Research Article

Implementation of the Nursing Process Based on Betty Neuman Model in Kidney Transplant Patients: A Study in the Field

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Abstract

Background: Proper use of nursing models and theories is an important step in improving patient care standards and quality of life. The growing trend of kidney failure and subsequent kidney transplantation in the country shows the importance of creating a proper structure in nursing patient care for transplant patients and recognizing the stressors that affect these patients.

Objectives: This study aimed to investigate the ability of the Betty Neuman model to provide a comprehensive model for nursing care of clients undergoing kidney transplantation.

Methods: This clinical and clinical study was performed on the client of the kidney transplant candidate based on the application of Betty Neuman system theory. During the data collection, the interactions between the client's five variables were examined and the stressors and resources in the internal, inter, and extra-individual domains were identified. Nursing diagnoses were created in accordance with the North American International Nursing Diagnostics Association (2018 - 2018) classification, and then nursing interventions were designed and implemented at three levels of prevention.

Results: The results of the study of physiological, psychological, social, evolutionary, and spiritual variables, as well as interpersonal and extra-individual stressors, were 7 potential and actual nursing diagnoses.

Conclusions: Designing and applying a nursing process based on this model is a holistic and systematic attitude toward the client that requires proper, efficient, and evidence-based nursing care but increases the need for nursing human resources.

Keywords: Kidney Transplantation, Nursing Models, Nursing Diagnosis, Nursing Theory

1. Background

Nursing is one of the vital activities in medical centers (1) and the importance of nursing care based on scientific principles in kidney transplant patients has been described in previous studies (2). The first kidney transplant in humans was performed in Ukraine in 1933, and then in the early 1950s several kidney transplants were performed in Paris and Boston, but there was no cure for kidney rejection, and only one patient survived. The first transplant in Iran was performed in 1967 in Shiraz, and by the end of 2007, about 23,600 kidney transplants had been performed in Iran (3-5).

Despite reduced mortality from transplant patients (6), hemodynamic instability and surgical wound infection, hemorrhage, graft thrombosis, renal artery stenosis, urinary incontinence, and urinary tract obstruction (2) still persist in the first 24 hours after hemodynamic instability surgery (7). Long-term side effects associated with the use of immunosuppressive drugs affect these patients (8), so the incidence of opportunistic infections in these patients is reported to be 10% - 25% (9, 10). Also, acute and chronic kidney rejections due to antibodies play the most important roles in kidney transplant rejection (4, 11). Despite the lower prevalence of cardiovascular diseases compared to dialysis (12), its rate in transplant patients is still significantly higher than the general population (13, 14). The presence of multiple complications bolds the importance of team effort with different specialties, especially the nursing system (2, 15). Nurses in the transplant unit

must be qualified to care for these patients (2) because, in the event of poor care, potential complications could jeopardize the patient's connective tissue and survival (2, 16). The knowledge gap and lack of appropriate approach in this field, especially in the field of nursing diagnoses, which are usually formed during clinical procedures, elicit the development of appropriate nursing care plan (8, 17).

One of the most effective ways to fill the knowledge gap is to apply nursing theories in bed (18). Proper use of nursing theories is an important step in achieving the goals that guide nursing practices in the clinic (19). Despite this, it seems that there are still various obstacles to the implementation of nursing theories in bed, and nurses are still reluctant to use these theories in nursing care. Studies show that 55% of cases of inappropriate use of nursing models occur in bed (20-23).

By applying nursing theories, it can be hoped that patient care standards will improve (24). On the other hand, the growing trend of kidney transplantation and the exposure of these patients to lifelong stressors further highlights the importance of creating a proper structure in the nursing care of these patients (25).

Among the different models and theories in the nursing profession, Betty Neuman's model with an open systemic perspective (26) can be a suitable model for the implementation of patient care plans (27). This model was developed in 1970 and was used for the first time to understand five physiological, psychological, sociocultural, evolutionary variables, and later spiritual variables in education (26, 27). The aim of this study was to apply the Betty Neuman system model and provide a practical model in the implementation of nursing process in transplant candidate patients in the kidney transplant section of the only kidney transplant center from living donors in the west and northwest of the country.

1.1. Type of Study

This study was performed by field and clinical methods based on the application of system theory on the clients of kidney transplant candidates. The performance of the nurse in this control model is five main variables within the basic structure of the client system and flexible, normal and resistant defensive lines (1, 27). Stress is divided into three categories based on environmental origin (internal, external, and created): internal, interpersonal, and extra-personal (26, 27) in which intrapersonal agents include Interactions within the person, interpersonal agents of interaction between two or most people are created, and extra-individual agents include all interactions that occur in the extra-individual environment (28). When stressors have a negative effect on the system, stress, and when evaluated positively, they are called Eustress that can guide the

client toward the desired adaptation process (1, 26). Nursing care is defined as the preventive interventions at the primary, secondary, and tertiary levels in response to the impact of stress on each line of defense.

The first dimension of interventions is to prevent the impact of stress on the client's system. Nursing measures related to nursing diagnoses promote health and potential in this group (1, 26). The second dimension involves secondary interventions that follow the system's response to stressors and the ineffectiveness of the normal line of defense. Interventions related to actual nursing diagnoses fall into this category (1). Interventions in the third dimension are implemented to prevent further development of signs and symptoms and the severity of the disorder and damage to the resistance lines. Level 3 prevention is based on Betty Neuman model after nursing and treatment interventions in level 2 prevention to strengthen resistance lines and preventing the development of signs and symptoms and disease progression to restructure and strengthen health conditions in the client system (1, 27). In this model, the nurse can help the client by strengthening the patient's defensive lines (1, 29) and taking appropriate nursing action to restore health conditions (1, 30).

1.2. Study Population

The population of this study was all patients undergoing kidney transplantation in the transplant department, of whom a sample was selected by the available method.

1.3. Field of Study

This study was performed in the transplant Department of Imam Reza Hospital.

2. Methods

The present study has an ethical code number IR.UMSHA.REC.1398.803 from Hamadan University of Medical Sciences. After receiving the transplant list, one of the patients was selected to receive the transplanted kidney by available method. After obtaining informed consent from the patient based on the ethical principles of the Helsinki Statement, coordination with the patient's head nurse and physician, comprehensive nursing care was designed for the client based on Betty Neuman model. Initially, an interview was conducted with the patient and his family to introduce the process, evaluate, and determine preoperative stressors. In the initial assessment, interactions between five client variables, stressors, and resources in the internal, inter-, and extra-personal domains (Table 1) of nursing diagnoses were evaluated, according to the North American International Nursing Diagnosis

Association Classification (2018 - 2018). The necessary nursing interventions were designed, implemented, and evaluated at three levels of prevention (Table 2).

3. Results

The findings are shown in Tables 1 and 2.

3.1. Assessment

1) Examining the client's case shows that the client's need for painkillers has decreased and that he has learned the non-pharmacological measures to relieve the pain well, and that he uses it when the pain is severe and evaluates the results positively.

2) Without the use of oxygen, the supplement has a good respiratory condition and there are no signs of ventilation disorders. Despite the lack of incentive spirometry, the client explains how to perform effective and deep breathing with the support of the surgical site.

3) There is no evidence of pressure sores in the pressure points. The wound area of the operation lacks secretion and discoloration, and warmth. The patient's nutrition counseling is done, and according to the patient's activity after the operation, he/she actively participates in skin care and maintaining its cleanliness.

4) Clinical and laboratory signs of infection are not observed. In response to a nurse's question about the side effects of immunosuppressive drugs, he said, "I know that taking these drugs is essential for kidney function for the rest of my life, but these drugs make my body weaker than before against microbes". This sentence can indicate the patient's level of awareness and attitude towards the risk of infections.

5) Before and after the operation, with the possibility of an appointment, the client's family and his wife talked to him for a few sessions about his concerns. It was also possible for the client to see a transplant patient. The initial severity of anxiety about kidney transplant rejection has been largely eliminated in the patient's statements and feelings.

6) With the appropriate educational support of the treatment staff, his wife and family and a brief biography of the living, all the problems of the religious prejudice of the client have been solved to some extent, still attending the group of transplant patients with appropriate spiritual attitude and the possibility of interviewing Rouhani. The context is felt and it was intended to reconstruct the goals in the interventions during and after the clearance.

7) Despite the fact that the client is familiar with the process of resuming sexual activities and also the possibility of pregnancy process after transplantation. However, the pressure of not getting pregnant, despite three years of marriage and the frustration associated with it, is still evident in her statements and face. In reviewing the goals, follow-up interventions such as introducing counseling with a gynecologist as well as greater support for the spouse and the spouse's family were considered a strength to reduce the psychological stress caused by infertility.

4. Discussion

In this study, the outcome of the client evaluation with the Betty Neuman system model was 5 potential nursing diagnoses and 2 actual nursing diagnoses. In a descriptive study on the hospital records of patients undergoing transplantation, Levosiotto et al. (31) extracted five potential risk-related diagnoses and 13 actual diagnoses from the files. Ferreira et al. (2) also conducted a retrospective study on medical and nursing documentation of transplant patients to extract nursing diagnoses. The results of this study included six actual nursing diagnoses and one potential diagnosis in which all diagnoses were in the field. It was physiological and the assessment was not performed at other levels of the variables. Although a number of nursing diagnoses, especially those related to risk factors in the present study, were consistent with these studies, all diagnoses derived from these studies were at the physiological level and no diagnosis was made at the psychological, evolutionary, social, or spiritual levels. It shows the power of comprehensiveness in the Betty Neuman model. In line with the results of the present study, Ahmadi and Sadeghi (32) in a study of the application of Betty Neuman system model on a client with MS in a case study found that this model is capable of identifying stressors at different levels and can be used as a suitable framework in the process. Nursing should be used in these clients.

The results of the present study indicate the proper performance of the model in identifying stressors and determining the necessary interventions to prevent, control or reconstruct the client's environment, so that accurate and comprehensive identification of stressors at different levels to determine the potential or actual variance of health is at the level of five physiological, evolutionary, psychological, social, spiritual, interpersonal and extra-individual variables and leads to related nursing diagnoses and helps the nurse to plan nursing interventions. Ahmadi and Sadeghi (32) also found that the desirability of patient care and satisfaction with nursing care increased with the use of this model. Therefore, the use of this model and other nursing models in nursing care of patients was recommended (32).

In line with the findings of the present study, the results of the study of Braga et al. (1) also showed that the application of Betty Neuman system model in patient care

Table 1. Evaluating and Collecting the Information

Identification, Classification and Evaluation of Interactions Between the Five Variables, Inter-Personal and Extra-Personal Factors	Identification of Stressors and Resources	Information Collection Resources; Identification and Differentiation Between Customer and Caregiver Perceptions; Perceptual Dispute Resolution Approach
Physiological variables		
Urinary-genital system	**Stress:** Kidney failure leads to dialysis and kidney transplantation/infertility	**Source of information:** Approach of physiotherapy and physiological systems and client signs/interview with the patient/review of medical records and records/obtaining information from physician and nursing system; **Identification of customer and caregiver perceptions:** interview with the patient and communicate regularly with the physician and nurse; **Perceptual dispute resolution approach:** Re-interviewing with the patient, improving the patient's awareness level, and agreeing approach based on observance of principles of care and treatment
Respiratory system	**Eustress:** The lack of underlying respiratory disease, no additional abnormal sound and respiratory secretion	
	Stress: Superficial and increase respiration	
Cardiovascular system	**Eustress:** no underlying heart disease, normal hemodynamics	
Nervous system	**Eustress:** The normal function of the neurological system	
Digestive system	**Eustress:** The normal functioning of the digestive system, sufficient information in the field of oral care	
Protection system	**Eustress:** Proper pre-operative skin care and care pattern, natural skin moisture and turgor, clean surgical wound without discharge and odor	
	Stress: Red pressure areas, signs of abrasion friction in some area	
Musculoskeletal system	**Eustress:** Natural function in the musculoskeletal system without restriction of movement in the range of joints	
Psychological variable	**Eustress:** A healthy psychological background, expressing feelings about preoperative concerns, good health beliefs	Similar to physiological variables
	Stress: Concerns about rejection of kidney transplant, fear and anxiety of inability to conceive after surgery, anxiety caused by insistence on pregnancy by the spouse's family, concern about being in the community with kidney transplant, anxiety caused by labor pain and procedures aggressive	
Social variable	**Eustress:** Interest in artistic activities such as painting and face painting, participating in dialysis patients' gatherings	**Source of information:** Interview with the client, the patient's spouse and family, obtaining information from the nursing team; **Identification of customer and caregiver perceptions:** client statements and obtaining information from the nursing team and extracting client perceptions and transferring them back to the client to review the agreement. **Perceptual dispute resolution approach:** Re-interviewing the patient in cases of disagreement on diagnosing and creating a client-centered agreement
	Stress: Limited friendships	
Evolutionary variable	**Eustress:** Successful marriage, readiness to accept motherhood, natural growth and development	Similar to the social variable
	Stress: Unsatisfied evolutionary need associated with infertility	
Spiritual variable	**Eustress:** Theism, the strengthening of heart and spiritual beliefs since the onset of kidney failure	Similar to social variables
	Stress: Interference of Islamic values with receiving a kidney from a stranger	
Inter-personal agents	**Eustress:** Proper support from the spouse, proper therapeutic communication with the nurse and the treatment team	**Source of information:** Similar to Social variables in addition to evaluating the client's living environment, hospital ward, and medical facilities and equipment; **Identification of customer and caregiver perceptions:** Similar to Social variables; **Perceptual dispute resolution approach:** creation an agreement with the client, spouse and family to raise awareness about environmental factors and available resources.
	Stress: Inadequate interpersonal communication with the spouse's family	
Extra-personal agents	**Eustress:** The level of knowledge and professional competence of the transplant team, the appropriate financial situation of the spouse	
	Stress: Limitations of living with a transplanted kidney, living in a high-traffic urban area	

Table 2. Nursing Diagnoses, Based on Priority[a]

Variable	Nursing Diagnosis	Purpose	Level of Intervention Prevention	Intervention
Physiologic	1) Acute pain associated with surgery with a sign of restlessness	Pain control and relief	Secondary	(1) Check the surgical site; (2) Measurement of the amount of pain using the pain measurement criterion; (3) Surgery support to reduce pain during coughing and deep breathing; (4) Educate non-pharmacological measures to relieve pain such as distraction; (5) Teaching family members about psychological support for the client; (6) Pain control with painkillers when needed
Physiologic	2) Ineffective respiratory pattern associated with pain at the site of surgery with a symptom of shallow breathing	Training and empowering the patient to correct the respiratory pattern	Secondary	(1) Educate and encourage effective breathing; (2) The use of incentive spirometers; (3) Putting the patient in a semi-sitting position if possible; (4) The use of supplemental oxygen if needed
Physiologic	3) Disorders of skin integrity (after surgery) due to immobility with red skin symptoms	Maintain skin integrity	Primitive	(1) Proper maintenance of wound drainage catheter; (2) Check the performance of the corrugated mattress; (3) Examination and care from surgical wounds to complete healing and suturing; (4) Regular examination of the skin for temperature, color and redness in areas of pressure; (5) Timely change of sheets and promotion of the client's personal health; (6) Change position every two hours; (7) Control of abrasion factors while moving the patient
			Secondary	(1) Early detection of pressure ulcer symptoms; (2) Take care of damaged skin
Physiologic	4) The risk of infection associated with the use of immunosuppressants	Improving the client's ability to prevent and identify opportunistic infections	Primitive	(1) Promoting personal health; (2) Limiting the number of unnecessary postoperative visits and examinations (reverse isolation); (3) Informing the client about how to attend high-risk places and close communication
			Secondary	(1) Monitoring and identification of local signs and symptoms (redness, tenderness and infectious discharge at the site of operation) and systemic signs of infection (increase in body temperature); (2) Monitoring laboratory results of CBC/dif if there are any symptoms
Psychological	5) Concerns and anxieties related to the rejection of the transplanted kidney with signs of concern on the patient's face and his expression	Empowering the patient to control anxiety and worry	Secondary	(1) Provide appointments with successful transplant patients; (2) Teach relaxation techniques and avoid negative mindsets; (3) Encourage the patient to perform artistic activities that she has expressed interest in and that do not interfere with the healing process
Spiritual	6) Disorder of religious bigotry related to receiving a kidney transplant from a person unfamiliar with the symptoms in the patient's speech	Improving the patient's level of awareness and ability to better accept transplanted kidneys	Secondary	(1) Meeting with a kidney donor with religious and cultural values close to the patient's values; (2) Meeting with an expert clergyman in the field of organ transplantation in order to promote the patient's spiritual peace
Physiologic	7) Infertility associated with reproductive system problems	Improving the client's ability	Secondary	(1) Improving the patient's knowledge about the reversibility of sexual function after transplantation; (2) Improving the patient's knowledge about the possibility of getting pregnant 1 year after a successful transplant and normalization of kidney function; (3) Improving the patient's level of knowledge about new methods of pregnancy in people with primary infertility
			Tertiary	(1) Familiarize the patient with successful centers in the field of infertility treatment; (2) Using the positive support of the patient's spouse in reducing anxiety and worry in his wife; (3) Trying on change the attitude of the patient's spouse's family in insisting on her pregnancy

[a] Some nursing diagnoses such as lack of awareness and readiness to increase health literacy due to overlapping interventions with other nursing diagnoses are not included in this table.

with peripheral venous catheter is practical and additionally leads to comprehensively identifying stressors, affecting the client system. Providing proper nursing care for these clients, and the use of this model have been significantly valuable in determining the necessary interventions to rehabilitate the client system under study. Tuareg et al. (cited in Gómez Tovar et al.) (33) also conducted a quantitative and prospective study on 49 inpatient care clients to provide guidance for the evaluation and nursing care of clients in order to prevent delirium. The study found that using guidelines based on Betty Neuman model and evidence-based nursing could prevent up to 94 percent of delirium attacks.

In line with the study of Braga et al. (1), the results obtained in this study can be used to evaluate the impact of nurses or medical teams or inefficient management practices as stressors in the Betty Neuman system model, which are comprehensive benefits. Negro Betty Neuman model is considered in the implementation of nursing process. This factor is not mentioned in other studies (32, 33).

Moreover, contrary to the process of using this model in other studies (32-34), in the present study, the stressors were divided based on the negative or positive effect on the client system, and positive stressors as strengths were used to maintain the balance of the client system in nursing interventions.

4.1. Conclusions

Betty Neuman system model is capable of providing nursing care to patients undergoing kidney transplants and diagnosing internal, external, and interpersonal stressors. This study in the kidney transplant section with a balanced nurse-to-patient ratio performed on other patients, especially the general population, may increase the need for human resources. Also, owing to the need to rebuild and pursue some goals, it is necessary to implement the activation of the community-based nursing system.

Acknowledgments

Footnotes

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