

### How to Avoid or Control Neurological Dis-Orders

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#### Abstract

As populations are growing and aging, neurological disorders and their sequelae are currently estimated to affect as many as a billion people worldwide in all geographical regions and the prevalence of major disabling neurological disorders steeply increases with age. Their cure is not always possible and mostly restrict daily life causing disability. Therefore, a large scale approach for the early diagnosis, prevention and rehabilitation for neurological disorders is certainly an indispensable priority.

**Keywords:** Neurological Disorder; Stroke; Dementia; Epilepsy

Neurological disorders of the central and peripheral nervous system, including epilepsy, dementias, headache, cerebrovascular diseases, multiple sclerosis, Parkinson's disease, neuroinfections, brain tumours, and traumatic head trauma, affect the brain, spinal cord, cranial or peripheral nerves or their roots, autonomic nervous system, neuromuscular junction, or the muscles.

Neurological disorders are the world's largest cause of disability and the second leading cause of deaths (12% of total global deaths, 9.0 million [8.8 - 9.4]). Cerebrovascular diseases due to neurological disorders are responsible for 85% of these deaths. The four largest contributors of neurological disorders are stroke (42.2%), migraine (16.3%), dementias (10.4%), and meningitis (7.9%). The burden of neurological disorders (especially non-communicable disorders) has been challenging the health systems, and more effective treatments and prevention measures of prevalence and mortality have to be designed and developed against the long-term disability.

Stroke is the third cause of death in developed countries, after the coronary heart disease and cancer, with more than 6 million people each year. Survivors become dependent or experience loss of vision and/or speech, paralysis, confusion or spasticity. The most important modifiable causes of stroke are hypertension or other heart disease, smoking, unhealthy diet with high salt intake, or diabetes. The high cost of treatment of stroke, turns the priority to preventive strategies.

Worldwide, there are around 50 million people with dementia, and it is projected to reach 82 million in 2030 and 152 in 2050. In 2015, the total global societal cost of dementia was US\$ 818 billion. In dementia, there is deterioration in memory, thinking, behaviour and the ability to perform everyday activities and the physical, psychological, social, and economic impact, is not only on people with dementia, but also on their carers, families and society by causing disability and dependency especially among old people. To support and improve the lives of people with dementia and their carers and families, the following steps can be followed:

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- Promoting optimal management
- Optimizing physical health, cognition, activity and well-being
- Identifying and treating physical illness
- Detecting and treating behavioural and psychological symptoms
- Providing information.

People can reduce the risk of dementia by getting regular exercise, not smoking, avoiding alcohol intake, controlling the weight, eating a healthy diet, and maintaining blood pressure, cholesterol and blood sugar levels. Depression, low educational attainment, social isolation, and cognitive inactivity are additional risk factors. WHO has recognized dementia as a public health priority and launched the Global action plan on the public health response to dementia 2017 - 2025.

Migraine is ranked third among people aged 15 to 49 years for disability. Associated pain, nausea and vomiting result in inability to work or reduced productivity by provoking anxiety, avoidance behaviour, unnecessary hospital admissions and brain imaging.

Up to 10% of people worldwide have one seizure during their lifetime. Around 50 million people worldwide have epilepsy and an estimated five million people are diagnosed each year. The risk of premature death in people with epilepsy is up to three times higher than the general population. People with epilepsy and their families suffer from stigma and discrimination. Up to 70% of people with epilepsy can live seizure-free by proper diagnosis and treatment. 25% of epilepsy cases can be prevented as follows:

- Adequate perinatal care can prevent birth injury that can cause new cases of epilepsy.
- Preventing head injury will prevent post-traumatic epilepsy.
- Lowering the body temperature of a feverish child can prevent the febrile seizures.

Epilepsy associated with stroke can be prevented by the reduction of cardiovascular risk factors, e.g. control high blood pressure, diabetes and obesity, and the avoidance of tobacco and excessive alcohol use.

Elimination of parasites in tropical areas and education on how to avoid infections can be effective to prevent epilepsy due to central nervous system infections.

### **Risk factors for meningitis are:**

- The spread of bacteria or viruses through coughing, sneezing, kissing, or sharing eating utensils, a toothbrush or a cigarette can be prevented as well as with careful hand-washing
- Risk rises for anyone who hasn't completed the recommended childhood or adult vaccination schedule. Most cases of viral meningitis occur in children younger than age 5 while bacterial meningitis is common under age 20
- College students living in dormitories, personnel on military bases, and children in boarding schools and child care facilities are at greater risk of meningococcal meningitis
- Pregnancy increases the risk of listeriosis that causes meningitis. Listeriosis increases the risk of miscarriage, stillbirth and premature delivery
- Compromised immune system (AIDS, alcoholism, diabetes, use of immunosuppressant drugs) increases the risk

- Maintaining the immune system strong by getting enough rest, exercising regularly, and eating a healthy diet with plenty of fresh fruits, vegetables and whole grains.

### **Meningitis can result in severe complications:**

- Hearing loss
- Memory disturbance
- Learning disabilities
- Brain damage
- Gait problems
- Seizures
- Kidney failure
- Shock
- Death.

Neurological disorders affect the individual's functioning and result in disabilities or limit the activities and restrict the social participation. Considering the long-term nature of chronic, relapsing and remitting course of the neurological disorders, they are better managed with a continuing care approach by the individual's adjustment and behavioural change and social support in a well organized referral and linkage system offering accessibility, comprehensiveness, coordination and continuity of care, effectiveness, and equity within the local, social, economic and cultural contexts. The development of other molecular approaches, pharmacotherapy of neurodegenerative diseases or neurostimulation methods might become ineffective in the treatment of many brain, including cerebellar diseases so that transplantation may be tried. The development of neurotransplantation therapy as a clinical tool for patient treatment will also help to understand brain development, rules of stem cell proliferation, cellular migration and differentiation, or self-regenerative processes and mechanisms of brain plasticity.

Disability due to neurological disorders can be improved by rehabilitation programmes. Rehabilitation is an active process to achieve full recovery or realize an optimal physical, mental and social potential in the most appropriate environment of the primary health-care, along with promotion, prevention and treatment. While promotion and prevention primarily target the reduction of the risk factors, the treatment targets ill-health, and the rehabilitation includes education, labour and social affairs. Rehabilitation is based on four key approaches:

- Biomedical and engineering approaches;
- To build and strengthen the resources of the person;
- To provide a facilitating environment;
- To guide across services, sectors and payers.

Specific rehabilitation interventions include physical medicine, pharmacology, nutrition, psychology and behaviour, education and counselling, occupational and vocational advice, social and supportive services, architecture and engineering. Rehabilitation is a powerful tool

to provide personal empowerment by patient education and self-management like a bridge between isolation and exclusion and should start as soon as possible after the diagnosis of a neurological disorder. As patients can present with diverse sequelae, including physical functioning limitations such as paralysis of the left or right side of the body, or both sides - which limit severely the person's capacity for many daily living activities, as well as mobility in the community and the capacity to return to work or school, or rigidity, uncoordinated movements, and/or weakness. People with disabilities may have limited access to rehabilitation services as well as to appropriate assistive technology, such as wheelchairs. For example persons with head injury who require wheelchairs for adequate positioning and mobility may not leave their house and participate in community activities, access educational facilities, or work.

Cognitive impairments such as memory and attention problems, mild to severe intellectual deficiency, a limited ability to learn may affect emotional stability, and limit performance at work or at home, as well as social isolation in the long term, aggravating depression.

Behavioural sequelae such as poor impulse control, uncontrolled anger and sexual impulses, and the impossibility to learn affect the person's capacity to be socially accepted and limit the possibility of returning to educational or vocational services.

Communication impairments such as speech problems and poor vocalization with lack of augmentative or alternative communication devices affect basic daily living activities by functional and cognitive limitations in dressing or getting a spoonful of food to his mouth, resulting in social isolation. The non-drug interventions are often highly effective, as the first choice in managing behavioural problems. The first step is to identify and treat the cause, which could be physical, psychological or environmental. Psychosocial interventions, particularly the provision of information and support to carers, can reduce their severe psychological distress.

Psychosocial limitations, in access to education and the impossibility to return to vocational status impact on the behavioural, physical and cognitive aspects of the person affected by a neurological disorder.

In neurology, stigma primarily refers to a mark or characteristic indicative of the history of the neurological disorder following the physical or mental abnormality. The stigma is associated with the disability rather than the disorder itself in forming the social prognosis of the patients. The amount of stigma associated with neurological disorder is determined by two separate and distinct components: the attribution of responsibility for the stigmatizing disorder and the degree of the discomfort in social interactions. Stigmatized individuals have less "social value" and are often rejected by neighbours and the community, and as a result suffer loneliness and depression. The psychological effects of stigma are a general feeling of unease or "not fitting in", loss of confidence, increasing self-doubt and depreciated self-esteem, and a general alienation from the society. Even when the behaviour or physical attributes disappear, individuals continue to be stigmatized by others and by their own self-perception and the stigmatization becomes irreversible. The families of people with neurological disorders may also be subjected to other forms of social sanction, such as being excluded from community activities or from societal opportunities such as education or work. The affected individuals or those responsible for their care may not seek treatment, because of the stigmatization to avoid the negative social consequences of diagnosis, which results in delayed or lost opportunities for recovery.

Sometimes the stigma surrounding the disorder can be more difficult to cope with than living with any limitation imposed by the disorder itself. Appropriate strategies for the prevention and treatment of the neurological disorders have to be developed in case of under reporting the stigmatizing conditions. A multilevel approach to educate health professionals and inform the community about neurological disorders to promote positive attitudes avoiding common myths is required to reduce stigma and to tackle the discriminatory attitudes and prejudicial behaviour. The stigma associated with neurological disorders aggravates the vicious cycle between the disorder and the social negative reaction leading to social exclusion and discrimination and adds to the social and economic burden.

Combining mortality and disability does not usually take into account the pain, suffering and social and economic losses, reduction of the productivity and the quality of life of the affecting patients, their families and the community because of the socioeconomic challenges of care, treatment and rehabilitation. The annual economic cost of neurological disorders (dementia, epilepsy, migraine and other

headaches, multiple sclerosis, Parkinson's disease and stroke) amounted to € 139 billion (approximately US\$ 180 billion) in 2004 in Europe.

Certain drugs (cholinesterase inhibitors) act on the symptoms but not on the disease itself and temporarily may decelerate the progressive cognitive decline in some forms of neurodegenerative dementia but not in all. They make only a small contribution to maintain the physiological. Evidence-based drug therapies are available for psychological symptoms such as depression, anxiety, agitation, delusions and hallucinations that can occur in people with dementia. There are modestly effective drugs (neuroleptics) available for the treatment of associated behavioural problems such as agitation. All of these drugs should be used with caution, particularly tricyclic antidepressants and neuroleptics (because of anticholinergic side-effects, sedation, and an increased risk of stroke and higher all-cause mortality).

General malnutrition especially in childhood leads to macronutrient or micronutrient deficiencies caused by insufficient supply or increased consumption (called "hidden hunger") or ingestion of toxic compounds. The majority of the neurological disorders due to malnutrition can be avoided by simple measures such as a preventive adapted communication for changing behaviour, strengthening capacities and reducing the incidence of the neurological complications with specific nutrition programmes to diagnose and replace the vitamin and mineral deficiencies. Potentially toxic food compounds may contribute to neurological disorders such as Wernicke's encephalopathy, visual problems (amblyopia), peripheral neuropathy, Spastic paraparesis (lathyrism), tropic ataxic neuropathy.

Neuropathic pain with its physical and psychological dimensions, is a direct or indirect consequence of a neurological disorder with a lesion or a disease of the pain pathways in the peripheral or in the central nervous system (CNS). Chronic pain may persist long after even if the initial tissue damage has been healed and becomes a specific health-care problem and even a recognized disease. Examples of indirect consequences of a nervous disease, that cause secondary activation of pain pathways include musculoskeletal pain in extrapyramidal diseases such as Parkinson's disease, or deformity of joints and limbs due to neuropathies or infections. Secondary joint pain is usually controlled with a simple analgesic such as a non-steroidal anti-inflammatory drug (NSAID). Opioids may show some efficacy in neuropathic pain. Topical agents including lidocaine or capsaicin cream may produce local relief particularly in the treatment of post-herpetic neuralgia.

Neurological disorders may cause deformity, subluxation or dislocation by increasing the abnormal stresses on joints. For example "frozen shoulder" or pericapsulitis occurs in 5 - 8% of stroke patients. Disuse results in the atrophy of muscles around joints rising the pain on the lining tissues. Deformities may damage the nerves in close proximity resulting in neuropathic pain of the "evoked" or spontaneous type. One third of cancer patients have a neuropathic component to their pain impairing their immunological system. The stump pain arises from an injured nerve in the limb caused by a local neuroma or by tethering to local tissues. Phantom limb pain is a central neuropathic pain very difficult to treat. Central stroke pain is a type of neuropathic pain that follows an unequivocal episode of stroke. The pain is more incapacitating and distressing than other symptoms. Muscle relaxants can be administered against the spasticity and the rigidity as well as the systemic or intrathecal use of baclofen. Physical therapy and the electrical stimulation techniques such as transcutaneous electrical stimulation or dorsal column stimulation are important part of the management of neurological disorders, painful or not. Relaxation techniques, hydrotherapy and exercise may help to manage the musculoskeletal component. Multimodal treatment and rehabilitation programmes to improve the quality of life are effective in the management of chronic pain disorder considering also active treatment for the associated moderate to severe depression.

Neurological disorders as a growing public health burden need to be emphasized and detailed by large scale standards, guides and algorithms to be prepared for their prevention, early diagnosis and rehabilitation [1-16].

## Conclusion

Neurological disorders have been increasingly becoming a public health problem because of the high mortality and disability rate. Beside the pharmacological and non-pharmacological treatment methods a new multi modal and psychosocial approach has to be initiated emphasizing early diagnosis for optimal conventional treatment including rehabilitation.

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