Enhancing Efficiency in Hospital Supply Chains: A Project on Material Planning Optimization through Centralized Procurement

1. Introduction

Hospitals rely on a complex supply chain to deliver essential medical supplies for patient care. Inefficiencies in this system can lead to stockouts, expired materials, and increased costs. This project aims to investigate the effectiveness of centralized procurement in optimizing material planning and enhancing overall hospital supply chain efficiency.

2. Research Question

a) Which factors act as major drivers of material planning and procurement in hospital supply chains?
b) What are the implications of centralized procurement on material planning optimization and supply chain performance in hospitals?
c) What are the best practices and strategies in enhancing inventory management, warehouse operations, and vendor performance of the supply chain in a hospital setting?

3. Objectives

To identify and analyze the critical factors influencing material planning and procurement within hospital supply chains.

To explore the impact of centralized procurement on the efficiency and effectiveness of material planning processes.

To develop actionable insights and recommendations for improving procurement practices in hospital settings.

To contribute to the body of knowledge in healthcare supply chain management and provide practical guidance for healthcare administrators and supply chain professionals.

4. Hypothesis

Centralized procurement exerts a positive effect on material planning optimization and supply chain efficiency in hospitals.

SAP software implementation enhances inventory management and operational performance of hospital supply chains.

ABC analysis is a valuable tool in focusing inventory control effort on the right items so that inventory turnover rates can be improved in the hospital supply chain.

5. Material and Methods

This section describes the research design, setting, participants, data collection procedures, and analysis plan for the study on establishing the effect of centralized procurement on hospital supply chains.

Study Design:

• **Observational, Retrospective Cohort Study:** This study will observe existing data on hospitals that have already implemented centralized procurement to assess its impact on their supply chains.

Setting:

• A combination of types of hospitals, such as urban, rural, teaching, and not-for-teaching, shall be included in this research in a region so that proper representation may be derived.

Study Population

• Inclusion Criteria:

- The acute care hospitals that have implemented centralized procurement in the last two years.
- The target hospital uses a computerized inventory management system
- The willingness of the facility to provide data related to the procurement practices, inventory levels, and supply chain performance metrics for this study

Exclusion criteria:

- Those hospitals that have experienced significant changes in the volume of patients treated or services offered since the start of the study period.
- Any hospitals whose procurement and inventory management data is incomplete or unreliable.

Study Instrument:

A standardized data collection form will be developed to capture:

- Hospital information; size, location, teaching status
- Centralized procurement data, duration, coverage
- Inventory management data, use of the ABC analysis
- Supply chain performance indicators, inventory turns, stock out rates

Study Duration:
3 months

Sample Size:

• An a priori sample size calculation will be done using relevant software. We want to have adequate statistical power to detect a medium effect size of the primary outcome variable, which may be represented by an inventory turnover ratio. This will yield a target sample size for [specify target number, for example 50 hospitals].

Sampling Technique:
Stratified random sampling: The hospitals will be stratified with respect to size and geographical location to ensure good representation within the study setting. A random sample of hospitals from each stratum will then be selected.

Data Collection Procedure:
The data shall be collected from the following methods:

a) Review of existing medical records: extraction of existing electronic hospital data on the procurement activities, inventory levels and the supply chain performance.

- **Online Questionnaires:** Invitations to answer a web-based questionnaire will be extended to obtain further information concerning practices and experiences from key people involved in procurement and inventory management.

Operational Definitions:

• **Centralized Procurement:** A process consisting of the standardized structure from which purchases of supplies should take place at all sub-departments of a hospital system.

• **Inventory Turnover Ratio**: The number of times inventory is sold and replaced within a given period, such as a year.

• **Stock-out Rate:** The frequency on the number of times that a requested item is not available in stock when needed.

Proposed Data Analysis Plan

- The data will be entered and analyzed in a statistical software such as SPSS or STATA.
- Descriptive statistics will be done to describe the characteristics of the study sample and important variables.
- Bivariate analyses shall be conducted to test the relationship between centralized procurement practice and supply chain performance metric variables.
- In multivariate analyses, which include regression analysis, potential confounding variables will be accounted for and establish an independent relationship.
- A value of alpha = 0.05 will be considered significant.