

Midocean University
College of Business Administration

**The Impact of Clinical Resource Optimization on
Cost Reduction in Intensive Care Units in Saudi
Arabia**

Prepared by: Mohammed Almesned

Supervised by: Dr. Fayez Jrad

Academic Year: 2026

Introduction

Intensive Care Units (ICUs) represent one of the most resource intensive environments within modern hospitals. They require specialized healthcare professionals, advanced life support equipment, and continuous patient monitoring. As global healthcare expenditures continue to rise, hospitals are under increasing pressure to optimize the use of clinical resources while maintaining high standards of patient care. In Saudi Arabia, healthcare spending has expanded significantly due to population growth, technological advancement, and the expansion of public healthcare services. Under Saudi Vision 2030, improving healthcare efficiency and reducing unnecessary expenditures have become strategic national priorities. Optimizing the use of clinical resources in ICU departments including medication utilization and respiratory equipment management may contribute significantly to cost reduction and healthcare sustainability.

Problem Statement

Despite substantial financial investments in hospital infrastructure, ICU departments often face inefficiencies in resource utilization. These inefficiencies may include unnecessary medication administration, prolonged use of respiratory support equipment without clear clinical indications, and limited administrative monitoring of resource allocation. Such practices may increase operational costs without necessarily improving patient outcomes. Therefore, there is a need to examine whether improving clinical resource utilization can contribute to measurable cost reduction in ICU settings within Saudi hospitals.

Importance of the Study

Scientific Importance: This study contributes to the academic literature in healthcare management by examining the relationship between clinical resource optimization and financial efficiency in critical care environments.

Practical Importance: The findings may assist hospital administrators and healthcare policymakers in developing strategies to improve ICU resource management, reduce unnecessary spending, and enhance operational efficiency in Saudi hospitals.

Objectives of the Study

1. Analyze the impact of clinical resource optimization on cost reduction in ICUs.
2. Measure the extent of unnecessary medication utilization in ICU environments.
3. Assess the utilization patterns of respiratory equipment in ICU departments.
4. Examine the relationship between resource optimization policies and financial efficiency.
5. Provide recommendations to improve ICU cost management practices.

Research Questions

1. To what extent does medication utilization influence ICU operational costs?
2. How does respiratory equipment utilization affect ICU financial efficiency?
3. What is the relationship between clinical resource optimization and ICU cost reduction?
4. What management strategies can improve ICU resource efficiency?

Research Hypotheses

H1: Clinical resource optimization has a statistically significant impact on ICU cost reduction.

H1a: Efficient medication utilization contributes positively to ICU cost reduction.

H1b: Improved respiratory equipment utilization enhances financial efficiency.

H0: There is no statistically significant relationship between clinical resource optimization and ICU cost reduction.

Previous Studies

Kaplan and Porter (2016) emphasized the importance of value based healthcare systems in improving hospital cost management and reducing unnecessary healthcare expenditures.

Rapoport et al. (2018) examined ICU resource utilization and concluded that inefficient clinical practices including prolonged equipment use and unnecessary treatments contribute substantially to hospital expenses.

Kahn et al. (2017) analyzed ICU operational efficiency and found that better coordination of clinical resources can improve patient outcomes and hospital financial sustainability.

Halpern and Pastores (2015) highlighted that critical care services account for a large portion of hospital expenditures, emphasizing the importance of optimizing ICU resource allocation.

Al Saeed (2021) examined healthcare cost efficiency in Saudi hospitals and concluded that improved management of clinical resources can reduce unnecessary operational spending.

Research Gap

Although previous studies have examined hospital cost management and ICU efficiency, limited research has explored the relationship between clinical resource optimization and cost reduction in ICU environments in Saudi Arabia. This study aims to address this gap by examining how optimizing medication and respiratory equipment utilization may influence ICU financial efficiency in Saudi public hospitals.

Theoretical Framework

This study is based on healthcare resource management theory and cost efficiency theory. These theories suggest that effective allocation and utilization of resources improves organizational performance and reduces operational costs. Applying these theories to ICU environments allows this research to examine how clinical resource utilization influences hospital financial efficiency.

Methodology

This study adopts a quantitative descriptive analytical research design. Data will be collected using a structured questionnaire distributed to healthcare professionals working in ICU departments in Saudi public hospitals.

Population and Sample

The study population consists of healthcare professionals working in Intensive Care Units in public hospitals across Saudi Arabia. A random sample of approximately 120 to 150 participants will be selected from hospitals in Riyadh, Jeddah, and Dammam.

Research Tools

The primary data collection tool will be a structured questionnaire consisting of demographic information and Likert scale questions evaluating clinical resource utilization and ICU cost management practices. Reliability will be tested using Cronbach Alpha.

Statistical Analysis

Data will be analyzed using SPSS software. Statistical methods will include descriptive statistics, Pearson correlation analysis, multiple regression analysis, and T tests or ANOVA where appropriate.

Study Limitations

The study is limited to ICU healthcare professionals working in Saudi public hospitals and data collected during the year 2026.

References

- Kaplan R and Porter M 2016 How to solve the cost crisis in health care Harvard Business Review
- Rapoport J Teres D Zhao Y and Lemeshow S 2018 Resource utilization in intensive care units Critical Care Medicine
- Kahn J et al 2017 ICU resource utilization and outcomes American Journal of Respiratory and Critical Care Medicine
- Halpern N and Pastores S 2015 Critical care medicine in the United States Critical Care Medicine
- Al Saeed M 2021 Healthcare cost efficiency in Saudi hospitals Journal of Health Management
- Porter M 2010 What is value in health care New England Journal of Medicine

Pronovost P 2016 Improving ICU quality and efficiency JAMA

Bodenheimer T 2017 High and rising health care costs Annals of Internal Medicine

OECD 2020 Health at a Glance

World Health Organization 2022 Global health expenditure report

Almalki M 2019 Health care system in Saudi Arabia Eastern Mediterranean Health Journal

Alshuwaikhat H and Abubakar I 2020 Sustainable development in Saudi Arabia Sustainability

Bohmer R 2018 The challenge of hospital cost control Harvard Business School

Shortell S 2017 Healthcare management and efficiency Health Services Research

Drummond M 2015 Methods for the economic evaluation of health care programmes