The Inaugural June Halper Excellence in MS Nursing Program

This activity is jointly provided by CMSC, IOMSN, CATAMOUNT Medical Education

This activity is supported by independent educational grants from Keenova Therapeutics, previously Mallinckrodt Pharmaceuticals, Novartis, and TG Therapeutics.

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June Halper, MSN, APN-C, FAAN MSCN

A Nursing Hero

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In Memory of an MS Nursing Giant

June Halper MSN, APN-C, FAAN, MSCN

Left us on July 24, 2024

Remembered by MS Nurses Everywhere

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June Halper

- June Halper was born on June 22,1938, in the Bronx, New York
- Moved with her husband Morris to Fair Lawn, New Jersey in 1968 where she raised three children Michael, Matthew, and Julie
- Later she welcomed son-in-law (Ernie), daughter-in-law (Bobbi Ann), two grandchildren – Lee and Hallie and two step grandchildren Andrew and Alexa
- June valued family above everything, and they were always the focus of her life
- She was able to prioritize her family while attaining major accomplishments in her professional career

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Academic Accomplishments

- At one time she contemplated medical school, but her heart directed her to nursing school
  - 1976: RN from Bergen Community College in Paramus, NJ
  - 1981: Bachelors Degree from Felician College in Lodi, NJ
  - 1983: MSN from Seton Hall University in South Orange, NJ
  - 1999: Fellow in the American Academy of Nursing (FAAN)

Career Accomplishments

- Co-founder of the MS Center at Holy Name Medical Center in Teaneck, NJ
- Chief Executive Officer and founding member of the Consortium of Multiple Sclerosis Centers (CMSC) and the International Organization of Multiple Sclerosis Nurses (IOMSN), actively working with both organizations until her final days
- Her leadership and vision transformed the landscape of MS treatment and care that has improved the lives of countless individuals worldwide

Contributions to Nursing

- Published and lectured extensively to nurses everywhere
- Facilitated the establishment of MS Nursing competencies
- Spearheaded the establishment of the Multiple Sclerosis International Credentialing Board (MSNICB)
- Established the MS Nursing Scholarship fund at the Foundation of the CMSC
- Created the Nightingale Nursing Scholarships
- Secured accreditation which allows CMSC to offer CE-certified educational programs for nurses
- Supported MS nursing organizations internationally

A Friend

- I knew June for over 30 years
- Her impact on my career in MS nursing was significant
- She was my “career hero”
- She was fun loving, kind, generous, courageous, and a mentor and lifelong friend to all of us who knew her!

Memorial Lecture: *The Nurse's Role in Comprehensive Care*

Colleen Harris, MN, NP, MSCN

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Objective

- Recognize the importance of comprehensive care in multiple sclerosis (MS) management and the nurse's role in optimizing patient outcomes

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What is Comprehensive MS Care?

- Prior to mid-20th century MS care was fragmented and largely symptomatic with little understanding of the disease progression or the needs of patients
- Comprehensive care reflects the evolution of MS care from isolated treatment to comprehensive multidisciplinary approaches that significantly improve patient outcomes and quality of life
- Comprehensive care is a coordinated, multidisciplinary, and patient centered approach that addresses the full spectrum of a person's needs—medical, functional, psychological, and social—across the course of the disease

Marie Namey, CMSC Meeting, 2025

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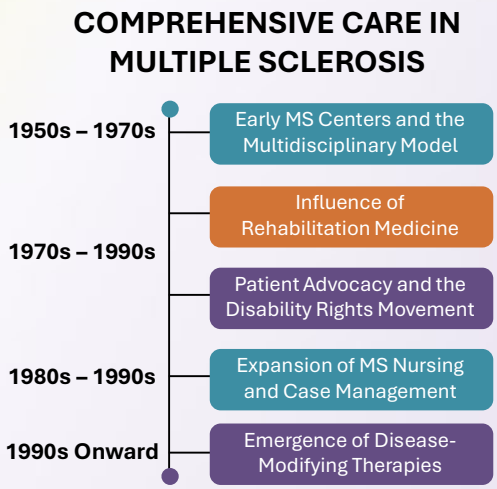
History of Comprehensive Care



Marie Namey, CMSC Meeting, 2025

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Evolution of Comprehensive Care in the US

- **National Mandate (1973–1975)**
  - In 1973, the National Advisory Commission on Multiple Sclerosis recommended significant funding for the first dedicated comprehensive treatment centers. These were focused on preventing complications and disability
- **Early Centers (1977–1978)**
  - UW Medical Center: Began providing comprehensive services in 1977.
  - Rocky Mountain MS Center: Founded in 1978 to provide specialized clinical options for patients who were previously told "there's nothing anyone can do"
- **Consortium of Multiple Sclerosis Centers (1986)**
  - Founded as a multidisciplinary professional organization instrumental in networking MS health professionals and promoting the "team approach" to care
- **Disease-Modifying Therapies (1993)**
  - The approval of the first DMTs accelerated the need for comprehensive clinics to manage complex drug regimens alongside traditional rehabilitation
- **Certification and Accreditation (1990s and early 2000s)**
  - Organizations like the National MS Society began officially accrediting facilities as "Centers for Comprehensive MS Care" to ensure patients had access to a full team, including neurologists, nurses, social workers, and therapists

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Comprehensive Care Movement in Canada

- **Montreal Neurological Institute**
  - Formed in 1949 following the establishment of the Canadian National MS Society in 1948
  - Had research base but not the structure for multidisciplinary care
- **London Health Sciences Centre**
  - First dedicated multidisciplinary care clinic established in 1972 as part of a network of clinics across Canada
- **National expansion** of these clinics occurred across Canda between 1976-1981 with funding from the National MS Society
- **Nurses** and/or social workers lead comprehensive team

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Thoughts on Comprehensive Care

"Activities that are essential to patient care can be grouped into the following areas: establishing care; continuing care; and sustaining care. Together, these interwoven areas provide a framework for a comprehensive and cohesive model for MS nursing practice."
June Halper, MSN, APN-C, MSCN, FAAN, Interview with the Multiple Sclerosis Association of America. Available at: https://mymsaa.org/publications/motivator/summer-fall12/cover-story/halper/

"Optimal care for persons with MS should be delivered by a coordinated multidisciplinary team that addresses medical, psychological, and rehabilitation needs."
Rae-Grant A, Day GS, Marrie RA, et al. Comprehensive systematic review summary: Disease-modifying therapies for adults with multiple sclerosis. Neurology. 2018;90(17):789-800.

"A comprehensive MS care center offers coordinated care that is proactive, responsive, and integrated across all services affecting the patient's well-being."
Kalb R, Brown TR, Coote S, et al. The multiple sclerosis care team: Comprehensive MS care. Int J MS Care. 2012;14(3):105–113.

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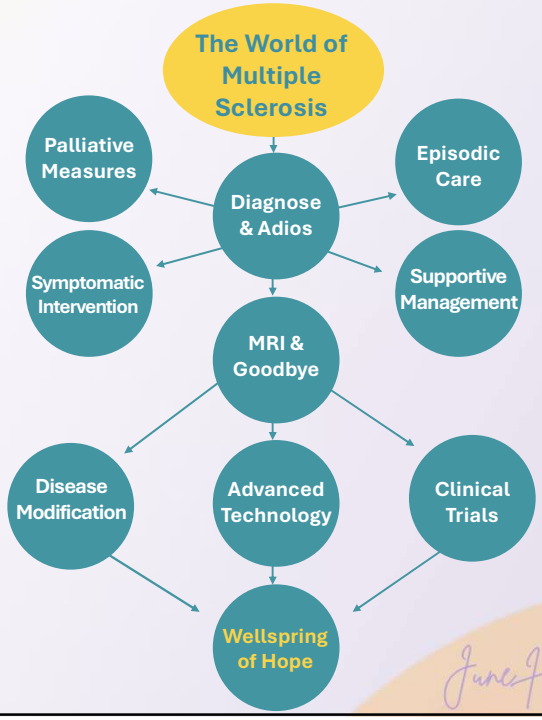
The Evolution in MS Care



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Challenges to Delivering Comprehensive MS Care

- Dynamic in nature
- Unpredictable disease course
- Wide impact from pediatric to aging populations
- Spectrum of symptoms
- Psychological and socio-economic implications
- Demands knowledge, skilled and comprehensive care

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Consortium of MS Centers (CMSC) and Support of Comprehensive MS Care

- Organized in 1986 under the direction of neurologists dedicated to clinical care of MS
- Formalized best practices and professional standards for MS care
- Promoted comprehensive team-based care and helped define roles for providers across disciplines
- Evolved into a multidisciplinary organization providing a team approach to MS care and a network for all health care professionals and related specialists in the care of persons with MS
- CMSC has grown rapidly to over **250 member centers** in the United States and Canada
- Representing over **12,000 health care professionals** worldwide who provide care for more than **250,000 individuals with MS and their families**

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International Organization of MS Nurses (IOMSN) in Comprehensive Care

- The International Organization of Multiple Sclerosis Nurses (IOMSN) is the sole global body dedicated to MS nurses
- IOMSN provides education, networking, and resources to develop standards and foster best practices in comprehensive care
- IOMSN through (MSNICB) provides certification to elevate nursing professionalism worldwide
- Founded May 30,1997, in Calgary, Alberta, Canada by a group of international MS Nurses

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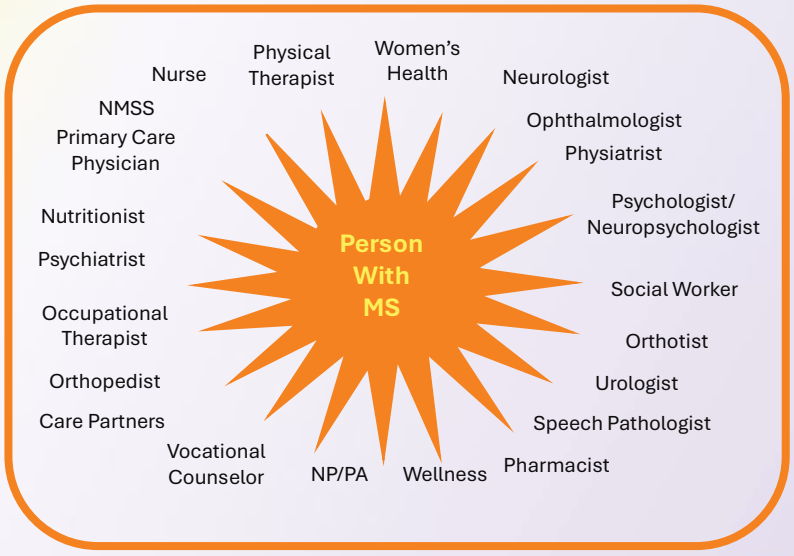
The MS Care Team



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Some Evidence for Comprehensive Care

Comprehensive Approaches to MS Care

- Lakin et al, sought to raise the profile of invisible symptoms for MS nurses and other members of the care team
- Reviewed and brought together health care provider and patient perspectives on impact of invisible MS symptoms
- Concluded that key components to the comprehensive management of invisible symptoms are:
  - Open communication between the patient and their care team
  - Stigma mitigation
  - Shared decision making
- Suggested that empowering patients and providers to address the impact of invisible symptoms on overall quality of life starts with increasing knowledge and closing communication gaps

Lakin L, et al. *Neurol Ther*. 2021;10(1):75-98.

What is Good Comprehensive Care?

- Canadian study by Petrin et al, examined the perspectives of health care providers delivering service to the MS population
- The aim was to summarize what good health care should look like according to health care providers
- Found that a gap exists between what health professionals are offering patients and what they feel is really needed for quality comprehensive care
- Reported many clinics were understaffed and lacked a true multidisciplinary approach
- Recommended the funding of standardized multidisciplinary team-based MS Clinics across the country

Petrin J, et al. *Front Neurol*. 2023;14:doi: 10.3389/fneur.2023.1101521.

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Evaluation of Evidence for Multidisciplinary Roles

- Savio et al, did a systemic review of original research studies that discussed roles of multidisciplinary roles
- 27 studies were reviewed
- Studies from various countries highlighted improved outcomes with multidisciplinary teams that include neurologists, nurses, physiotherapists, occupational therapists, psychologists and other specialties
- Concluded there was evidence for multidisciplinary approach BUT future research necessary regarding role clarification in the team

Savio M, et al. *Mult Scler Relat Disord*. 2025;95:106342.

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MS Nursing to Improve Care and Education (MSNICE)

- Observational, multicenter and cross-sectional study on seven centers with an MS nurse and twelve centers without an MS nurse
- Objective was to explore differences in patient reported outcomes (HRQol), health care resources, and expenditures in persons with or without access to an MS nurse
- Results did not show clinical difference regarding HRQoL in centers with or without an MS nurse BUT it did show a higher level of MS-specific knowledge in patients from centers where there was access to a MS nurse

Van Hijfte L, et al. *BMC Nurse*. 2025;24(94):https://doi.org/10.1186/s12912-024-02682-6.

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Where Does the MS Nurse Fit in Comprehensive Care?

- Nurses in general provide comprehensive care by:
  - Serving as patient advocates, educators, and coordinators to deliver holistic care
  - Supporting physical, mental, social, and spiritual needs
  - Promoting wellness
  - Ensuring smooth transitions across the health care system
- The nurse's role in comprehensive MS care is:
  - Multifaceted
  - Longitudinal
  - Patient-centered
- MS nurses act as a key point of contact, helping patients and their families manage the physical, emotional, and social challenges of the disease

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Defining MS Nursing

- The MS nurse is a competent expert who collaborates with those affected by MS and shares knowledge, strength, and hope. MS nurses can enhance adaptive and coping skills, facilitate empowerment and a sense of control, and thereby engender hope and positive attitudes among patients with MS and their family members or care partners.

-IOMSN.org

Symptom Management–A Cornerstone of Comprehensive MS Care

- Fatigue
- Muscle or motor symptoms
- Vision problems
- Sensory symptoms
- Difficulties with balance and coordination
- Gait issues
- Bowel bladder and sexual dysfunction
- Speech and swallowing problems
- Cognitive and emotional problems

Newsome SD, et al. *Int J MS Care*. 2017;19(1):42-56.

Key Aspects of Nursing Role in Comprehensive MS Care

- Care co-ordination
- Patient education and empowerment
- Symptom management and monitoring
- Emotional and psychosocial support
- Advocacy
- Promoting wellness, independence, and hope

- "The nurse's role is dynamic and has evolved to meet the complex changing needs of individuals living with MS, ensuring that they receive continuous, collaborative, and personalized support."

Burke,T et al. *Int J MS Care*. 2011;(3):105-112.

Disease Modifying Therapies (DMTs) and the MS Nurse

- MS nurses are central to assisting patients with MS DMTs
- Nurses:
  - Provide education
  - Help manage administration details
  - Ensure adherence
  - Monitor side effects
  - Build patient confidence
  - Act as a vital link between patients, neurologists, and other health care providers
  - Help personalize treatment and improve long-term outcomes in a complex treatment landscape

The MS Nurse in a Comprehensive Care Clinic

An Example

Contributions of MS Nurses in a Comprehensive Program

- University of Calgary MS Clinic was founded in 1976 to provide expert clinical care and provide data base of patients for the purpose of clinical research
- Now operates at two sites with over 5,000 patients, and full multidisciplinary teams at both sites
- Nine (9) nurses and one (1) nurse practitioner, occupational therapist, physical therapist, social worker, psychologist, and neuro psychiatrists
- Short wait lists and good comprehensive care

Care Coordination Role

- Care Coordination Nurses:
  - Direct care through the team, spend time with the patient at diagnosis, and direct to rehab and mental health team as needed
  - Have working partnerships with community agencies (NMSS, Homecare) and will involve them when required
  - Coordinate the initiation of DMT including:
    - Funding
    - Pre-initiation
    - Labs
    - Vaccines
    - Teaching
    - Partnering with patient support programs for ongoing reimbursement and DMT renewal
    - Directing patients to appropriate agencies for income support

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Symptom Management

- Symptom management is a significant role where nurses:
  - Are active in telehealth for advice on symptom management
  - Are specialized in bladder management (post-void residual (PVR), medications authorized prescribers for supplies)
  - Manage the intrathecal baclofen pump program (test dosing, implantation and ongoing follow up)
  - Link with chronic pain program for neuropathic pain management

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Emotional and Psychosocial Support

- Mental health a vital role and program nurses:
  - Assess and refer those with severe depression and other mental health changes to neuropsychiatrist/psychologist/social worker
  - Involve family members and significant others with treatment plan
  - Provide ongoing education on disease course, impact of medications on mood
  - Stress the importance of mental health
  - Provide resources for community support

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Advocacy

- Significant role for advocacy and nurses will:
  - Work in collaboration with other advocacy agencies (MS Canada, industry support programs, social services
  - Involve social worker and rehab professionals to help with income support through social services and assured income programs for disabled
  - Facilitate the compassionate funding for DMT's by collaborating with patient support programs and insurance programs
  - Work with employers and educational institutions with "duty to accommodate" mandate

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Promotion of Wellness and Independence

- In collaboration with multidisciplinary partners the program nurses:
  - Understand the significance of brain health and will actively promote it
  - Ask at yearly visits about daily wellness routine
  - Assist with smoking cessation goals and provision of medications
  - Reinforce the role of mental health as part of wellness
  - Have knowledge of community wellness programs
  - Follow principles of caring for a chronic illness in the presence of wellness
  - Support safe independent living as well as shared decision making

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Our Journey to Development

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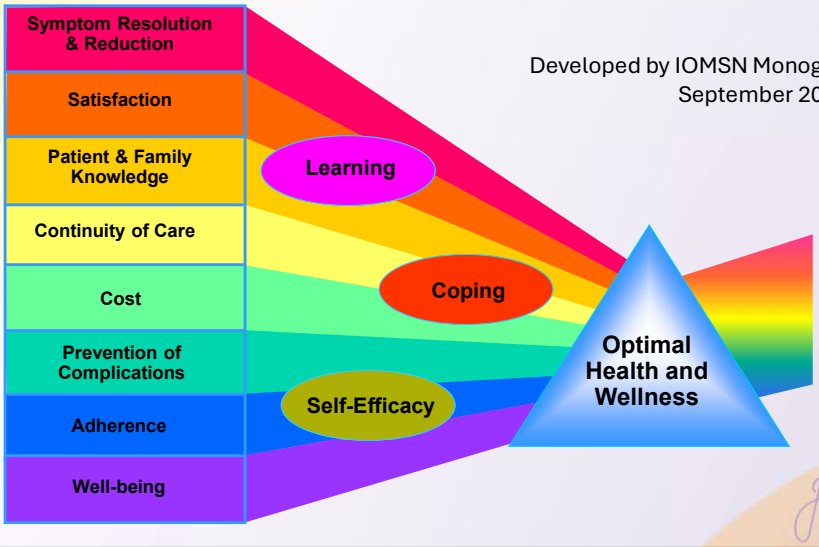
Nurses Can Do This



Developed by IOMSN Monograph Participants
September 2002

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Linda Morgante – friend, mentor, role model, and nursing hero!

Passed away on March 26, 2007

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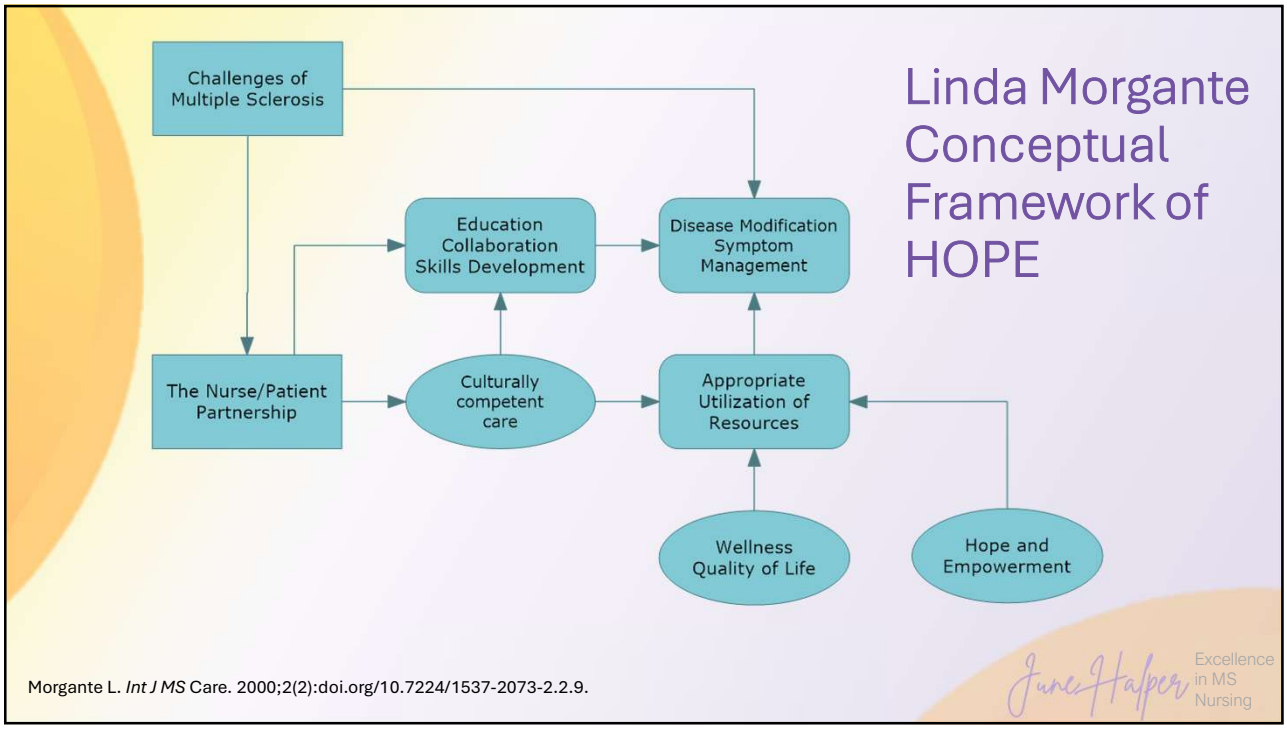

Linda Morgante Conceptual Framework of HOPE

Morgante L. *Int J MS* Care. 2000;2(2):doi.org/10.7224/1537-2073-2.2.9.

Comprehensive Care and Hope

"Hope is an essential element of life - it embodies our vision of the future, our opinion of ourselves and others, and our sense of control over the events and direction of our lives. The presence of hope for someone experiencing an illness can provide the energy necessary to promote health and enhance well-being."

–Linda Morgante (2000)

Diagnosis: *Updates and Approaches to Supporting and Educating Patients*

Amy Perrin Ross, APN, CNRN, MSCN

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Principles of Multiple Sclerosis (MS) Diagnosis

- There is no single pathognomonic clinical feature or diagnostic test
- Diagnosis of MS still relies on the integration of clinical, imaging, and laboratory findings
- 2017 Criteria
  - Dissemination in space (DIS)
  - Dissemination in time (DIT)
- 2024 Criteria
  - DIT is no longer needed in all cases
  - Can make a diagnosis without any typical symptoms (RIS)
  - Need of paraclinical evidence to diagnose MS
  - McDonald Criteria is intended for use in typical presentations

NO BETTER EXPLANATION!

RIS=radiologically isolated syndrome

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Goal of the 2024 McDonald Diagnostic Criteria

- Each iteration of the McDonald Criteria (2001, 2005, 2010, & 2017) has focused on increased sensitivity and earlier diagnosis, based on accumulating scientific evidence
- 2017 Criteria enables more first-attack presentations to be diagnosed with relapsing MS (RMS) with greater sensitivity
- 2024 Criteria
  - Earlier diagnosis in those who truly have MS, yet incorporating criteria to prevent misdiagnosis
  - Greater reliance on diagnostic biomarkers to facilitate correct diagnosis of MS
  - Caution in diagnosing MS in atypical age groups and those with comorbidities[1]

[1]Krieger S. *Neurology Today*. January 2, 2026. Available at: https://neurologytoday.aan.com/doi/10.1097/01.wnt.0001177696.91302.30.

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2024 McDonald Criteria: *Summary*

- **DIS:** 2 out of 5 topographies, ON, JC/IC, PV, IT, SC – show typical MS lesions regardless if these lesions are symptomatic
- **DIS:** optic nerve-MRI, OCT and visual evoked potentials
- **DIS + DIT:** sufficient to diagnose MS as stated in 2017
- **DIS + OCB and/or kFLC:** is sufficient to diagnose MS (no DIT needed)
- **Typical symptoms + typical lesions in at least 4 topographies:** sufficient to diagnose MS
- **Typical symptoms + typical lesions in one topography + 6 CVS or PRLs plus DIT or positive CSF:** sufficient to diagnose MS
- **Progressive MS + two spinal cord lesions:** sufficient to demonstrate DIS

CSF=cerebrospinal fluid, CVS=central vein sign, DIS=dissemination in space, DIT=dissemination in time, IC=infratentorial, JC=juxtacortical, kFLC=kappa-free light chains, MRI=magnetic resonance imaging, OCB=oligoclonal bands, OCT=optical coherence tomography, ON=optic nerve, PRLs=paramagnetic rim lesions, PV=periventricular, SC=spinal cord. Montalban X, et al. *Lancet Neurol*.2025:24(10):850-865.

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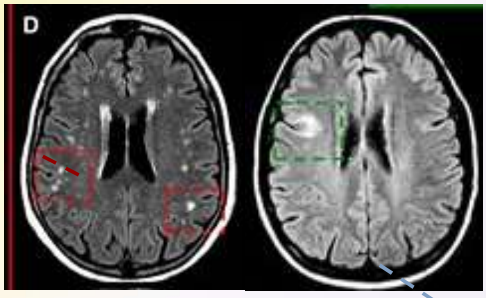
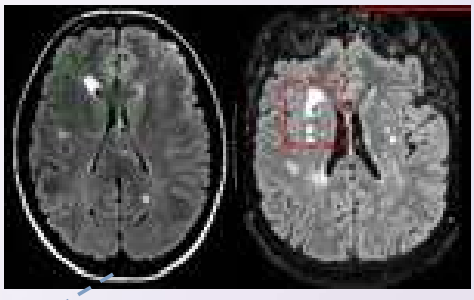
Characteristic Lesions

JUXTACORTICAL



PERIVENTRICULAR



SMALL VESSEL DISEASE

MULTIPLE SCLEROSIS

ISCHEMIC SMALL VESSEL DISEASE

Filippi M, et al. *Brain*. 2019;142(7):1858-1875; Solomon AJ, et al. *Mult Scler J*. 2021;28(8):1248-1256.

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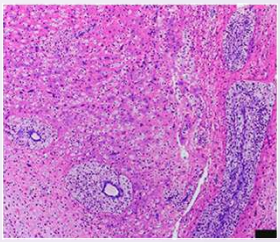
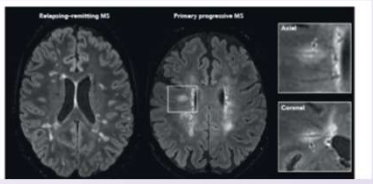
The Central Vein Sign (CVS)

- Pathological evidence of central veins and venules in MS plaques since early 1800s
  - Charcot described and illustrated the association between sclerotic lesions and blood vessels
  - Perivenular inflammation and demyelination a pathological hallmark of MS
- Perivascular space around veins a privileged site for immune cells to interact with antigen-presenting cells → triggers inflammatory cascade leading to the formation of lesions around veins
- Development of susceptibility-based imaging techniques have enabled the in vivo assessment of veins within brain lesions





Charcot JM. *Progrés Médical*. Paris. 1879; Sati P, et al. *Nat Rev Neuro*. 2016;12(2):714-722.

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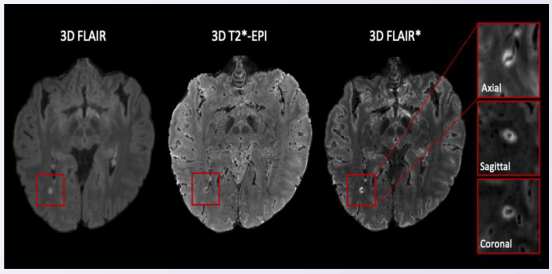
MRI Biomarker to Improve MS Diagnosis: CVS

- Presence of central vessel in MS lesion[1,2]
- Distinguishes MS lesions from lesions with other etiologies[3]
  - Also differentiates RIS from non-MS[4]
- Variety of proposed criteria based on CVS+ lesion count, proportion, and/or location[4,5]
  - Presence of 3 or more CVS+ lesions was highly specific to MS vs non-MS[5,6]



A central vein running through a lesion visible in the 3 planes (zoomed-in boxes) in a 3D FLAIR* obtained combining FLAIR and T2*-EPI acquisitions at 3T.
Reproduced from La Rosa, et al. (CC-BY)[7]

EPI=echo planar imaging; FLAIR=fluid-attenuated inversion recovery; RIS=radiologically isolated syndrome. [1]Wattjes MP, et al. *Lancet Neurol*. 2021;20(8):653-70; [2]Sati P, et al. *Nat Rev Neurol*. 2016;12(12):714-22; [3]Ontaneda D, et al. *Neuroimage Clin*. 2021;32:102834; [4]Landes-Chateau C, et al. *Ann Clin Transl Neurol*. 2024;11(3):662-72; [5]Sinnecker T, et al. *JAMA Neurol*. 2019;76(12):1446-56; [6]Solomon AJ, et al. *Mult Scler*. 2018;24(6):750-7; [7]La Rosa F, et al. *Neuroimage Clin*. 2022;36:103205.

Paramagnetic Rim Lesions (PRLs)

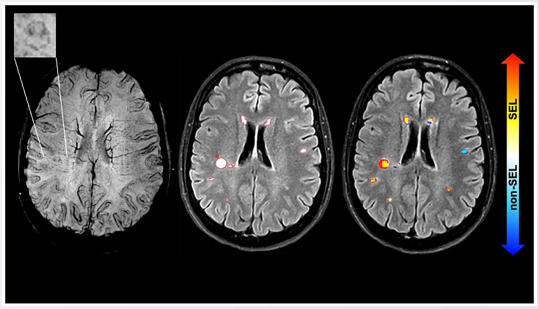
- PRLs are biomarkers for MS
- PRLs are identified on imaging as lesions with a paramagnetic rim, which indicates the presence of iron-laden microglia and macrophages at the lesion edges
- PRLs reflect chronic active lesions, develop in RRMS patients, and persist in progressive MS
- Presence of at least 4 PRLs is associated with earlier clinical disability, higher prevalence of clinically progressive MS, and more severe brain atrophy
- PRLs are estimated to occur in about 40% of patients and on average make up ~10% of the overall lesion count

Sati P, et al. *Nat Rev Neurol*. 2016;12(12):714-722; Preziosa P, et al. *Curr Opin Neurol*. 2021;34(4):505-513; Calvi A, et al. *Mult Scler*. 2023;29(3):352-362.

Slowly Expanding Lesions (SELs) and Paramagnetic Rim Lesions (PRLs)

- SELs and PRLs are chronic active lesions
- SELs are chronic white matter lesions with continual expansion and tissue destruction that predict clinical progression
- SELs are more numerous than PRLs
- Joint occurrence is associated with greater clinical progression

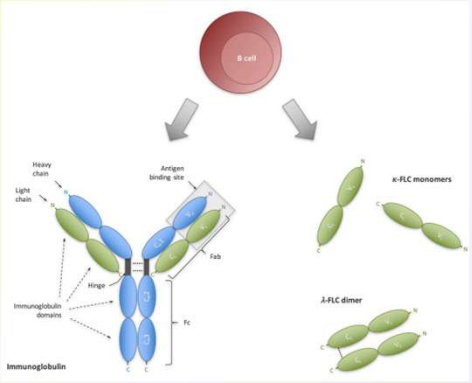
MRI showing PRL at baseline and the correspondence to an SEL



Calvi A, et al. *Mult Scler*. 2023;29(3):352-362.

Fluid Biomarkers: Kappa-free Light Chains

- CSF-specific OCBs a useful diagnostic fluid biomarker
  - Recommended detection method (isoelectric focusing, followed by IgG immunodetection) time-consuming and rater dependent



Kappa-free light chains (kFLC)

- Plasma cells also secrete kappa and lambda free light chains in excess of formed immunoglobulins
- Measures intrathecal kappa chain synthesis
- Systematic review and meta-analysis of 32 studies showed diagnostic accuracy of kFLC index was similar to that of OCBs
- Advantages over OCBs: quantitative, fast, easy, reliable, and cost-effective
- Optimal use may be as an initial screening in cases of CIS, with the addition of OCB in cases of negative kFLC index (using a cutoff of 6.1)

Berek JS, et al. *Neurol Neuroimmunol Neuroinflamm*. 2021;8(4):e1005; Arrambide G, et al. *Brain*. 2022;145(11):3931-3942; Levraut M, et al. *Neurol Neuroimmunol Neuroinflamm*. 2023;10(1):e200049; Hegen H, et al. *Front Immunol*. 2023;14:1327947.

Neurofilaments (NfL)

- NfL light protein
  - Most abundant protein in mature, myelinated axons
  - Major component of neuronal cytoskeleton
    - Supports axonal structure
  - Neuroaxonal damage can cause release of NfL into CSF, then blood
  - Not specific for MS, but has potential as a tool to measure MS disease processes

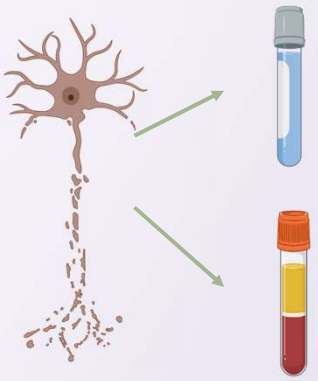


Figure courtesy of: Dr. Raphael Schneider

Thebault S, et al. *MSJ.* 2022;28(10):1491-1497.

Proposed Use of sNfL in Clinical Practice

- Disease monitoring for relapse disease biology
  - Monitoring for treatment response
    - May guide when clinical assessment / MRI is needed
- Prognostic tool
  - Assists with tailoring treatment
- Disease monitoring for progressive disease biology
  - May consider once "relapsing" disease activity is sufficiently suppressed

sNfL=serum neurofilament light. Thebault S, et al. *Front Neurosci.* 2021;15:654942; Bittner S, et al. *Brain.* 2021;144(10):2954-2963; Akgun, et al. *Neurol Neuroimmunol Neuroinflamm.* 2019;6(3):e555.

Clinical Utility of Blood NfL Consensus Recommendations

Purpose	Recommendations[1]
Monitoring disease activity	• Measure every 6-12 months to evaluate change from baseline • Obtain new baseline 3 months after recovery from relapse
Assessing treatment response	• Measure before the start of therapy (after corticosteroids are discontinued) and then 3-6 months later, depending upon the onset of action of the DMT • Persistently elevated NfL after 3 months might suggest a need for further assessment (eg, MRI)

Tips and cautions for interpretation of results

- Absolute values vary depending on assay and should be interpreted with caution, especially in individuals older than 50-55 years because levels increase with age[1,2]
- Minor biologic variation is normal[1]
- False negatives can occur with marked obesity or other medical comorbidity; repeated measures can increase accuracy[1]
- Published age-specific and disease-specific normative reference values allow use of percentiles and z-scores for individualized assessment of risk[3]

DMT=disease-modifying therapy. [1]CMSC Neurofilament Consensus Panel. Published December 2023. Accessed January 27, 2024. https://mscare.sharefile.com/share/view/s60a6a95b73684d83873c6d9cab9d66b8; [2]Bose G, et al. *Mult Scler*. 2023;29(11-12):1418-27; [3]Benkert P, et al. *Lancet Neurol*. 2022;21(3):246-57.

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2024 McDonald Criteria: *Nursing Implications*

- Early diagnosis presents challenges to patients and health care providers
  - Not all patients will have access to advanced imaging and fluid biomarkers
- Patients may not understand the importance of early diagnosis and treatment, education is the key
- Patients often reluctant to start treatment if initial symptoms have resolved
- Nurses play a key role in helping patients understand the 2024 criteria and what it means for them

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Patient and Family Education

- Provide the information necessary to promote patients
  - Active participation in care
  - Ability to make informed choices about health behaviors
  - Ability to engage in self-care with confidence and competence
- Guide the patient toward self-efficacy
- Promote:
  - Maximum health potential
  - Coping and adaptation
  - Self-care with confidence
  - Empowerment leading to improved quality of life
  - Hopefulness

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Learning Needs of the MS Patient

- Disease process and cause
- How it's diagnosed
- Recognizing relapses and management
- Treatment options
- Administrating DMTs
- MS-related symptoms and management
- Plan of care
- Role of team members
- Role of rehabilitation
- When to call the office or center
- Follow-up care and tests
- Support network
- Resources
- Positive health behaviors
- Wellness approach
- Support groups

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Discussion

- Encourage patients to bring family members to the appointment
- Ask the patient and family what he or she needs to know
  - Assess educational needs
- Establish a therapeutic environment that promotes shared decision making
- Discuss with the patient and family
  - How the diagnosis was made
  - Review diagnostic findings
  - The basic pathology of MS
  - Long-term implications of the disease
  - The meaning of disability
  - The goals of management

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General Advice for Motivating Patients

- MS is lifelong; treatment is a lifelong commitment
- Be adherent to treatment plan
- Keep follow-up appointments
- Communicate with health care provider
- Find a strong support network that includes other people with MS
- Implement a wellness approach to promote brain reserve
  - Manage co-morbidities: HTN, cholesterol, DM
  - Exercise, nutrition, drink water, stop smoking
  - Social activities, stress management

DM=diabetes mellitus, HTN=hypertension

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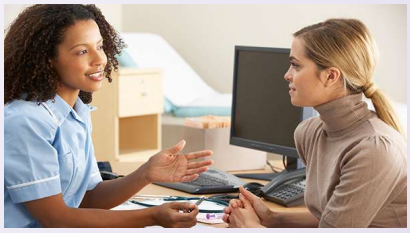
Optimizing Patient Care

- Recognize individual perception of quality of life (QoL)
  - Patient goals and expectations
  - Patient values
- Shared perspective between the patient and the clinician health care goals
  - More likely to involve self-management practices
  - Improved adherence when patients actively participate in treatment decisions
- Collaborative approach



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Shared Decision Making

- Shared decision making occurs when a health care provider and a patient work together to make a health care decision that is best for the patient
- The optimal decision takes into account evidence-based information about available options, the provider's knowledge and experience, and the patient's values and preferences
- Use an MS-Support Tool for shared decision making

Col N, F et.al *Mult Scler Rel* Disord. 2023;80:105092.

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Collaboration: *Patient and Practitioner*

- Collaboration is being in a relationship
- Truly hearing what the person is saying
  - Let the patient tell their story in their words and their perspective
- Ensure they understand your perspective
- "The patient is the expert in one's own life and the clinician is the teacher"[1]

[1]Rintell D, Melito R. *Int J MS Care*. 2013;15(3):130-136.

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Artificial Intelligence (AI)

- AI can be used to assist in diagnosis, develop personalized treatment plans and assist with decision making
- May use information on genetics, environment, lifestyle and biomarkers to develop individual treatment plans
- AI can be used to provide predictive analysis and risk assessment related to disease modification plans
- AI can be used by patients to access health care information and enhance learning

Voigtlaender S, et al. *J Neurol*. 2024;271(5):2258-2273.

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Supporting and Educating Patients

MS Nurses are pivotal to ensuring success in the patient journey with MS.

Thanks for all you do!

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Multiple Sclerosis Disease Modifying Therapy: *Choices and Challenges*

Amber Peskin, MN, AGCNS-BC, MSCN

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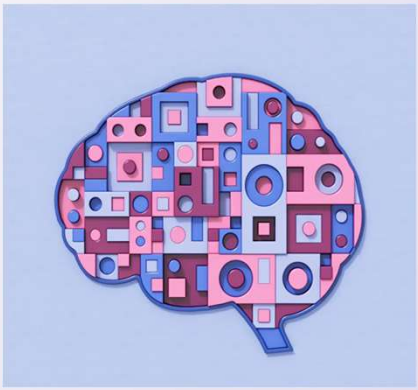
DMT Goals

- Goals of treatment are the same for all DMTs
  - Alter the natural course of the disease with goal of NEDA
  - Reduce frequency and severity of relapses
  - Slow disability progression/delay progression to SPMS (measured by EDSS or MSFC)
  - Suppress MRI lesion activity and reduce new T2 lesions
  - Slow accumulation of disability
  - It is important to be clear with newly diagnosed patients that DMTs are not a cure and will not reverse disability or treat symptoms
  - Recommend early initiation to preserve long-term function



DMT=disease modifying therapy; EDSS=Expanded Disability Status Scale; MSFC=Multiple Sclerosis Functional Composite; MRI= Magnetic Resonance Imaging; NEDA=no evidence of disease activity; SPMS=secondary progressive multiple sclerosis

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DMT Basics

Spectrum of treatment

Low to moderate to high efficacy

Safety—low risk to high risk

Methods of administration

First-line injectables

Orals

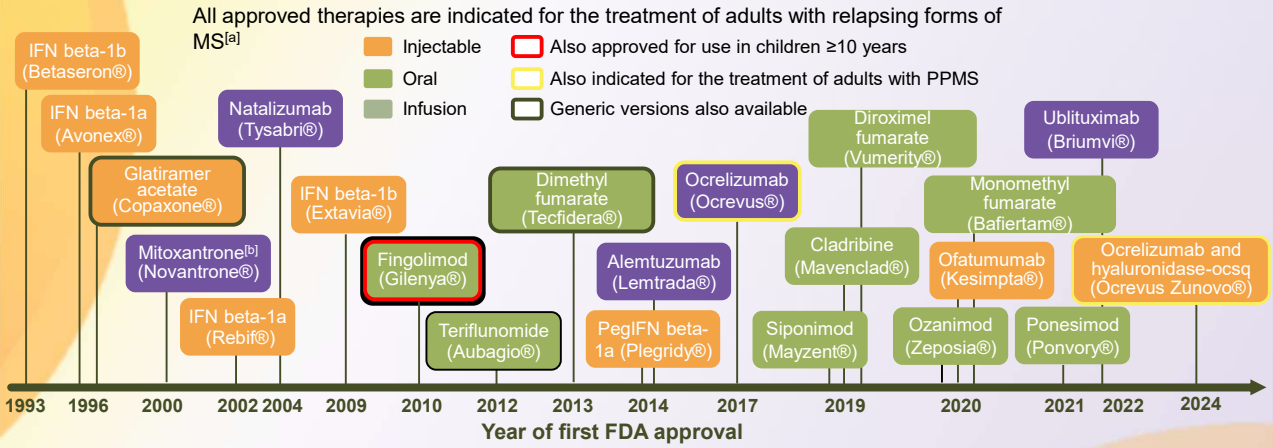
Infusions/injection

One Size Does Not Fit All!

- Over 20 FDA approved treatments
  - Most for RMS
- Individualized/personalized treatment
  - Disease course
  - Symptoms
  - Likelihood of adherence
  - Comorbidities/medical history
  - Family planning
  - Age
  - Lifestyle
  - Patient preference

FDA=Food and Drug Administration; RMS=relapsing multiple sclerosis

MS DMT: *A Crowded Landscape*



IFN=interferon; PPMS=primary progressive multiple sclerosis.
[a]Including: RRMS and active SPMS for alemtuzumab and cladribine; SPMS, progressive relapsing, or worsening RRMS for mitoxantrone; CIS, RRMS, and active SPMS for all other therapies. [b]Mitoxantrone is rarely used in North America due to safety concerns.
U.S. Food and Drug Administration (FDA). Drugs@FDA: FDA-Approved Drugs. n.d. Accessed January 30, 2026. https://www.accessdata.fda.gov/scripts/cder/daf/.

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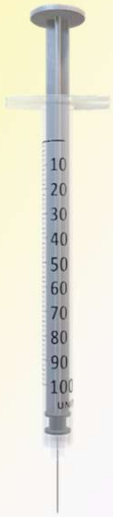
Injectable DMTs



- Interferon Beta-1a IM and SC—Avonex (titration, followed by 30 mcg IM weekly) and Rebif (titration, followed by 44 mcg three times a week)
- Interferon beta-1b (Betaseron, Extavia—every other day)
- Peginterferon beta-1a IM and SC (Plegridy—every 2 weeks)
  - Indicated for CIS, RMS, active SPMS
  - Reduce relapse rates by approximately 30%
  - Immunomodulators vs immunosuppressants
  - Pros—long-term safety, generally well-tolerated, low infection risk
  - Cons—frequent injections, injection site reactions and flu-like symptoms, lower efficacy compared to new treatments, adherence challenges due to injection frequency, elevated liver enzymes

CIS=clinically isolated syndrome; IM=intramuscular; SC=subcutaneous

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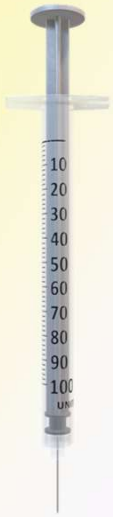
Injectable DMTs



- Glatiramer (20 mg SC daily—Copaxone, Glatopa, Glatect and 40 mg SC 3x/week—Copaxone, generic)
  - Indicated for CIS, RRMS, and active SPMS
  - PROS—long-term safety, generally well-tolerated, low infection risk
  - CONS—frequent injections, injection site reactions, post-injection reactions, lipoatrophy
- Interferons and glatiramer are possibly best for newly diagnosed individuals with mild disease and risk aversion

Injectable DMTs

- Ofatumumab (Kesimpta)—depletes B cells
  - Indicated for CIS, RRMS, active SPMS
  - 20 mg SC at weeks 0, 1, 2, then monthly starting at week 4
  - PROS—high efficacy, convenient administration schedule, can be done at home, well-tolerated, no pre-medications, no infusion reactions
  - CONS—injection site-reactions, increased risk of infection, low immunoglobulins, delayed administration if infection is present

Oral DMTs

S1Ps—trap lymphocytes in lymph nodes

- Fingolimod (Gilenya)
- Siponimod (Mayzent)—dose dependent on genotype; 1-2 mg in varied titration
- Ozanimod (Zeposia)—0.92 mg daily
- Ponesimod (Ponvory)—titration, then 20 mg daily
  - Indicated for CIS, RMS, active SPMS
  - PROS—moderate efficacy, convenient administration, rapid onset of action
  - CONS—cardiac side effects (bradyarrhythmia), risk for rebound relapse, skin cancers, monitoring requirements (EKG, macular edema screening, skin exams), lymphopenia, liver enzyme elevation, contraindicated in pregnancy, increased risk of infection, hypertension

Teriflunomide (Aubagio)—inhibits immune cell proliferation

- Indicated for CIS, RMS, active SPMS
- Dosage of 7 or 14 mg orally daily
- PROS—convenient dosing, moderate efficacy, well-established safety profile
- CONS—pregnancy category X (teratogenicity), long half-life, liver toxicity, GI side effects, hair thinning/loss, hypertension, headache, lymphopenia (rare), frequent lab monitoring, slow excretion (accelerated elimination)

EKG=electrocardiogram

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Oral DMTs

Fumarates—activate anti-inflammatory pathways

- Dimethyl fumarate (Tecfidera)—120 mg BID dosing x1 week, then 240 mg BID daily
- Diroximel fumarate (Vumerity)—231 mg BID x1 weeks, then 462 mg BID
- Monomethyl fumarate (Bafiertam)—95mg BID x 1 week, then 190 mg BID
  - Indicated for CIS, RRMS, active SPMS
  - PROS –long-term safety data, moderate efficacy, oral administration
  - CONS—GI side effects, flushing, lymphopenia, liver enzymes elevation, risk of PML (rare), adherence

Cladribine (Mavenclad)—oral immune reconstitution therapy

- Indicated for RRMS (not CIS) and active SPMS
- 2 treatment courses over 2 years (cumulative dose of 3.5 g/kg)
- PROS—high efficacy, convenient dosing, less frequent monitoring than continuous DMTs
- CONS—lymphopenia, small risk of malignancy, contraindicated in pregnancy, limited data in progressive MS, risk of infections, liver injury

BID=twice a day; GI=gastrointestinal; PML=Progressive multifocal leukoencephalopathy

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Infusion DMTs

- Natalizumab (Tysabri)—blocks immune cell migration across BBB
  - Indicated for CIS, RMS, active SPMS
  - Dosage—300 mg IV every 28-32 days
  - PROS—very effective, works quickly, convenient dosing and short infusion, less systemic immunosuppression
  - CONS—PML, frequent lab monitoring, risk of rebound disease activity, hypersensitivity reactions (rare, but includes urticaria, edema, rashes, angioedema, cardiac symptoms), infusion reactions, hepatoxicity

IV=intravenous

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Infusion DMTs

- Ocrelizumab (Ocrevus and Ocrevus Zunovo)—depletes B cells
  - Indicated for CIS, RRMS, active SPMS, and PPMS
  - IV--Dosage of 300 mg at first visit, followed by 300 mg 2 weeks later; maintenance dose of 600 mg every 24 weeks
  - Zunovo—920mg SubQ every 6 months
  - PROS—very effective, first and only FDA approved option for PPMS, convenient dosing, rare PML risk, two options (IV or Zunovo)
  - CONS—infusion reactions (manageable with pre-meds), colitis, elevated liver enzymes, increased risk of infections, malignancy risk (low), long infusion times for IV, low immunoglobulins, delayed administration if infection is present

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Infusion DMTs

- Alemtuzumab (Lemtrada)—reduces circulating T cells, B cells, and NK cells
  - Indicated in RRMS and active SPMS
  - Generally reserved for patients with inadequate response to >2 other DMTs
  - Dosage—Year 1—12 mg/day on 5 consecutive days; Year 2—12/g day on 3 consecutive days
  - PROS—very effective (especially for highly active or refractory disease), convenient dosing schedule (5 days in year 1, 3 days in year 2), long-term remission for many with no DMT requirement for years after
  - CONS—secondary autoimmune disease for years after (thyroid, kidney, ITP), monthly monitoring requirements for 48 months, infusion reactions, increased risk of infections, antiviral requirement, risk of stroke and cervicocephalic arterial dissection, increased risk of infection

ITP=Immune Thrombocytopenia

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Infusion DMTs

- Ublituximab (Briumvi)—depletes B cells
  - Indicated for CIS, RRMS, and active SPMS
  - Dosage—150 mg IV at first dose, then 450 mg IV 2 weeks after first dose; 450 mg IV every 24 weeks
  - PROS—very effective, faster infusion time compared to other anti-CD20 treatments, convenient dosing schedule
  - CONS—infusion reactions, increased risk of infection, low immunoglobulin levels, fatigue

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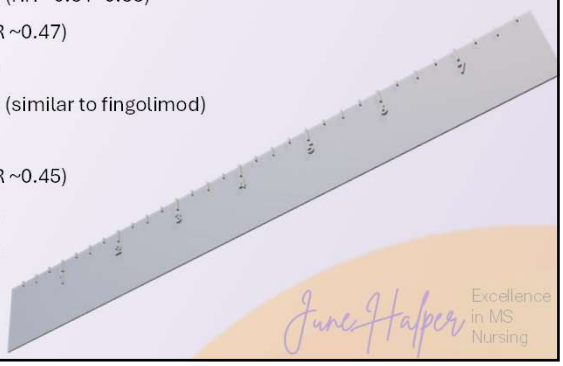
How do DMTs measure up?

DMT	Approx. ARR Reduction vs Placebo/Active Comparator/Relative ARR
Alemtuzumab	~70% reduction vs placebo (RR ~0.30)
Ocrelizumab	~70% reduction (RR ~0.30–0.37)
Ofatumumab	~71% reduction (RR ~0.29)
Natalizumab	~69–70% reduction (RR ~0.31–0.38)
Ponesimod	~53% reduction (RR ~0.47)
Fingolimod	~47–54% reduction
Ozanimod	~47–54% reduction (similar to fingolimod)
Dimethyl fumarate	~50% reduction
Cladribine (Mavenclad)	~45% reduction (RR ~0.45)
Teriflunomide	~20–40% reduction
Interferons / Glatiramer acetate	~30–35% reduction



ARR=absolute risk reduction; RR=relative risk

MS Coalition Recommendations (2019)

- Initiation of treatment with an FDA-approved DMT is recommended for all clinically definite MS and for CIS in many cases
- Clinicians should consider prescribing a high efficacy medication such as alemtuzumab, fingolimod, ocrelizumab or natalizumab for newly-diagnosed individuals with highly active MS
- Clinicians should also consider prescribing a high efficacy medication for individuals who have breakthrough activity on another DMT, regardless of the number of previously used agents

Costello K, et al. Multiple Sclerosis Coalition. https://ms-coalition.org/wp-content/uploads/2019/03/dmt_consensus_ms_coalition032019.pdf. Accessed February 2, 2026

MS Coalition Recommendations (2019)

- Treatment with a given DMT should be continued indefinitely unless any of the following occur – in which case an alternative DMT should be considered:
  - Sub-optimal treatment response as determined by the individual and his or her treating clinician
  - Intolerable side effects, including significant laboratory abnormalities
  - Inadequate adherence to the treatment regimen –
  - Availability of a more appropriate treatment option
  - The health care provider and patient determine that the benefits no longer outweigh the risks
  - Movement from one DMT to another should occur only for medically appropriate reasons as determined by the treating clinician and patient.
  - When evidence of additional clinical or MRI activity while on consistent treatment suggests a suboptimal response, an alternative regimen (eg, different mechanism of action) should be considered to optimize therapeutic benefit

Costello K, et al. Multiple Sclerosis Coalition. https://ms-coalition.org/wp-content/uploads/2019/03/dmt_consensus_ms_coalition032019.pdf. Accessed February 2, 2026

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What's in the pipeline?

- Bruton tyrosine kinase inhibitors
- Frexalimab and intranasal foralumab
- CAR-T
- Hematopoietic stem cell transplantation (HSCT)
- Mesenchymal stem cells for regeneration

CAR-T=Chimeric antigen receptor T-cell therapy

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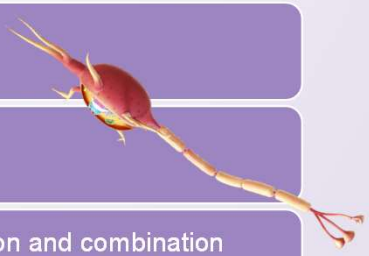
What's in the Pipeline?

- Vidofludimus calcium
- Epstein-Barr Virus vaccine
- Biomarker driven therapy (NFL and GFAP) for better precision and combination therapies
- Still a need for repair and remyelination therapies; PIPE307 did not meet endpoint

Inside the Pipeline: Emerging Remyelination Therapies in MS



GFAP=Glial fibrillary acidic protein; NFL=Neruofilament light chain

Artificial Intelligence (AI) Applications in MS

Artificial Intelligence and Machine Learning in Multiple Sclerosis

- MRI Lesion Detection—AI identifies and segments MS lesions automatically
- Disease Progression Prediction—Machine learning models predict MS stage and progression
- Structural & Functional Biomarker Analysis—AI detects subtle changes in white matter or serum biomarkers
- Speech & Functional Assessment—AI evaluates voice/acoustic features to monitor neurological function

Advancing Diagnosis and Monitoring

Decisions, decisions…how do we decide?

- Escalation—start with low to moderate efficacy treatment options with less risk of PML and serious side effects; escalate if breakthrough disease occurs
- Early high-efficacy/Induction—start with high efficacy treatment early in disease course (ex—for young patients with high lesion burden, spinal cord lesions); delays conversion to SPMS and improves long-term outcomes. Emerging data shows that this approach can have long-term benefits over escalation.
- Induction, then maintenance—aggressive induction followed by lower maintenance therapy (ex—Lemtrada, then something else)
- Personalized/precision—using genetic markers, biomarkers, imaging (none are perfect yet)

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When Should We Switch?

- New relapses
- New MRI lesions
- Intolerable side effects
- Pregnancy planning
- Lymphopenia or infection risk
- Cost concerns
- Lack of adherence

*Challenges with switching include risk of rebound during washout periods between some drugs

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A patient perspective is IMPORTANT!

- https://www.instagram.com/themsguide/reel/DQHKdZtAv-A/

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Challenges

So many choices	– Limited for PPMS and SPMS; only ocrelizumab for PPMS and siponimod for active SPMS – Early initiation of high-efficacy therapies to improve outcomes
Safety vs efficacy balance	– High efficacy agents offer better relapse prevention, but correlate with greater risk (PML, infections) – Safer agents may not be as effective to control disease
Choosing a lifelong therapy can be stressful and complex. It is a long-term commitment.	
Must be individualized—consider comorbidities and previous treatment plans	

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Challenges

- Inconvenient administration and monitoring requirements
  - Frequent injections or hours spent at infusion center; trouble remembering to take oral medications daily
  - JCV testing; MRI surveillance
  - Immunosuppression labs and infection screening—CBC, CMP, hep B, immunoglobulins, thyroid, UA (more frequent for alemtuzumab), hep B, TB
  - Vaccine status
- Side effects
- Fear, misinformation, lack of education/poor health literacy
- Disease stability—people may question if they "need" DMT or want to exclusively try a natural approach

CBC=complete blood count; CMP=comprehensive metabolic panel; JCV=John Cunningham virus; TB=tuberculosis; UA=urinalysis

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Challenges

- Cost—DMTs are EXPENSIVE!!
- Insurance coverage, copay assistance, access
  - High deductibles or out of pocket expenses
  - Step therapy requirements
  - Appeals
  - Delays in scheduling at infusion center
  - Shipping delays with medications
  - Biosimilars and generics improve affordability

- Fertility/family planning considerations
  - Some DMTs are safe in pregnancy, while others must be stopped before trying to conceive
  - Birth control counseling
  - Post-partum planning

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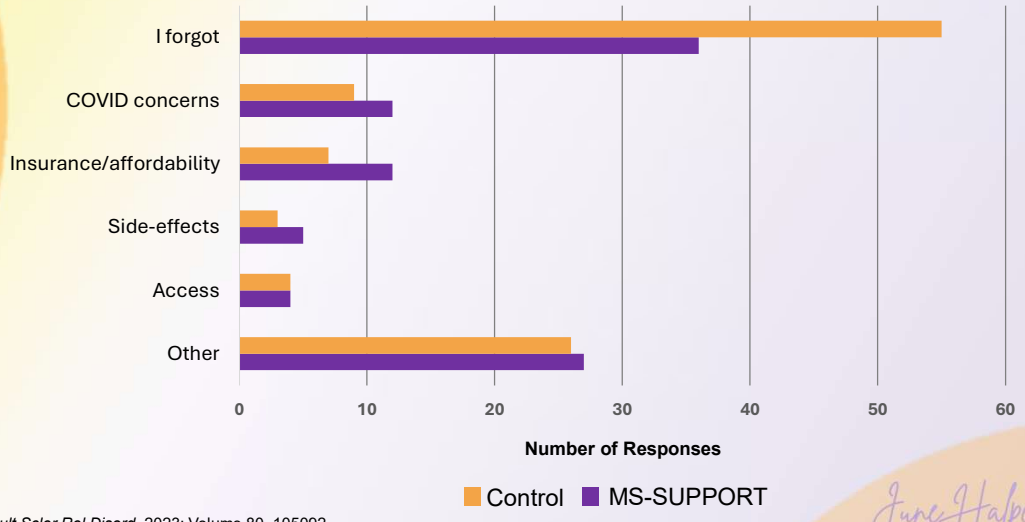
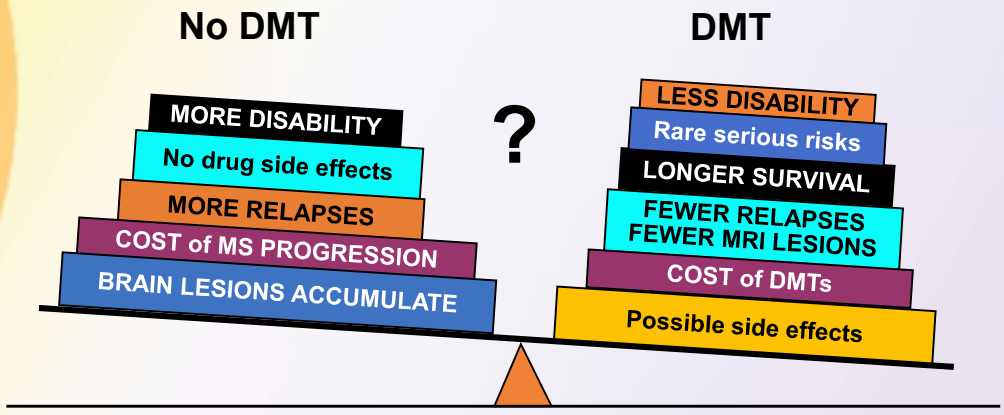
Reasons for Missing DMT Dose



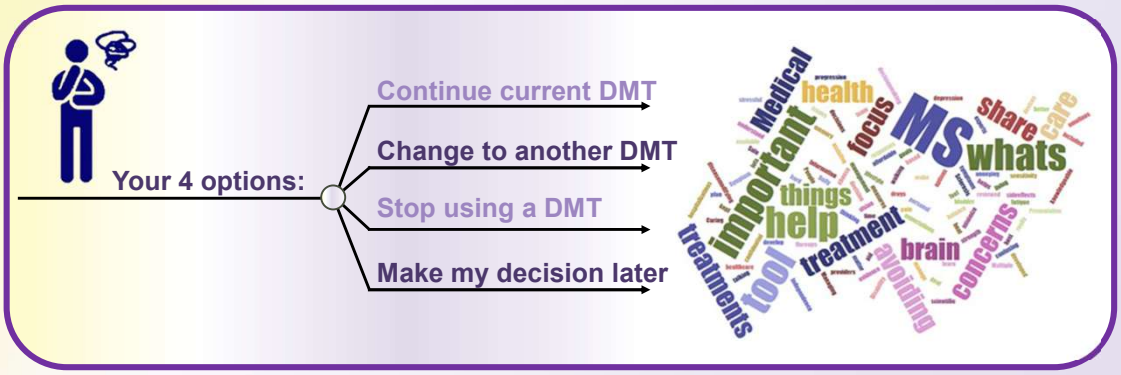
Col NF, et al. *Mult Scler Rel Disord*. 2023; Volume 80, 105092.

DMTs Can Influence Life in Many Ways



Col N, et al. *MDM Policy & Practice*. 2019;4(2):2381468319879134.

Options When Taking DMT



Col N, et al. *MDM Policy & Practice.* 2019;4(2):2381468319879134.

Shared Decision Making

Patient and Caregiver
- Education from provider
- Symptoms
- Preferences
- Values
- Practical factors
- Cost

Provider Team
- Disease pathology
- Risk factors
- Genetics
- Potential triggers
- Experience

Treatment Choice

Outcomes
- Improved patient understanding
- Improved satisfaction
- Better adherence
- Health-system benefits

"The more patients are involved in shared decision-making, the more likely they will be adherent to the therapy and lifestyle recommendations we might be making for them."

Day GS, et al. *Neurol Clin Pract.* 2018;8(3):179-85; Ross AP. *Pract Neurol.* April 2017;22-24

Nursing Implications

- Acute and long-term management of MS requires nursing knowledge and vigilance
- We have entered a new era of complex choices that challenges nursing and medical professionals to stay up to date on current advances
- Patient and caregiver education is essential to understanding the choices and challenges of DMTs in MS

Case Study 1

- CM, 58-year-old female
- Diagnosed with MS in 2008
- Comorbidities: diabetes mellitus (DM), hypertension, obesity, depression, acute kidney injury
- Social history: married, has adult children, recently homeless living in between her car and shelter
- Prior treatments
  - 2008-2016: Interferon beta-1b (Betaseron) (injection fatigue, flu-like side effects)
  - 2017-2025: Interferon beta-1a (Avonex)
- Periodically had issues remembering to order meds or had lapses in delivery
- Started to feel a decline in her walking in 2020, but MRIs were stable; also had spondylosis on spine MRIs and peripheral neuropathy from DM

Case Study 1

- Stopped seeing us in 2021 because lost insurance; was off of Avonex for >1 year; started seeing another provider who ordered teriflunomide (Aubagio)
- She had extreme hair loss and did accelerated elimination after just a few months
- Developed new lesions off of DMT
- Able to come back to our clinic
  - Started using a cane because of leg pain, and started seeing pain management
  - Asked to return to Avonex in spite of other meds being offered/discussed

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Case Study 1

- Restarted Avonex in March 2023
- March 2024
  - Weaker, more unsteady; stable MRIs; concern for PIRA vs lumbar stenosis vs diabetic neuropathy
  - Discussed infusions but very resistant to "chemo" despite educating her on such
  - Interested in cladribine (Mavenclad), but scared to get colonoscopy
- October 2024: admitted to not taking Avonex
- February 2025
  - Taking Avonex, still interested in Mavenclad
  - "Moving to Washington,"; came back after 1.5 months, not on Avonex
  - Not willing to get colonoscopy
  - Living in homeless shelter with some family support for meals

PIRA=progression independent of relapse activity

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Case Study 1: *What Should We Do?*

- S1P?
- Ofatumumab (Kesimpta)?
- Dimethyl fumarate (Tecfidera)?

Case Study 1

September 2025—started Kesimpta; storing it at her sister's house. So far, so good!

December 2025—asked to return to Avonex because she felt flu-like for an hour after each Kesimpta injection; discussed strategies for management of side effects

Case Study 2

- BC, 39-year-old male
- November 2017: symptoms began
  - Low back pain and dragging right leg
  - Saw pain management for bulging lumbar disc and had epidural steroid injection; right leg symptoms persisted
- Got second opinion and had MRIs of brain and spine that showed lesions suspicious of MS

Case Study 2

- January 2019: saw MD at our center
  - Right leg tightness, one fall, and bladder urgency
  - T25FW was 4.7 seconds
  - Concern for PPMS
- January/February 2019: ocrelizumab (Ocrevus) started
- August 2019: patient reports that walking is worse; more spasticity; did not like side effects of baclofen and tizanidine; still working full-time at an active delivery job
- May 2020—walking less; applied for disability, but was denied

Case Study 2

- 2021-2023: relatively stable with no signs of relapse or progression; spasms controlled with tizanidine and clonazepam
- 2024: reports of being off balance, pain in legs, unable to stand for more than 5 minutes due to tightness in legs, falling about once a week and limiting time outside of the home due to fear of falling; walk time now 7.8 seconds
- Discussed alternative DMT: **Can you guess which one?**

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Case Study 2

- October 2024: he opted to proceed with Ocrevus
  - Walk time improved back to 5.1 seconds, so perhaps he was relapsing in 2024?
- October 2025: pain and weakness in both legs, limiting standing and walking
- NFL: 8.8 (normal)
- GFAP: 59.20 (elevated)
- MRIs have been stable since 2019
- He's JCV positive with high index=3.33
  - **What would you do?**

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Case Study 3

- PC, 50-year-old female
  - Works as a social worker in an immunology clinic
- June 2012: diagnosed with MS, initially seen at Mount Sinai
  - Symptoms included tingling in hands and feet, weakness in arms, impaired fine motor coordination, and walk felt "off"
  - Reported intermittent symptoms for years prior to diagnosis
  - Got second opinion to confirm diagnosis
  - Finally started natalizumab (Tysabri) in December 2012 after multiple insurance appeals
- 2016: first came to our clinic
  - Mild white matter disease on brain, but extensive spinal cord lesions, + CSF on review; stable exam with no disability

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Case Study 3

- Unremarkable disease course, doing well on Tysabri until March 2020 when she became JCV positive
  - Plan was to switch to ocrelizumab (Ocrevus), but this was halted due to immunosuppression concerns and COVID-19
  - Tysabri interval was extended to 6 weeks
  - Ultimately did switch to Ocrevus in June 2020
- Did great clinically—UNTIL November 2022 when she was diagnosed with breast cancer and had double mastectomy
  - Did not require chemo, but did have radiation
  - Our physician put her on glatiramer acetate (Copaxone)
  - Had significant pain and site reactions, affecting adherence
- We have some limitations: **What should we do?**

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Case Study 3: *What Did We Do?*

- We felt it best to continue with the low level of immunosuppression
- Started teriflunomide (Aubagio)
- She has remained clinically and radiographically stable

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Case Study 4

- AB, 47-year-old female
- 2003: diagnosed with MS at age 25 after numbness/tingling and MRI showed lesions typical of MS
- Started on interferon beta-1a (Avonex), took it for 2 years, but stopped due to flu-like side effects
- No DMT for several years as she had multiple pregnancies; had relapses during this time, including optic neuritis
- Started glatiramer (Copaxone) in 2008, took it for 2 years, then stopped because of insurance issues

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Case Study 4

- 2014: first saw MD in our clinic (no DMT for 4 years); pregnant with 4th child
- On initial exam in our clinic:
  - Had mild gait disturbance (using a cane) and mild left-side weakness, muscle spasms, urge incontinence, fatigue
  - T25FW=5.1 seconds
  - MRI review showed moderate lesion in burden in brain and severe spinal cord lesion burden
- Breastfed after baby was born, so deferred DMT

Case Study 4

- Relapse at 6 months postpartum:
  - Impaired balance, falls, worsened left-side weakness, and impaired coordination
  - T25FW=10.2 seconds
  - MRI brain showed enhancing lesions
  - She was admitted for PLEX and recovered well from relapse
  - Natalizumab (Tysabri) was recommended, but she opted for Copaxone TIW in case of future pregnancy (2015)

Case Study 4

In 2016, pt reported only taking Copaxone twice weekly, reinforcement given. MRI in 2017 with a new lesion, but she was resistant to change DMT. MRI in 2018 showed several enhancing lesions. Ocrevus was discussed, and she started in August 2018.

No-showed February 2019 infusion….Restarted Ocrevus in 2021, missed all scheduled clinic visits in 2022, did not do MRIs, said she was too busy to get her treatment

2024—had a miscarriage at age 46; had to use a wheelchair on a visit to NY, muscle spasms, cognitive concerns, fatigue. Discussed Kesimpta as alternative to Ocrevus. Deferred due to possible continued family planning, but she and her husband ultimately decided to end attempts to conceive. Discussed Mavenclad, but she did not want to do cancer screenings. MRI in 2025 showed new brain and spine lesions. Agreed to restart Ocrevus again. STAY TUNED!!

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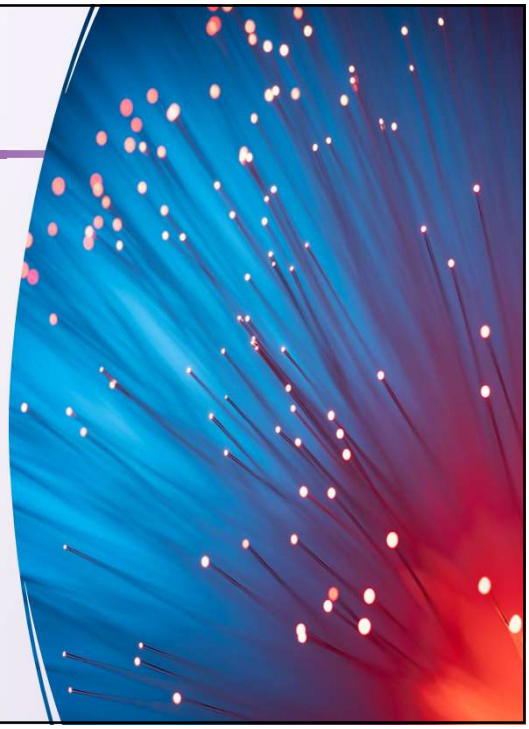
Summary

- Many choices for treatment and several things in the pipeline
- Balance between efficacy, risk/safety, patient preference, adherence, cost, etc.
- Limitations in progressive MS
- Technological advances—biomarkers can help to predict relapse and progression and assist in decision-making



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- From pathogenesis to precision medicine: Targeting immune imbalance in multiple sclerosis – ScienceDirect
- Escalation vs Early Aggressive Treatment in Multiple Sclerosis - Neurology Advisor
- Implementing Shared Decision-Making for Multiple Sclerosis: The MS-SUPPORT Tool - Multiple Sclerosis and Related Disorders
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- Understanding When to Adjust or Stop MS Medications: What You Should Know | Weill Cornell Medicine Multiple Sclerosis Center
- Growth of MS Treatment Options Presents Challenges, Opportunities for Pharmacists to Get Involved | Pharmacy Times
- Advances in and Algorithms for the Treatment of Relapsing-Remitting Multiple Sclerosis – PMC
- Teriflunomide reduces relapses with sequelae and relapses leading to hospitalizations: results from the TOWER study – PMC
- New data for Roche's OCREVUS show that after 10 years of treatment 77% of people with relapsing multiple sclerosis were free from disability progression and 92% continue to walk unaided
- dmt_consensus_ms_coalition032019.pdf

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Recognizing and Managing Visible Symptoms of MS

Jeffrey Hernandez, DNP, APRN, MSCN

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Visible Multiple Sclerosis (MS) Symptoms

- Vision changes
- Speech and swallowing difficulties
- Spasticity
- Gait difficulty

This presentation discusses the off-label use of certain medications.

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Vision Changes

- Optic neuritis
  - Inflammation of the optic nerve resulting in acute vision loss/blurry vision/scotoma, typically painfully
  - Most often unilateral in MS
  - Up to 25% will experience optic neuritis as first MS symptom
  - Up to 50% may experience optic neuritis
  - Impaired vision should improve from a few weeks to one year without treatment
  - IV steroids may help speed up visual recovery
    - Some providers may also choose to use a tapering oral prednisone for several reasons including reducing risk of recurrence

IV=Intravenous. Costa S, et al. *Arch Phys Med Rehabil.* 2020;101(12):2263-2265. Tong B, et al. *J Transl Med.* 2025;23(1):87. Osborne B, Balcer L. *Optic neuritis: prognosis and treatment.* UpToDate. Updated 2024. Accessed January 30, 2026. Olek MJ, Narayan RN, Frohman EM, Frohman TC. *Manifestations and symptom management of multiple sclerosis in adults.* UpToDate. Updated 2025. Accessed January 30, 2026.

Vision Changes

- Abnormalities in eye movement
  - Internuclear ophthalmoplegia
    - Impaired ipsilateral adduction with contralateral nystagmus due to a lesion of the medial longitudinal fasciculus (MLF) in the brainstem
  - Nystagmus
    - Rhythmic, abnormal eye movement (jerky movement)
  - Lesions in the brainstem, cerebellar, or cranial nerves (cranial nerve VI palsy)
  - If new-onset, patient would be worked up for a relapse/exacerbation and treated accordingly

Costa S, et al. *Arch Phys Med Rehabil.* 2020;101(12):2263-2265. Tong B, et al. *J Transl Med.* 2025;23(1):87. Osborne B, Balcer L. *Optic neuritis: prognosis and treatment.* UpToDate. Updated 2024. Accessed January 30, 2026. Olek MJ, Narayan RN, Frohman EM, Frohman TC. *Manifestations and symptom management of multiple sclerosis in adults.* UpToDate. Updated 2025. Accessed January 30, 2026.

Speech and Swallowing Difficulties

- Dysarthria
  - Spastic Dysarthria
    - Results from bilateral damage to the upper motor neurons
  - Ataxic Dysarthria
    - Results from cerebellar damage
  - Mixed Dysarthria
- Dysphagia
  - Any difficulty in swallowing food/fluid because of lesions in the corticobulbar tracts, cerebellum and brainstem, and cranial nerve paresis
  - About a 43% prevalence of dysphagia in patients with MS
  - Impairment may occur at any stage of swallowing (mouth, pharynx, and/or esophagus)

Plotas P, et al. *Eur J Med Res.* 2023;28(1):252. Smyrni V, et al. *Mult Scler Relat Disord.* 2025;98:106458. Ansari N, et al. *Degener Neurol Neuromuscul Dis.* 2020;10:15-28.

Spasticity

- Spasticity
  - Increase in the muscular stretch reflexes and muscle tone
    - "Tightness or stiffness" due to demyelination in the descending CNS pathways
  - Tonic spasm: resistance to movement (rate dependent)
  - Phasic spasm: involuntary jerk/spasm affecting limbs, worse at night
  - May worsen with time, even in the absence of a new lesion
- Management is individualized as overtreating may result in increased weakness and impact certain motor function

Rivelis Y, et al. Spasticity. In: *StatPearls* [Internet]. Treasure Island, FL: StatPearls Publishing; 2025. Accessed January 30, 2026. National Institute for Health and Care Excellence. *Multiple sclerosis in adults: management. Evidence review F: pharmacological management of spasticity.* London, England: National Institute for Health and Care Excellence; 2022. Accessed January 30, 2026. Carod-Artal F, et al. *Expert Rev Neurother.* 2022;22(6):499-511. Smith K, et al. *J Neurol Neurosurg Psychiatry.* 2023;94(5):337-348. Bethoux F, et al. Overview of rehabilitation in multiple sclerosis. In: Rae-Grant AD, et al, eds. *Multiple Sclerosis and Related Disorders: Clinical Guide to Diagnosis, Medical Management, and Rehabilitation.* 2nd ed. Cham, Switzerland: Springer; 2018:159-165.

Difficulty Walking

- Walking difficulties may present as reduced gait quality, speed and/or endurance
- Has a major impact on QoL and at times, the ability to perform usual activities
- Possible causes:
  - Weakness in the lower extremities
  - Sensory alterations
  - Spasticity
  - Cerebellar ataxia
  - Performance fatigability

QoL=Quality of life. Bethoux F, et al. Overview of rehabilitation in multiple sclerosis. In: Rae-Grant AD, et al, eds. *Multiple Sclerosis and Related Disorders: Clinical Guide to Diagnosis, Medical Management, and Rehabilitation*. 2nd ed. Cham, Switzerland: Springer; 2018:159-165. Stolt M, et al. *J Foot Ankle Res.* 2020;13(1):54. Tramonti C, et al. *Eur J Transl Myol.* 2020;30(4):9353.

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Key Takeaways

- Vision
  - Work with neuro-ophthalmology
    - May benefit from corrective lenses
  - Consider low-vision referral
  - Referral to occupational therapy
    - Train vision or compensate for vision loss
  - National and local resources
- Speech and Swallowing
  - Screen patients at every visit
  - Referral to speech therapy and modified barium swallow study/video fluoroscopic swallow study
  - Referral to ENT for additional evaluation/management
  - If appropriate, encourage ongoing swallow therapy

ENT=Ear, nose and throat specialist

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Key Takeaways

- Spasticity
  - Mild or minimal discomfort
    - Stretching
    - Physical therapy
    - Hydration (remind patients to hydrate!)
  - Bothersome or mild-moderate
    - Physical therapy
    - Baclofen, tizanidine, gabapentin, diazepam (second line)
  - Moderate-severe and/or negatively impacting ADLs
    - Consult with physical medicine and rehab
    - Consideration for onabotulinumtoxinA (Botox)
    - Intrathecal baclofen

Key Takeaways

- Walking difficulties
  - T25FW, 500-meter walk test
  - Exercises
    - Resistance to help address the weakness, perception of fatigue
    - Aerobic may help with fatigue
    - Hippotherapy
  - Refer to physical and occupational therapy early
  - Consult with PM&R and PT to consider inpatient rehabilitation program
  - Assistive devices
    - Ankle-foot orthoses (AFO) – foot drop
    - Common functional electrical stimulation – bioness, walk-aide, cionic sleeve
    - Exo-band
    - Cane, walker, wheelchair, motorized scooter

PM&R=Physical Medicine and Rehabilitation; PT=physical therapy; T25FW=Timed 25-foot walk. Tramonti C, et al. *Eur J Transl Myol.* 2020;30(4):9353. Locatelli G, et al. *Front Physiol.* 2024;15:1477431. Giannou I, et al. *Mult Scler Relat Disord.* 2025;97:106374. Jesus V, et al. *Mult Scler Relat Disord.* 2024;88:105714. Sagawa Y, et al. *J Exerc Rehabil.* 2024;20(2):65-75. Abou L, et al. *Mult Scler Relat Disord.* 2024;84:105506. Parsaei M, et al. *Mult Scler Relat Disord.* 2024;82:105415.

Nursing Implications

- Help identify any patient concerns during triage; ask open ended questions
- Educate on typical signs and symptoms of a relapse
- Identify and address visual problems
- Encourage follow up with primary care physician and their care team – specialties
- Educate on fall precautions
- Encourage appropriate use of assistive devices
- Promote physical activity
- Become familiar with available resources to share with patients and family

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Shedding Light on Invisible Symptoms of MS

Jeffrey Hernandez, DNP, APRN, MSCN

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Invisible Symptoms of Multiple Sclerosis (MS)

- Fatigue
- Cognition
- Pain
- Bladder Dysfunction
- Bowel Dysfunction
- Sexual Dysfunction

This presentation discusses the off-label use of certain medications.

Fatigue

- Up to 86% may experience fatigue
- Many describe it as debilitating
- Limits:
  - Daily activities
  - Work performance
  - Socializing
  - May worsen their physical weakness

Olek MJ, et al. *Manifestations and symptom management of multiple sclerosis in adults.* UpToDate. Updated 2025. Accessed January 30, 2026; Johnson E, et al. *Pract Neurol*. 2024;24(3):181-191.

Fatigue

- Primary MS-related fatigue:
  - Often fluctuates on a day-to-day basis
  - May worsen with heat exposure and increased physical activity
- Secondary causes of MS-related fatigue:
  - Sleeping difficulties
  - Anemia
  - Thyroid dysfunction
  - Depression
  - Sedentary lifestyle

Olek MJ, et al. *Manifestations and symptom management of multiple sclerosis in adults.* UpToDate. Updated 2025. Accessed January 30, 2026; Johnson E, et al. *Pract Neurol*. 2024;24(3):181-191.

Cognition

- Cognitive deficits may occur early in MS
  - Cognitive processing speed
  - Learning
  - Short term memory
  - Executive function
  - Visuospatial processing
- Prevalence ranges from 34%-65%
- Cognitive performance may be impacted by psychiatric comorbidities and medication side effects

Olek MJ, et al. *Manifestations and symptom management of multiple sclerosis in adults.* UpToDate. Updated 2025. Accessed January 30, 2026; Benedict RHB, et al. *Lancet Neurol*. 2020;19(10):860-71.

Pain

- Central neuropathic pain is often ongoing or intermittent pain caused by a lesion or disease of the central nervous system
- Common MS pain syndromes include:
  - Typically, a burning, electric, tightness, or tingling type pain
  - Spasms may be painful due to the prolonged abnormal muscle contractions
- Risk factors include:
  - Older age
  - Longer disease duration
  - Comorbid fatigue, depression, mental health
  - Women may have a greater severity of pain, although the likelihood of pain is equal in men and women
  - Progressive forms of MS

Rosner J, et al. *Nat Rev Dis Primers*. 2023;9(1):73; Chisari CG, et al. *Expert Opin Pharmacother*. 2020;21(18):2249-63; Seixas D, et al. *Neuroimage Clin*. 2014;5:322-31; Di Stefano G, et al. *CNS Drugs*. 2020;34(7):749-61; Shkodina AD, et al. *CNS Drugs*. 2024;38(3):205-24; O'Connor AB, et al. *Pain*. 2008;137(1):96-111.

Bladder Dysfunction

- Neurogenic bladder–patient lacks bladder control due to brainstem or spinal cord lesions
- About 70%-80% of patients with MS may experience bladder issues
- Often occurs 6 years after diagnosis
- Reported symptoms may include:
  - Inability to store (overactive bladder)
    - Urgency
    - Increased frequency
    - Frequent nocturia
    - Incontinence
  - Inability to empty (underactive bladder)
    - Sensation of incomplete emptying
    - Hesitancy or difficulty voiding
    - Slow or intermittent urinary stream

Tota V, et al. *Mult Scler Relat Disord*. 2024;91:105884; Ginsberg DA, et al. *J Urol*. 2021;206(5):1097-105; Ginsberg DA, et al. *J Urol*. 2021;206(5):1106-13; Lúcio AC, et al. *Neurourol Urodyn*. 2010;29(8):1410-3; Panicker JN, et al. *Eur J Neurol*. 2025;32(4):e70119.

Bowel Dysfunction

- Approximately two-thirds of patients may have bowel dysfunction
- Constipation is most common, but fecal incontinence may occur
- Constipation may occur due to:
  - Slow transit of stool through colon
  - Medications
  - Lack of mobility
  - Dehydration due to bladder problems
- Fecal incontinence may occur due to:
  - Rectal sphincter impairment
  - Loss of voluntary control
  - Reduced/absent anorectal sensations

Sacco R, et al. *Mult Scler*. 2021;27(10):1577-84; Magnuson FS, et al. *J Clin Med*. 2023;12(22):6971; Faber W, et al. *J Clin Med*. 2021;10(8):1598; Gulick EE. *Int J MS Care*. 2022;24(5):209-17; Bharucha AE, et al. *Gastroenterology*. 2020;158(5):1232-49.e3; Sadler K, et al. *Am Fam Physician*. 2022;106(3):299-306.

Sexual Dysfunction

- It may affect both men (50%-90%) and women (40%-85%), but often overlooked or underreported and undertreated
- May be due to lesions, physical disability or psychological/emotional factors
- Men may experience:
  - ↓ Libido
  - ↓ Erectile dysfunction/ejaculation
  - ↓ Altered genital sensation
  - ↓ Frequency/intensity of orgasms
  - ↑ Bladder spasticity
  - ↑ Depression
- Women may experience:
  - ↓ Libido
  - ↓ Altered genital sensation
  - ↓ Frequency/intensity of orgasms
  - ↓ Vaginal lubrication/clitoral engorgement
  - ↑ Bladder spasticity
  - ↑ Depression

Panicker JN, et al. *Eur J Neurol*. 2025;32(4):e70119; Foley FW, Beier M. *Assessment and treatment of sexual dysfunction in multiple sclerosis.* New York, NY: National Multiple Sclerosis Society; Halper J, et al. *Comprehensive care in multiple sclerosis: a core curriculum*. 3rd ed. Hackensack, NJ: Consortium of MS Centers; 2022.

Key Takeaways: *Fatigue*

- Primary:
  - Nonpharmacologic management
    - Rest
    - Diet
    - Cooling vest
    - Physical and occupational therapy
  - Pharmacological management
    - Amantadine
    - Modafinil
    - Dalfampridine
    - Dextroamphetamine-amphetamine
- Secondary causes:
  - Sleeping difficulties
    - Evaluate sleep habits, consider referral to sleep medicine
  - Anemia
    - CBC w/diff, work with primary care provider (PCP) and/or hematology
  - Thyroid dysfunction
    - TSH, T3/4, work with PCP and/or endocrinology
  - Depression
    - Screen at every visit (eg, PHQ9), treat and/or refer to psychiatry/psychology
  - Sedentary lifestyle
    - Evaluate hobbies, daily activities, referral to physical and occupational therapy and physical medicine & rehabilitation

Key Takeaways: *Cognitive Impairment*

- History
- Labs
  - Vitamin B12
  - Anemia
  - Hypothyroidism
- Mini-mental State Examination (MMSE) and Montreal Cognitive Assessment (MoCA) are not recommended
- Symbol Digit Modality Testing to help tease out cognitive problems
- Neuropsychological testing
- Medications such as donepezil, memantine are not effective for cognitive impairment in MS
- Strategies
  - Organizers, reminders, phone calendar/log
  - Pace activities
  - Work accommodations
  - Cognitive rehab

Key Takeaways: *Pain*

- Nonpharmacologic management
  - Stretching, light massages, acupuncture
  - Cooling
  - Physical and occupational therapy
- Pharmacologic management
  - Gabapentin
  - TCAs
  - Duloxetine
  - Lamotrigine
  - Levetiracetam
  - Carbamazepine/Oxcarbazepine
  - Baclofen
  - Botulinum toxin
  - Cannabis

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Key Takeaways: *Bladder Dysfunction*

- Nonpharmacologic management
  - Voiding schedule
  - Limit or avoid bladder irritants
  - Double voiding
  - Pelvic floor therapy
- Pharmacologic management
  - Inability to store (overactive bladder)
    - Anticholinergic/antimuscarinic drugs–oxybutynin, tolterodine, solifenacin, and trospium
    - Beta-3 adrenergic agonists – mirabegron and vibegron
    - OnabotulinumtoxinA
  - Inability to empty (underactive bladder)
    - Intermittent catheterization (IC)
    - Indwelling catheter
    - Suprapubic catheter
    - Condom catheter for men
    - PureWick external catheter for women
  - Additional options → posterior tibial nerve stimulation, sacral neuromodulation

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Key Takeaways: *Constipation and Fecal Incontinence*

- Constipation
  - Nonpharmacologic management
    - Review medications
    - Fluids, fiber
    - Toileting schedule, positions
    - Exercising
    - Pelvic floor therapy
  - Pharmacologic management
    - Bulk-forming agents (eg, psyllium)
    - Stool softeners/stimulants (eg, docusate calcium/polyethylene glycol)
    - Laxatives (eg, senna)
- Fecal incontinence
  - Nonpharmacologic & pharmacologic management
    - Biofeedback and pelvic floor therapy
    - Metamucil
    - Loperamide
    - Percutaneous posterior tibial nerve stimulation

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Key Takeaways: *Sexual Dysfunction—Men*

- Nonpharmacologic management
  - Physical exam, vascular screening, T-levels, sexually transmitted infections (STI)/HIV
  - Lifestyle modifications (reduce stress, plan)
  - Counseling, sex therapy
- Pharmacologic management
  - Phosphodiesterase-5 (PDE-5) inhibitors: sildenafil, tadalafil, vardenafil, avanafil
  - Vacuum constriction
  - Intracavernous injections
- Additional options - Penile prostheses

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Key Takeaways: *Sexual Dysfunction—Women*

- Nonpharmacologic management
  - Physical exam, vascular screening, cervical/ovarian screening, sexually transmitted infections (STI)/HIV
  - Lifestyle modifications (reduce stress, plan)
  - Counseling, sex therapy
  - Pelvic floor therapy
  - Vaginal lubricants
  - Vibrators
  - EROS clitoral therapy device
- Pharmacologic management
  - Low dose vaginal estrogen therapy
  - Transdermal testosterone short term trial
  - Bupropion

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Supporting Rehabilitation: *Educating and Encouraging Patients*

Patty Bobryk, MHS, PT, MSCS, ATP

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Why Rehabilitation Matters in Multiple Sclerosis (MS)

- Emerging evidence supports rehab as influencing functional reserve, neuroplasticity and participation
- Rehab is appropriate at all stages of MS—not just advanced disability
- Most effective when integrated early and reinforced by entire team

Key message

Rehab is not optional care—it is core MS management

Core Rehab Disciplines

- Physical Therapy (PT)
  - Addresses:
    - Mobility
    - Gait
    - Balance
    - Strength
    - Fall prevention
  - Sub-specialties:
    - Pelvic health
    - Vestibular rehab
    - Wound care
    - Lymphedema
    - Equipment/wheelchair prescription/access (ATP)

ATP=Assistive technology professional

Core Rehab Disciplines

- Occupational Therapy (OT)
  - Addresses:
    - ADLs/IADLs
    - Fatigue management
    - Upper extremity function
    - Functional cognitive rehab
  - Sub-specialties:
    - Driving evaluations
    - Equipment prescription/home evaluation
    - Lymphedema management
    - Visual dysfunction

ADLs=Activities of daily living; IADLs=Instrumental activities of daily living

Core Rehab Disciplines

- Speech-Language Pathology (SLP):
  - Addresses:
    - Cognitive-related speech difficulties
    - Dysarthria/dysphonia
    - Dysphasia
  - Sub-specialties:
    - Augmentative and alternative communication (AAC)
    - Flexible Endoscopic Evaluation of Swallowing (FEES)

Why Refer Early?

- Rehabilitation should begin early—even when the individual appears "high functioning"
- Establishes baseline function
- Prevents de-conditioning and compensatory movement patterns
- Builds patient trust before critical points in care occur
- Improves adherence when needs increase later

Key message

Rehab has impact when patients are still "doing well"

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Nursing Professionals Often Are First to Identify

- You hear it first:
  - "I'm slowing down."
  - "I trip more."
  - "I'm exhausted after basic tasks."

- You see it first:
  - Falls or near falls
  - Worsening fatigue
  - Decline in walking, transfers, or hand function
  - Caregiver strain or safety concerns

Key message

Any of these changes should prompt a rehab referral

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Integrating Rehab into Visit

- Observe gait, transfers, fatigue in real time
- Ask **"What activities are the hardest right now?"**
- Validate rehab as proactive and preventative care
- Align rehab goals with medical treatment plan

Key message

Educating on the role of each rehab discipline and how they can help will assist with patient engagement

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Nursing Actions That Make the Difference

- Normalize rehab as part of routine MS care
- Educate patients that rehab is not only for decline
- Referrals based on function—not disability level
- Support ongoing engagement, not one-time referral

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Objective Measures

- High-impact data that supports referral and medical necessity:
  - Timed 25-Foot Walk (T25FW)
  - MS Walking Scale (MSWS-12)
  - 5 Times Sit-to-Stand (5TSTS)
  - Modified Fatigue Impact Scale (MFIS)
  - Fall History

Timed 25-Foot Walk (T25FW)

- Measures walking speed
- Procedure: Walk 25 ft at usual pace (2 trials, average time, document device)
- Norm: ~3–5 seconds
- Meaningful change: ≥20% faster or slower

Clinical Meaning

Slower speed = ↑ fall risk & mobility decline

MS Walking Scale–12 (MSWS-12)

- Patient-reported walking difficulty
- 12-item questionnaire
- Higher score = worse walking function
- Meaningful change: ~8–12 points

Clinical Meaning

Captures fatigue, confidence & real-world impact

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Five Times Sit-to-Stand Test (5TSTS)

- Measures lower-extremity strength & functional mobility
- Procedure: Stand up & sit down 5 times as fast & safe as possible without upper extremity assist
- Norm: <12 seconds
- >15 sec = ↑ fall risk

Clinical Meaning

Reflects weakness, spasticity, fatigue

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Modified Fatigue Impact Scale (MFIS)

- Measures impact of fatigue on daily life
- 21-item questionnaire (Score: 0–84)
- ≤38 mild fatigue
- 39–58 moderate fatigue
- ≥59 severe fatigue
- Meaningful change: ~10 points

Clinical Meaning

Guides energy conservation & rehab strategies

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Fall History

- Strongest predictor of future falls
- Ask about falls in past 6–12 months
- ≥1 fall = increased fall risk
- Fear of falling also indicates functional risk

Clinical Meaning

Falls alone justify rehab referral

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Consistent Messaging is Important

- Conflicting messages reduce adherence
- Shared Language Themes
  - Function over strength
  - Quality of movement over quantity
  - Fatigue management, not fatigue avoidance
  - Safety, independence, participation
  - Normalize use of adaptive equipment

Nurse's Role in Equipment Success

- Reinforce clinical need and expectations
- Support required documentation
- Encourage therapy assessments and follow-through
- Helpful Language:
  - "This supports your independence."
  - "This helps conserve energy."
  - "This keeps you doing what matters most."

Key message

Equipment is a tool—not a failure

Advance Mobility Decision Making

- Criteria base on in-home use
- Face-to-face may be required
- Documentation must address:
  - Functional limitation affecting mobility-related ADLs
  - Why a cane/walker is insufficient
  - Why a manual wheelchair is insufficient
  - Ability to safely operate the power device (physical and cognitive)

Technology-Assisted Rehab: Functional Electrical Stimulation (FES)

- Electrical Stimulation coupled with sensors and real-time gait analysis
- Improves foot clearance and walking efficiency
- Reduces fall risk
- Nursing Considerations:
  - Skin integrity monitoring
  - Patient education on wear tolerance
  - Reinforce therapist-guided use
  - Identify changes in gait or comfort

Bioness and Cionic Neural Sleeve

Equipment Procurement: *Why Nurses Matter*

- Equipment acquisition can be complex and frustrating for patients
  - Insurance requirements
  - Documentation timelines
  - Medical necessity language
- Nurses support success by:
  - Reinforcing the clinical need in patient education
  - Supporting medical necessity documentation
  - Encouraging follow-through with therapy
  - Communicating functional changes

Take-Home Messages

- Rehab is essential throughout the MS trajectory
- Functional changes, even minor, should trigger a rehab referral
- Nurses are critical partners in rehab success
- Adaptive equipment supports safety, independence and quality of life

Key message

Rehab + Nursing = Better Outcomes

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References and Resources

- Find A Provider
  - Pelvic Health
    - www.aptapelvichealth.org/ptlocator
  - Vestibular Rehab
    - www.vestibular.org
  - National Lymphedema Network
    - www.lymphnet.org

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References and Resources

- Functional Outcome Measures
  - Timed 25-Foot Walk (T25FW)
    - Timed 25-Foot Walk (T25-FW) for MS | National MS Society
  - MSWalking Scale–12 (MSWS-12)
    - msws-eng.pdf
  - Modified Fatigue Impact Scale (MFIS)
    - Modified Fatigue Impact Scale (MFIS) | National MS Society
  - Five Times Sit-to-Stand Test
    - https://www.sralab.org/rehabilitation-measures/five-times-sit-stand-test

References and Resources

- Adaptive Equipment & Technology
  - RESNA – Assistive Technology & Mobility Standards
    - https://www.resna.org
  - Exercise Guidelines
    - Exercise and lifestyle physical activity recommendations for people with multiple sclerosis throughout the disease course