.96 (Mendoza et al., 1999; Okuyama et al., 2003; Radbruch et al., 2003) 2. Test-retest: r = 0.79 to 0.91 (Radbruch et al., 2003) *Validity* 1. Construct: factor analysis verified it is one factor (Mendoza et al., 1999; Okuyama et al., 2003; Radbruch et al., 2003) 2. Convergent: FACT (anemia subscales) (Mendoza et al., 1999); EORTC Global QOL (r = –.051), POMS depression subscale (r = 0.52) (Okuyama et al., 2003) 3.Convergent validity: correlations with Cancer Fatigue Scale (r = 0.64 to 0.76), POMS fatigue (r = 0.60–0.70) and vigor subscales (–0.23 to –0.28), and EORTC QLQC-C 30 fatigue subscale (r = 0.59 to 0.72) (Okuyama et al., 2003); MIDOS (0.46 to 0.76), SF-36 (r = –0.51 to –0.67), ECOG–PSR (with decreased rating of the performance status both BFI mean scores also did increase)	Patients with cancer reported higher levels of fatigue compared with control group (members of service groups) (Mendoza et al., 1999).	Rapidly identify those patients with clinically significant fatigue, and easy for intervention study to follow up on the impact of interventions on fatigue.	The study found that the optimal cut point for "mild" and "moderate" fatigue severity should be investigated further (Mendoza et al., 1999).

Name of Tool	Populations*	Reliability and Validity	Sensitivity	Clinical Utility	Comment
		(Radbruch et al., 2003)			
Cancer Fatigue Scale	1. 307 adult inpatients and outpatients in Japan 2. 139 adults with disease-free breast cancer in Japan 3. 112 adult women with breast cancer in Iran	*Reliability* 1. Internal consistency: Cronbach's coefficient alpha = 0.84 to 0.94 total and range = 0.79 to 0.92 for subscales 2. Test-retest: r = 0.80 eight days later *Validity* 1. Construct: factor analysis yielded 3 factors with factor loadings > 0.5 depression (consistently), dyspnea and insufficient sleep (inconsistently) predicted fatigue 2. Convergent r = 0.69 with depression and 0.69 with anxiety 3. Convergent: each factor correlated with VAS fatigue r = 0.38 (affective), r = 0.39 (cognitive), r = 0.70 (physical), and 0.67 (total)	Receiving treatment did not significantly predict fatigue	Can be completed in less than two minutes	Psychometric testing not available for English version Hypothesis testing studies used minimal measures of depression, anxiety, and sleep
Cancer-Related Fatigue Distress Scale	1. 221 adult inpatient and outpatients with multiple types of cancer; 89% Caucasian	*Reliability* Internal consistency: Cronbach's alpha coefficient = 0.98 (Holley, 2000) *Validity* 1. Construct validity: factor analysis did not confirm subscales; only one distress scale with factor loadings of 0.59 to 0.91 2. Content validity: index mean =	Pre/post-test study (no control) of a multifaceted restorative intervention showed significant change (n = 20) (Holley & Borger, 2001).	Short and easy to use with clear instructions	Third-grade reading level

Name of Tool	Populations*	Reliability and Validity	Sensitivity	Clinical Utility	Comment
		0.91 with five cancer survivors			
Fatigue Severity Scale (FSS) (Winstead-Fry, 1998)	1. Adult outpatients with a variety of cancer diagnosis from rural residence; 34% had breast cancer, and 79% were newly diagnosed	*Reliability* 1. Internal consistency: Cronbach's alpha coefficient = 0.95 *Validity* 1. Construct validity: factor analysis by using oblique rotation, and verified one factor 2. Convergent validity: Pearson correlation with MAF ($r = 0.74$, $p < 0.05$), VAS-F ($r = 0.37$, $p < 0.05$), and RFS ($r = 0.03$, $p > 0.05$)	No data available	It could be of value for clinical trials.	The population of the original study to develop the scale (Krupp et al., 1989) was notpatients with cancer, and the psychometric properties of the scale are questionable because of the small sample size (25 patients with chronic multiple sclerosis, 29 patients with SLE, and 20 healthy adults) used in its development.
Fatigue Symptom Inventory (FSI)	1. 107 adult women undergoing breast cancer treatment, 88 adult women in post-treatment group, and 50 adult healthy women (Hann et al., 1998) 2. 342 adult patients with a variety of cancer diagnosis in oncology outpatients clinics in four states (Hann, Denniston, & Baker, 2000)	*Reliability* 1. Internal consistency: Cronbach's alpha coefficient: 0.93 to 0.95 (Hann et al., 1998; Hann et al., 2000) 2. Test-retest reliability for cancer patients: r = 0.35 to 0.75 *Validity* 1.Construct validity: differences in fatigue between the active treatment, post-treatment and healthy groups as an indication of the construct validity of the FSI	Patients with breast cancer reported significantly worse fatigue than did healthy women of similar age.	It is good for clinical trial or intervention study to follow severity, frequency, daily pattern of fatigue, and its perceived interference with quality of life.	

Name of Tool	Populations*	Reliability and Validity	Sensitivity	Clinical Utility	Comment
		(Hann et al., 1998) 2. Convergent validity: correlation with POMS-Fatigue scale (r = 0.51 to 0.86) for all groups (Hann et al., 1998; Hann et al., 2000) 3. Divergent validity: correlation with SF-36 (–0.52 to –0.77), and MC-20 (–0.03 to –0.27) (Hann et al., 1998) correlation with CES-D (0.37 to 0.63), and SLDS-C (–0.46 to –0.61) (Hann et al., 2000)			
Lee Fatigue Scale (LFS)	1. 75 healthy adult patients, 57 patients with sleep disorders (Lee et al., 1991) 2. 210 adult patients, mostly Caucasian, with a variety of cancer diagnosis receiving cancer therapy (Meek, 2000) 3. 24 adult patients, mostly Caucasian, with a variety of cancer diagnosis, receiving outpatient RT for bone metastases (Miaskowski & Lee, 1999) 4. 131 adults in a rural setting with a variety of cancer diagnoses, most	*Reliability* 1. Internal consistency: Cronbach's alpha coefficient: 0.91 to 0.96 (Lee et al., 1991; Meek et al., 2000; Miaskowski & Lee, 1999) 2. Test-retest reliability: 0.47 (fatigue) and 0.77 (energy) (Meek et al., 2000) *Validity* 1. Construct: factor analysis yielded three factors rather than two (Meek et al., 2000) (Winstead-Fry, 1998) 2. Convergent: correlated with RFS (r = 0.80), MAF (r = 0.42), and FSS (r = 0.37) (Winstead-Fry, 1998); energy subscale correlated with POMS vigor (r = 0.56) and POMS fatigue (r = –0.73); fatigue	Able to detect differences in fatigue attributable to sampling times of day	Easy, reliable, sensitive to time of day changes	

Name of Tool	Populations*	Reliability and Validity	Sensitivity	Clinical Utility	Comment
	were newly diagnosed (Winstead-Fry, 1998)	subscale correlated with POMS fatigue (0.70) and POMS vigor (–0.59); correlated with Stanford Sleepiness Scale: energy (r = –0.83) and fatigue (r = 0.73) (Lee et al., 1991)			
Multidimensional Assessment of Fatigue (MAF)	1. 133 outpatient adults with arthritis, mostly Caucasian women, (Belza et al., 1993) 2. 51 outpatient adults with arthritis, mostly Caucasian women and 46 healthy adults, mostly Caucasian women (Belza, 1995) 3. 131 adults in a rural setting with a variety of cancer diagnoses, (Winstead-Fry, 1998) 4. 210 adult patients with a variety of cancer diagnosis, mostly Caucasian, receiving cancer therapy (Meek et al., 2000)	*Reliability* 1. Internal consistency coefficient = 0.93 (Belza, 1995; Belza et al., 1993; Winstead-Fry, 1998; Meek et al., 2000) 2. Test-retest reliability: N = 0.47 to 0.73 (Belza, 1995) and 0.87 (Meek et al., 2000) *Validity* 1. Construct: factor analysis did not support 4 factors (Winstead-Fry, 1998; Meek et al., 2000) 2. Convergent: correlated with POMS fatigue (r = 0.78 to 0.84) and vigor (r = –0.60 to –0.62) subscales (Belza, 1995; Belza et al., 1993); correlated with LFS (r = 0.42) and FSS (r = 0.74) (Winstead-Fry, 1998)	Not able to detect small changes in fatigue	Lower completions rates (85%) and more complex scoring	
Multidimensional Fatigue Inventory (MFI-20)	1.111 adult patients receiving radiotherapy in outpatient clinic, 357 patients with the chronic fatigue syndrome, 481 psychology students,	*Reliability* 1.Internal consistency: mean Cronbach's alpha coefficient was 0.84 (range: 0.53 to 0.93) for the Dutch version (Smets et al., 1995); Cronbach's alpha	Responsiveness: small effect size (0.32) (Meek et al., 2000)	In clinical setting, many professionals could benefit from this scale in assessing multidimensional fatigue.	The variation of internal consistency Cronbach's alpha of English version (0.43–0.94); the scale needs more

Name of Tool	Populations*	Reliability and Validity	Sensitivity	Clinical Utility	Comment
	158 medical students, 316 army recruits and 46 junior physicians in the Netherlands (Smets et al., 1995) 2. Adult outpatients with a variety of cancer diagnoses in rural Iowa (Schneider, 1998) 3. Adult inpatients and outpatients with a variety of cancer diagnoses (Meek et al., 2000)	coefficient ranged from 0.43 to 0.94 for the English version (Meek et al., 2000; Schneider, 1998) 2. Test-retest reliability: r = 0.76 (total); 0.50 to 0.72 (subscales) (Meek et al., 2000) *Validity* 1.Determined the dimensional structure: using confirmatory factor analyses (LISREL's unweighted least squares method); the hypothesized five-factor model appeared to fit the data in all samples tested (AGFIs > 0.93) (Smets et al., 1995); factor analysis through the use of principle component extraction Varimax rotation, and showed five factors explained 74.2% variance (Meek et al., 2000) 2.Construct validity was established after comparisons between and within groups, assuming differences in fatigue based on differences in circumstances and/or activity level (Smets et al., 1995) 3.Convergent validity: was investigated by correlating the MFI-scales with a VAS measuring fatigue (0.22 < r <			psychometric testing in English.

Name of Tool	Populations*	Reliability and Validity	Sensitivity	Clinical Utility	Comment
		0.78) (Smets et al., 1995); correlation with the RFS, and the range from 0.44–0.59 (Schneider, 1998)			
Multidimensional Fatigue Symptom Inventory (MFSI)	5 adult patients with breast cancer and 70 healthy women in an oncology inpatient and outpatient clinic (Stein et al., 1998)	*Reliability* 1.Internal consistency: Cronbach's alpha coefficient: for rationally derived scales: 0.87 to 0.92; for empirically derived scales: 0.85 to 0.96 (Stein et al., 1998) 2.Test-retest reliability: N = 0.54 to 0.68 (rationally derived scales); r = 0.51 to 0.70 (empirically derived scales) (Stein et al., 1998) *Validity* 1.Convergent validity: correlation with the POMS–Fatigue subscale (r = 0.62 to 0.89; –0.59 for vigor scale) and SF-36 vitality scale (r = –0.45 to –0.80; 0.64 for vigor scale) 2. Convergent validity: positive correlation with anxiety (STAI) (0.51 to 0.80; –0.66 for the vigor scale), depression (CES-D) (0.61 to 0.80, –0.65 for the vigor scale) 3. Discriminant validity: negative with MC-20 (a measure of a social desirability) (r = –0.13 to –0.30) (Stein et al., 1998)	Significant differences were found between the patient group and the comparison subjects: 1. rationally derived scales: global fatigue, behavior symptoms, and somatic symptoms; 2. empirically derived scales: general fatigue, physical fatigue, emotional fatigue, and vigor	It contains no reference to any medical diagnosis or illness; it can also be administered to other healthy individuals who experience fatigue.	The sample in testing psychometric properties was all women. Further study in men is needed.
PedsQL	1. 220 children with a	*Reliability*	No studies have	Reliable, valid, and	

Name of Tool	Populations*	Reliability and Validity	Sensitivity	Clinical Utility	Comment
Multidimensional Fatigue Scale Acute Version (Varni et al., 2002)	variety of childhood cancers, on or off therapy in a variety of settings, and 338 parents; ethnically diverse sample; 105 healthy children and 157 parents; ethnically diverse sample (Varni et al., 2002)	1. Internal consistency: Cronbach's alpha coefficient was 0.67 to 0.94 (Varni et al., 2002) 2. Test-retest reliability not available *Validity* 1. Construct: total score and subscale scores demonstrate differences between healthy children and children with cancer	used this tool as an outcome measure for fatigue.	feasible tool to measure fatigue in patients aged 2– 18 years.	
Piper Fatigue Scale (Revised)	1. Multiple studies with samples of mostly women with breast cancer, predominantly Caucasian, receiving outpatient therapy 2. Sample included 4 women with ovarian cancer receiving inpatient chemotherapy (Payne, 2002) 3. 12 adults with melanoma receiving biochemotherapy (Fu, 2002) 4. 74 adults with lung cancer receiving outpatient RT (Beach et al., 2001)	*Reliability* 1. Internal consistency: Cronbach's alpha coefficient ranges from 0.80 (Berger et al., 2000) to 0.99 (Berger et al., 1998) *Validity* 1. Construct: factor analysis verified 4 factors (Piper et al., 1998) 2. Convergent: correlated with Fatigue Symptom Checklist (r = 0.55) and fatigue subscale of POMS (r = 0.42) (Mock et al., 1997)		Fairly long for routine clinical use	
Rhoten Fatigue Scale	1. 77 adults with lung and breast cancer, racially diverse, receiving	*Reliability* 1. Test-retest not reported	Did not show a difference between control	Very easy to use	

Name of Tool	Populations*	Reliability and Validity	Sensitivity	Clinical Utility	Comment
	inpatient or outpatient therapy (Blesch et al., 1991) 2. 12 healthy women and 12 women with ovarian cancer receiving inpatient or outpatient chemotherapy (Pickard-Holley, 1991) 3. 131 adults in a rural setting with a variety of cancer diagnoses (Winstead-Fry, 1998)	*Validity* 1. Construct: did not show a difference between control group and patient group (Pickard-Holley, 1991) 2. Convergent: correlated with the POMS fatigue subscale (r = 0.636) (Blesch et al., 1991); correlated with the Lee Fatigue Scale (r = 0.80) (Winstead-Fry, 1998)	and patient group		
Schwartz Cancer Fatigue Scale (SCFS-revised)	1. 303 adults with varying types of cancer; 157 were receiving treatment and 146 had completed treatment (Schwartz & Meek, 1999)	*Reliability* 1. Internal consistency: Cronbach's coefficient alpha = 0.90 to 0.92 for total scale; .088 for the physical subscale and 0.81 for the perceptual subscale *Validity* 1. Construct validity: factor analysis supported a revision as original structure not supported; 2-factor solution factor loadings > 0.73; Goodness of Fit Index = 0.92 2. Content validity: established with patients and nurse experts 3. Convergent validity: with POMS fatigue, Lee Fatigue, and MAF	Significant difference between participants undergoing treatment and those who had completed treatment Significant decrease in fatigue for exercisers vs. nonexercisers	Brief, easy to use	Has been delivered using computer interface Original framed within past two to three days

Note: BDS = Beck Depression Scale; CES-D = Center for Epidemiological Studies-Depression Scale; ECOG-PSR = Eastern Collaborative Oncology Group Performance Status Rating; EORTC QOL-C 30=European Organization for Research and Treatment of Cancer QLQ-C 30; FACT = Functional Assessment of Cancer Therapy; FACIT = Functional Assessment of Chronic Illness Therapy; MAF = Multidimensional

Assessment of Fatigue scale; MC-20 = Marlowe-Crowne Social Desirability Scale; MODIS = minimal documentation system; PANAS = trait version of the Positive and Negative Affect Scale; POMS = Profile Of Mood States; QOL = quality of life; RFS = Rhoten Fatigue Scale; SF-36 = Short Form SF-36 Quality-of Life Questionnaire; SLDS-C = Satisfaction with Life Domains Scale-Cancer; STAI = State-Trait Anxiety Inventory; VAS = Visual Analog Scale; VAS-F = Visual Analog Scale-Fatigue.

7. References Related to Specific Instruments to Measure Fatigue

Brief Fatigue Inventory (BFI)

Mendoza, T. R., Wang, X. S., Cleeland, C. S., Morrissey, M., Johnson, B. A., Wendt, J. K., & Huber, S. L. (1999). The rapid assessment of fatigue severity in cancer patients: Use of the Brief Fatigue Inventory. *Cancer, 85,* 1186–1196.

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Cancer Fatigue Scale (CFS)

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Cancer-Related Fatigue Distress Scale

Holley, S., & Borger, D. (2001). Energy for Living With Cancer®: Preliminary findings of a cancer rehabilitation

group intervention study. *Oncology Nursing Forum, 28,* 1393–1396. Oncology Nursing Forum

Holley, S. K. (2000). Evaluating patient distress from cancer-related fatigue: An instrument development study. *Oncology Nursing Forum, 27,* 1425–1431. Oncology Nursing Forum

Fatigue Severity Scale (FSS)

Krupp, L. B., LaRocca, N. G., Muir-Nash, J., & Steinberg, A. D. (1989). The Fatigue Severity Scale. Application to patients with multiple sclerosis and systemic lupus erythematosus. *Archives of Neurology, 46,* 1121–1123.

Winstead-Fry, P. (1998). Psychometric assessment of four fatigue scales with a sample of rural cancer patients. *Journal of Nursing Measurement, 6*(2), 111–122.

Fatigue Symptom Inventory (FSI)

Hann, D. M., Denniston, M. M., & Baker, F. (2000). Measurement of fatigue in cancer patients: Further validation of the Fatigue Symptom Inventory. *Quality of Life Research, 9,* 847–854.

Hann, D. M., Jacobsen, P. B., Azzarello, L. M., Martin, S. C., Curran, S. L., Fields, K. K., et al. (1998). Measurement of fatigue in cancer patients: Development and validation of the Fatigue Symptom Inventory. *Quality of Life Research, 7,* 301–310.

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with cancer patients. *Cancer Practice, 6*(3), 143–152.

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Lee Fatigue Scale

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Multidimensional Fatigue Inventory (MFI-20)

Meek, P. M., Nail, L. M., Barsevick, A., Schwartz, A. L., Stephen, S., Whitmer, K., et al. (2000). Psychometric testing of fatigue instruments for use with cancer patients. *Nursing Research, 49,* 181–190.

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Multidimensional Fatigue Symptom Inventory (MFSI)

Stein, K. D., Martin, S. C., Hann, D. M., & Jacobsen, P. B. (1998). A multidimensional measure of fatigue for use with cancer patients. *Cancer Practice, 6,* 143–152

PedsQL

Varni, J. W., Burwinkle, T. M ., Katz, E. R., Meeske, K., & Dickinson, P. (2002) The PedsQL in pediatric cancer: Reliability and validity of the Pediatric Quality of Life Inventory Generic Core Scales, Multidimensional Fatigue Scale, and Cancer Module. *Cancer, 94*, 2090–2106

Piper Fatigue Scale

Beach, P., Siebeneck, B., Buderer, N.F., & Ferner, T. (2001). Relationship between fatigue and nutritional status in patients receiving radiation therapy to treat lung cancer. *Oncology Nursing Forum, 28*, 1027–1040. Oncology Nursing Forum

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