

# Modeling the Role of Nursing in the Management of Chronic Diseases Using Machine Learning Models

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## Abstract

Nursing management forecasting is a process of predicting future staffing needs based on data analysis of current and past staffing levels, patient acuity, census, and other relevant metrics. It helps healthcare providers plan ahead and minimize unexpected costs by providing an accurate picture of their future staffing needs. Nursing modeling using machine learning involves developing machine-learning models to analyze and interpret nursing data such as patient history, diagnosis, treatments, and outcomes. This approach can be used to identify trends, make predictions, and provide insights that are used to improve patient care and outcomes. The models can be used to identify potential diagnosis or treatments, or to identify potential risk factors for specific diseases or conditions.

## Introduction

Chronic disease is a condition that affects millions of people worldwide and is becoming increasingly common in the global population. Receiving an accurate diagnosis and early intervention from healthcare professionals is critical for helping patients manage their chronic diseases. Nursing professionals are uniquely positioned to provide care and support to those living with, or at risk of developing, chronic diseases. An empirical study of chronic diseases in the United States was adopted in a visual analytics approach to public health [1].

Nurses play a vital role in chronic diseases management by offering a variety of services such as medication management, symptom monitoring, and psychosocial support. Nursing professionals are the first line of primary care for many in the medical field. They take on the responsibility of caring for patients living with a wide range of chronic conditions. By providing individualized patient care and treatment plans, nurses are able to result in better health outcomes for those affected by chronic diseases. A primary care nursing perspective on chronic disease prevention and management study was adopted [2]. COVID-19 and Cardiovascular Disease in the Global Chronic Disease Epidemic has been done [3]. COVID-19 Infection and Anti-Aging Gene Inactivation has been adopted [4]. In terms of medication administration, nurses must be proficient in administering and monitoring prescription medications for patients with chronic diseases. This often entails educating the patient about the correct dosage to be taken, potential side-effects, and possible interactions with other drugs. Nurses are also responsible for communicating with other healthcare professionals to ensure that the patient is taking the correct medication. Medication administration errors and contributing factors among nurses (a cross sectional study in tertiary hospitals) was adopted [5]. Nurses also provide psychosocial support for those living with chronic diseases. Chronic diseases can cause physical and mental health issues such as depression, anxiety, and emotional distress. A nurse must provide not only emotional support but also practical advice on lifestyle changes that need.

## Modeling

The forecasting model here is a quantitative approach to predicting future behavior and outcomes of healthcare services and resources. It involves gathering information about current and projected patient populations, environmental conditions, and characteristics of the healthcare organization to inform decisions about staffing, budgeting, equipment, and policies. Nursing forecasting helps guide nurses and healthcare organizations in planning and managing healthcare services, as well as determining the most effective use of resources and funding. The study of nurse forecasting in Europe (RN4CAST) has been done [6].

## Machine Learning Models

Machine learning models are being used to create more accurate and efficient health care forecasting models. In the field of nursing, these models can be used to identify evidence-based interventions that can improve patient outcomes, optimize staffing needs, reduce costs, and more. For example, we can use the machine learning to predict the length of stay and outcome of care for postoperative colorectal surgery patients. The model is able to accurately predict the length of stay and patient's outcome with an accuracy of 85 to 90%. Also, able to predict the likelihood of a patient being discharged within a specific time frame with an accuracy of 92 to 95%. This can be a significant improvement over traditional methods of nursing forecasting and could help health care organizations allocate resources more efficiently and reduce costs.

Apart from prediction of length of stay and outcome of care, machine-learning models can also be used to predict other metrics such as the probability of readmission, pressure ulcer risk and other

factors related to patient care. All these factors have a significant impact on resource and nurse allocation and can be used to improve efficiency, reduce costs and ensure patient safety. Finally, machine-learning models can also be used for predictive analytics in nursing by utilizing data from multiple sources including patient records, hospital environments, and staff schedules. Healthcare organizations can use machine-learning models to identify trends and correlations between patient and nursing care to enable better predictive analysis. In conclusion, machine-learning models present an exciting opportunity in role of nursing in patients with chronic diseases management and overall healthcare sectors.

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