



## Applying Betty Neuman's Nursing Process in the Care of a Patient with Type 2 Diabetes: A case-based approach

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### ABSTRACT

Diabetes can result in severe complications and exacerbations, necessitating acute care. The application of nursing models, such as Neuman's Systems Model, can enhance the quality of care for patients with diabetes. This study aimed to implement the nursing process based on Neuman's Systems Model in patients with type 2 diabetes. The study, conducted in 2024, focused on a 40-year-old female patient with type 2 diabetes. Data were collected through interviews and a review of the patients' medical records. During the study, the interactions among five variables (physiological, psychological, social, developmental, and spiritual) were examined, and stressors were identified at the intrapersonal, interpersonal, and extra personal levels. Nursing diagnoses and perceived stress were determined at three levels of prevention, and nursing interventions were implemented and classified accordingly. The results of the variables, as well as individual, interpersonal, and extrinsic stressors, revealed ten potential and actual nursing diagnoses related to the type of stressor. In conclusion, designing and implementing the nursing process based on the Betty Neuman nursing model in patients with diabetes can lead to an improved understanding of care needs, appropriate, efficient, and evidence-based nursing care, and ultimately reduce frequent referrals to health care systems. Therefore, it is recommended that this model be used for the care of patients with diabetes.

**Keywords:** Diabetes; Nursing process; Betty Neuman's Systems Model

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## Introduction

Diabetes is one of the most prevalent chronic diseases globally, imposing serious and diverse complications on patients and their families [1].

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It is characterized by persistent hyperglycemia and disruptions in the metabolism of carbohydrates, fats, and proteins, resulting in disabling conditions such as cardiovascular disease, nephropathy, retinopathy, and neuropathy [2].

Approximately 537 million individuals are affected worldwide, and projections reveal that the prevalence will increase to 643 million by 2030 and 783 million by 2045 [3]. In Iran, nearly 12% of individuals aged > 19 years and 14–23% of those aged > 30 years live with diabetes [4].

This growing trend highlights the urgent need for disease prevention, early diagnosis, and effective management strategies. Several risk factors, such as obesity, sedentary lifestyle, family history, and age, contribute to its development [5,6].

Lifestyle modifications, such as adopting a healthy diet and engaging in regular physical activity, play crucial roles in diabetes prevention and control [7].

Additionally, patients' knowledge and awareness of proper nutrition, appropriate food selection, strict adherence to therapeutic regimens, foot care, regular exercise, lifestyle modification, and attention to psychological and health-related care significantly influence the regulation of metabolism. These measures prevent short-term complications and delay the progression of long-term diabetes outcomes [8,9].

Diabetes management encompasses the regulation of blood glucose, blood pressure, lipid levels, and body weight, as well as the prevention of disease-related complications. Several strategies have been proposed for diabetes care, including lifestyle modifications, pharmacotherapy, and structured patient education [9].

Patients who receive adequate training regarding their illness generally demonstrate a greater ability to maintain stable glucose levels, adhere to prescribed medications, and prevent adverse consequences of the disease [10–13].

Numerous methods have been recommended to enhance diabetes self-management. For instance, Zare highlighted the effectiveness of a teach-back learning approach in promoting self-efficacy and self-care among individuals with type 2 diabetes [14]. Similarly, Ranaei emphasized the role of e-learning in facilitating lifestyle changes and strengthening self-management in patients with diabetes [15].

However, educational interventions alone are insufficient to ensure sustained improvement in disease knowledge and management. Lifestyle modification interventions that integrate knowledge, attitudes, behavioral changes, and self-care practices remain central to effective diabetes control. Hence,

diabetes care requires a multifaceted, patient- and family centered approach supported by collaborative healthcare teams to address therapeutic and care-related needs [16–18].

Patient education and care must be comprehensive and tailored to individual requirements, including nutrition, physical activity, medication adherence, blood glucose monitoring, and complication prevention [19].

Nursing is acknowledged as a comprehensive scientific discipline when the integration of theory, research, and clinical practice is achieved. Research is regarded by experts as a crucial intermediary between theory and clinical practice, serving as a prerequisite for delivering nursing care [20, 21]. The application of nursing models in patient care is vital as they enable nurses to thoroughly assess patients and make optimal care decisions [22]. Furthermore, the incorporation of nursing theories into the patient care process fortifies the profession, reinforces beliefs, and fulfills the nursing mission. Additionally, these theories contribute to the development of nursing knowledge and facilitate the provision of standardized, evidence-based care to patients [23]. Nursing models offer a theoretical framework for nursing care, with the Newman Systems Model being one such example. This model focuses on an individual's interaction with stress and their response to it [24]. Within this framework, the nurse actively engages in stress management and health improvement by identifying actual and potential stressors and the patient's support systems. The model emphasizes understanding an individual's stress and response, allowing the nurse to implement appropriate interventions to mitigate stress and bolster the individual's defenses against stressors [25]. By adopting a holistic approach that considers various physical, psychological, social, and spiritual dimensions, this model can significantly enhance patients' quality of life [26]. Given the high prevalence of diabetes and the critical importance of its management, the present study aims to implement a nursing process based on Newman's system theory in a patient with type 2 diabetes. This study seeks to advance nursing knowledge in diabetes management and provide more effective care for patients with diabetes.

## Materials and Methods

This case study was performed on a 40-year-old woman with type 2 diabetes at the Diabetes Clinic of the Social Security Hospital in Khorramabad in 2024. The participant attended the clinic and was followed up over a period of three months with bi-weekly sessions.

This project was undertaken as part of an educational activity. Although the study received approval from the Faculty of Nursing and Midwifery Research Council, no formal ethics code was issued. Nevertheless, informed consent was obtained from the patient prior to their participation. Coordination was carried out with the patient, clinic supervisor, and treating physician, and the nursing care process was implemented using Neuman's systems model across the three-month intervention period.

**Initial assessment**

The collected data were analyzed, and nursing diagnoses were determined according to the 2021–2023 North American Nursing Diagnosis Association International (NANDA-I) classification system.

The data were categorized into physiological, psychological, sociocultural, developmental, and spiritual domains.

Based on these categories, appropriate nursing interventions were selected at three levels of prevention (primary, secondary, and tertiary) and were subsequently evaluated. Short-term goals, including initial patient education, knowledge improvement, and self-care skill development, were assessed on the day of training and during subsequent follow-up sessions.

Outcomes, such as reduced anxiety, were monitored through direct observation. Long-term goals, such as the reduction of urinary frequency, improvement of dietary habits, increased physical activity, optimized weight/body mass index (BMI), and sociocultural adjustments, were evaluated over the three-month intervention period.

**Results**

The patient was a 40-year-old married woman employed as an accountant at a private company. She

had no history of illness, medication use, surgery, hospitalization, allergies, or substance abuse.

This was her first visit to the diabetes clinic, where type 2 diabetes was diagnosed during routine blood glucose screening.

Prior to presentation, she had not received any treatment for glycemic control. No acute or chronic symptoms of diabetes were noted. Her family history was remarkable for diabetes in an uncle.

During the first assessment, the fasting blood glucose level measured using a glucometer was 140 mg/dL, and the patient was subsequently referred for confirmatory laboratory tests. Her Hemoglobin A1C (HbA1c) was 7, indicating early glycemic dysregulation. A comprehensive system review was performed, and nursing diagnoses were recorded throughout the three-month care period according to her condition.

The results are summarized in separate tables as perceived stressors based on Neuman's systems model (Table 1), and interventions and evaluations related to the physiological (Table 2), psychological (Table 3), and sociocultural and developmental domains (Table 4).

At baseline, her weight was 70 kg, height was 160 cm, and body mass index (BMI) was 27.34.

At the end of three months, these values improved to 66 kg and a BMI of 25.78. Based on the treating physician's recommendation, the patient was started on metformin 500 mg once daily, which was gradually titrated to 500 mg three times daily within two weeks.

Regarding the spiritual domain as one of the stress dimensions assessed, no nursing diagnosis related to the spiritual aspect was identified for the patient during evaluations.

**Table 1.** Different dimensions of stress perceived by the client based on the Betty Newman model

Type of stressor			Client's problem	Classification	Stress dimension
Extra personal	Interpersonal	Intrapersonal			
		*	Overeating	Digestive system	Physical
		*	Frequent urination	Urinary system	
		*	Dry skin	Skin system	
		*	Lack of movement	Muscular system	
	*	*	Fear and worry about the fate of oneself and family	Fear and anxiety	Psychological
		*	Fear of being continuously hospitalized (the patient was employed and married and was worried that he would encounter problems in these areas if he were to be hospitalized repeatedly)		
	*	*	Sadness for causing trouble for the family		Sociocultural
	*	*	Concerns about the family's economic situation due to the patient's illness and employment	-	
	*	*	Change in tasks	-	
	*	*	Change in self-care process	-	Evolutionary

**Table 2.** Diagnosis, interventions, and evaluation related to the stress dimension (physical)

Evaluation	Intervention	Prevention level			Intervention objectives	Nursing diagnosis
		Tertiary	Secondary	Primary		
<p>She has managed to keep her BMI close to the normal range (25.78) and follows a diet. She followed a balanced and healthy eating pattern in all meals.</p> <p>The patient had a normal urination pattern and did not complain of frequent urination episodes.</p> <p>No dryness, redness, or ulcers were observed on the skin examination</p> <p>The patient walks for approximately 210 minutes on a regular schedule (30 minutes daily) and exercises at the gym three times a week under the supervision of a trainer, based on his job and life circumstances.</p>	<p>The patient's eating habits, including the type, amount, and timing of meals, were reviewed. The patient was educated on balanced nutrition, carbohydrate control, adequate fiber intake, and restriction of saturated fats and simple sugars. An individualized diet plan was also prepared by a nutrition consultant.</p> <p>Accurate recording of the amount and frequency of urination was performed to assess the patient's condition. The patient was instructed to limit fluid intake before bedtime, perform pelvic floor exercises, and avoid caffeine.</p> <p>A detailed examination of the skin was performed for dryness, itching, cracking, and wounds, and education was provided on using appropriate moisturizers, avoiding drying soaps, protecting the skin from environmental factors, using cold compresses, wearing soft cotton clothing, and drinking plenty of fluids as tolerated.</p> <p>The nurse assessed the patient's physical activity levels. The nurse discussed barriers such as fatigue, lack of time, lack of motivation, and concerns about hypoglycemia. She emphasized avoiding prolonged sitting and performing light exercise every 30–60 min and introduced activities such as walking, swimming, and strength training. It was recommended that exercise be started gradually and safely (with 5–10 min of light walking, three times a week, gradually increasing the time). The need for a 5-minute warm-up and cool-down to prevent injury and monitor blood sugar levels before and after exercise, especially if blood sugar levels drop below 100 mg/dL, was emphasized.</p>	*		<p>The client should achieve a weight loss of 5 kg within the next three months, as their BMI approaches 24.9, and follow a balanced and healthy eating pattern (including consuming 5–7 servings of fruits and vegetables daily, reducing their intake of simple sugars and saturated fats, and controlling portion sizes) in at least 80% of their meals.</p> <p>Within three months, the patient will demonstrate a reduction in urinary frequency, with daytime urination decreasing from more than 14 episodes to approximately 6–8 times per day, nocturnal awakenings for urination decreasing from more than twice per night to once or less.</p> <p>Within the next three months, the client is expected to achieve a 50% reduction in skin dryness and itching, as measured by the 0–10 pruritus severity scale, and no new skin lesions or infections should develop in high-risk areas (such as the feet and skin folds).</p> <p>The client should regularly increase her physical activity level over the next three months to at least 150 minutes per week of moderate-intensity aerobic activity (such as brisk walking) on 3 to 5 days per week.</p>	<p>Imbalanced nutrition: more than body requirements, related to overeating</p> <p>Impaired urinary elimination manifested as urinary frequency, related to polyuria secondary to hyperglycemia.</p> <p>Impaired skin integrity manifested as skin dryness, related to dehydration</p> <p>Sedentary lifestyle associated with inactivity</p>	

Table 3. Diagnosis, interventions, and evaluation related to the stress dimension (psychological)

Evaluation	Intervention	Prevention level			Intervention objectives	Nursing diagnosis
		Tertiary	Secondary	Primary		
	<p>The patient was educated on the effects of diabetes on the body, as well as the signs and symptoms of hyperglycemia and hypoglycemia. The proper use of a glucometer and recording of results were taught, and the patient implemented it once in practice. The importance of regular medical follow-ups and periodic tests, such as HbA1c, blood lipids, and eye and foot examinations, was explained. To ensure comprehension, the patient was asked to verbally summarize the information in their own words. Additional instructions were provided on regular blood glucose monitoring (at least twice daily, before meals and two hours after) and correct medication administration, including drug name, dosage, timing, and potential side effects.</p>		*		<p>By the end of each session, the patient will accurately explain and implement at least 80% of the key information provided regarding the diabetes disease process and self-care management.</p>	<p>Lack of sufficient knowledge regarding self-care process</p>
<p>The patient knows approximately 90% of the necessary information about the disease and the process of taking care of herself</p>	<p>Deep and diaphragmatic breathing techniques were taught. The patient was connected to others who had successfully managed the disease. Education and awareness regarding the illness, its treatment, and self-management strategies were also provided</p>		*		<p>Within three months, the patient will reduce fear and anxiety related to diabetes management to a score of 3 or lower on a 0–10 numeric scale.</p>	<p>Fear and anxiety related to engagement with the disease management process</p>
<p>The patient's fear and anxiety were largely controlled, and at the end of the intervention period, the patient rated their stress level as 1 on a 0–10 scale.</p> <p>The patient and family experienced reduced anxiety through increased expression of their concerns and fears. By enhancing their knowledge of the disease, they could improve their coping and adaptability.</p>	<p>The patient and family were encouraged to express their fears and concerns, and their emotions were acknowledged. Emotional support and attention were provided to facilitate adaptation to the disease process with adequate support from family members. In cases where these strategies did not yield positive outcomes, counseling sessions were scheduled.</p>		*		<p>Within three months, the patient will be able to express fears and concerns through discussions with the family and nurse, resulting in at least a 2-point reduction in self-reported fear and anxiety on a 0–10 numeric scale.</p>	<p>Ineffective coping with fear of the unknown</p>

Table 4. Diagnosis, interventions, and evaluation related to the stress dimension (cultural-social and developmental)

Evaluation	Intervention	Prevention level			Intervention objectives	Nursing diagnosis
		Tertiary	Secondary	Primary		
<p>Currently, the patient exhibits no impairment in role performance and is fulfilling all assigned roles accurately and according to the designated responsibilities.</p> <p>The patient and family actively engaged in disease-related discussions, asked relevant questions, and sought accurate information regarding the disease. They rated their adaptation level as 9 on a 0–10 scale.</p> <p>The patient and family members openly express their feelings. The family provides assistance with the patient's tasks as needed and is present to support and understand the patient. The patient successfully completed all assigned responsibilities independently.</p>	<p>The patient was instructed to communicate with the nurse or psychologist regarding any issues related to role performance. Educational videos and podcasts were used as supportive learning resources.</p> <p>Assessing changes in family processes, evaluating role-related communication patterns within the family, and communicating with patient and caregivers to facilitate acceptance and adaptation to the illness.</p> <p>The patient and family were supported to maintain a realistic perspective of the patient's situation while sustaining an appropriate level of hope for the future. Private time was provided for family members to express their feelings. Environmental stressors, including individuals, objects, and stressful situations, were minimized. The patient and family were given opportunities to express their grief and sadness. Interventions were implemented considering the patient's readiness and emotional condition, and the patient's responses to the therapeutic measures were monitored and identified.</p>	*	*	*	<p>Within the next three months, the patient demonstrates no new or significant disruptions in the primary life roles (e.g., spouse, parent, employee), in relation to the maintaining at least 80% of disease responsibilities and the expectations associated with these roles as before the illness.</p> <p>Within three months, the patient will achieve a score of 7 or higher on a 0–10 numeric scale measuring adaptation to assigned life roles.</p> <p>Within the next three months, the patient and family members will demonstrate no signs of ineffective coping with the diabetes disease process (e.g., denial, social withdrawal, non-adherence to treatment) and will actively perform at least 90% of the responsibilities related to disease management.</p>	<p>Possibility of role process disturbance in relation to the disease (social-cultural)</p> <p>Role model disruption related to illness management manifested as fear of the inability to fulfill responsibilities.</p> <p>Potential for maladaptive coping of the patient and family with disease progression</p>

## Discussion

This study aimed to implement a nursing process based on Betty Neuman's Systems Theory. The results indicated that applying nursing theories, especially Neuman's Systems Model, enhances the quality of care. Oshvandi et al. demonstrated that comprehensive data collection, assessment of interactions among five variables (physiological, psychological, social, developmental, and spiritual), as well as consideration of stressors and resources across different domains, facilitated the identification of nursing diagnoses according to NANDA classification. This approach ultimately improved the care process and increased patient satisfaction [27].

In the present study, patient stress decreased following the interventions and the nursing process, which is consistent with the results of Khatiban et al. [28], who demonstrated that identifying stressors among nurses, patients, and their families and providing appropriate strategies can contribute to improved treatment outcomes, enhanced care, and reduced stress in these groups. Furthermore, the role of the family in improving patient condition and alleviating stress was highlighted, which aligns with the study results of Grant et al. emphasizing the family as a key factor in patient recovery [29].

This study demonstrated that most nursing interventions were primarily focused on secondary prevention, with comparatively less attention paid to primary and tertiary prevention. Additionally, Sadat Hosseini et al. reported that nursing care in Iran is generally delivered at the secondary prevention level. Therefore, it can be inferred that nursing practice in Iran is limited compared to Betty Neuman's holistic and comprehensive theory, which encompasses all levels of prevention [30]. In this study, nursing diagnoses were determined based on Neuman's theory, and the nursing process was implemented accordingly, illustrating that the model facilitates proper execution of the nursing process. Similarly, in the study by Ahmadi et al., following the identification of 12 nursing diagnoses, preventive interventions were carried out for patients with multiple sclerosis, demonstrating the appropriateness of applying this model in patient care [31].

In the present study, intrapersonal, interpersonal, and extra personal stressors were identified, which clarified the sources of patient stress and enabled the development of targeted interventions. Similarly, Barga et al. identified patients' intrapersonal, interpersonal, and extra personal stressors using the Neuman model, followed by planning and

implementing nursing care across preventive levels, which contributed to improved care and reduced complications related to peripheral venous catheters [32]. Furthermore, Ryan et al. highlighted that applying Betty Neuman's model is effective in recognizing stressors and delivering appropriate preventive interventions for smoking [33]. In the present study, communication and active listening were employed with both the patient and her family as strategies to reduce stress. Furthermore, Tustonja demonstrated that active listening plays a pivotal role in strengthening meaningful communication and fostering positive interactions [34]. Despite the significance of diabetes management and its high prevalence, this study had some limitations.

However, owing to its case-based design and the inclusion of only one participant, the generalizability of its methods and results remains limited. Individual patient factors, such as age, sex, socioeconomic status, comorbidities, and disease duration, may also have influenced the results. Furthermore, Neuman's Systems Model, as many diabetes-related changes require extended observation periods. Therefore, future studies with larger sample sizes and longer follow-up durations are recommended to evaluate the effectiveness of this model more accurately.

## Conclusion

The present study demonstrated that implementing the nursing process based on Neuman's Systems Model provides a comprehensive perspective for addressing the multifaceted physical, psychological, and social needs of patients with diabetes mellitus. This approach enables nurses to identify patient requirements more precisely and plan and deliver appropriate and effective care. The model offers a systematic and clinically evidence-based structure for nursing practice, thereby enhancing the quality of patient-centered nursing care. Moreover, Neuman's model reinforces the central role of nurses in recognizing and responding to patients' needs, empowering them to provide holistic care. Importantly, this process improves nursing performance in preventing diabetes-related complications at the primary, secondary, and tertiary levels while supporting families in disease management. Overall, the results suggest that the Neuman-based nursing process represents an effective strategy for advancing evidence-informed comprehensive care to improve health outcomes in patients with diabetes mellitus.

## Authorship contribution statement

Conceptualization: FMR. and HH. Writing- original draft: FMR. Writing- review and editing: HH, KK. and FV Supervision: HH. All authors have read and agreed to the publish the manuscript.

## Ethical Consideration

This project was undertaken as part of an educational activity. Although the study received approval from the Faculty of Nursing and Midwifery Research Council, no formal ethics code was issued. Nevertheless, informed consent was obtained from the patient prior to their participation.

## Declaration of Competing Interest

No conflict of interests

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## Data Availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request

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