

CLINICAL REVIEW IN MULTIPLE SCLEROSIS



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CLINICAL REVIEW IN MULTIPLE SCLEROSIS

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There are an estimated 400,000 people in the U.S. with multiple sclerosis (MS), which is the most frequently acquired neurologic disease in young adults. *[Halper and Holland, p2; Halper, p4]* The variable pattern of MS, along with the uncertainty and loss of control that the diagnosis brings to an MS patient and family are characteristics that set it apart from other chronic diseases. *[Halper and Holland, p6, p10]* MS can vary from person to person and within an individual over time, and involves a diverse range of neurologic impairments.

Since the 1980s, several advances have radically altered the way that MS is managed within the health care system. One of these is the use of MRI for detecting distinctive brain, spinal cord and optic nerve lesions. Compared to older diagnostic criteria, the McDonald criteria (revised in 2005) incorporated increased understanding of MRI parameters, which recognized reduced time between the appearance of symptoms and the diagnosis of MS. These criteria allowed for earlier treatment of MS. *[Halper and Holland, p8-p9]*

Another advance was the discovery of immunomodulatory therapies that had the potential to alter an individual MS patient's disease course, especially when used early in the disease. The first generation of these therapies are injectables, which involve injection-related issues of skin reactions and

patient non-adherence. *[Halper and Holland, p117-p118]*

Symptomatic therapies are also being established for treating the various types of MS symptoms.

Case management models of health care for chronic diseases was another important advance because comprehensive management of MS requires the skills and direct services of so many different types of health care professionals in addition to neurologists. In the 1980s, case management models were designed to prevent fragmentation of health care for chronic conditions. Case management is now a concept that is used by facilities, government agencies, insurance carriers and health care programs. *[Halper and Holland, p226]*

Multiple sclerosis is a chronic disease that changes an individual's life and self-perception. The assistance of significant others and health care professionals is required for managing symptoms, implementing and adhering to, or remaining on, prescribed treatments, and making modifications in lifestyle and behaviors for adapting to the illness. Yet, health care professionals who are involved in the care of patients with MS are often faced with gaps in the information they need to accomplish their tasks. This guidebook is designed to help health care providers for individuals with MS to provide informed and practical care.

Fundamentals of Multiple Sclerosis

1

Increased use of MRI technology and neuroimaging has allowed for

- Predictability of an individual MS patient's disease course
- Reduced need for clinical assessment in the diagnosis of MS
- Shortened time between first clinical attack and diagnosis of MS
- Types and courses of MS (RRMS, SPMS, PPMS) to be redefined

2

Frank and Marie are both in their 30s and were looking forward to starting a family, but Marie was diagnosed with MS. Which of the following is true about family planning and MS?

- Certain methods of birth control are not effective for patients with MS
- Effects of MS can be ignored postpartum
- Fertility is impaired in women with MS
- Risk of exacerbations is lower during pregnancy

3

Based on genetic factors only, what is the risk that Frank and Marie's child will have MS?

- 4 percent
- 10 percent
- 26 percent
- 54 percent

4

What pathophysiological process(es) in the CNS has/have been shown to be involved early in the course of MS?

- Inflammation and destruction of the myelin sheath
- Axonal degeneration
- Fibrillar protein deposits
- Both a and b
- Both a and c

5

After what age has the incidence of MS been shown to remain higher in people who have emigrated from high-risk regions (northern latitudes) to low-risk regions?

- 3 years
- 15 years
- 30 years
- 65 years

6

Which viruses have been most often studied as associated with the development of MS?

- Epstein-Barr virus and polio virus
- Herpes virus and Epstein-Barr virus
- Herpes virus and HIV
- HIV and West Nile virus

7

What is the necessary duration of an episode of neurological disturbance and the time between the first and second episodes for it to qualify as an MS attack or exacerbation?

- a. Six hours duration and 10 days separation
- b. 12 hours duration and 20 days separation
- c. 24 hours duration and 30 days separation
- d. 48 hours duration and 60 days separation

8

Which of the following criteria do not qualify for a diagnosis of MS?

- a. Single attack and two characteristic MRI lesions disseminated in time
- b. Two attacks and clinical evidence of two lesions
- c. Two attacks and two characteristic MRI lesions
- d. Four characteristic MRI lesions disseminated in space

9

In addition to clinical/neurological evaluation and MRI, what other type of test is used to support the diagnosis of MS?

- a. Cerebrospinal fluid analysis
- b. Levodopa challenge
- c. Muscle biopsy
- d. Antibody blood test

10

Which of the following regions of the CNS is not typically involved with neurologic symptoms of clinically isolated syndrome (CIS)?

- a. Brain stem
- b. Cerebellum
- c. Optic nerve
- d. Spinal cord

11

For which level of the WHO classification of dysfunction does the Expanded Disability Status Scale (EDSS) serve as the Minimum Record of Disability in MS?

- a. Disability
- b. Handicap
- c. Impairment

12

Approximately what percent of MS patients are diagnosed with relapsing-remitting MS?

- a. 15 percent
- b. >60 percent
- c. 85 percent
- d. >95 percent

13

Which of the following is an indicator of a poor prognosis?

- a. Brain stem symptoms (nystagmus, tremor, ataxia, dysarthria)
- b. Onset at an early age
- c. Female gender
- d. One relapse per year

14

True or False. An MS patient can have a disease course classified as primary progressive MS (PPMS) leading to secondary progressive MS (SPMS).

- a. True
- b. False

15

What is the approximate percentage of patients who present with primary progressive MS (PPMS)?

- a. 10 percent
- b. 25 percent
- c. 50 percent
- d. 85 percent

Multidisciplinary Management of Multiple Sclerosis

16

According to the Medical Advisory Board of the National Multiple Sclerosis Society, the choice among approved first-line disease modifying therapies (DMTs) listed to the right for patients with RRMS is appropriately

- a. At the discretion of clinician and patient
- b. Based on recommendations from the American Academy of Neurology
- c. Based on recommendations from the National MS Society
- d. Determined by the MRI findings for each patient

THERAPY	MECHANISM OF ACTION	DELIVERY METHOD	DOSE	FREQUENCY	SIDE EFFECTS
Beta interferon-1a (Avonex)	Inhibits proliferation of leukocytes and antigen presentation; increases anti-inflammatory cytokines ; inhibits T-cell movement across the BBB	IM injection	30 µg	Q week	Fever, chills, HAs, mild flu-like symptoms, muscle aches, anemia, depression
Beta interferon-1a (Rebif)	Same as above	SC injection	44 µg	TIW	Injection-site reactions, mild flu-like symptoms, muscle aches, anemia, depression
Beta interferon-1b (Betaseron)	Same as above	SC injection	250 µg	QOD	Injection-site reactions, flu-like symptoms, menstrual disorders, headaches, mild neutropenia, anemia, or thrombocytopenia, depression
Glatiramer acetate (Copaxone)	Designed to mimic myelin basic protein and promote anti-inflammatory cytokine production	SC injection	20 mg	QD	Injection-site reactions, IPIR, rarely lymphadenopathy
Fingolimod (Gilenya)	Sequesters mainly T-lymphocytes in the lymph nodes	Oral capsule	0.5 mg	QD	Transient bradycardia and atrioventricular block, infections, macular edema, dyspnea and decreased lung function, liver dysfunction, hypertension
Natalizumab (Tysabri)	Humanized monoclonal antibody against cellular adhesion molecule α4-integrin	IV infusion	300 mg	Every 28 days	Allergic reactions, especially after second dose, infections, progressive multifocal leukoencephalopathy, liver abnormality

17

Which of the following is generally a benefit of switching DMTs in a patient with a suboptimal response to an initial DMT?

- a. Improved efficacy
- b. Less frequent dosing
- c. Prevention of disease progression
- d. Reduced risk of adverse events

18

What is/are the best source(s) of information when there are concerns about administration, insurance coverage and other patients' experiences with an MS therapy?

- a. Facebook
- b. National Multiple Sclerosis Society
- c. Pharmaceutical company Patient Assistance Program
- d. PubMed

19

Jane D is an MS patient anxiously calling your office with concerns about numbness and tingling on the left side of her face. She explains that she has just finished mowing the yard for the first time this season. How should you advise Jane?

- a. Explain to Jane that she has probably become overheated, to cool down and call back if the symptoms persist more than 24 hours
- b. Remind Jane that it is important to not become overheated because it can lead to permanently damaging exacerbations if left untreated, but it is probably OK this time because the duration wasn't more than 24 hours
- c. Tell Jane to remain calm but explain that she should make an appointment to receive corticosteroid therapy for possible relapse as soon as possible

20

Current evidence-based practice for corticosteroid treatment of acute relapses in MS suggests that

- a. Fifteen days is more effective than five days of corticosteroid treatment
- b. Mild as well as severe relapses should be treated with corticosteroids
- c. There is not a specific optimal dose, duration of treatment or route of administration
- d. Treating acute relapses with corticosteroids prevents further relapses

21

Which of the following is the only type of treatment **not** generally required by patients with early-stage MS?

- a. Disease-modifying treatments
- b. Episodic treatments
- c. Immunosuppressant treatments
- d. Symptomatic treatments

22

Which members of an MS interdisciplinary health care team would need to interact to solve bladder dysfunction in an MS patient?

- a. Physician, urologist and nurse
- b. Physician, urologist, nurse and psychologist
- c. Physician, urologist, nurse, occupational therapist and physical therapist

23

Which of the following statements is true about rehabilitation in terms of relapse management?

- The need for rehabilitation is no greater during and following a relapse than at any other time in the disease course
- Rehabilitation is best accomplished through a multidisciplinary approach
- The nurse's main role is to inform patients about their need for rehabilitation
- The goals of MS rehabilitation are to improve mobility, activities of daily living and quality of life; prevent complications; and promote safety and independence

24

What is the most common, and often the most disabling, symptom associated with MS?

- Depression
- Fatigue
- Pain
- Spasticity

25

What is the first necessary step for managing fatigue in a patient with MS?

- Discussing pharmacotherapeutic options with the patient
- Including an occupational therapist on the care team to advise on possible management techniques
- Performing a comprehensive evaluation for contributing factors
- Providing literature to the patient about fatigue in MS

26

What is the most definitive means for diagnosing cognitive impairment in a patient with MS?

- A neuropsychological examination
- Evidence of the patient's behavior and performance from close relatives and friends
- The Mini-Cog assessment
- The Mini-Mental State Examination

27

The incidence of cognitive impairment in patients with MS is estimated to range from 40 percent to 70 percent. Which of the following is not one of the factors shown to affect cognition in MS patients?

- Concurrent medications
- Intelligence
- Mood disorders
- Physical or mental stress

28

How does the MS Functional Composite (MSFC) manual provide a more comprehensive clinical assessment than the Expanded Disability Status Scale (EDSS)?

- The MSFC assesses the level of care received by the MS patient
- The MSFC has been more commonly used in clinical studies
- The MSFC assesses several functional abilities, including ambulatory function
- MSFC outcomes have been directly associated with brain lesions in MS patients

29

To which of the following bladder dysfunction characteristics can a patient's symptoms of urgency, frequency and incontinence be attributed?

- a. Failure to empty
- b. Failure to store
- c. Combined failure to empty/store
- d. Insufficient information for a determination

30

Intermittent catheterization is used as a treatment for MS patients with which of the following types of bladder dysfunction?

- a. Bladder stone formation
- b. Failure to empty
- c. Failure to store
- d. UTI

31

After careful questioning, Pamela B, a patient with MS, has admitted that she is experiencing moderate pain with intercourse that she has never experienced before. What is the likely cause of Pamela's pain symptoms?

- a. Sensory changes caused by direct damage to nerves (primary sexual dysfunction)
- b. MS-related pain (secondary sexual dysfunction)
- c. Emotional changes (tertiary sexual dysfunction)
- d. Neurologic changes, sensory changes and/or emotional changes

32

What is the general range that has been reported for the rate of non-adherence to disease-modifying therapies among patients with MS?

- a. 1 percent to 5 percent
- b. 5 percent to 10 percent
- c. 25 percent to 30 percent
- d. 60 percent to 70 percent

33

Which of the following would be the best tactic(s) for encouraging adherence in an MS patient?

- a. Establish an injection schedule for the patient
- b. Discuss the options with the patient, find out from the patient what would work best, demonstrate any necessary techniques, establish a follow-up schedule with the patient
- c. Establish a relationship with the patient, discuss the options with the patient, demonstrate any necessary techniques, establish a follow-up schedule with the patient
- d. Either a or b
- e. Either b or c

34

Which of the following is not a factor that has been shown to influence adherence in MS patients?

- a. Patient's perception of a lack of efficacy
- b. Patient's perception of the health care provider's ability
- c. Patient's self-esteem
- d. Sensitivity of the health care provider

35

Which of the following best reflects current thought about the use of complementary and alternative medicine (CAM) in MS?

- CAM can be equally effective to DMTs and either can be used for MS therapy
- CAM is harmless and does not need to be addressed in MS patients' health care regimens
- CAM provides a false sense of security for MS patients and should be avoided
- Certain types of CAM are helpful for some patients and can be used in conjunction with DMTs

36

What is the main difference between Clark's Wellness Model and the traditional nursing model of care?

- Nurses and health care providers are better trained to address their patients' needs
- Patients are seen on a more regular basis by their nurses and health care providers, providing a continuum of care
- There is more of a collaboration between nurses or health care providers and patients that focuses on patient self-awareness and responsibility
- There is more of a focus on CAM and less on traditional medicines

37

In the list below of special primary care needs of MS patients, which needs are particularly associated with advanced MS?

- Occupational and speech therapies to aid in adaptation to physical and mental limitations; prevention and treatment of pressure ulcers and

respiratory complications

- Prevention and treatment of osteoporosis, pressure ulcers and respiratory complications
- Physical therapy for general mobility and functional independence; prevention and treatment of pressure ulcers and respiratory complications

SPECIAL PRIMARY CARE NEEDS OF PATIENTS WITH MS

Coping skills for

- Sexual dissatisfaction
- Incontinence

Effects of exercise on reducing risk of

- Cardiovascular disease
- Osteoporosis

Occupational and speech therapies to aid in adaptation to physical and mental limitations

Physical therapy for general mobility and functional independence

Prevention and treatment of

- Osteoporosis
- Pressure ulcers
- Respiratory complications

Strategies to improve quality of life

- Diet and nutrition
- Stress management
- T'ai chi
- Yoga

Vaccinations/immunizations

- Hepatitis A
- Hepatitis B
- Influenza
- Tetanus
- Other infectious diseases

38

Why is it particularly important that MS patients remain up-to-date on their immunizations against disease?

- Because infections are a known trigger for MS exacerbations
- Because infections are difficult to treat in patients with MS
- Because vaccinations are known to stimulate the immune system and slow the progression of MS
- Because MS patients must have received their immunizations before they can begin any disease-modifying therapy

39

What are the two main skin care needs of patients with MS?

- a. Appropriate injection care practice and coping with hypersensitivity to sunlight
- b. Appropriate injection care practice and pressure reduction during periods of immobility
- c. Prevention of eczema and pressure reduction during periods of immobility
- d. Prevention of eczema and coping with the increased risk of melanoma

40

Although exercise is an important part of an MS patient's wellness program, what concern associated with exercising is specific to MS?

- a. Exercise can cause muscle atrophy in individuals with MS
- b. Exercise can induce emotional stress in individuals with MS
- c. Exercise-induced increases in body temperature should be controlled in individuals with MS
- d. Exercise is problematic due to breathing problems in individuals with MS

41

Deana M is an MS patient age 40 who was recently diagnosed. During her three-month follow-up visit, she reports that she really feels depressed because she feels that this is "all her fault." Upon questioning, she reports extreme fatigue and difficulties concentrating over the past two weeks. Her weight is the same, she says "no" to questions about appetite changes and sleep disturbance. How should Deana's health care provider approach dealing with this issue?

- a. Explain to Deana that her symptoms are common in MS, not sufficient for a clinical diagnosis of depression and that she should concentrate on her enjoyable activities to heal
- b. Explain to Deana that her symptoms are common in MS, and they will be addressed during this visit and subsequent visits
- c. Explain to Deana that her symptoms are not usually seen in patients with early-stage MS, and that she should really get a referral to a specialist to see if there is another condition responsible for these symptoms

42

What can cause depression in a patient with MS?

- a. Actual neurologic damage in certain regions of the brain
- b. Medication side effects
- c. Reaction to altered life circumstances
- d. Any of the above

43

Which of the following is not a psychological condition known to be associated with MS?

- a. Bipolar disorder
- b. Mood swings
- c. Personality change
- d. Pseudobulbar affect
- e. None of the above

44

Which of the following best describes characteristics of lipoatrophy resulting from injection therapy?

- A transient dimpling of the skin
- A permanent depression in the skin
- A discolored scar on the skin
- An abscess on the skin

45

What characteristics of MS are unique from other chronic diseases and dictate that health care providers are especially able to “think on their feet?”

- The lack of uniformity of disease presentation and unpredictability of disease progression
- The rapid progression of disease and high mortality rate
- The suddenness of disease onset and lack of early-stage treatments

46

Which of the following is the best approach for initiating therapy for neurogenic pain in an MS patient?

- Pharmacotherapies should be tried one at a time at higher, more effective doses
- Low doses of several different pharmacotherapies can be tried for better management and fewer side effects
- Start with one standard type of pharmacotherapy for all MS patients
- Base the pharmacotherapy decision on the individual patient’s needs, then avoid changing therapy

47

What type(s) of medication should be avoided when treating the common MS burning type of pain that occurs most often in the extremities?

- Anticonvulsants
- Antidepressants
- Aspirin, codeine and narcotic analgesics
- Capsaic acid

48

Which of the following types of therapists is essential for evaluating dysphagia in patients with MS?

- Occupational therapist
- Physical therapist
- Respiratory therapist
- Speech/language therapist

49

Robert V, the owner of a thriving business, has recently been diagnosed with MS. What is the best information you can give him when he asks about planning for his financial future?

- That he is fortunate to have a thriving business, which will be helpful in terms of cost of MS health care, and he should continue on as usual, keeping his MS expert health care team apprised of his situation
- He should be aware that MS may affect his ability to work but that his MS health care team can assist in ways to plan ahead and throughout the course of his treatment as needed.
- That he should consider turning his business over to an able associate as soon as possible, so that he can concentrate on working on a treatment plan with his MS expert health care team

50

What is the best level of family involvement (for the direct family members) in terms of long-term health care planning for a competent patient with MS?

- a. The family should be involved in all long-term health care planning decisions dealing with the patient as soon as possible
- b. The family should be included in all long-term health care planning discussions, but the patient ultimately retains autonomy in decision-making
- c. The family should be kept apprised of all long-term health care planning discussions and resulting decisions at some point

Patient Empowerment

51

What is the best action for a health care provider who is not confident about entitlements for a particular patient with MS?

- a. Refer the patient to another, more experienced health care provider
- b. Refer the patient to a government website that explains Social Security disability benefits
- c. Refer the patient to the National Multiple Sclerosis Society website [www.nationalmssociety.org]
- d. Request that the patient come back after the health care provider has researched the topic

52

Which of the following is not one of the main areas identified by the National Multiple Sclerosis Society as contributing to quality of life for patients with MS?

- a. Acceptance
- b. Health
- c. Independence
- d. Knowledge

53

What type of learning has been shown to be the best for empowering the adult patient with MS?

- a. Group
- b. Online
- c. Self-directed
- d. Visual

54

What patient parameters do measures of health-related quality of life (HRQOL) assess?

- a. Physical and mental health status
- b. Physical, mental and functional health status
- c. Physical, mental, functional and social health status

55

What gaps in the current health care system for MS patients require advocacy?

- a. Accommodations in the workplace
- b. Adequate, affordable health insurance coverage
- c. Appropriate long-term care services
- d. Patient protection and confidentiality
- e. All of the above

56

When is the best time to encourage MS patients to pursue advance directives, such as a living will and health care power of attorney?

- a. As soon as the patient receives the diagnosis of MS
- b. As soon as the patient's disease is determined to be progressive
- c. As soon as the patient's family is adequately coping with the situation
- d. Only at the time when the patient is significantly disabled

57

When was the case management model for patients requiring multidisciplinary care instituted?

- a. More than 80 years ago
- b. More than 30 years ago
- c. Within the past five years

58

Which of the following documents used in clinical research was instituted to protect human rights?

- a. Case report
- b. Informed consent
- c. Investigator's brochure
- d. Safety report

59

What is the purpose of a Phase II clinical trial?

- a. Dose-finding to determine the metabolism and pharmacologic actions of the drug
- b. To evaluate the effectiveness and safety of a drug in a large study population
- c. To evaluate the effectiveness of a drug in a well-controlled study
- d. To test an approved product in different groups of subjects

60

What should reasonable goal-setting for a patient with RRMS include?

- a. Maintaining a certain standard quality of life
- b. Maintaining a quality of life as determined by the patient
- c. To reduce the occurrence of relapses
- d. To slow the progression of disease
- e. Both a and c
- f. Both b and d

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Fundamentals of Multiple Sclerosis

1.C

Compared to older diagnostic criteria, the McDonald criteria (revised in 2005) incorporate increased understanding of MRI parameters, which allows for less time between the appearance of symptoms and the diagnosis of MS. These new criteria allow for earlier treatment of MS, with the potential for altering the long-term outcome. *[Halper and Holland, p8-p9]*

2.D

Although medical opinion before 1950 was to advise women with MS against pregnancy, newer research findings suggest that the exacerbation rate during pregnancy is actually lower than the expected normal rate. *[Halper and Holland, p185]*

3.A

Current theory suggests that MS is the result of an interaction between both genetic and environmental factors. *[Halper and Holland, p3]* A comprehensive study in 1981 of 815 individuals with MS found a risk of 3 percent to 5 percent for children and siblings, which is 30-50 times the risk for the general population. *[Halper and Holland, p5, p183]*

4.D

For decades, the pathology of MS was defined by inflammation and demyelination. More recent evidence suggests that axonal degeneration is involved, which causes permanent and irreversible damage. *[Halper, p3-p4]*

5.B

MS is the most frequently acquired neurologic disease in young adults. High-risk regions include northern latitudes of some countries in the northern hemisphere (U.S., Canada, Europe) and southern latitudes of some countries in the southern hemisphere (Australia and New Zealand). *[Halper, p4]* Prevalence studies of migrants from high-risk to low-risk areas indicate that individuals migrating after the age of 15 retain the same risk of MS as they acquired from their birthplace, whereas those migrating before the age of 15 acquired the lower risk of their new region of residence. *[Burks and Johnson, p70]*

6.B

Although the cause of MS is not known, it is suspected to be an immunologic response to a trigger (often attributed to certain types of viruses) in genetically susceptible individuals. *[Halper, p3]* The human herpes virus and Epstein-Barr virus have long been considered triggers for MS, but there is no hard evidence to support this theory at this time. Canine distemper virus, measles and HHV-6 have also been considered as other candidates, but the evidence does not support these as triggers for MS. *[Halper and Holland, p3]*

7.C

A relapse is defined as the appearance of new neurologic symptoms or worsening of previous symptoms that lasts longer than 24 hours and is separated by at least 30 days from the resolution of any prior relapse. In addition, true relapses have to be distinguished from pseudorelapses, which are temporary worsening of symptoms that can be brought on by concurrent illness, fever or infection. *[Halper, p69-p70]*

8.D

A diagnosis of MS is made by a neurologist after a patient has experienced two or more attacks with neurological symptoms that can be associated with two or more lesions in the CNS. Fewer than two attacks and/or clinical evidence for only one lesion requires evidence for dissemination either in time or in space as shown by MRI. *[Harris and Halper, p5]* Irrespective of the contributions of MRI technology toward a better understanding of MS, a diagnosis of MS still requires clinical confirmation. *[Burks and Johnson, p111]*

9.A

Diagnostic criteria for MS were modernized in the early 1990s to include MRI, evoked potentials and cerebrospinal fluid analysis. *[Halper, p4]*

10.B

Clinically isolated syndrome is the initial presentation of many patients with MS. Symptoms of CIS typically involve the spinal cord, brain stem or optic nerve. According to a recent panel of MS experts, CIS is a single (monophasic) presentation of relatively rapid onset, with suspicion of underlying inflammatory, demyelinating disease. *[Costello and Halper, p6]*

11.C

The WHO classification of dysfunction includes three levels:

- Impairment—apparent clinical signs and symptoms of neurologic damage
- Disability—personal limitations on activities of daily living caused by neurologic impairment
- Handicap—social and environmental repercussions of impairment or disability

EDSS is used as the Minimum Record of Disability (MRD) for impairment, Incapacity Status Scale is used as the MRD for disability, and Environmental Status Scale is used as the MRD for handicap in patients with MS. *[Burks and Johnson, p223]*

12.C

Relapsing-remitting MS is the characteristic onset of disease for approximately 85 percent of patients with MS. Approximately 75 percent of these patients then develop secondary progressive MS after a number of years. *[Halper, p3]*

13.A

Indicators of a favorable prognosis include female gender, onset at an early age, mono-regional vs. poly-regional attack and complete recovery from exacerbations. Indicators of a poor prognosis include brain stem symptoms, poor recovery from exacerbations and a frequent rate of attacks. *[Halper and Holland, p6]*

14.B

Patients with primary progressive MS demonstrate disease progression from the onset. Secondary progressive MS begins with a relapsing-remitting course of disease. *[Halper and Holland, p9]*

15.A

Relapsing-remitting MS is the characteristic onset of disease for approximately 85 percent of patients with MS. Primary progressive MS is the characteristic onset of disease for approximately 10 percent of patients with MS. *[Halper, p3]*

Multidisciplinary Management of Multiple Sclerosis

16.A

These DMTs have all been shown in clinical trials to modify disease progression, reduce future disability and improve quality of life for patients with RRMS. *[Harris and Halper, p19-p21]* Therefore, treating patients with a confirmed diagnosis of MS as well as those patients with clinically isolated syndrome who are at high risk of developing MS involves the question of which DMT to use. Recommendations of the Medical Advisory Board of the National Multiple Sclerosis Society state that all FDA-approved immunomodulatory agents should be included in formularies and covered by third-party payers to allow physicians and patients to determine the most appropriate agent on an individual basis. Note that fingolimod and natalizumab have important safety programs associated with them.

17.A

The three different interferon betas as well as glatiramer acetate have been shown to be only partially effective in controlling MS. *[Halper and Holland, p245]* A suboptimal response is one of the reasons for switching DMTs, and adverse events is another reason. Members of the MS health care team should be educated about monitoring for suboptimal responses as well as adverse events in their patients. *[Harris and Halper, p22]* Strategies for improving efficacy from a suboptimal response include switching DMTs, combining treatments or using short-term induction therapy.

18.C

There is a Patient Assistance Program established for every MS therapy, which provides information on reimbursement issues and offers nursing and personal support pertaining to that specific therapy and other MS-related issues. The table lists the Patient Assistance Program associated with each approved therapy that has been approved in the U.S. There are comparable programs in other countries where these therapies are approved and used for the treatment of MS.

THERAPY	PATIENT ASSISTANCE PROGRAM
Beta interferon-1a (Avonex)	Avonex Services (www.avonex.com/service-and-support/service-and-support.xml)
Beta interferon-1a (Rebif)	MS LifeLines (www.ms lifelines.com)
Beta interferon-1b (Betaseron)	BETA Nurses (www.betaseron.com/patients/betap-lus/beta_nurse)
Glatiramer acetate (Copaxone)	Shared Solutions (www.sharesolutions.com)
Fingolimod (Gilenya)	Patient Assistance Foundation (www.pharma.us.novartis.com/info/about-us/our-patient-caregiver-resources/index.jsp)
Natalizumab (Tysabri)	Patient Assistance.com (www.patientassistance.com)

19.A

In people with MS, heat and exercise can bring on sensory symptoms or symptoms of blurry vision or weakness in the legs. *[Burks and Johnson, p78]* These symptoms usually disappear with rest and cooling. The health care provider should reassure patients that symptoms brought on by overheating are transient and do not indicate occurrence of a relapse or progression of their disease. *[Halper, p51]*

20.C

High-dose glucocorticoids are indicated for relapses that are severe enough to significantly impact an individual's activities of daily living. [Halper, p73] This therapy has been shown to shorten the duration of the relapse, but not affect the course of disease. Common doses for IV methylprednisolone are 1 g/day or oral prednisone of 1,250 mg/day for three to five days. The MS Council for Clinical Practice Guidelines has stated that there is no strong evidence suggesting an optimal dose, duration of treatment, or route of administration.

21.C

Immunosuppressants, such as mitoxantrone, are generally considered third-line treatments for patients with aggressive relapsing MS or in patients with an inadequate response to DMTs. [Halper and Holland, p245] Immunosuppressants are generally associated with risks of serious adverse events. [Halper, p35]

22.C

In this scenario, members of the health care team who meet regularly include the physician, nurse, occupational therapist and physical therapist. A urologist is also a team member when bladder dysfunction issues are involved. In addition to assessing bladder dysfunction, evaluation of hand function, transfers, sitting or standing, and balance might need to be done by the occupational and physical therapist. [Halper and Holland, p223-p224]

23.D

Rehabilitation is an important aspect of MS care in terms of symptomatic treatment. It allows the individual to retain as much independence as possible throughout the disease course. [Halper and Holland, p216-p218]

24.B

At least two-thirds of MS patients report experiencing fatigue, and 14 percent to 28 percent report that it is their most disabling symptom. [Burks and Johnson, p291; Harris and Halper, p5]

25.C

Multiple factors, such as depression, infection, pain, poor quality of sleep and certain therapeutic side effects, can contribute to the individual MS patient's experience of fatigue. Therefore, treatment will depend on which of these factors are involved. [Burks and Johnson, p293]

26.A

Past estimates of the frequency of cognitive changes occurring in patients with MS are now considered to be underestimates. [Costello and Halper, p21-p23] Insensitive diagnostic procedures, such as the brief bedside mental status exam, are now known to miss subtle brain deficiencies. Neuropsychological evaluation through either comprehensive screening or the use of screening batteries is considered the most definitive for determining cognitive changes in MS patients. [Halper, p139]

27.B

People with MS perform normally or with minimal impairment on tests of general intelligence, language, attention span and implicit memory. [Costello and Halper, p21]

28.C

The MSFC includes the “timed 25-foot walk,” a measure of walking speed, the “nine-hole peg test,” a measure of fine manual dexterity, and the “paced auditory serial addition test,” a measure of attention and information processing speed. The EDSS is heavily weighted towards ambulation. [*Kurtzke, 31:1–9*]

29.D

Symptoms of urgency, frequency and incontinence may be present in all three types of bladder dysfunction. Urodynamic testing is often required for differentiating among the three types and to determine appropriate interventions. [*Halper and Holland, p93, p97*]

30.B

Whereas failure to empty is treated with intermittent catheterization, failure to store is treated with anticholinergic medication and UTI is treated with antibiotics. [*Halper and Holland, p97*]

31.D

MS-related sexual problems are common in both men and women, and these problems should receive much more clinical attention than they have in the past. Sexual problems can be the result of neurologic impairment (primary sexual dysfunction); debilitating physical symptoms (secondary sexual dysfunction); or psychosocial sequelae of MS (tertiary sexual dysfunction). [*Halper and Holland, p171*]

32.C

In a survey of 2,566 MS patients from 22 countries, the Global Adherence Project found 25.3 percent of patients were non-adherent. A literature review by Costello reported that 60 percent to 76 percent of patients with MS were adherent for two to five years. [*Costello and Halper, p15*]

33.E

Core elements for promoting patient adherence include partnership, mutually established goals and a therapeutic alliance. Main factors that have been demonstrated to affect adherence are:

- Patient knowledge and understanding
- Communication between patient and health care provider
- Quality of interaction between patient and health care provider, and patient satisfaction
- Social support systems
- Health beliefs and attitudes

[*Halper, p92-p93, p96-p97*]

34.B

Patient self-efficacy, self-esteem, hope and perception of benefit have emerged as predictors of adherence for patients with MS. [*Costello and Halper, p15*]

35.D

The current conventional DMTs are biologically and evidence-based to be more effective than any CAM for treating MS disease. However, for symptom treatment, CAM therapies may have strong benefit. Regardless of the reasons for considering a CAM therapy, patients need to be able to evaluate the evidence, risks, costs and availability. Health care providers, regardless of their opinions, may want to support the CAM treatment if it is helping to provide hope and not harming the patient. [Halper and Holland, p125-p126]

36.C

The goal in Clark's Wellness Model is for patients to be knowledgeable about their illness, but still have wellness with a deep appreciation for the joy of living and a purpose to life. To accomplish this, patients have to take on self-awareness and self-responsibility. This model defines more of a collaboration between patient and nurse than the traditional nursing model of care. While this reference reflects a nursing focus, this model can be extrapolated to include the MS team. [Halper and Holland, p10]

37.A

Primary care for patients with MS is the promotion of general health and wellness across their lifespans. The specific needs for MS patients change throughout the course of disease. The needs listed in the table are general needs for all patients with MS, except for those associated with pressure ulcers, respiratory complications, and occupational and speech therapies, all of which are more specific for patients with advanced MS. [Costello and Halper, p23, p25]

38.A

It is well documented that exacerbations of MS are frequently preceded by viral and/or upper respiratory tract infections. Therefore, it is important that MS patients maintain an appropriate immunization schedule including seasonal (such as influenza vaccine) and risk-reducing vaccines. [Halper, p50, p51, p70]

39.B

The first generation of DMTs are all injectable medications that require appropriate skin preparation, injection technique and injection site rotation. Injection site reactions are common and complications, such as skin infection and necrosis, can also be involved. There is also significant potential for impaired skin integrity in MS patients, especially in those with decreased mobility. Prevention is the key to treating pressure sores and requires reducing pressure points as well as spasticity. [Halper and Holland, p117-p118]

40.C

An increase in body temperature of less than one-half degree centigrade can increase or induce weakness in a patient with MS. A variety of strategies are helpful for body cooling and protecting the MS patient against deleterious effects of elevated body temperature. Exercising in a cool environment or wearing a cooling vest during exercise can have positive effects on muscle strength and fatigue. [Burks and Johnson, p310, p315]

41.B

Both clinical depression and less severe emotional distress are common in MS. It has been estimated that approximately 50 percent of people with MS experience a major depres-

sive episode at some time during the course of their disease. Depression in an MS patient can be a symptom caused by MS or associated with the occurrence of unexpected changes in lifestyle or the patient's consideration of the uncertainty of MS. Health care providers should be vigilant for, assess symptoms of and be ready to treat depression throughout the course of disease. *[Halper and Holland, p140; Halper, p214-p215]*

42.D

Possible causes and contributors to depression in MS include disease activity, neuropathologic changes in areas of the brain responsible for affect, neuroendocrine changes, reaction to altered life circumstances and medication side effects. *[Burks and Johnson, p412-p413]*

43.E

Psychological conditions known to be associated with MS include depression, bipolar disorder, emotional lability, affective release or pseudobulbar affect and emotional crescendo, of which any one can produce a change in personality. *[Burks and Johnson, p411]*

44.B

[Edgar, Brunet, Fenton, McBride, Green, 58-63.]

45.A

The variable pattern of MS, along with the uncertainty and loss of control that the diagnosis brings to the patient and family impels the health care provider to respond with cultural sensitivity and individualized care. *[Halper*

and Holland, p10] Because MS is unpredictable in its course and outcome, the philosophy of MS health care must be flexible, fluid, dynamic and responsive to changes in the patient's physical and emotional status. *[Harris and Halper, p8]*

46.B

The goal of pain management in MS is improved function and to increase mood, sleep quality and quality of life. Patients should be advised that pain control may be more realistically viewed as control rather than eradication. Low doses of several different types of medication can achieve better management with fewer adverse effects. Doses can be slowly increased to manage potential side-effects. *[Halper, p207]*

47.C

Dyesthesias, experienced as burning or aching sensations, are the most common types of pain seen in MS. Mood-altering drugs, such as tranquilizers and antidepressants, can be effective as treatment. Anticonvulsants are most often used to treat trigeminal neuralgia and can be used to treat peripheral dyesthesias as well. Topically applied capsaic acid cream also can alleviate the burning sensation. However, standard pain medications such as aspirin, codeine and narcotic analgesics are not effective in treating dyesthesias. *[Halper and Holland, p76]*

48.D

Dysphagia is difficulty with swallowing that is often reported in patients with MS. If left undetected, dysphagia can lead to weight loss and pneumonia. As soon as the problem is detected, referral to a speech-language pathologist is indicated. *[Halper and Holland, p112-p113]*

49.B

Because of the unpredictability of MS, making sure that the individual's financial future is protected is of primary concern. Patients need to develop plans and strategies for the future. Health care providers should be knowledgeable about the legal documents and financial options available, and encourage patients to pursue this information, despite whether or not they currently have significant disability. *[Halper and Holland, p46]*

50.B

The health care provider-patient relationship in dealing with a chronic disease, such as MS, needs to include family members. It takes an ongoing, active collaboration among patient, family members and health care providers to ensure effective MS management. Although the involvement of family members is an important component of ongoing MS treatment, the patient's right to confidentiality and personal autonomy must also be respected. *[Burks and Johnson, p568-p569]*

Patient Empowerment

51.C

Families dealing with a chronic illness, such as MS, and trying to obtain supportive services and benefits to which they are entitled can be totally overwhelming. Documentation provided by their health care professionals is often the most important determinant of whether these benefits will be secured by the patient. Therefore, it is necessary that health care providers working with MS patients make sure that medical documentation they provide is comprehensive and accurate. Also, by encouraging patients to contact their local chapter of the National Multiple Sclerosis Society, health care providers can help patients link to invaluable information and support. *[Halper and Holland, p48-p50]*

52.A

Quality of life is important to individuals with chronic disease, their families and health care providers because it represents the individual's perceptions about how illness and the related interventions affect their everyday lives. The National Multiple Sclerosis Society identified three main areas that contribute to quality of life. These three areas are MS knowledge, health and independence. *[Halper and Holland, p29-p30]*

53.C

Self-directed learning emphasizes empowerment and independent activity for the MS patient. Although the process is not well-defined, most patient education programs encourage patients to be actively involved in their decision-making and care delivery. Self-directed learning ensures that the patient will be able to continue to acquire the necessary information and skills on a lifelong basis. *[Halper and Holland, p31]*

54.C

Outcomes of medical care are often measured in terms of HRQOL, which can be defined as "the value one places on current abilities and limitations, including the effects of illness and treatment upon physical, emotional, and social well-being." Instruments of HRQOL assess physical, functional, mental and social health status. *[Costello and Halper, p29]*

55.E

Current health care standards stress patient advocacy, empowerment and consumerism. Major issues facing people with MS that require advocacy on a policy level include:

- Patient rights legislation

- Patient protection and confidentiality
- Expanding health insurance coverage
- Broadening of Medicare and Medicaid
- Pharmaceutical assistance programs
- Affordable and appropriate long-term care services
- Caregiver tax credits
- Promoting MS research [Halper and Holland, p51]

56.A

Because there is no way to predict an individual MS patient's disease progression or severity at the time of diagnosis, it is important for people with MS to prepare themselves for any eventuality. Documents that each patient should be encouraged to pursue at the time of diagnosis include advance directives, power of attorney, wills and trusts. [Halper and Holland, p47-p48]

57.B

In the 1980s, the need for case management was identified and models were designed to prevent health care for chronic conditions from becoming fragmented. Case management is now a concept that is used by facilities, government agencies, insurance carriers and health care programs. [Halper and Holland, p226]

58.B

Ethical standards for clinical trials that were developed to ensure full disclosure, the participant's autonomy and right to self-determination include the Institutional Review Board and informed consent. [Halper, p116-p117]

59.C

Phase II clinical trials are well-controlled, closely monitored studies to evaluate the effectiveness of a drug for a particular indication. This phase is also used to help determine the short-term side effects and risks of the drug. [Halper, p115]

60.F

Current goals for MS treatment have expanded beyond management of neurological symptoms to include reducing relapse rates, slowing disease progression and preventing disability. The key to successful treatment of people with MS is balancing the efficacy of a prescribed agent with the patient's capacity or desire to adhere to a treatment regimen and the impact of that regimen on their quality of life. Quality of life is dynamic and differs across individuals and over time. [Costello and Halper, p4, p29, p41]

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