Diagnosis

National Multiple Sclerosis Society

2017 McDonald Criteria for the Diagnosis of Multiple Sclerosis

ECTRIMS
EUROPEAN COMMITTEE FOR TREATMENT AND RESEARCH IN MULTIPLE SCLEROSIS

Diagnosis of MS requires elimination of more likely diagnoses and demonstration of dissemination of lesions in the CNS in space and time. See Lancet Neurology paper* for details.

CLINICAL PRESENTATION	ADDITIONAL DATA NEEDED TO MAKE MS DIAGNOSIS
...in a person with a typical attack/CIS at onset	(see KEY below for definitions)
• ≥2 attacks and objective clinical evidence of ≥2 lesions • ≥2 attacks and objective clinical evidence of 1 lesion with historical evidence of prior attack involving lesion in different location	None. Dissemination in space (**DIS**) and dissemination in time (**DIT**) have been met.
• ≥2 attacks and objective clinical evidence of 1 lesion	**One** of these criteria: – **DIS:** additional clinical attack implicating different CNS site – **DIS:** ≥1 **symptomatic or asymptomatic** MS-typical T2 lesions in ≥2 areas of CNS: periventricular, **juxtacortical/cortical**, infratentorial or spinal cord
• 1 attack and objective clinical evidence of ≥2 lesions	**One** of these criteria: – **DIT:** additional clinical attack – **DIT:** simultaneous presence of both enhancing and non-enhancing **symptomatic or asymptomatic** MS-typical MRI lesions – **DIT:** new T2 or enhancing MRI lesion compared to baseline scan (without regard to timing of baseline scan) – **CSF-specific (i.e. not in serum) oligoclonal bands**

CONTINUED ON REVERSE

Colored text= revisions compared to previous McDonald Criteria

KEY: CIS: clinically isolated syndrome **CNS:** central nervous system **CSF:** cerebrospinal fluid **DIS:** dissemination in space **DIT:** dissemination in time **T2 lesion:** hyperintense lesion on T2-weighted MRI

*Thompson AJ, et al. Lancet Neurol 2017; online Dec 21. http://dx.doi.org/10.1016/S1474-4422(17)30470-2.

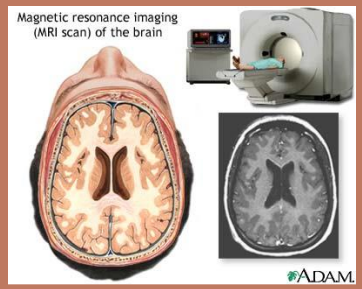
2017 McDonald Criteria for the Diagnosis of Multiple Sclerosis (continued)

CLINICAL PRESENTATION	ADDITIONAL DATA NEEDED TO MAKE MS DIAGNOSIS
...in a person with a typical attack/CIS at onset (continued)	(see KEY on reverse for definitions)
• 1 attack and objective clinical evidence of 1 lesion	**One** of these criteria: – **DIS**: additional attack implicating different CNS site – **DIS**: ≥1 MS-typical **symptomatic or asymptomatic** T2 lesions in ≥2 areas of CNS: periventricular, **juxtacortical/cortical**, infratentorial or spinal cord **AND** **One** of these criteria: – **DIT**: additional clinical attack – **DIT**: simultaneous presence of both enhancing and non-enhancing **symptomatic or asymptomatic** MS-typical MRI lesions – **DIT**: by new T2 or enhancing MRI lesion compared to baseline scan (without regard to timing of baseline scan) – **CSF-specific (i.e. not in serum) oligoclonal bands**
...in a person with progression of disability from onset	
• progression from onset	– 1 year of disability progression (retrospective or prospective) **AND** **Two** of these criteria: – ≥1 **symptomatic or asymptomatic** MS-typical T2 lesions (periventricular, **juxtacortical/cortical** or infratentorial) – ≥2 T2 spinal cord lesions – CSF-specific (i.e. not in serum) oligoclonal bands

The International Panel on Diagnosis of Multiple Sclerosis was convened under the auspices of the International Advisory Committee on Clinical Trials in MS, sponsored by the National MS Society and the European Committee for Treatment and Research in Multiple Sclerosis.

More resources for clinicians: https://www.nationalmssociety.org/For-Professionals/Physicians

Diagnosis



Tests and procedures used to diagnosis MS

Magnetic resonance imaging, or MRI for short, is a type of scan that uses strong magnetic fields and radio waves to produce detailed images of the inside of the body. Importantly, MRI scans can show there is damage to the central nervous system before the person experiences symptoms of MS.

Lumbar punctures, which allow a sample of spinal fluid to be tested for immune cells and antibodies.

Evoked potentials, which measure the time it takes for the brain to receive messages from the eyes, ears and skin.

OCT (optical coherence tomography), which scans nerves in the back of the eye to detect signs of optic neuritis, a common early symptom of MS.

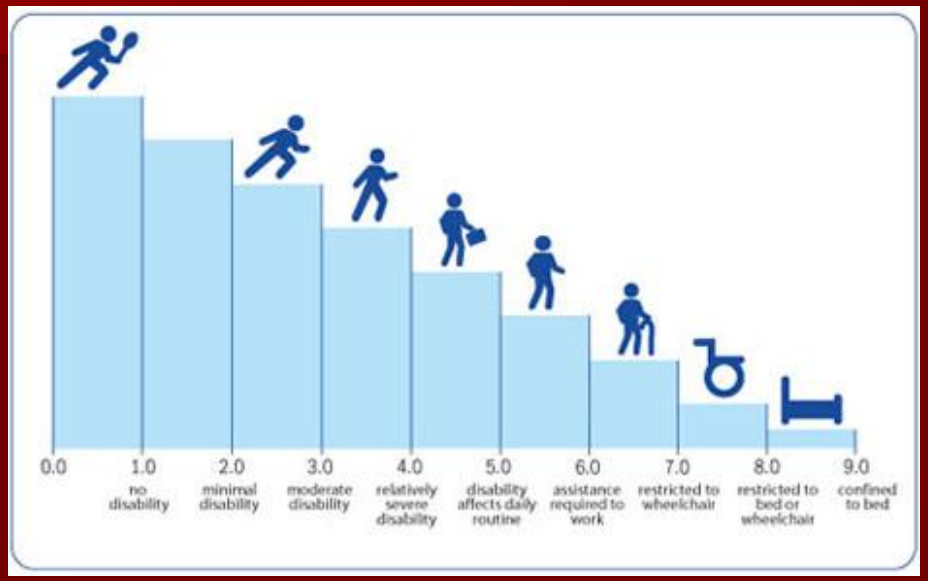
Tools/ Scales to measure function/ progression

Kurtzke ***Expanded Disability Status Scale (EDSS)***. measures degree of disability, largely in terms of mobility. It uses whole & half numbers from one to 10 to measure degree of disability, largely in terms of mobility.

The EDSS is used in conjunction with Kurtzke's ***Functional System (FS)***. This measures the function of seven major systems in the CNS (plus a section for "other"), each relating to the different areas of functioning that can be affected by MS (such as movement, sensory, bowel and bladder, vision, cognition, etc.). These are each graded on a scale of zero (normal) to six (severe).

A newer measurement system designed to be even more sensitive is the ***MS Functional Composite (MSFC)*** scale. This measures lower extremity function with a ***Timed 25-Foot Walk***, upper extremity function through the ***9-Hole Peg Test (9-HPT)***, and cognitive function, using the ***Paced Auditory Serial Additions Test (PASAT)***.

Expanded Disability Status Scale



- The EDSS is a way of measuring physical disability. Two-thirds of people with MS do not progress past level 6, with treatment.

Common DMTs

To help understand the range of DMTs that people have access to, we have classified licensed DMTs[14] into three efficacy categories in our analysis, as shown in the table below.

High efficacy	Good efficacy	Moderate efficacy
Alemtuzumab	Cladribine (oral)	Glatiramer acetate
Natalizumab	Dimethyl fumarate	Interferon-beta 1a
Ocrelizumab	Fingolimod	Interferon-beta 1b
	Siponimod	Peginterferon-beta 1a
		Teriflunomide

Early treatment with disease modifying therapies can change the course of a person's MS and reduce future disability. It is important that people with MS have access to a wide range of affordable therapies to suit their disease course and personal circumstances.

Disease-Modifying Therapies

- Self-injectable DMTs include:
  - Glatiramer acetate (Copaxone®, glatiramer acetate injection, Glatopa®)
  - Interferon beta-1a (Avonex®,Betaseron®, Extavia®, Rebif®)
  - Peginterferon beta-1a (Plegridy®)
  - Ofatumumab (Kesimpta®)Learn more about injectable therapies.
- Oral therapies include:
  - Cladribine (Mavenclad®)
  - Dimethyl fumarate (Tecfidera®)
  - Diroximel fumerate (Vumerity®)
  - Fingolimod (Gilenya®, Tascenso ODT®)
  - Monomethyl fumarate (Bafiertam™)
  - Ozanimod (Zeposia®)
  - Ponesimod (Ponvory™)
  - Siponimod (Mayzent®)
  - Teriflunomide (Aubagio®)

DMT & other Medications

- Infused DMTs include:
  - Alemtuzumab (Lemtrada®)
  - Mitoxantrone (Novantrone®)
  - Natalizumab (Tysabri®)
  - Natalizumab-sztn (Tyruko®)
  - Ocrelizumab (Ocrevus®)
  - Ublituximab-xiiy (Briumvi™)
- Medications used Off-Label
  - Mycophenolate Mofetil
  - Cyclophosphamide
  - Azathioprine
  - Minocycline
  - Rituximab
  - Statins

Atlas-3rd-Edition-clinical-management-report-EN-5-5-21.pdf (msif.org)

PML

- Progressive multifocal leukoencephalopathy (PML) is a rare, progressive white matter brain disease that targets cells that make myelin and usually leads to severe disability or death. PML is caused by the reactivation of the JC (John Cunningham) virus, a common virus to which most people have been exposed.
- One medication, Tysabri, tests for JC virus before starting treatment and while on treatment to help identify people who are at a higher risk for PML.
- Symptoms of PML are diverse and can be similar to MS symptoms, including clumsiness, weakness and visual, speech and personality changes. Individuals should be alert to any new or worsening symptoms and report them promptly to their MS healthcare provider.
- Currently, the best available therapy is reversal of the immune-deficient state, since there are no effective drugs that block virus infection without toxicity.
- In general, PML has a mortality rate of 30-50 percent in the first few months following diagnosis but depends on the severity of the underlying disease and treatment received. Those who survive PML can be left with severe neurological disabilities.

Managing relapses

- For severe relapses (involving loss of vision, severe weakness or poor balance, for example), which interfere with a person's mobility, safety or overall ability to function, most neurologists recommend treatment with corticosteroids.
- Corticosteroids are not believed to have any long-term benefit on the disease.

- Plasmapheresis (plasma exchange) may be considered for severe exacerbations that do not respond adequately to the standard steroid treatment.
- Rehabilitation

Medication options include:

- High-dose Intravenous Solu-Medrol® (methylprednisolone)
- High-dose Oral Deltasone® (prednisone)
- H.P. Acthar Gel (ACTH) is an option for those who are unable to cope with the side effects of high-dose corticosteroids, have been treated unsuccessfully with corticosteroids, do not have access to intravenous therapy, or have trouble receiving medication intravenously because of difficulty accessing the veins.

Rehabilitation

- **The goal of a rehabilitation program is to restore or maintain functions essential to daily living.** Rehabilitation can be especially useful soon after an exacerbation
- The members of the rehab team —
  - Physical therapists
  - Occupational therapists
  - Speech/language pathologists
  - Cognitive remediation specialists

The team address problems with:

- Mobility,
- ADLs,
- Role performance at home and work
- Overall fitness

They also provide evaluation and treatment of speech and swallowing difficulties and problems with thinking and memory that may have appeared or worsened during the exacerbation.

Managing symptoms

Bladder Problems

- **Dysfunction**
  - Botox (onabotulinumtoxin A)
  - DDAVP Nasal Spray (desmopressin)
  - Detrol (tolterodine)
  - Ditropan (oxybutynin), Ditropan XL
  - Enablex (darifenacin)
  - Flomax (tamsulosin)
  - Prazosin
  - Myrbetriq (mirabegron)
  - Oxytrol (oxybutynin)
  - Tofranil (imipramine)
  - Vesicare (solifenacin succinate)
- **Infection**
  - Bactrim; Septra (sulfamethoxazole)
  - Cipro (ciprofloxacin)
  - Levaquin (levofloxacin)
  - Macrodantim (nitrofurantoin)
  - Hiprex (methenamine)
  - Pyridium (phenazopyridine)

Bowel Dysfunction

- Colace (docusate)
- Dulcolax (bisacodyl)
- Enemeez (docusate stool softener laxative)
- Fleet Enema (sodium phosphate)
- Mineral Oil
- Metamucil (psyllium hydrophilic musilloid)
- Phillips Milk of Magnesia (magnesium hydroxide)
- Sani-Supp suppository (gylcerin)

Depression

- Celexa (citalopram)
- Cymbalta (duloxetine hydrochloride)
- Effexor (velafaxine)
- Paxil (paroxetine)
- Prozac (fluoxetine)
- Wellbutrin (bupropion)
- Zoloft (sertraline)

Dizziness and Vertigo

- Antivert (meclizine)

Emotional Changes

- Nuedexta (dextromethorphan + quinidine)

Managing symptoms

Fatigue

- Adderall (dextroamphetamine and amphetamine)
- Amantadine
- Provigil (modafinil)
- Prozac (fluoxetine)
- Ritalin (methylphenidate)

Itching

- Vistaril (hydroxyzine)

Pain

- Cymbalta (duloxetine)
- Effexor (venlafaxine)
- Elavil (amitriptyline)
- Lamictal (lamotrigine)
- Lyrica (pregabalin)
- Neurontin (gabapentin)
- Pamelor; Aventyl (nortriptyline)
- Tegetrol (carbamazepine)
- Trileptal (oxcarbazepine)

Sexual Problems

- Cialis (tadalafil)
- Levitra (vardenafil)
- MUSE (alprostadil)
- Prostin VR (alprostadil)
- Stendra (avanafil)
- Viagra (sildenafil)

Spasticity

- Baclofen
- Botox (onabotulinumtoxin A)
- Dantrium (dantrolene)
- Klonopin (clonazepam)
- Valium (diazepam)
- Zanaflex (tizanidine)

Tremors

- Laniazid - Nydrazid (isoniazid)
- Klonopin (clonazepam)

Walking (Gait) Difficulties

- Ampyra (dalfampridine)

Alternative therapies

- Alternative therapies come from many disciplines and traditions. They include acupuncture, aromatherapy, biofeedback, chiropractic, guided imagery, herbal medicine, homeopathy, hypnosis, hypnotherapy, macrobiotics, naturopathy, reflexology, relaxation techniques, traditional Chinese medicine, yoga, "therapeutic touch," and various schools of massage, among others
- Recommended

Food and diet — Although various diets have been promoted to cure or control MS, no diet has been proven to modify the course of MS. MS specialists recommend that people follow the same heart healthy, high fiber, low fat diet that is recommended for all adults. Some other medical conditions – such as high blood pressure and cardiovascular disease may be associated with MS worsening, so a heart healthy diet is very important.

Exercise — Exercise offers many benefits for people with MS. In addition to improving your overall health, aerobic exercise reduces fatigue and improves bladder and bowel function, strength, and mood. Stretching exercises reduce stiffness and increase mobility. A physical therapist can recommend an exercise plan to fit your abilities.

Stress management (.pdf) — The relationship between stress and the onset or worsening of MS is far from clear — and different types of stress appear to affect different people in different ways. But none of us feel our best when we're stressed, so it's important to find the stress management strategies that work best for you.

Acupuncture — Acupuncture is finding its way into Western medicine, with studies suggesting possible benefits for a wide range of symptoms, such as pain, gait.

Nursing Process

- **Assessment**
- **Plan of Care**
- **Goals**
- **Nursing Interventions**

  Improve mobility and neuromuscular function

  Conserve energy

  Maintain independence in ADLs

  Improve Bladder function and prevent complications

  Improve knowledge

  Develop effective coping strategies to adjust to the illness

  Maintain visual functioning

  Promote comfort

Nursing Process

- **Assessment**
  - **Physical**
    - **Observe physical appearance**
      - **Spasticity**
      - **Weakness**
      - **Incontinence**
      - **Visual impairments**
    - **Medication reconciliation**
      - **Prescription medications**
      - **Compliance**
      - **Alternative medications**

Nursing Process

- **History**
  - **Current symptoms**
  - **Time of onset**
  - **History of relapses**
  - **Recent or past viral infections**
  - **Stress**
  - **Pregnancy**
  - **Exposure to extreme temperatures**
  - **Self Care Deficits**

Plan of Care: Nursing Diagnosis

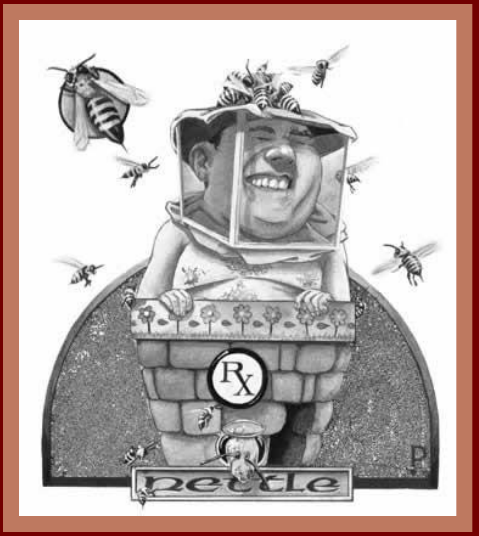
- Impaired physical mobility re: neuromuscular impairment
- Fatigue re: MS disease process
- Self-care deficits re: weakness, spasticity, and tremor
- Altered urinary elimination re: spinal cord involvement and decreased functional ability
- Knowledge deficit re: the variable nature of symptoms and multifaceted treatment options
- Ineffective individual coping re: the variability of the disease course, cognitive impairments, decreased independence and changes in family and vocational roles
- Sensory perception alterations: visual, re: optic nerve involvement
- Chronic pain re: neuropathy

Goals

- Maintain maximal level of mobility
- Demonstrate safety in mobility and recognize need for appropriate assistive devices
- Conserve energy and verbalize understanding of ways to integrate energy conservation principles into ADLs & daily activities
- Attain maximal level of function in ADLs
- Maintain continence and identify symptoms of UTI
- Verbalize understanding of the disease process, significant implications and prescribed regimens
- Verbalize appropriate plans for coping with stress
- Attain maximal visual functioning and demonstrate satisfactory use of compensatory measures when needed
- Verbalize satisfactory pain relief

Nursing Interventions

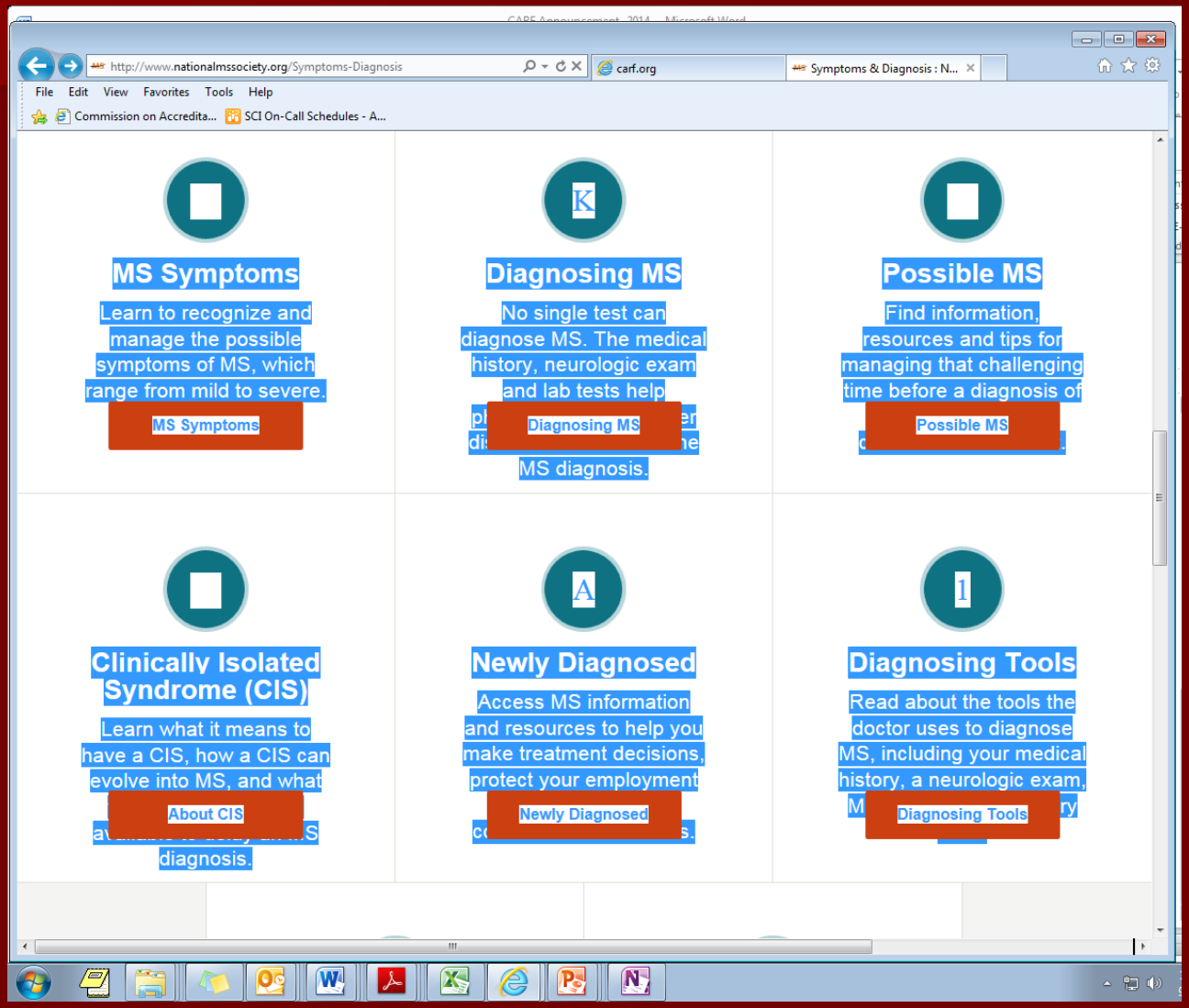
- Improve mobility and neuromuscular function.
- Conserve Energy
- Maintain independence in ADL's
- Improve bladder function and prevent complications
- Improve knowledge
- Develop effective coping strategies to adjust to the illness
- Maintain visual functioning
- Promote comfort



Case Study: Joanna, Nurse with new diagnosis of MS

- Questions
- What is the role of the APN in this case, as a colleague and as a rehabilitation specialist?
- What nursing interventions should take priority in this case?
- What can you anticipate will be the outcome of this acute episode?
- What safety issues can you identify, and how may they be addressed?
- What long term needs can you address at this stage in the course of Joanna's disease?
- How can you best support the staff in the ICU?
- What medications may be helpful for long-term management of Joanna's disease?

http://www.nationalmssociety.org/Symptoms-Diagnosis/MS-Symptoms



Other topics

- Diabetes Mellitus
- Cancer
- HIV and AIDS
- Obesity

Too Quick? YES

- **Study well**
- **Use your Resources at your Facility**