

# Application of the Betty Neuman systems model in the nursing care of patients/clients with multiple sclerosis

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## Abstract

**Objective:** This study aimed to assess the application of the Betty Neuman systems model to the care of patient/clients with multiple sclerosis.

**Methods:** This clinical study resulted from the application of the nursing process to a patient/client admitted with multiple sclerosis in the neurological ward of a hospital in an urban area of Iran.

**Results:** A patient/client was evaluated according to the Neuman model. Intrapersonal stressors (physiological, psychological, socio-cultural, and spiritual), interpersonal stressors (being away from family and children) and extra-personal stressors (aggression and psychological pressure from the spouse) were found. Based on the examination, 12 nursing diagnoses based on the taxonomy of the North American Nursing Diagnosis Association International, and nursing care based on three levels of prevention that are important in the view of Neuman, are presented. The results were used in the classification of nursing interventions and the classification and nursing outcomes respectively.

**Conclusions:** The results suggest the desirability of care and patient/client satisfaction in the evaluation of nursing care based on the Neuman model. The model can be used as a framework to help nurses care for patients/clients. Thus, the application of this model and other models is recommended in the nursing care of patients/clients.

**Keywords:** Multiple sclerosis, patient/client care, nursing models, Neuman systems model

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## Introduction

Multiple sclerosis (MS) is an autoimmune disease of the central nervous system (CNS) characterized by brain inflammation, demyelination, and axonal loss, which occurs primarily between the ages of 20–40 years.<sup>1</sup> MS is the most prevalent inflammatory<sup>2</sup> and the second most common cause of neurological disability in working-age adults. Since it usually strikes in the prime of life, frequently progresses to disability, and has no cure, MS can have a strong emotional impact not only on those who suffer from it, but also on the healthcare team.<sup>3</sup> The range of symptoms that occur in MS can have disabling functional consequences for patients and lead to significant reductions in their quality of life and the ability of individuals to carry out their roles and job tasks.<sup>4</sup>

The goal of early disease management is to intervene before irreversible neuronal destruction happens, to delay the progression of disability, and to improve the quality of life.<sup>5</sup> Currently, there is no known cure for MS, and the treatment goal of MS is the prevention of permanent neurological damage.<sup>6</sup> Thus, the nature of the disease poses an obvious need for interdisciplinary services. Nurses have to play a key role in the interaction with patients/clients and their families to improve the patient/client's health.<sup>7</sup> The purpose of nursing care is to improve the quality of life of patients/clients.<sup>8</sup> An effective way to promote nursing care is by applying nursing theories.<sup>9</sup>

The clinical use of nursing models and theories helps develop nursing knowledge.<sup>10</sup> It is an important step to achieve the goals that guide the practical

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application of clinical and educational research.<sup>11</sup> A wide variety of situations and phenomena make a certain degree of flexibility necessary in the selection of the models and nursing theories according to the circumstances.<sup>12</sup> The Betty Neuman systems model is one theory that provides guidance at three levels of prevention.<sup>13</sup>

### *Neuman systems model*

The Neuman systems model is based on a general system theory and reflects the nature of living organisms as open systems in interaction with each other and with the environment. Within the Neuman model, the client may be an individual, a family, a group, a community, or a social entity. An important assumption of the Newman theory is: “each client system is unique, a composite of factors and characteristics within a given range of responses.”<sup>13</sup> [p. 285]

The human being is a total person, characterized by five variables: these include physiological, psychological, socio-cultural, spiritual, and developmental variables.<sup>14</sup> The physiological variable refers to body structure and function. The psychological variable refers to mental processes in interaction with the environment. The socio-cultural variable refers to the effects and influences of social and cultural conditions. The spiritual variable refers to spiritual beliefs and influences. The developmental variable refers to age-related processes and activities.<sup>13</sup>

An individual organism is said to have a central “core” of basic survival mechanisms, such as temperature control, ego, and organ function.<sup>12</sup> The core is protected by lines of defence. The outer layer is the flexible line of defence, and is variable, responding to the particular stressor. The inner or “normal” line of defence represents the state of wellness and adaptation of the individual. It is generally stable. The lines of resistance represent the internal factors that determine an organism’s response to a stressor. Stressors (intrapersonal, interpersonal, and extra-personal) are significant to the concept of environment and are described as environmental forces that interact with, and potentially alter, system stability.<sup>15</sup> Intrapersonal factors include interactions contained within the client, such as conditioned responses. Interpersonal factors arise from interaction between two or more individuals, such as role expectation. Extra-personal factors comprise all interactions occurring outside the client, such as financial circumstances.<sup>16</sup>

Neuman defines the environment as all the internal and external forces surrounding the client, influencing and being influenced by the client at any point

in time. She identifies three relevant environments: internal, external, and created.<sup>12</sup> The internal influences are contained within the boundaries of the client’s system in other words, they are intrapersonal in nature. The external influences exist outside the client; and the created environment is unconsciously developed and is used by the client to support protective coping.<sup>17</sup> She views health as a continuum of wellness to illness that is dynamic in nature and is constantly changing. Optimal wellness exists when the total system needs are completely met and illness exists at the opposite end of the continuum from wellness and represents a state of instability and energy depletion.<sup>12</sup>

Neuman believes that nursing is concerned with the whole person. She views nursing as a unique profession and believes that it is concerned with all the variables affecting an individual’s response to stress. The primary aim of nursing is the stability of the client system. This is achieved through nursing intervention to reduce the stressors. Neuman’s process contains three basic parts: nursing diagnosis, nursing goals, and nursing outcomes. Neuman stresses the importance of identifying the client’s and the caregiver’s perceptions and collaboration between the client and the caregiver in all stages of the process. She identifies three levels of intervention: primary, secondary, and tertiary (Table 1). Primary prevention takes place even before the client system can respond to a stressor that the purpose is to reduce the possibility of encounter with the stressor. Secondary prevention takes place after the client system responds to a stressor. Tertiary prevention occurs after the active treatment or secondary prevention stage that it focuses on readjustment toward optimal client system stability.<sup>13</sup> This paper demonstrates the application of the Betty Neuman systems model to the care of patients/clients with MS.

### **Method**

This clinical study resulted from the application of the nursing process mediated by the nursing theory of Betty Neuman to the care of patients/clients with MS in a neurological ward of a hospital in an urban area of Iran. One patient was studied in this study.

In the first stage of the nursing process, an interview was drawn up with the purpose of guiding the research and determining the stressors. This clinical study was about single patient.

After the assessment and data collection, 12 nursing diagnoses were established according to the taxonomy of the North American Nursing Diagnosis

**Table 1.** Summary of Betty Neuman's nursing process steps.

<p>A. Nursing diagnosis</p> <ol style="list-style-type: none"> <li>1. Database and assessment <ul style="list-style-type: none"> <li>– Identification, classification, and evaluation of interactions among five client variables</li> <li>– Identification of stressors and resources in the intra-, inter-, and extra-personal areas</li> <li>– Identification and differentiation of client and caregiver perceptions</li> <li>– Attempt to resolve perceptual differences</li> </ul> </li> <li>2. Actual or potential variances from wellness (These are what most other theorists call 'nursing diagnoses')</li> </ol> <p>B. Nursing goals</p> <ol style="list-style-type: none"> <li>1. Expected outcomes, specific desirable behavioral responses to deal with the actual or potential variances from wellness (decided jointly by the client and the caregiver)</li> <li>2. Planned interventions, specific actions of the client, the caregiver or others to effect the expected outcomes</li> </ol> <p>C. Nursing outcomes</p> <ol style="list-style-type: none"> <li>1. Actual interventions</li> <li>2. Evaluation and goal reformulation <ul style="list-style-type: none"> <li>– Analysis of specific client responses</li> <li>– Determination of the attainment of expected outcomes</li> <li>– If incomplete attainment, determination of cause of non-attainment</li> <li>– Goal reformulation as needed</li> </ul> </li> </ol>
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Association International (NANDA-I), and nursing care based on three levels of prevention that are important in view of Neuman, was presented. The diagnoses were:

1. Disruption of the concept of "self" associated with the disease, decreased muscle strength, power and weakness,
2. Not tolerating any activity associated with weakness, fatigue and irritability,
3. Stress and anxiety associated with being away from children and family, disease and aggression of the spouse,
4. Eating disorder, eating less than what the body needs, anorexia and nausea,
5. Risk of trauma and falls in association with visual and movement disorders, weakness, and dizziness,
6. Disturbance in bowel habits associated with illness, weakness, and disability,
7. Changes in sexual pattern associated with fatigue and depression,
8. Disorders in sleep pattern associated with an urge for urination, headache, and flushing,
9. Disorder in reading and writing associated with visual disturbances and vertigo,
10. Impaired skin integrity in association with drugs and associated complications,
11. Urinary dysfunction associated with the disease and bladder nerve damage,
12. Avoiding loneliness associated with being away from children and family.

### Experience reports

Evaluation of patients/clients to classify types of stress is posed by Neuman.

#### *Intrapersonal stressors*

Intrapersonal stressors include the following needs: physiological, developmental, psychological, socio-cultural, and spiritual.

#### *Physiological*

Neurological: dysfunctions of this system include severe headache and vertigo that worsens in light, weakness and walking disorders due to muscle weakness, blurred vision and double vision, seizures, heaviness in the head, and sometimes inability in gripping objects with hands and as a result, dropping the object, minor burning and tingling sensation in hands and feet, which worsens during an attack.

Gastrointestinal: dysfunctions of this system include loss of appetite, early satiety, weight loss in recent months, and impairment of bowel movements in the form of constipation, and occasional nausea and vomiting.

Respiratory: the respiratory rate was normal and lung auscultation was clear.

Genitourinary: difficulty in urination, dripping urination.

Dermatological: dry and red skin with spots on the face, and sometimes severe scalp irritation, especially during anxiety and under psychological pressure.

**Table 2.** Nursing process adapted according to the Neuman theory for the multiple sclerosis (MS) patient/client.

Type of patient/client variable	Nursing diagnoses	Aim	Level of prevention	Interventions
Physiological	Not tolerating any activity associated with weakness, fatigue, and irritability	Helping the patient/client carry out activities without depending on others	Secondary	Avoiding exposure to environments with high temperatures, taking hot showers, eating heavy foods, too many activities, hunger and stress, which exacerbate fatigue. Exercise and sports, such as swimming and simple gestures, as much as tolerated Reduction in ambient noise Avoiding too much work, resting between work periods, and getting adequate sleep Compliance with energy saving techniques, such as sitting while showering, and brushing teeth Cold shower, sucking ice, using ice packs or wet towel, when feeling hot
Physiological	Eating disorder, eating less than what the body needs, anorexia and nausea	Improving the quality of the patient/client's appetite, nutrition, and proper diet	Secondary	Avoidance of irritant materials and odors Resting before each meal to minimize weakness Eating in a quiet and clean environment and devoting enough time to it Eating frequent meals in small amounts Gentle position-changing to avoid nausea Avoiding fatty foods, like butter, sauces, and nuts Avoiding fluid intake during food intake to prevent early satiety Avoiding foods that contain caffeine, such as tea, coffee, and spicy food.
Physiological	Risk of trauma and falls in association with visual and movement disorders, weakness and dizziness	Avoiding trauma, injury, and controlling the situation during weakness and dizziness	Primary	Availability of necessary supplies, and avoiding disorganization and chaos Using appropriate shoes and slippers Sufficient ambient light Keeping calm and avoiding rush during work Avoiding abrupt changes in a situation to avoid dizziness Sitting during dizziness

(continued)

**Table 2.** Continued

Type of patient/client variable	Nursing diagnoses	Aim	Level of prevention	Interventions
Physiological	Disturbance in bowel habits associated with illness, weakness, and disability	Improving the patient/client's defecation pattern	Secondary	Assigning regular hours for defecation, preferably an hour after meal Encouraging to eat high-fiber foods such as bran, bread, fruits, and fresh herbs Increasing fluid intake during the day Activity, as much as possible
Physiological	Disorders in sleep pattern, associated with an urge for urination, headache, and flushing	Improving the status and quality of sleep and rest	Secondary	Reducing fluid intake in the evening to avoid waking up at night Refraining from beverages containing caffeine Creating a quiet and peaceful environment Using cooling devices Using proper cover
Physiological	Disorder in reading and writing associated with visual disturbances, and vertigo	Encouraging the patient/client to use the remaining abilities and prevent the progression of weakness and faintness	Secondary and tertiary	Protecting eyes from sunlight Emphasizing and encouraging the patient/client to regularly have a visual check-up Resting the eyes and preventing eye fatigue Avoiding exposure to severe light
Physiological	Impaired skin integrity in association with drugs, and associated complications	Maintaining tissue integrity	Secondary and tertiary	Avoiding exposure to severe sunlight Encouraging the use of protective clothing, such as hats, and gloves Recommending the use of gloves when working with detergent Recommending brushing hair gently and not using rough combs Avoiding the use of chemical hair colors Cold showers to stop itching
Physiological	Urinary dysfunction, associated with the disease and bladder nerve damage	Improving the patient/client's defecation pattern	Secondary and tertiary	Avoiding beverages containing caffeine Not limiting fluid intake due to damage to the kidneys Reducing fluid intake after sunset Pouring hot water on the perineal area to stimulate urination

(continued)

**Table 2.** Continued

Type of patient/client variable	Nursing diagnoses	Aim	Level of prevention	Interventions
Psychological	Disruption of the concept of ‘self’ associated with the disease, decreased muscle strength, power, and weakness	1. Encouraging the patient/client to talk about beliefs and parameters, such as the concept of ‘‘self’’, power and self-efficacy. 2. Helping the patient/client find incentives to continue with life and activities despite limitations of power and energy.	Secondary and tertiary	Encouraging to consume at least eight glasses of fluids during the day and reduce it before sunset Encouraging good hygiene to prevent urinary tract infections Allowing the patient/client to express feelings, moods, and behavior Encouraging her to talk to other patient/clients with MS and participate in meetings conducted by the Centre for Special Diseases (MS) Meeting children Encouraging physical activity as much as muscle strength allowed
Psychological	Stress and anxiety associated with being away from children and family, disease, and aggression of the spouse	Helping the patient/client control and reduce her stress and anxiety	Secondary	Learning relaxation techniques and distraction of negative ideas Personal contact and phone calls to children and family Encouraging patient/clients to attend MS sports classes
Psychological	Changes in sexual pattern associated with fatigue, and depression	Helping the patient/client have a proper and satisfactory relationship, as much as possible	Secondary and tertiary	Family counseling Encouraging clients to consider the sexual needs of her spouse to reduce stress Rest between activities to avoid boredom Talking to the spouse about emotional support to patient/clients
psychological	Avoiding loneliness, associated with being away from children and family	Promoting patient/client’s support and getting rid of loneliness	Secondary	Encouraging phone calls with children during their absence Encouraging the patient/client to continue participating in Qur’anic, sports, and art classes Encouraging the patient/client to interact and communicate with neighbors to get rid of loneliness

Some variables including socio-cultural, psychological, and physiological variables may interact, and therefore are not repeated in the table under the related variable.

Musculoskeletal: weakness in arms and legs, radiating pain in the shoulder and chest, imbalance and dizziness during attacks.

Hearing: stuffiness in the ear.

Sight: blurred vision, double vision, fluttering objects in the visual field, reduced visual field, inability to see beyond a distance of about 7–8 m.

*Psychological.* The patient/client cannot express any feelings about the disease, but is depressed and anxious, looks tired and bored. In the case study, irritability and mental pressure by the patient/client's husband were considered as intrapersonal factors that caused stress. Following stress and family dissociation, she was constantly agitated and anxious. She needed intense mental family support.

*Socio-cultural.* The patient/client participates in artistic activities and believes that she will be mentally calm. But the patient/client cannot participate in sports classes, held by the MS center, due to problems of transportation and distance.

*Developmental.* She has been successfully engaged in meeting developmental needs appropriate to a middle-aged adult, for example: preparing for menopause.

*Spiritual.* Considers herself a religious person. She believes in God and prays. She participates in religious ceremony.

#### *Interpersonal stressors*

These include (a) being away from family due to long distance; (b) being away from children due to remote education place; and (c) extra-personal stressors.

### **Results**

The nursing results were used for the classification of nursing interventions and the classification of nursing outcomes respectively (Table 2).

### **Discussion**

MS is a chronic disorder with no definite cure. So, the goal of treatment is to control the signs and symptoms, prevent further progress, and ensure better compliance from the patient/client.

1. Communication with nurses, spouse, and family, and getting the opportunity to express her feelings about her situation somewhat reduced the patient/client's concerns, which stemmed from her desire to get attention. She stated that the hope for a bright future for her children was the incentive for the rest of her life.

2. The patient/client mentioned techniques that she was taught to maintain her energy levels. She became aware of the importance of resting between activities to avoid boredom and stated that she would try to consider resting in between work.
3. When the patient/client became aware of the impact of stress on the progress of her disease, she was determined to reduce the amount of stress in her life. Her family was also consulted and asked to put family tensions aside to help her.
4. The patient/client named several types of foods that she should avoid, like fatty and spicy food, and decided to avoid situations that decreased her appetite, and thus, improved her nutritional status.
5. The patient/client's awareness of the measures to avoid trauma caused her to avoid walking during vertigo attacks and sit down until she felt better.
6. The patient/client named several foods containing fiber that helped improve the defecation pattern. She stated that she used soaked figs to improve her situation.
7. With regard to training to prevent fatigue, the patient/client could do it over time, and also understood that this could be a reason for her spouse's aggression. So, she decided to pay more attention to the needs of her husband.
8. The patient/client uses proper coverage and cooling equipment during sleep. Regarding consumption of tea before bedtime, she decided to cut the use of caffeine.
9. The patient/client used to go for visual examination, but the visit intervals were long. Considering the importance of this issue, she decided to shorten the intervals of visit and used protective clothing for her eyes, such as sunglasses, when she went out into the sun.
10. She stated that she could not use gloves while using detergents. She decided to bathe in warm water instead of cold water.
11. The patient/client stated that she followed all the necessary hygienic measures to prevent urinary tract infections. She also decided to limit the consumption of beverages containing caffeine.
12. According to the patient/client's statement, she had the enthusiasm and interest to continue participating in training classes, and she felt lonely if she did not do so.

### **Conflicts of interest**

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