



# Understanding multiple sclerosis and the nurse's role

Nurses play a critical role in enhancing care and must know treatments and interventions to provide thorough care for patients with MS.

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The leading cause of neurologic disability not related to trauma in young adults is multiple sclerosis (MS).<sup>1</sup> MS is defined as an autoimmune demyelinating neurodegenerative disease. The prevalence of MS is on the rise globally, with the highest incidence in North America, Western Europe, and Australasia. Nearly 1 million individuals are involved in the US alone. Women are affected almost three times more often than men and have a younger average age of 30 years.<sup>2</sup>

More than 100 per 100,000 MS cases are complex and multifaceted, involving immune dysregulation, inflammation, demyelination, neurodegeneration, and gliosis.<sup>2</sup> This interplay of processes leads to the development of clinical symptoms. MS affects the tissue of the central nervous system (CNS), beginning with inflammation and demyelination of the nerve fibers. Once the process starts, it's followed by astroglia proliferation and neurodegeneration, resulting in tissue

damage.<sup>3</sup> Clinical manifestations are divided into two categories: relapsing or progressive. Relapsing MS affects women most often, whereas progressive MS primarily affects men in their 40s.<sup>2</sup> Discrete, unnoticed episodes can occur when a patient attributes the temporary loss of neurologic function to an unrelated event. Over time, the attacks become more common and involve partial or complete loss of neurologic function in an area. As the disease advances, the remission periods decrease, and the condition worsens due to the progressive nature of MS.<sup>2</sup>

Evolving treatments and approaches affect the patient's prognosis and outcome expectation. Controlling acute attacks is crucial. Symptom management requires multifaceted approaches. Understanding the B cell's targeted therapies and T-cell-mediated effect can contribute to the development and success of treatment.<sup>1,2</sup> The emergence of treatments with higher efficacy requiring less frequent medication administration has improved patients' and caregivers' quality of life and substantially increased the patients' life span. For instance, what was once, on average, a 19-year life span after diagnosis has become

## Pathophysiology breakdown of MS

<b>Autoimmune response</b>	MS is an autoimmune disease wherein the immune system mistakenly attacks the myelin sheath (a protective covering of nerve fibers in the CNS).  The exact autoimmune response trigger is unknown; however, MS is thought to involve a combination of genetic susceptibility and exposure to environmental factors (infections or toxins).
<b>Inflammation</b>	The immune system's response leads to the infiltration of immune cells (primarily T cells and B cells) into the CNS. These immune cells release proinflammatory cytokines and antibodies, which initiate an inflammatory cascade, causing damage to the myelin sheath and the underlying nerve fibers.
<b>Demyelination</b>	Inflammation in MS destroys myelin, the fatty substance that surrounds and insulates nerve fibers (critical for the efficient transmission of nerve signals). Demyelination disrupts the normal flow of electrical impulses along the affected nerve fibers, leading to neurologic symptoms.  Initially, the myelin repairs itself to some extent, but repeated episodes of inflammation and demyelination may result in permanent damage.
<b>Plaque formation</b>	As MS progresses, areas of demyelination form characteristic lesions or plaques in the CNS. These plaques are commonly found in the white matter of the brain, spinal cord, and optic nerves. They vary in size, shape, and distribution throughout the CNS, giving rise to the diverse clinical manifestations seen in MS.
<b>Neurodegeneration</b>	Over time, the chronic inflammation and demyelination processes can also lead to neurodegeneration (characterized by the loss of nerve cells [neurons] and their axons).  Neurodegeneration contributes to the accumulation of disability in MS and is responsible for the irreversible neurologic deficits observed in the advanced stages of the disease.
<b>Reactive gliosis</b>	In response to inflammation and tissue damage, the CNS activates a repair mechanism known as gliosis. Reactive gliosis involves the proliferation and activation of glial cells, such as astrocytes and microglia.  Although glial cells have a protective role in limiting further damage, their prolonged activation contributes to scar tissue formation, further impeding normal neuronal function.
<b>Axonal injury</b>	Axons are responsible for transmitting signals between neurons and may become damaged due to the immune response or the loss of myelin support. Axonal injury disrupts the integrity and efficiency of neural communication. It contributes to the long-term disability seen in MS.

long-term management of the disease with at least double the time of functionality."<sup>2</sup>

### Pathophysiology

Understanding the immune pathology is essential for caregivers to properly manage and treat MS (see *Pathophysiology breakdown of MS*).<sup>4</sup>

The pathophysiology and the accumulation of disability occur over time. Understanding the mechanisms of MS leads to effective treatment. Developing effective treatment that modifies the course of the disease will improve the quality of life for individuals with MS (see *Pathophysiology of MS*).<sup>4</sup>

### Assessment and diagnosis

Assessing and diagnosing MS involves a combination of clinical evaluation, medical history, neurologic examination, and diagnostic tests. Several key steps and tools are commonly used in the assessment and diagnosis of MS (see *Assessing and diagnosing MS*).<sup>5</sup>

It's important to note that the diagnosis of MS is often a complex process that requires the expertise of a neurologist or healthcare professional experienced in evaluating and managing the disease. The diagnosis may evolve over time as new clinical manifestations or additional diagnostic information becomes available (see *Testing for MS*).

### Clinical manifestations

MS is a complex disease that presents with a wide range of clinical manifestations. The specific symptoms and their severity vary widely among individuals with MS. The clinical course of MS is categorized into different types, including relapsing-remitting MS, primary progressive MS, secondary progressive MS, and progressive-relapsing MS (see *Clinical manifestations of MS and Types of MS*).<sup>5-8</sup>

It's important to note that the symptoms of MS vary significantly among individuals, both in terms of type and severity.

### Pathophysiology of MS

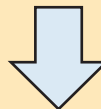
AUTOIMMUNE RESPONSE



INFLAMMATION



DEMYELINATION



PLAQUE FORMATION



NEURODEGENERATION



REACTIVE GLIOSIS



AXONAL INJURY

Additionally, the symptoms might change over time and may have periods of exacerbation (relapses) followed by partial or complete recovery (remissions) in the case of relapsing-remitting MS. The clinical manifestations and course of MS are highly individualized, and a multidisciplinary approach involving neurologists, physiotherapists, occupational therapists, and other healthcare professionals is often required to manage the diverse symptoms and provide comprehensive care to individuals with MS.<sup>5,6</sup>

### Treatment

MS treatment aims to manage symptoms, slow disease progression, and improve quality of life. The specific treatment

approach depends on various factors, including the type of MS, the severity and frequency of symptoms, and individual patient characteristics. Treatment plans are often developed and monitored by neurologists or healthcare professionals specializing in MS (see *Treatment of MS*).<sup>2</sup>

Individuals with MS must have regular follow-up visits with their healthcare providers to assess treatment efficacy, monitor disease activity, and make necessary adjustments to the treatment plan. The

treatment landscape for MS is continuously evolving, and new therapies are being developed and approved. It's essential to consult with healthcare professionals who specialize in MS to receive the most up-to-date and individualized care.<sup>2</sup>

### Emotional aspects and support

An MS diagnosis significantly impacts a person's emotional well-being and overall quality of life. The emotional aspects of MS vary from person to person, and

## Assessing and diagnosing MS<sup>5</sup>

<b>Medical history and symptom evaluation</b>	<p>The provider will begin by taking a detailed medical history, including any neurologic symptoms, and the presence of any previous symptoms and their duration.</p> <p>Symptoms suggestive of MS may include visual disturbances, sensory abnormalities, motor deficits, balance problems, or unexplained fatigue.</p>
<b>Neurologic exam</b>	<p>A comprehensive neurologic assessment is performed to assess the function of the CNS.</p> <p>The provider will evaluate motor strength, coordination, reflexes, sensation, gait, and eye movements by conducting specific tests, such as the evaluation of optic nerves and visual fields to identify signs of optic neuritis.</p>
<b>MRI</b>	<p>MRI can detect the presence of characteristic MS lesions or plaques in the CNS. These appear as areas of inflammation, demyelination, or scar tissue. The lesions' location, size, and distribution provide valuable information for diagnosing and classifying MS.</p> <p>MRIs are typically performed with contrast agents to enhance the visualization of active inflammation or recent damage.</p>
<b>Cerebrospinal fluid (CSF) analysis</b>	<p>A lumbar puncture, also known as a spinal tap, may be performed to obtain a sample of CSF. Analysis of the CSF helps in evaluating the presence of specific biomarkers that may support the diagnosis of MS.</p> <p>In MS, there's often an increase in the number of immune cells (lymphocytes) and the presence of specific antibodies called oligoclonal bands.</p>
<b>Evoked potentials</b>	<p>Evoked potential tests measure the electrical activity generated by the nervous system in response to sensory stimuli. Visual evoked potentials, auditory evoked potentials, and somatosensory evoked potentials are commonly used to assess the conduction of nerve signals along specific pathways.</p> <p>Delayed or abnormal responses may suggest demyelination or damage in those pathways.</p>
<b>Differential diagnosis</b>	<p>The provider will consider and rule out other conditions that mimic MS symptoms, such as other autoimmune disorders, infections, vitamin deficiencies, and structural abnormalities in the CNS.</p> <p>The evaluation may involve additional tests, including blood tests, to assess for other potential causes.</p>
<b>McDonald criteria</b>	<p>The McDonald criteria is a widely used diagnostic guideline for MS. This criterion incorporates clinical, imaging, and CSF findings to establish the likelihood of MS.</p> <p>The criteria consider the presence of characteristic symptoms, evidence of dissemination in space (lesions in different locations), and evidence of dissemination in time (new or enhancing lesions on MRI over time).</p>

various recommendations for support include:

**1. Emotional response:** A diagnosis of a chronic and unpredictable condition such as MS may elicit a range of emotions, including shock, disbelief, fear, sadness, anger, and anxiety. It's normal for the patient to go through a period of adjustment and emotional processing. Understanding and acknowledging these emotions is essential in coping with the diagnosis.

**2. Depression and anxiety:** Depression and anxiety are common in individuals with MS. The challenges of living with a chronic illness, uncertainty about the future, and the impact of physical symptoms contribute to feelings of sadness, hopelessness, worry, and excessive fear. It's critical to seek professional help if these symptoms persist and interfere with daily functioning.

**3. Grief and loss:** Patients with MS experience many losses, such as loss of physical abilities, loss of independence, changes in relationships, and adjustments to life plans and goals. It's natural to grieve these losses and adapt to the changes. Support from loved ones, healthcare teams, and support groups assist in navigating this process.

**4. Social support:** Building a solid support network is crucial for individuals with MS. Friends, family, and loved ones provide emotional support, understanding, and practical assistance. Sharing feelings and experiences with others with MS through support groups or online communities is also beneficial. Connecting with others who relate to the challenges of MS helps reduce feelings of isolation.

**5. Education and information:** Learning about MS and understanding the condition empowers individuals to participate in their treatment and make informed decisions actively. Accessing reliable information from healthcare professionals, support organizations, and reputable

## Testing for MS

### Neurologic exam:

Including cognitive testing to determine function of nervous system and degree of damage to brain

### Blood tests:

Used to help with differential diagnosis and rule out other diseases

### MRI:

Used to visualize damage to myelin sheath and active inflammation

### Evoked potentials:

To measure electrical activity in brain and spinal cord

### Spinal tap:

To analyze CSF for lymphocytes, oligoclonal bands, and IgG antibodies

online sources provides a sense of control and reduces anxiety.

**6. Counseling and therapy:** Professional counseling or therapy is highly beneficial in managing the emotional aspects of living with MS. Psychotherapy provides a safe space to explore and process emotions, develop coping strategies, and enhance resilience. Cognitive-behavioral therapy and mindfulness-based interventions are often helpful in managing anxiety, depression, and stress.

**7. Self-care and stress management:** Prioritizing self-care and adopting stress management techniques are essential for emotional well-being. Engaging in activities that bring joy, practicing relaxation techniques (such as deep breathing, meditation, or yoga), and maintaining a

## Types of MS<sup>7,8</sup>

**Relapsing-Remitting MS (RRMS):** Relapses show increase in symptoms, followed by remission. During remission, all symptoms may disappear if not permanent.

**Primary Progressive MS (PPMS):** Absence of relapses and steady increase in disability without attacks. Neurologic function declines with symptom appearance.

**Secondary Progressive MS (SPMS):** Follows initial RRMS. Neurologic function worsens over time with decrease of remission.

**Progressive-Relapsing MS (PRMS):** Includes attacks, with steady decline in neurologic function.

healthy lifestyle positively impact mental health.

**8. Healthcare team support:** Developing a trusting and open relationship with healthcare providers is essential. Regular communication with neurologists, nurses, and other healthcare professionals specializing in MS provides guidance, answers questions, and addresses concerns. They can help navigate treatment options and coordinate comprehensive care.

Emotional support is essential for individuals with MS. Proactive engagement in self-care strategies improves wellness. Seeking help from mental health

## Clinical manifestations of MS<sup>5,6</sup>

<b>Sensory disturbances</b>	May include numbness, tingling, or a feeling of pins and needles in various parts of the body. Disturbances may affect the face, limbs, trunk, or entire body.
<b>Motor deficits</b>	Weakness and muscle stiffness (spasticity) make movements difficult and lead to coordination difficulties. Muscle cramps and tremors might also occur. These motor deficits affect mobility and fine motor skills.
<b>Optic neuritis</b>	Inflammation of the optic nerve (optic neuritis) is a common early symptom of MS. It can cause blurred or loss of vision, pain with eye movement, or even complete loss of vision in one eye. Vision usually improves over time; some individuals may experience residual visual problems.
<b>Fatigue</b>	Fatigue is one of the most common and debilitating symptoms of MS. It's a pervasive and overwhelming sense of exhaustion that's not necessarily related to physical activity. Fatigue significantly impacts daily functioning and quality of life.
<b>Cognitive changes</b>	MS affects cognitive function in select individuals. Problems with memory, attention, concentration, information processing speed, and problem-solving may arise. These mental changes vary from mild to severe and significantly impact work, relationships, and overall functioning.
<b>Balance and coordination problems</b>	MS disrupts the normal functioning of the cerebellum and other parts of the CNS responsible for balance and coordination. As a result, MS individuals might experience balance difficulties, dizziness, vertigo, and unsteady gait.
<b>Bowel and bladder dysfunction</b>	MS affects the normal bladder and bowel functioning, leading to urinary urgency, frequency, incontinence, constipation, or loss of bowel control.
<b>Emotional and psychological changes</b>	The emotional and psychological impact includes depression, anxiety, mood swings, and irritability. These changes can be a result of the physical burden of the disease, as well as the impact on daily life and relationships.

## Treatment of MS

### Disease-modifying therapies (DMTs)

DMTs are the mainstay of treatment for MS, particularly in relapsing forms of the disease.

DMTs work by modifying the immune response and reducing relapse frequency and severity, slowing disease progression, and reducing the formation of new lesions.

There are several DMT options available, including injectable medications (interferons, glatiramer acetate), oral medications (fingolimod, dimethyl fumarate), and infusions (natalizumab, ocrelizumab). The choice of DMT depends on factors such as disease activity, patient preferences, and potential adverse reactions.

### Symptom management

MS symptoms are diverse and require specific treatments to manage them effectively. For example, medications may alleviate muscle spasticity, reduce fatigue, manage bladder or bowel dysfunction, and control pain. Physical and occupational therapy also helps individuals with MS maintain or improve mobility, strength, and coordination.

### Relapse management

During relapses or exacerbations of MS, corticosteroids (such as I.V. methylprednisolone) are commonly used to reduce inflammation and shorten the duration of symptoms.

These medications can hasten recovery but don't alter the long-term course of the disease.

### Symptom-specific interventions

Various interventions address specific symptoms of MS. Medications such as fampridine may be prescribed to improve walking ability, whereas medications such as modafinil help manage fatigue.

Physical, occupational, and speech therapy may also be recommended to address mobility issues, improve fine motor skills, or manage speech and swallowing difficulties.

### Rehabilitation and support

Rehabilitation programs, including physical therapy, occupational therapy, and cognitive rehabilitation, help individuals with MS improve or maintain their functional abilities.

Supportive treatments, such as counseling, support groups, and vocational rehabilitation, are crucial in addressing the emotional and psychosocial aspects of living with MS.

### Lifestyle modifications

Adopting a healthy lifestyle positively impacts MS management. Modifications include regular exercise, a well-balanced diet, stress reduction techniques, and adequate rest.

Smoking cessation is vital, as smoking has been associated with more severe disease progression in MS.

professionals who have experience working with individuals with chronic illness is invaluable in addressing the emotional aspects of living with MS.<sup>9</sup> (See *Cheat sheet*.)

### Indications for nursing care

Nursing care is vital in supporting individuals with MS throughout their journey (see *Caring for a patient with MS*). The comprehensive and holistic approach of nursing care helps individuals with MS manage their symptoms, adapt to the challenges of the disease, and optimize their overall health and well-being.

### A joint effort

The diagnosis and treatment of MS are multifaceted and dramatically impact an individual's quality of life. These

### Cheat sheet: MS quick tips

1. Understanding and acknowledging emotions is essential in coping with the diagnosis of MS.
2. It's crucial for patients to seek professional help if symptoms of depression and anxiety persist and interfere with daily functioning.
3. Support from loved ones, counseling, and support groups assists in navigating grief and loss associated with MS.
4. Building a solid support network is critical.
5. Connecting with others who relate to the challenges of MS helps reduce feelings of isolation.
6. Learning about MS and understanding the condition empowers individuals to participate in their treatment and make informed decisions actively.
7. Professional counseling or therapy is highly beneficial in managing the emotional aspects of living with MS.
8. Engaging in activities that bring joy, practicing relaxation techniques (such as deep breathing, meditation, or yoga), and maintaining a healthy lifestyle positively impact mental health.
9. Developing a trusting and open relationship with healthcare providers helps in navigating treatment and coordinating comprehensive care.

## Caring for a patient with MS

### Education and counseling

Nurses provide essential education to individuals newly diagnosed with MS and their families. They explain the disease process, treatment options, and self-management strategies.

Nurses also offer counseling and emotional support, addressing concerns and helping individuals cope with the challenges associated with MS.

### Symptom management

Nurses are crucial in assessing and managing pain, spasticity, fatigue, bladder and bowel dysfunction, sensory disturbances, and mobility issues.

They may collaborate with the healthcare team to develop personalized care plans, provide appropriate medications, and teach individuals about self-care techniques.

### Rehabilitation and practical support

Nurses work closely with physical therapists, occupational therapists, and other rehabilitation specialists to facilitate rehabilitation programs tailored to the specific needs of individuals with MS.

They support individuals in maintaining or improving mobility, promoting independence in daily activities, and maximizing quality of life. Nurses may assist with exercises, provide mobility aids, and teach energy conservation techniques.

### Psychosocial support

Nurses provide psychosocial support through active listening; offering empathy; and addressing concerns about self-image, relationships, and emotional health.

They may refer individuals to support groups, counseling services, or community resources for additional assistance.

### Lifestyle counseling and health promotion

Nurses play a vital role in promoting a healthy lifestyle and preventing complications associated with MS.

Nurses facilitate maintaining a balanced diet, engaging in regular exercise, managing stress, and adopting strategies for self-care.

Nurses also emphasize the importance of preventive measures, such as vaccinations and regular health screenings.

### Continuity of care and care coordination

Nurses collaborate with the healthcare team to ensure continuity of care for individuals with MS. They facilitate communication between healthcare providers, assist with appointment scheduling, and coordinate various aspects of care, including referrals to specialists, diagnostic tests, and follow-up visits.

Nurses advocate for individuals' needs and help them navigate the healthcare system.

### Patient and caregiver education

Nurses provide education and support to individuals with MS and their caregivers. They offer guidance on caregiving strategies, assistive devices, and respite care options. By equipping caregivers with the necessary knowledge and skills, nurses contribute to the overall well-being and quality of life of individuals with MS and their support systems.



individuals require healthcare providers, including the neurologic team, nurses, and mental health professionals, to aid in improving care management. MS treatment has progressed based on new knowledge of pathophysiology and complex clinical manifestations. The development of new, effective therapies aids in controlling relapsing disease; however, new therapies are needed to control the progression. The nurse plays a critical role in enhancing care and must know treatments and interventions to provide thorough care for patients with MS. ■

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