Case Management in Multiple Sclerosis

A stage-by-stage guide to MS care for nurse case managers

A publication of the International Organization of MS Nurses (IOMSN)
Through an Educational Grant from Teva Neuroscience

About the Faculty

Kathleen M. Costello, RN, MS, CRNP, MSCN

Kathleen Costello is an Adult Nurse Practitioner and the Clinical Director of the Maryland Center for Multiple Sclerosis at the University of Maryland in Baltimore. She was among the founders of the International Organization of Multiple Sclerosis Nurses and served as its president from 2002 through 2004. She serves on the Professional Education Committee of the NMSS and Clinical Care Committee of the Consortium of MS Centers.

June Halper, MSCN, ANP, FAAN

June Halper is Executive Director of the Consortium of Multiple Sclerosis Centers, the largest organization of MS healthcare professionals in the world, She is Executive Director of the International Organization of MS Nurses (IOMSN) where she is a founding director. She was a founder of the Bernard W. Gimbel Multiple Sclerosis Comprehensive Care Center in Teaneck, NJ, and has served as its Executive Director since 1989. Ms. Halper lectures and publishes extensively on multiple sclerosis and has been a strong advocate for improved care for MS patients.

Linda Morgante, RN, MSN, MSCN, CRRN

Linda Morgante is the Director of Clinical Services for the Maimonides MS Care Center in Brooklyn, New York and its satellite center at Mount Sinai Medical Center in Manhattan. A founding member of the IOMSN in 1997 she has served on its Board of Directors since 1998 and on many of its committees. Ms. Morgante has been active in the Consortium of MS centers since its inception and is an editor of its newsletter, as well as author of many publications on MS.

Marie Namey, RN, MSN, MSCN

Marie Namey is an Advanced Nurse Practitioner and Clinical Nurse Specialist at the Mellen Center for Multiple Sclerosis Treatment and Research, a part of the Cleveland Clinic Foundation in Cleveland, OH. She has served in many leadership roles for the Consortium of Multiple Sclerosis Centers as well as the International Organization of Multiple Sclerosis Nurses (IOMSN), of which she is a founding member. She is widely published and a frequent lecturer on MS care and research.

Contact Information

International Organization of MS Nurses (IOMSN)

c/o Gimbel MS Center, 718 Teaneck Road, Teaneck, New Jersey 07666
P.O. Box 450 Teaneck, NJ 07666
Phone: (201) 837-9241
Fax: (201) 837-0604
www.iomsn.org
e-mail: info@iomsn.org

Consortium of Multiple Sclerosis Centers (CMSC)

c/o Gimbel MS Center, 718 Teaneck Road, Teaneck, New Jersey 07666
Phone: 201-837-0727
Fax: 201-837-9414
www.mscare.org
e-mail: info@mscare.org

Case Management in Multiple Sclerosis

A Stage by Stage Guide to MS Care for Nurse Case Managers

Prepared by the International Organization of MS Nurses
through an Educational Grant from Teva Neuroscience

Contents

How this Guideline Approaches Case Management in MS

This manual is written for healthcare professionals who have a background or training in case management but who have relatively limited knowledge about the specifics of multiple sclerosis (MS). The manual will explain how managing MS is different from many other case management scenarios, and how a case management approach can be specifically tailored to the particular needs of the MS patient.

While most comprehensive texts on multiple sclerosis are divided into chapters according to types of care and individual symptom groups, this program attempts to look at the patient as a whole, by examining patient care needs according to the various stages of MS as the disease progresses. That being said, it is important to acknowledge that there is no one "typical" MS patient. Indeed, the unpredictable course of MS is one of the hallmarks of this disease. The timing of disease progression in MS varies widely among individuals and will also depend on the patient's response to, and adherence with, disease-modifying therapies.

The overriding theme in each of the four sections is outlined below.

Stage	Case Management Emphasis
Newly diagnosed patient	Education and counseling: Provision of appropriate information, acceptance of diagnosis, adapting to change
Relapsing-remitting MS	Intervention: Disease modification, treating exacerbations, identifying and treating symptoms
Worsening MS	Care planning and rehabilitation: Symptom management, emotional support, assessing and treating physical environmental changes
Advanced MS	Supportive care: Prevention of complications, access to full supports, symptom management, palliative care

Education

Education is an essential component of case management in each stage of MS, beginning with the patient's difficult task of adjusting to the diagnosis of a lifelong, progressively debilitating condition. Some patients will want to absorb every bit of available information about MS, but others may turn to denial as a coping mechanism and delay or refuse treatment. Others may turn to alternative treatment approaches in an attempt to seek a way around conventional treatment of this disease.

Disease Management

The entire treatment milieu has changed for MS patients since the introduction of effective disease modifying drugs. MS has gone from a disease for which very little could be done—popularly termed the "Diagnose and Adios" approach—to one where early and proactive use of disease modification strategies is the accepted management protocol. These drugs have successfully delayed disease progression in a substantial percentage of patients for many years.

Symptom Management

Still, despite the tremendous advances in managing MS in recent years, we do not yet know how to prevent it from happening, or how to fully treat the disease. Therefore, a great deal of health care must still focus on symptom management. This is a disease in which a myriad of symptoms can affect virtually any part of the body, with fairly little ability to predict which symptoms will affect which patients and when they might occur.

For example, some patients' primary problem is overwhelming fatigue. Others may have a relatively low level of physi-

cal disability, yet their lives are dramatically changed by the troubling problem of cognitive decline. People often think of mobility impairment as being the main issue in MS, and indeed envision a wheelchair-dependent patient when MS is mentioned. This is an important area of concern, yet many MS patients' main problems are with vision loss, spasticity, loss of bowel or bladder control, and pain, often neuropathic in origin.

Supportive Care

The case manager's function will change again for those patients whose disease progresses into advanced stages, to a primarily supportive role: emotional support for patient and family, home care strategies based largely on problems associated with reduced mobility, and help with decision-making as the patient is cared for in the home or in a residential facility.

Advocacy at Each Stage of MS

A key part of working with all MS patients as a nurse case manager is understanding how you can help: when to offer interventions that may benefit the patient, when to recommend that the patient consult with a neurologist or other MS care specialist, and when psycho-educational efforts are warranted to help the patient adjust to a new situation or learn effective self-care strategies.

Advocating for patients, to ensure that they receive the appropriate intervention for their specific needs, is a significant part of the nurse case manager's role. This may be especially true for patients who, for geographical or other reasons, cannot receive regular follow-up at a specialized, comprehensive MS care center or from an MS specialist. Still, the nurse case manager is never alone. Many excellent resources are available for case managers, caregivers, and patients. The Appendices of this manual will provide information about how to access many of those resources.

Applications to Case Management

In The Essence of Case Management, Llewellyn and Moreo state that case management "epitomizes best practice in the continued quest for a health care system based on wellness rather than illness."* This is an appropriate goal for case management in MS, as the latest MS care models are based on a wellness principle rather than illness. This model of care focuses on how the health care team can care for the whole patient, and how the patient can maximize quality of life despite MS.

Goals and Objectives of Case Management

Primary Goal: To provide services that ensure appropriate, quality care for individuals who are at risk, in a timely, cost-effective manner.

Objectives of case management include:

- Assist the patient and family to achieve optimum function;
- Coordinate the delivery of care, decrease fragmentation, and assure appropriate use of resources;
- Enhance the quality of life for the individual patient/family;
- Improve and facilitate interdisciplinary communication and planning;
- Help to strengthen the family unit when the disease worsens;
- Engage in health education that promotes wellness;
- Proactively identify problems and needs, and implement services that provide high-quality care to meet the individualized needs of the patient/family.

[Adapted from Llewellyn and Moreo. The Essence of Case Management, April 2001.]

* Llewellyn A, Moreo K. The Essence of Case Management. Washington, DC: Institute for Research, Education, and Consultation at ANCC. April 2001.

Section 1

Case Management for the Newly Diagnosed MS Patient

Marie A. Namey, RN, MSN

"Nursing case management is a dynamic and systematic collaborative approach to providing and coordinating health care services to a defined population. It is a participative process to identify and facilitate options and services for meeting individuals' health needs, while decreasing fragmentation and duplication of care, and enhancing quality, cost-effective clinical outcomes."
–American Nurses Association (ANA) official definition of case management

Introduction

A generation ago, the majority of patients with MS arrived at their diagnosis after years of mysterious symptoms, doctor-hopping, and frustration. Even when MS was suspected, it often took time to confirm this diagnosis. Understandably, physicians were not anxious to impose a basically hopeless diagnosis of MS if a more palatable (and treatable) source for the patient's symptoms could be found. For some patients, the initial reaction to an eventual diagnosis of MS was relief that they were not crazy and that there was an explanation for their problems and a name for their affliction.

In some parts of the world, where MS is not readily recognized, this scenario still holds true. In the U.S. and other developed countries, however, the process of diagnosing MS has been streamlined with greater clinical expertise regarding the earliest stages of this disease, and the use of magnetic resonance imaging (MRI) techniques to support the diagnosis.

Demographics of MS

The average age of onset in MS is between 20 and 50 years,[1,2] although there are exceptions. It occurs more commonly in woman than in men, at a ratio of greater than 2 to 1, especially among younger patients.[2] MS is more common in Caucasians than in other races, although this gap seems to be slowly closing with people of African background, Middle Eastern heritage, Latinos, and Asians being diagnosed more frequently during the past several decades.[1,2] While MS is not a disease that occurs at a high incidence or prevalence, there is a gene-linked susceptibility involved in its occurrence. The risk of a child acquiring MS at any age is about 1 in 100 if an aunt or uncle has MS and about 1 in 40 if a parent has MS, in comparison to a lifetime risk ranging from 1 in 750 to 1 in 1,000 for the general population.[3]

The exact cause of this disease still unknown, although it is believed to result from a combination of genetic susceptibility and an autoimmune process, possibly triggered by an unknown viral or environmental agent.

Childhood onset of MS

Only about 5% of patients fall outside of the age range of 10 to 50 years for diagnosis of MS, but this is admittedly a very broad range. More cases of MS are being identified during childhood and adolescence, partly due to better understanding of the disease in its early stages. Among the 400,000 Americans estimated to have MS, about 8,000 to 10,000 are children or adolescents, according to the National Multiple Sclerosis Society (NMSS).[4] Other children might have had symptoms or an episode indicative of MS, but often diagnosis is delayed until their teen or adult years because these signs are nonspecific and fleeting. Childhood diagnosis of MS is particularly difficult for the family, and specialized care should be sought with a health care team familiar with managing these cases.

What Causes the Neurologic Damage in MS?

In a person with MS, inflammatory cells cross the blood-brain barrier and into the central nervous system (CNS), where they damage nerve tissues, partly by demyelinating (removing the myelin coating) from the nerve cells (which include neurons and axons). This

results in areas called "plaques" in the CNS—most often in the optic nerves, spinal cord, brain stem, and cerebellar white matter—which are visible on MRI. The inflammatory activity tends to occur in a cyclic manner, gradually increasing growth of these plaques. These attacks may occur as many as 5 to 12 times a year (based on newer understanding of MS using MRI),[5] and we now know that they can cause neurologic damage even if"clinically silent." Over time, this process causes permanent and progressive damage to neurologic function.

Earliest MS Symptoms

Patients who undergo a diagnostic workup for MS may have a history of troubling and sometimes puzzling neurologic symptoms. The earliest signs may include visual changes such as diplopia (double vision) or numb or tingling sensations in the limbs. In a report by McAlpine and colleagues,[6] the incidence of initial symptoms in newly diagnosed MS patients included the following (either alone or in combination with other symptoms):

- motor weakness, limbs (40%)
- optic neuritis (22%)
- paresthesia/sensory disturbances (21%)
- diplopia (12%)
- vertigo or vomiting (5%)
- bladder function disturbance (5%)

Other early symptoms may include spasticity (stiffness), ataxia (incoordination), and dysarthria (speech difficulties caused by changes in the muscles and nerves controlling speech).

Diagnosis of MS

The clinical diagnosis of MS has evolved over the years as imaging techniques have become more sophisticated. Standard methods for diagnosing MS include the Schumacher,[7] Poser,[8] and most recently the McDonald[5] criteria (see Table). Older criteria used for diagnosing MS required evidence that disease activity had appeared over time, and in different areas of the central nervous system. Obviously, this dissemination of disease is what clinicians want to prevent through therapy.

Clinically isolated syndrome (CIS)

Traditionally, a formal diagnosis of MS was made after two episodes, or "attacks," of unexplained neurologic symptoms had occurred. Clinically isolated syndrome (CIS) is the term for a patient who has had just one of these attacks, plus MRI findings indicative of demyelination. A definitive diagnosis of MS has not been made, but the findings are suggestive. According to the American Academy of Neurology guidelines on early diagnosis of MS,[9] the available evidence suggests that early treatment of clinically isolated syndrome with MRI abnormalities lessens disease activity and severity.

Table 1

2001 McDonald Criteria[5] for Diagnosing Multiple Sclerosis

Clinical Presentation	Additional Data Needed
➤ 2 or more attacks ➤ 2 or more objective clinical lesions	None; clinical evidence will suffice (additional evidence desirable but must be consistent with MS)
➤ 2 or more attacks ➤ 1 or more objective clinical lesions	Dissemination in space, demonstrated by: • MRI, *or* • positive CSF and 2 or more MRI lesions *or* • further clinical attack involving different site
➤ 1 attack ➤ 2 or more objective clinical lesions	Dissemination in time, demonstrated by: • MRI, *or* • second clinical attack
➤ 1 attack ➤ 1 objective clinical lesion (monosymptomatic presentation)	Dissemination in space, demonstrated by: • MRI *or* • positive CSF and 2 or more MRI lesions Dissemination in time, demonstrated by: • MRI, *or* • second clinical attack
➤ Insidious neurologic progression suggestive of MS (primary progressive MS)	Positive CSF *and* Dissemination in space, demonstrated by: • MRI evidence of 9 or more T2 brain lesions *or* • 2 or more spinal cord lesions *or* • 4–8 brain and 1 spinal cord lesion *or* • positive VEP with 4-8 MRI lesions *or* • positive VEP with < 4 brain + 1 spinal lesions *and* Dissemination in time, demonstrated by: • MRI, *or* • continued progression for one year

Role of MRI in diagnosis of MS

Conventional MRI techniques measure the properties of protons on water and other molecules. MRI has become an essential tool for diagnosing MS and excluding other disorders. The appearance of new lesions, or enhancements, on MRI scans can now be used as substitute for diagnostic criteria that formerly called for a clinical symptom or a relapse—at least a second one—to make a definite diagnosis.

Among several types of MRI used in MS are gadolinium-enhanced scans, which help show the active nature of MS. Gadolinium is an injected contrast agent used to measure properties of the blood-brain barrier (BBB). When inflammation occurs in a disease process, gadolinium can leak across the BBB and indicate active disease even when clinical symptoms are not present. The number of gadolinium-enhancing lesions provides an idea of how active the disease is at a specific moment in time, but is a very weak predictor of disease progression and also has a poor correlation with disability.[10]

A dark signal, or "black hole," on a T1-weighted scan is a marker of axonal loss and tissue injury. This type of destruction is strongly correlated with disability in MS. In addition, measurement of changes in brain volume (atrophy) on MRI is used as an overall marker of tissue damage and axonal loss.

Other diagnostic tools: Evoked potentials, cerebrospinal fluid

Evoked potential tests measure the speed of impulses along neurons using electroencephalography (ECG) studies. Demyelinated neurons transmit nerve signals slower than normal nerve cells, which can be detected via this test. The results are analyzed on a computer in comparison to normal response times. Specific types of evoked potential tests include visual, which measures activity of the optic nerve, brainstem, and somatosensory. Abnormal results in evoked potential tests, along with other signs, are strongly indicative of MS. Evaluation of cerebrospinal fluid (CSF) from a "spinal tap" is an older method used to diagnose MS that preceded the current MRI technology. While most MS patients display oligoclonal bands in the CSF, other conditions may cause this response as well. In addition, a small percentage of MS patients do not show oligoclonal banding detectable via this test. These tests are still used in research studies and are used to support a diagnosis of primary progressive MS for which MRI scans of the brain are frequently negative.

Differential diagnosis

Diagnosis of MS is getting more precise with better technology, particularly specialized MRI techniques, but it is not always a "slam dunk." MS symptoms are certainly not specific to this disease. Other conditions with symptoms that can mimic MS include lupus erythematosus and Lyme disease. A variety of other neurologic conditions, some very rare, can complicate the diagnostic picture. This is why some patients are said to have "possible MS" rather than a definitive diagnosis, until a thorough differential diagnostic process can be completed.

Table 2

Classification of MS Subtypes

The following four definitions were developed from an international survey conducted to standardize the terminology for classifying the varying presentations of MS disease course.[11]

1. Relapsing-remitting (RRMS)
Clearly defined relapse followed by periods of remission during which there is no apparent disease progression. Approximately 85% of those with MS begin with this form.

2. Secondary-progressive (SPMS)
Patients begin with relapsing-remitting disease but at some point convert to a more progressive course, with fewer relapses but steady worsening of symptoms and signs of MS. An estimated 75% of RRMS patients will change to a secondary course over time, but disease modification may in time alter that estimate.

3. Primary-progressive (PPMS)
Nearly continuous worsening disease course, possibly interrupted by minor improvements but otherwise characterized by to steady deterioration. Approximately 10% of MS patients fit this category.

4. Progressive-relapsing (PRMS)
Progressive disease from the point of diagnosis. Relapses occur but patient's disease progresses from each point without remitting or returning to baseline. A rarer form, affecting an estimated 5% of patients.

Subtypes of MS

This manual focuses primarily on the most common type of MS, relapsing-remitting (RRMS). Patients with this condition will often convert to a secondary progressive course, SPMS, over time. The latter sections deal with that transition. Classification of MS subtypes is summarized in Table 2.[11]

Devic's disease (Neuromyelitis optica)

A variant of MS, Devic's disease is a distinct form of MS that affects mainly people of Asian descent and

affects primarily the optic nerves and spinal cord. While there may be lesions elsewhere in the CNS, these lesions tend to be characterized by more axonal loss, less scarring, and decreased cellular infiltration.

Patient Education: Accepting the Diagnosis

Case managers who are called to work with patients in the earliest stages of an MS diagnosis are faced with both challenges and opportunities. The opportunities include helping to shape the patient's course from the beginning and ensuring that appropriate management is begun early, instead of having to deal with problems that may have arisen as a result of mismanaged treatment. One of the primary challenges often relates to providing patient/family education about the disease along with positive and encouraging emotional support.

An NMSS consensus statement identifies three main areas that contribute to quality of life for the MS patient: knowledge, health, and independence. According to Holland,[12] educational goals for individuals with MS include:

1. Understanding the diagnosis and successful coping with its potential impact on one's life
2. Planning regarding critical areas such as relationships, parenting, employment, and lifestyle
3. Preventing potentially disabling outcomes, with specific goals related to new symptoms.

Stages of Acceptance

Emotional reactions

In their chapter on Psychosocial Implications of MS, Springer et al[13] said: "Diagnosis of MS evokes an array of emotional responses that can range from shock, grief, anger, and fear, to profound relief in the knowledge that the reason for their symptoms has finally been discovered. Nurses should develop care plans that effectively ease patients' movement through this emotional roller coaster and assist in the development of an effective nurse-patient relationship."[13]

Or, as Samuel and Cavallo said, "Most of us assume we will be healthy forever. Losing that illusion is devastating, particularly in early or middle adulthood. Just as no two cases of MS are identical, no two reactions are exactly the same."[14]

During the initial shock, patients rarely "hear" the details of the conversation. Not much information can be absorbed after the words "you have multiple sclerosis" are uttered. As the news sinks in, it can be helpful for the person to write down questions for the neurologist or nurse as they arise, or to ask a family member to do so, or to take notes during the conversation.

Why me? Why did I get this?

An important part of the early educational process is assuring the newly diagnosed patient that there is nothing he or she "did" to trigger MS. Nor do we have ways to prevent the disease from occurring with certainty, even if susceptible individuals could be identified. Patients at this stage are extremely vulnerable to misinformation that abounds, especially on the Internet. As the coordinator of care, the case manager can help steer patients toward reliable information sources and reassure them as they grapple with the "Why me?" stage that often accompanies a difficult diagnosis.

Moving from shock to grief

According to Samuel and Cavallo, the second phase of accepting the diagnosis, after the initial shock wears off, is often one of grieving and loss. "After an initial period of denial, many people feel very angry," they note. "We are accustomed to thinking that disease can be conquered, and frustration is high when it cannot."[14]

While patients should be reassured that this stage of grief is normal and the feelings of anger and/or depression are common reactions to this diagnosis, newly diagnosed patients today can also be given a message of hope and empowerment that MS can be fought against, and for many patients, can be controlled.

Where to turn: Support Groups, Informational Resources, Organizations

For many newly diagnosed patients, one of the first places to turn for resources is a major MS organization such as the National Multiple Sclerosis Society (NMSS) MS Foundation, or Multiple Sclerosis Association of America. These organizations have chapters and services throughout the United States (See Appendix). Many chapters have educational programs for newly diagnosed MS patients and their families. It is useful to note here that support groups for those with worsening MS or advanced disease are often not suitable for the new MS patient, because seeing others in wheelchairs and hearing about the extent of their problems may be too much for some newly diagnosed patients to handle. These patients often benefit more from interactions with peers who are learning to cope, as they are, with a strange and new concept.

Initiating Disease-Modifying Therapy

The philosophy of hope and empowerment about MS is relatively new. As recently as the late 1980s, symptom management and treatment of acute relapses was the extent of help medicine could offer, and the disease essentially had to run its course. Since the introduction of FDA-approved disease-modifying therapies in 1993, clinical studies have shown the effects these drugs have on reducing the number of relapses, limiting the degree of disability, and reducing the disease-related loss of brain tissue as shown on MRI. (More information about clinical trial results will appear in Section 2.)

Natural history of MS—What happened without disease-modifying therapy?

In order to grasp the impact these drugs have made in the past decade, it may be helpful to review the "natural history" data on MS and how quickly the disease progressed on average before these drugs were available. Before disease-modifying therapy, about 50% of people with RRMS entered a progressive phase within 10 years of diagnosis (although diagnosis was usually later in the disease course).[15] For example, a long-term study of patients using interferon beta-1b (Betaseron®) showed that only 6.9% converted to a progressive course after 10 years.[16]

The available disease-modifying MS drugs are discussed in more detail in the next chapter on RRMS. For the new patient, one difficult hurdle to get over is the fact that these drugs are injected. No approved oral disease-modifying therapies exist. For a few months, beginning in November 2004, the choices also included an infusible drug, natalizumab (Tysabri®), a monoclonal antibody. Although it had been FDA approved, Tysabri was withdrawn from the market in mid-February 2005 after a small number of cases of a rare, fatal condition called progressive multifocal leukoencephalopathy (PML), were attributed to the drug.[17] In the cases identified, patients were receiving Avonex® (interferon beta-1a) in combination with Tysabri. The drug is being studied and is expected to return to the market pending further research and analysis of data.

Currently, there are four FDA approved injectable medications for relapsing forms of multiple sclerosis (Betaseron, Copaxone, Avonex, and Rebif), and one infusible medication approved for worsening disease, mitoxantrone (Novantrone®).

TABLE 3

Nursing Strategies to Improve Adherence

- ➤ Nurse-patient relationship
  - • Empathize with patient
  - • Establish a trusting relationship
  - • Be accessible
  - • Provide reassurance
  - • Help set realistic expectations
  - • Maintain a sense of hope
- ➤ Communication
  - • Discuss diagnosis and treatment options
  - • Discuss treatment plan selected
  - • Offer reinforcement
  - • Discuss timetable for follow-up
- ➤ Education about treatment
  - • Provide written information
  - • Provide simple, structured directions
  - • Arrange for additional support to help patient and family:
    - —understand treatment plan
    - —implement plan
    - —integrate plan into current situation
- ➤ Continuity of care
  - • Provide indirect support (telephone, e-mail)
  - • Schedule regular follow-up
  - • Facilitate access to health care system
  - • Facilitate access to home care agencies
  - • Refer to appropriate specialists (physical therapy, occupational therapy, social work, psychology)
  - • Encourage use of community resources
  - • Advocate for access to care

Adapted with permission from Namey M. Advanced Concepts in MS Nursing Care.[20]

Facilitating adherence

Accepting the idea of giving oneself a "shot," on a regular basis, and getting over the fear of actually self-injecting a drug, are no small feats for a person still reeling from a devastating diagnosis. The nurse case manager can play a key role in helping patients through this stage, getting them to the point where administering the drugs becomes second nature, and helping them to stay on the drug so that they can benefit clinically from their therapy.

The term "adherence," (preferable to "compliance") has been defined as "the active, voluntary, and collaborative involvement of the patients in a mutually acceptable course of behavior that results in a desired preventive or therapeutic outcome."[17] This definition seems ideally suited to disease modifying therapy, because the patient's active, and voluntary, role is essential. That desired preventive/therapeutic outcome—keeping the disease from progressing—can be a very difficult goal for patients to keep in mind, because the beneficial effects of the drugs are not immediate or even noticeable to the patient in the near term.

Teaching injection technique

Once a decision is made about which drug therapy will be initiated, the patient may receive support services from the manufacturer for teaching the appropriate injection techniques and maintaining therapy. These support services involve follow-up contact with a nurse specialist assigned to support patients who are using that particular drug. The Appendix contains contact information for these services, which will serve as a key resource for the case manager and the patient. The case manager's involvement may include serving as liaison between the patient, the company-appointed clinical specialist, and the neurologist, to ensure that adequate and consistent information is being presented. If the case manager has more opportunities for direct contact with the patient, the case manager may be called on to provide assistance with injection techniques, suggestions for minimizing side effects, and assurance that the regimen is being adhered to on a regular basis.

Early drug side effects

It goes without saying that a drug can't help the patient if it isn't taken, or administered in sufficient doses. MS drugs are designed to provide benefits over the long term, after months or years on regular therapy. However, the initial side effects of some treatments may seem, to some new patients, to be worse than the MS itself. It is important for patients to understand that MS drugs are serious therapy—and adherence is critical. Staving off a disease like MS involves altering the immune system, and altering the immune system cannot be done, at this time, without risks or side effects.

That said, while some side effects should be expected to "go with the territory," the degree to which they occur will vary among individuals and by drug. Patients' tolerance to therapy is important to monitor.

Flu-like symptoms. Interferons as a class are associated with flu-like symptoms, which occur in up to 30% of patients, and may subside after several months of therapy.[18] These symptoms may include fever, chills, sweating, fatigue, and muscle aches. Steps to minimize these symptoms include use of OTC analgesics prior to the injection, and administering the drug at night with the intent of sleeping through the side effects. Glatiramer acetate has not been associated with flu-like effects.

Injection site reactions. For all the disease-modifying drugs, local injection-site reactions are the most common adverse events associated with therapy. The primary injection site-related side effects include redness, pain, swelling, and mild bruising.[19,20] Because interferon beta-1a (intramuscular) is injected through the skin, the usual skin reactions are not seen.

A notable but rare side effect associated with glatiramer acetate is an immediate post-injection reaction, in which the patient may experience chest tightness, facial flushing, palpitations, shortness or breath, and anxiousness. This effect (which is benign) occurs within the first few moments after the injection, is self-limiting, and generally resolves in about 10 to 20 minutes.[19]

Interferons have been associated with skin necrosis in a small percentage of patients (about 5% receiving interferon beta-1b), which typically develops within the first four month of therapy.[18] Another skin-related side-effect is lipoatrophy (subcutaneous tissue loss) which has been noted in a small percentage of glatiramer acetate users.[19]

Injections: Do I have to?

"Injecting myself is no fun, and the drug makes me feel lousy. Why should I bother to do it at all?" It's probably a rare patient who doesn't occasionally feel this way about MS disease-modifying therapy. It's important for the case manager to help these patients see the bigger picture. Assuming they are on the right drug and are responding well to it, they are preventing permanent neurological damage in the brain and spinal cord which would spell disability down the road for them—either cognitive or physical impairment, or both. As scary as the injection may be, the thought of this disability is even scarier.

The patient's ability to tolerate therapy is an important aspect of adherence. Data from one comparative clinical trial showed that fewer patients receiving Copaxone (8%) dropped during a six-month trial period as compared with any of the interferons (dropout rates ranging from 20% to 32%).[20]

Helping patients to understand of the benefits of taking charge of MS is the most powerful way to motivate them to begin and maintain regular therapy. It may be helpful for them to connect with others who have used these drugs for years and have had a positive experience and ongoing quality of life despite MS. Company-sponsored patient support groups (see Appendix) can be a good source for positive reinforcement.

No Guarantees

It is essential for the case manager to understand that disease management in MS does not carry a guarantee. Just as there is no one typical course and symptom set in MS, there is no way of predicting which patients might have a poor, or "suboptimal," response to the therapy selected. After several months on the drug, the neurologist will look for indications of whether the patient is responding well. As the person following the patient's case most closely, the case manager may be in a position to identify any potential "red flags" that the disease is progressing more rapidly than it should despite appropriate use of therapy. Nonadherence should be ruled out as a possible cause, and the nurse case manager may be able to provide valuable input in this respect. If the drug is indeed being used correctly but is still "not working," this does not mean that there is no hope for that patient. A different agent or different drug category may be warranted. For example, because the interferons have a different mechanism of action than glatiramer acetate (Copaxone), a patient not responding to one category might be switched to another. More information about response to therapy and switching drugs is included in the next section.

Settling into a Pattern

The next chapter will address disease-modifying therapy in more detail, addressing the fact that most new MS patients move on from the early shock and ignorance about MS and settle into a pattern in which they often become quite knowledgeable about the disease. Follow-up will be discussed, especially in case of an

acute exacerbation. The case manager will be a key individual coordinating care at the time of an acute exacerbation of MS, also called a "relapse" or "flare."

Conclusion

Patient/family education is a key aspect in this early stage of the disease process and sets the stage for successful ongoing management. The next section discusses relapsing remitting MS (RRMS), with a focus on disease-modifying therapy.

References

1. Halper J, Holland NJ. An overview of multiple sclerosis. Implications for nursing practice. In: Halper J, Holland NJ, eds: *Comprehensive Nursing Care in Multiple Sclerosis.* New York: Demos, 2002: 5.
2. Kurtzke JF, Epidemiology of multiple sclerosis. In Vincken PJ, et al (eds). *Handbook of Clinical Neurology*, Vol. 3, Demyelinating Diseases. Amsterdam: Elsevier, 259-587.
3. Ben-Zacharia A, Morgante M. The basics of genetics in multiple sclerosis. Consortium of Multiple Sclerosis Centers. Available at: www.mscare.org/pdf/geneticsandMS.pdf
4. National Multiple Sclerosis Society. About MS: Pediatric (childhood) MS. Available at: www.nationalmssociety.org/Pediatric_and_Childhood.asp.
5. McDonald WI, Compston A, Edan G, et al. Recommended diagnostic criteria for multiple sclerosis: guidelines from the International Panel on the Diagnosis of Multiple Sclerosis. *Ann Neurol.* 2001;50:121-127.
6. McAlpine D, Lumsden CE, Acheson ED. *Multiple Sclerosis. A Reappraisal*. London: Churchill Livingstone. 1972.
7. Schumacher G, Beebe G, Kibler R, et al. Problems of experimental trials of therapy in multiple sclerosis: report by the panel on the evaluation of experimental trials on therapy in multiple sclerosis. *Ann NY Acad Sci.* 1965;1:552.
8. Poser CM, Paty DM, Scheinberg LC, et al. New diagnostic criteria for multiple sclerosis: guidelines for research protocols. *Ann Neurol.* 1983;13:227.
9. American Academy of Neurology. The utility of MRI in suspected MS: report of the Therapeutics and Technology Assessment Subcommittee of the American Academy of Neurology. *Neurology.* 2003. 61:602-611.
10. Ford CC. MRI in MS: Seeing is not always believing. *Int J MS Care.* 2005;(suppl):8-11.
11. Lublin F, Reingold S. Defining the course of multiple sclerosis: results of an international survey. *Neurology.* 1996;46:907-911.
12. Holland NJ. Patient and family education. In: Halper J, Holland NJ, eds. *Comprehensive Nursing Care in Multiple Sclerosis.* 2nd ed. New York: Demos, 2002:191-203.
13. Springer RA, Clark S, Price E, Weldon P. Psychosocial implications of multiple sclerosis. In: Halper J, ed. *Advanced Concepts in Multiple Sclerosis Nursing Care.* New York: Demos, 2001:217.
14. Samuel L, Cavallo P. Emotional issues. In: van den Noort S, Holland NJ (eds). *Multiple Sclerosis in Clinical Practice.* New York: Demos;1999;107.
15. Weinshenker BG, Bass B, Rice GPA, et al. The natural history of multiple sclerosis. a geographically based study. *Brain.* 1989;112:133-146.
16. IFN, Study group. Interferon beta-1b in the treatment of multiple sclerosis: final outcome of the randomized controlled trial. *Neurology.* 1995;45: 1277-1285.
17. Namey MA. Promoting adherence to complex protocols. In: Halper J, ed. *Advanced Concepts in Multiple Sclerosis Nursing Care.* New York: Demos, 2001:63.
18. Betaseron® [package insert]. Montville, NJ: Berlex Laboratories; 2003.
19. Copaxone® [package insert]. Kansas City, MO: Teva Neuroscience; 2004
20. Haas J. Onset of clinical benefit of glatiramer (Copaxone) acetate in 225 patients with relapsing remitting multiple sclerosis (RRMS). *Neurology.* 2003;60(suppl 1):P06:105.

Case Studies

Case 1

Susan is 26 years old and has had symptoms of MS for approximately four years. She initially presented with optic neuritis but was not treated with steroids or disease-modifying therapy. At the time, based on MRI results, her diagnosis was clinically isolated syndrome (CIS). Recently, Susan developed vertigo, diplopia, and truncal ataxia, which after four weeks was treated with IV steroids. Analysis of cerebrospinal fluid was positive and her MRI showed many new lesions. The patient is very angry about lack of intervention in the earlier stages of her disease course. Her neurologist has prescribed a high-dose/high-frequency interferon for self-injection.

Case Manager Interventions

- The patient needs education and supportive counseling to promote adjustment to her diagnosis.
- She will need assistance to obtain her therapy and receive training in self-injection.
- She will require ongoing monitoring to see how she is adhering to therapy and adjusting to life with chronic illness.
- Management of side effects as they arise

Case 2

Jason is 35 and has had intermittent symptoms suggestive of MS for about ten years. He has never had disease-modifying therapy, but has educated himself about his condition and has tried a large number of alternative therapies in an attempt to ward off further neurologic deterioration. Finally this year, following a period of worsening neurologic symptoms, Jason agreed to an MRI, which revealed new disease activity and yielded a positive diagnosis of MS. While Jason seems somewhat interested in injected therapies, he is still reluctant to commit to this approach until he has tried a new alternative treatment, dietary supplementation with Tahitian noni juice, for several months.

Case Manager Interventions:

- Since there is no "cure" for MS, it's difficult to argue with patients who want to try alternative therapies. Instead, the case manager should help patients balance the methods they want to try (helping to rule out potentially harmful ones) with more proven therapies.
- Jason's interest in educating himself could be put to good use by steering him toward reliable information sources about the benefits of proven disease-modifying therapies.
- This patient might benefit from consultation with a neurologist who advocates disease-modifying therapies and has some knowledge of alternative therapies as well, so that an open discussion of Jason's own beliefs and treatment approaches can be maintained.

Section 2

Case Management in Relapsing Remitting MS

June Halper, MSCN, RN, ANP

Comprehensive care embraces a philosophy of empowerment in which the patient takes an active role in planning and implementing healthcare and self-care activities and acts as consultant to the team. This active, rather than passive, role is fitting in light of the fact that MS, like all chronic illnesses, is expected to last a lifetime.
—June Halper

Introduction

Following the initial stage of diagnosis, and the difficult process of informing and educating the new MS patient, the next step is usually to get patients onto disease-modifying therapy. For a significant percentage, this will serve to minimize relapses and stave off the "silent," ongoing neurological damage that we know is occurring even in the absence of an acute relapse. Getting qualifying patients onto the right therapy, keeping them on it regularly, and managing day-to-day symptoms and drug side effects, will be the primary focus of this section. An important point to remember is that in MS, these symptoms can vary widely from patient to patient.

First step: Getting the Patient on Disease-Modifying Therapy

Rationale for disease-modifying drugs

As discussed in the previous chapter, numerous studies have established that MS patients maintain their physical health, independence, and quality of life much longer when they receive disease-modifying therapy. From an economic standpoint, keeping a person ambulatory, still employed and productive, and without needing higher levels of nursing care is preferable financially, not to mention far better for the individual and society. MS is a lifelong disease, and invariably an expensive one. But compared with the potentially catastrophic results of a disease left unchecked, treating these patients with a drug that maintains their health is beneficial in the long run. Major MS organizations such as the Consortium of Multiple Sclerosis Centers (CMSC) and the NMSS advocate early and ongoing therapy with a disease-modifying drug for patients who have a suspected or definitive diagnosis of RRMS. Major insurers cover these drugs, at least partly, as does Medicare/Medicaid under certain conditions.

ABC-what?

MS old-timers may refer to the main disease-modifying drugs as the "ABC drugs," which stands for the brand names Avonex, Betaseron, Copaxone. When a third interferon, Rebif, was introduced in 2002, this acronym became "ABCR." The chemotherapeutic agent Novantrone (mitoxantrone) is also technically considered a disease-modifying drug. This agent will be discussed separately in section 3, on Worsening MS. Therefore, except where specified, this manual will refer to disease-modifying drugs as the main four: Copaxone (glatiramer acetate) which is a non-interferon immunomodulator, and three interferons (Avonex, Betaseron, and Rebif).

A note on Tysabri® (Natalizumab)

In 2005 a new monthly infusion therapy for MS, natalizumab (Tysabri) was taken off the market less than three months after its approval. Natalizumab, a monoclonal antibody, is the only drug of this type ever approved for MS. At the time of this printing, two patients receiving combination therapy with natalizumab and interferon beta-1a intramuscular (Avonex) had developed a rare, fatal brain infection called progressive multifocal leukoencephalopathy. The combination of natalizumab with the interferon is considered to be the most likely source of this serious complication. These deaths, and the associated publicity, set off a great wave of concern and fear among people with MS who were on the drug or considering trying it.

While the MS community regrets this loss of a potentially effective drug, it is now more important than ever to emphasize the safety of the remaining, available agents. These drugs now have long-term data on safety and efficacy experience in this country extending back over 20 years. In addition, published data from long-term clinical trials now extend back as long as 15 years[1] with information from patients on continuous therapy for the duration of that time.

Evidence-based summary of efficacy

The American Academy of Neurology and The MS Council for Clinical Practice Guidelines released an evidence-based analysis of disease-modifying MS drugs in 2002 which remains a valuable document for MS care providers and case managers.[2] Using an evidence-based model, this paper analyzes the results of a number of large clinical trials and presents the level of evidence (Level A being the highest) which exists to establish that these drugs reduce relapse rate, disease progression based on disability measures, and disease progression based on MRI findings.

The effectiveness of an MS drug is determined in a number of ways. Some of the endpoints in MS clinical trials are outlined in Table 1.

Placebo-controlled trials of MS drugs are, of necessity, fairly short, but have served as the basis for FDA approval of these drugs. In the placebo-controlled trials, reduction of relapse rates was a key endpoint, which averaged about 30% compared with placebo.[3-5] Comparative trials of these drugs have also been conducted. Trials comparing the interferon formulations have established that more frequent dosing with interferon beta-1b) (Betaseron) and subcutaneous interferon-1a (Rebif) is more effective than the once-weekly intramuscular form, Avonex.[6]

Results from large comparative trials among different categories of MS drugs are beginning to be available. In a German study comparing glatiramer acetate (Copaxone) with all three interferons in 283 MS patients, reduction of relapse rate was the primary endpoint, which was significantly reduced for all the drugs. Copaxone had the highest reduction in relapse rate.[7]

Clinical trials also tell us something about how many people are willing to stay on drug therapy. In the trial mentioned above,[7] dropout rates were 20% to 32% by six months for the interferons and 8% for Copaxone during the entire 24-month study period, demonstrating the overall improved tolerability of this drug versus the interferons.

Those staying on therapy long-term fare better

Long-term data now emerging are very telling about how well these drugs work. One study of interest is an ongoing trial of Copaxone,[8] which included a group of 108 patients who remained on the therapy for 10 consecutive years and returned every six months for evaluation. Efficacy results from these patients were compared with those of 47 patients who dropped out of the Copaxone trial but were willing to return after 10 years to be evaluated. (Some of these patients were using other MS drugs in the interim.)[8]

A total of 50% of the dropouts reached an EDSS level of 6 (representing the need for a cane) 10 years after the start of the trial, compared with just 9% of those who remained on the drug.[9] For the group remaining on therapy, the mean EDSS scores went from 2.56 at baseline to just 3.6 after 10 years, a remarkably small change. However, among those who dropped out of the trial, mean EDSS went from 2.84 at baseline to 5.11 after 10 years (2.25 steps higher).[8]

MRI Changes: The Importance of Keeping What You Have

Clinical benefits such as those described above are of key importance to the patient MRIs, which are conducted as part of clinical trials, also show why these drugs are of such importance. We now know that the inflammatory cells that are present in the CNS of MS patients are actually able to sever a nerve cell (fiber or axon), in addition to eating away at the myelin which coats the each axon. MS patients develop what are called "black holes" on the MRI indicating loss of nerve tissue, in addition to brain atrophy.

Unless they are participating in a clinical trial, most MS patients do not have MRIs on a regular basis. However, it is important for them to understand that these insidious changes are taking place even in the early stages of the disease—before the person experiences severe disability from them—and that it is crucial to keep them to a minimum. The evidence shows that the disease-modifying drugs are most beneficial the earlier they are given in the disease course.[2] Once the damage has been done, there is no turning back and restoring the lost myelin or brain

Table 1

Efficacy Measures for MS Drugs[2]

- Lower annualized relapse rate
- Longer time to first relapse (after drug therapy is initiated)
- Longer time between relapses
- Reduced progression of disability (Advancement on Expanded Disability Status Scale; EDSS) and other measures
- MRI measures
  - No or fewer new lesions
  - No gadolinium-enhancing lesions
  - Smaller new lesions

tissue (at least, with the present technology). Therefore, getting the patient on a therapy as soon as possible is a primary goal. The nurse case manager is often an integral part of this decision-making process.

Drug Selection: Which One is Right for the Patient?

A team approach to selection of initial drug therapy has been found to be the most effective. Ideally, this team should include the nurse case manager, other MS nurse specialists, the neurologist, and the patient and family. Factors that may weigh in this important decision might include the patient's eligibility for a clinical trial (usually these enroll "naïve" patients who have not been on these drugs in the past), the injection schedule, the patient's perceived ability to deal with side effects, and the neurologist's evaluation of the patient's disease course.

As mentioned in the previous chapter, the patient will have to accept the idea of these injections and then learn how to do perform the injection, in some cases with the assistance of a close family member.

Nonadherence and discontinuation of therapy

Clearly, the patient who does not follow through with regular injections is not going to benefit from the drug. This presents a challenge in MS, particularly, because the benefits are not immediately apparent—symptoms do not magically disappear as a result of the injection. Understandably, dropouts and nonadherence are significant concerns in this patient population. The nurse case manager cannot be there to witness every injection or to administer them for the patient. Training and helping patients gain confidence in this process are critical educational steps. Obviously, these benefits of these drugs are meaningless if the patient has difficulty tolerating the side effects and stops therapy.

Recognizing and Managing Relapses

An exacerbation of MS has been defined as "a sudden worsening of an MS symptom or symptoms, or the appearance of new symptoms, which lasts at least 24 hours and is separated from a previous exacerbation by at least one month."[10] Other terms for an exacerbation include attack, relapse, and flare. Acute exacerbations—followed by complete or partial recovery with no obvious disease progression between attacks—are a hallmark of relapsing-remitting MS.

While an exacerbation should be a clearly defined entity, it can be confused with a minor symptom flare or even side effects from medications. For example, heat causes MS symptoms such as fatigue to worsen, and a particularly bad reaction when the patient becomes overheated might be confused with an exacerbation. Infections or fevers are other causes. Intense stress is another condition that has been linked to MS symptoms, but these data remain controversial. Situations that lead to increased symptoms of MS in the absence of a true exacerbation are sometimes called "pseudoexacerbations."

How are true exacerbations distinguished?

True exacerbations of MS are caused when an area of inflammation in the CNS causes demyelination, or deterioration of the myelin sheath coating the nerve fibers or interferes with nerve conduction. This leads to the formation of an abnormal area called a *plaque* which interrupts the flow of nerve impulses, thus producing neurologic symptoms such as visual disturbance or disruption of motor function. True exacerbations usually last days or weeks, or even months in some cases, and can range from mild to severely disruptive. Recovery may take several months and may be incomplete.

Management of the acute exacerbation

Fortunately, in the case of acute exacerbation or relapse, there is something that can be done: steroids have been shown to reduce the duration of attacks, presumably by reducing inflammation in the CNS. Acute exacerbations are usually treated with intravenous or oral corticosteroids, which have been shown to shorten the duration of attacks. A typical regimen is usually 1 gram IV methylprednisolone per day for three to five days.[11,12] This is often followed by an oral taper using dexamethasone or prednisone. Some patients may be treated with a course of oral corticosteroids only.

Many patients who undergo steroid therapy for their acute exacerbations find themselves feeling reenergized after this therapy and may believe that the steroids would be beneficial to them long-term. These patients should be educated about the significant toxic effects of long-term steroid treatment and told that these agents have no utility in long-term management of this disease.

Emotional response to relapse

Exacerbations are frightening and extremely distressing to the patient. Exacerbations are a sign that a disease that he or she may have succeeded in pushing into the background has now reared its head again and threatens to take over. An exacerbation for an MS patient might be likened to a cancer patient being in remission and then finding that the disease has begun to spread again. In addressing the emotional response to relapse or exacerbation of MS, the case manager can look to the family and patient's personal support system, as well as the rest of the MS care team. Referral to counseling services may be beneficial for some patients.

Remission

Especially in the early stages of MS, an acute exacerbation may be followed, much to the patient's delight and relief, by a return to baseline level of functioning, as indicated by the diagram below.[13] A remission does not mean that MS is gone, but rather that a person with MS appears clinically to return to the baseline that existed before the last exacerbation began. As the disease progresses, these patients will normally have some residual deficits following subsequent remissions, until they move into a progressive course in which relapses no longer occur. Recovery from a relapse is, unfortunately, often incomplete.

Determining an Optimal Response to Therapy

A certain proportion of patients do not have a positive response to the MS disease-modifying therapy selected. In 2004, an expert task force commissioned by the NMSS released a position paper with recommendations on determining an optimal response to therapy and changing therapies.[14] In essence, this paper concluded:

- Relapses occur relatively infrequently in RRMS; thus it is unlikely that treatment failure could be declared within six months of compliant use of an MS drug.
- It is unclear whether the efficacy of approved MS treatments is due to a partial responsiveness of all treated patients, or a complex mix of complete, partial, and unresponsive patients. Nor is it fully appreciated whether unresponsiveness or partial responsiveness to a treatment may develop over time.

Markers of a suboptimal response

Indications that a patient may be having a poor or "suboptimal" response to a drug include:[14]

- **Attacks.** The NMSS task force states that "declaring treatment failure based on a single attack on therapy is not justified by the known efficacy of these agents."
- **EDSS.** Increase in the EDSS of 1 point in a year, or from a previous score of 3.0 to 5.5, or a 0.5 point increase from a previous score of 6.0 or greater in the absence of clinical attacks, should raise concern. This may indicate that the previously relapsing-remitting patient has transitioned to secondary-progressive disease, or that the secondary-progressive patient has only a partial response to therapy. In the low EDSS ranges (under 3.0) measurement of these changes is too variable to use as a sole determining factor of treatment failure.
- **MRI.** Three or more enhancements, or two or more new T2 lesions on each repeated scan separated by at least quarterly intervals, would be considered "excessive MRI activity."

The usual course of action for a patient who does not respond to the original drug selected is, of course, to try another agent. If the initial agent is one of the interferons, Copaxone may be an appropriate choice since it has a different mechanism of action, and vice versa. Patients who switch therapy will need to be retrained on the new drug and become accustomed to its dosage schedule. Again, the manufacturer's support system will be implemented for this transition, and the patient will encounter different personnel, emphasizing the importance of continuity of care from the nurse case manager.

Unfortunately, some patients remain refractory to all of the available disease-modifying drugs.

A word about neutralizing antibodies

Neutralizing antibodies are a highly controversial aspect of MS drug therapy. These antibodies can be detected in the blood of some patients taking interferon-based agents. While their effect on efficacy is subject to debate, some believe that the presence of neutralizing antibodies indicate that the patient has developed a resistance to the drug that reduce its activity. On this topic, the task force mentioned above stated:

> *"The presence of neutralizing antibodies to interferon beta may be associated with incomplete response to therapy. The presence of neutralizing antibodies to interferon in the face of continued frequent relapses or excessive MRI activity may justify the use of non-interferon disease-modifying drugs. Presently, in the absence of clinical or MRI activity, finding high titer interferon beta neutralizing antibodies in the serum does not warrant a change in therapy. This conclusion may need to be revised as additional evidence accrues."*[14]

While the development of neutralizing antibodies is linked to interferons used to treat MS, glatiramer acetate has not been shown to be associated with the development of neutralizing antibodies.

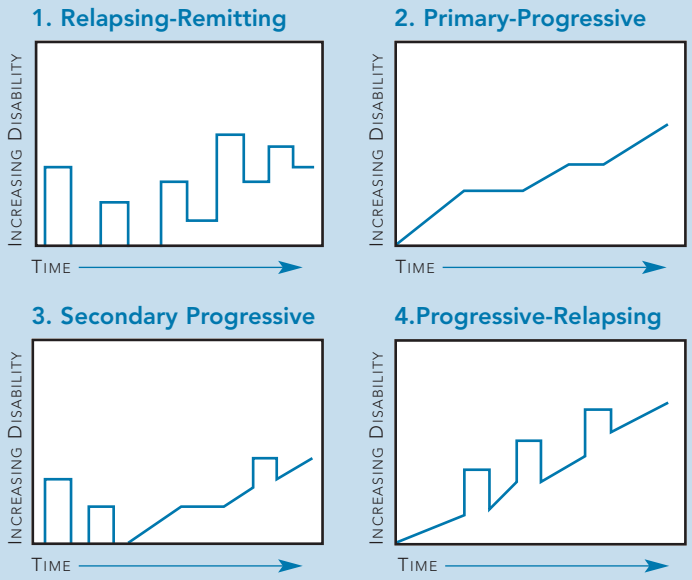
It should be noted that some insurance companies consider neutralizing antibody assays to be "experimental" and thus do not cover the cost of this test.

The Expanded Disability Status Scale (EDSS): Uses and Limitations

Any health professional reading the literature on MS will see many references to the Kurtzke Expanded Disability Status Scale (EDSS), a measure of disability in MS and a way to chart disease progression or outcome measures in clinical trials (See Table, EDSS).[15] While it is useful for the case manager to be aware of what the EDSS is, there are some important cautionary notes. The EDSS does not tell the whole story about the patient's degree of functioning. This is because the impact of certain disability parameters, such as cognitive impairment or fatigue, cannot really be weighed directly against mobility factors, which are the focus of the EDSS. Substantial cognitive impairment may be

FIGURE.

Types and Courses of MS



Reprinted with permission from: Halper J. Advanced Concepts in Multiple Sclerosis Nursing Care. Demos. 2001.[13]

present in a patient who is fairly young and ranks quite high on the EDSS. Other patients may be quite immobile but still possess their mental faculties. Others could be functionally blind, or suffer from severe spasticity. While EDSS is not as useful in clinical practice, it is useful in clinical trials of disease-modifying drugs.

Because of this, the relative degree of disability caused by this disease must be evaluated on a case-by-case basis. Likewise, it is essential that planning of appropriate interventions be dynamic and focused on each individual patient's needs.

Wellness and MS

The "Wellness Model" for MS, as defined by Clark,[16] states that people can be ill and still have a "deep appreciation for the joy of living and a purpose in life." In numerous MS patient-run or patient-oriented web sites, support programs, and organizations, we see examples of how this philosophy has helped many patients to accept their condition, fight it when they can, and move forward when the disease presents them with limitations.

Exercise

The current wellness focus to care emphasizes another paradigm shift in managing this disease. Years ago, patients were discouraged from exercising lest anything strenuous spark an exacerbation. Now, exercise is highly recommended and some activities such as yoga, T'ai chi, walking, and swimming may be especially beneficial.[17]

Diet and Nutrition

At some time most MS patients are bound to hear that a specific dietary approach is capable of "curing" their MS. While good nutritional planning is important in all MS patients' health maintenance, no dietary supplement or elimination of certain foods has been proven to have an effect on the disease course, despite anecdotal claims to the contrary. Poor nutrition can make a patient more prone to infection or complications, and fiber and fluid intake can have an impact on constipation, which is a common complaint in MS. Weight control is important in managing both the disease and the patient's overall health.

Pregnancy

Another example of the paradigm shift: women with MS were once discouraged from becoming pregnant, or simply told they could not get pregnant at all. Today, evidence shows that most women with RRMS have normal pregnancies, labor, and delivery, and many are able to go through the pregnancy without being categorized as high-risk. However, the hormones present in pregnancy do have some implications in MS. On one hand, many women report feeling better during the pregnancy and feel that their MS symptoms have abated during its course. Relapses tend to be reduced during pregnancy. Experimental therapies have explored whether these hormones could have a therapeutic effect on female MS patients who are not pregnant. On the other hand, increased exacerbation risks soon after the birth have been demonstrated. Resources on pregnancy and MS were once scant, but are now expanding to help the case manager and patient navigate this special and important life stage. Planning for infant care and extra help for the new mother in the early postpartum period are especially important, as mothers with MS may be particularly susceptible to severe fatigue or other setbacks during this time.

Disease-modifying therapy during pregnancy is controversial, and no clear guideline has been developed about when to stop—and when to resume—the patient's disease-modifying drugs. The interferons are all Category C, meaning that they are abortifacient. Copaxone is Category B, which, according to the Food & Drug Administration, means that "if there is a clinical need for a Category B drug, it is considered safe to use it."[18] Prenatal vitamins and acetaminophen are also classified as Category B. Whether to continue Copaxone through the pregnancy should be decided on a case-by-case basis, preferably as part of a collaborative effort by the obstetrician, the neurologist, and other MS care specialists close to the patient.

Employment/Productivity

Issues related to employment are a major concern, especially because MS tends to strike young adults just embarking on careers or in their most productive years. An estimated 25% of people with MS are working, and another 25% have expressed a desire to return to the workforce.[19] Fatigue and cognitive impairment can be detrimental to a person's ability to work, even if no visible disability is present. Many patients strive to keep their MS a secret from employers and coworkers, fearing discrimination or possible job loss. The case manager can review legal issues pertaining to the Americans With Disabilities Act, Family Medical Leave Act, and other pertinent guidelines with the patient. When these people do reveal their condition, workplace accommodations should be explored. These might include allowing the employee to rest more often during the day or allowing some work to be done from home, depending on the type of job. Health and life insurance issues should also be explored.

Parents with MS who care for their children at home are another special population. The stress, guilt, and fatigue these people (often mothers) experience while keeping up with the physical and emotional demands of a young child or children can be particularly difficult to endure. The case manager can help these parents explore support systems and backup plans for days when they need extra rest or to help with errands involving a lot of footwork or driving. Education about MS may be useful for spouses as well as older children.

Paying for MS Drugs: Coverage Issues

Disease-modifying therapy is expensive, ranging from about $16,000 to over $20,000 per year.[9] A variety of strategies can be used by MS patients to obtain assistance with this substantial cost. The NMSS and other MS organizations can provide more information about how individual patients can obtain funding assistance. Specialized MS centers also have this information.

- Private health insurance, as long as the plan pays for prescription drugs and these drugs are on its formulary.
- Medicare Part B. This program has traditionally covered only Avonex (because of the type of injection, which is intramuscular, and only if it is given in a clinicians' office). However, an expansion program called the Medicare Demonstration Project was recently adopted to cover up to 80% of the cost of MS drugs for qualifying individuals. The NMSS provides more information about this program as it affects MS patients, at www.nationalmssociety.org/medicare_demo.asp. People with MS may qualify for Medicare coverage before age 65 if Social Security determines that they are permanently disabled.
- Medicaid, which pays for health care for low-income Americans, does include prescription drug coverage, but the formularies vary state by state.
- Drug company clinical trials and assistance programs. Patients who enroll in clinical trials usually have the drugs and other services such as MRI provided free of charge. The manufacturers of MS drugs also have financial assistance programs and provide help to people with MS in applying for government assistance.

Medicare Part D is an important new program providing prescription drug coverage for MS patients. Information about enrollment appears on page 24.

Conclusion

MS strikes in the prime of life, among people who are rarely willing to accept disability as a part of their self-image. Disease-modifying therapies can keep patients functioning at a higher level much longer, and work best if they are introduced early in the disease course. Because their benefits are long-term and not something the patient can see or touch, adherence can be a problem, with medication side effects influencing this. The nurse case manager plays an important role as a liaison in keeping RRMS patients on therapy and monitoring their response to therapy. The MS drug manufacturer's support services can be a key resource.

References

1. Data on file, Teva Neuroscience.
2. Goodin DS, Frohman EM, Garmany GP Jr, et al. Disease modifying therapies in multiple sclerosis: report of the Therapeutics and Technology Assessment Subcommittee of the American Academy of Neurology and the MS Council for Clinical Practice Guidelines. *Neurology*. 2002. 58:169-78.
3. Johnson KP, Brooks BR, Cohen JA, et al. Copolymer 1 reduces relapse rate and improves disability in relapsing-remitting multiple sclerosis: results of a phase III multicenter, double-blind placebo-controlled trial. *Neurology*. 1995;45:1268-1276.
4. IFNB Multiple Sclerosis Study Group. Interferon beta-1b is effective in relapsing-remitting multiple sclerosis: I. clinical results of a multicenter, randomized, double blind, placebo controlled trial. *Neurology*. 1993;43:655-661.
5. PRISMS Study Group. Randomised double-blind placebo-controlled study of interferon beta-1a in relapsing/remitting multiple sclerosis. *Lancet*. 1998; 352:1498-1504.
6. Johnson KP. Practicing responsible evidence-based medicine: applications for the management of MS patients. *Int J MS Care*. Feb 2005; suppl 1:4-8.
7. Haas J. Onset of clinical benefit of glatiramer (Copaxone) acetate in 225 patients with relapsing remitting multiple sclerosis (RRMS). *Neurology*. 2003;60(suppl 1):P06:105.
8. Johnson KP, Panitch HS, Ford CC. Long-term slowing of disability progression in patients receiving continuous glatiramer acetate compared with those withdrawing from therapy: 10-year results from an ongoing trial. *Neurology*. 2004;62(suppl 5):S20-S24.
9. National Multiple Sclerosis Society. Comparing the disease modifying drugs. Available at: www.nationalmssociety.org/Brochures-Comparing.asp
10. National Multiple Sclerosis Society. Exacerbation. In: Multiple Sclerosis Information Sourcebook. 2003. Available at: www.nationalmssociety.org/Sourcebook-Exacerbation.asp.
11. van den Noort S. Treatments to reduce disease progression and disability. In: van den Noort S, Holland NJ. Multiple Sclerosis in Clinical

Practice. New York: Demos. 1999:23-33.
12. Schapiro RT, Schneider DM. Symptom management in multiple sclerosis. In: Halper J, Holland NJ (eds): *Comprehensive Nursing Care in Multiple Sclerosis*. New York: Demos, 2002:32.
13. Halper J. The nature of multiple sclerosis. In: *Advanced Concepts in Multiple Sclerosis Nursing Care*. New York: Demos, 2001:1-26.
14. National Multiple Sclerosis Society, Medical Advisory Board. Disease Management Consensus Statement. 2005. Available at: www.nationalmssociety.org/pdf/forpros/Exp_Consensus.pdf
15. Kurtzke JF. Rating neurologic impairment in multiple sclerosis: an expanded disability status scale (EDSS). *Neurology*. 1983;33:1444-1452.
16. Clark CC. *Wellness Nursing: Concepts, Theory, Research, and Practice*. New York: Springer, 1986.
17. Karpatkin H. Exercise in multiple sclerosis: A review of the evidence. *Int J MS Care*. 2005;2:36-41.
18. Meadows M. Pregnancy and the drug dilemma. *FDA Consumer*. 2001;35. Available at: www.fda.gov/fdac/features/2001/301_preg.html
19. Johnson KM, Bruyere SM. Workplace accommodations for people living with multiple sclerosis. Cornell University, Employment and Disability Institute Collection. May 2001.

Case Studies

Case 1

Samantha is a 28-year-old woman with MS who has been on disease modifying therapy for two years. She has a high school education; her husband is a truck driver. She has two small children and has problems making ends meet at home. She calls her case manager to state that her MS is stable and she wishes to stop treatment at this time. The case manager ascertains that the patient is tired of self-injecting and that her husband is unwilling to assist her. He asserts that since her relapses have stopped, there is no reason for her to continue therapy.

Case Management Interventions

- This patient would benefit from an update on the long-term benefits of disease modifying therapy.
- It would be important to discuss the patient's financial concerns regarding daily expenses and the burden that injectable therapy is imposing on her.
- A family meeting might be helpful at this time to educate the patient and family.
- Family counseling would be helpful throughout the family's adjustment to a growing family and the uncertainty of MS.

Case 2

Charles is a 31-year-old male who has been glatiramer acetate treatment for three years. He previously experienced one to two relapses annually, but this has been reduced to less than one per year on the therapy. He lives alone and receives intermittent assistance from a community program. He complains of short-term memory problems and difficulty with activities of daily living. The patient calls early one Friday morning requesting a referral to a dentist, stating that he has had facial pain for about one week. Questioning by the case manager reveals that the pain emanates from his ear to his chin and is worse at night.

Case Management Interventions

- These symptoms appear to be an exacerbation of the patient's multiple sclerosis.
- The patient must be advised to contact his physician for immediate treatment.

Kurtzke Expanded Disability Status Scale (EDSS)

The Kurtzke EDSS quantifies disability according to eight functional systems (FS) and allows the clinician to assign a Functional System Score (FSS) in each of these. The eight functional systems are:

- pyramidal
- cerebellar
- brainstem
- sensory
- bowel and bladder
- visual
- cerebral
- other

EDSS steps 1.0 to 4.5 refer to people with MS who are fully ambulatory. EDSS steps 5.0 to 9.5 are defined by the impairment to ambulation.

Score Descriptions

0.0 Normal neurological examination

1.0 No disability, minimal signs in one FS

1.5 No disability, minimal signs in more than one FS

2.0 Minimal disability in one FS

2.5 Mild disability in one FS or minimal disability in two FS

3.0 Moderate disability in one FS, or mild disability in three or four FS. Fully ambulatory

3.5 Fully ambulatory but with moderate disability in one FS and more than minimal disability in several others

4.0 Fully ambulatory without aid, self-sufficient, up and about some 12 hours a day despite relatively severe disability; able to walk without aid or rest some 500 meters

4.5 Fully ambulatory without aid, up and about much of the day, able to work a full day, may otherwise have some limitation of full activity or require minimal assistance; characterized by relatively severe disability; able to walk without aid or rest some 300 meters.

5.0 Ambulatory without aid or rest for about 200 meters; disability severe enough to impair full daily activities (work a full day without special provisions)

5.5 Ambulatory without aid or rest for about 100 meters; disability severe enough to preclude full daily activities

6.0 Intermittent or unilateral constant assistance (cane, crutch, brace) required to walk about 100 meters with or without resting

6.5 Constant bilateral assistance (canes, crutches, braces) required to walk about 20 meters without resting

7.0 Unable to walk beyond approximately five meters even with aid, essentially restricted to wheelchair; wheels self in standard wheelchair and transfers alone; up and about in wheelchair some 12 hours a day

7.5 Unable to take more than a few steps; restricted to wheelchair; may need aid in transfer; wheels self but cannot carry on in standard wheelchair a full day; May require motorized wheelchair

8.0 Essentially restricted to bed or chair or perambulated in wheelchair, but may be out of bed itself much of the day; retains many self-care functions; generally has effective use of arms

8.5 Essentially restricted to bed much of day; has some effective use of arms retains some self care functions

9.0 Confined to bed; can still communicate and eat.

9.5 Totally helpless bed patient; unable to communicate effectively or eat/swallow

10.0 Death due to MS

Section 3

Case Management in Worsening MS

Kathleen Costello, RN, MS, CRNP, MSCN

"The period of worsening (disease transition) is a unique and taxing period for patients, families, and health care providers. In addition to more frequent exacerbations, there are more symptomatic complaints, ongoing functional decline, and a more intense need for care and reassurance. At this time, the MS team must develop and sustain a dynamic plan of care to address the variable and frightening transition."
—From Advanced Concepts in Multiple Sclerosis Nursing Care. Demos. 2001:12.[1]

Introduction

This section discusses worsening MS and covers some basics on symptom management, goals of health maintenance, and rehabilitation. When MS symptoms begin to increase, the first questions the health care provider must ask are: Is this a new exacerbation? An incomplete recovery from an exacerbation? Or is it a sign that the patient's RRMS is beginning to transition toward a progressive course in which relapses and remissions will be a less prominent feature of the disease?

By this time, if the case manager has experience working with the MS patient, he or she will be familiar enough with the individual's needs to help provide support and advocacy during this transitional time. A case manager who begins contact with a patient at this time will require a thorough history as well as a comprehensive evaluation of current health status. Although the determination of a shift from relapsing-remitting to secondary-progressive MS can be difficult, the important feature for the case manager is the worsening of symptoms that can negatively impact the patient's activities of daily living.

It's important to bear in mind that in MS, increasing disability could include any combination of symptoms and may impair physical, emotional, and cognitive abilities. In addition, symptoms will vary among patients Secondly, the variable nature of this disease will be apparent even as relapses take on a less-prominent role, as patients will continue to have "good days and bad days." Because of this, adaptive strategies need to be flexible and offer multiple options. For example, a patient may need to use a wheelchair some days, but a walker or forearm crutch on other days. It will be important for the case manager to advocate for a broad variety of equipment to meet the variable needs of these patients. Educating the patient in the use of assistive devices, or encouraging patients to use other aids that help them meet their needs, will be another challenge. Often, MS patients resist equipment that makes them appear disabled, even if it means that mobility is improved and fatigue is reduced. Also, patients may feel that utilizing adaptive equipment means they have "given in" to the disease. Adaptation to change is difficult, and the challenge is help individuals understand that appropriate use of assistive devices can help patients maintain or restore function and independence.

With worsening MS, advocacy, symptom management, and support are paramount for the case manager. Patients may need to change or upgrade their durable medical equipment, deal more with daily symptoms, and adjust to new limitations. An interdisciplinary approach to counseling, educational, and rehabilitation services will be especially relevant when the disease worsens.

How is Worsening MS Determined?

As noted in the previous section, any increase or change in the pattern of a patient's usual MS symptoms, or signs of a progressive decline, would warrant consultation with the patient's neurologist/MS specialist. Although MRI does not always correlate directly with symptoms in MS, the neurologist may order an MRI to assist in care planning. The Consortium of MS Centers (CMSC) guidelines on when an MRI is indicated are summarized in Table 1.

TABLE 1

Clinical Guidelines for Brain and Spinal Cord MRI in MS

Suspected MS

Baseline evaluation:

- Brain MRI recommended (with gadolinium)
- Spinal cord MRI if presenting symptoms are at the level of the spinal cord and have not resolved, or if the brain MRI is non-diagnostic.

Follow-up evaluation:

- Brain MRI recommended to demonstrate new disease activity

Established MS Indications

Baseline evaluation:

- Brain MRI recommended (gadolinium optional)

Follow-up of MS:

- Unexpected clinical worsening
- Re-assessment of disease burden before starting or modifying therapy
- Suspicion of a secondary diagnosis

The CMSC's "MRI Protocols for Brain and Spinal Cord"[2] should be consulted for specific MRI technical guidelines.

Evaluating Level of Disability/ New Needs of Patient

With the patient's disease status in transition, this is a critical time for the case manager and MS care team to evaluate the individual patient's changing needs. This may include the following:

Cognitive change: Neuropsychologic evaluation

Cognitive impairment is a very distressing and disruptive aspect of MS that can affect patients of any age; appropriate evaluation and management of the MS patient's cognitive status is an essential component of case management.

Signs of cognitive decline warrant evaluation of the patient, preferably by a neuropsychologist with specialized knowledge of MS, when possible. This comprehensive evaluation is designed to pinpoint specific areas of cognitive impairment that are unique to MS. Because visual and motor deficits must be taken into account, the battery of tests involved in this exam should be tailored toward the MS patient. This assessment can also be used to identify areas of strength. The potential benefits of such an intervention are to help keep patients functioning as well and independently as possible, by teaching compensatory skills such as memory strengthening techniques, as well as offering counseling and reassurance in dealing with the fear and frustration associated with cognitive impairment in a younger person. Cognitive decline and depression are often confused, or may be related, so it is important to clarify the difference and provide adequate treatment and support.

Rehabilitation

Patients should also be evaluated to determine what rehabilitative services are appropriate for their needs. These services may include physical therapy, occupational therapy, and other specialized services, as well as equipment selection.

Evaluation of motor deficits by a physical therapist (PT) with expertise in MS is an essential part of this process. PTs with a more general focus may have an "endpoint-oriented" approach that is appropriate following a stroke or injury, but does not take into account the progressive yet variable presentation seen in MS. Physical therapy and specialized exercise recommendations can help patients to preserve remaining function and target problem areas such as:

- Balance and gait problems
- Lack of coordination
- Weakness
- Fatigue
- Pain
- Symptoms associated with heat intolerance

Specialized MS rehabilitation centers can be an excellent and energizing experience for patients. Some of these centers have a particular wellness approach that embraces care of the whole patient from nutrition, to exercise, to counseling. All provide comprehensive, multidisciplinary rehab services tailored to the needs of the patient.

Equipment Needs

Selection of mobility equipment, which includes wheeled devices, is a highly specialized aspect of MS management that will often be required with worsening MS. Contrary to the popular myth, not all MS patients will require a wheelchair; an estimated 25% of MS patients will eventually require full-time wheelchair or scooter use.[3] However, natural history data indicate that after 15 years, if they are not treated with disease-modifying drugs, approximately 50% of MS patients will require some ambulatory assistance, in the form of a cane, forearm crutch, rolator, or walker.

Part-time use of a wheelchair or scooter is an approach adopted by up to 61% of MS patients.[4] Although they may be able to ambulate, numerous factors can limit stamina and ambulatory distance, including heat exposure, fatigue, and spasticity.

Choosing a wheeled mobility device involves consideration of the individual's physical needs, financial considerations, and the environment in which the

device will be used. The patient's seating needs, coordination, living space, and many other factors should be considered in picking the right device. Unfortunately, many devices are selected without the benefit of a seating specialist and lead to additional symptoms such as pain or skin breakdown. Evaluation of the need for an assistive device and the choice of device should be made by a rehabilitation specialist who is knowledgeable about MS. There is no "one size fits all"—in MS, each patient must have an individualized plan of care.

It is common in MS for the patient to have a variety of assistive devices in use. Day to day needs fluctuate: one day the patient may require a wheelchair, another a cane. Case managers must be aware of the dynamic nature of MS even when the disease is more advanced.

Emotional Needs in Worsening MS

A number of factors can affect the emotional state of the person with MS as the disease begins to show signs of progressing. These include:

- Need to adjust to progressing physical disability
- Need to accept more help from others, possible use of mobility aids
- Profound, draining fatigue may impact mental state
- Clinical depression is known part of disease process; not simply reactionary to worsening condition
- Cognitive dysfunction may be difficult to distinguish from symptoms of depression or fatigue.

Loss of independence and the subsequent effect on self-esteem are particularly difficult at this stage. Patients often must "grieve" each loss. Education, advocacy, and encouragement are important functions of the case manager. These functions may include help with obtaining rehabilitative services or reimbursement for these services, appropriate equipment, and counseling services, as well as appropriate medical care and follow-up.

Medications in Worsening MS

Immunomodulators

Some neurologists may elect to maintain disease-modifying therapy at this stage, or to discontinue it based on an analysis of how the disease is progressing and repeat MRI findings. Medications with FDA-approved indications for secondary-progressive MS include Betaseron, whose new labeling states it is approved for "relapsing forms of MS," including secondary progressive MS with relapses.[5] In Europe, Rebif is approved for SPMS. Avonex is approved for relapsing forms of MS; however, Copaxone is approved for relapsing-remitting MS only.

Off-label use of medications is a fairly common practice in MS particularly when patients have a suboptimal response to approved therapies. Alternative approaches that are being tried for patients not responding well to therapy include increasing the dose (double-dose Betaseron is being tested in some centers[6]), combination therapy with more than one disease-modifying agent, and novel therapeutic approaches such as bone marrow (stem cell) transplant.

Mitoxantrone (Novantrone)

Novantrone (mitoxantrone) is a chemotherapeutic agent given as an IV infusion every three months for a two to three year period. This drug is indicated for reducing neurologic disability and/or the frequency of clinical relapses in patients with secondary progressive, progressive relapsing and worsening relapsing-remitting MS. Because of significant toxic effects associated with mitoxantrone, the number of doses is limited to between 8 and 12 in a course of two to three years, depending on individual patient factors. The most common side effects include nausea, thinning hair, loss of menstrual periods, bladder infections, and mouth sores. Nausea may occur in the first 24 hours following the infusion.[7] A cardiologist or oncologist may provide support in its use.

In addition, mitoxantrone may cause serious and potentially fatal cardiac damage and increased risk of infection.[7] New labeling calls for measurement of left ventricular ejection fraction (LVEF) prior to each dose of the medication. Clearly, as in other diseases, chemotherapy is serious business, and the MS care team will have to weigh the potential benefits of this drug for the patient against its risks. Mitoxantrone is contraindicated in pregnancy. If a patient is selected for this therapy, it will be important for the case manager to review signs of cardiac toxicity or infection with the patient and help to monitor for these signs.

Symptom Management in MS

Symptoms occur in MS at any time; however, over the lifetime of the disease, symptoms tend to increase and accumulate.

Typical symptoms affecting the MS patient are listed in Table 2. The case manager should be aware that any combination of symptoms is possible. Some patients report that fatigue is their most troubling symptom; for others, deteriorating vision creates the greatest barrier to normal functioning. Bowel, bladder, or sexual dysfunction can be difficult and embarrassing for the MS

patient to discuss. These warrant special attention from the case manager to ensure that these important problems are not overlooked.

Fatigue

Fatigue related to MS is considered to be one of the most pervasive symptoms, affecting up to 80% of patients. MS-related fatigue is often described as "lassitude," or an exhausted, completely drained feeling thought to be unique to MS. However, it is important to recognize that other causes of fatigue can occur in people with MS that present with symptoms resembling those of MS-related fatigue. Fatigue may result from causes such as sleep disruption, depression, spasticity, medications, or illnesses. The case manager should encourage patients to have a medical evaluation when reporting the new onset or worsening of fatigue.

Table 2

Common Symptoms of Multiple Sclerosis

- Fatigue
- Bowel/bladder dysfunction
- Cognitive impairment
- Optic neuritis/visual impairment
- Mobility impairment
- Neurologic pain
- Depression
- Skin reactions
- Spasticity
- Symptom
- Ataxia
- Joint and skeletal pain

As with many MS symptoms, treatment of fatigue involves pharmacologic and nonpharmacologic approaches. Medications such as modafinil and amantadine are often utilized to treat fatigue in MS. Nonpharmacologic approaches often include the use of energy management strategies, which can be taught by a rehabilitation specialist.

Bladder dysfunction

Bladder dysfunction occurs in anywhere from 50% to 90% of MS patients.[9] Bladder dysfunction results from neurologic damage in the spinal cord, the brainstem, and the brain. In addition, bladder symptoms can be complicated by mobility issues such as weakness and spasticity. Bladder irritants such as alcohol, caffeine, and artificial sweeteners can also complicate bladder symptoms.

➤ **Detrusor hyperreflexia** *(failure to store)*	Bladder contracts involuntarily due to overactive detrusor muscle.
➤ **Detrusor arreflexia** *(failure to empty)*	Incomplete emptying, or total inability to void; recurrent UTIs, overflow incontinence.
➤ **Detrusor/sphincter** *(combination)*	Combination of increased contractions, dyssynergia, plus urethral sphincter that closes when the bladder contracts.

Bladder dysfunction falls into roughly three categories: failure to store normal quantities of urine in the bladder, failure to empty the bladder completely, and a combination of the two problems. Symptoms can be similar among them and include urgency, frequency, incontinence, and hesitancy. Risk of urinary tract infection increases, particularly with incomplete emptying of the bladder.

Various agents, including anticholinergic medications, are prescribed to address urgency and frequency related to a urine storage problem. For failure to empty problems, medications such as alpha blockers, or intermittent catheterization, may be utilized. Indwelling catheters may be used, but patients must be monitored closely for urinary tract infections, calculi, and urethral damage. When an indwelling catheter is needed for long-term management, a suprapubic catheter is considered to be a safer approach. For some patients, combinations of medications and catheterization may be recommended.

Implantation of a bladder stimulator is another possible approach, as are more invasive surgical procedures such as augmentation cystoplasty. Clearly these approaches carry greater risk to the patient, but may be offered when other less-risky interventions are ineffective.

The case manager can help to assess the impact of bladder dysfunction on aspects of daily living such as sexual function, social activities, and employment, as well as identify the presence of secondary complications, which include infection, skin breakdown, and renal calculi. In addition to teaching and educating about intermittent self-catheterization, the case manager can assist patients in developing a drinking/voiding schedule and proper dietary modifications to acidify urine and reduce the risk of UTI.

Cognitive impairment

Cognitive impairment is a common problem in MS. In the early stages of MS, disease-related cognitive deficits affect up to 50% of patients. This figure increases to at least 70% in the total population of MS patients, with severe cognitive impairment believed to occur in about 10%.[10] Many cognitive mechanisms in the brain are carried out via myelinated nerves. Deficits are usually noted in abstraction, memory, attention, and word-finding functions, and may be subtle and transient. Sometimes cognitive symptoms worsen in association with a new exacerbation. Like all symptoms of MS, cognitive function may stabilize or progress. Patients with symptoms of cognitive impairment should be referred for neuropsychologic testing and assistance with compensatory techniques specific to the individuals' problems. This may include speech therapy, occupational therapy, or lifestyle modification to help with memory (writing things down) and concentration (e.g. reducing distractions). Other symptoms, such as depression and sleep dysfunction, may exacerbate cognitive problems and should be evaluated as part of the treatment plan.

Although the pharmacolgoic approach to cognitive dysfunction in MS remains limited, small studies using donezepil suggest that this medication may be useful in the treatment of MS cognitive dysfunction. (need ref!)

Mobility impairment

Decline in motor abilities has historically been one of the hallmarks of worsening MS, and remains a primary measure for evaluating progression of the disease. Impaired mobility in MS is a complex process based on a combination of factors, including muscle weakness from disuse, spasticity, tremor, balance and coordination problems, "foot drop," as well as contracture of the hands, fatigue, paralysis, and altered sensations such as numbness or tingling.

Rehabilitation strategies such as physical therapy and occupational therapy are necessary for patients with mobility impairment. It is important to understand that traditional rehab models which utilize therapeutic interventions for a finite period of time are not generally useful in MS. As MS tends to fluctuate and often progress, the intermittent use of these services over the years will help to maximize the patient's functional abilities.

Pain

Pain is an underrecognized symptom of MS and can be a very difficult and disabling aspect of the disease. Several types of pain syndromes are associated with MS, including:

- Paroxysmal pain, which occurs intermittently, such as trigeminal neuralgia;
- Chronic neurogenic pain, which is a steady persistent pain often described as burning, tingling, nagging, like pins and needles, and feelings of tightness;
- Pain related to spasticity and/or spasms;
- Musculoskeletal pain, such a low back pain and neck or joint pain, which may represent a secondary symptom.

Between 20% and 50% of patients report having pain, often described as a burning, neuropathic pain.[12] Although traditional analgesics such as opioids are often ineffective in treating neuropathic pain, there will be patients for whom this class of medication is the only useful approach. Tricyclic antidepressants and antiepileptic medications are utilized with much greater success in the treatment of pain associated with MS. Although it is unavailable legally in most areas, medicinal use of marijuana is hailed by many to offer superior pain relief, particularly that related to spasticity.

Depression

Depression in MS is not necessarily just a reaction to the difficulty of coping with the disease, although this could be a contributing factor. It has been demonstrated that depression in MS is a primary symptom caused by altered brain chemistry related to the disease process.[13] Estimates of the prevalence of depression among MS patients range from 25.7% to up to 50%.[14] Some analyses have also shown elevated suicide risk in this population.[15] Depression can exacerbate other MS symptoms, such as pain or fatigue, and should be treated as part of overall management. All patients should be routinely screened for depression. Treatment strategies include psychotherapy and use of antidepressant medications.

Sexual Dysfunction

MS is commonly associated with sexual dysfunction in both men and women, and it can present a difficult management problem for both patients and caregivers.

Neurologic impairment may lead to any of the following primary symptoms of sexual dysfunction:

- Decreased or absent libido
- Altered genital sensations
- Decreased frequency and intensity of orgasms
- Erectile dysfunction
- Reduced ejaculatory force or inability to ejaculate
- Decreased vaginal lubrication and/or muscle tone

Secondary sexual dysfunction is also common and can be related to other physical problems associated with MS, such as bladder and bowel dysfunction, fatigue, low self-esteem/poor body image, and spasticity.

Patients and their partners are often embarrassed or reluctant to discuss sexual matters with health care pro-

fessionals, and usually will not raise the issue on their own. Despite their reluctance to discuss this intimate subject, sexual dysfunction can be particularly distressing to patients with MS, Addressing these problems are a part of the whole-person management of MS. The nurse case manager can be part of the solution by including appropriate questions about sexual function in regular discussions with the patient about MS symptoms, problems, and concerns. Referral to appropriate medical and mental health professionals, particularly within a specialized interdisciplinary MS care setting, is the next step.

Conclusion

Progression of disease course with increased disability and worsening symptoms is an unfortunate reality for many patients who are diagnosed with MS. Although disease-modifying therapies are useful in reducing the number and frequency of relapses and delaying disability progression, worsening can still occur. The case manager will be involved in coordinating care at a number of levels: evaluation of functional status and need for rehabilitative services, selection and purchase of mobility equipment, increased symptom management, evaluation of employment status, and patient education as it relates to each of these areas.

Accurate assessment and appropriate interventions will help the patient to maintain functional abilities and prevent complications.

The next section on Advanced MS will involve discussion a supportive/palliative care model. Symptom management is still key; disease management becomes largely related to problems of immobility.

References

1. Halper J. The nature of multiple sclerosis. In: Halper J. *Advanced Concepts in Multiple Sclerosis Nursing Care.* Demos. 2001:12.
2. Traboulsee A, Li D, Frank J, et al. Consortium of MS Centers MRI Protocol for the Diagnosis and Follow-up of MS. Available at www.mscare.org.
3. Roxburgh HSR, Seaman SR, Masterman T, et al. Multiple sclerosis severity score: using disability and disease duration to rate disease severity *Neurology.* 2005;64:1144-1151.
4. Author. Name of paper. *Int J MS Care.* 2005;7(3). In press.
5. Betaseron® [package insert]. Montville, NJ: Berlex Laboratories; 2003.
6. Arnason BGW and the BEYOND Study Steering Committee. BEYOND-Betaseron Efficacy Yielding Outcomes of a New Dose. Presented at 56th American Academy of Neurology Annual Meeting, San Francisco, April 24-May 1, 2004. Abstract P06.086.
7. National Multiple Sclerosis Society. Chemotherapy. MS Information Sourcebook. Available at: www.nationalmssociety.org/Sourcebook-Chemotherapy.asp
8. Schapiro RT, Schneider DM. Symptom management in multiple sclerosis. In: Halper J, Holland NJ (eds): *Comprehensive Nursing Care in Multiple Sclerosis*. New York: Demos, 2002:32.
9. Kobashi KC, Leach GE. Bladder dysfunction. In: van den Noort S, Holland NJ. *Multiple Sclerosis in Clinical Practice.* New York: Demos. 1999:67-80.
10. Benedict RHB, Shapiro A, Priore R, et al. Neuropsychological counseling improves social behavior in cognitively-impaired multiple sclerosis patients. *Mult Scler.* 2000;6 :391-396.
11. Frohman EM. Vision. In: van den Noort S, Holland NJ. *Multiple Sclerosis in Clinical Practice.* New York: Demos. 1999:89-93.
12. Svendsen KB, Jensen TS, Overvad K, et al. Pain in patients with multiple sclerosis. *Arch Neurol.* 2003;60:1089-1094.
13. Bakshi R, Czarnecki D, Zubair S, et al. Brain MRI lesions and atrophy are related to depression in multiple sclerosis. *Neuroreport.* 2000;1153-1158.
14. Bashir K, Whitaken JN, eds. *Handbook of Multiple Sclerosis.* Philadelphia: Lippincott Williams & Wilkins; 2002.
15. Sadovnick AD, Eisen K, Ebers GC, Paty DW. Cause of death in patients attending multiple sclerosis clinics. *Neurology.* 1991;41:1193-1196.

Case Studies

Case 1

Jane is 45 years of age and has 2 grown children. She has a 10-year history of MS. A few years ago she was forced to stop working because of frequent exacerbations. She has been treated with oral, but not intravenous, corticosteroids. She has never received disease-modifying therapy because her neurologist feels that she would not benefit from this treatment because of the length of time that she has had MS.

In addition to the exacerbations, Jane is currently experiencing fatigue, and her ability to walk has deteriorated. Other symptoms include constipation and bladder control problems, such as urinary urgency, frequency, and nocturia. She has been put in contact with the case manager because she wants a second opinion concerning the benefits of physical therapy.

Case Manager interventions:

- Patients with worsening MS need to accurate information about the natural history of MS and treatment options in order to form realistic expectations while remaining hopeful about the future.
- The patient must be given a balanced presentation of both the benefits and limitations of physical therapy and other rehabilitation interventions in her specific case and the role that aggressive symptom management can play in maintaining optimal function.
- In addition a frank discussion about disease-modifying therapy, including chemotherapy agents such as mitoxantrone, is warranted.
- Finally, the patient should be given information about community support programs and counseling.

Case 2

Ken is 42 years old and has a 10-year history of relapsing-remitting MS. He is no longer working because of MS-related cognitive changes related to MS. During the past year, Ken has experienced two relapses and is anxious to begin treatment with a disease modi-

fying agent as soon as possible. Ken wants to self-inject, but his wife has concerns about his ability to learn this technique, given his cognitive difficulties.

Case Manager interventions

- Audio- and videotaped material and written instructions on the proper technique for self-injection might aid learning retention for this patient.
- Having the patient demonstrate the self-injection in front of a nurse would allow the nurse to offer suggestions or corrections, if necessary.
- Home visits with the patient and his wife would offer opportunity for reinforcement of proper self-injection technique. The patient should be encouraged to demonstrate self-injection for the nurse to allow for suggestions or corrections.

Adherence tips include:

- Contacting the patient periodically after he begins self-injection.
- Having him keep written records of injection sites.
- Referral to a support group of patients using the same medication.
- Scheduling follow-up appointments at appropriate intervals.

Other considerations:

- The effect of disease-modifying therapy on the progression of cognitive dysfunction is not yet clear.
- Pharmacologic therapies that might improve cognition are being studied in MS patients.
- Cognitive rehabilitation can help MS patients to function more effectively and to learn ways of compensating for impaired abilities.
- Psychological support can help the patient to cope with cognitive problems.

Important Note About Prescription Drug Coverage Under Medicare

In the past, people with MS could not get reimbursement for their injectable disease-modifying drugs unless their insurance companies paid for them, or unless they received intramuscular injections in a clinic or doctor's office (in which case they were covered under Medicare Part B). All that is changing with the sweeping new Medicare Prescription Drug Plan set to take effect in 2006.

Part D of the Medicare Modernization Act means that prescription drugs (those which are prescription only, FDA approved, sold in the US, used for a medically accepted indication) will be covered beginning Jan 1, 2006, through private plans approved by Medicare.

Medicare-eligible patients must enroll in Medicare Part D on top of their regular Medicare coverage (Part A covers hospital services and B covers doctors and outpatient providers). Another option for Medicare patients is to choose the Medicare Advantage plan (Part C), which is a managed care plan that includes drug coverage.

Patients with MS who qualify for Medicare and do not currently have a prescription drug coverage plan, or have a plan that is inferior to that offered by Medicare, should take heed! Those who fail to enroll in a plan by May 15, 2006 may face a lifetime premium penalty of an additional 1% per month over their regular payment—an amount that can add up considerably given the cost of injectable drugs for MS.

According to the National Multiple Sclerosis Society, people with MS should pay special attention to Medicare's new enrollment requirements, particularly those who:

- Are on Medicare but have no prescription drug benefit;
- Have a prescription drug benefit that is not as good as that offered by Medicare (patients will receive a letter from their plan explaining whether this is the case)
- Plan to be on Medicare in 2006;
- Currently receive free or low-cost medications from a pharmaceutical company plan while on Medicare. Medicare patients will not qualify for these plans after December 31, 2005;
- Are receiving coverage from the Medicare Rx Demonstration Project. This project ends December 31, 2005;
- Receive intramuscular interferon injections (Avonex) in a doctor's office or clinic. This will continue to be covered under Part B, but if a patient plans to receive the injections at home or needs coverage for other drugs, enrollment in Part D will be necessary;

• Qualify for both Medicare and Medicaid (dual eligibility). These patients will be automatically enrolled in a plan by January 1, 2006, but may select one that is better suited to them.

Patients can call 800-MEDICARE or go to www.medicare.gov for an interactive tool to help compare the various plans. In addition, counseling is available through state health insurance programs (SHIPS). Links are available on the Medicare site to guide patients to this resource. Advocacy organizations such as the Medicare Rights Center (www.medicarerights.org) are another patient information resource on this subject.

Section 4

Case Management in Advanced MS

Linda Morgante, MSN, RN, CRRN

"Long-term care services include a continuum of preventive, diagnostic, rehabilitative, therapeutic, supportive, and maintenance services addressing the health, social, and personal needs of individuals with chronic illnesses and disabilities and their families. These services may include: health care, home care, adult day care, respite care, assisted living, nursing home care, transportation assistance, and meals."
—National Multiple Sclerosis Society. Advocacy Issue Brief, The Challenge of Long Term Care. Spring 2002.

What to Expect in Advanced MS

The previous section discussed a stage we have termed "worsening MS," involving patients who are, in all likelihood, still having relapses. When the patient reaches a stage considered to be "advanced MS," acute relapses usually have ceased. The patient is more stable, but considerably more disabled. Severe spasticity, sometimes requiring an implantable baclofen pump, possible need for a feeding tube, catheterization, dependence on a wheelchair or confined to bed, pressure ulcers, and respiratory complications are just some of the care issues that nurse case managers will likely encounter in this group of patients. In addition, cognitive function may be impaired, causing memory loss, impaired ability to retrieve information, and difficulty with decision-making and problem-solving abilities.

An important point is that, while this section describes care of a severely disabled patient, people with MS are generally living better much longer than they were 20 years ago. Management of this disease has improved significantly, as the previous sections have emphasized. It is also important to reiterate that for a substantial proportion of patients with MS, the cause of death is ultimately some other illness or condition, as would be the case with the general public.

A certain subset of people with progressive MS—often those with an aggressive course characterized by a steady decline—will become immobilized or paralyzed by the deteriorating neurological effects of this disease. Those who die as a result of advanced MS often do so because of a complication such as an infection, serious skin ulceration, malnutrition because of difficulty swallowing, or respiratory failure.

Definition of Advanced MS

Definitions of advanced MS may vary widely, but generally this includes patients whose EDSS classification[1] is above 6.5, meaning that their level of disability has progressed to paraplegia or beyond. While the person with worsening MS is beginning to adapt to the use of a mobility device for some situations, patients who reach the advanced stage will be fully dependent on a wheelchair. However, some patients may still be able to work, depending upon the type of job and the accommodations made by the employer.

Where to Care: Home, Skilled Care Facility, or Hospice?

In most cases, it's preferable for the advanced MS patient to remain in his or her home, or that of a family member, as long as possible. This is especially important because most of these patients will still be relatively young when the disease reaches an advanced stage.

In its very advanced stages, when MS progresses to paralysis, the person will require round-the-clock care. Nursing care is focused on measures to prevent the complications of immobility. These include frequent turning and repositioning, and ensuring adequate nutrition and hydration, to prevent skin breakdown, renal calculi, and joint contractures. It is not unheard of for the patient to remain in the home when the disease has advanced to this stage. A few patients are fortunate enough to have dedicated caregivers who will take on this substantial commitment, while others will require placement in a skilled nursing facility. For some patients whose MS is truly at an end stage (or those who have MS and a concomitant terminal condition) hospice care may be an appropriate setting.

What to expect on home care visits

For advanced MS patients who remain in the home, the nurse "case" manager may become the nurse "care" manager. This complex role involves assessing the patient's needs and planning for round-the-clock care. The nurse is responsible for approaching the patient in a holistic manner and must consider the physical, psychological, social, and spiritual dimensions, while including the needs of the family in the plan of care. Some examples of nursing measures include monitoring the patient's neurological status, ensuring adherence to symptomatic treatments, making appropriate rehabilitation referrals, ensuring follow-up medical (or primary) care, ordering necessary supplies and equipment, and helping with plans for the transition from home to skilled nursing facility or hospice care.

Patient safety is the primary goal of each home visit made by the nurse case manager. To accomplish this, the nurse should assess the patient for signs and symptoms of physical or psychological complications and identify any areas in the home that require modification to prevent injury. Appropriate interventions and referrals, including accessing help from the local MS society, can then be put into place.

Symptoms in Advanced MS

From a case management perspective, care of the patient with advanced MS shares common ground with that of other patients requiring round-the-clock home care. Many problems stem from immobility, including skin breakdown, urinary and bowel dysfunction, muscle atrophy, and joint contractures. Case managers will require guidance from the multidisciplinary MS care team, particularly MS nurse specialists, when a patient's disability prevents visits to a neurologist or MS center.

Fever

Presence of fever is an especially important warning sign. Fever in a disabled patient may be a sign of a very serious complication. In MS patients a slight rise in body temperature can cause profound weakness. The source of the fever is frequently an infection of the urinary tract. Many cases of fever require prompt hospitalization to prevent the onset of sepsis. Lower grade fevers may call for an office visit or outpatient hospital visit to obtain blood work and urine specimens.[2]

Pressure ulcers

Skin breakdown is a concern for any patient with immobility problems, and prevention of ulceration is a high priority for nursing care in patients with advanced MS. A small red spot indicating the beginning of a pressure sore can deteriorate into an ulceration in just a few days, and the resulting wound may takes months to heal.[3] The presence of a pressure ulcer often forces patients to become more immobile because the bed, with frequent repositioning, becomes the treatment of choice (versus a chair) for faster healing. Assessment tools such as the Braden and Norten scale[4] are recommended for use by nurse case managers to assess risk and initiate steps for prevention and treatment of skin ulcerations.

Urinary tract management

Urinary incontinence is a common manifestation of advanced MS. While diapers or other continence products may be useful, particularly for the female patient, frequent changing must be carried out to ensure that the patient remains dry. For male patients, external urethral catheters may be helpful and are often preferable to continence products. Intermittent catheterization by a competent and willing caregiver is another option for treating incontinence in patients with advanced MS. There are situations when an indwelling Foley catheter is necessary to prevent chronic wetness that can lead to skin breakdown. Patients with indwelling Foley catheters are monitored carefully for urinary tract infections. The surgical interventions discussed in Section 3 may also be considered as a treatment option for urinary incontinence.

Bowel dysfunction

Bowel dysfunction includes either constipation (most common) or bowel incontinence. Constipation may be a result of insufficient fluids, immobility, decreased intestinal motility, or can result from the effects of medications used to treat other symptoms in MS. Bowel incontinence may also be an issue and is the result of neurologic damage in MS.

Spasticity

Spasticity can worsen at this stage, and muscle relaxants such as baclofen and tizanidine will become part of the regular medication regimen for most patients. These medications can be administered orally, or crushed for administration via feeding tube, if necessary. Management of spasticity can be guided by a treatment algorithm such as the one developed by the CMSC (see Spasticity Algorithm, page 29).[6]

Dysphagia (Swallowing difficulties)

Swallowing may become difficult to the extent that a feeding tube may be indicated for those patients who cannot maintain adequate nutrition and body weight through regular dietary intake. The need for a feeding tube is often a particularly difficult step for the patient and caregiver to accept, and some resistance may be encountered. However, weight loss can reach dangerous levels in some cases when factors such as inability to swallow, severe tremors, and digestive complications combine to prevent adequate caloric intake and nutritional balance. In such cases, the placement of a feeding tube can make things easier for both patient and care-

giver, and can provide access for administration of medications.

Dysarthria (Speech difficulties)

Speech disturbances can range from mild to severe, with disorders of vocal intensity, quality, articulation, and intonation. The term "scanning" refers to a pattern of speech in which there are abnormally long pauses between words or even between syllables in individual words. As speech difficulties progress, others may experience difficulty comprehending what the patient is saying, which only serves to increase the patient's sense of social isolation.

A speech therapist with experience in MS can help to assess the underlying causes of the speech disturbance (which may include cognitive and/or physical disabilities) and recommend ways to help the patient improve speech or learn compensatory mechanisms to increase communication abilities.

Tremor

MS-related tremors do not respond as predictably to interventions as some other neurological conditions.[7] Tremors can adversely affect coordination, ambulation, and hand function and can seriously impact the patient's ability to perform activities of daily living. There are several oral medications that can be used to treat tremor, but most have sedating side effects. An interdisciplinary approach, particularly involving occupational therapy, may enhance independence in the activities of daily living and should be considered in the treatment of a patient with advanced MS. Surgical interventions, such as deep brain stimulation and, rarely, thalamotomy may also be used to treat tremor in MS.

Emotional Support in Advanced MS

Grieving and loss are present in every stage of MS. Patients with advanced MS and their loved ones live with heartbreak, sadness, and uncertainty. There are often role changes and adjustments, with older teens or young adults caring for a parent. Interestingly, some caregivers and MS care specialists have observed that some of their patients with very advanced MS eventually come to a resolution with the disease at this point—to a place of quiet acceptance.

End of life planning

Research done by Bowen et al from the University of Washington MS Center about end-stage MS planning[8] has shown that most people with MS prefer to avoid making specific plans for such an ominous outcome that may or may not affect them down the road—specifically, transfer to a nursing home or hospice. However, when questioned, they almost unanimously agree that they would not want to be cared for in a "nursing home" primarily oriented toward elderly persons, but are more open to the idea of a facility that specializes in care of people with MS. Such facilities, where available, tend to have a younger clientele and offer more specific MS-oriented services.

Financial Issues in Advanced MS

MS patients in the United States are usually receiving benefits from Medicare and/or Medicaid at this stage in their disease process. Medicare Part D changes scheduled to go into effect in 2006 will influence various aspects of care, including drug coverage for people with MS, so it's important to be familiar with this legislation especially given the expected confusion associated with the adoption of Medicare Part D.

A high priority of MS advocates is to prevent premature institutionalization by pushing for better long-term care options (and Medicaid coverage) in the home or community setting. Providing support to caregivers such as family members is an important part of this process, as is monitoring of in-home care to detect any cases of abuse or neglect. The U.S. Supreme Court acted to support community based (rather than institutional) care in its 1999 "Olmstead Mandate," requiring state Medicaid programs to provide long-term care in "the most integrated setting possible."[9]

What does this mean? The Supreme Court stated that denying community placement to individuals with disabilities represents a violation of the Americans with Disabilities Act. Unnecessary segregation and institutionalization constitute discrimination and violate the ADA's "integration mandate" unless certain defenses are established. Furthermore, the court mandates that states bear some of the costs to accommodate the community service needs of the disabled.

Successful case management can keep MS patients in their homes or other non-institutional care settings for as long as possible, even when the disease reaches an advanced stage. A knowledgeable case manager can become adept at assessing the patient's needs and accessing the resources necessary to improve or maintain health and to prevent serious complications, ensuring the best possible quality of life for people with advanced MS.

Conclusion

MS is an extremely challenging disease for the case management specialist, but it can be a very rewarding one as well. People with MS are often keenly interested in their own care management, learning more about their disease, and how to cope with their disability, and trying to get the most out of life despite the obstacles they face. This is largely attributable to:

- The relative youth of persons who contract the disease

- The wide variety of educational and supportive information available to persons with MS via the Internet, national and international advocacy groups, and fellow MS patients who want to share their solutions and stories
- The CMSC, IOMSN, and other research and care-oriented organizations which work to expand scientific knowledge and improve healthcare delivery for people with MS.

The case manager is never alone in any difficult care decision involving a person who has multiple sclerosis. The MS "community" of scientists, health professionals, caregivers, and persons with MS is a strong, active, and helping network with ties and information to the best specialists and the most current information. Do not hesitate to tap into this network by whatever means available to enhance the care of your patients with MS. The CMSC and IOMSN can be good places to start.

References

1. Kurtzke JF. Rating neurologic impairment in multiple sclerosis: an expanded disability status scale (EDSS). *Neurology* 1983;33:1444-1452.
2. Halper J. Optimal primary care management for people with multiple sclerosis. In: Halper J, ed. Advanced *Concepts in Multiple Sclerosis Nursing Care.* New York: Demos, 2001:46.
3. Harris C. Prevention of complications in the severely disabled. In: Halper J, Holland NJ, eds. *Comprehensive Nursing Care in Multiple Sclerosis*, 2nd ed. New York: Demos, 2002:77-92.
4. Braden B, Bergstrom N. Braden Scale for Predicting Pressure Sore Risk. Available at: www.bradenscale.com.
5. Schapiro RT. *Managing the Symptoms of Multiple Sclerosis*, 4th ed. New York: Demos, 2003.
6. Schapiro RT, Schneider DM. Spasticity, balance, tremor, and weakness: factors in mobility impairment. In: van den Noort S, Holland J, eds. *Multiple Sclerosis in Clinical Practice.* New York: Demos, 1999:43.
7. Schapiro RT. Symptom management in multiple sclerosis. *Ann Neurol.* 1994;36:S1230-S129.
8. Bowen J. Key issues in symptom management in advanced MS. Presented at: Consortium of Multiple Sclerosis Centers, 2005 annual meeting, June 1-5, Orlando.
9. National Multiple Sclerosis Society. Government affairs/advocacy. Available at: www.nationalmssociety. org/statetrends_2004longterm.asp.

CASE STUDIES

Case 1

Edward is a 43-year-old male with a four-year history of multiple sclerosis. He is on long-term disability through his work and is planning to apply for Social Security disability. He has had a progressive course despite interferon treatment. His last MRI demonstrated no enhancing lesions in the brain but showed a large plaque in the C5 – C6 spinal region. He is barely able to walk with a walker, is incontinent of bowel and bladder, and can no longer drive. Edward has no help at home; he falls frequently. He lives alone and is very frightened about the future.

Case Management Interventions

- This patient requires a great deal of counseling, support, and individualized services.
- It would be important to ascertain the availability of programs via his insurance plan and through his community.
- Case management should include a discussion of the patient's potential long-term needs.
- For the short-term, it would be important to place home health care to prevent injury or falls.
- Environmental assessment should be provided to determine if there are safety issues in the home.

Case 2

Beth is in her early forties and has had a steadily progressive course of MS since her symptoms first appeared at around age 18. Beth is married and her husband has devoted himself to becoming her full-time nurse, gradually acquiring the skills needed for her advancing care requirements. Wheelchair-dependent for several years, Beth's paralysis has increased recently and she now has limited movement beyond her ability to turn her neck and move her facial features.

The case manager is called because of the husband's concern about the patient's weight loss. Upon examination, it's clear that this woman's weight has dropped precipitously, due to difficulty eating and swallowing, and general problems related to immobility. She has normal cognitive ability but does not want a permanent feeding tube inserted, because of the finality of this situation and the implications of being bed-bound. Both partners steadfastly refuse to discuss a long-term care facility or any "institutionalization."

Case Management Interventions

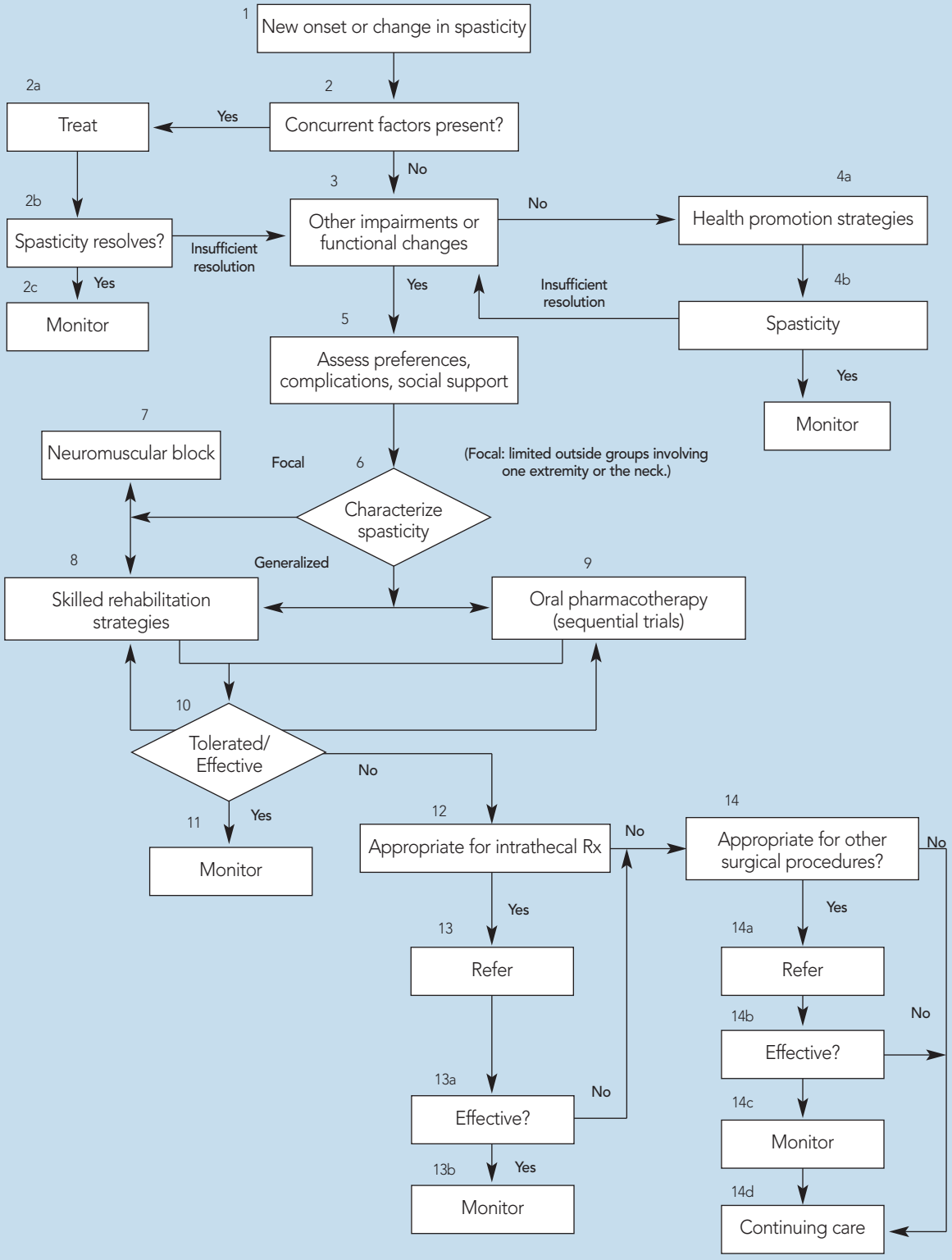
- This woman requires immediate intervention to convince her of the necessity of a feeding tube: the alternative may be that she will die if her weight continues to drop.

- The family would benefit from a consult with a dietitian to help them understand the advantages that a permanent feeding tube could provide at this stage (she can receive medications for spasticity through the tube; it will make caregiving easier for her partner).

- The family also requires counseling to discuss care of the patient and the caregiver going forward: will the husband be able to keep up with the demands of her care? Are there ways that he can get the breaks he needs to be able to maintain his ability to provide care for her?

FIGURE.

Spasticity Management in Multiple Sclerosis



Appendix: Main Injectable Disease-Modifying

Drug	Avonex®	Betaseron®
Manufacturer	Biogen	Berlex
Generic name, injection method	Interferon beta-1a (intramuscular)	Interferon beta-1b (subcutaneous)
Indications	For treatment of patients with relapsing forms of MS, to slow the accumulation of physical disability and decrease the frequency of clinical exacerbations.	For treatment of relapsing forms of MS, including relapsing remitting MS and secondary progressive MS with relapses, to reduce the frequency of clinical exacerbations.
Dosage & frequency	30 mcg, intramuscular, once per week	250 mcg, subcutaneous, every other day
How drug is supplied	Package contains four administration dose packs (each with one vial of Avonex, one 10 mL diluent vial, 2 alcohol wipes, one gauze pad, one 3 mL syringe, one MicroPin vial access pin, one 23-gauge needle, and one adhesive bandage)	Packaged in a clear glass, single-use vial (3 mL capacity); a pre-filled single-use syringe containing 1.2 mL of diluent (sodium chloride, 0.54% solution), 2 alcohol pads, and one vial adapter with attached 27 gauge needle are included for each vial of drug.
Warnings	**Depression and suicide** have been reported with increased frequency in patients receiving interferon compounds, including Avonex. These patients should be monitored closely. Avonex should be used with caution in patients with pre-existing depression. There have been post-marketing reports of depression, suicidal ideation and/or development of new or worsening of other pre-existing psychiatric disorders (including psychosis). **Anaphylaxis and other allergic reactions** (dyspnea, bronchospasm, tongue edema, rash, urticaria) have been reported as a rare complication of Avonex use. **Decreased peripheral blood cell counts** in all cell lines, including rare pancytopenia and thrombocytopenia, have been reported from post-marketing experience. This product contains albumin, a derivative of human blood, which carries an extremely remote risk for transmission of viral diseases.	**Depression and suicide** have been reported with increased frequency in patients receiving interferon compounds, including Betaseron. These patients should be monitored closely. Betaseron should be used with caution in patients with pre-existing depression. Injection site necrosis has been reported, usually within the first 4 months of therapy. Time to healing of the lesion varies and may be associated with scarring. **Anaphylaxis and other allergic reactions** (dyspnea, bronchospasm, tongue edema, rash, urticaria) have been reported as a rare complication of Betaseron use. This product contains albumin, a derivative of human blood, which carries an extremely remote risk for transmission of viral diseases.
Precautions	Should be used cautiously in patients with pre-existing seizure disorders, angina, congestive heart failure, or arrhythmia. Cases of idiopathic thrombocytopenia, hyper- and hypothyroidism, and rare cases of autoimmune hepatitis have been reported in patients taking Avonex. Regular monitoring of complete blood counts and blood chemistries, including liver function tests, is therefore recommended, as well as periodic thyroid function testing. Patients on Avonex should be monitored for signs of hepatic injury and caution should be exercised when taking other drugs associated with hepatic injury. There are no adequate controlled trials investigating the safety and efficacy of Avonex in pregnant women and children. Nursing women should discontinue breast-feeding or discontinue the drug. Use of aseptic technique is required to administer this agent.	Regular monitoring of complete blood counts and blood chemistries, including liver function tests, is recommended. Regular monitoring for thyroid abnormalities is also recommended. There are no adequate controlled trials investigating the safety and efficacy of Betaseron in pregnant women and children. Nursing women should discontinue breastfeeding or discontinue the drug. Use of aseptic technique is required to administer this agent.
Common adverse reactions	Depression, suicidal ideation, and new or worsening other psychiatric disorders, including psychosis; flu-like symptoms, such as muscle aches, fever, chills, fatigue, headaches, nausea, and vomiting. Laboratory abnormalities include a decrease in peripheral blood cell counts.	Depression and suicidal ideation; injection-site reactions, such as inflammation, pain, edema, necrosis; flu-like symptoms, such as fever, chills, muscle aches, sweating; laboratory abnormalities including a decrease in white blood cell count and increases in total bilirubin and SGPT; menstrual irregularities.
Storage instructions	Refrigerate. Reconstituted product should be refrigerated and used within 6 hours. If unreconstituted product cannot be refrigerated it can be stored at 25° C (77° F) for up to 30 days.	Room temperature until reconstituted. After reconstitution, if not used immediately, the product should be refrigerated and used within 3 hours. Avoid freezing.

Drugs for MS

	COPAXONE®	REBIF®
	TEVA NEUROSCIENCE	SERONO
	Glatiramer acetate (subcutaneous)	Interferon beta-1a (subcutaneous)
	For use in patients with relapsing-remitting MS, to reduce the frequency of relapses.	For treatment of relapsing forms of MS, to decrease the frequency of clinical exacerbations, and delay accumulation of physical disability. The efficacy of Rebif in chronic progressive MS has not been established.
	20 mg subcutaneous, every day	44 mcg subcutaneous, 3 times per week
	Supplied as a single-use, pre-filled syringe containing 1.0 mL of sterile, non-pyrogenic solution containing 20 mg of glatiramer acetate and 40 mg of mannitol, USP in cartons of 30 single-use, prefilled syringes, 33 alcohol preps (wipes) and instructions for use.	Supplied as a single-use, pre-filled syringe containing 44 mcg interferon beta-1a. Single-use, pre-filled syringes containing 22 mcg interferon beta-1a are also available in a Starter Pack. Supplied as a sterile, preservative-free solution packaged in graduated, ready-to-use 0.5 mL prefilled syringes with 27-gauge, 0.5-inch needle for subcutaneous injection.
	Copaxone should not be administered intravenously.	**Depression, suicidal ideation, and suicide** have been reported with increased frequency in patients receiving interferon compounds, including Rebif. These patients should be monitored closely. Rebif should be used with caution in patients with pre-existing depression. Rebif should be used with caution in patients with **active liver disease**, alcohol abuse, SGPT >2.5 times the upper limits of normal, or a history of significant liver disease. **Allergic reactions including anaphylaxis**, skin rash, and urticaria have been reported, with no clear association to dose or duration of treatment. This product contains albumin, a derivative of human blood, which carries an extremely remote risk for transmission of viral diseases.
	There are no adequate controlled trials investigating the safety and efficacy of Copaxone in pregnant women and children. Caution should be exercised when Copaxone is administered to nursing women. Use of aseptic technique is required to administer this agent. There is a possibility that this agent will interfere with immune function. The continued long-term use has not been evaluated.	Should be used cautiously in patients with pre-existing seizure disorders. Regular monitoring of complete blood counts and blood chemistries, including liver function tests, is recommended. Regular monitoring for thyroid abnormalities is also recommended. There are no adequate controlled trials investigating the safety and efficacy of Rebif in pregnant women and children. Exercise caution when administering Rebif to nursing women. Use of aseptic technique is required to administer this agent.
	Injection-site reactions, such as redness, itching, pain, welt, inflammation and induration. Post-injection reactions consisting of flushing, chest pain, palpitations, anxiety, dyspnea, throat constriction, urticaria, and transient chest pain.	Depression, suicidal ideation and attempts; injection-site reactions such as inflammation, pain, edema, necrosis; flu-like symptoms such as fever, chills, muscle ache, fatigue, and headache; and abdominal pain. Laboratory abnormalities include elevation of liver enzymes and decreases in leukocytes and platelets.
	Refrigerate (2° C to 8° C/36° F to 46° F). Excursions from recommended storage conditions for unreconstituted drug to room temperature for up to 1 week are allowed.	Refrigerate, or may be stored at or below 25° C/77° F for up to 30 days away from heat and light. Rebif contains no preservatives. It should not be used beyond the expiration date printed on packages.

Drug-Company Sponsored Support Programs for People with MS

Companies that distribute the major disease-modifying drugs provide valuable services that are available to people with MS whether or not they are taking the company's drug. Among the most valuable are the nurse hotlines, which are staffed by nurses specializing in MS. Contact information for these services is listed below. The web sites contain a variety of information for MS patients, families, and health care professionals.

AVONEX (Biogen Idec)

www.avonex.com
MS ActiveSource™
800-456-2255
Support services available Monday through Friday, 8:30 am to 8:00 pm Eastern time.

BETASERON (Berlex)

www.mspathways.com
MS Pathways™
800-788-1467
Offers 24-hour access to a nurse hotline staffed by MS nurses.

COPAXONE (Teva)

www.sharedsolutions.com
Shared Solutions®
800-887-8100
Confidential nurse counseling available by phone Monday through Friday, 7:00 am to 10:00 pm Central time. Messages can be left after hours for nurse call-back.

REBIF (Serono/Pfizer)

www.MSlifelines.com
MSLifelines
877-44-REBIF
Offers nursing support hotline Monday through Friday 8 am to 8 pm Eastern time. Messages can be left after hours for nurse call-back.

Sources: Avonex Package Insert. Cambridge, MA. Biogen IDEC, 2005. Betaseron Package Insert. Montville, NJ. Berlex Laboratories, 2005. Copaxone Package Insert. Kansas City, MO. Teva Neuroscience, 2004. Rebif Package Insert. Rockland, MA, Serono Laboratories. 2005.

CMSC-Recommended Web Resources

Organizations and web sites for health professionals involved in the care of MS patients. List is adapted courtesy of the CMSC, whose Web Editorial Review Board reviews the sites. For convenient links to these sites, access the list at www.mscare.org/professional.cfm.

Medicine

Medlineplus Health Information from the National Library of Medicine
(http://www.nlm.nih.gov/medlineplus/)

National Library of Medicine (NLM) Gateway
Retrieval system allows for simultaneous searching in multiple databases.
(http://www.Gateway.nlm.nih.gov/gw/Cmd)

American Academy of Neurology (AAN)
Association web site for neurologists and neuroscience professionals, offers clinical practice tools and guidelines, CME, and resources.
(http://www.aan.com)

The Whole Brain Atlas
A graphic site with good anatomical models to aid in patient and professional education.
(http://www.med.harvard.edu/AANLIB/home.html)

Multiple Sclerosis Complementary and Alternative Medicine (MS-CAM)
From the Rocky Mountain MS Center in Colorado, provides accurate unbiased reviews on CAM in MS. $30 annual subscription fee.
(http://www.ms-cam.org)

Neuroscience on the Internet
Searchable index of Internet neuroscience resources. **(http://www.neuroguide.com)**

National Center for Complementary and Alternative Medicine
NIH organization explores CAM in the context of rigorous science. Fact sheets, consensus statements, databases, clearinghouse of CAM info, clinical trial section. **(http://nccam.nih.gov)**

Neuromuscular Information Services
Supported by Elan Pharmaceutical, site provides information on neuromuscular conditions, includes archives of newsletters Pain Watch and Spasticity Watch.
(www.neruomuscularinfo.com)

Multicultural

Multicultural Health Clearinghouse of the University of Illinois
This site provides health and wellness information and links to other health resources.
(http://www.mckinley.uiuc.edu/multiculturalhealth/index.html)

Rural Information Center Health Service
This site offers a good focused listing of links to information on Hispanic health.
(http://www.nalusda.gov/ric/richs/hispanic.htm)

Office of Minority Health
US government Office of Minority Health site offers conference links, publications, statistics, extensive listing of government resources.
(http://www.omhrc.gov)

Agape/Baylor Community Care Program
Resource to help health care professionals understand Hispanic communities. It offers bilingual resources and links to translation sites. **(http://www.baylor.edu/~Charles Kemp/hispanichealth.htm)**

New York On Line Access to Health (NOAH)
This site provides a variety of health information for consumers in both English and Spanish.
(www.noah-health.org/index.html)

Latin America Committee for Treatment and Research in Multiple Sclerosis (LACTRIMS)
LACTRIMS represents clinical services in MS throughout Latin America and some portions of the United States.
(http://www.lactrims.org.ar)

Rehabilitation in Multiple Sclerosis (RIMS)
RIMS is a network of MS Centers in Europe involved in clinical care and rehabilitation in MS. Focuses on an interdisciplinary, multidisciplinary team approach to MS care.
(http://www.rims.be)

Nursing

International Organization of Multiple Sclerosis Nurses (IOMSN)
The first and only international organization focused solely on the need and goals of professional nurses, anywhere in the world, who care for people with multiple sclerosis.
(http://www.iomsn.org)

Association of Rehabilitation Nurses (ARN)
Certifying organization for rehabilitation nurses. Site offers CE articles, conference information, a journal, certification information and practice test, and opportunities for networking. **(http://www.rehabnurse.org)**

American Nurses Association (ANA)
Organization representing 2.6 million RNs through its state organizations. This is a full service site with many offerings, including a nice listing of useful web site links.
(http://www.nursingworld.com)

American Association of Neuroscience Nurses (AANN)
Certifying organization for neuroscience nurses, develops core curriculum and standards of practice for neuroscience nursing.
(http://www.aann.org)

Behavioral Medicine Research Center (BMRC)
The center is completing studies on injection anxiety and has developed a patient workbook and a counselor manual available through its website. **www.ucsf.edu/bmrc.**

Nutrition

American Dietetic Association
Includes resources for health professionals and consumers: nutrition tip of the day, nutrition fact sheets, how to find a nutrition professional in your area and a catalog of educational materials for purchase.
(http://www.eatright.org)

Food Medication Interactions
Information about two comprehensive, well-documented items of interest to professionals: Food Medication Interactions Handbook and Herb-Drug Interactions Handbook
(http://www.foodmedinteractions.com)

Quackwatch, Inc.
Non-profit organization focuses on health care related frauds, hoaxes, myths and fallacies. It critiques alternative medicines, dubious products, and questionable advertisements. Information is well documented.
(http://www.quackwatch.org)

United States Department of Agriculture Food and Nutrition Information Center
This website provides a wealth of information on general nutrition for professionals and consumers. **(http://www.nal.usda.gov/fnic/)**

Occupational Therapy

Abledata
A federally funded project, database contains information on more than 30,000 assistive technology products from white canes to voice output. Provides information on how to contact manufacturers or distributors of these products. **(http://www.abledata.com/)**

American Occupational Therapy Association (AOTA) (http://www.aota.org)

Association for Driver Rehabilitation Specialists (ADED)
Supports driver education professionals and equipment modifications for persons with disabilities. Membership directory helps in locating local driver rehabilitation specialists.
(http://www.driver-ed.org)

Canadian Association of Occupational Therapists (CAOT) (http://www.caot.ca/)

Closing the Gap, Inc.
Resource for computer technology in special education and rehabilitation.
(http://www.closingthegap.com)

National Mobility Equipment Dealers Association (NMEDA)
A non-profit trade association of mobility equipment dealers: vehicle modifications and equipment installation, equipment manufacturers, driver rehabilitation specialists, etc. **(http://www.nmeda.org/)**

Rehabilitation Engineering & Assistive Technology Society of North America (RESNA)
A resource for technology-related services, information, or referrals. Resources and links to other sites provided.**(www.resna.org)**

The Center for Universal Design
A national research, information, and technical assistance center that evaluates, develops, and promotes universal design in housing, public and commercial facilities, and related products. **(www.ncsu.edu/ncsu/design/cud)**

Trace Research & Development Center
The Trace Center is currently working on ways to make standard information technologies and telecommunications systems more accessible and usable by people with disabilities.
(http://www.tracecenter.org)

Patient Information

National Multiple Sclerosis Society
Outstanding resource for individuals with MS and their families that provides information pertaining to living with MS, MS treatment, scientific progress, publications and its organization structure and functions.
(http://www.nmss.org)

Multiple Sclerosis Society of Canada
Information about the disease, progress in MS research, available services, fund raising opportunities and quick access to the MS Society. **(http://www.mssociety.ca)**

Multiple Sclerosis Association of America
A national nonprofit organization dedicated to enhancing the quality of life for those affected by MS. MSAA provides ongoing support and direct services to individuals with MS and their families. **(http://www.msaa.com)**

Multiple Sclerosis Foundation
Great source of basic information about MS. Website has interactive, multimedia MS library and online forum. Can also subscribe to MSFocus, a quarterly magazine and the MS Foundation newsletter. **(http://www.msfacts.org/)**

International Federation of MS Societies (IFMSS)
Advocacy group works in partnership with MS societies and research community to represent those with MS. Patients can access MS symptoms, definitions and publications.
(www.msif.org)

Understanding MS
This site offers a full range of information about treatments, lifestyle issues, and new research.
(http://www.understandingms.com)

MSwatch
"Chat" site developed by a person with MS, popular way to communicate with others who have MS patients via the message boards. Sponsored by Teva Marion Partners, but site is unbiased. **(http://www.mswatch.com)**

Computer Literate Advocates for MS (CLAMS)
Advocates computer communications for support, companionship and information for those with MS. Offers resource for finding MS care professional recommended by others with MS. **(http://www.clams.org)**

Healthfinder
Consumer resource from the Department of Health and Human Services, provides access to latest government health news, Medicare, and other health topics of interest.
(http://www.healthfinder.gov)

Caregiving Online
Provides a support system for caregivers (professional or family member) through tips, real life stories, and message boards.
(http://www.caregiving.com)

ElderWeb
Helping older adults cope with the expanding world of technology. Has links to long term care information, as well as an expanding library of articles and reports.
(http://www.elderweb.org)

Nursing Home Abuse and Neglect
Consumer site explains federal and state law and steps in filing a complaint against a nursing home.
(http://www.txlegal.com/nursing.htm)

Multiple Sclerosis Trust
A leading independent UK organization for people with MS, families, and health professionals. The Library and Information Service (LIS) is useful for UK-based health professionals. **(http://www.mstrust.org.uk)**

Multiple Sclerosis Society of UK
The MS Society is the UK's largest advocacy group for people with MS. The Society is the main source of reliable information about MS and the leading UK funder of MS research.
(http://www.mssociety.org.uk)

Pharmacy

Centers for Disease Control
Public health guidelines, vaccine and travel information and CDC publications
(http://www.cdc.gov/)

CNN Interactive
Consumer health information on the news
(http://www.cnn.com/health)

Food and Drug Administration
Drug information, including approvals, shortages, news, etc.
(http://www.fda.gov/cder)

National Institute of Health
Information on disease states, research and federal health programs
(http://www.nih.gov/health/)

National Library of Medicine
A searchable listing of abstracts of medical literature **(www.ncbi.nlm.nih.gov/entrez)**

Drug Digest from Express Scripts
Provides drug and disease information for consumers **(http://www.drugdigest.org/)**

DrugInfoNet
From US Department of Health and Human Services **(http://www.druginfonet.com)**

HealthFinder
Government-sponsored consumer resource on prevention and self-care, latest government health news, Medicare, and other health topics of interest across all ages.
(http://www.healthfinder.com)

Healthtouch
Basic information on hundreds of prescription medications
(http://www.healthtouch.com/level1/menu.htm)

Mayo Clinic
Provides information on more than 8000 prescription and OTC medications as well as health information **(http://www.mayoclinic.com)**

National counsel on patient information and education
Links to timely guidelines, tips and resources to help patients use their medications safely and appropriately. **(http://www.talkaboutrx.org)**

Safe medications
Provides user friendly, easy to read information on over 700 drug products
(http://www.safemedications.com)

Web MD Health
Information on prescription and herbal medications, providing drug news and product recalls and links to health information.
(http://www.webmd.com)

Center for Food Safety and Applied Nutrition
Site providing adverse drug reaction information for herbal products and supplements **(http://www.cfsan.fda.gov/list.html)**

NIH National Center for Complementary and Alternative Medicine
(http://www.nccam.nih.gov)

CDC National Immunization Program
Current guidelines provided regarding vaccines **(http://www.cdc.gov.nip)**

Immunization Action Coalition
Educational resources for health care professionals and patients
(http://www.immunize.org)

Generic/Brand Name Drug Directory
(http://www.mscare.org)

Psychology & Neuropsychology

American Psychological Association Division 22 - Rehabilitation Psychology
Division 22 - Rehabilitation Psychology
(http://www.apa.org/about/division/div22.html)

American Psychological Association - Division 40 - Clinical Neuropsychology
(http://www.div40.org)

National Academy of Neuropsychology
The National Academy of Neuropsychology is a professional society that includes clinicians, scientist/practitioners, and researchers interested in neuropsychology. **(http://nanonline.org)**

International Neuropsychological Society
Multi-disciplinary non-profit organization dedicated to promoting research, service and education in neuropsychology, and to enhancing communication among the scientific disciplines **(http://www.osu.edu/ins)**

Neuropsychology Central
A general site of neuropsychological information and neuropsychology search engine.

(http://www.neuropsychologycentral.com)

Speech Language Pathology

American Speech-Language-Hearing Association
Professional association for speech-language pathologists, audiologists; advocacy organization for people with communications disorders. **(http://www.asha.org)**

Dysphagia Resource Center
Broad based resources for swallowing and swallowing disorders.
(http://www.dysphagia.com)

Medonline
Provides a forum for professionals to discuss clinical cases and various topics related to swallowing and swallowing disorders.
(http://dysphagia@medonline.com)

A publication of the International Organization of MS Nurses (IOMSN)
Through an Educational Grant from Teva Neuroscience