

APPLYING BETTY NEUMAN SYSTEMS MODEL IN THE MANAGEMENT OF A PATIENT WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

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Abstract

Chronic Obstructive Pulmonary Disease (COPD) is a progressive respiratory disorder characterized by persistent airflow limitation that significantly affects physical functioning, psychological well-being, and quality of life. Recurrent acute exacerbations are among the leading causes of hospitalization, disability, and mortality in individuals living with COPD. Effective management requires a comprehensive nursing approach that addresses physiological, psychological, sociocultural, developmental, and environmental factors influencing patient outcomes. Betty Neuman's Systems Model provides a holistic framework for understanding patients as open systems continuously interacting with internal and external stressors. This case report demonstrates the application of Betty Neuman's Systems Model in managing a patient admitted with an acute exacerbation of COPD. The patient experienced worsening respiratory symptoms due to multiple stressors, including respiratory infection, previous smoking history, air pollution exposure, poor medication adherence, anxiety, and financial constraints. Comprehensive nursing assessment identified intrapersonal, interpersonal, and extra personal stressors that disrupted the patient's normal line of defence. Nursing interventions were planned according to Neuman's primary, secondary, and tertiary prevention strategies to restore system stability, reduce stressor impact, and promote recovery. Following implementation of individualized nursing care, the patient demonstrated improvement in respiratory status, treatment adherence, symptom management, and confidence in self-care. This case highlights the value of integrating Betty Neuman's Systems Model into clinical nursing practice to provide holistic, evidence-based, and patient-centered care for individuals with chronic respiratory diseases.

INTRODUCTION

Application of Nursing Theory into practice
(Betty Neuman's System model)

"This case study aims to discuss a clinical case

scenario with the systematic application of Betty Neuman's Systems Model to guide nursing assessment and interventions".

1. Case Scenario

A 42-year-old male patient admitted in the Medicine ward reporting along with symptoms of acute respiratory distress with 4-year history of Chronic Obstructive Pulmonary Disease (COPD) and known case of hypertension. The patient's family history was a rapid onset 48 hours of productive cough, purulent sputum, and progressive dyspnea with a history of upper respiratory tract infection.

Clinically, the patient had severe air hunger, accessory muscle activity, audible wheezing, and a significant concern about his compromised air hunger. Vital signs at admission were extremely unstable with severe tachypnea (34 breaths per minute), a critically low SPO₂ (85% on room air), tachycardia (114 beats per minute), and elevated blood pressure (142/90 mmHg).

That sudden infective trigger coupled with chronic environmental exposure and lack of therapeutic compliance resulted in a critical shift in the patient's physiological baseline. This is a clinical situation of significant system instability with acute biological, environmental and social factors accumulating, placing the patient at immediate risk of respiratory failure.

2. Problem Questions

After a thorough clinical evaluation and theoretical analysis of this scenario, the following important questions emerge in relation to the application of Betty Neuman's Systems Model:

- What are the tools to assess acute stressors vs chronic stressors that are outside the patient (extra-personal)?
- What is the effect of chronic extra-personal stressors (dust exposure and financial constraints) on the patient's normal line of defense?
- Which of the following immediate secondary preventions will help to protect the main structure from falling apart because of acute respiratory acidosis?
- What are some nursing interventions that can help alleviate intrapersonal anxiety to decrease metabolic needs and to calm volatile vital signs?

- What can tertiary prevention strategies do to facilitate systemic reconstitution and long-term adaptation to a chronic COPD baseline?

3. Hypothesis

The use of the Betty Neuman Systems Model in clinical practice will statistically and clinically significantly improve the systemic stability and stressor-coping mechanisms of the patient in chronic COPD management.

4. Overview of Theory Application

Theoretical Analysis Using Neuman's Systems Model:

The use of Neuman's Systems Model in this clinical case demonstrates an extreme level of dis-stability in the patient's system. The patient is a 32-year-old man with a complex medical history of Chronic Obstructive Pulmonary Disease (COPD) and Hypertension; at the Core Structure, the basic survival factors are significantly compromised. The current environment system of the client is facing numerous and interacting stressors. Interpersonally, the patient is in a state of acute respiratory acidosis, active infection and severe anxiety. Psychologically, there is a stress in the family about the family welfare because of the debilitating nature of the illness. Chronically, the system is challenged by the extra-personalities, daily occupational dust exposure and severe financial constraints.

These background stressors had a significant effect on the patient's Lines of Defense. The flexible and normal lines of defense had already been disrupted by chronic exposure to occupational dust, and financial insecurity, which directly led to medication non-adherence. Thus, an acute environmental trigger easily overcame these defenses, and triggered a serious physiological crisis, threatening the stability of the core system.

Nursing interventions are organized at Neuman's

levels of prevention to restore stability and aid in reconstitution. Secondary Prevention is aimed at immediate stabilization during the acute phase,

employing BiPAP therapy, aggressive nebulization, intravenous antibiotic therapy and therapeutic communication to alleviate severe anxiety. After stabilization, Tertiary Prevention measures are undertaken during discharge planning to keep the system well and to avoid future introduction of stressor(s). It covers detailed training in the correct use of inhalers, guidelines for dust safety at work, and referral to welfare services for provision of inexpensive inhalers, all to assist with long-term inhalation.

Clinical Application of Neuman's Systems Model:

The Neuman Systems Model is a holistic, all-inclusive model where the patient is viewed as an open system interacting with multiple stressors within the environment. This framework evaluates and controls five variables that interact: physiological, psychological, sociocultural, developmental and spiritual, and applies targeted prevention levels to keep the system in balance.

On clinical observation, the patient's acute respiratory infection and severe dyspnea, as well as the intense feeling of death, were recognized as intrapersonal stressors which directly threatened the core physiological structure, namely acute stress. Intense death anxiety, acute respiratory infection and severe dyspnea were observed as critical intrapersonal stressors, which directly threatened the core physiological structure, namely acute stress. To counteract this breach, Secondary Prevention interventions were immediately implemented. Digital clinical decision support was used to titrate non-invasive positive pressure ventilation (BiPAP) therapy, nebulize bronchodilators and adjust intravenous antibiotic administration to rapidly optimize gas exchange and maintain core parameters. At the same time, the psychological component was dealt with through the use of structured therapeutic communication which effectively reduced anxiety and the respiratory drive.

The patient's interpersonal and extra-personal stressors were evaluated following comprehensive assessment, which included the family's uncertainty about home care management,

frequent occupational dust exposure with his position as a school administrator, and socioeconomic financial barriers leading to full maintenance inhaler non-adherence. Taking the next step to address these systemic weaknesses, Tertiary Prevention interventions were carried out to ensure optimal reconstitution. Hands-on return demonstration education was offered to the patient and his wife about proper inhaler delivery, energy conservation training was offered, and an arrangement was made for a strategic referral to social welfare services to remove the financial barriers to medication access.

5. Discussion

This high-acuity situation highlights the high impact that Neuman's Systems Model can have for the clinical application of nursing, as it can serve as a more encompassing approach than using a biomedical-based model. The client system's defense mechanisms, which are protecting the 32-year-old male, can be systematically analyzed to help with the stabilization and recovery of the client.

As the outermost protective buffer, Flexible Line of Defense was severely weakened prior to admission. This first layer was not sufficient because the patient's 3-month history of total lack of adherence to maintenance inhalers, coupled with ongoing exposure to dust at work due to campus renovations, had left it vulnerable. Thus, a sudden, intense URTI became a powerful environmental stressor and easily broke through this outer barrier in just 48 hours.

The patient's normal state of good health has been structurally altered for 4 years by a history of chronic obstructive pulmonary disease (COPD) and controlled hypertension. As soon as the acute biological trigger attacked the flexible layer, it was able to immediately impact the normal line of defense, causing a high degree of physiological instability. This was seen as being severe tachypnoea (34 breaths per minute), oxygen saturation (SpO₂) on room air 85%, tachycardia (114 beats per minute) and high BP (142/90 mmHg).

After successful passage of the normal line of defense, the patient's core biological structure was directly attacked by acute respiratory acidosis and secondary pulmonary infection. The body's internal lines of resistance were activated to protect survival factors deemed essential to the body. The simultaneous onset of an intrapersonal psychological stressor, however, in the form of high death anxiety, was associated with high demands for oxygen consumption, which if not controlled could lead to immediate failure of the respiratory system and collapse of the core structures.

Objective algorithmic data seamlessly integrated with systemic nursing care, using digital clinical decision support (CDS) tools at the bedside to implement Secondary Prevention strategies with high precision. Targeted BiPAP, nebulization and IV antibiotic therapy helped to support the internal lines of resistance to correct the SpO₂ of 85% and respiratory acidosis. At the same time, using a structured therapeutic communication to mitigate the psychological panic reduced the HR from 114 bpm, thus avoiding a critical increase in the metabolic demand.

In addition, the clinical usefulness of the model in the management of progressive chronic diseases is demonstrated in the way the model moves from emergency secondary stabilization to long-term Tertiary Prevention. As there is no cure

for COPD, an advanced nursing role is to focus on the patient's functional capacity given his/her limitations. Social support coordination and targeted worksite education during the discharge planning phase provided an active form of socioeconomic and environmental stress management that helped to strengthen and fortify the patient's natural line of defense to prevent future environmental challenges from causing a breach in the system, thereby re-establishing long-term system balance.

6. Conclusion

Finally, this case study illustrates that with systematic implementation of advanced nursing frameworks, there is no theory-practice gap. The patient's clinical status changed drastically and is proof of the effectiveness of the Neuman Systems Model. A new three-tiered, synchronized approach to nursing care was effective in moving beyond a symptomatic approach to a wellness approach to clinical care. Optimal reconstitution and long-term systemic equilibrium were successfully realized through the implementation of secondary and tertiary preventions to protect the core structure during the acute crisis and to reconstruct the flexible and normal lines of defense against occupational dust and financial barriers.

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