MEASURING ONCOLOGY NURSING-SENSITIVE PATIENT OUTCOMES:
EVIDENCE-BASED SUMMARY

1. **Outcome:** Fatigue

2. **Category:** Symptoms

3. **Definitions:**

Fatigue is a sensation of tiredness and should be approached as a self-perceived state (Nail, 2002).

Fatigue is a common, persistent, and subjective sense of tiredness related to cancer or to treatment for cancer that interferes with usual functioning (Mock et al., 2000).

ICD-10 Criteria for Cancer-Related Fatigue
Six (or more) of the following symptoms have been present every day or nearly every day during the same two-week period in the past month, and at least one of the symptoms is (A1) significant fatigue.

A1. Significant fatigue, diminished energy, or increased need to rest, disproportionate to any recent change in activity level
A2. Complaints of generalized weakness or limb heaviness
A3. Diminished concentration or attention
A4. Decreased motivation or interest to engage in usual activities
A5. Insomnia or hypersomnia
A6. Experience of sleep as unrefreshing or nonrestorative
A7. Perceived need to struggle to overcome inactivity
A8. Marked emotional reactivity (e.g., sadness, frustration, irritability) to feeling fatigued
A9. Difficulty completing daily tasks attributed to feeling fatigued
A10. Perceived problems with short-term memory
A11. Postexertional malaise lasting several hours
B. The symptoms cause clinically significant distress or impairment in social, occupational, or other important areas of functioning

C. There is evidence from the history, physical examination, or laboratory findings that the symptoms area a consequence of cancer or cancer therapy.

D. The symptoms are not primarily a consequence of comorbid psychiatric disorders such as major depression, somatization disorder, somatoform disorder, or delirium (Cella, Peterman, Passik, Jacobsen, & Breitbart, 1998, p. 374).

References for Definitions:

Cella, D., Peterman, A., Passik, S., Jacobsen, P., & Breitbart, W. (1998). Progress toward guidelines for the management of fatigue. *Oncology, 12,* 369–377.

Mock, V., Atkinson, A., Barsevick, A., Cella, D., Cimprich, B., Cleeland, C., et al. (2000). NCCN practice guidelines for Cancer related fatigue. *Oncology, 14*(11A), 151–161.

Nail, L. M. (2002). Fatigue in patients with cancer. *Oncology Nursing Forum, 29,* 537–546.

4. Integrative Reviews and Meta-Analysis

Reviews Related to Fatigue and Its Management

This list includes systematic reviews of fatigue in cancer that clearly identified the search strategy. All reviews were published since 2000. It does not include clinical articles, tutorials, or book chapters.

Ahlberg, K., Ekman, T., Gaston-Johansson, F., & Mock, V. (2003). Assessment and management of cancer-related fatigue in adults. *Lancet, 362,* 640–650.

Ancoli-Israel, S., Moore, P. J., & Jones, V. (2001). The relationship between fatigue and sleep in cancer patients: A review. *European Journal of Cancer Care (Engl), 10,* 245–255.

de Jong, N., Courtens, A. M., Abu-Saad, H. H., & Schouten, H. C. (2002). Fatigue in patients with breast cancer receiving adjuvant chemotherapy: A review of the literature. *Cancer Nursing, 25,* 283–297; quiz 298-289.

Nail, L. M. (2002). Fatigue in patients with cancer. *Oncology Nursing Forum, 29*, 537–546. Oncology Nursing Forum

Patrick, D. L., Ferketich, S. L., Frame, P. S., Harris, J. J., Hendricks, C. B., Levin, B., Link, M. P., Lustig, C., McLaughlin, J., Ried, L. D., Turrisi, A. T., 3rd, Unutzer, J., & Vernon, S. W. (2003). National Institutes of Health State-of-the-Science Conference Statement: Symptom management in cancer: Pain, depression, and fatigue, July 15–17, 2002. *Journal of the National Cancer Institute, 95,* 1110–1117

Stasi, R., Abriani, L., Beccaglia, P., Terzoli, E., & Amadori, S. (2003). Cancer-related fatigue: Evolving concepts in evaluation and treatment. *Cancer, 98,* 1786–1801.
Stone, P. (2002). The measurement, causes and effective management of cancer-related fatigue. *International Journal of Palliative Nursing, 8*(3), 120-128.

Reviews With Abstracts

1. Ahlberg, K., Ekman, T., Gaston-Johansson, F., & Mock, V. (2003). Assessment and management of cancer-related fatigue in adults. *Lancet, 362,* 640–650. PubMed Abstract
2. Ancoli-Israel, S., Moore, P. J., & Jones, V. (2001). The relationship between fatigue and sleep in cancer patients: a review. *European Journal of Cancer Care, 10,* 245–255. PubMed Abstract
3. de Jong, N., Courtens, A. M., Abu-Saad, H. H., & Schouten, H. C. (2002). Fatigue in patients with breast cancer receiving adjuvant chemotherapy: A review of the literature. *Cancer Nursing, 25,* 283–297. PubMed Abstract
4. Nail, L. M. (2002). Fatigue in patients with cancer. *Oncology Nursing Forum, 29,* 537–546. PubMed Abstract
5. Patrick, D. L., Ferketich, S. L., Frame, P. S., Harris, J. J., Hendricks, C. B., Levin, B., et al. (2003). National Institutes of Health State-of-the-Science Conference Statement: Symptom management in cancer: Pain, depression, and fatigue, July 15–17, 2002. *Journal of the National Cancer Institute, 95,* 1110–1117. PubMed Abstract
6. Stasi, R., Abriani, L., Beccaglia, P., Terzoli, E., & Amadori, S. (2003). Cancer-related fatigue: Evolving concepts in evaluation and treatment. *Cancer, 98,* 1786–1801. PubMed Abstract
7. Stone, P. (2002). The measurement, causes and effective management of cancer-related fatigue. *International Journal of Palliative Nursing, 8,* 120–128. PubMed Abstract

Reviews Related to Measurement of Fatigue

This list includes systematic reviews of measurement approaches to fatigue in general and fatigue in cancer that clearly identified the search strategy. This includes several reviews published in books. All reviews were published since 2000. It does not include clinical articles or tutorials.

Piper, B. (2004). Measuring fatigue. In M. Frank-Stromberg and S.J. Olsen (Eds.), *Instruments for clinical health-care research* (3rd ed., pp. 538–569). Boston: Jones and Bartlett.
Schwartz, A. H. (2002). Validity of cancer-related fatigue instruments. *Pharmacotherapy, 22,* 1433–1441

Sidani, S. (2003). Symptom management. In D. M. Doran (Ed.), *Nursing-sensitive outcomes:State of the science* (pp. 115–175). Toronto: Jones and Bartlett.

Wu, H. S., & McSweeney, M. (2001). Measurement of fatigue in people with cancer. *Oncology Nursing Forum, 28,* 1371–1384. Oncology Nursing Forum

5. Guidelines and Standards

Mock, V., Atkinson, A., Barsevick, A., Cella, D., Cimprich, B., Cleeland, C., et al. (2000). NCCN practice guidelines for cancer-related fatigue. *Oncology,* 14(11A), 151–161. NCCN Practice Guidelines for Cancer-Related Fatigue

Oncology Nursing Society. (2001). Chemotherapy and biotherapy: Guidelines and recommendations for practice. Pittsburgh, PA:Author.

Oncology Nursing Society. (1998). Manual for radiation oncology nursing practice and education. Pittsburgh, PA: Author.

Rizzo, J.D., Lichtin, A.E., Woolf, S.H., Seidenfeld, J., Bennett, C.L., Cella, D., et al. (2002). Use of epoetin in patients with cancer: Evidence-based clinical practice guidelines of the American Society of Clinical Oncology and the American Society of Hematology. *Blood, 100,* 2303–2320. 2. Use of epoetin in patients with cancer: evidence-based clinical practice guidelines of the American Society of Clinical Oncology and the American Society of Hematology.

Systematic Treatment Disease Site Group. (2003). The role of erythropoietin in the management of cancer patients with non-hematologic malignancies receiving chemotherapy [Practice guideline 12-1]. Toronto: Cancer Care Ontario.. The role of erythropoietin in the management of cancer patients with non-hematologic malignancies receiving chemotherapy.

The following guideline is from *Chemotherapy and Biotherapy Guidelines and Recommendations for Practice* (pp. 226), by K.A. Brown, P. Esper, L.O. Kelleher, J.E. O'Neill, M. Polovich, & J.M. White (Eds.), 2001, Pittsburgh, PA: Oncology Nursing Society.

Fatigue

Monitoring Parameter(s)

- Perform subjective and objective assessment of patient's ability to participate in activities of daily living (performance status).
- Monitor for presence and degree of immobility, sensory deprivation, and depression.

- Monitor for physical signs or symptoms of concurrent health problem(s) (e.g., anemia).

Intervention(s)

- Help the patient employ energy-conservation strategies, including priority setting.
- Help the patient maintain an appropriate level of physical activity.
- Provide optimal fluid intake and nutrition.
- Control pain.
- Correct anemia if it is present.

Comment(s)

- Medications used to alleviate concurrent symptoms (e.g., antiemetics, narcotics) may compound fatigue.

The following guideline is from *Manual for Radiation Oncology Nursing Practice and Education* (2nd ed.) (p. 79), by D.W. Bruner, T.K. Gosselin-Acomb, & M. Haas (Eds.), Pittsburgh, PA: Oncology Nursing Society. Copyright 1998 by the Oncology Nursing Society.

Fatigue

Incidence: An estimated 72%–99% of all patients with cancer experience fatigue

Collaborative Management:

- Teach the patient that fatigue is an expected side effect of radiation therapy (RT). This is the most important intervention; otherwise, the patient may fear that fatigue is a sign of tumor progression.
- Instruct the patient on high-calorie/high-protein diet to maintain proper nutritional intake.
- Instruct the patient to maintain adequate fluid intake to promote waste elimination from body and prevent dehydration.
- Instruct the patient to watch for and report signs and symptoms of infection.
- Ensure that lab work abnormalities, such as anemia and electrolyte imbalances, are treated accordingly.
- Assist the patient with scheduling of treatment time based on fatigue (e.g., treatment at end of day after work or school).
- Reinforce teaching on specific patient strategies to reduce fatigue as described previously.
- Instruct the patient about the importance of exercise to enhance tolerance of cancer treatments.

6. 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 6A. 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
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

Name of tool	Author/Year	Domains or Factors	# of Items	Scaling	Scoring	Language
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, physical, emotional, mental, and vigor aspects Short Form (SF): general, physical, emotional, mental, vigor aspects	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 reversed scored (item 21, 39, 69, 70, 81).	English

Name of tool	Author/Year	Domains or Factors	# of Items	Scaling	Scoring	Language
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 6B. 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) (Radbruch et al., 2003)	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
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 = 0.91 with five cancer survivors	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
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 (Hann et al., 1998)	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
		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 were newly diagnosed	*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 subscale correlated with POMS	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
	(Winstead-Fry, 1998)	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, 158 medical 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 coefficient ranged from 0.43 to 0.94 for the English	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 psychometric testing in English.

Name of Tool	Populations*	Reliability and Validity	Sensitivity	Clinical Utility	Comment
	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)	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 < 0.78) (Smets et al., 1995); correlation with the RFS, and the range from 0.44–0.59 (Schneider, 1998)			

Name of Tool	Populations*	Reliability and Validity	Sensitivity	Clinical Utility	Comment
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 Multidimensional Fatigue Scale Acute Version (Varni et al., 2002)	1. 220 children with a variety of childhood cancers, on or off therapy in a variety of settings, and 338 parents; ethnically	*Reliability* 1. Internal consistency: Cronbach's alpha coefficient was 0.67 to 0.94 (Varni et al., 2002) 2. Test-retest reliability not available	No studies have used this tool as an outcome measure for fatigue.	Reliable, valid, and feasible tool to measure fatigue in patients aged 2– 18 years.	

Name of Tool	Populations*	Reliability and Validity	Sensitivity	Clinical Utility	Comment
	diverse sample; 105 healthy children and 157 parents; ethnically diverse sample (Varni et al., 2002)	*Validity* 1. Construct: total score and subscale scores demonstrate differences between healthy children and children with cancer			
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 inpatient or outpatient therapy (Blesch et al., 1991) 2. 12 healthy women and 12 women with ovarian	*Reliability* 1. Test-retest not reported *Validity* 1. Construct: did not show a difference between control group and patient group (Pickard-Holley, 1991)	Did not show a difference between control and patient group	Very easy to use	

Name of Tool	Populations*	Reliability and Validity	Sensitivity	Clinical Utility	Comment
	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)	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)			
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)

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8. Summary of key evidence that nursing interventions influence this outcome and gaps in current evidence base

This section is based on a review of the integrated reviews published on cancer-related fatigue (see Section 4) and highlights evidence that nursing interventions influence fatigue. Gaps in existing knowledge and recommendations for research are identified.

A. Evidence that nursing interventions influence fatigue

- Aerobic exercise has been shown to reduce fatigue in adult patients receiving a variety of treatments. The most consistent evidence is in women with breast cancer receiving chemotherapy. Limited evidence exists in patients undergoing autologous stem cell transplantation and those receiving interferon. There is limited information about the effectiveness and acceptability of an exercise program designed for patients who already have high levels of fatigue.
- Recombinant human EPO (epoiten alpha) has been shown to increase hemoglobin level, decrease transfusion requirements, and improve self-reported energy and activity in adult patients with anemia secondary to myelosuppressive cancer chemotherapy for nonmyeloid malignancies.There is initial but limited evidence that a nurse-delivered energy conservation and activity management program can produce a modest decrease in fatigue in patients undergoing cancer treatment.
- There is initial but limited evidence that structured education and support interventions may reduce fatigue.
- There is inadequate evidence to support the use of megestrol acetate, prednisone, amifostine, and methylphenidate.
- Evidence regarding treatment of fatigue in children and adolescents, older adults, individuals with cognitive impairment, and individuals from different racial and ethnic groups is insufficient.

B. Gaps in Evidence

Prevalence/Pattern

- Studies indicate that fatigue is a prevalent symptom, but most studies were not systematic and did not use strict diagnostic criteria. The findings are also limited by lack of a healthy comparison group, lack of clarity between incidence and prevalence of fatigue, and lack of diverse samples.

- Fatigue exists at the time of diagnosis as well as during and after treatment. There are no general conclusions about its pattern over time, except that peak fatigue seems to occur in the first few days after chemotherapy.

Assessment/Measurement

- There are no published evaluations of clinical assessment approaches.
- There is limited information with respect to the meaning, effect, and experience of cancer-related fatigue from the patient's perspective.
- There is a lack of an agreed-upon definition of fatigue and approach to measurement among researchers.
- It is not clear how various measurement instruments compare in performance, item overlap, and time sensitivity. Little is known about clinically useful cut-off scores and meaningful change over time.
- There are few established instruments for children and adolescents, older adults, individuals with cognitive impairment, and individuals from different racial and ethnic groups. Most of the instruments related to cancer-related fatigue were developed after 1995; further studies of their psychometric properties in different countries and diverse populations are needed.
- Sufficient evidence exists in regard to pain assessment to support the use of brief rating scales for other symptoms in clinical practice.

Mechanisms/Etiology of Fatigue

- The mechanism of fatigue is poorly understood. Many physiologic and psychosocial factors are likely to contribute to fatigue, such as metabolic imbalances, tumor- and/or treatment-associated features, and psychosocial influences.

Correlates of Fatigue

- Research is inconsistent about the relationship between fatigue and physical movement, stage of disease, type of treatment, biochemical factors (hemoglobin, white blood count), and demographic characteristics (age, gender, marital status, occupation).
- There is a lack of information on the role that coexisting conditions and patient characteristics play in the development of fatigue.
- Preliminary research exists to examine the causes and correlates of postoperative fatigue and to determine the relationship between nutritional status, hydration status, and fatigue.
- Initial research supports the positive correlation between fatigue and daytime inactivity and nighttime restlessness. Limited but consistent research supports the relationship between fatigue and self-reported

sleep. There is inadequate evidence regarding the relationship of objectively measured quality and quantity of sleep and fatigue.

- The phenomenon of radiation-induced fatigue, including etiology and correlates, is poorly understood. It is not clear how the type of biotherapy agent influences the type and pattern of fatigue.
- It is not clear how mental demands associated with a cancer diagnosis and treatment contribute to fatigue.
- The nature of the relationship between fatigue and depression is unclear.

9. Recommendations

Practice

Use the NCCN guidelines for screening, evaluation, and interventions. Screen for fatigue at every encounter on 0–10 scale. For mild fatigue (1–3), provide education plus common strategies to manage fatigue. For moderate (4–6) or severe (7–10) fatigue, complete a primary evaluation and focused history and assess for seven treatable contributing factors (pain emotional distress, sleep disturbance, anemia, nutrition, activity level, comorbidities)

Education

All patients with cancer should receive routine education about fatigue and its management.

All cancer-care providers need ongoing education about the management of cancer-related fatigue.

Research

- Develop instruments and interventions to meet the needs of diverse populations.
- Research is needed on the definition, occurrence, assessment, and treatment of fatigue through adequately funded prospective studies.
- Consider patient characteristics such as age ethnicity, geographical distance from providers, and coexisting conditions in studies of fatigue
- Improve basic descriptive epidemiology of fatigue. Conduct prospective studies with sufficient sample sizes to provide more accurate estimates of incidence and prevalence of fatigue.
- Conduct studies comparing the experience of patients with cancer to healthy normal subjects.
- Develop conceptual models to direct systematic research.
- Explore whether symptoms differ quantitatively and qualitatively between cancer and noncancer populations.Develop mechanism-based classifications of fatigue.
- Reach consensus on a definition and use consistent measures that are reliable and valid

- Evaluate accommodation to symptoms and response shift over time. Include measures of the impact of fatigue on daily functioning.
- Develop and test new treatments to address fatigue, including the mechanisms by which such treatments are effective. Repeat interventional studies to increase the evidence in varying samples of patients.
- Investigate the relationship between fatigue management and adherence to cancer treatment.
- Conduct longitudinal studies including measures prior to surgery.
- Conduct research with adequate sample sizes

10. Links

National Comprehensive Cancer Network http://www.nccn.org/
Cancer Symptoms.org http://www.cancersymptoms.org/symptoms/fatigue/
Guidelines Clearinghouse http://www.guidelines.gov/
American Cancer Society http://www.cancer.org/

11. Current Research Related to Fatigue

ONS Foundation-funded research http://www.ons.org/research/funding/Projects/index.shtml

"Effect of Endurance Exercise on Biobehavioral Outcomes of Fatigue," Sadeeka Al-Majid, PhD, RN, Virginia Commonwealth University
"Fatigue and Physical Activity in Stem Cell Transplant Patients," Eileen Hacker, PhD, RN, AOCN®, University of Chicago
"Sleep, Fatigue, and Enhanced Activity in Children With Cancer," Pamela S. Hinds, PhD, RN, CS, St. Jude Children's Research Hospital

NIH-funded research http://crisp.cit.nih.gov/

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