

FOR HEALTH PROFESSIONALS



AUSTRALIA

# PRACTICE

Management of complex symptoms  
in multiple sclerosis (MS)





## Management of complex symptoms in multiple sclerosis (MS)

People with MS can present with a complex range of symptoms. Some of these include dysautonomia (autonomic dysfunction), fatigue, cognitive impairment, and mood disorders. These symptoms must be managed in order to optimise intervention outcomes.

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## 1.0 Dysautonomia or autonomic dysfunction

Dysautonomia describes a range of disorders of the autonomic nervous system (ANS), and thus, may otherwise be known as autonomic dysfunction. There are three components to the ANS — the sympathetic, parasympathetic, and enteric nervous system. The ANS controls unconscious body functions such as heart rate, temperature regulation, blood pressure, micturition (voiding urine), respiratory rate, and sexual function.

In MS, the ANS changes are most commonly due to central nervous system (CNS) lesions from demyelination and axonal loss within the critical pathways responsible for autonomic function of spinal cord, brainstem, and hypothalamus. Demyelination and axonal loss may also occur within the cerebral cortex, including structures of the central autonomic network.<sup>1</sup> Dysautonomia can affect single or multiple ANS functions depending on the location of the

nervous system damage. While there is no cure for dysautonomia, the symptoms can be managed and their impact on an individual's life reduced. The ANS may also be influenced by psychological factors such as depression and stress. These psychological factors need to be managed with psychological therapy to minimise their impact on the ANS.<sup>2</sup> The relationship between ANS dysfunction and these symptoms is weak. Further research is required to support or refute the involvement of the ANS.

Health professionals who suspect that a person with MS has dysautonomia should refer them to their neurologist for testing and management. A number of reliable tests are available to identify dysautonomia. However, they can be difficult to interpret because they test the organ function rather than the organ innervation.

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## 2.0 Impaired thermoregulation

### 2.1 Incidence and impact

The incidence of impaired thermoregulation in people with MS is reported to be between 60 and 90%.<sup>3,4</sup> Thermoregulation may be critical for people with MS since even a small elevation of body temperature causes reduced nerve conduction velocity. This may enhance existing MS symptoms or accentuate new symptoms that were previously not apparent. In contrast, a reduction in nerve conduction velocity may also be beneficial as it may provide relief from pain symptoms. Therefore a person whose primary MS symptom is pain may want to exercise in a way that elevates body temperature. It is important to gain a thorough understanding of how impaired thermoregulation affects a person with MS, and to prescribe management strategies tailored to the individual.<sup>3</sup>

### 2.2 Clinical characteristics

Impaired thermoregulation presents as inappropriate increases or decreases in body temperature. The person with MS can be adversely affected by small changes in internal or external temperatures. A heightened response to increases in temperature is commonly referred to as 'heat sensitivity'. Such an

increase in temperature may occur during exercise, after a warm shower or bath, or when the person with MS has an infection. The increase in temperature can result in the onset or worsening of neurological symptoms, such as blurred vision, weakness or fatigue.

### 2.3 Assessment

As mentioned, tests for assessment of ANS dysfunction are limited in value as they measure the organ involved rather than its response.<sup>5</sup>

### 2.4 Management

All factors that increase body temperature must be identified and managed according to the individual needs of the person with MS. Exercise is not contraindicated in the majority of people with thermoregulatory impairment, but care must be taken to minimise core body temperature elevation. It is recommended that 30 minutes of rest following exercise should allow symptoms to return to baseline.



Symptom changes that last longer than this may temporarily impair the person's function.<sup>6</sup> For example exercise induced onset of blurred vision, or increased numbness in the lower limbs, may temporarily impact on a person's driving ability. Exercise intensity should be managed, and cooling strategies used to avoid prolonged post-exercise symptom increase.

It is important to note that an increase in symptoms that persist for 24 hours or more, post-exercise, may be related to a coincidental MS relapse. In this situation the patient should be referred to their medical practitioner for appropriate management and advice. Accurate recording of symptoms, pre- and post-exercise, will support decision making in this instance.

The following suggestions may assist people with MS to curtail rises in core body temperature during exercise:

- Wearing loose, light clothing
- Maintaining hydration by drinking cool water before, during, and after exercise
- Exercising in a cool environment (e.g., morning or evening; air-conditioned room; pool heated up to 27°C for those affected by heat [the temperature may be up around 32°C])

- Avoiding exercise in direct sunlight
- Exercising regularly for short periods, rather than less frequently for long periods
- Wearing a wet towel or cooling scarf around the neck
- Having a cool shower after exercising
- Wearing a cooling vest immediately prior, during, and after exercise
- Not exercising if unwell.

Cooling therapy may be indicated for individuals with severe heat intolerance. Cooling therapy involves reducing surface body temperature to 10-20°C. Research is limited in this area. However it demonstrates a trend; supporting the use of cooling therapy to reduce body temperature and improve nerve conduction (for up to 30 minutes), with symptom reduction continuing throughout the day of intervention. Cooling therapy is complicated and should only be undertaken by a health professional who specialises in MS and has appropriate training.<sup>7-9</sup>

## 3.0 Cardiovascular dysfunction

### 3.1 Incidence and impact

Cardiovascular dysfunction will affect 10–50% of people with MS. The pattern of pathological findings is highly heterogeneous, suggesting a predominantly sympathetic involvement in some patients, and a predominantly parasympathetic pathology in others.<sup>5</sup> These impairments may be related to the number of lesions within the mid-brain.<sup>10</sup> The overall impact of cardiovascular dysfunction in MS is unknown; it may affect the safety of exercise participation.

### 3.2 Clinical characteristics

Cardiovascular dysfunction in people with MS may involve reduced heart rate response<sup>11,12</sup> and blood pressure response to stimuli such as exercise and stress.<sup>13</sup> Self-reported symptoms may include postural hypotension, dizziness, and light headedness which can impact on the person's ability to maintain balance, or move around their environment.<sup>5</sup>

### 3.3 Assessment and management

People with MS should be assessed for their response to exercise prior to prescribing cardiovascular exercise. This involves taking regular heart rate and blood pressure measurements. If these measures show a blunted response to exercise, alternative measures such as Borg Rate of Perceived Exertion scale should be used to monitor training exercise intensity. People with a history of falling should also be screened for orthostatic intolerance.<sup>5</sup> People with MS who have any cardiovascular risk factors should undertake formal cardiovascular fitness testing prior to engaging in stressful cardiovascular physical activities. For further information refer to the *Strength and cardiovascular exercise for people with multiple sclerosis* handout.

## 4.0 Sleep dysfunction

### 4.1 Incidence and impact

Sleep disturbance is reported to affect between 45 and 60% of people with MS. It is related to a combination of factors such as: sleep-related breathing disturbances, immobility, leg muscle spasms, pain, nocturia, medications,<sup>14,15</sup> restless leg syndrome (RLS)<sup>16</sup>, and psychological issues such as anxiety and depression.<sup>17,18</sup> Frequent night-waking can affect a person's ability to function the following day. Nocturia (the need to get up during the night in order to urinate) was reported as the primary reason for middle-of-the-night insomnia.<sup>14</sup> Another significant sleep disorder in people with MS is narcolepsy.<sup>19</sup> Narcolepsy is a chronic neurological disorder in which the brain is unable to regulate normal sleep-wake cycle, leading to fleeting urges to sleep. Both sleep issues have the potential to cause daytime fatigue and somnolence (excessive daytime sleepiness). Middle-of-the-night insomnia, rather than initial or terminal insomnia, is highly correlated with fatigue and somnolence.

### 4.2 Clinical characteristics

Common clinical signs of sleep disturbance are fatigue (prior to physical or mental exertion), somnolence, irritability, and difficulty with concentration.

### 4.3 Assessment and management

Health professionals may identify people with sleep disturbance during subjective examinations. Management is dependent on the cause of the sleep disturbance. Referral to an MS nurse (1800 042 138) or other relevant health professionals for assessment, strategies and medication to manage the MS symptoms that are affecting their sleep (e.g., bladder dysfunction, depression, pain, spasticity, narcolepsy, and RLS), may be of benefit. Referral to a sleep clinic for formal sleep studies should be considered for people who continue to have sleep disturbances.

## 5.0 Bladder dysfunction

### 5.1 Incidence and impact

The reported incidence of bladder voiding dysfunction in people with MS ranges between 30 and 50%, and appears to be related to disease disability status.<sup>20,21</sup> Lack of bladder control can significantly limit a person's quality of life. Many people reduce their activity participation because of the risk of social embarrassment, and fear of being unable to access toileting facilities.

### 5.2 Clinical characteristics

Detrusor-sphincter dyssynergia and detrusor hyper-reflexia (overactivity) are two bladder dysfunctions that occur in people with MS. They are indicative of a pontine and cervical spinal cord lesion, respectively.<sup>21</sup> Detrusor-sphincter dyssynergia is loss of coordination between the detrusor and external urethral sphincter (outlet obstruction). This results in urinary retention (incomplete emptying) and may lead to upper urinary tract dilation, chronic renal failure, or urinary tract infection. Detrusor hyper-reflexia is involuntary bladder contraction which produces the sensation of imminent voiding (urgency) despite low bladder volume. Urge incontinence occurs when these involuntary

contractions are associated with urine leakage.<sup>5,13</sup>

### 5.3 Assessment

Health professionals should screen people with MS for bladder dysfunction during subjective examinations and strongly encourage people with bladder issues to access appropriate services. People with these symptoms should be referred to an MS nurse (1800 042 138), urologist, or to the Continence Foundation of Australia ([www.continence.org.au](http://www.continence.org.au) or 1800 330 066).

### 5.4 Management

Management of bladder dysfunction is important to prevent chronically raised temperatures and long-term health issues. Optimal management of bladder overactivity and incomplete bladder emptying may involve anticholinergic medication and intermittent catheterisation. Note that catheterisation may be difficult for people with upper limb dysfunction, spasticity, weakness, poor sitting balance, or cognitive



impairment. Urgency and incontinence may become refractive to medication and require management with an indwelling catheter (suprapubic or urethral).<sup>22</sup> Physiotherapists have a role in maintaining adequate physical function to allow people to manage these issues themselves. If incontinence continues in the absence of abnormal bladder volumes, there may be a role for physiotherapists to train the person in pelvic floor re-education.<sup>23</sup>

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## 6.0 Bowel dysfunction

### 6.1 Incidence and impact

The incidence of bowel dysfunction in people with MS ranges from 45–68% with a higher incidence correlated with longer disease duration.<sup>24</sup> The impact of bowel dysfunction can be similar to that of bladder dysfunction, affecting quality of life, and activity participation.

### 6.2 Clinical characteristics

Bowel dysfunction may involve gastroparesis (impaired stomach motility), abnormal colonic motor activity, or anorectal dysfunction, which results in the symptoms of constipation and/or faecal incontinence.

### 6.3 Assessment and management

As with bladder dysfunction, health professionals should regularly screen people with MS for bowel

dysfunction during subjective examinations. They should strongly encourage those with bowel issues to access appropriate services. For professional assessment and management, people should be referred to an MS nurse (1800 042 138) or to the Continence Foundation of Australia ([www.continence.org.au](http://www.continence.org.au) or 1800 330 066). Management strategies to address constipation in people with MS may involve ensuring sufficient daily fluid intake, recommendations for a high fibre diet, prescription of regular physical activity, and a daily routine of attempted evacuation (with or without the assistance of suppositories and medications).<sup>13</sup>

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## 7.0 Sexual dysfunction

### 7.1 Incidence and impact

Autonomic dysfunction can cause sexual dysfunction in men and women with MS. One recent study identified 61% of its MS female population to report some sexual dysfunction<sup>25</sup> and 80% of the MS male population.<sup>26</sup> This may result in difficulty with fertility, sexual pleasure, and impaired sexual relations.

### 7.2 Clinical characteristics

Sexual dysfunction may be related to autonomic dysfunction or MS symptoms. Autonomic dysfunction can cause impotence (erectile dysfunction) in men, and alter orgasmic capacity in both men and women.<sup>26</sup> Women may also experience decreased lubrication, sensory dysfunction in the genital area, weakness of the pelvic muscles, decreased sexual desire and lower

libido.<sup>25</sup> Other symptoms experienced by people with MS that can interfere with a normal sexual response include somatosensory loss (e.g., vibration sense loss), bowel and bladder dysfunction, fatigue and muscular impairment. Sexual intimacy is compounded further by potential psychological factors such as low self-esteem, mood, and coping with disability.

### 7.3 Assessment and management

Medical practitioners have a key role in pharmacological management of sexual dysfunction



in people with MS. Other health professionals may become involved in managing related symptoms that are affecting sexual function. There is emerging evidence for the role of physiotherapists in the provision of pelvic floor exercises to reverse muscle weakness. Muscle weakness of the pelvic area may be inversely linked with male and female genital arousal and orgasm.<sup>27</sup>

## 8.0 Fatigue

Fatigue is a difficult symptom to define as people experience fatigue in different ways, and because the causes and mechanisms of MS fatigue remain somewhat unclear.<sup>28</sup> The Fatigue Management Panel of the Multiple Sclerosis Council for Clinical Practice Guidelines defines fatigue as “a subjective lack of physical or mental energy that is perceived by the individual or caregiver to interfere with usual and desired activities.”<sup>29</sup>

Fatigue is related to a number of causative factors and is commonly referred to as either primary or secondary. Primary fatigue is attributed to the intrinsic MS disease process and is evidenced when fatigue is worsened by heat. Secondary fatigue occurs as a result of other MS symptoms (e.g., disturbed sleep, pain, or spasms), medications. It is also a consequence of inactivity and is similar to that experienced in the general population.<sup>30</sup> Fatigue is often reported in people with MS in conjunction with subjective symptoms of depression and cognitive disturbances. While fatigue is often a reported symptom of depression, MS related fatigue can be independent of clinical depression. Differential testing will be required to establish causative association and appropriate management.<sup>31</sup>

Recently, depression was demonstrated to have a moderate link with fatigue – especially cognitive fatigue as measured by the Modified Fatigue Impact Scale.<sup>32</sup> However, fatigue symptoms are not related to tested and confirmed cognitive impairment.<sup>33</sup>

### 8.1 Incidence and impact

The symptom of fatigue is reported to affect 75% of people with MS at some stage during the course of their illness.<sup>31,34–36</sup> In comparison, between 20 and 25% of the general population report feeling tired all the time.<sup>37</sup> Fatigue may impact significantly on physical

functioning and quality of life.

### 8.2 Clinical characteristics

There are characteristics of MS-related fatigue which distinguish it from the sort of fatigue experienced by healthy individuals:

- It generally occurs on a daily basis
- Its onset occurs more easily and suddenly
- Its onset occurs more easily after daily activities, and necessitates resting
- It tends to be aggravated by heat and humidity
- It is more likely to interfere with daily responsibilities.

### 8.3 Assessment

The assessment of fatigue is best undertaken by a suitably experienced allied health professional. They can screen for primary and secondary causes of fatigue during a subjective assessment. Subjective self-report measures are usually more practical for the clinical setting.<sup>37</sup> A range of subjective and objective fatigue measures are available:

- Fatigue Severity Scale (FSS)<sup>38</sup>
- Fatigue Assessment Instrument<sup>39</sup>
- Fatigue Impact Scale (FIS) or Modified Fatigue Impact Scale (MFIS)<sup>40</sup>
- Single item visual analogue scale of fatigue<sup>38</sup>
- Rochester Fatigue Diary.<sup>41</sup>

Of these tools the FSS, FIS, and MFIS have been validated for use in a population of people with MS.<sup>38,40</sup>

It is noted in clinical practice that as people improve their overall functional capacity, they undertake more activity participation. This automatic increase in activity can distort measurements of response to fatigue

management interventions as people continue to complain of similar levels of fatigue. Keeping an activity diary may help to identify these people.

## 8.4 Management

The management of fatigue requires a multidisciplinary approach.<sup>42</sup> Once potential causal factors have been identified, referrals to the appropriate services and specialists – such as psychology, physiotherapy, continence advice, sleep clinics, medical specialists, social worker, or dietician – can be arranged. The following management guidelines are based on the fatigue management guidelines published by the Multiple Sclerosis Council for Clinical Practice.<sup>29</sup>

### 8.4.1 Energy conservation

Occupational therapists and other health professionals can educate people with MS, their families and carers about balancing rest and activity through prioritising, delegating, pacing tasks, and taking regular short rests between tasks. People with MS-related fatigue can learn how to identify aggravating lifestyle factors and apply the aforementioned strategies as their activities change and as the effects of fatigue vary over time.<sup>43,44</sup>

### 8.4.2 Exercise

People with MS participate in less physical activity and adopt a more sedentary lifestyle as a result of MS-related symptoms.<sup>45</sup> The combination of reduced physical activity and MS fatigue symptoms can lead to a progressive disuse cycle whereby lower activity levels lead to reduced physical fitness. This increases the energy costs of physical activity and worsens fatigue symptoms. Worsening fatigue then leads a person to further reduce their physical activity, continuing the progressive cycle. This cycle can be interrupted through regular exercise utilising physiotherapy rehabilitation interventions.<sup>46,47</sup> The aim of these interventions is to increase the efficiency of energy utilisation throughout the body in order to reduce the energy cost of activity which should reduce secondary fatigue.<sup>48</sup>

Practical strategies for providing exercise and treatment sessions for a person with MS who is affected by fatigue:

- Scheduling the exercise or treatment sessions early in the day
- Encouraging the person to work at their own pace and have regular rests
- Beginning with exercise sessions of short duration

(<20 minutes) and gradually increasing as tolerated

- Beginning with a low number of repetitions and low intensity then gradually progressing as the participant can manage more repetitions or increased intensity
- Mixing vigorous exercises with lighter exercises to avoid long periods of exercise at high heart rates
- Alternating muscle groups in order to rest one muscle group while exercising another
- Encouraging the participant to maintain regular fluid intake to avoid dehydration
- Encouraging the participant to keep body temperature down as much as possible.

### 8.4.3 Equipment modifications

Occupational therapists and physiotherapists can prescribe and train people with MS to use assistive equipment for mobility, self-care, and seating. This can minimise energy consumption during activities of daily living. Supportive seating can reduce energy consumption for maintaining posture, and mobility equipment may improve the biomechanical efficiency of walking, thus reducing fatigue associated with walking.<sup>49-51</sup>

### 8.4.4 Environmental modifications

Changes to environmental factors can assist in minimising fatigue. Changes may include installing air-conditioning, elevators, railings in stairwells, and ergonomic office equipment. An assessment and appropriate recommendations can be made by a physiotherapist or occupational therapist to improve the workplace or the home environment.

A multidisciplinary team may address additional factors such as sleep disturbance, spasms, pain, nocturia, medication side effects, or breathing disturbances. Pharmacological intervention may be prescribed when adequate improvement has not been achieved using the aforementioned fatigue management strategies. Medication is not widely used in Australia for MS-related fatigue management compared with other parts of the world. However, medications that may be used to manage MS-related fatigue include amantadine, modafinil, pemoline, and methylphenidate. Some of these medications have reported side effects such as irritability, insomnia, hyperactivity, dry mouth,



constipation and urinary retention.<sup>37</sup> It is important for people with MS to discuss the use of these medications with their general practitioner, neurologist, and pharmacist to ensure that side effects and potential drug interactions are minimised.

## 9.0 Cognitive impairment

### 9.1 Incidence and impact

Cognitive impairment (i.e., memory and thinking problems) may occur in more than 50% of people with MS.<sup>52</sup> Participation in work, social and home environments can be significantly affected by the presence of any of these cognitive impairments.

### 9.2 Clinical characteristics

Cognitive impairments in people with MS most commonly involve short-term memory, attention, speed of information processing, and executive function (such as abstract reasoning, problem-solving, self-monitoring insight and flexibility of thought). Some of these impairments may be apparent during daily tasks, such as holding a conversation within a distracting environment, doing two things at once, or completing complex work tasks. The capacity to be aware of one's own cognitive impairment can, itself, be impaired in some people with MS. It should be noted that cognitive impairment is not correlated with disease duration or with severity of physical symptoms.<sup>53</sup> Cognitive impairment tends to be mild to moderate in most people with MS, but in approximately 10% of people with MS, it can become severe enough to be classified as a form of MS-related dementia.<sup>54</sup>

### 9.3 Assessment

Health professionals often rely on a person's verbal report or demonstration of cognitive impairment to guide intervention decisions and accommodate the person's cognitive status. Cognitive impairments in MS are notoriously difficult to detect during brief social interactions and verbal self-reports may be influenced by symptoms other than cognitive issues.<sup>55</sup> For example, people with MS who have depression<sup>55</sup> or fatigue<sup>33</sup> tend to self-report higher levels of cognitive impairment than is evident through testing. Furthermore, some people with MS who have cognitive impairment may not be aware of it themselves, and will therefore not necessarily report it.<sup>56</sup>

If cognitive impairment is suspected, a thorough understanding of a person's cognitive impairments through a neuropsychological assessment can assist. Health professionals and their clients can set realistic goals, and maximise adherence with treatment plans and intervention outcomes. Whenever cognitive impairment is suspected, and especially when people with MS report that suspected cognitive impairment is impacting upon their work or their ability to live at home, a neuropsychological assessment should be sought. If the presence of cognitive impairment is less obvious, a referral to an occupational therapist trained in screening people with MS for cognitive impairment may assist in clearly identifying if there is any cognitive impairment. An occupational therapist can also provide practical advice about the management of cognitive symptoms.

### 9.4 Management

Scientific evidence for the effectiveness of psychological interventions to assist people with MS, and to specifically manage cognitive impairments, is currently inconclusive.<sup>56-58</sup> There is, however, an increasing number of encouraging studies showing evidence for the effectiveness of cognitive rehabilitation in MS.<sup>59,60</sup> No medication has shown a stand-alone capacity to clinically improve symptoms of cognitive impairment in people with MS.<sup>56,61</sup> A small single-centre trial recently demonstrated that donepezil has promising benefits for improving memory, but further studies are required to confirm this finding.<sup>62</sup> A recent study exploring the role of modafinil in the treatment of cognitive impairment is also showing promise. Current management approaches focus on applying strategies that minimise the impact of cognitive impairment on a person's ability to set realistic goals and manage daily tasks.

Basic strategies that health professionals can use to maximise therapy interventions (such as exercise classes, or fatigue management education sessions) include:

- Minimising background noise and distractions
- Exercising for shorter periods of time to accommodate reduced capacity to sustain concentration
- Ensuring that intervention sessions are well-structured, engaging, and reinforcing to help keep a disorganised person focused and clear about each session's goals
- Providing written, audio-taped, or video-taped instructions in addition to verbal instructions to take with them
- Providing demonstration and/or manual guidance to facilitate understanding about the required movements when teaching manual tasks or exercises
- Providing people with MS with succinct written education materials to support their decision-making regarding clinical treatment options<sup>63</sup>
- Scheduling multiple short consultations instead of fewer long consultations since people with MS have a greater susceptibility to cognitive fatigue and reduced learning capacity
- Speaking slowly and clearly to people with impaired information processing speed, allowing them time to provide an appropriate response, and checking that they understand what they need to know before ending a session
- Encouraging the person to use a diary or calendar to improve recollection of appointments and important daily tasks (such as practising exercises)
- Allowing each new skill to be strongly established (using extra rehearsal time if necessary) before introducing new skills, in order to help reduce the impact of rigidity (cognitive inflexibility) or moderate memory impairment
- Providing additional reviews of progress to ensure that intervention goals are being met and cognitive issues are not interfering with maintenance behaviours and exercise routines
- Considering the principles of Errorless Learning,<sup>64</sup> Spaced Retrieval Learning,<sup>65</sup> Story Memory Technique,<sup>66</sup> or other training techniques shown to be effective in people with other forms of acquired brain injuries (such as stroke or traumatic brain injuries) for teaching important new skills to people with moderate memory impairment
- Ensuring close one-on-one supervision, feedback or guidance is provided to people who may be at risk of injury or falls during manual tasks. The supervision may be provided by training with a friend, relative, carer, or volunteer.

## 10.0 Mood disorders

Mood disorders are common in MS, as are depressive and generalised anxiety disorders. They are:

- Major depressive disorder
- Dysthymic disorder
- Bipolar disorder

Major depressive disorder is the most common of these disorders and will be discussed further, along with anxiety disorder.

### 10.1 Major depressive disorder

#### 10.1.1 Incidence and impact

Depression has been reported to affect between 50 and 60% of people with MS at some stage during the course of the disease.<sup>68-70</sup> At any one time, approximately 15-40% of people with MS will have depression.<sup>71</sup> This rate of depression is higher than the rate of 15% reported in people with other

chronic illness<sup>72</sup> or the non-MS healthy population.<sup>73</sup> Depression can affect all aspects of life participation and enjoyment.

#### 10.1.2 Clinical characteristics and causes

Major depressive disorder is characterised by a persistently low mood, occurring most of the time, lasting for weeks or longer, and of sufficient severity to cause distress and/or affect social or work function. The low mood is usually accompanied by feelings of sadness or emptiness. People with depression often report a loss of interest and pleasure in daily activities and can feel worthless and guilty.<sup>74</sup>



The underlying cause of the much higher rate of depression in people with MS is poorly understood. Many studies have postulated associations or correlations; however for as many that found correlations others have not. Some possible causes are:

- Uncertainty of disease progression<sup>75,76</sup> including future disability level<sup>77,78</sup>
- Medication side effects, notably interferon 1 beta has shown positive correlation<sup>79</sup> and negative correlation<sup>68</sup>
- Loss of social support and contact<sup>80</sup>
- Neurobiological influence from altered immune function, CNS lesions and abnormalities in hypothalamic functioning has shown both positive correlation<sup>76</sup> and negative correlation<sup>81</sup> with depression
- Post-traumatic stress reactions to the diagnosis and to living with a chronic, potentially deteriorating condition.<sup>82</sup>

Depression in people with MS should be identified and treated swiftly since 30% of people with MS with concomitant depression report suicidal intent.<sup>83</sup> Suicidal intent is three times greater than an age-matched population,<sup>76,83</sup> and untreated depression worsens over time.<sup>84</sup> Depression also significantly affects quality of life<sup>42,85-88</sup> and may even worsen the underlying pathogenic inflammatory processes of MS.<sup>89</sup>

## 10.2 Assessment

When a health professional suspects that a person has depression, they should encourage them to accept a referral to a clinical psychologist or mental health

professional to undergo a full assessment and receive appropriate intervention. Two studies have suggested that regular use of depression screening questions may be of benefit to the health professional. The screening questions consist of:

1. "Are you depressed?"<sup>90</sup>
  - An affirmative answer warrants referral to a clinical psychologist
- 2a. "During the past two weeks, have you often been bothered by feeling down, depressed, or hopeless?"
- 2b. "During the past two weeks, have you often been bothered by little interest or pleasure in doing things?"
  - An affirmative answer to one of these questions warrants a referral to a clinical psychologist.<sup>91</sup>

## 10.3 Management of depression

The treatment of depression may improve an individual's self-esteem, functional status, quality of life, and overall compliance to medical and rehabilitation programs.<sup>57,92</sup> Cognitive behavioural therapy is demonstrated to significantly improve depression, anxiety, and coping with MS.<sup>57</sup> This is especially true for mild to moderate depression. Other interventions include the use of antidepressants<sup>84</sup> and improved social supports and contacts. The use of exercise as an adjunct to clinical psychology for the improvement of depression in MS has been poorly investigated. To date, findings have not supported exercise in its own right as beneficial in improving depression in people with MS.<sup>93</sup> More studies are needed with larger numbers of participants or involving cognitive behavioural therapy.

# 11.0 Anxiety disorder

## 11.1 Incidence and impact

Anxiety disorders are reported to affect between 37 and 40% of people with MS,<sup>94,95</sup> and are associated with social dysfunction and thoughts of suicide.<sup>83</sup> Individuals with anxiety disorder may also have a major depressive disorder.<sup>95</sup> Anxiety is commonly noted in people with a recent diagnosis of MS,<sup>96</sup> and is often related to post-traumatic stress reactions to the diagnosis, and to living with a chronic, potentially deteriorating condition.<sup>82</sup>

## 11.2 Assessment and management

People with anxiety disorder should be referred to a clinical psychologist for appropriate management. Evidence points strongly to an increase in MS relapses when a person with MS experiences multiple stressors or stress without social supports. These stressors appear to be related to everyday events rather than



disease activity.<sup>97-99</sup> Emotional stressors include depression, anxiety, negative attributions (negative self-talk or beliefs), inability to cope, and low social support.<sup>100</sup>

Limited research has been conducted on people with MS to ascertain responses of anxiety disorders to pharmaceutical and psychotherapy management techniques. However the evidence is clear that depression and anxiety are comorbid conditions, and successful treatment of one benefits the state of the

other. It is also clear that cognitive behavioural therapy for anxiety is the most effective approach among the general population. There is strong evidence that the psychological outcomes of people with MS are more closely related to controllable cognitive and behavioural factors than to the physical effects of the disease. Consequently, it can be concluded that interventions that target these specific coping strategies and cognitive appraisals, such as cognitive behavioural therapies, will be effective in treating the emotional effects of MS.<sup>101</sup>

## 12.0 Summary

- People with MS can present with a complex range of symptoms, such as dysautonomia, fatigue, cognitive dysfunction, continence problems, and mood disorders. These symptoms can affect the success of health professional interventions and must be suitably managed in order to optimise intervention outcomes.
- Dysautonomia refers to disorders of the ANS and can cause impaired thermoregulation, cardiovascular dysfunction, sleep disturbance, bladder voiding dysfunction, bowel dysfunction, and sexual dysfunction in people with MS.
- Many of the symptoms of dysautonomia can be managed (though not cured) by the involvement of a range of health professionals such as nurses, doctors, occupational therapists, and physiotherapists.
- Fatigue affects up to 75% of people with MS and can be either primary (attributed to the intrinsic MS disease process) or secondary (e.g., a consequence of inactivity). Depression has been shown to be a moderate causative factor of MS cognitive fatigue.
- Fatigue can severely limit a person's ability to function and participate in many activities. Effective multidisciplinary management strategies can address depression (when evident), energy conservation, exercise, equipment modification, environmental modification and other factors such as sleep disturbance and muscle spasms.
- Cognitive dysfunction occurs in approximately 50% of people with MS and can involve impaired short-term memory, attention, speed of information processing, and executive functioning. This area of symptomatology can affect a person's capacity to set realistic goals and adhere to agreed rehabilitation programs, as well as affecting their performance of social and work tasks.
- Neuropsychological assessment can help to identify and clarify the nature and potential practical implications of various types of cognitive impairment. A neuropsychologist can also recommend strategies for overcoming this impairment. This information and advice can assist health professionals to deliver services to a person with MS who is cognitively impaired in a way that is realistic and effective in supporting their goals.
- People with MS have a high risk for depression (50–60%), anxiety (37–40%), and suicidal intent (30%).
- People with MS who have symptoms of depression or anxiety should be referred to a clinical psychologist for assessment and management.

## References

1. Vita G, Fazio M, Milone S, *et al.* Cardiovascular autonomic dysfunction in multiple sclerosis is likely related to brainstem lesions. *J Neurol Sci* 1993; 120: 82–6.
2. Thayer JF, Sternberg E. Beyond Heart Rate Variability. *Vagal Regulation of Allostatic Systems*. *Ann NY Acad Sci* 2006; 1088(1): 361–72.



3. Petrilli S, Durufle A, Nicolas B *et al.* Influence of temperature changes on clinical symptoms in multiple sclerosis: an epidemiologic study. *Ann Readapt Med Phys* 2004; 47(5): 204–8.
4. Brenneis M, Harrer G, Selzer H. [On the temperature sensitivity of multiple sclerosis patients]. *Fortschritte der Neurologie, Psychiatrie und Ihrer Grenzgebiete* 1979; 47(6): 320–5.
5. Merkelbach S, Haensch C, Hemmer B, *et al.* Multiple sclerosis and the autonomic nervous system. *J Neurol* 2006; 253 (Suppl. 1): I21–5.
6. Smith RM, Adeney-Steel M, Fulcher G, *et al.* Symptom change with exercise is a temporary phenomenon for people with multiple sclerosis.[erratum appears in *Arch Phys Med Rehabil* 2006; 87(9): 1286]. *Arch Phys Med Rehabil* 2006; 87(5): 723–7.
7. Meyer-Heim A, Rothmaier M, Weder M, *et al.* Advanced lightweight cooling-garment technology: functional improvements in thermosensitive patients with multiple sclerosis. *Mult Scler* 2007; 13(2): 232–7.
8. Schwid SR, Petrie MD, Murray R, *et al.* A randomized controlled study of the acute and chronic effects of cooling therapy for MS. *Neurology* 2003; 60(12): 1955–60.
9. Feys P, Helsen W, Liu X, *et al.* Effects of peripheral cooling on intention tremor in multiple sclerosis. *J Neurol Neurosurg Psychiatry* 2005; 76(3): 373–9.
10. Saari A, Tolonen U, Paakko E, *et al.* Cardiovascular autonomic dysfunction correlates with brain MRI lesion load in MS. *Clin Neurophysiol* 2004; 115(6): 1473–8.
11. Mahovic D, Lakusic N. Progressive impairment of autonomic control of heart rate in patients with multiple sclerosis. *Arch Med Res* 2007; 38(3): 322–5.
12. Monge-Argiles JA, Palacios-Ortega F, Vila-Sobrino JA, *et al.* Heart rate variability in multiple sclerosis during a stable phase. *Acta Neurologica Scandinavica* 1998; 97(2): 86–92.
13. Haensch C-A, Jorg J. Autonomic dysfunction in multiple sclerosis. *J Neurol* 2006; 253 (Suppl. 1): I3–9.
14. Stanton BR, Barnes F, Silber E. Sleep and fatigue in multiple sclerosis. *Mult Scler* 2006; 12(4): 481–6.
15. Tachibana N, Howard RS, Hirsch NP, *et al.* Sleep problems in multiple sclerosis. *Eur Neurol* 1994; 34(6): 320–3.
16. Manconi M, Fabbrini M, Bonanni E, *et al.* High prevalence of restless legs syndrome in multiple sclerosis. *Eur J Neurol* 2007; 14(5): 534–9.
17. Gregory, AM, Eley, TC, O'Connor, TG, *et al.* Family influences on the association between sleep problems and anxiety in a large sample of pre-school aged twins. *Personal Individ Diff* 2005; 39(8): 1337–48.
18. Brunello, N, Armitage, R, Feinberg, I, *et al.* Depression and sleep disorders: Clinical relevance, economic burden and pharmacological treatment. *Neuropsychobiol* 2000; 42: 107–19).
19. Fleming WE, Pollak CP. Sleep disorders in multiple sclerosis. *Semin Neurol* 2005; 25(1): 64–8.
20. Araki I, Matsui M, Ozawa K, *et al.* Relationship between urinary symptoms and disease-related parameters in multiple sclerosis. *J Neurol* 2002; 249: 1010–5.
21. Araki I, Matsui M, Ozawa K, *et al.* Relationship of Bladder Dysfunction to Lesion Site in Multiple Sclerosis. *J Urol* 2003; 169(4): 1384–7.
22. DasGupta R, Fowler CJ. Bladder, bowel and sexual dysfunction in multiple sclerosis: management strategies. *Drugs* 2003; 63(2): 153–66.
23. Vahtera T, Haaranen M, Viramo-Koskela AL, *et al.* Pelvic floor rehabilitation is effective in patients with multiple sclerosis. *Clin Rehabil* 1997; 11(3): 211–19.
24. Chia YW, Fowler CJ, Kamm MA, *et al.* Prevalence of bowel dysfunction in patients with multiple sclerosis and bladder dysfunction. *J Neurol* 1995; 242: 105–8.
25. Gruenwald I, Vardi Y, Gartman I, *et al.* Sexual dysfunction in females with multiple sclerosis: quantitative sensory testing. *Mult Scler* 2007; 13(1): 95–105.
26. McCabe MP. Relationship functioning and sexuality among people with multiple sclerosis. *J Sex Res* 2002; 39(4): 302–9.
27. Rosenbaum TY. Pelvic floor involvement in male and female sexual dysfunction and the role of pelvic floor rehabilitation in treatment: a literature review. *J Sex Med* 2007; 4(1): 4–13.



28. Lapiere Y, Hum S. Treating fatigue. *Int MS J* 2007; 14: 64–71.
29. Multiple Sclerosis Council for Clinical Practice Guidelines. *Fatigue and Multiple Sclerosis: Evidence-Based Management Strategies for Fatigue in Multiple Sclerosis*. 1998.
30. The National MS Society. *Expert Opinion Paper: Management of MS-related Fatigue*. 2002.
31. Iriarte J, Subira ML, Castro P. Modalities of fatigue in multiple sclerosis: correlation with clinical and biological factors. *Mult Scler* 2000; 6(2): 124–30.
32. Penner IK, Bechtel N, Raselli C, *et al*. Fatigue in multiple sclerosis: relation to depression, physical impairment, personality and action control. *Mult Scler* 2007; 13(9): 1161–7.
33. Deloire MS, Bonnet MC, Salort E, *et al*. How to detect cognitive dysfunction at early stages of multiple sclerosis? *Mult Scler* 2006; 12(4): 445–52.
34. Freal JE, Kraft GH, Coryell JK. Symptomatic fatigue in multiple sclerosis. *Arch Phys Med Rehabil* 1984; 65(3): 135–8.
35. Fisk JD, Pontefract A, Ritvo PG, *et al*. The impact of fatigue on patients with multiple sclerosis. *Can J Neurol Sci* 1994; 21(1): 9–14.
36. Krupp LB, Christodoulou C. Fatigue in multiple sclerosis. *Curr Neurol Neurosci Rep* 2001; 1(3): 294–8.
37. MacAllister WS, Krupp LB. Multiple Sclerosis-Related Fatigue. *Phys Med Rehabil Clin N Am* 2005; 16(2): 483–502.
38. Krupp LB, LaRocca NG, Muir-Nash J, *et al*. The Fatigue Severity Scale: application to patients with multiple sclerosis and systemic lupus erythematosus. *Arch Neurol* 1989; 46(10): 1121–3.
39. Schwartz JE, Jandorf L, Krupp LB. The measurement of fatigue: a new instrument. *J Psychosom Res* 1993; 37(7): 753–62.
40. Fisk JD, Ritvo PG, Ross L, *et al*. Measuring the functional impact of fatigue: initial validation of the fatigue impact scale. *Clin Infect Dis* 1994; 18 (Suppl. 1): S79–83.
41. Schwid SR, Covington M, Segal BM, *et al*. Fatigue in multiple sclerosis: current understanding and future directions. *J Rehabil Res Dev* 2002; 39(2): 211–24.
42. Lobentanz IS, Asenbaum S, Vass K, *et al*. Factors influencing quality of life in multiple sclerosis patients: disability, depressive mood, fatigue and sleep quality.[see comment]. *Acta Neurologica Scandinavica* 2004; 110(1): 6–13.
43. Mathiowetz V, Matuska KM, Murphy ME. Efficacy of an energy conservation course for persons with multiple sclerosis. *Arch Phys Med Rehabil*. 2001; 82(4): 449–56.
44. Matuska K, Mathiowetz V, Finlayson M. Use and perceived effectiveness of energy conservation strategies for managing multiple sclerosis fatigue. *Am J Occup Ther* 2007; 61(1): 62–9.
45. Stuifbergen K, Blozis A, Harrison C, *et al*. Exercise, functional limitations, and quality of life: A longitudinal study of persons with multiple sclerosis. *Arch Phys Med Rehabil*. 2006; 87(7): 935–43.
46. Di Fabio RP, Soderberg J, Choi T, *et al*. Extended outpatient rehabilitation: its influence on symptom frequency, fatigue, and functional status for persons with progressive multiple sclerosis. *Arch Phys Med Rehabil* 1998; 79(2): 141–6.
47. Williams K, Hoang P. The benefits of exercising in groups versus at home independently for pwms. *International Multiple Sclerosis Conference*. 2006; Sydney
48. Evans WJ, Lambert CP. Physiological basis of fatigue. *Am J Phys Med Rehabil* 2007; 86(1 Suppl.): S29–46.
49. Protas EJ, Raines ML, Tissier S. Comparison of spatiotemporal and energy cost of the use of 3 different walkers and unassisted walking in older adults. *Arch Phys Med Rehabil* 2007; 88(6): 768–73.
50. Hachisuka K, Makino K, Wada F, *et al*. Oxygen consumption, oxygen cost and physiological cost index in polio survivors: a comparison of walking without orthosis, with an ordinary or a carbon-fibre reinforced plastic knee-ankle-foot orthosis. *J Rehab Med* 2007; 39(8): 646–50.
51. Thijssen DH, Paulus R, van Uden CJ, *et al*. Decreased energy cost and improved gait pattern using a new orthosis in persons with long-term stroke. *Arch Phys Med Rehabil* 2007; 88(2): 181–6.



52. Medical Advisory Board of the National Multiple Sclerosis Society. Expert Opinion Paper: Assessment and Management of Cognitive Impairment in Multiple Sclerosis. New York: National Multiple Sclerosis Society; 2006.
53. Kalb R. Multiple Sclerosis: a guide for families. Demos Vermande. 1998: 24.
54. Longley WA. Multiple sclerosis-related dementia: relatively rare and often misunderstood. *Brain Imp* 2007; 8(2): 154–67.
55. Julian L, Merluzzi NM, Mohr DC. The relationship among depression, subjective cognitive impairment, and neuropsychological performance in multiple sclerosis. *Mult Scler* 2007; 13(1): 81–6.
56. Benedict RH, Munschauer F, Linn R, *et al*. Screening for multiple sclerosis cognitive impairment using a self-administered 15-item questionnaire. *Mult Scler* 2003; 9(1): 95–101.
57. Thomas PW, Thomas S, Hillier C, *et al*. Psychological interventions for multiple sclerosis. *Cochrane Database Syst Rev* 2006(1): CD004431.
58. Lannin NA, Longley WA. The evidence for the effectiveness of interventions to assist people with cognitive impairments with MS was found to be inconclusive: Critically Appraised Paper. *Aust Occ Ther J* 2006; 53: 341–4.
59. Lincoln NB, Dent A, Harding J, *et al*. Evaluation of cognitive assessment and cognitive intervention for people with multiple sclerosis. *J Neurol Neurosurg Psychiat* 2002; 72(1): 93–8.
60. Lincoln NB, Dent A, Harding J. Treatment of cognitive problems for people with multiple sclerosis. *Int J Ther Rehab* 2003; 10: 412–6.
61. Amato MP, Zipoli V. Clinical management of cognitive impairment in multiple sclerosis: a review of current evidence. *Int MS J (MS Forum)* 2003; 10(3): 72–83.
62. Amato MP, Portaccio E, Zipoli V. Are there protective treatments for cognitive decline in MS? *J Neurol Sci* 2006; 245: 183–6.
63. Krupp LB, Christodoulou C, Melville P, *et al*. Donepezil improved memory in multiple sclerosis in a randomized clinical trial. *Neurol* 2004; 63(9): 1579–85.
64. Heesen C, Kasper J, Segal J, *et al*. Decisional role preferences, risk knowledge and information interests in patients with multiple sclerosis. *Mult Scler* 2004; 10: 1–8.
65. Wilson BA, Baddeley A, Evans J, *et al*. Errorless learning in the rehabilitation of memory impaired people. *Neuropsychol Rehabil* 1994; 4(3): 307–26.
66. Camp CJ, Foss JW, O'Hanlon AM, *et al*. Memory interventions for persons with dementia. *Appl Cog Psychol* 1996; 10: 193–210.
67. Chiaravalloti ND, DeLuca J, Moore NB, *et al*. Treating learning impairments improves memory performance in multiple sclerosis: a randomized clinical trial. *Mult Scler* 2005; 11(1): 58–68.
68. Feinstein A. Multiple sclerosis, disease modifying treatments and depression: A critical review. *Mult Scler* 2000; 6: 343–8.
69. Sadovnick ADP, Remick RAM, Allen JM, *et al*. Depression and multiple sclerosis. *Neurol* 1996; 46(3): 628–32.
70. Sollom AC, Kneebone II. Treatment of depression in people who have multiple sclerosis. *Mult Scler* 2007; 13(5): 632.
71. Patten SB, Beck CA, Williams JV, *et al*. Major depression in multiple sclerosis: A population-based perspective. *Neurol* 2003; 61: 1524–7.
72. Schubert DSP, Foliart RH. Increased depression in multiple sclerosis: a meta-analysis. *Psychosomat* 1993; 34: 124–30.
73. Khan F, McPhail T, Brand C, *et al*. Multiple sclerosis: disability profile and quality of life in an Australian community cohort. *Int J Rehabil Res* 2006; 29(2): 87–96.
74. Mohr D, Dick LP, Russo D, *et al*. The psychosocial impact of multiple sclerosis: exploring the patient's perspective. *Health Psychol* 1999; 18(4): 376–82.



75. Mullins LL, Cote MP, Fuemmeler BF, *et al.* Illness intrusiveness, uncertainty and distress in individuals with multiple sclerosis. *Rehab Psychol* 2001; 46(2): 139–53.
76. The Goldman Consensus statement on depression in multiple sclerosis. *Mult Scler* 2005; 11(3): 328–37.
77. Beal CC, Stuijbergen AK, Brown A. Depression in multiple sclerosis: a longitudinal analysis. *Arch Psych Nurs* 2007; 21(4): 181–91.
78. Tsvigoulis G, Triantafyllou N, Papageorgiou C, *et al.* Associations of the Expanded Disability Status Scale with anxiety and depression in multiple sclerosis outpatients. *Acta Neurol Scand* 2007; 115(1): 67–72.
79. Mohr DC, Goodkin DE, Likosky W, *et al.* Therapeutic expectations of patients with multiple sclerosis upon initiating interferon beta-1b: relationship to adherence to treatment. *Mult Scler* 1996; 2(5): 222–6.
80. Mohr D, Classen C, Barrera MJ. The relationship between social support, depression and treatment for depression in people with multiple sclerosis. *Psychol Med* 2004; 34(3): 533–41.
81. Siegert RJ, Abernethy DA. Depression in multiple sclerosis: a review. *J Neurol Neurosurg Psychiatry* 2005; 76(4): 469–75.
82. Chalfant AM, Bryant RA, Fulcher G. Posttraumatic stress disorder following diagnosis of multiple sclerosis. *J trauma stress* 2004; 17(5): 423–8.
83. Feinstein A. An examination of suicidal intent in patients with multiple sclerosis. *Neurol* 2002; 59(5): 674–8.
84. Mohr D, Goodkin DE. Treatment of Depression in Multiple Sclerosis: Review and Meta-analysis. *Clinical Psychology: Sci Prac* 1999; 6(1): 1–9.
85. Amato MP, Ponziani G, Rossi F, *et al.* Quality of life in multiple sclerosis: the impact of depression, fatigue and disability. *Mult Scler* 2001; 7: 340–4.
86. D'Alisa S, Miscio G, Baudo S, *et al.* Depression is the main determinant of quality of life in multiple sclerosis: a classification-regression (CART) study. *Disabil Rehabil* 2006; 28(5): 307–14.
87. Janardhan V, Bakshi R. Quality of life in patients with multiple sclerosis: the impact of fatigue and depression. *J Neurol Sci* 2002; 205: 51–8.
88. O'Connor P, Lee L, Ng PT, *et al.* Determinants of overall quality of life in secondary progressive MS: a longitudinal study. *Neurol* 2001; 57: 889–91.
89. Mohr DC, Goodkin DE, Islar J, *et al.* Treatment of depression is associated with suppression of nonspecific and antigen-specific T(H)1 responses in multiple sclerosis. *Arch Neurol* 2001; 58(7): 1081–6.
90. Vahter L, Kreegipuu M, Talvik T, *et al.* One question as a screening instrument for depression in people with multiple sclerosis. *Clin Rehab* 2007; 21(5): 460–4.
91. Mohr DC, Hart S, Vella L. Reduction in disability in a randomized controlled trial of telephone-administered cognitive-behavioral therapy. *Health Psychol* 2007; 26(5): 554–63.
92. Mohr DC, Goodkin DE, Gatto N, *et al.* Depression, coping and level of neurological impairment in multiple sclerosis. *Mult Scler* 1997; 3(4): 254–8.
93. Walker ID, Gonzalez EW. Review of intervention studies on depression in persons with multiple sclerosis. *Issues in Mental Health Nursing* 2007; 28(5): 511–31.
94. Galeazzi G, Ferrari S, Giaroli G, *et al.* Psychiatric disorders and depression in multiple sclerosis outpatients: impact of disability and interferon beta therapy. *Neurol Sci* 2005; 26: 255–62.
95. Korostil M, Feinstein A. Anxiety disorders and their clinical correlates in multiple sclerosis patients. *Mult Scler* 2007; 13(1): 67–72.
96. Janssens ACJW, van Doorn PA, de Boer JB, *et al.* Perception of prognostic risk in patients with multiple sclerosis: the relationship with anxiety, depression, and disease-related distress. *J Clin Epidemiol* 2004; 57(2): 180–6.
97. Brown RF, Tennant CC, Sharrock M, *et al.* Relationship between stress and relapse in multiple sclerosis: Part I. Important features. *Mult Scler* 2006; 12(4): 453–64.
98. Brown RF, Tennant CC, Sharrock M, *et al.* Relationship between stress and relapse in multiple sclerosis: Part II. Direct and indirect relationships. *Mult Scler* 2006; 12(4): 465–75.



99. Mohr DC, Hart SL, Julian L, et al. Association between stressful life events and exacerbation in multiple sclerosis: a meta-analysis. *BMJ* 2004; 328(7442): 731.
100. Mohr DC. Stress and multiple sclerosis. *J Neurol* 2007; 254 (Suppl. 2): II65–8.
101. Chalk HM. Mind over matter: cognitive-behavioral determinants of emotional distress in multiple sclerosis patients. *Psychol Health Med* 2007; 12(5): 556–66.

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MS Practice is an initiative of MS Australia (MSA). MS Practice is an online resource designed to support allied health professionals in the symptom management of people with multiple sclerosis (MS). The series addresses the various symptoms associated with MS, providing health professionals with evidence-based information and clinical practice recommendations to enhance the quality of care and outcomes for people with MS. The MS Practice topics were identified by the MSA Physiotherapy Network.

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### **Credits**

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