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Preventing suicidal behaviour in patients with multiple sclerosis: a scoping review
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Abstract

Introduction: Suicidal behavior is a relatively rare occurrence among patients with multiple sclerosis (MS). Nonetheless, it is important to identify and be aware of the constituting risk factors to prevent suicidal behavior among vulnerable patients.

Areas covered: This scoped review will shortly outline well-known biological and psycho-social risk factors for suicidal behavior among MS patients and suggest preventive initiatives. The preventive strategies should include a close monitoring of MS pharmacotherapy to prevent progression, and awareness and early identification of psycho-social risk factors across a variety of health care and social instances the patient may encounter during their life with the disease. The staff in these instances should be educated in detecting the MS patients at increased risk and refer them to relevant healthcare instances, including the general practitioner, neurologists, psychiatrist etc.. In addition, referral to social instances to support educational, vocational and home environment to the state of the disease is of utmost importance.

Expert Commentary: Enhancing quality of life for as long as possible by these means may be held to reduce the risk for psycho-social problems and hence suicidal behavior.

Keywords: multiple sclerosis, suicidal behavior, suicide, suicide attempts, risk factors, prevention
1. The risk of suicidal behavior among patients with multiple sclerosis

Multiple sclerosis (MS), is a chronic disease of the central nervous system (CNS) characterized by loss of motor, cognitive, affective and sensory function, that results from immune-mediated inflammation, demyelination and subsequent axonal damage (1). The prevalence of the disease varies in different countries, ranging from 15/100,000, to 250/100,000 (2, 3), and it has been estimated that MS affects approximately 2.3 million patients worldwide (4). MS patients have an increased risk of premature death compared to the general population but with declining mortality over the last six decades, with a loss of less than 10 years in lifetime compared to the general population and living with the disorder frequently for more than 35 years (5, 6). Apart from MS given as the primary cause on death certificates, the most common causes of death include diseases such as cardiovascular diseases, respiratory diseases, infection and also suicide (5, 7-9). Suicidal behavior is nonetheless a relatively rare cause of death (5, 9), and the risk for suicide attempts is not well investigated. A recent paper reported that MS patients did not show an increased risk for suicide attempts (10). Regardless of the probable rare occurrence of suicide attempts and completed suicide it is imperative to identify risk factors for suicide ideation and behavior among those MS patients constituting a high risk group and little is known about risk factors among MS populations. Further, even less is known about how to prevent suicidal behavior among MS patients already identified as vulnerable and at risk. The aim of this scoping review is therefore to outline well-known biological and psycho-social risk factors for suicidal behavior and suggest preventive initiatives based on the Volitional Model (IMVM) of suicidal behaviour framework.

2. The Integrated Motivational–Volitional Model (IMVM) of suicidal behavior

The Integrated Motivational–Volitional Model (IMVM) of suicidal behavior is a theory that builds on several prior theoretical frameworks (11-13) and has been empirically validated among non-MS populations at risk of suicidal behavior (14). According to the IMVM suicidal behavior results from a complex interplay of risk factors and can be divided into three-phases, including a pre-motivational phase, a motivational phase, and a volitional phase. In the pre-motivational phase vulnerability background risk factors, such as personality and individual difference variables, combined with triggering events are present and initiate the suicide ideation. Triggering events might be a result of environmental factors or negative life events, but also a consequence of mood disorders. Vulnerability factors become particularly pernicious when activated by external stressors, such as a chronic disease, and together with environmental influences (e.g. lack of relevant treatment and support to accommodate to disease etc.) and other negative life events (e.g. mood disorders, divorce, unemployment etc.). These diatheses set the bio-psycho-social context in which suicidal ideation and behavior may develop. The motivational phase describes those factors associated with the development of suicidal ideation and the intention to engage in suicidal behavior. Suicidal ideation may be predicated on feelings of entrapment that experience of burdensomeness, humiliation and defeat has triggered. Again personality and individual factors, such as negative cognitive and affective states, inadequate coping strategies and social support may moderate the process through suicide behavior. In the process from suicide ideation to suicide behavior the individual is ending up in the volitional phase. This third phase includes any risk factors that increase the likelihood to act on the suicide ideation, such as access to means of suicide, capability to attempt suicide and impulsivity (14).

Thus, constellations of a variety of different risk factors including personality and individual differences, cognitive factors, social aspects, negative life events and environmental aspects, and
progressing though the three phases, may ultimately lead to suicide attempts or completed suicide. Further if a patient has already been through all phases hence have attempted suicide, this is obviously a risk factor in itself for further attempts.

3. **Risk factors of suicidal behavior among patients with multiple sclerosis**

Although suicidal behavior is relatively uncommon among MS patients it is important to be familiar with risk factors to effectuate prevention in these cases.

Figure 1 outlines some of the most important risk factors within an IMVM framework of suicidal behavior among MS patients. First and foremost having a chronic disease and its progression increases the risk of suicide ideation, attempts and behavior (7, 15-17). In addition, it is well known that mood disorders are among the most important risk factors for suicidal behavior among non-MS populations (18), and the presence may both be influenced and influence various risk factors delineated in the IMVM. Patients with MS are at increased risk of developing mood disorders, i.e. depressive disorders, anxiety disorders and adjustment disorders (19-21), and it has been estimated that the lifetime prevalence of depression in MS is up to 50% (20, 22, 23). There is however limited understanding regarding the underlying mechanisms responsible for the increased risk of mood disorders, but may be multifaceted and complex and has been elucidated from a number of biological disease-related perspectives as well as psycho-social adjustment perspectives. The disease perspective stresses cerebral inflammation or axonal damage in CNS responsible for normal functioning of brain structures processing and regulating emotional and affective states. Applying structural and also more recently functional imaging techniques of the brain some progress has been performed in the understanding. In structural as well as resting state functional imaging studies among depressed MS patient’s cerebral atrophy and lesions have been located in a variety of areas crucial for emotional processing involving the temporal, parietal, frontal lobes as well as the cingulate gyrus, hippocampus and cerebellum (24-32). Thus, brain structures crucial for normal emotional and affective function may be damaged; likewise structures involved in motor, cognitive, and sensory function, leading mood disorders. Few functional imaging studies have been conducted exposing MS patients for emotionally and affective loaded stimuli and only among MS patients that have not been screened or diagnosed with depression or other psychiatric disorder. The studies suggest a pattern of abnormal activity and connectivity between the ventromedial parts of the frontal lobe and limbic subcortical temporal structures such as the amygdala when MS patients are processing emotional and affective stimuli (29, 33). Hence, in addition to vulnerability related to the personality and individuals differences pointed out by the IMVM and also affecting the biological underpinnings the disease process itself may also induce biological changes in neural correlates for emotional and affective processing leading to altered mood.

The adjustment perspective stresses psycho-social factors and it has been found that negative cognitive and affective states, such as uncertainty about the future, hopelessness, and helplessness; inadequate coping strategies; loss of recreational opportunities; poor life quality and relationships; lack of autonomy and high levels of stress due to the decline of motor, cognitive, affective and sensory function are all implicated in mood disorders among MS patients (34-39). The use of inadequate coping strategies has received the most attention, and the evidence suggests that emotion-focused and escape-avoidant coping is associated with negative psycho-social outcomes, whereas active problem-focused strategies are related to better adjustment and decreased risk for mood disorder (34, 35, 40-43). In addition, a decline in the quality of social networks and reduced or totally abandons contact with family and friends as well as lifestyle activities is common and may reduce quality of life and affect the mood negatively (40, 44, 45). Further patients with MS often experience unemployment and a consequently decline in financial and social status (46-49). Finally, it is important to mention that substance use disorders (SUDs) often co-occur with mood disorders (50, 51), and is a risk factor for suicidal behavior. SUDs may worsen or cause psychiatric symptoms and promote psycho-social risk factors. It has been reported that MS patients are likely to report excessive drinking and also a scarce minority abuse of other substances (39, 52, 53).
Whether the other outlined biological and psycho-social risk factors mainly may facilitate the pre-motivational stage and the motivational stage according to the IMVM, SUDs may play a role through all the stages and in particular the final stage where impulsivity may increase the likelihood to act on the suicide ideation (54). This may also apply to comorbidity with other psychiatric disorders implicating low impulse-control as impulsivity in combination with the capability to enaction and access to lethal means lead to attempts and completed suicide likewise in non-MS populations (14).

Thus, probably due to disease-related biological changes the persons with MS have to work that much harder to maintain normal CNS processing, and less functional reserve remains to adjust to a chronic disease. In combination with psycho-social risk factors such as maladaptive coping, lack of social support and decline in social status, the patient’s may end up feeling entrapped and develop mood disorders or symptoms and consequently be prone to suicidal behaviour.

It is important to highlight that the high estimates of mood disorders, namely depression, may be due to the fact that many studies do not distinguish between depressive symptoms and a clinical depression, when giving estimates of the prevalence as many studies are based on screening tests and not diagnostic assessment (55). Furthermore, depression can be chronic but frequently is temporary, and it should be kept in mind that a life with MS usually is in decades, so this risk factor may only be one of several consequences of a disorder giving rise to progressive disability influencing autonomy, family and social life as well as education and economy (49, 56, 57). Further, MS patients may not necessarily be more prone to mood disorders than other clinical populations with chronic diseases. A meta-analysis including 41 original depression studies revealed that a majority of patients with MS did have more depressive symptoms than healthy controls. However interesting, the results of the same meta-analysis were more heterogeneous with higher, lower and equivalent levels of depressive symptoms when the prevalence rates of other chronic diseases were compared with those of MS, indicating that the emotional and affective symptoms were not specific to this form of demyelinating disease (58). Also, depressive symptoms are frequent in other neurological diseases including epilepsy, migraine, Alzheimer’s disease, Parkinson’s disease, essential tremor, and stroke (59). In a recent systematic review and meta-analysis of psychiatric comorbidity, excluding depression, the most common and only significant comorbidity was adjustment disorders. The findings could suggest that the changes in behavior may be closely related to psycho-social maladjustment (21). It is no surprise that MS patients may exhibit depressive symptoms and adjustment disorders, due to the stress associated with a chronic disease, like other patients with chronic and neurological diseases (15-17). Further, it is also plausible that some patients not exhibiting mood disorder-related symptoms or disorders are at risk of suicidal behavior due to the progress and still more challenges related to adjusting to the chronic disease, pervading all psycho-social aspects. A recent study found after controlling for depressive symptoms those MS patients experiencing problems with automatic and controlled CNS motor functions, such as swallowing and speaking as well as bladder and bowel symptoms, indicative of a progressed disease, were more likely to have suicidal ideation compared to patients without these symptoms (60). Hence in line with the IMVM extreme external stressor as an MS diagnosis and its progression may trigger suicide ideation, perhaps even without a vulnerable disposition, and may in combination with environmental factors and further negative life events, as those listed in Figure 1, lead to feelings of entrapment, and finally suicidal behavior. Thus without any apparent psychiatric symptoms the patient may make the decision that the quality of life is too low and life is too complicated and doesn’t have more to offer. So in addition to identifying risk factors related to mood disorders and symptoms, obstacles related to MS diagnosis/symptoms as well as alleviating feelings of entrapment, burdensomeness and humiliation are crucial.

In sum, risk factors are likewise non-MS populations complex and even more among MS patients due to the facts that biological disease related progresses may influence both mental and somatic health. Independently of whether suicidal ideation evolves from mood disorders/symptoms or not they may lead
to suicidal behavior and involve several risk factors across the three phases as outlined in Figure 1. Due to the fact that the research in this area is relatively sparse various other bio-psycho-social risk factors may be unraveled by future research.

4. Prevention

Currently we lack guidelines to prevent suicidal behavior among vulnerable MS patients, but it is plausible that suicide prevention should not be much different from preventing suicide among other populations experiencing similar life circumstances as patients with other chronic somatic diseases. However, to date no consensus has been reached regarding identification, prevention and effective treatments for these sufferers partly due to limited understanding regarding the underlying mechanisms responsible for the affected mood and mood disorders that are comorbid with this disease (61). Although, the disease activity may, independently of psycho-social factors, cause damage to structures and functions crucial for normal emotional and affective processing, it is not unlikely that maladjustment to an unpredictable and chronic disease may play a crucial important role in the development of suicidal behavior. Further, it has been documented that stress and maladjustment influence the disease activity and course of the disease negatively inducing more lesions (62, 63). So in addition to the usual pharmacological treatment of MS focusing on the biological manifestations of the disease, it may be wise to focus on the identification and treatment of mood disorders and other signs of maladjustment to prevent suicidal behavior among MS patients.

With reference to the IMVM of suicidal behavior, it is clear that prevention of a relatively rare phenomenon with a long survival span need to be broad and involve several instances the MS patient may encounter, including a variety of health care and social care professionals. Generally, the number and quality of studies on suicide assessment and preventions is limited (64, 65), and more so among MS patients. Nonetheless, there is some consensus that the challenge needs to be addressed at different treatment settings encountering the patient and from a number of angles in both MS and non-MS populations, including identification, pharmacological, psycho-social treatment and follow-up care (61, 64-66).

4.1. Treatment setting

Differences between countries and over time exist in who are responsible for the care of MS patients, but will involve the general practitioner (GP) in primary care and neurologists in the specialized out- and inpatient clinics in secondary care and the care will often be interdisciplinary. Due to the chronic and progressive nature of the disease the social services are also often involved to accommodate the patients’ educational, vocational and home environment to the state of the disease. This is important to realize when suggesting prevention for suicidal behavior, which is a rare occurrence for a very long life with a chronic disease, perhaps with a minimum of contact with health care professionals. So we have to look for preventive measures in primary and secondary care as well as societal measures through the municipalities.

4.2. Health care professionals

In the last three decades treatment options for both reducing the progression of MS and also symptomatic treatment of somatic symptoms, such as bladder and bowel symptoms, pain, etc. has progressed positively. Obviously, it is of major importance that patients always have access to the best treatment – also to prevent suicidal ideation and behavior. Ideally, the patients are controlled by the same GP as well as MS team or MS treatment responsible and have easy access to the team or health care responsible whenever needed. Furthermore, the health care professionals should be educated in identifying risk factors and how to react when they become aware of suicidal behavior.

4.3. Identification of patients at risk for suicidal behavior
Independently of the concerned healthcare professional having the contact and responsibility, an important issue is availability of tools for health care professionals to identify the patients with an increased suicide risk. Several standardized risk assessment instruments are available, such as Becks scale for suicide ideation and intent, Becks hopelessness scale, Beck depression inventory (67-72), SAD PERSONS scale (73), the Columbia-suicide severity rating scale (C-SSRS) (74), the suicide trigger scale (STS: (75, 76), the suicide probability scale (SPS: (77), the self-injurious thoughts and behaviors interview (SITBI (78)) etc.. However, studies are lacking in regards to the predictive validity of many instruments in non-MS populations and the identification of suicide ideation and behavior is based on self-reporting (64, 65). Further, due to the interdisciplinary contact with MS patients and the rare occurrence of suicidal behavior it may not be relevant to initiate screening and diagnostic assessment programs for all patients but restrict it to vulnerable patients. The best way to routinely assess suicidal ideation and behavior is simply be courageous and to talk with the patient about the topic and show interest, with a focus on relevant risk factors in patients with MS. This presupposes education of health care professionals in identifying suicidal ideation and behavior and knowledge how to act competent when meeting such behavior, which may also be applicable to patients with other neurological disorders.

4.4. Referral to relevant instances

Depending on the background of the identifier and the identified risk factors associated with the distress and which of the three phases the patient is in, relevant instances can be contacted such as GP, neurologist, psychiatrist, psychologist, physiotherapist and a wide range of social services dependent on the countries legislation and regulation, including the home care service, educational and vocational services etc..

In case of minor psychiatric symptoms or disorders, i.e. minor and moderate mood disorder or anxiety disorders, the GP will normally be the first person to make assessment and recommend treatment. It may often be more helpful to effectuate initiatives to overcome obstacles related to impaired function rather than psychiatric symptoms and contact to the local social services can be relevant. In the case of suspected severe psychopathology the patient should be referred to a psychiatric specialist assessment, and relevant treatment should be initiated eventually also by involving the care for the patients psychosocial problems. The psychiatric treatment will depend on the identified disorder, but will often be a mood disorder as more severe psychiatric disorders are uncommon (21). The sooner the patients with psychiatric disorders or at risk of developing disorders are detected the better the prognosis of treatment.

In general patient with a diagnosed mood disorder and a suicidal risk are best treated combining pharmacological and psychosocial treatment, and this approach may also apply to patients with chronic diseases. Reviews of the literature suggest that pharmacological treatment usually used to treat mood disorders may relieve some of the symptoms contributing to suicide risk. The first line of treatment for depression and anxiety consist of selective serotonin reuptake inhibitors (SSRIs) followed by serotonin-norepinephrine reuptake inhibitors (SNRIs), and finally tricyclic antidepressants (TCAs) and monoamine oxidase inhibitors (MAOs) may be considered. Also other treatment has shown anti-suicidal properties including lithium, mood stabilizers and second generation antipsychotics (64, 79). The limited literature among MS patients indicates that SSRIs are well-tolerated, but that SNRIs generally have failed to treat depression due to their side effects profile and frequent interaction with other drugs. Further, TCAs and MAOs have also been reported to have pronounced side-effects in MS populations, although, there has only been conducted two studies with small sample sizes (80-82). The use of TCAs and MAOs are not recommended to suicidal patients due to the general toxicity of these drugs. Thus among the MS patients with a diagnosed mood disorder SSRIs may be the optimal choice. The complexity of such considerations can be reduced with a close collaboration between MS neurologist and psychiatrist evaluating which treatment has priority at the moment – mood disorder and/or MS pathology/symptoms.

Evidence indicates that several psychosocial treatment approaches may help prevent suicidal behavior in non-MS patients (64, 83). Among MS patients, neuropsychological treatment approaches
attempting to ameliorate specific cognitive dysfunctions have found some improvement in attention, working memory and element of short and long-term memory (84). Cognitive dysfunctions are closely related to emotional and affective dysfunction and the majority of psychiatric diseases are related to a decline in these functions. However, there is currently no evident effect of neuropsychological rehabilitation on emotional functions (84). Classical clinical psychological approaches such as cognitive behavioral therapy (CBT) targeting maladaptive coping strategies and adjustment, and also derives of CBT such as mindfulness-based therapy (MBT) targeting to diminish psychological distress and prevent relapse in depressive and other psychiatric symptoms have shown promise in diminishing emotional distress (80, 85, 86), and hereby the risk of suicidal behavior. There may be other psychosocial approaches suitable for MS patients derived from MBT, including acceptance and commitment therapy (87-89) that, however, together with CBT and MBT need to be investigated further. These methods may also help patients without a psychiatric diagnosis to adjust to MS. However, as mentioned above, it may often be more helpful to effectuate initiatives to overcome obstacles related to impaired function and adjust to new life circumstances rather than a psychotherapeutic intervention.

In addition to psychological treatments, interventions building up the quality of social networks and restoration of abandoned contacts may be crucial in treatment of MS patients. Although it has been widely recognized that social factors are important in the development of depressive symptoms and other psychopathology, treatment targeting these challenges have been neglected in the treatment of psychiatric and distress symptoms. However, it may be of crucial importance to intervene against social risk factors. Social support can attenuate responses to stress or threatening situations and increase perceived safety, moderate the impact of negative life events and have a positive effect on quality of life and perceived health status (90-92). Intervention such as family therapy, community reinforcement therapy, self-help groups etc., may be effective in building up new networks and restoring healthy relationships with family (93-96). Nonetheless, social interventions addressing the relational and social issues of this particular group are still lacking and calls for investigation to preventing suicide ideation and behavior among MS patients.

Providing professional social support in addition to the support provided in the out- and inpatient clinics may be relevant. Follow-up care for suicidal people includes a variety of approaches such as telephone calls, repeat assessments, case management, and caring letters or postcards and have shown some promise (83). These approaches may also apply to MS patients with and without psychiatric comorbidity in addition to interventions supporting autonomy and the function level.

The probably most important interventions for MS patients may be to get the needed support to maintain a as high function level as possible able to have a certain quality of life. Thus in addition to the support and treatment patients with MS receive from healthcare professionals, initiatives from social instances to support educational, vocational and home environment to the state of the disease is of utmost importance. Enhancing quality of life for as long as possible by these means may be held to give patients life quality and reduce the risk for psycho-social problems and hence suicidal risk.

Finally it is important to emphasize that the interventions should be adapted to the phase the patient is currently facing. Whereas the abovementioned initiatives may mostly apply to phase 1 and 2, phase 3 obviously requires immediate action from emergency and inpatient health care services.

5. Conclusion

Suicidal behavior is a rare occurrence among MS patients. Nonetheless, healthcare staff should be aware about risk factors, including disease-related biological changes that impact normal CNS functioning and adjustment-related psycho-social factors. Dependent on the risk factors, referral to relevant healthcare and social instances are recommended. Healthcare professionals should delay the progression of the disease and be aware of risk factors for suicidal behavior, and referral to relevant specialized instances may be relevant. Prevention of suicidal behavior is a collaborative progress and should not only be restricted MS clinics but implicate all, who are involved in the care of MS patients.
6. Expert commentary
Several papers have in the last three decades demonstrated that patients with MS have a somehow increased risk of committing suicide compared to a control population. A number of bio-psycho-social risk factors are known, but a strategy to prevent suicidal behaviour in MS patients is still missing. A goal in MS care and treatment may then be to develop strategies to prevent suicide attempts and completed suicide among patients constituting a high risk group.

To achieve this goal further it is important to consider that MS patients at risk of committing suicide is a heterogeneous group: some may have disease-induced mood disorders, others a psycho-social induced mood disorders, while again others may not have any psychiatric symptoms or diagnoses. Thus it is of utmost importance to identify the underlying risk factors in order to effectuate relevant prevention and treatment initiatives. Studies are needed examining whether mood disorders and increased suicidality is more pronounced in MS or whether this also include other neurological or somatic disorders. Further, is there any difference in the risk of suicide comparing disorders with highly effective treatments to neurological and psychiatric disorders with sparse or no treatment? How does and what treatment (neurological vs. psychiatric vs. social initiatives) seems to work in clinical populations with highly effective treatments? Can lessons be learned from disorders where a reduction in suicide rate has succeeded? Can age-cohort-period analyses over several decades demonstrate change in risk of suicide in MS? Can possible changes over the decades be related to change in treatment options and care? Can such a possible difference be explained by the organization of patient care? Such studies can be conducted in countries with many registries and in the increasing number of new MS patient registries worldwide.

In addition, pharmacological, psychological and social intervention studies targeting mood disorders are needed to evaluate how much this factor can reduce the risk of suicide both in MS cohorts but also in society generally. MS patients at risk of committing suicide is a heterogeneous group and risk factors for committing suicide are abundant. Hence, potentially an extensive assessment of potential risk factors and a variety of interventions targeting sub-types of vulnerable patients have to be evaluated before we can expect to be able to measure a reduction in mortality due to suicide. This is very complex and when evaluating interventions, it is important to remember that suicide in patients with MS is a rare occurrence in a disorder, which patients have to live with for decades.

Until we have more knowledge about effective sub-types of MS patients at risk of suicide and preventive strategies a very important and somehow more tangible issue is how well trained the MS staff are in identifying the risk factors for suicide and their options to help their patients or refer them to competent professionals. The best way to prevent suicide at current may be referral to professional updated in the preliminary knowledge-base as well as knowledge from suicide prevention targeting other clinical populations. Further, in order to reduce suicide rate in MS other initiatives are needed than those involving health care and social staff, including the family, social services and MS societies. MS Societies would be an obvious leading part in the work needed to improve MS patient’s quality of life and thus reducing the risk of suicide.

7. Five-year view: A recent rising interest in the risk of maladjustment in MS and understanding the importance of bio-psycho-social interactions give the foundation for better MS care. As a consequence MS clinics should have implemented a strategy to prevent suicidal behaviour as part of their plan for MS care.

Key issues
- The risk of suicidal behavior among MS patients is low relative to other causes of death, but still calls for identification of risk factors and prevention.
- Risk factors for suicidal behavior include prior suicide attempts, vulnerable disposition, diagnosis and progression of MS, mood disorders, substance use disorders, affective and cognitive states, inadequate coping-strategies, isolation and lack of social support, loss of recreational opportunities, decline in financial
and social status, lack of autonomy, poor quality of life, capability to enaction, intentions and planning, impulsivity, access to lethal means etc.

- Due to the interdisciplinary contact with MS patients and the rare occurrence of suicide behavior it may not be clinically relevant to initiate screening programs and, the best way to assess suicidal ideation and behavior may simply be to talk with the patient about the topic and show interest, with a focus on the documented risk factors in patients with MS.
- The staff in healthcare and social instances should be educated in detecting the MS patients at increased risk and dependent of the source of distress and identifier, refer patients to relevant, including the general practitioner at primary care and neurologists, psychiatrist etc. in secondary care as well as to the social services.
- Prevention of suicidal behavior is a collaborative process and should not only be restricted MS clinics but involved all, who are involved in the care of MS patients.

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   Up-dated nationwide study of survival with new statistical methodology
   Meta-analysis of standardised mortality ratios.
   Recent mortality study
   First nationwide study of suicide in multiple sclerosis.
   Study on suicide attempts in patients on immuno-modullary treatment.
   Description of the model.
   Systematic review and metalysis of important symptoms and impairments.


91. How to provide social support.
93. Effect of social support.
95. Perception of social support.

Figure 1- Risk factors within the Integrated Motivational–Volitional Model of suicidal behavior among patients with multiple sclerosis
Figure 1. Risk factors within the Integrated Motivational–Volitional Model of suicidal behavior among patients with multiple sclerosis

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<td>Substance use disorders</td>
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\(^1\) E.g. defeat and humiliation, entrapment, future thoughts, hopelessness, helplessness etc.