Fatigue affects as many as 25% to 75% of stroke survivors. This poststroke fatigue (PSF) is often disabling and negatively influences on neurological recovery and patients’ quality of life. There are numerous definitions of PSF, which includes subjective feelings of exhaustion and lack of physical or mental energy that interfere with everyday activity. PSF is associated with both biological and psychocognitive factors. The aim of this article is to provide an overview on PSF assessment, causative factors, treatment interventions, and nursing implications.

Assessment of PSF
Multiple instruments have been used to assess fatigue, none of which are specific to stroke. Commonly used assessment instruments that have been evaluated for patients with stroke are listed in Table 1. For nurses involved in stroke care, the PSF case definition developed by Lynch et al is likely the most useful. Nurses may ask 2 questions to stroke survivors in either the hospital or the community. Patients meet the definition of PSF if since their stroke, the patient has experienced fatigue, a lack of energy, or an increased need to rest every day or nearly every day. In addition, stroke survivors living in the community meet the definition if over the past month, there has been at least a 2-week period when the patient has experienced fatigue, a lack of energy, or an increased need to rest every day or nearly every day. This fatigue has led to difficulty taking part in everyday activities.

Causative Factors Related to PSF
Evidence indicates that PSF is a multifaceted phenomenon associated with many causative mechanisms. Although older adults and females were found to report PSF more frequently than young or male stroke survivors, this was not confirmed by other studies. PSF has been reported to be less common in married (versus single) people and in those living at home (versus living in an institution), whereas another study reported no such relationship. Patients with PSF are more often unemployed and change their jobs than in those without. The cause and effect relationship remains unclear.

Biological Factors

Neurological or Physical Deficits
Overall neurological deficits, motor dysfunction, and speech disturbances (aphasia or severe dysarthria) are related to PSF. The impact may be at least partly attributed to associated depression, especially in the chronic stage.

Medical Comorbidities and Medications
Nurses should pay attention to PSF and identify treatable causes by checking for signs, such as hypotension, arrhythmia, edema, and relevant laboratory test results (e.g., complete blood count, albumin, glucose, renal function, liver function, and tests for infection). Moreover, comorbid medical diseases, such as hypotension, diabetes mellitus, heart failure, and anemia, as well as the drugs used for these conditions, may cause fatigue. Poststroke eating difficulties related to dysphagia, poor attention, and appetite loss can induce malnutrition and may result in PSF. For nutritional deficiency, nurses should be aware of the fact that oral or parenteral high-dose thiamine may improve fatigue. Sleep disturbances in general or daytime sleepiness, which are common in patients with stroke, are reported to be related to PSF. Several studies have found an association between poststroke pain and PSF although this link was not confirmed by others.

Prestroke Fatigue
Prestroke fatigue is closely related to PSF although complete characterization of prestroke fatigue has not been made. Excessive fatigue has been recognized as a risk factor for stroke per se and one study has reported that patients with prestroke fatigue more often had medical comorbidities than those without. Thus, prestroke fatigue may be related to conditions that increase stroke risk, such as diabetes mellitus, congestive heart failure, or subclinical strokes.

Psychocognitive Factors
Depression is also closely related to PSF. Although this relationship may be connected to the inclusion of a fatigue item in depression scales, the relationship is still positive even when studies that used depression scales containing a fatigue item are excluded. However, PSF patients rarely express worthlessness, hopelessness, and suicidal ideation, suggesting that fatigue and depression are separate constructs. Anxiety and cognitive impairment may be the causes of PSF. Nurses should assess carefully the prescription of the patients’ medications and tests for infection). Moreover, comorbid medical diseases, such as hypotension, diabetes mellitus, heart failure, and anemia, as well as the drugs used for these conditions, may cause fatigue. Poststroke eating difficulties related to dysphagia, poor attention, and appetite loss can induce malnutrition and may result in PSF. For nutritional deficiency, nurses should be aware of the fact that oral or parenteral high-dose thiamine may improve fatigue. Sleep disturbances in general or daytime sleepiness, which are common in patients with stroke, are reported to be related to PSF. Several studies have found an association between poststroke pain and PSF although this link was not confirmed by others.

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Other Factors

Damage to the basal ganglia,27 brain stem, and thalamic reticular formation6 have been associated with PSF, possibly by way of altering dopaminergic or adrenergic neurotransmitters. However, most studies failed to find an association between PSF and brain lesion location.13,14 These controversial results may result either from an insufficient number of patients with a lesion involving a particular brain area27 or from multidimensional causes of PSF. It has also been suggested that chronic inflammation and immunologic changes may be related to PSF.28

Pharmacological and Nonpharmacological Interventions

In both the acute and the chronic care settings, numerous multifaceted nursing interventions assist patients to cope and manage PSF. The most prevalent and evidence-based pharmacological and nonpharmacological interventions are listed in Table 2.

Among the pharmacological interventions, tirilazad mesylate, a neuroprotective agent, was reported to be effective in treating fatigue in a randomized trial containing female subarachnoid hemorrhage patients.29 In addition, modafinil, a drug for hypersomnia, was effective in patients with brain stem-diencephalic strokes but not in those with cortical strokes.30 The monoaminergic stabilizer (−)-OSU6162 was reported to relieve PSF in patients with mental fatigue in a nonrandomized study,31 whereas selective serotonin reuptake inhibitors, such as fluoxetine,32 duloxetine, citalopram, and sertraline, were not effective.33

For nonpharmacological interventions, general stroke education, including a fatigue management program, may be beneficial.34,35 An enjoyable movement intervention that was similar to a game was effective in alleviating fatigue in a small study with a nonsynchronized, nonequivalent control group pre and post test design.36 A combination of cognitive-behavioral therapy and graded activity training37 and cognitive-behavioral therapy with mindfulness techniques seem to be effective in alleviating PSF.38 Regular exercise and increasing daily step count in the early stage of stroke were reported to decrease fatigue at 6 and 12 months,39 and walking and water aerobics were perceived by patients as helpful in relieving PSF.40 Therefore, nurses should recommend physical

### Table 1. Poststroke Fatigue Assessment Instruments

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Characteristics and Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatigue Assessment Scale</td>
<td>Short, unidimensional instrument; focused on severity; good psychometric properties7</td>
</tr>
<tr>
<td>Fatigue Impact Scale</td>
<td>Short, unidimensional instrument; focused on impact; good psychometric properties6</td>
</tr>
<tr>
<td>FSS</td>
<td>Commonly used scale in stroke patients; FSS-7 has better psychometric properties than FSS-109,9</td>
</tr>
<tr>
<td>Vitality scale of the 36-item Short Form Multidimensional Fatigue Symptom Inventory general subscale</td>
<td>Subscale with good face validity7</td>
</tr>
<tr>
<td>Fatigue domain from the Profile of Moods States</td>
<td>Comprehensive instrument; good psychometric properties; best face validity7,8</td>
</tr>
</tbody>
</table>

FSS indicates Fatigue Severity Scale.

### Table 2. Interventions for Poststroke Fatigue

<table>
<thead>
<tr>
<th>Author/yr</th>
<th>Methodology/Design</th>
<th>Intervention</th>
<th>Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pharmacological</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ogden/1998</td>
<td>Randomized controlled trial (n=18)</td>
<td>100 mL of 1.5 mg/mL tirilazad mesylate or placebo for 10 d</td>
<td>Effective29</td>
</tr>
<tr>
<td>Choi-Kwon/2007</td>
<td>Double-blind, placebo-controlled trial (n=83)</td>
<td>Fluoxetine 20 mg or placebo daily for 3 mo</td>
<td>Ineffective32</td>
</tr>
<tr>
<td>Brioschi/2009</td>
<td>An open study with an ABA design and no placebo (n=40)</td>
<td>Modafinil; initial dose of 50 mg/d, increased up to 200 mg at 2 mo</td>
<td>Effective30</td>
</tr>
<tr>
<td>Johansson/2012</td>
<td>A double-blind, randomized, crossover design (n=12)</td>
<td>(−)-OSU6162; from 15 to 45 mg BID</td>
<td>Improved mental stamina31</td>
</tr>
<tr>
<td>Karaiskos/2012</td>
<td>An open-label, controlled clinical trial (n=60)</td>
<td>Duloxetine group (60–120 mg/d), citalopram control group (20–40 mg/d), sertraline control group (50–200 mg/d)</td>
<td>All ineffective33</td>
</tr>
<tr>
<td>Costantini/2014</td>
<td>Case study (n=3)</td>
<td>Thiamine 600 mg/d orally (n=2) or 100 mg/wk parenterally (n=1)</td>
<td>All effective38</td>
</tr>
<tr>
<td>Nonpharmacological</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lorig/2001</td>
<td>Longitudinal design as follow-up to a randomized controlled trial (n=1140)</td>
<td>Chronic disease self-management program</td>
<td>Ineffective44</td>
</tr>
<tr>
<td>Clarke/2012</td>
<td>Randomized controlled trial (n=16)</td>
<td>Fatigue Management Group vs General Stroke Education control group</td>
<td>Both groups effective35</td>
</tr>
<tr>
<td>Kim/2012</td>
<td>Nonsynchronized, nonequivalent control group (n=45)</td>
<td>Enjoyable intervention that appeared more like a game or a play</td>
<td>Effective in the experimental group54</td>
</tr>
<tr>
<td>Zedlitz/2012</td>
<td>Randomized, controlled trial (n=68)</td>
<td>A 12-wk cognitive therapy program and graded activity training</td>
<td>Effective37</td>
</tr>
<tr>
<td>Hofer/2014</td>
<td>Preliminary study (n=8)</td>
<td>A mindfulness-enhanced, integrative neuropsychotherapy program</td>
<td>Effective33</td>
</tr>
</tbody>
</table>

ABA design is measurement A followed by B, and A.
exercise for patients with PSF that always take into consideration individualized needs pertaining to their condition, age, and resources.

Disclosures
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References


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