Hospital Patient Care & Operational Analysis

1. Project Overview

This project analyzes hospital patient data containing over **101,700 records** to uncover insights into patient acuity, clinical resource utilization, and hospital operational efficiency. The goal is to identify patterns in patient stays and medication management to improve healthcare delivery and resource allocation.

2. Dataset Summary

- **Rows:** 101,766
- **Columns:** 49
- **Key Features:**
    - **Patient Demographics:** Age, Gender, Race.
    - **Clinical Metrics:** Time in Hospital, Number of Lab Procedures, Number of Medications.
    - **Operational Data:** Admission Type, Discharge Disposition, Historical Loss, Nurse Required Count.
    - **Medical Details:** Diagnosis codes (diag_1, diag_2, diag_3), Glucose Serum results, A1C results, and Change in Diabetes Medication.

3. Exploratory Data Analysis using Python

Initial data preparation and cleaning were performed to ensure the integrity of the analysis:

- **Initial Exploration:** Used df.info() to verify data types and df.describe() for statistical distribution.
- **Metric Calculation:** * **Average Length of Stay:** 4.40 days.
    - **Average Lab Procedures per Visit:** 43.1 procedures.
    - **Average Medications Prescribed:** 16.0 medications.

4. Advanced Analysis & Insights

Following the logic of the previous customer analysis, we looked at how specific patient factors influence hospital resource utilization:

- **Medication Impact on Re-admission:** Analysis showed that patients on diabetes medication have a higher average inpatient visit rate (0.65) compared to those not on medication (0.57), suggesting a need for more robust outpatient follow-up for diabetic patients.
- **Risk Segment (High Acuity):** We categorized patients by acuity_score to identify "High Risk" segments that require a higher nurse_required_count.

5. Dashboard in Power BI

An interactive dashboard was built to present these insights visually for hospital administrators.

Dashboard Features:

- **KPI Cards:** Total Patients (102K), Avg Stay (4.4 Days), Avg Lab Tests (43).

- **Patient Profile:** A donut chart showing the breakdown of patients by **Race** and **Gender**.
- **Efficiency Analysis:** A bar chart comparing **Admission Type** vs. **Time in Hospital**.
- **Impact by Age Group:** A column chart showing the **Historical Loss** (Financial Impact) across different age brackets, identifying the 70–80 age group as the highest impact segment.

6. Business & Clinical Recommendations

- **Optimize Staffing:** Focus nursing resources on the 70–80 age bracket and high-acuity patients who show consistently higher resource needs.
- **Diabetes Care Management:** Since patients on diabetes medication show higher re-admission tendencies, implement a "Post-Discharge Wellness" program to reduce inpatient returns.
- **Resource Allocation:** Streamline lab procedures for specialties with stays longer than 5 days to reduce operational bottlenecks.