

Project Title

Medical Equipment Supply and Maintenance

Milestone 1

Problem Definition

Group 8

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Problem Setting:

In healthcare facilities, for systematic operation of medical equipment, supply and maintenance is of great importance as it contributes to patient care and safety. Inadequate supply or maintenance can result in frequent disruptions to critical healthcare services, compromising patient care and increasing operational costs. Recently, a large urban hospital experienced multiple disruptions in its critical medical equipments like MRI machines, CT scanners and life-support systems which resulted in cancelled surgeries and care delays. Therefore, to avoid such situations, proactive maintenance needs to be enforced in healthcare facilities ensuring equipment reliability and minimizing downtime.

Problem definition:

A real-world challenge faced by the healthcare domain is continuous and reliable availability of equipments. To address the comprehensive management of medical equipment, we integrate supply chain principles in healthcare facilities. To ensure that the supply and maintenance is smooth, we aim to analyze the data primarily focusing on supplier details, revenue generation, maintenance logs, hospitals/ healthcare facilities supplied to, equipment inventory, maintenance scheduling, patient information, allocation of equipments to various departments, and user access records.

Objective:

This project seeks to develop a data driven solution to implement medical equipment supply and maintenance system which ensures consistency of availability, operational efficiency, improve patient care quality and reduce operational costs.

End-Goal:

Transforming the hospitals supply and maintenance practices in order ensure enhanced patient care, data driven healthcare allowing more informed decision making in equipment handling and maintenance, mitigating compliance risks and improving the hospital reputation and patient satisfaction. Through this, we aim to understand:

- how medical equipment is used (whether it is overutilized or underutilized) across various departments within the facilities.
- predict maintenance requirements in advance to avoid delays.
- monitor supply chain process.
- resource allocation and cost optimization
- impact on patient care
- identify any breaches of access and usage of equipment.

Data sources:

1. Utilization and Payment data of medical supplies and equipment -> This dataset will be used to give us an insight into the usage and payment of supplies and equipment and contains the name, address of the supplier and user, category of supply and equipment, amount of supplies and the cost:

<https://data.world/johnsnowlabs/utilization-and-payment-data-medical-equipment-and-supplies-2013>

2. Medical durability Data -> This contains the category and indicators (categories) if which are unlikely medical from the dataset. We can use this to differentiate which fall in the category and which don't in segregating the supplies:

<https://data.world/johnsnowlabs/medically-unlikely-edits-durable-medical-equipment-supplier-services>

3. Medical Equipment line items -> Here, we can find the list of medical equipments from Medicare claims. This dataset helps in understanding the utilization to make estimate for future planning. It has all the equipments used, the quantity, the amount per user and information about the patient:

<https://data.world/johnsnowlabs/bsa-durable-medical-equipment-line-items-puf>

4. Patient generation tool -> This tool gives us realistic patient data which contains the patient details, the devices used by them, the procedures, the organizations involved, the suppliers, the payers, the transitions and the medication:

Patient simulation tool: <https://synthetichealth.github.io/synthea/>

5. Medical equipment Spare -> This dataset has the medical spares inventory which helps us to identify the maintenance requirements, the procedures, the risks involved and the security measures which need to be taken:

<https://www.kaggle.com/datasets/mohdkhidir/medical-equipment-spares-inventories-datasets>