# Learning Guide for Multiple Sclerosis Nurses

*A joint collaboration between UK MSSN (UK MS Nurses) and MSNA Inc (Australian & New Zealand MS Nurses) to assist self-development and learning for early career MS Nurses*

Version 2, dated 19th March 2020

## Authorship and background

This guide is based on the foundational 2013 document (version 1), which was initiated by the late UK MSSN and MS Nurse advocate, Nicki Ward-Abel. Even though it is only seven years since version 1, so much has changed and our knowledge has expanded in so many directions - in disease modifying drugs (DMDs), in understanding the pathophysiology of the disease (or more correctly now, diseases), in understanding genetics and in understanding the lived experience of MS. Accordingly, this version is almost a complete re-write. However, it is only possible because of Nicki's vision and extraordinary leadership in this area to even imagine embarking on such a project.

The authors worked collaboratively to bring this resource up to date; a joint venture from the UK MSSN (led by Amy Harbour and Karen Vernon) and MSNA nurses (Sharon Barlow and Tim O'Maley). Therese Burke acted as co-ordinator, for the re-write, compiling resources and updating publications and honouring Nicki's wishes in regard to her vision. Karen Vernon from the UK nurtured and encouraged this project as a dedication to Nicki and to her achievements and passion in this specialty.

## About this guide

This guide acts as a revision tool for early career MS Nurses to further their own education and professional development, with a view to sitting the Multiple Sclerosis Nurse International Credentialing Board (MSNICB) examination.

This guide IS NOT advice to sitting the exam; nor is it a complete or dedicated resource for tips or hints at what the examination could or may ask. It is simply a guide to support nurses to follow a structured study program to be used in conjunction with other resources, of which there are many. Additionally, this guide is a constant "work in progress", as information is changing so rapidly to keep in touch with new research and new findings in the field of MS. The aim going forward is to perform a joint UK and Australasian update annually to reflect these changes and updates.

Instead of reams of text and information, we have elected to point the MS Nurse in the direction of where the bulk of the information lies, rather than re-hashing information verbatim. The five categories listed in the MSNICB candidate Handbook (see below) are very broad and would be impossible to comprehensively address in this document alone. The websites recommended here are trusted, reliable sources of information at the time of going to print, but you should always re-assess this when you access the information in case of changes. Additionally, this guide is not complete by any stretch of the imagination, and many of the websites or articles should be read with the aim of extending the information by looking further into the references and the bibliographies they contain.

The MSNICB examination guidelines and the MSCN certification exam candidate Handbook *must be read and understood* in conjunction with this guide, as the candidate Handbook provides the structure for this document. These may both be found on the MNSICB website:

www.msnicb.org

## Obtaining the most out of this guide

As mentioned, this guide is structured around the MSNICB candidate Handbook, which provides a lay-out of the key curriculum an MS Nurse of two years MS experience is expected to be knowledgeable about.

*MSNICB candidate Handbook*

In addition to the MSNICB website, the candidate Handbook may be found directly on this link of the Professional Testing Company New York (PTCNY, the examination company MSNICB hires to conduct the examination):

http://ptcny.com/pdf/MSNICB.pdf

The candidate Handbook breaks down the examination material into five different categories, with a different weighting for each category. This weighting is reflected in the amount of questions in the examination. There are currently 150 multiple choice questions comprising the examination. The 2019 version of the candidate Handbook outlines these areas and approximate weighting:

1. Concepts underlying clinical practice (23%)

2. Assessment and intervention for clinical practice (42%)

3. Advocacy (10%)

4. Education (17%)

5. Research (8%)

Where possible, a full reference is provided for you to look up the articles and journals yourself, rather than the version 1 hyperlinks, as many of these hyperlinks became outdated after publication of version 1.

## General texts and websites with multiple information categories

1. *Nursing management and core concept books in MS*

These texts are essential to grasp the nursing concepts of MS and are comprehensive in covering most areas mentioned in the candidate Handbook. These include but are not limited to the following texts. If you can only afford to buy one book, the 2016 latest version of the core curriculum (4th edition) by Halper and Harris is a **must** as it provides an extensive and historical view of MS nursing, as well as the most current knowledge and lists of resources.

Halper, J., & APN-C, M. S. C. N. (2007). *Advanced concepts in multiple sclerosis nursing care*. Demos Medical Publishing.

Halper, J., APN-C, M. S. C. N., & Holland, N. J. (2010). *Comprehensive nursing care in multiple sclerosis*. Springer Publishing Company.

Halper, J., APN-C, M. S. C. N., Harris, C., & MSCN, N. (2016). *Nursing practice in multiple sclerosis*. Springer Publishing Company.

2. *MS Society and Organisational websites*

There are many MS society and MS organisational websites to access the most up to date general information. These can be investigated by you for relevant information to suit most categories, especially candidate Handbook categories one-four. These include:

- MS Trust (UK) www.mstrust.org
- The UK MS Society www.mssociety.org.uk
- The MS Society of Canada www.mssociety.ca
- The National MS Society (USA) www.nationalmssociety.org
- MS Australia www.msaustralia.org.au
- MS Research Australia www. msra.org.au
- MS Society of New Zealand www.msnz.org.nz
- MS International Federation (some aging articles, but many are seminal and important) www.msif.org

3. *MS Nursing and Medical/Scientific associations and organisations*

- UK MSSNA website and slide library (for UK MSSNA members) www.ukmssna.org.uk

- MSNA Inc (for Australian and NZ members) and the MS Nursing Manual www.msnainc.org.au

- International Organisation of MS Nurses (IOMSN): Particularly look under “tools” and “resources” www.iomsn.org

- LiveWise MS: You can type in your particular area of interest www.livewisems.org

- Consortium of MS Centres (CMSC): A website with a host of up to date information, particularly under “Resources”. Much medical and scientific information, but also nursing related, scroll through each section under this tab. Excellent consensus papers as well. Many categories here, which apply to candidate Handbook categories one-three in particular. www.mscare.org

- Projects in Knowledge: A constantly updated “E-textbook” in general neurology but also includes a subsection on MS. Set at a much higher level than the MSNICB exam, but you may find extension material here if you wish to investigate further. www.projectsinknowledge.com

- European Committee for Treatment and Research in MS (ECTRIMS): Also home of the Multiple Sclerosis Journal www.ectrims.eu

- Professor Gavin Giovannoni from the UK has a website that has content suitable for patients but also sections for health care professionals and often lively debates on current trending topics in MS. https://multiple-sclerosis-research.org

- There are many YouTube and other SlideShare presentations available online from the world experts in MS that might help you in specific areas. For example, Neurologist Dr Ben Thrower from the USA has a series of presentations on YouTube covering many of the basics and the symptoms of MS.

# HANDBOOK CATEGORY 1: CONCEPTS UNDERLYING CLINICAL PRACTICE

## A) Definition of Multiple Sclerosis

i. Disease course and classifications
ii. Epidemiology and Aetiology
iii. Disease Trajectory

### i) Disease course and Classifications

It is still impossible to predict the disease course of MS. No two people have exactly the same experience of MS, the disease course may look very different from one person to another. In recent years, USA based Neurologist Fred Lublin and colleagues have challenged these categories and suggested new classifications, which are generally internationally recognised, but not yet adopted universally (see below 2014). However, there are generally recognized classifications of MS which are regarded as:

- Radiological Isolated syndrome (RIS)
- Clinically Isolated Syndrome (CIS)
- Relapsing Remitting MS (RRMS)
- Primary Progressive MS (PPMS)
- Secondary Progressive MS (SPMS)
- Progressive Relapsing MS (PRMS)

Excellent resources for this section are on the organizational websites outlined above, but also in recent publications:

- Klineova, S., & Lublin, F. D. (2018). Clinical course of multiple sclerosis. *Cold Spring Harbor perspectives in medicine*, *8*(9), a028928.

- Lublin, F. D., Reingold, S. C., Cohen, J. A., Cutter, G. R., Sørensen, P. S., Thompson, A. J., ... & Bebo, B. (2014). Defining the clinical course of multiple sclerosis: the 2013 revisions. *Neurology*, *83*(3), 278-286.

- Lublin, F. D. (2014). New multiple sclerosis phenotypic classification. *European neurology*, *72*(Suppl. 1), 1-5.

- Ontaneda, D., Thompson, A. J., Fox, R. J., & Cohen, J. A. (2017). Progressive multiple sclerosis: prospects for disease therapy, repair, and restoration of function. *The Lancet*, *389*(10076), 1357-1366.

- Sand, I. B. K., & Lublin, F. D. (2013). Diagnosis and differential diagnosis of multiple sclerosis. *CONTINUUM: Lifelong Learning in Neurology*, *19*(4), 922-943.

- Sand, I. K. (2015). Classification, diagnosis, and differential diagnosis of multiple sclerosis. *Current opinion in neurology*, *28*(3), 193-205.

- Thompson, A. J., Banwell, B. L., Barkhof, F., Carroll, W. M., Coetzee, T., Comi, G., ... & Fujihara, K. (2018). Diagnosis of multiple sclerosis: 2017 revisions of the McDonald criteria. *The Lancet Neurology*, *17*(2), 162-173.

- Tullman, M. J. (2013). Overview of the epidemiology, diagnosis, and disease progression associated with multiple sclerosis. *The American journal of managed care*, *19*(2 Suppl), S15-20.

### ii) Epidemiology and Aetiology

Much recent information has been developed in the last decade concerning both the epidemiology and aetiology of MS, although the puzzle is far from complete. This area is under constant review, so ensure you have the most up to date resources available to get a handle on current thinking. The global ATLAS from Browne and colleagues (2014, see below) provides excellent information on this topic, as do the other resources listed here.

- Ascherio, A. (2013). Environmental factors in multiple sclerosis. *Expert review of neurotherapeutics*, *13*(sup2), 3-9.

- Browne, P., Chandraratna, D., Angood, C., Tremlett, H., Baker, C., Taylor, B. V., & Thompson, A. J. (2014). Atlas of multiple sclerosis 2013: a growing global problem with widespread inequity. *Neurology*, *83*(11), 1022-1024.

- Etemadifar, M., Sajjadi, S., Nasr, Z., Firoozeei, T. S., Abtahi, S. H., Akbari, M., & Fereidan-Esfahani, M. (2013). Epidemiology of multiple sclerosis in Iran: a systematic review. *European neurology*, *70*(5-6), 356-363.

- Goodin, D. S. (2014). The epidemiology of multiple sclerosis: insights to disease pathogenesis. In *Handbook of clinical neurology* (Vol. 122, pp. 231-266). Elsevier.

- Howard, J., Trevick, S., & Younger, D. S. (2016). Epidemiology of multiple sclerosis. *Neurologic clinics*, *34*(4), 919-939.

- Kurtzke, J. F. (2013). Epidemiology in multiple sclerosis: a pilgrim's progress. *Brain*, *136*(9), 2904-2917.

- Leray, E., Moreau, T., Fromont, A., & Edan, G. (2016). Epidemiology of multiple sclerosis. *Revue neurologique*, *172*(1), 3-13.

- Olsson, T., Barcellos, L. F., & Alfredsson, L. (2017). Interactions between genetic, lifestyle and environmental risk factors for multiple sclerosis. *Nature Reviews Neurology*, *13*(1), 25.

- Simpson, S., Blizzard, L., Otahal, P., Van der Mei, I., & Taylor, B. (2011). Latitude is significantly associated with the prevalence of multiple sclerosis: a meta-analysis. *Journal of Neurology, Neurosurgery & Psychiatry*, *82*(10), 1132-1141.

### iii) Disease Trajectory

As already mentioned, the disease trajectory for MS is largely unknown at the beginning of the journey, with individual heterogeneity between cases and for reasons that are not currently understood. It is expected that the next decade will bring new knowledge to this area in particular.

- Bove, R., Musallam, A., Healy, B. C., Houtchens, M., Glanz, B. I., Khoury, S., ... & Chitnis, T. (2013). No sex-specific difference in disease trajectory in multiple sclerosis patients before and after age 50. *BMC neurology*, *13*(1), 73.

- Tremlett, H., Zhao, Y., Rieckmann, P., & Hutchinson, M. (2010). New perspectives in the natural history of multiple sclerosis. *Neurology*, *74*(24), 2004-2015.

## B. Pathophysiology of Multiple Sclerosis

i. **Disruption of Blood/Brain Barrier**
ii. **Immune Dysfunction/Inflammatory Process**
iii. **Destruction of Myelin**
iv. **Role of Oligodendrocytes**
v. **Axonal Damage**
vi. **Nerve conduction/Neurophysiology**
vii. **Neuropathology**
viii. **Neuroanatomy**

Most general neurology textbooks and E-books will have an excellent section on the pathophysiology of MS, and our understanding of this is increasing with each passing year. The neuroanatomy section has seen less change and you should familiarise yourself with as much anatomy as you can and practice this clinically as often as possible. It will help you to isolate symptoms and possible lesion location, which you can develop further down the track into neuroassessments of your own when you start to gain more confidence. The work of Dr Bruce Trapp (USA) is highly regarded in this area and his research is a must-read as new pathophysiology knowledge is identified and reported.

- Bican, O., Minagar, A., & Pruitt, A. A. (2013). The spinal cord: a review of functional neuroanatomy. *Neurologic clinics*, *31*(1), 1-18.

- Dendrou, C. A., Fugger, L., & Friese, M. A. (2015). Immunopathology of multiple sclerosis. *Nature Reviews Immunology*, *15*(9), 545.

- Dutta, R., Chen, J., Ohno, N., Ontaneda, D., & Trapp, B. D. (2017). Axonal Loss and Neurodegeneration in Multiple Sclerosis. *Neurodegeneration*, 238-247.

- Filippi, M., Brück, W., Chard, D., Fazekas, F., Geurts, J. J., Enzinger, C., ... & Schmierer, K. (2019). Association between pathological and MRI findings in multiple sclerosis. *The Lancet Neurology*, *18*(2), 198-210.

- Franklin, R. J., Edgar, J. M., & Smith, K. J. (2012). Neuroprotection and repair in multiple sclerosis. *Nature Reviews Neurology*, *8*(11), 624.

- Gartzen, K., Katzarava, Z., Diener, H. C., & Putzki, N. (2011). Peripheral nervous system involvement in multiple sclerosis. *European journal of neurology*, *18*(5), 789-791.

- Grigoriadis, N., & Van Pesch, V. (2015). A basic overview of multiple sclerosis immunopathology. *European journal of neurology*, *22*, 3-13.

- Haines, J. D., Inglese, M., & Casaccia, P. (2011). Axonal damage in multiple sclerosis. *Mount Sinai Journal of Medicine: A Journal of Translational and Personalized Medicine*, *78*(2), 231-243.

- Hemmer, B., Kerschensteiner, M., & Korn, T. (2015). Role of the innate and adaptive immune responses in the course of multiple sclerosis. *The Lancet Neurology*, *14*(4), 406-419.

- Kamm, C. P., Uitdehaag, B. M., & Polman, C. H. (2014). Multiple sclerosis: current knowledge and future outlook. *European neurology*, *72*(3-4), 132-141.

- Kuhlmann, T., Ludwin, S., Prat, A., Antel, J., Brück, W., & Lassmann, H. (2017). An updated histological classification system for multiple sclerosis lesions. *Acta neuropathologica*, *133*(1), 13-24.

- Lassmann, H., Van Horssen, J., & Mahad, D. (2012). Progressive multiple sclerosis: pathology and pathogenesis. *Nature Reviews Neurology*, *8*(11), 647.

- Prineas, J. W., & Parratt, J. D. (2012). Oligodendrocytes and the early multiple sclerosis lesion. *Annals of neurology*, *72*(1), 18-31.

- Trapp, B. D., & Nave, K. A. (2008). Multiple sclerosis: an immune or neurodegenerative disorder?. *Annu. Rev. Neurosci.*, *31*, 247-269.

- Trapp, B. D., & Ontaneda, D. (2018). Identifying a new subtype of multiple sclerosis. *Neurodegenerative disease management*, *8*(6), 367-369.

- Trapp, B. D., Vignos, M., Dudman, J., Chang, A., Fisher, E., Staugaitis, S. M., ... & Fox, R. J. (2018). Cortical neuronal densities and cerebral white matter demyelination in multiple sclerosis: a retrospective study. *The Lancet Neurology*, *17*(10), 870-884.

Version 1 important information: The following short section on the immune system is taken directly from Nicki's version 1 of the guide and as an area Nicki often taught and lectured in, we are leaving it in the guide unedited:

Jean-Martin Charcot worked with people with neurological conditions in Paris in the 1800's. He is often identified as the man who first 'discovered' MS as he defined and framed the disease and gave it a name (sclerose en plaques) people could recognise. He described a condition occurring in young adults with tremor and paralysis, who at postmortem were noted to have grey patches (plaques or sclerosis) scattered through the spinal cord, brain and brain stem. He was able to separate the tremor of MS from Parkinson's disease. The development of knowledge of this condition is fascinating; and well worth learning a brief history detailing the timeline of developments.

To understand about auto immunity, a fundamental understanding of how the immune system works is also needed. Additionally, this will also help in understanding how the disease modifying drugs work in MS (more on this in Category 2).

This seminal nursing guide is helpful in understanding basic concepts:

Storey, M & Jordan S (2008) An overview of the immune system. Nursing Standard. 23. 15-17. 47-56.

***Key points:***

- there are over 80 different auto immune conditions
- females are more affected than males
- the 2 parts of the immune system are the innate and the adaptive

- the innate system is non-specific and is ready to be activated upon the first signs of infection.
- the adaptive system "remembers" antigens it has encountered and reacts more quickly and efficiently the next time that antigen is found by producing antibodies.
- in MS the key cell for auto immunity to occur is the T cell
- T cells mature in the Thymus
- The T cell may cross the blood brain barrier and attack the myelin causing demyelination
- cytokines are messenger substances which allow the cells of the immune system to communicate
- B cells produce and carry antibodies
- oligodendrocytes produce myelin

Vitamin D levels are also appearing important in MS pathophysiology and management and this story is evolving rapidly as we speak. Vitamin D deficiency may increase susceptibility to MS; this hypothesis is very popular, but not yet substantiated as a direct causative factor, although new research is looking to confirm this. Recent scientific research has linked the Vitamin D theory with genetic and cellular factors – watch this space.

Another excellent resource in the immunological area is a little tricky to find but we will endeavour to upload it to the MSNA website as a resource. It is over a decade old, but the concepts have not changed.

- Porter, B; Costello, K; Halper, J et al. (2004). Topics in Multiple Sclerosis: An immunological perspective. The Whitaker-McFarlin MS Colloquium. Embryon.

## C. Diagnosis of Multiple Sclerosis/Diagnostic Criteria

### i. Presenting Symptoms/Clinical Findings

### ii. Prognostic Indicators

### iii. Diagnostic Tests (MRI, EPs, LPs, lab work, other)

The diagnosis of MS can be a long drawn out process for many, and this can result in living with a great deal of uncertainty and anxiety. This extended process is partly because there is no one single test currently available that definitely confirms or excludes the diagnosis of MS. There are also a range of other neurological conditions that have similar features and excluding these mimic disorders is an important part of the diagnostic process for MS. An early diagnosis is important, as the earlier the treatment is started the more of a possibility that a medication will be able to modify the progression of disease. Similarly, an accurate diagnosis is just as important, as some of the medications can have significant side effects and are very expensive.

Part of the diagnostic process of MS will require the Neurologist or Nurse Practitioner to carry out a Neurological Examination (“neuro exam”) that will provide clues as to what condition the patient may be presenting with. Once the examination is completed, then the necessary investigations will begin, often based on the neuro exam findings.

There is an internationally accepted criteria for diagnosing MS, this is called the McDonald Criteria. First reported in 2005, the criteria has been updated in 2010 (published in 2011) and again in 2017 (published in 2018). This criterion guides and supports an accurate diagnosis of MS and is widely used globally. It balances the need for early diagnosis (so treatment can be initiated) and the importance of avoiding false positive diagnosis (which can be extremely detrimental to a person’s health and well-being). Thompson et al’s (2018) revisions of the McDonald criteria are a ***must read*** and are listed in the key references below.

Resources on the diagnostic tests can be found in all neurological texts and E-books as they are key for many neurological disorders, not just MS.

- Brownlee, W. J., Hardy, T. A., Fazekas, F., & Miller, D. H. (2017). Diagnosis of multiple sclerosis: progress and challenges. *The Lancet*, *389*(10076), 1336-1346.

- Filippi, M., Rocca, M. A., Ciccarelli, O., De Stefano, N., Evangelou, N., Kappos, L., ... & Gasperini, C. (2016). MRI criteria for the diagnosis of multiple sclerosis: MAGNIMS consensus guidelines. *The Lancet Neurology*, *15*(3), 292-303.

- Giffroy, X., Maes, N., Albert, A., Maquet, P., Crielaard, J. M., & Dive, D. (2016). Multimodal evoked potentials for functional quantification and prognosis in multiple sclerosis. *BMC neurology*, *16*(1), 83.

- Guillemin, F., Baumann, C., Epstein, J., Kerschen, P., Garot, T., Mathey, G., ... & LORSEP Group. (2017). Older age at multiple sclerosis onset is an independent factor of poor prognosis: a population-based cohort study. *Neuroepidemiology*, *48*(3-4), 179-187.

- Karim, A. K., Sheaheed, N. M., Taha, A., & Al-Musawi, Z. N. (2015). Prognostic Indicators in Patients with Relapsing Remitting Multiple Sclerosis. *Iraqi Academic Scientific Journal*, *14*(3), 403-409.

- Iaffaldano, P., Simone, M., Lucisano, G., Ghezzi, A., Coniglio, G., Brescia Morra, V., ... & Bergamaschi, R. (2017). Prognostic indicators in pediatric clinically isolated syndrome. *Annals of neurology*, *81*(5), 729-739.

- Rovira, À., Wattjes, M. P., Tintoré, M., Tur, C., Yousry, T. A., Sormani, M. P., ... & Barkhof, F. (2015). Evidence-based guidelines: MAGNIMS consensus guidelines on the use of MRI in multiple sclerosis—clinical implementation in the diagnostic process. *Nature Reviews Neurology*, *11*(8), 471.

- Thompson, A. J., Banwell, B. L., Barkhof, F., Carroll, W. M., Coetzee, T., Comi, G., ... & Fujihara, K. (2018). Diagnosis of multiple sclerosis: 2017 revisions of the McDonald criteria. *The Lancet Neurology*, *17*(2), 162-173.

- Valado, A., Sousa, L., & Baldeiras, I. (2019). CSF IgG oligoclonal bands and prognosis in multiple sclerosis. *European Journal of Public Health*, *29*(Supplement_1), ckz034-016.

## D. Diagnosis of Relapse

## E. Clinically Isolated Syndrome (CIS)

## F. Phenotypes of MS

There is pertinent information for these sections under the definitions and classifications of MS earlier in this category, but the 2017 updated revisions to the McDonald criteria (2018, see below) also give direction in this section as well. Excellent resources for this section are on the organizational websites.

Thompson, A. J., Banwell, B. L., Barkhof, F., Carroll, W. M., Coetzee, T., Comi, G., ... & Fujihara, K. (2018). Diagnosis of multiple sclerosis: 2017 revisions of the McDonald criteria. *The Lancet Neurology*, *17*(2), 162-173.

# HANDBOOK CATEGORY 2: ASSESSMENT AND INTERVENTION FOR CLINICAL PRACTICE

## A) PHARMACOLOGY TREATMENTS

i. Relapse management

ii. Disease modifying drugs

### i) Relapse management

Relapse management consists of both corticosteroids and other drugs, and supportive care to see people through a relapse safely.

In most PwRRMS, clinical manifestations of the relapse reflect the area of demyelination in the CNS and indicate the involvement of motor, sensory, visual, and autonomic systems, but many other symptoms and signs can occur (Compston & Coles, 2008). Keeping people safe through a relapse is an important concept, helping to understand capabilities (for example, understanding what can be done at work with hand numbness, walking safely with a cerebellar relapse) and advising on recovery are vital roles of the MS Nurse. Understanding exactly what happens with an episode of demyelination is also important to understanding how the medications work (or do not work).

#### Relapses:

This first article by Ben Thrower (2009) addresses many key concepts of relapse management. Although it is a decade ago, many concepts still are relevant. Other more recent articles covering relapse treatment are also listed.

- Thrower, B. W. (2009). Relapse management in multiple sclerosis. *The neurologist*, *15*(1), 1-5.

- Doshi, A., & Chataway, J. (2017). Multiple sclerosis, a treatable disease. *Clinical Medicine*, *17*(6), 530-536.

- Berkovich, R. (2016). Treatment of acute relapses in multiple sclerosis. In *Translational Neuroimmunology in Multiple Sclerosis* (pp. 307-326). Academic Press.
- Bevan, C., & Gelfand, J. M. (2015). Therapeutic management of severe relapses in multiple sclerosis. *Current treatment options in neurology*, *17*(4), 17.

An important adjunct to DMDs, especially after a relapse, is neurorehabilitation and physical therapy. Various forms of exercise such as weight training, Pilates and yoga have also been found to be useful in alleviating symptoms of MS and in building strength (Feinstein, Freeman, & Lo; 2015). Rehabilitation in both physical and cognitive forms is a key treatment for all phenotypes of MS (Haselkorn et al., 2015; Khan et al., 2017; Mitolo, Venneri, Wilkinson, & Sharrack, 2015). The following book has covered important rehabilitation aspects of relapse management:

- Fox, R. J., Rae-Grant, A. D., & Béthoux, F. (Eds.). (2018). *Multiple Sclerosis and Related Disorders: Clinical Guide to Diagnosis, Medical Management, and Rehabilitation*. Springer Publishing Company.

Further references:

- Feinstein, A., Freeman, J., & Lo, A. C. (2015). Treatment of progressive multiple sclerosis: what works, what does not, and what is needed. *The Lancet Neurology*, *14*(2), 194-207.

- Haselkorn, J. K., Hughes, C., Rae-Grant, A., Henson, L. J., Bever, C. T., Lo, A. C., ... & Armstrong, M. J. (2015). Summary of comprehensive systematic review: rehabilitation in multiple sclerosis: report of the Guideline Development, Dissemination, and Implementation Subcommittee of the American Academy of Neurology. *Neurology*, *85*(21), 1896-1903.

- Khan, F., & Amatya, B. (2017). Rehabilitation in multiple sclerosis: a systematic review of systematic reviews. *Archives of physical medicine and rehabilitation*, *98*(2), 353-367.

- Mitolo, M., Venneri, A., Wilkinson, I. D., & Sharrack, B. (2015). Cognitive rehabilitation in multiple sclerosis: a systematic review. *Journal of the Neurological Sciences*, *354*(1-2), 1-9.

Several medications are commonly used to treat relapses, the most common of these are corticosteroids in varying forms according to country. It is always important to remember the side effects of corticosteroid treatment and to educate patients accordingly.

- Smets, I., Van Deun, L., Bohyn, C., Van Pesch, V., Vanopdenbosch, L., Dive, D., ... & Dubois, B. (2017). Corticosteroids in the management of acute multiple sclerosis exacerbations. *Acta Neurologica Belgica*, *117*(3), 623-633.

- Lattanzi, S., Cagnetti, C., Danni, M., Provinciali, L., & Silvestrini, M. (2017). Oral and intravenous steroids for multiple sclerosis relapse: a systematic review and meta-analysis. *Journal of neurology*, *264*(8), 1697-1704.

The following articles also look at treatments other than corticosteroids for relapse treatment, including ACTH:

- Bevan, C., & Gelfand, J. M. (2015). Therapeutic management of severe relapses in multiple sclerosis. *Current treatment options in neurology*, *17*(4), 17.

- Wang, C., Ruiz, A., & Mao-Draayer, Y. (2018). Assessment and treatment strategies for a multiple sclerosis relapse. *Journal of immunology and clinical research*, *5*(1).

- Perrin Ross, A. A., Ben-Zacharia, A. D., Harris, C. J., NP, M., & Smrtka, J. (2013). Multiple sclerosis, relapses, and the mechanism of action of adrenocorticotropic hormone. *Frontiers in neurology*, *4*, 21.

### ii) Disease modifying drugs (DMDs)

There have been many recent developments in treatments for RRMS, however a cure for the disease remains elusive. The immune dysregulation in the development of MS leads to a cascade of events resulting in inflammation and axonal degeneration in the CNS (Grigoriadis & van Pesch, 2015). The DMDs act to interrupt this cascade at varying points of the process. The goal of the DMD is to delay the accumulation of disability and to delay transition to the more progressive and disabling SPMS (Liu et al., 2016). The occurrence of a relapse on a DMD is usually considered an indication of breakthrough disease and suboptimal response (Liu et al., 2016) and often results in a "switch" of DMD to another medication, usually to a more efficacious medication (Bevan & Gelfand, 2015). The concept of no evidence of disease activity (NEDA) is a goal for many treating neurologists.

All of the DMDs have side effects associated with their use, some of which (such as injection site reactions and intermittent mild diarrhoea) can be easily managed. Some of the newer treatments (the monoclonal antibodies) are more efficacious than the injectable medications, reducing relapse rates by 50-70% compared to approximately 30% for injectables (Kalincik et al., 2017). However, they do possess significant additional safety concerns. The newer DMDs require specific monitoring for adverse events, some of which can be fatal if not recognised early (Finkelsztejn, 2014).

This area is rapidly changing and at present, as many as thirteen medications are registered in different countries to treat RRMS, and in some cases, SPMS and/or PPMS. This is one area which is covered very well on the basic education websites, including UK MS Trust, CMSC and ECTRIMS websites, as well as many MS society websites in different countries. These websites are the most likely to be up to date with current registrations and thinking in this area. Are a great place to start your research and updates.

- Liu, Y., Morgan, C., Hornung, L., Tyry, T., Salter, A. R., Agashivala, N., ... & Cutter, G. R. (2016). Relationship between symptom change, relapse activity and disability progression in multiple sclerosis. *Journal of the neurological sciences*, *362*, 121-126.

- Grigoriadis, N., & Van Pesch, V. (2015). A basic overview of multiple sclerosis immunopathology. *European journal of neurology*, *22*, 3-13.

- Bevan, C., & Gelfand, J. M. (2015). Therapeutic management of severe relapses in multiple sclerosis. *Current treatment options in neurology*, *17*(4), 17.

- Kalincik, T., Brown, J. W. L., Robertson, N., Willis, M., Scolding, N., Rice, C. M., ... & McGuigan, C. (2017). Treatment effectiveness of alemtuzumab compared with natalizumab, fingolimod, and interferon beta in relapsing-remitting multiple sclerosis: a cohort study. *The Lancet Neurology*, *16*(4), 271-281.

- Finkelsztejn, A. (2014). Multiple sclerosis: overview of disease-modifying agents. *Perspectives in medicinal chemistry*, *6*, PMC-S13213.

As knowledge on medications to treat MS are constantly evolving, all we will do here is list several recent articles and update them each year as new side effects emerge, as further information about side effects is presented and as new medications are added to the treatment paradigm. Updated product information can be checked for contemporary side effects or safety concerns for specific medications on the regulatory websites (PBS, FDA, EMA). Please also note that there is a great variation between countries in first line treatment and which phenotypes of MS may be eligible for support in each country.

- Garg, N., & Smith, T. W. (2015). An update on immunopathogenesis, diagnosis, and treatment of multiple sclerosis. *Brain and behavior*, *5*(9), e00362.

- Dargahi, N., Katsara, M., Tselios, T., Androutsou, M. E., De Courten, M., Matsoukas, J., & Apostolopoulos, V. (2017). Multiple sclerosis: immunopathology and treatment update. *Brain sciences*, *7*(7), 78.

### iii) Emerging treatments:

Even though there are many rigorously clinically proven DMDs to treat RRMS, patients can be so desperate for a cure that they will overlook the lack of carefully tested scientific evidence and consider unproven and potentially dangerous treatments (Bowman, Racke, Kissel, & Imitola, 2015). This is understandable as vulnerable patients search for answers to their illness, not just in the absence of a cure, but also in the setting of very serious effects from DMDs and the risk of disease progression, even when compliant with DMD.

There are many emerging treatments for MS, in the form of different molecules and medications. Some of these, such as stem cell treatments, are gaining importance as information from the clinical trials starts to build. This is a significant area of current development and the research will need to be reviewed frequently to maintain current consensus on their use. Presently, autologous hematopoietic stem cell transplantation is usually reserved for aggressive cases of RRMS, but this could change in the future when more is known about efficacy, optimal dosages and safety. Other forms of stem cell therapy are also being trialled and researched around the world. Several recent articles are listed below:

- Cohen, J. A., Imrey, P. B., Planchon, S. M., Bermel, R. A., Fisher, E., Fox, R. J., ... & Karafa, M. (2018). Pilot trial of intravenous autologous culture-expanded mesenchymal stem cell transplantation in multiple sclerosis. *Multiple Sclerosis Journal*, *24*(4), 501-511.

- Rush, C. A., Atkins, H. L., & Freedman, M. S. (2019). Autologous hematopoietic stem cell transplantation in the treatment of multiple sclerosis. *Cold Spring Harbor perspectives in medicine*, *9*(3), a029082.

- Mancardi, G., Sormani, M. P., Muraro, P. A., Boffa, G., & Saccardi, R. (2018). Intense immunosuppression followed by autologous haematopoietic stem cell transplantation as a therapeutic strategy in aggressive forms of multiple sclerosis. *Multiple Sclerosis Journal*, *24*(3), 245-255.

- Bowman, M., Racke, M., Kissel, J., & Imitola, J. (2015). Responsibilities of health care professionals in counseling and educating patients with incurable neurological diseases regarding “stem cell tourism”: caveat emptor. *JAMA neurology*, *72*(11), 1342-1345.

## B) SYMPTOMS AND SYMPTOM MANAGEMENT

You will be already familiar with the myriad of symptoms possible with MS. Some general texts, especially Halper & Harris 2016, will cover all of these in greater detail, but some additional texts will give also provide continued building of these concepts and manifestations. There are literally hundreds of resources available across the many individual symptoms of MS. Some symptoms in MS may also form clusters and can influence each other (for example, depression, fatigue and sleep). The Australian MS Nursing Manual (2013) also has an excellent section in Module 4 covering symptoms and symptom management.

We recommend exploring all of these individual symptoms in detail as part of your study program:

- Fatigue
- Pain
- Spasticity
- Tremor
- Weakness

- Mobility and balance
- Visual impairment
- Cognition
- Bladder dysfunction
- Bowel dysfunction
- Sexual dysfunction
- Speech, swallowing
- Altered sensation
- Mood disorders
- Other symptoms

Resources:

- Halper, J., APN-C, M. S. C. N., & Holland, N. J. (2010). *Comprehensive nursing care in multiple sclerosis*. Springer Publishing Company.

- Halper, J., APN-C, M. S. C. N., Harris, C., & MSCN, N. (2016). *Nursing practice in multiple sclerosis: a core curriculum*. Springer Publishing Company.

- Ben-Zacharia, A. B. (2011). Therapeutics for multiple sclerosis symptoms. *Mount Sinai Journal of Medicine: A Journal of Translational and Personalized Medicine*, *78*(2), 176-191.

- Ben-Zacharia, A. B., & Mathewson, G. (2017). Symptom management in multiple sclerosis. In *Handbook of Relapsing-Remitting Multiple Sclerosis* (pp. 115-134). Adis, Cham.

- Crabtree-Hartman, E. (2018). Advanced symptom management in multiple sclerosis. *Neurologic clinics*, *36*(1), 197-218.

- Coyle, P. K. (2016). Symptom management and lifestyle modifications in multiple sclerosis. *Continuum: Lifelong Learning in Neurology*, *22*(3), 815-836.

## C) PSYCHOSOCIAL ISSUES

This area is one which almost every MS Nurse knows is such an important area for the patients and families under their care, but an area which can often be overlooked by the more “exciting” new developments on pathophysiology and disease treatment. However, the fact remains that disruptions in the psychosocial world of people living with MS are all too common, and sometimes challenging to uncover and to manage. There are many resources to assist here, some good general texts exploring this are in the core curriculum books of Halper & Holland (2010) and Halper & Harris (2016). However, this is such a broad area that focused articles are difficult to uncover, you will have to explore a little with this one. Some general articles to review:

- Grech, L. B., Kiropoulos, L. A., Kirby, K. M., Butler, E., Paine, M., & Hester, R. (2018). Target coping strategies for interventions aimed at maximizing psychosocial adjustment in people with multiple sclerosis. *International journal of MS care*, *20*(3), 109-119.

- Comber, L., Coote, S., Finlayson, M., Galvin, R., Quinn, G., & Peterson, E. (2017). An exploration of fall-related, psychosocial variables in people with multiple sclerosis who have fallen. *British journal of occupational therapy*, *80*(10), 587-595.

- Cowan, C. K., Pierson, J. M., & Leggat, S. G. (2018). Psychosocial aspects of the lived experience of multiple sclerosis: personal perspectives. *Disability and rehabilitation*, 1-11.

- Walker, L. A., Gardner, C., Freedman, M. S., MacLean, H., Rush, C., & Bowman, M. (2019). to-Practice Gaps in Multiple Sclerosis Care in One Canadian Center for Those with Subjective Cognitive, Mental Health, and Psychosocial Concerns. *International Journal of MS Care*.

- Giovannetti, A. M., Schiavolin, S., Raggi, A., Quintas, R., Cerniauskaite, M., Confalonieri, P., ... & Leonardi, M. (2016). Psychosocial difficulties of individuals with multiple sclerosis: the PARADISE-24 questionnaire. *International Journal of Rehabilitation Research*, *39*(4), 339-345.

- Burke, T., Vucic, S., & Patching, J. (2018). Management of 'surplus suffering'in relapsing remitting multiple sclerosis to improve patient quality of life. *British Journal of Neuroscience Nursing*, *14*(6), 265-271.

- Burke, T., Vucic, S., & Patching, J. (2019). "Taming the Beast": Exploring the Lived Experience of Relapsing Remitting Multiple Sclerosis Using a Life History Approach. *Research and Theory for Nursing Practice*, *33*(3), 229-245.

***The candidate Handbook specifically addresses these areass:***

Response to Chronic Illness
Emotional Status

Support Network
Ethnocultural Issues
Family and Relationships

Vocational
Financial
Recreational

Potential for Abuse and Neglect

Depression
End of Life Planning

As these are mostly universal, yet highly specific concerns, detailed articles are also challenging to find, but all of the usual core concept texts address these issues generally. Emotional status and depression are covered in previous areas right through the life and disease trajectory. Ethnocultural issues are generally inadequately covered in MS but looking at similar conditions can be helpful for overlapping issues. Personal relationships can be affected greatly by MS in so many ways.

**Some general articles:**

- Kalb, R., Costello, K., & Guiod, L. (2019). Case Management Services to Meet the Complex Needs of Patients with Multiple Sclerosis in the Community—The Successes and Challenges of a Unique Program from the National Multiple Sclerosis Society.

- Goverover, Y., Genova, H. M., DeLuca, J., & Chiaravalloti, N. D. (2017). Impact of multiple sclerosis on daily life. In *Changes in the Brain* (pp. 145-165). Springer, New York, NY.

- Valvano, A. K., Rollock, M. J., Hudson, W. H., Goodworth, M. C. R., Lopez, E., & Stepleman, L. (2018). Sexual communication, sexual satisfaction, and relationship quality in people with multiple sclerosis. *Rehabilitation psychology*, *63*(2), 267.

- Balto, J. M., Pilutti, L. A., & Motl, R. W. (2019). Loneliness in Multiple Sclerosis: Possible Antecedents and Correlates. *Rehabilitation Nursing Journal*, *44*(1), 52-59.

- Burke, T., & Patching, J. (2019). Exploring life history methodology in chronic illness: a study in Relapsing Remitting Multiple Sclerosis. *Australian Journal of Advanced Nursing (Online)*, *36*(4), 45-52.

A general abuse and neglect new article with concepts relevant to MS:

- Wajnberg, A., Koppel, S., & Kahan, F. (2020). Elder Abuse and Neglect. In *Home-Based Medical Care for Older Adult s*(pp. 41-47). Springer, Cham.

Looking at financial issues in MS:

- Tracy, V. L., Basso, M. R., Marson, D. C., Combs, D. R., & Whiteside, D. M. (2017). Capacity for financial decision making in multiple sclerosis. *Journal of clinical and experimental neuropsychology*, *39*(1), 46-57.

Looking specifically at advance care planning and palliative care in MS:

- DeLuca, G. C., & Hutchinson, J. J. (2018). Comparing and Contrasting the Approach to Advance Care Planning in Multiple. *Case Studies in Neuropalliative Care*, 158.
- Rinker, J. R., & Cutter, G. (2017). Women and Neurological Disability: End-of-Life Care and Mortality in Women with MS. In *Health Issues in Women with Multiple Sclerosis* (pp. 113-126). Springer, Vienna.
- Costello, J. (2017). Preserving the independence of people living with multiple sclerosis towards the end of life. *International journal of palliative nursing*, *23*(10), 474-483.
- Costello, J. (2018). Palliative care for people MS. *Adult Palliative Care for Nursing, Health and Social Care*, 58.

### D) PAEDIATRICS: Special mention

As we already know, RRMS can occur at any age, but the most common age for diagnosis is as a young adult between 18 and 40 years, with a mean age of 30 years (Compston & Coles, 2008). However, paediatric MS occurs in about 5% of cases with onset before the age of 18 years (Lulu, Graves, & Waubant, 2016) and is more prevalent in adolescents than younger children (Waldman et al., 2016). Progressive MS is extremely rare in children. There are many concerns with great relevance to paediatrics in particular, it is important for the MS Nurse to be aware of them, even if working with adults, the patient may have been diagnosed with MS as a child or adolescent and present with issues later in life. Fatigue and cognition are areas of particular concern. The following papers shed some light on paediatric MS and some of the unique characteristics and symptoms of the disease in the younger age group:

- Lulu, S., Graves, J., & Waubant, E. (2016). Menarche increases relapse risk in pediatric multiple sclerosis. *Multiple Sclerosis Journal*, *22*(2), 193-200.

- Waldman, A., Ness, J., Pohl, D., Simone, I. L., Anlar, B., Amato, M. P., & Ghezzi, A. (2016). Pediatric multiple sclerosis: clinical features and outcome. *Neurology*, *87*(9 Supplement 2), S74-S81.

- Rostásy, K., & Bajer-Kornek, B. (2018). Paediatric multiple sclerosis and other acute demyelinating diseases. *Current opinion in neurology*, *31*(3), 244-248.

- Carroll, S., Chalder, T., Hemingway, C., Heyman, I., Bear, H., Sweeney, L., & Moss-Morris, R. (2019). Adolescent and parent factors related to fatigue in paediatric multiple sclerosis and chronic fatigue syndrome: A comparative study. *European Journal of Paediatric Neurology*, *23*(1), 70-80.

- Duignan, S., Brownlee, W., Wassmer, E., Hemingway, C., Lim, M., Ciccarelli, O., & Hacohen, Y. (2019). Paediatric multiple sclerosis: a new era in diagnosis and treatment. *Developmental Medicine & Child Neurology*.

- Bartels, F., Nobis, K., Cooper, G., Wendel, E., Cleaveland, R., Bajer-Kornek, B., ... & Karenfort, M. (2019). Childhood multiple sclerosis is associated with reduced brain volumes at first clinical presentation and brain growth failure. *Multiple Sclerosis Journal*, 1352458519829698.

- Johnen, A., Elpers, C., Riepl, E., Landmeyer, N. C., Krämer, J., Polzer, P., ... & Meuth, S. G. (2019). Early effective treatment may protect from cognitive decline in paediatric multiple sclerosis. *European Journal of Paediatric Neurology*.

- Johnen, A., Elpers, C., Riepl, E., Landmeyer, N. C., Krämer, J., Polzer, P., ... & Meuth, S. G. (2019). Early effective treatment may protect from

cognitive decline in paediatric multiple sclerosis. *European Journal of Paediatric Neurology*.

- Lanzillo, R., Chiodi, A., Carotenuto, A., Magri, V., Napolitano, A., Liuzzi, R., ... & Morra, V. B. (2016). Quality of life and cognitive functions in early onset multiple sclerosis. *european journal of paediatric neurology*, *20*(1), 158-163.

- Amato, M. P., Krupp, L. B., Charvet, L. E., Penner, I., & Till, C. (2016). Pediatric multiple sclerosis: cognition and mood. *Neurology*, *87*(9 Supplement 2), S82-S87.

- Carroll, S., Chalder, T., Hemingway, C., Heyman, I., & Moss-Morris, R. (2016). Understanding fatigue in paediatric multiple sclerosis: a systematic review of clinical and psychosocial factors. *Developmental Medicine & Child Neurology*, *58*(3), 229-239.

- Hinton, D., & Kirk, S. (2017). Living with uncertainty and hope: A qualitative study exploring parents' experiences of living with childhood multiple sclerosis. *Chronic illness*, *13*(2), 88-99.

Although these studies were completed over a decade ago, the seminal work by Boyd and MacMillan is well worth knowing about in relation to paediatric issues in MS:

- Boyd, J. R., & MacMillan, L. J. (2005). Experiences of children and adolescents living with multiple sclerosis. *Journal of neuroscience nursing*, *37*(6), 334.

- Boyd, J. R., & MacMillan, L. J. (2000). Multiple sclerosis in childhood: understanding and caring for children with an" adult" disease. *Axone (Dartmouth, NS)*, *22*(2), 15-21.

And this text offers practical suggestions for dealing with paediatric patients:

- Boyd, J. R., & Milazzo, M. C. (2010). Working With the Pediatric Patient Diagnosed With Multiple Sclerosis. *Comprehensive Nursing Care in Multiple Sclerosis*, 193.

# HANDBOOK CATEGORY 3: ADVOCACY

A. Patient Rights
B. Ethical Practice
C. Negotiating Health Care Systems
D. Empowerment
E. Community Resources
F. Organizations

Advocacy can be difficult to articulate, but it is essential for MS Nurses to have basic knowledge about concepts of advocacy and what advocacy might look like in our clinical or community practice. At the most basic understanding, advocacy occurs when nurses stand up and protect patient dignity, it is when they champion patient care and are ready and willing to challenge poor care, it also occurs when nurses defend patients' rights.

## Advocacy in MS nursing:

The National MS Society Nurse Practitioner's handbook (2013 p.147) describes the MS Nurse role as serving "as an advocate for patients and staff members, and as an agent for change in dealings with health care providers, allied health professionals, the community and health care systems".

The Nursing and Midwifery Board of each country or region will also have a definition of advocacy specific to that particular area, but they all tend to follow similar themes, that of *promoting and protecting the interests of people in the care of nurses and midwives, many of whom may be vulnerable and incapable of protecting their own interests (Nursing and Midwifery Council, UK).*

*The Nursing and Midwifery Council UK:* www.nmc.org.uk

*Nursing and Midwifery Board of Australia:* www.nursingmidwiferyboard.gov.au

*National Council of State Boards (USA):* www.ncsbn.org

*Nursing Council of New Zealand:* www.nursingcouncil.org.nz

*European Nursing Council:* www.enc-eu.org

In general:

Many MS Nurses do not realise that one of their greatest acts of advocacy for patients lies in the vast amount of education and learning that they provide on a daily basis. Empowering people living with MS to be proficient in terms of self-management and self-awareness is a great gift of advocacy, ensuring that they are able to negotiate the medical world and find their place in the medical system with confidence. Examples of this include:

- Increasing the understanding for a patient, family or friends about MS and how it affects each person individually
- Inform patients of treatment strategies and the need for self responsibility and self monitoring
- Provide information about MS related or MS appropriate services, and relevant resources
- Increase public awareness of MS and educate public (for example, work colleagues or employers, with permission)

Below is a list of 'advocacy tasks' which enable you to structure your reading, along with some useful resources on advocacy.

**Advocacy tasks:**

1. Negotiate for the patient and family in the healthcare system
2. Advocate self-care strategies
3. Serve as a consultant
4. Increase awareness of MS in the community
5. Protect patient rights
6. Examine practice outcomes

Seminal nursing articles on advocacy:

- Balwin, M. A. (2003). Patient advocacy: a concept analysis. *Nursing Standard (through 2013)*, *17*(21), 33.

- Bennett, O. (1999). Advocacy in nursing. *Nursing Standard (through 2013)*, *14*(11), 40.

This new text on Advocacy in Neurology has some excellent history. Particularly chapter 9 (advocacy and neurology nursing) and Chapter 21 (Advocacy in MS).

- Grisold, W., Struhal, W., & Grisold, T. (Eds.). (2019). *Advocacy in Neurology*. Oxford University Press.

**Other more recent articles:**

Albina, J. K. (2016). Patient abuse in the health care setting: The nurse as patient advocate. *AORN journal*, *103*(1), 73-81.

Archer, L. (1986). The nurse as advocate for vulnerable persons. *Journal of Advanced Nursing*, *11*(3), 255-263.

Chiu, C., Bishop, M., Pionke, J. J., Strauser, D., & Santens, R. L. (2017). Barriers to the accessibility and continuity of health-care services in people with multiple sclerosis: A literature review. *International journal of MS care*, *19*(6), 313-321.

Choi, P. P. (2015). Patient advocacy: the role of the nurse. *Nursing Standard (2014+)*, *29*(41), 52.

Hanks, R. G. (2010, April). The medical-surgical nurse perspective of advocate role. In *Nursing Forum* (Vol. 45, No. 2, pp. 97-107). Malden, USA: Blackwell Publishing Inc.

Hebert, K., Moore, H., & Rooney, J. (2011). The nurse advocate in end-of-life care. *Ochsner Journal*, *11*(4), 325-329.

Kemppainen, V., Tossavainen, K., & Turunen, H. (2013). Nurses' roles in health promotion practice: an integrative review. *Health Promotion International*, *28*(4), 490-501.

Pacquiao, D. (2018). Advocacy and Empowerment of Individuals, Families and Communities. In *Global Applications of Culturally Competent Health Care: Guidelines for Practice*(pp. 239-253). Springer, Cham.

Rumrill, P. D. (2010). *Employment issues and multiple sclerosis*. ReadHowYouWant. com.

Shannon, S. E. (2016). The nurse as the patient's advocate: A contrarian view. *Hastings Center Report*, *46*, S43-S47.

Water, T., Ford, K., Spence, D., & Rasmussen, S. (2016). Patient advocacy by nurses–past, present and future. *Contemporary nurse*, *52*(6), 696-709.

## Organisations

The Halper & Harris text (2016) has an excellent section covering these areas. You can also do your own on-line browsing to become familiar with organisations that you may not already know. Some of these websites are also covered in the introduction and general websites at the beginning of this guide.

World Health Organization (WHO)
MS Coalition and its Organizations
International Organization of Multiple Sclerosis Nurses (IOMSN)
CMSC
American Association of Neuroscience Nurses (AANN)
American Academy of Neurology (AAN)
ECTRIMS/ACTRIMS
Association of Rehabilitation Nurses (ARN)

## HANDBOOK CATEGORY 4: EDUCATION

This category, being more general in nature, will focus more on universal texts to help you with discussing and understanding the following concepts. For some of the topics, it is an area of scant literature in MS and a lot of our understanding comes from generalisations across many other disease states and patient and professional development in general. For this reason, articles are very few, but recent articles that may be of interest are included. Halper and Harris (as referenced multiple times) cover most of these aspects comprehensively in their most recent MS nursing text (2016), which should underpin your learning in this general area.

The recent Brain Health initiative has many insights in relation to education in MS care and is a must-read in this department:

- Giovannoni, G., Butzkueven, H., Dhib-Jalbut, S., Hobart, J., Kobelt, G., Pepper, G., ... & Vollmer, T. (2016). Brain health: time matters in multiple sclerosis. *Multiple sclerosis and related disorders*, *9*, S5-S48.

Otherwise, please review these general articles for further information in the area of education:

- D'hooghe, M. B., Haentjens, P., Van Remoortel, A., De Keyser, J., & Nagels, G. (2016). Self-reported levels of education and disability progression in multiple sclerosis. *Acta Neurologica Scandinavica*, *134*(6), 414-419.

- McCabe, M. P., Ebacioni, K. J., Simmons, R., McDonald, E., & Melton, L. (2015). Unmet education, psychological and peer support needs of people with multiple sclerosis. *Journal of psychosomatic research*, *78*(1), 82-87.

- de Medeiros Rimkus, C., Avolio, I. M. B., Miotto, E. C., Pereira, S. A., Mendes, M. F., Callegaro, D., & da Costa Leite, C. (2018). The protective effects of high-education levels on cognition in different stages of multiple sclerosis. *Multiple sclerosis and related disorders*, *22*, 41-48.

- Rieckmann, P., Boyko, A., Centonze, D., Elovaara, I., Giovannoni, G., Havrdova, E., ... & LeLorier, J. (2015). Achieving patient engagement in multiple sclerosis: A perspective from the multiple sclerosis in the 21st Century Steering Group. *Multiple Sclerosis and Related Disorders*, *4*(3), 202-218.

## A) PATIENT EDUCATION:

### i) Disease specific

Of course, in this area you will have covered in your own disease specific learning in Categories one and two outlined above and you will relate this knowledge to patient education in the disease, along with aspects of the following concepts.

### ii) Principles of Teaching and Learning

This text from Cantillon et al (2017) forms an excellent basis for learning and teaching and theory.

- Cantillon, P., Wood, D. F., & Yardley, S. (Eds.). (2017). *ABC of learning and teaching in medicine*. John Wiley & Sons.

- Mohamadirizi, S., Shaygannejad, V., Mohamadirizi, S., & Tolou-Ghamari, Z. (2017). The effect of electronic education on knowledge of patients with multiple sclerosis. *Journal of education and health promotion*, *6*.

An article on “dosing” the newly diagnosed MS patient with education is an interesting concept:

- Miller, L. K. (2017). Dosing of Education for Patients Newly Diagnosed with Multiple Sclerosis.

The MS Nurse is a unique educator to PwMS and the following nursing concepts are also important to teaching, notable are the works of Susan Bastable.

- Bastable, S. B. (2017). *Nurse as educator: Principles of teaching and learning for nursing practice*. Jones & Bartlett Learning.
- Bastable, S. B. (2016). *Essentials of patient education*. Jones & Bartlett Learning.
- Bradshaw, M., & Hultquist, B. L. (2016). *Innovative teaching strategies in nursing and related health professions*. Jones & Bartlett Learning.
- Arnold, E. C., & Boggs, K. U. (2019). *Interpersonal Relationships E-Book: Professional Communication Skills for Nurses*. Elsevier Health Sciences.

### iii) Health Promotion and change theory

- Batras, D., Duff, C., & Smith, B. J. (2016). Organizational change theory: implications for health promotion practice. *Health promotion international*, *31*(1), 231-241.
- Fertman, C. I., & Allensworth, D. D. (Eds.). (2016). *Health promotion programs: from theory to practice*. John Wiley & Sons.
- Kok, G. (2018). A practical guide to effective behavior change: How to apply theory-and evidence-based behavior change methods in an intervention.
- Glanz, K., Rimer, B. K., & Viswanath, K. (Eds.). (2015). *Health behavior: Theory, research, and practice*. John Wiley & Sons.

### iv) Special populations (developmental issues, comorbidities, other)

In more recent years, comorbidity in MS nursing and medicine has become a very hot topic. Currently comorbidity issues are an important part of the nursing assessment in caring for PwMS and present as areas of care where the MS Nurse can have an incredible scope of influence. These recent articles from Ruth Marrie and others highlight some of the recent developments.

- Marrie, R. A., Elliott, L., Marriott, J., Cossoy, M., Tennakoon, A., & Yu, N. (2015). Comorbidity increases the risk of hospitalizations in multiple sclerosis. *Neurology*, *84*(4), 350-358.

- Marrie, R. A., Cohen, J., Stuve, O., Trojano, M., Sørensen, P. S., Reingold, S., ... & Reider, N. (2015). A systematic review of the incidence and prevalence of comorbidity in multiple sclerosis: overview. *Multiple Sclerosis Journal*, *21*(3), 263-281

- Marrie, R. A., Elliott, L., Marriott, J., Cossoy, M., Blanchard, J., Leung, S., & Yu, N. (2015). Effect of comorbidity on mortality in multiple sclerosis. *Neurology*, *85*(3), 240-247.

- Marrie, R. A. (2017). Comorbidity in multiple sclerosis: implications for patient care. *Nature Reviews Neurology*, *13*(6), 375.

- Marrie, R. A., Patten, S. B., Tremlett, H., Wolfson, C., Warren, S., Svenson, L. W., ... & Fisk, J. (2016). Sex differences in comorbidity at diagnosis of multiple sclerosis: a population-based study. *Neurology*, *86*(14), 1279-1286.

- Berrigan, L. I., Fisk, J. D., Patten, S. B., Tremlett, H., Wolfson, C., Warren, S., ... & Marrie, R. A. (2016). Health-related quality of life in multiple sclerosis: direct and indirect effects of comorbidity. *Neurology*, *86*(15), 1417-1424.

- Marck, C. H., Neate, S. L., Taylor, K. L., Weiland, T. J., & Jelinek, G. A. (2016). Prevalence of comorbidities, overweight and obesity in an international sample of people with multiple sclerosis and associations with modifiable lifestyle factors. *PloS one*, *11*(2), e0148573.

In areas of developmental care:

- Aaen, G., Waltz, M., Vargas, W., Makhani, N., Ness, J., Harris, Y., ... & Gorman, M. (2019). Acquisition of Early Developmental Milestones and Need for Special Education Services in Pediatric Multiple Sclerosis. *Journal of child neurology*, *34*(3), 148-152.

And concepts of palliative care continue to be of importance and are also mentioned later in this guide:

- Vanopdenbosch, L. J., Oliver, D. J., & Kass, J. S. (2016). Palliative care in multiple sclerosis. *CONTINUUM: Lifelong Learning in Neurology*, *22*(3), 943-946.

### v) Cultural sensitivity

The 7th edition of Giger's Transcultural nursing text (2016) provides updated information and frameworks on cultural sensitivity.

- Giger, J. N. (2016). *Transcultural Nursing-E-Book: Assessment and Intervention*. Elsevier Health Sciences.

And some recent articles to start you thinking about cultural sensitivity, humility and diversity:

- Lor, M., Crooks, N., & Tluczek, A. (2016). A proposed model of person-, family-, and culture-centered nursing care. *Nursing Outlook*, *64*(4), 352-366.

- McFarland, M. R., & Wehbe-Alamah, H. B. (2017). Theory of Culture Care Diversity and Universality. *Nursing Theorists and Their Work-E-Book*, 339.

### vi) Gender differences (both reproductive issues and hormonal changes, aging)

This is also an area of recent and ongoing development in MS with many articles updating the MS community on the latest knowledge. This should also be searched regularly.

- Ploughman, M., Collins, K., Wallack, E. M., Monks, M., Mayo, N., & Health, Lifestyle, and Aging with MS Canadian Consortium*. (2017). Women's and Men's Differing Experiences of Health, Lifestyle, and Aging with Multiple Sclerosis. *International journal of MS care*, *19*(4), 165-171.

- Bove, R., McHenry, A., Hellwig, K., Houtchens, M., Razaz, N., Smyth, P., ... & Rintell, D. (2016). Multiple sclerosis in men: management considerations. *Journal of neurology*, *263*(7), 1263-1273.

- Bove, R., Healy, B. C., Musallam, A., Glanz, B. I., De Jager, P. L., & Chitnis, T. (2016). Exploration of changes in disability after menopause in a longitudinal multiple sclerosis cohort. *Multiple Sclerosis Journal*, *22*(7), 935-943.

- Bove, R., White, C. C., Fitzgerald, K. C., Chitnis, T., Chibnik, L., Ascherio, A., & Munger, K. L. (2016). Hormone therapy use and physical quality of life in postmenopausal women with multiple sclerosis. *Neurology*, *87*(14), 1457-1463.

- Airas, L. (2015). Hormonal and gender-related immune changes in multiple sclerosis. *Acta Neurologica Scandinavica*, *132*, 62-70.

- Pakpoor, J., Wotton, C. J., Schmierer, K., Giovannoni, G., & Goldacre, M. J. (2016). Gender identity disorders and multiple sclerosis risk: a national record-linkage study. *Multiple Sclerosis Journal*, *22*(13), 1759-1762.

- Houtchens, M. K., & Bove, R. (2018). A case for gender-based approach to multiple sclerosis therapeutics. *Frontiers in neuroendocrinology*, *50*, 123-134.

- Langer-Gould, A. (2016). Sex hormones and multiple sclerosis: another informative failure. *The Lancet Neurology*, *15*(1), 22-23.

- Gold, S. M., & Voskuhl, R. R. (2016, November). Pregnancy and multiple sclerosis: from molecular mechanisms to clinical application. In *Seminars in immunopathology* (Vol. 38, No. 6, pp. 709-718). Springer Berlin Heidelberg.

- Golden, L. C., & Voskuhl, R. (2017). The importance of studying sex differences in disease: The example of multiple sclerosis. *Journal of neuroscience research*, *95*(1-2), 633-643.

**Aging and MS**

Concepts of immunosenescence are becoming increasingly important in MS care, particularly in the setting of the newer DMDs. Immunosenescence is the gradual deterioration of the immune system with aging and may be a contributing factor to the risks associated with some of the current immunosuppressive and immunomodulatory medications used in treating multiple sclerosis (MS) and other inflammatory disorders. Immunosenescence plays a significant role in drug choice and monitoring as profound qualitative and quantitative changes occur in the adaptive and innate immunity compartments during aging (Grebenciucova & Berger, 2017):

- Grebenciucova, E., & Berger, J. R. (2017). Immunosenescence: the role of aging in the predisposition to neuro-infectious complications arising from the treatment of multiple sclerosis. *Current neurology and neuroscience reports*, *17*(8), 61.

- Karpatkin, H., & Cohen, E. (2019). Aging With a Progressive Neurologic Disease: Rehabilitation Management of the Adult Aging With Parkinson Disease or Multiple Sclerosis. *Topics in Geriatric Rehabilitation*, *35*(3), 172-182.

- Jamann, H., Clénet, M. L., Charabati, M., Mamane, V., Ouédraogo, O., Carmina Moratalla, A., ... & Arbour, N. (2018). Markers of immunosenescence in the peripheral blood of multiple sclerosis subjects compared to healthy controls.

- Ploughman, M., Collins, K., Wallack, E. M., Monks, M., Mayo, N., & Health, Lifestyle, and Aging with MS Canadian Consortium*. (2017). Women's and Men's Differing Experiences of Health, Lifestyle, and Aging with Multiple Sclerosis. *International journal of MS care*, *19*(4), 165-171.

- Sanai, S. A., Saini, V., Benedict, R. H., Zivadinov, R., Teter, B. E., Ramanathan, M., & Weinstock-Guttman, B. (2016). Aging and multiple sclerosis. *Multiple Sclerosis Journal*, *22*(6), 717-725.

- Jakimovski, D., Weinstock-Guttman, B., Roy, S., Jaworski, M., Hancock, L., Nizinski, A., ... & Benedict, R. H. (2019). Cognitive profiles of aging in multiple sclerosis. *Frontiers in aging neuroscience*, *11*, 105.

- Solaro, C., Ponzio, M., Moran, E., Tanganelli, P., Pizio, R., Ribizzi, G., ... & Battaglia, M. A. (2015). The changing face of multiple sclerosis: Prevalence and incidence in an aging population. *Multiple Sclerosis Journal*, *21*(10), 1244-1250.

- Bollaert, R. E., & Motl, R. W. (2019). Aging With Multiple Sclerosis: An Agenda for Examining the Effects of Physical Activity Behavior. *Topics in Geriatric Rehabilitation*, *35*(3), 183-189.

- Ruano, L., Portaccio, E., Goretti, B., Niccolai, C., Severo, M., Patti, F., ... & Roscio, M. (2017). Age and disability drive cognitive impairment in multiple sclerosis across disease subtypes. *Multiple Sclerosis Journal*, *23*(9), 1258-1267.

The issues in aging in MS are not just pathophysiological. Excellent aging in MS articles for patients and caregivers:

- Buhse, M. (2015). The elderly person with multiple sclerosis: clinical implications for the increasing life-span. *Journal of Neuroscience Nursing*, *47*(6), 333-339.

- Buhse, M., Della Ratta, C., Galiczewski, J., & Eckardt, P. (2015). Caregivers of older persons with multiple sclerosis: determinants of health-related quality of life. *Journal of Neuroscience Nursing*, *47*(2), E2-E12.

### vii) Resources and Referrals

The concept of the MS multidisciplinary team and the MS specialty clinic have an important place in modern MS care. Referrals and resources to and from these services form the backbone of consistent and effective MS management:

- Soelberg Sorensen, P., Giovannoni, G., Montalban, X., Thalheim, C., Zaratin, P., & Comi, G. (2019). The multiple sclerosis care unit. *Multiple Sclerosis Journal*, *25*(5), 627-636.
- Newsome, S. D., Aliotta, P. J., Bainbridge, J., Bennett, S. E., Cutter, G., Fenton, K., ... & Weigel, M. (2017). A framework of care in multiple sclerosis, part 2: Symptomatic care and beyond. *International journal of MS care*, *19*(1), 42-56.
- Lonergan, R., Kinsella, K., Fitzpatrick, P., Duggan, M., Jordan, S., Bradley, D., ... & Tubridy, N. (2015). Unmet needs of multiple sclerosis patients in the community. *Multiple sclerosis and related disorders*, *4*(2), 144-150.
- Sullivan, A. B. (2018). Caregiving in multiple sclerosis. *Multiple Sclerosis and Related Disorders: Clinical Guide to Diagnosis, Medical Management, and Rehabilitation*.
- Wallin, M. T., Campea, S., & Haselkorn, J. K. (2015). Multidisciplinary Management of a Patient With Multiple Sclerosis: Part 1. Neurologists' and Physiatrists' Perspectives. *Federal Practitioner*, *32*(Suppl 3), 14S.
- Maloni, H., & Hillman, L. (2015). Multidisciplinary Management of a Patient With Multiple Sclerosis: Part 2. Nurses' Perspective. *Federal Practitioner*, *32*(Suppl 3), 17S.

### viii) Adherence

In opposition to some of the poorly researched areas mentioned above, the area of adherence in MS and with DMDs is overwhelming in content! It is an area that is ever changing with new modes of delivery and side effect profiles, so do your own up to date searches. To help you get started, please find a selection of more recent MS adherence articles covering a variety of MS and clinical aspects.

- Munsell, M., Frean, M., Menzin, J., & Phillips, A. L. (2017). An evaluation of adherence in patients with multiple sclerosis newly initiating treatment with a self-injectable or an oral disease-modifying drug. *Patient preference and adherence*, *11*, 55.

- Ben-Zacharia, A., Adamson, M., Boyd, A., Hardeman, P., Smrtka, J., Walker, B., & Walker, T. (2018). Impact of Shared Decision Making on Disease-Modifying Drug Adherence in Multiple Sclerosis. *International journal of MS care*, *20*(6), 287-297.

- Bruce, J. M., Bruce, A. S., Lynch, S., Thelen, J., Lim, S. L., Smith, J., ... & Jarmolowicz, D. P. (2018). Probability discounting of treatment decisions in multiple sclerosis: associations with disease knowledge, neuropsychiatric status, and adherence. *Psychopharmacology*, *235*(11), 3303-3313.

- Evans, C., Marrie, R. A., Zhu, F., Leung, S., Lu, X., Melesse, D. Y., ... & Tremlett, H. (2016). Adherence and persistence to drug therapies for multiple sclerosis: a population-based study. *Multiple sclerosis and related disorders*, *8*, 78-85.

- Cohen, B. A., Coyle, P. K., Leist, T., Oleen-Burkey, M. A., Schwartz, M., & Zwibel, H. (2015). Therapy optimization in multiple sclerosis: a cohort study of therapy adherence and risk of relapse. *Multiple sclerosis and related disorders*, *4*(1), 75-82.

- Haase, R., Kullmann, J. S., & Ziemssen, T. (2016). Therapy satisfaction and adherence in patients with relapsing–remitting multiple sclerosis: the THEPA-MS survey. *Therapeutic advances in neurological disorders*, *9*(4), 250-263.

- Schwartz, C. E., Grover, S. A., Powell, V. E., Noguera, A., Mah, J. K., Mar, S., ... & Gorman, M. (2018). Risk factors for non-adherence to disease-modifying therapy in pediatric multiple sclerosis. *Multiple Sclerosis Journal*, *24*(2), 175-185.

- Erbay, Ö., Yesilbalkan, Ö. U., & Yüceyar, N. (2018). Factors Affecting the Adherence to Disease-Modifying Therapy in Patients With Multiple Sclerosis. *Journal of Neuroscience Nursing*, *50*(5), 291-297.

## B) PROFESSIONAL DEVELOPMENT

This is an area which is also under constant change and review. For the most up to date knowledge, please consult the websites mentioned at the beginning of this guide in the introduction. Particularly have a look at the IOMSN website and individual country MS Nurse groups for both the UK and Australasia and also the Halper and Harris text (2016) for helpful and current information.

# HANDBOOK CATEGORY 5: RESEARCH

A. Research terminology and Process
B. Protection of Human Subjects
C. Evidence Based Practice
D. Translational Research
E. Data Collection

## Why MS patients need clinical research and trials:

- We still don't have the Holy Grail – there is no cure
- Local area drug regulations/insurance
- Many symptoms still not well managed
- Burdens/risks of current medications remain
- Hope - the Linda Morgante legacy and the importance of future hope for MS patients

Linda Morgante (2000) Hope in Multiple Sclerosis: A Nursing Perspective. International Journal of MS Care.2(2): 9-15

Although research may not be part of your daily nursing role in MS, it is essential to have an understanding of research terminology and process for these reasons:

- To enable a critical analysis of new research or to analyse a study report
- To understand the process of new drug development in MS
- Patients under your care may seek your advice and ask questions
- Our patients participate in clinical drug trials as volunteers, ours and others, they ask us about studies and about taking part
- We are asked to clarify Adverse Events/Serious Adverse Events
- We are asked about relapses and treatments, current medications
- We advocate on the behalf of the patient
- We educate our patients and improve their health literacy and health system navigation
- Our patients have symptoms/issues that may impact informed consent

The Australian website for MS Research Australia (MSRA) hosts an excellent section under “NEWS” tab which has tutorials and webinars on many science subjects related to MS, as well as clinical trials and research. The website also includes an excellent, brief overview of the clinical trials process.

- www.msra.org.au/news/

And for videos:

- www.msra.org.au/news/?tab=videos

The FDA also has a brief summary of the clinical trials process on this website:

- www.fda.gov/drugs/drug-information-consumers/fdas-drug-review-process-ensuring-drugs-are-safe-and-effective

**How are research participants protected?**

The history of research in humans is a very long and sad pathway to what we practice today. To provide an understanding of the suffering that has been endured by research participants prior to the current procedures and process of modern times, there are many texts and articles that describe the inhumane conditions that historically have prevailed. Although very difficult to read and absorb, they give the MS Nurse an excellent understanding of just why the current research process is so important to protect patients under our care today. Nursing advocacy plays a vital role in this process.  Some of these texts and articles provide an excellent discussion of past care and the modern protective roles of the Nuremberg Code, the Declaration of Helsinki and Good Clinical Practice (GCP) guidelines. The article by Shuster (1997) is an excellent commentary on the impact of the Nuremberg Code and a fascinating review.

- Code, N. (1949). The Nuremberg Code. *Trials of war criminals before the Nuremberg military tribunals under control council law*, *10*, 181-182.

- Emanuel, E. Y. (2017). The Eighth Revision of the Declaration of Helsinki: What Should be Done.

- General Assembly of the World Medical Association. (2014). World Medical Association Declaration of Helsinki: ethical principles for

medical research involving human subjects. *The Journal of the American College of Dentists*, *81*(3), 14.

- Goodyear, M. D., Krleza-Jeric, K., & Lemmens, T. (2007). The declaration of Helsinki.
- Grady, C. (2018). Ethical principles in clinical research. In *Principles and practice of clinical research* (pp. 19-31). Academic Press.
- Grimes, D. A., Hubacher, D., Nanda, K., Schulz, K. F., Moher, D., & Altman, D. G. (2005). The Good Clinical Practice guideline: a bronze standard for clinical research. *The Lancet*, *366*(9480), 172-174.
- Malik, A. Y., & Foster, C. (2016). The revised Declaration of Helsinki: cosmetic or real change?. *Journal of the Royal Society of Medicine*, *109*(5), 184-189.
- Parsa-Parsi, R. W. (2017). The revised Declaration of Geneva: a modern-day physician's pledge. *Jama*, *318*(20), 1971-1972.
- Rickham, P. P. (1964). Human experimentation. Code of ethics of the world medical association. Declaration of Helsinki. *British medical journal*, *2*(5402), 177-177.
- Shuster, E. (1997). Fifty years later: the significance of the Nuremberg Code. *New England Journal of Medicine*, *337*(20), 1436-1440.
- Shuster, E. (1998). The Nuremberg Code: Hippocratic ethics and human rights. *The Lancet*, *351*(9107), 974-977.
- Vijayananthan, A., & Nawawi, O. (2008). The importance of Good Clinical Practice guidelines and its role in clinical trials. *Biomedical imaging and intervention journal*, *4*(1).
- World Medical Association. (2001). World Medical Association Declaration of Helsinki. Ethical principles for medical research involving human subjects. *Bulletin of the World Health Organization*, *79*(4), 373.

*Informed consent* is a process in which researchers provide potential and enrolled participants with all available information about a clinical trial or study. This information helps patients decide whether they wish to enrol, or continue to participate, in a research study. The informed consent process is intended to protect participants and should provide enough information for a person to understand the risks of, potential benefits of, and alternatives to the study. In addition to the informed consent document, the process may involve recruitment materials, verbal instructions, question-and-answer sessions, and activities to measure participant understanding. In general, a person must sign an informed consent document ***before*** any study related procedures or processes commence. However, signing the document and providing consent is not a contract. Participants may withdraw from a study at any time, even if the study is not over. Additionally, the informed consent process continues for the life of the study, as new information becomes known during the course of the research it must be reported to study participants.

**Further articles on the informed consent process and challenges:**

- Blease, C. R., Bishop, F. L., & Kaptchuk, T. J. (2017). Informed consent and clinical trials: where is the placebo effect?. *Bmj*, *356*, j463.
- D'Abramo, F. (2015). Biobank research, informed consent and society. Towards a new alliance?. *J Epidemiol Community Health*, *69*(11), 1125-1128.
- Erlen, J. A. (2010). Informed consent: Revisiting the issues. *Orthopaedic Nursing*, *29*(4), 276-280.
- Grady, C. (2015). Enduring and emerging challenges of informed consent. *New England Journal of Medicine*, *372*(9), 855-862.
- Kahn, J. P., Mastroianni, A. C., & Sugarman, J. (Eds.). (2018). *Beyond consent: Seeking justice in research*. Oxford University Press.
- Schenker, Y., & Meisel, A. (2011). Informed consent in clinical care: practical considerations in the effort to achieve ethical goals. *JAMA*, *305*(11), 1130-1131.

## Phases of clinical trial research

Clinical trials involving new drugs are commonly classified into four phases. Each phase of the drug approval process is treated as a separate clinical trial. The drug-development process will normally proceed through all four phases over many years. If the drug successfully passes through Phases 0, 1, 2, and 3, it will usually be approved by the national regulatory authority for use in the general population.

- Phase 0: Pharmacodynamics and Pharmacokinetics
- Phase 1: Screening for safety
- Phase 2: Establishing the testing protocol
- Phase 3: Final testing
- Phase 4: Post-approval studies

Clinical trials are only a small part of the research that goes into developing a new treatment. Potential drugs, for example, first have to be discovered, purified, characterized, and tested in laboratories (in cell and animal studies) before ever undergoing clinical trials. Many, many potential drugs are tested before just one reaches the point of being tested in a clinical trial. Clinical trials are closely supervised by appropriate regulatory authorities. All studies involving a medical or therapeutic intervention on patients must be approved by a supervising ethics committee before permission is granted to run the trial. The local ethics committee has discretion on how it will supervise noninterventional studies (observational studies or those using already collected data). In the USA, this body is called the Institutional Review Board (IRB) and in other countries it is known as the Human Research Ethics Committee (HRECs) or Health Research Authority (HRAs) or Research Ethics Service (RES).

The MSRA and FDA websites discussed previously also have information on clinical trials.  Additionally, the American Cancer Society website has an excellent overview on phases of clinical trials:

www.cancer.org/treatment/treatments-and-side-effects/clinical-trials/what-you-need-to-know/phases-of-clinical-trials.html

- Friedman, L. M., Furberg, C. D., DeMets, D. L., Reboussin, D. M., & Granger, C. B. (2015). Introduction to clinical trials. In *Fundamentals of clinical trials* (pp. 1-23). Springer, Cham.

**Evidence-based practice**

The seminal paper from Sackett et al (1996) is a must-read to understand evidence-based practice and provides this simple definition:

**"The conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients. The practice of evidence-based medicine means integrating individual clinical expertise with the best available external clinical evidence from systematic research"**

- Sackett, D. L., Rosenberg, W. M., Gray, J. M., Haynes, R. B., & Richardson, W. S. (1996). Evidence based medicine: what it is and what it isn't. *British Medical Journal.* 312: 71

**Other evidence-based nursing practice articles and texts:**

- Burns, N., & Grove, S. K. (2010). *Understanding nursing research-eBook: Building an evidence-based practice*. Elsevier Health Sciences.

- Dang, D., & Dearholt, S. L. (2017). *Johns Hopkins nursing evidence-based practice: Model and guidelines*. Sigma Theta Tau.

- DiCenso, A., Guyatt, G., & Ciliska, D. (2014). *Evidence-Based Nursing-E-Book: A Guide to Clinical Practice*. Elsevier Health Sciences.

- Ellis, P. (2019). *Evidence-based practice in nursing*. 4th Edition. Learning Matters. Sage Publications.

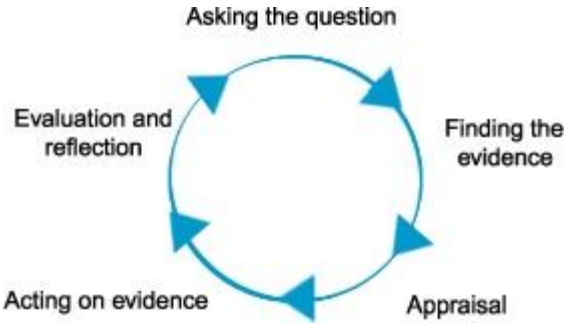
- LoBiondo-Wood, G., & Haber, J. (2017). *Nursing research-E-book: methods and critical appraisal for evidence-based practice*. Elsevier Health Sciences.

- Melnyk, B. M., & Fineout-Overholt, E. (Eds.). (2011). *Evidence-based practice in nursing & healthcare: A guide to best practice*. Lippincott Williams & Wilkins.

- Newhouse, R. P., Dearholt, S. L., Poe, S. S., Pugh, L. C., & White, K. M. (2007). *Johns Hopkins nursing evidence-based practice model and guidelines*. Indianapolis, IN: Sigma Theta Tau International Honor Society of Nursing.

- Reynolds, S. (2008). *Evidence-based practice: A critical appraisal*. John Wiley & Sons.

Evidence based practice is a continuous process. New questions are always arising that need to be answered. The diagram below illustrates this continuous process:



**Clinical nursing research in general:**

These texts and articles provide an overview of clinical research nursing and implications for nursing research care:

- Boswell, C., & Cannon, S. (2018). *Introduction to nursing research*. Jones & Bartlett Learning.

- Burks, A. C., & Keim-Malpass, J. (2019). Health literacy and informed consent for clinical trials: a systematic review and implications for nurses. *Nursing: Research and Reviews*, *9*, 31.

- Curtis, K., Fry, M., Shaban, R. Z., & Considine, J. (2017). Translating research findings to clinical nursing practice. *Journal of clinical nursing*, *26*(5-6), 862-872.

- Fain, J. A. (2017). *Reading, understanding, and applying nursing research*. FA Davis.

- Ingham-Broomfield, R. (2015). A nurses' guide to qualitative research. *Australian Journal of Advanced Nursing, The*, *32*(3), 34.

- Larkin, M. E., Beardslee, B., Cagliero, E., Griffith, C. A., Milaszewski, K., Mugford, M. T., ... & Witte, E. R. (2019). Ethical challenges experienced by clinical research nurses: A qualitative study. *Nursing ethics*, *26*(1), 172-184.

- Nusbaum, L., Douglas, B., Estrella-Luna, N., Paasche-Orlow, M., & Damus, K. (2019). Survey of risks and benefits communication strategies by research nurses. *Nursing ethics*, *26*(3), 937-950.

## CONCLUSION

In conclusion, this guide is only a suggested list of resources to help point you in the right direction of what areas you should consider when preparing for the MSNICB examination. This guide covers most of the areas referred to in the MSNICB candidate Handbook, which is your ultimate guide to the areas you need to study in preparation for the MSNICB exam. However, you must remember the guide is not final and is not comprehensive in every detail, just a starting point for your research and education in the field of MS Nursing. The articles are suggestions in the context of thousands of MS related articles being published each year. It is impossible to view them all, but herein lies some clues to reputable and relevant content. It is important to remember that bibliographies and reference lists within articles and books also provide valuable adjunct information for you to continue reading.

As you continue along your education journey in the field of MS, there is always so much to consider. Even MS Nurse experts who have been in the areas for decades will tell you that they never stop learning and they can never stay on top of every facet of MS - there is simply too much information. However, this is also a wonderful thing as it tells us the research and new findings are never ending and that can only be a great thing for our patients and families as we become closer to a cure. That will be a wonderful day.

An immense posthumous thank you to UK MS Nurse Nicki Ward-Abel for her incredible vision and her passion for education, which underscores this guide and the reasons for doing it. You are always with us, Nicki.