Multiple Sclerosis

Description/Etiology

Multiple sclerosis (MS) is a chronic immune-mediated inflammatory disease of unknown etiology, characterized by demyelination of the white matter of the brain and spinal cord. Clinical manifestations vary, but most patients develop signs and symptoms due to involvement of the motor, sensory, visual, and autonomic systems. Most patients experience fatigue, which can be severe and result in significant disability.

MS can present as one of four clinical types: relapsing-remitting (RRMS), primary-progressive (PPMS), secondary-progressive (SPMS), and progressive-relapsing (PRMS). Patients with RRMS have almost complete recovery between attacks, whereas patients with PPMS experience a steady progression of symptoms, and patients with PRMS experience a steady progression of symptoms interspersed with acute relapses. Patients with SPMS experience severe progression of symptoms later in the disease. Relapses are thought to be the result of demyelination and inflammation of the white matter of the CNS, with subsequent recovery and remyelination. Relapses range from mild to significantly disabling; damage is cumulative with each relapse. Serious complications include aspiration pneumonia due to dysphagia; respiratory failure due to cervical myelopathy or severe demyelination in the brainstem; pneumonia, deep vein thrombosis (DVT), pulmonary embolism, and pressure ulcers due to immobility; and urinary tract infection (UTI) and urosepsis due to neurogenic bladder (i.e., bladder dysfunction secondary to neurologic damage).

There are no diagnostic tests specific for MS; diagnosis is usually based on clinical findings. Imaging studies, CSF analysis, and neurological tests (e.g., visual evoked potentials [VEP]) may be helpful in diagnosis. Treatment is aimed at managing and preventing acute exacerbations and delaying progression of the disease. Medications are prescribed to control symptoms and improve QOL. (For more information, see Treatment Goals, below, and Evidence-Based Care Sheet: Multiple Sclerosis: Drug Therapy.) Physical and/or occupational therapy may be indicated in patients with functional disability. For statistics on prognosis, see Facts and Figures, below. Differential diagnosis includes diseases that manifest similar neurologic symptoms (e.g., optic abnormalities, fatigue, numbness and tingling, lesions on MRI) such as systemic lupus erythematosus, sarcoidosis, Sjogren’s syndrome, Behcet’s disease, Lyme disease, and vitamins and minerals deficiencies (e.g., vitamin B-12, vitamin D, zinc, copper).

Facts and Figures

MS affects an estimated 2.1 million people worldwide, and ~ 400,000 in the United States. The prevalence varies geographically and is generally higher in northern latitudes, and increases when the location is further from the equator in either the northern or southern hemisphere; per 100,000 population, MS affects140 in North America; 108 in Europe, and significantly lower in Sub-Saharan Africa and East Asia at 2.1–2.2. Disease onset is typically between the ages of 20 and 40 years. The average age at diagnosis is 30 years in women, and 31 years in men. The condition affects women more than twice as often as men, but men tend to have a worse prognosis. Approximately 82% of patients with MS have a relapsing-remitting course, and 50%–85% of these patients eventually progress to a secondary progressive course; 5%–10% present with PRMS, and < 5% present with PPMS. If left untreated, more than 30% of patients with MS develop significant disability within
20–25 years. Common causes of death in patients with MS are pneumonia, pulmonary embolism, aspiration, urosepsis, and/or pressure ulcers. Annual healthcare costs for a patient with MS exceed $50,000, which is similar to the costs for treating a patient with heart failure.

Risk Factors
Although the cause of MS is unknown, it is thought to result from the interaction of genetic and environmental factors. Family history is a risk factor for MS; first-degree relatives of patients with MS have a risk that is 7 times the risk in the general population. Concordance among monozygotic twins is 20%–35%. Several major histocompatibility complex (MHC) alleles are associated with increased risk for MS. MS incidence increases with increasing distance from the equator, suggesting that decreased sun exposure, and low vitamin D levels may increase risk. Certain infectious agents, including Epstein-Barr virus, are associated with the development of MS.

Signs and Symptoms/Clinical Presentation
Symptoms vary based on location of the lesions (e.g., brain lesions are associated with depression) and may change throughout the course of the disease. Sensory deficits include numbness and/or tingling in any part of the body, impaired position and vibratory sensation, hypersensitivity to touch and/or pain in 30–50% of the patients, trigeminal neuralgia, and visual disturbances (e.g., visual loss secondary to optic neuritis, scotomata, diplopia, and nystagmus). The patient may also have a positive Lhermitte’s sign (sharp pain down the spine and legs) with neck flexion. Bowel, bladder, and sexual dysfunction include constipation or fecal incontinence, urinary symptoms (e.g., urgency, frequency, and/or incontinence), and impotence in men. Motor deficits include deep tendon hyperreflexia; diminished cremasteric reflex in men (scrotum retracts when skin of inner thigh is touched) and abdominal skin reflex; tremors; clonus; poor coordination; presence of Babinski’s reflex and Hoffman’s sign; spasticity; ataxia; fatigue and dizziness (which 50%–60% of patients cite as one of their most vexing symptoms) and diminished muscle strength; heat intolerance after exposure to high temperatures (e.g., hot weather, intense exercise, hot sowers, fever) with subsequent increased fatigue and weakness; impaired speech; and dysphagia. Cognitive and psychological disorders in MS include impaired memory and attention span, dementia, anxiety, and depression.

Assessment
› Patient History
• Assess onset, duration, and severity of signs and symptoms, including pain and fatigue
› Laboratory Tests That May Be Ordered
• Analysis of CSF aspirated during lumbar puncture will indicate elevated immunoglobulins (IgG), myelin debris, and mildly elevated or normal protein
• Serum levels of vitamin B-12, vitamin D, vitamin E, copper, and zinc may be ordered to rule out deficiencies as the cause for the neurologic pathology
• Complete blood count (CBC) may be ordered to rule out infection or anemia
• Kidney function tests (e.g., serum creatinine and BUN, urinalysis) may be ordered to exclude renal complications
› Other Diagnostic Studies
• MRI and CT scan may indicate plaques and/or glial scars in the brain and spinal cord
• VEP test may diagnose optic nerve demyelination; other evoked potential tests may indicate similar slowing of nerve impulses

Treatment Goals
› Provide Symptomatic Relief and Reduce Risk of Complications
• Monitor airway patency and respiratory function, especially if patient has dysphagia; provide respiratory therapy to clear secretions, as needed, and provide supervision and/or assistance during mealtimes
• Assess fall risk and maintain patient safety (e.g., airway, circulation, injury prevention). (For more information, see Evidence-Based Care Sheet: Falls, Accidental: Risk Assessment)
• Assess for pain using a standardized pain assessment tool and administer analgesics (e.g., lidocaine, mexiletine), as ordered; ice, heat, ultrasound, transcutaneous electrical nerve stimulation (TENS), massage, biofeedback, mindfulness, and/or meditation may also be helpful
• Administer prescribed medications to combat fatigue (e.g., amantadine [Symmetrel], modafinil [Provigil]), as ordered; assess effectiveness of medications per patient report
• Administer prescribed high-dose corticosteroids (e.g., methylPREDNISolone) during acute exacerbations and immunomodulating or immunosuppressing drugs to decrease relapse rate; disease-modifying therapy options include interferon beta-1a (Avonex, Rebif), interferon beta-1b (Betaseron), glatiramer (Copaxone), natalizumab (Tysabri), and fingolimod (Gilenya): high–dose Cytoxan (i.e., an antineoplastic drug used to treat various cancers such as Hodgkin’s and non-Hodgkin’s lymphoma) for aggressive progressive MS
• Administer prescribed drugs for spasticity (e.g., oral baclofen, antiepileptics); a baclofen pump may be implanted in the abdomen in patients who are unresponsive or intolerant to oral baclofen
• If the patient becomes a candidate for a procedure (e.g., plasmapheresis, which may be used for short-term treatment of severe attacks in cases when corticosteroids are contraindicated or ineffective), follow facility pre- and postprocedure protocols, reinforce pre- and postprocedure education, and verify completion of facility informed consent documents
• Assess and alleviate bladder dysfunction, as ordered, by using timed voiding, minimizing intake of bladder irritants (e.g., caffeine), regulating fluid intake, and administering anticholinergic medications (e.g., oxybutynin [Ditropan], tolterodine [Detrol]); administer prescribed antibiotics for UTIs
• Administer prescribed clonazePAM, carBAMazepine, propranolol, or gabapentin, as ordered, for relief of tremor
• Administer prescribed selective serotonin reuptake inhibitors (SSRIs) or tricyclic antidepressants, as ordered, for treatment of depression
• Reduce risk for and/or manage constipation by promoting increased fiber and fluid intake and administering prescribed stool softeners. (For more information, see Evidence-Based Care Sheet: Multiple Sclerosis and Nutrition)
• Reduce risk for skin breakdown through use of an air/pressure distribution mattress and/or by assisting with positional changes every 2 hours, or more often, if prescribed; if the patient uses a wheelchair, teach wheelchair pushups to relieve pressure. (For more information, see Quick Lesson About ... Pressure Ulcers: Prevention; Evidence-Based Care Sheet: Pressure Ulcers: Prevention Strategies; or Nursing Practice & Skill ... Pressure Ulcers: Implementing Prevention Strategies)
• Request referral to a physical therapist for range-of-motion exercises, stretching, positioning, aerobic exercise, and relaxation techniques; to an occupational therapist for mitigation of fatigue through energy conservation and other techniques; and to a speech therapist for support with swallowing and speaking. (For more information, see Evidence-Based Care Sheet: Multiple Sclerosis: Rehabilitation)

Provide Emotional/Psychosocial Support and Educate
• Assess patient/family member anxiety level and coping ability; provide emotional support; educate and encourage discussion about MS pathophysiology, potential complications, treatment risks and benefits, and individualized prognosis

Food for Thought
• Historically, women with MS were discouraged from bearing children; however, there is no evidence that MS affects fertility, that pregnancy has an effect on the long-term clinical course of MS (in fact, pregnant women with MS may experience a reduced number of relapses, particularly in the second and third trimester), or that MS affects pregnancy outcomes
• The immunomodulating drug fingolimod is known to reduce risk of relapse in patients with RRMS, as authors of a 2017 review article reported that fingolimod also significantly reduces annual brain volume loss by approximately one-third, in comparison to the rate seen in healthy controls (De Stefano et al., 2017)
• Falls are common in patients with MS. A 2015 study indicated gait variability (e.g., stride length, step time, loss of gait rhythm) as a high risk for falls in MS patients (Moon et al., 2015)
• Researchers of a quasi-experimental prospective study indicated that a higher level of education about MS is associated with effective self-management (e.g., self-care and independence behaviors, improved self-confidence) without pharmacological interventions, and a subsequent improvement in quality of life (Daniali et al., 2016)
• Alternative, mind-body, therapies (e.g., acupuncture, yoga, meditation) may be useful in alleviating symptoms in some patients (e.g., improved depression symptoms, decreased pain, improved bladder control). (For more information, see Evidence-Based Care Sheet: Multiple Sclerosis: Alternative Therapy)

Red Flags
• Factors associated with worse prognosis include older age at disease onset, progressive course, incomplete recovery following initial neurologic episode, shorter time to second neurologic episode, and higher frequency of relapses during the first 2–5 years after diagnosis
• Psychiatric comorbidities (e.g., bipolar disorder, depression) in MS patients are linked to the use of disease-modifying therapies
Abrupt withdrawal of oral or intrathecal baclofen can lead to visual and auditory hallucinations or seizures. Bladder dysfunction (e.g., incontinence, failure to empty the bladder) occurs in 50–80% of MS patients, and is associated with a higher risk of developing UTI secondary to multiple causes (e.g., urinary stasis, use of indwelling catheterization). Failure of the initial conservative therapy (e.g., decreased fluid intake, weight loss) is followed with invasive interventions based on individual factors (e.g., suprapubic catheter, botulinum toxin [Botox] administration, bladder neck closure) (Tracey & Stoffel, 2016; Nikseresht et al., 2016).

What Do I Need to Tell the Patient/Patient’s Family?
- Advise patient to seek immediate medical attention for new or worsening symptoms
- Discuss ways to manage fatigue, including taking frequent breaks throughout the day
- Educate the patient about alternative strategies for pain management
- Teach patient and/or caregiver to inspect skin daily and to keep skin dry and clean
- Encourage joining support groups to connect with individuals who are facing similar health challenges
- Provide information for community services (e.g., National MS Society, financial aid)

References