PROJECT REPORT — Patient Care & Revenue Analytics

Transforming healthcare insights through data-driven decisions

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Toolset: Microsoft Excel, Pivot Tables, Pivot Charts, Data Modeling

Dataset: 54,967 hospital patient records (source: Kaggle)

1️⃣ Executive Summary

This project analyzes clinical, financial, and operational performance using a real-world healthcare dataset. Through data cleaning, transformation, and interactive dashboards, the project provides actionable insights that improve:

✔ Hospital revenue optimization
✔ Patient care quality and risk mitigation
✔ Staff utilization & operational efficiency

The final solution includes **three dynamic dashboards** linked with navigation buttons for seamless user experience.

2️⃣ Dataset Overview

Attribute Type	Examples
Patient Demographics	Age, Gender, Blood Type
Clinical Information	Medical Condition, LOS, Medication, Test Results
Hospital & Doctor Data	Hospital, Room No., Doctor, Admission Type
Financial	Insurance Provider, Billing Amount

Dates	Admission Date, Discharge Date

Original Size: 55,501 rows × 15 columns
Cleaned Size: 54,967 rows (534 duplicates removed)

📌 Dataset Source: Kaggle (Prasad Healthcare Dataset)

3️⃣ Data Preparation & Feature Engineering

Step	Outcome
Standardized formats	Dates, billing amounts, numeric fields corrected
Duplicate removal	534 exact duplicates dropped
WHO-based Age Brackets	Adolescents, Adults, Middle Age, Older Adults
Risk Level Score	High / Medium / Low based on medical condition severity
Length of Stay (LOS)	=Discharge Date – Admission Date
Year extraction	For time intelligence in pivots
Null check	Zero blank or missing values found

✨ Result: Fully analytics-ready structured dataset

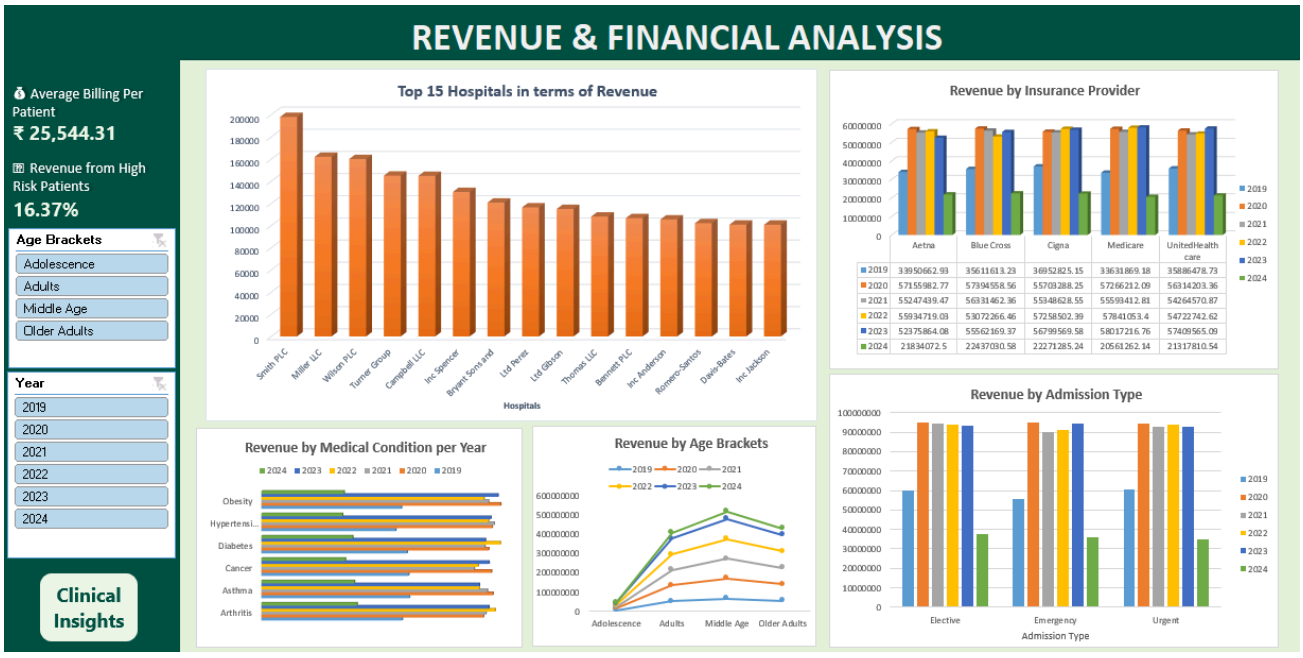
4️⃣ Dashboard 1 — Revenue & Financial Analysis

Key Insights

- High-risk patients contribute **16.37% revenue**
- Avg billing per patient: **₹25,544.31**
- Major hospitals dominate 80% of yearly revenue
- Older age groups incur higher medical expenses

📊 **Include these visuals here:**

1. Revenue by Medical Condition per Year *(Pivot Chart)*
2. Revenue by Age Bracket per Year
3. Revenue by Insurance Provider
4. Top 15 Hospitals by Billing
5. Revenue by Admission Type



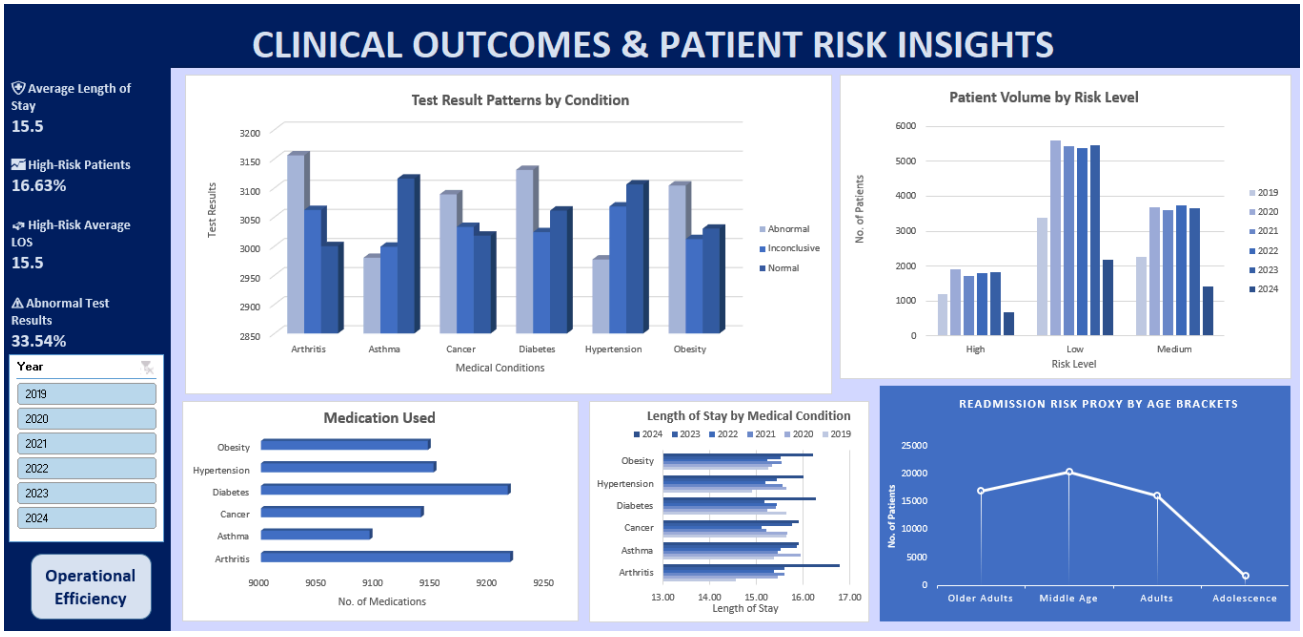
5️⃣ Dashboard 2 — Clinical Outcomes & Patient Risk

Key Insights

- Average LOS: **15.5 days**
- High-risk patients: **16.63%** of total population
- **33.54%** abnormal test results indicate patient complexity
- Cancer and hypertension ⟶ highest LOS

📊 **Include visuals here:**

1. LOS by Medical Condition
2. Readmission Proxy by Age Brackets
3. Volume by Risk Level
4. Medication Usage by Condition
5. Test Result Outcomes by Condition



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6 Dashboard 3 — Operational Efficiency & Patient Flow

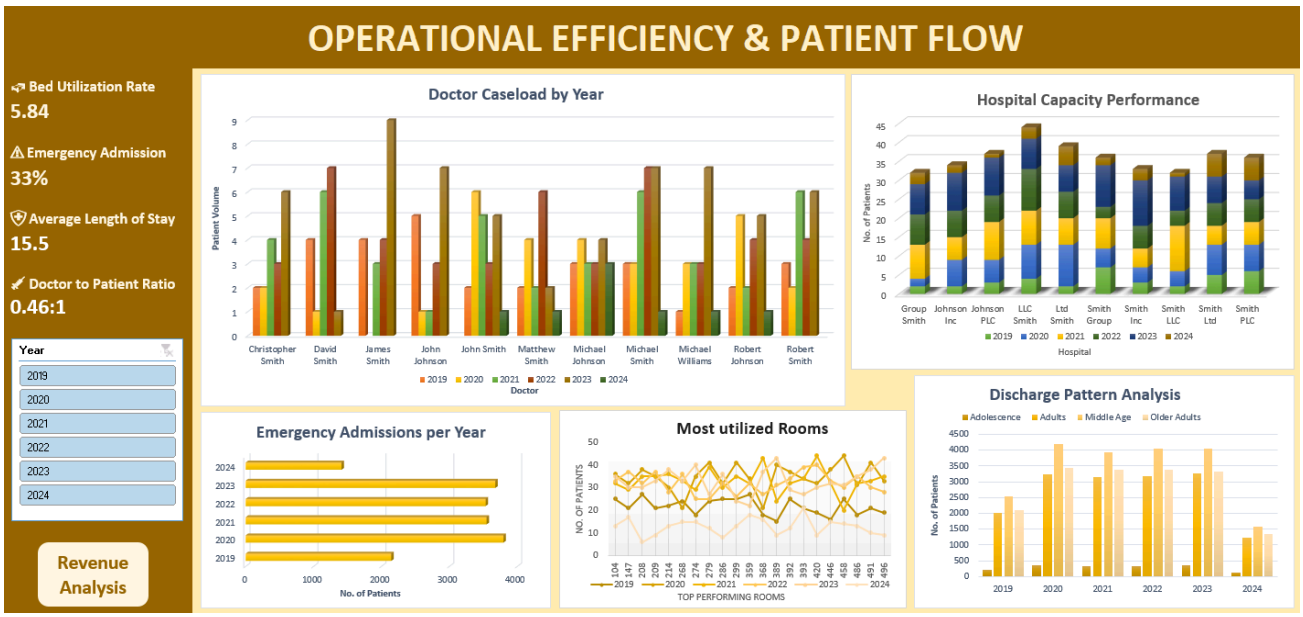
Key Insights

- Doctor-to-patient ratio: **0.46:1**

- Emergency admissions: **33%**
- Top rooms constantly full → capacity bottlenecks
- Improved discharge processes seen recently

📊 **Insert visuals here:**

1. Most Utilized Rooms
2. Doctor Caseload by Year
3. Emergency Admission Trends
4. Hospital Capacity per Month
5. Discharge Pattern Analysis



7️⃣ Key Performance Indicators (KPIs)

Category	KPI	Value
Finance	Avg Billing per Patient	₹25,544.31
Finance	Revenue from High-Risk Conditions	16.37%
Clinical	Avg Length of Stay	15.5 days
Clinical	High-Risk Patient Percentage	16.63%
Clinical	Abnormal Test Results	33.54%
Operations	Emergency Admission %	33%
Operations	Bed Utilization Index	5.84
Operations	Doctor-to-Patient Ratio	0.46 : 1

8️⃣ Value Delivered

✔ Increased visibility into revenue sources & cost drivers
✔ Improved ability to manage clinical risks proactively
✔ Better staffing & resource allocation insights
✔ Easy-to-use dashboards for leadership decision making

9️⃣ Future Enhancements

🚀 Expand capability beyond descriptive analytics:

- Predict LOS and readmission using ML models
- Anomaly detection for patient test results

- Deeper insurance claim analytics
- Power BI migration for richer interactivity

🔟 Conclusion

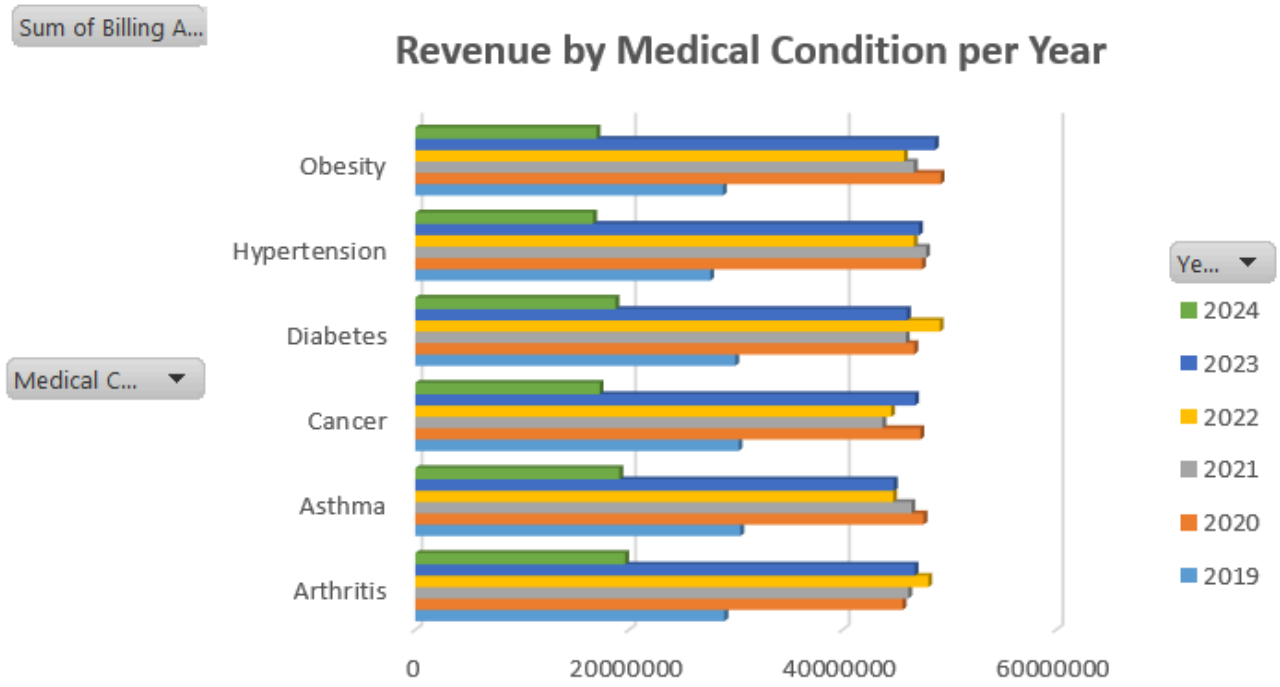
This project demonstrates strong capability in:

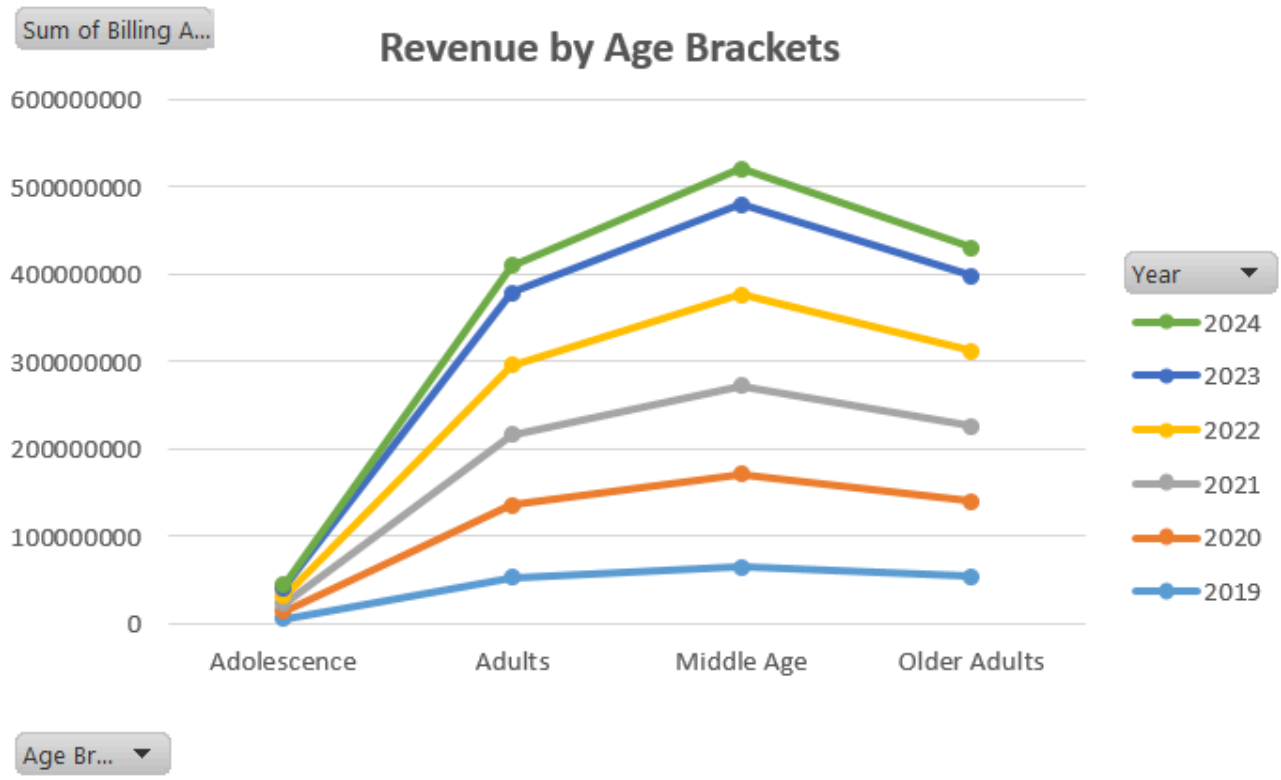
💡 Data transformation
📈 Excel BI visualization
📊 Healthcare data storytelling
🎯 Operational insight generation

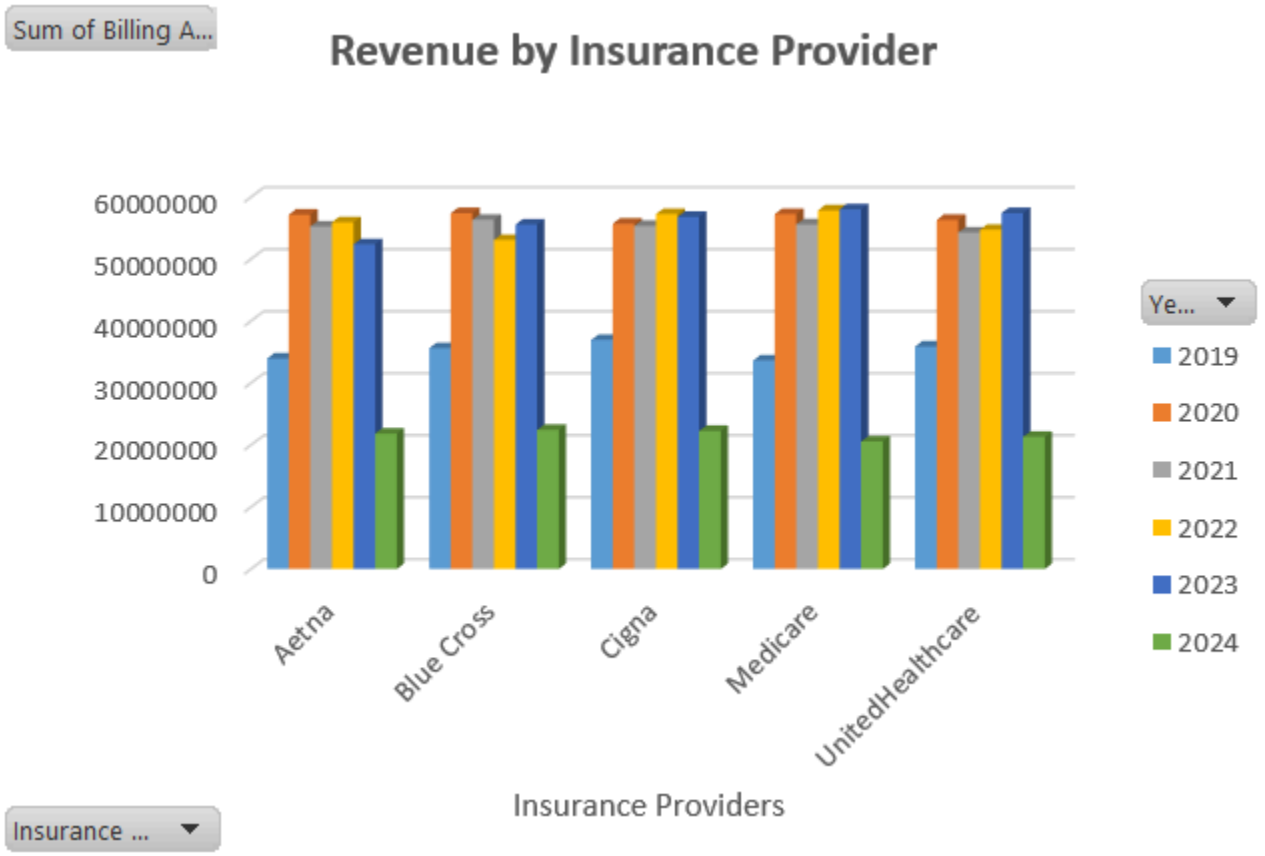
Positioning for mid-level data analyst roles with domain-oriented analytics.

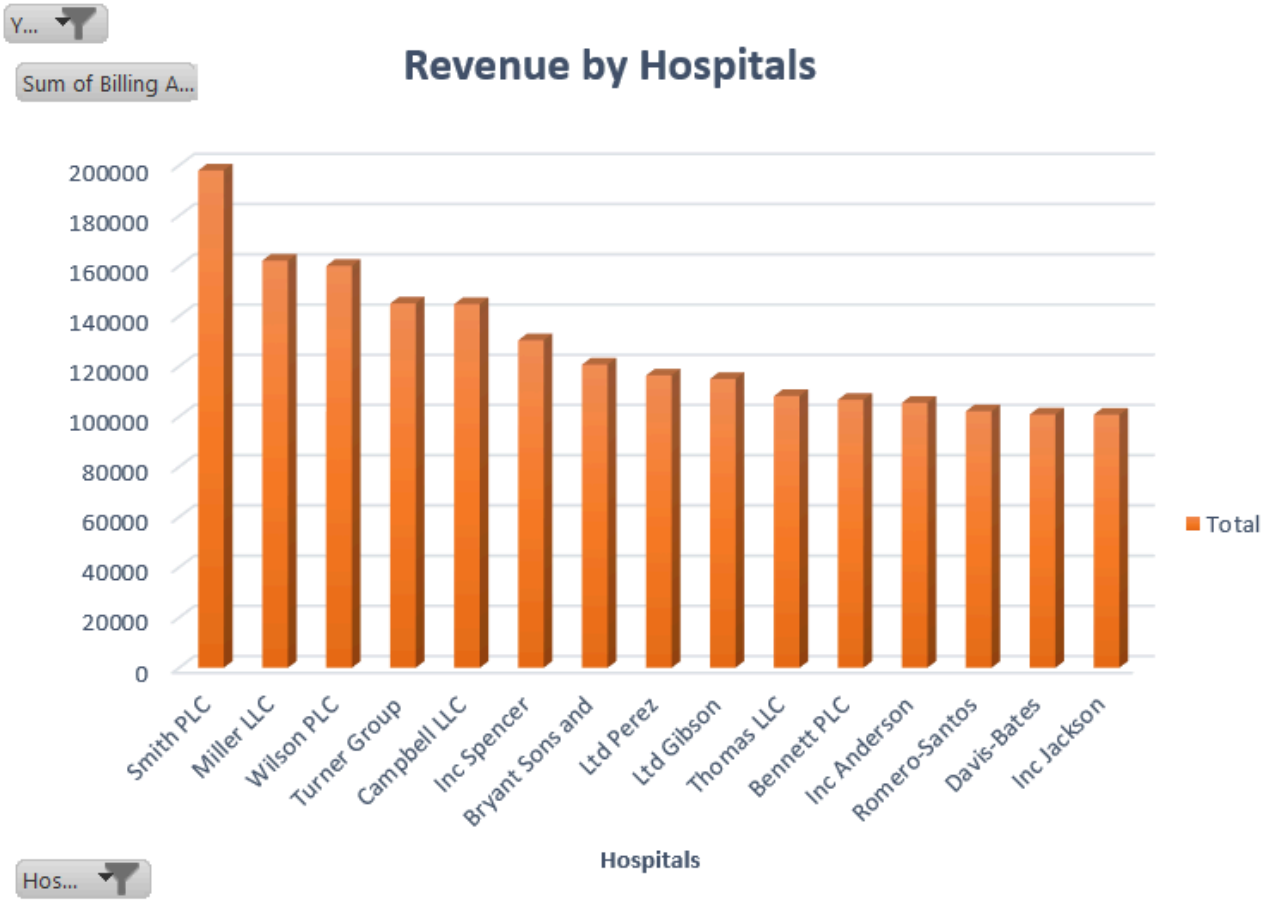
📌 Appendix

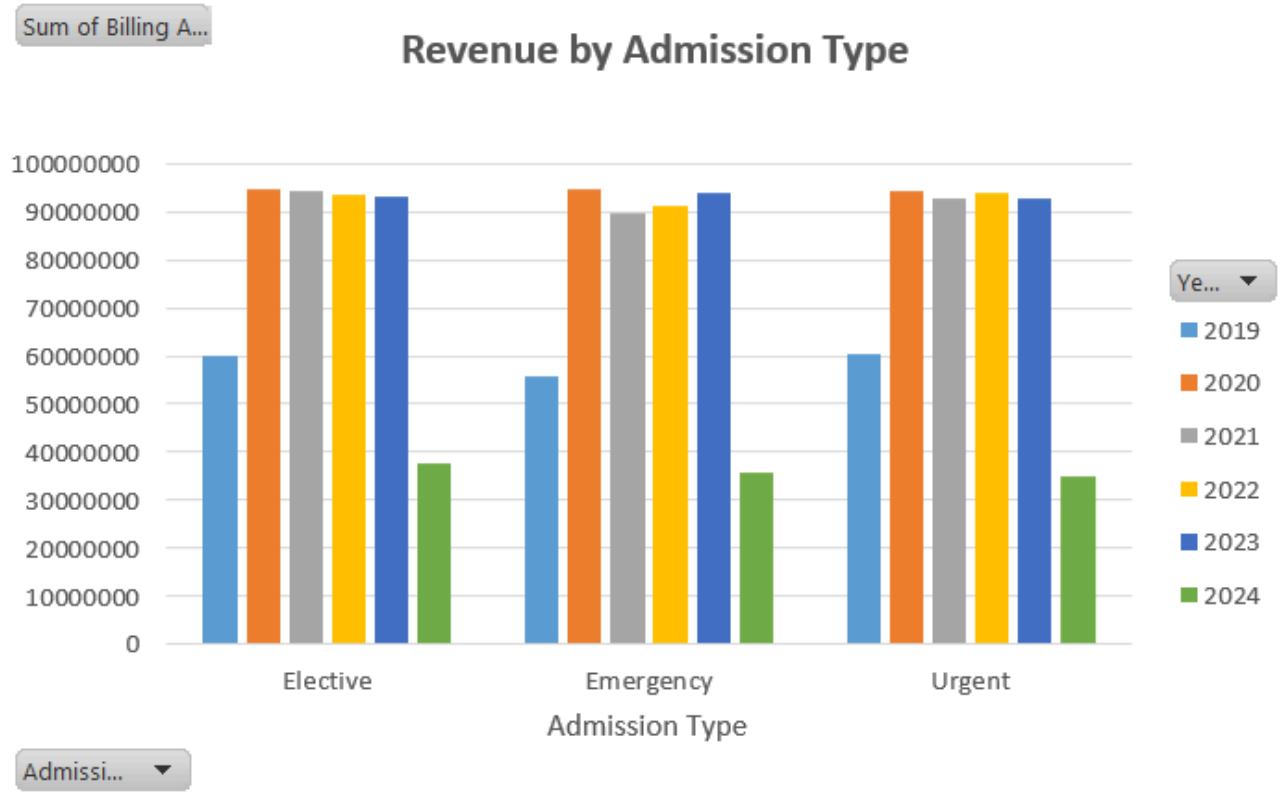
➡ Pivot charts

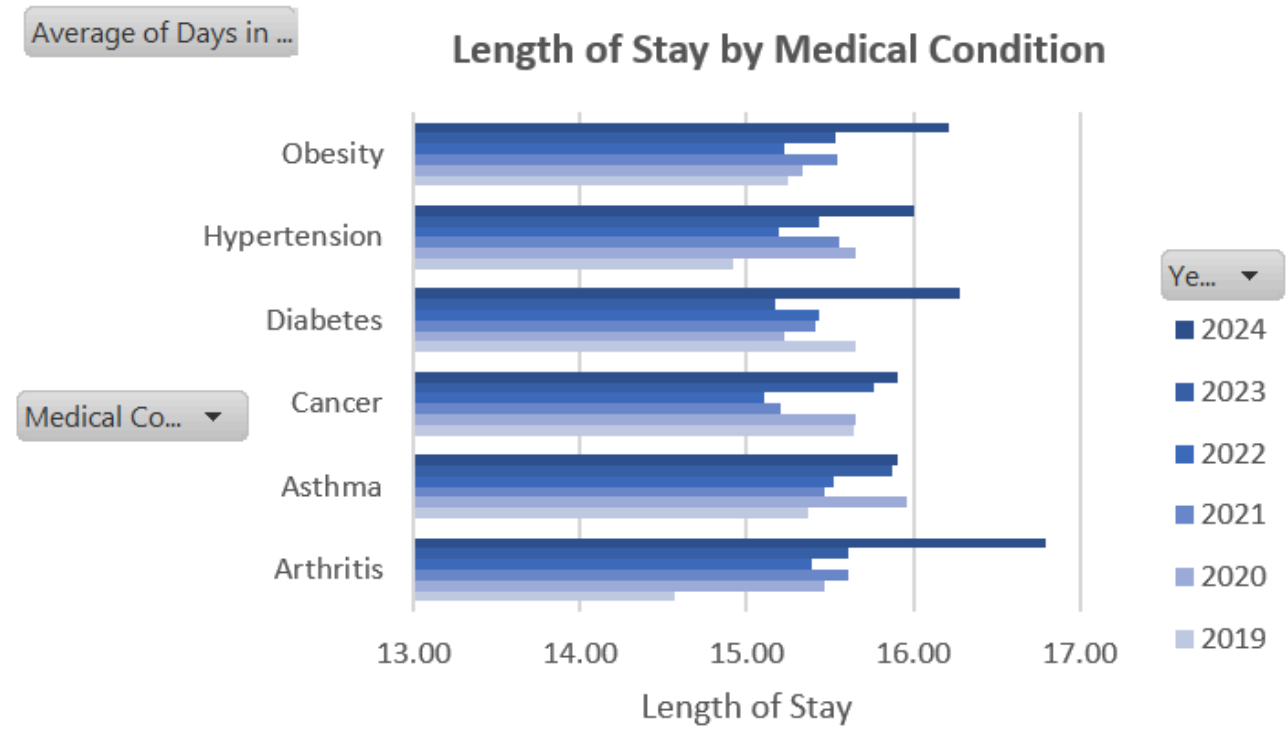


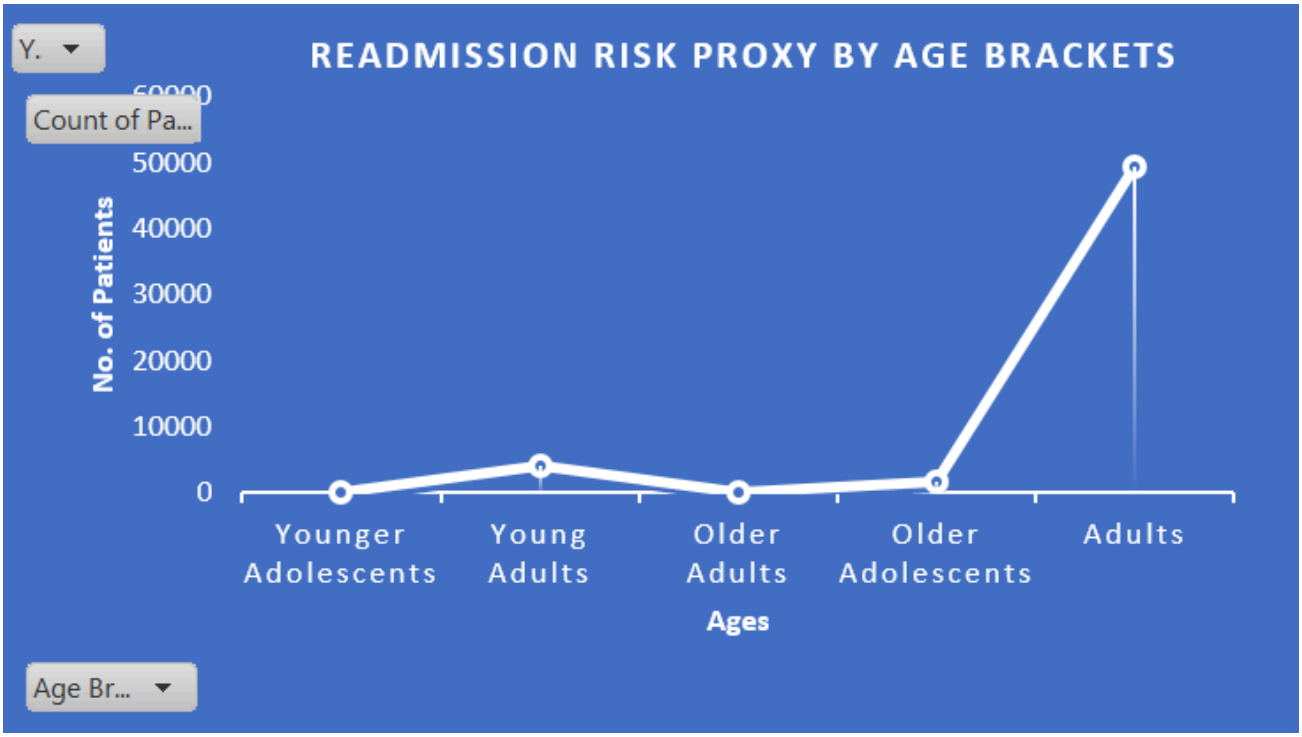

Sum of Billing A...
Revenue by Age Brackets
600000000
500000000
400000000
300000000
200000000
100000000
0
Adolescence
Adults
Middle Age
Older Adults
Year
2024
2023
2022
2021
2020
2019
Age Br...

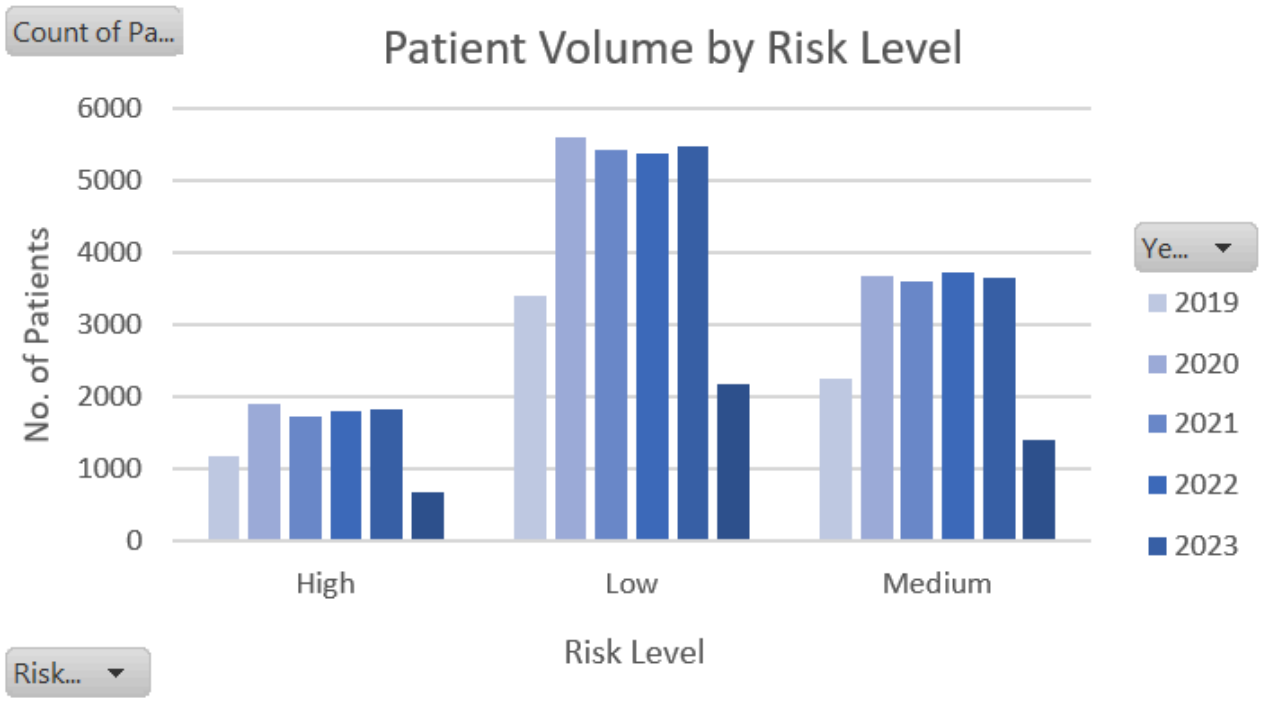

Sum of Billing A...
Revenue by Insurance Provider
60000000
50000000
40000000
30000000
20000000
10000000
0
Aetna
Blue Cross
Cigna
Medicare
UnitedHealthcare
Insurance Providers
Ye...
2019
2020
2021
2022
2023
2024
Insurance ...

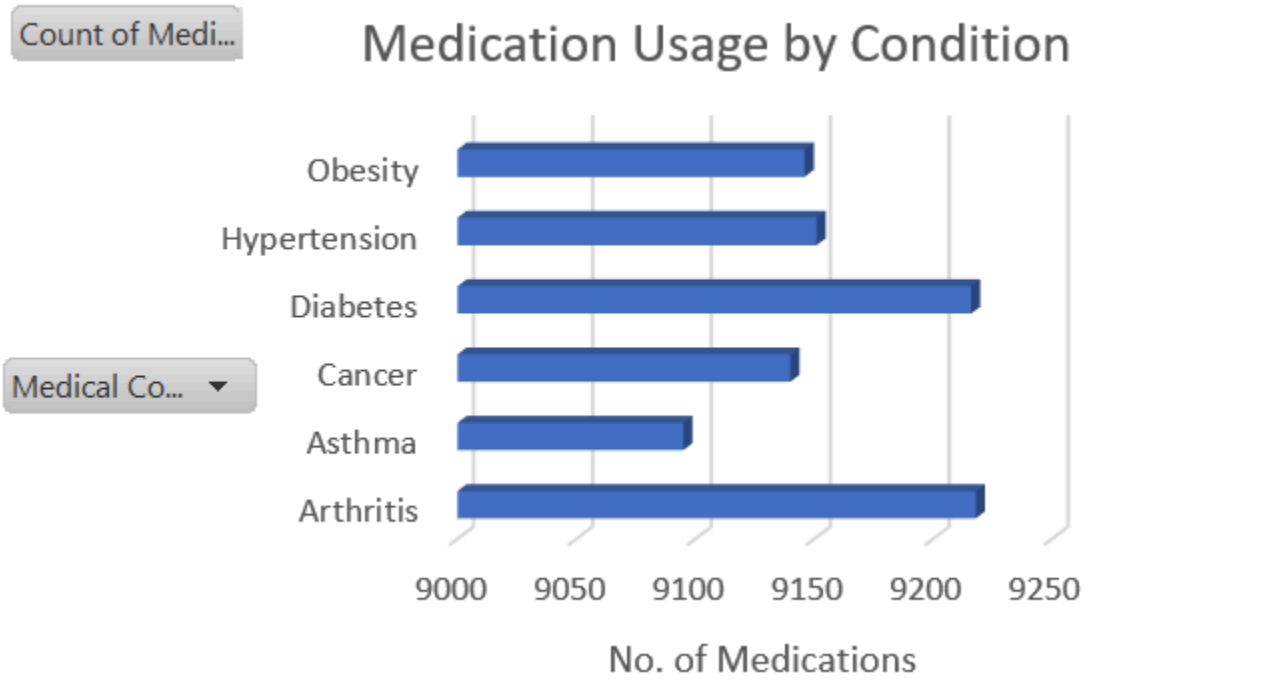

Y...
Revenue by Hospitals
Sum of Billing A...
200000
180000
160000
140000
120000
100000
80000
60000
40000
20000
0
Smith PLC
Miller LLC
Wilson PLC
Turner Group
Campbell LLC
Inc Spencer
Bryant Sons and
Ltd Perez
Ltd Gibson
Thomas LLC
Bennett PLC
Inc Anderson
Romero-Santos
Davis-Bates
Inc Jackson
Total
Hospitals
Hos...

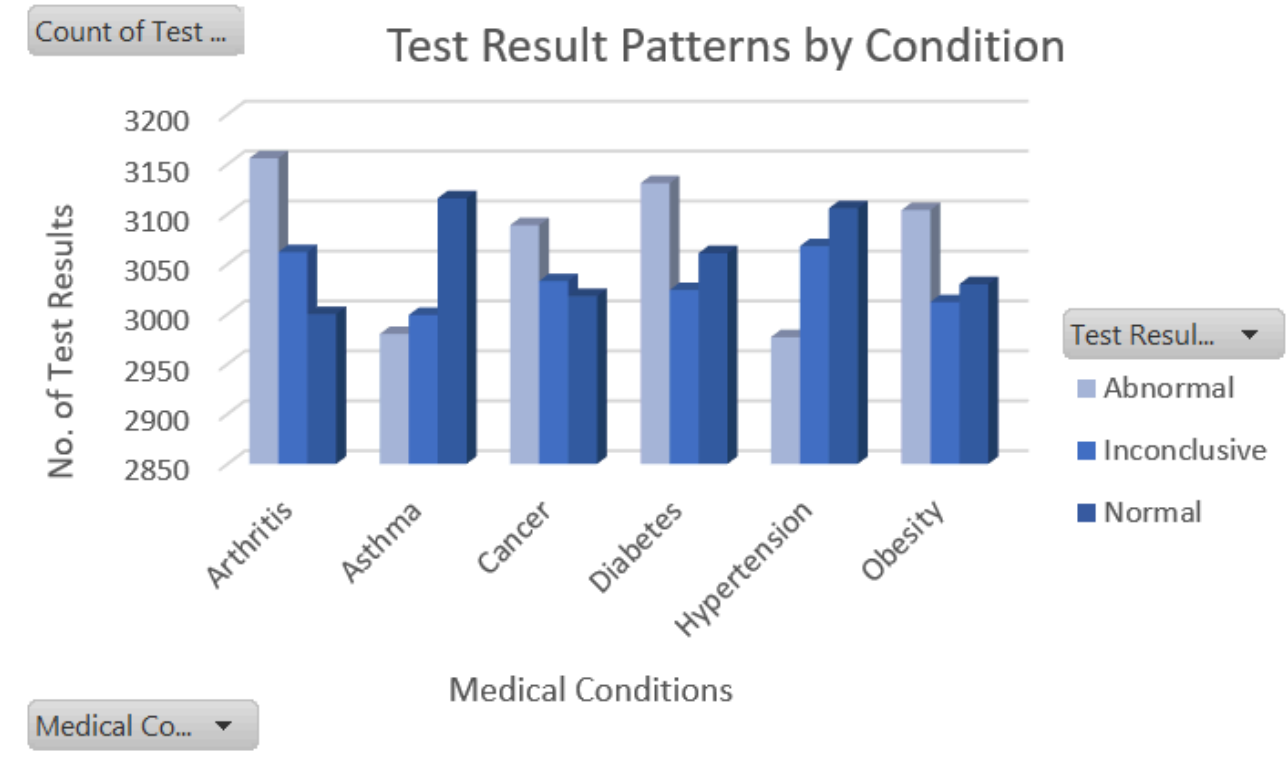

Sum of Billing A...
Revenue by Admission Type
100000000
90000000
80000000
70000000
60000000
50000000
40000000
30000000
20000000
10000000
0
Elective
Emergency
Urgent
Admission Type
Ye...
2019
2020
2021
2022
2023
2024
Admissi...

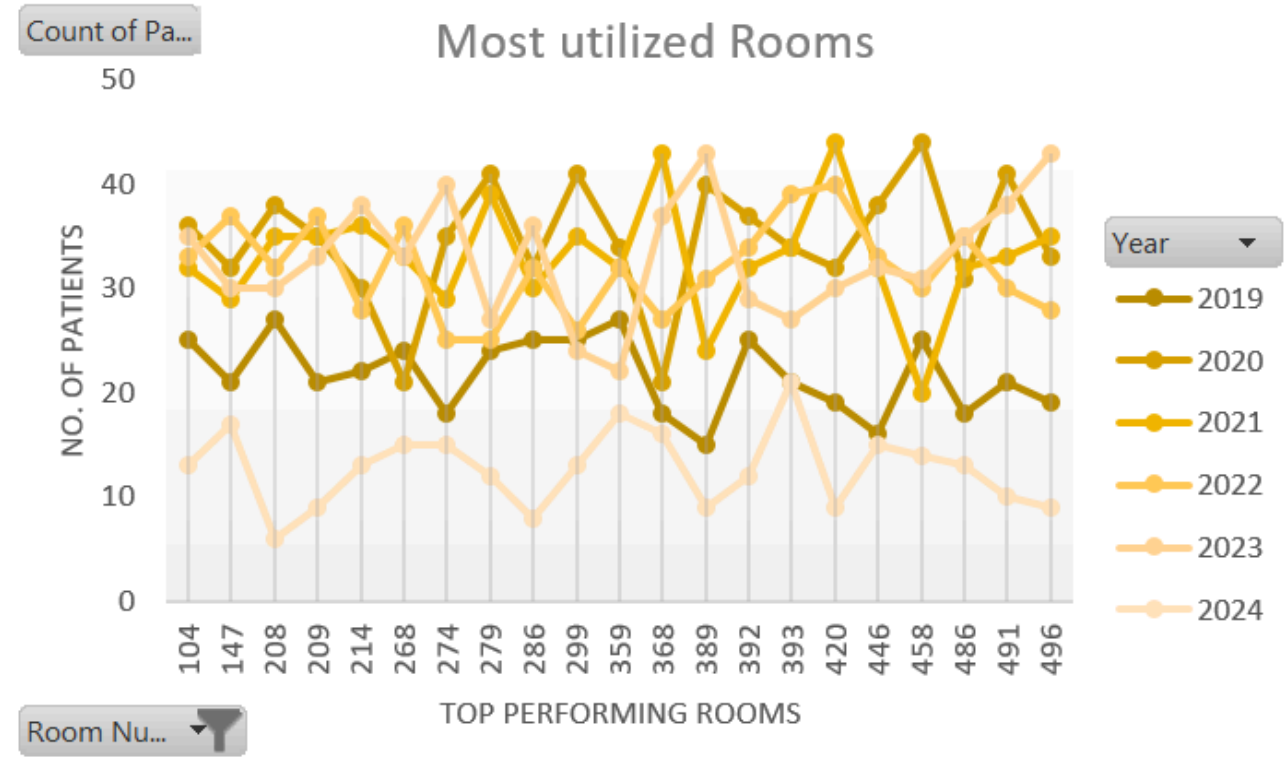

Average of Days in ...
Length of Stay by Medical Condition
Obesity
Hypertension
Diabetes
Cancer
Asthma
Arthritis
Medical Co...
Ye...
2024
2023
2022
2021
2020
2019
13.00
14.00
15.00
16.00
17.00
Length of Stay

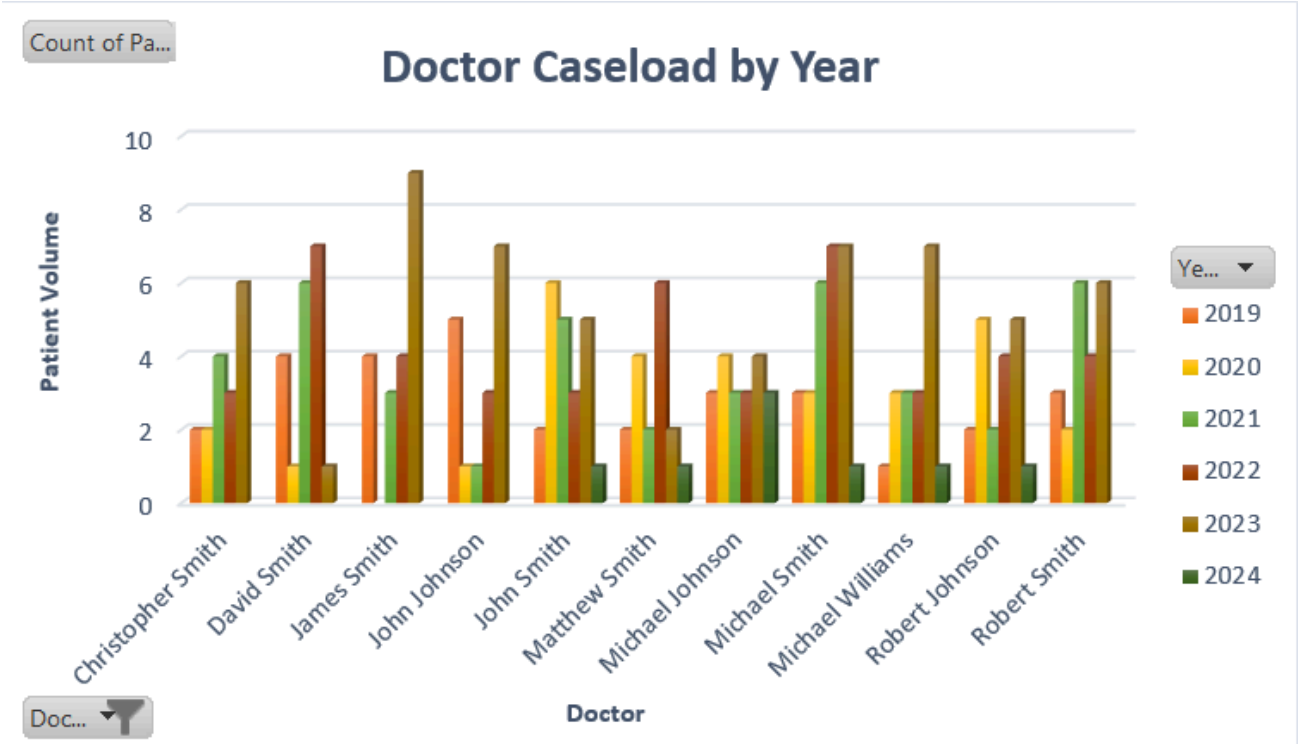

Y.
READMISSION RISK PROXY BY AGE BRACKETS
Count of Pa...
50000
40000
30000
20000
10000
0
No. of Patients
Younger Adolescents
Young Adults
Older Adults
Older Adolescents
Adults
Ages
Age Br...

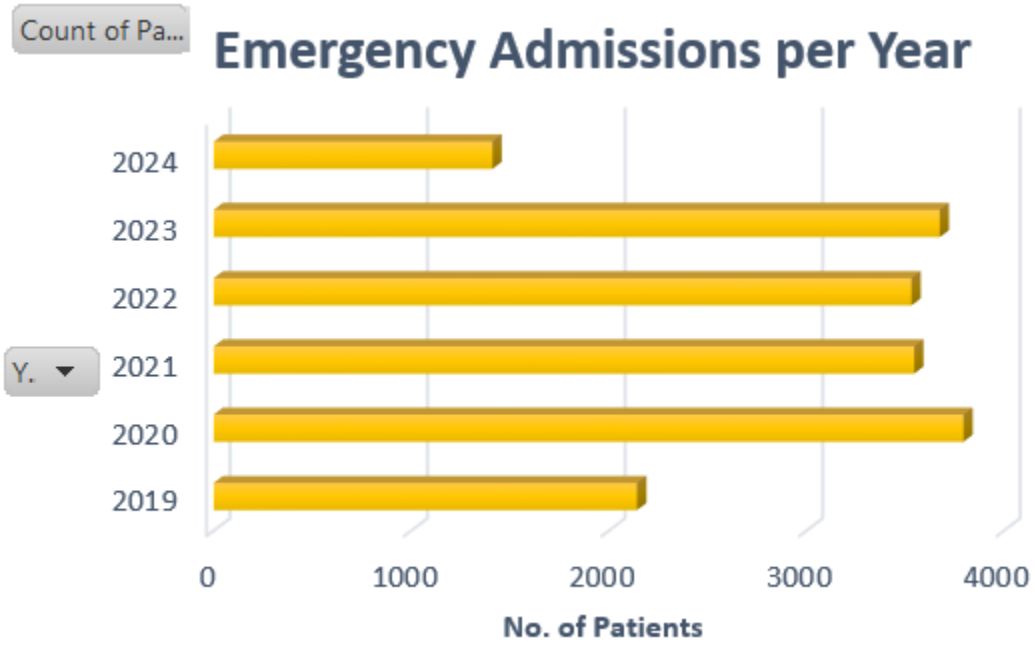

Count of Pa...
Patient Volume by Risk Level
6000
5000
4000
3000
2000
1000
0
No. of Patients
High
Low
Medium
Risk Level
Ye...
2019
2020
2021
2022
2023
Risk...

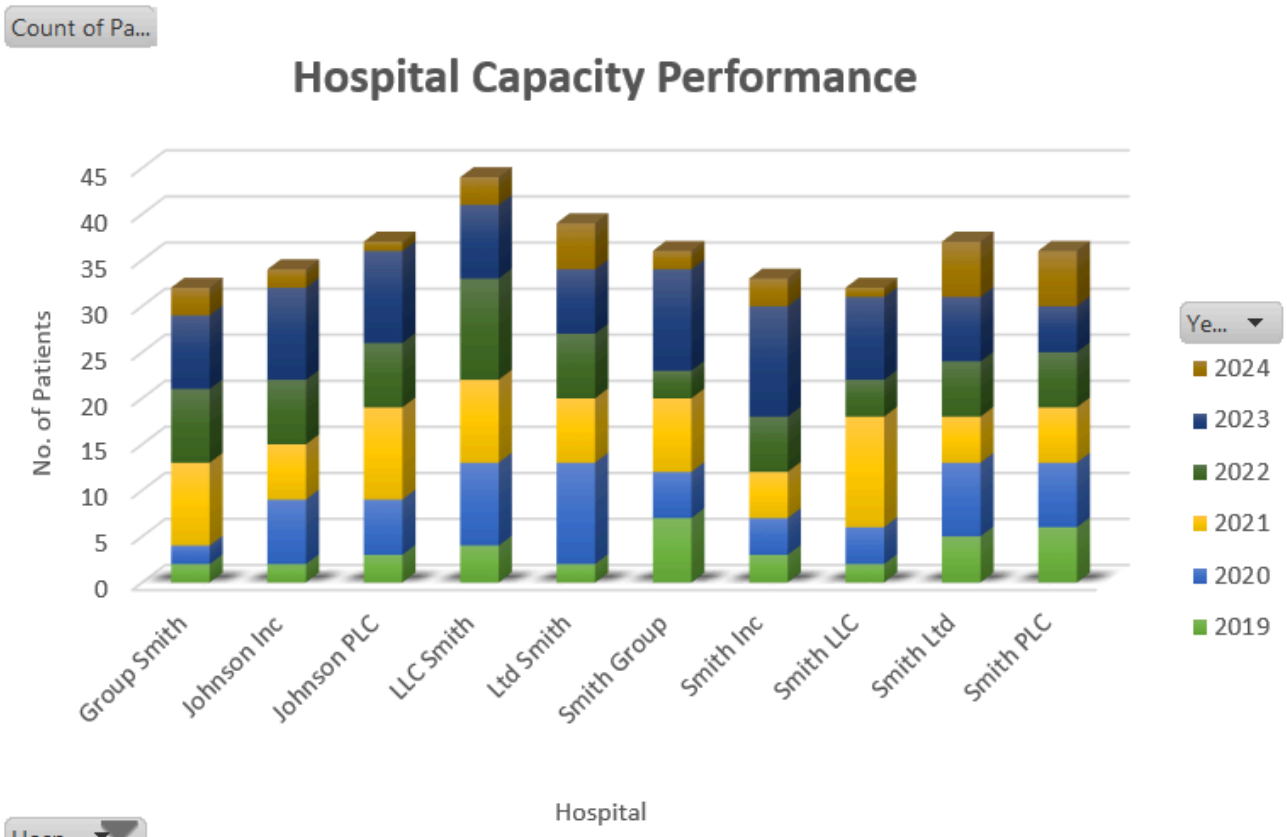

Count of Medi...
Medication Usage by Condition
Obesity
Hypertension
Diabetes
Cancer
Asthma
Arthritis
9000
9050
9100
9150
9200
9250
No. of Medications
Medical Co...

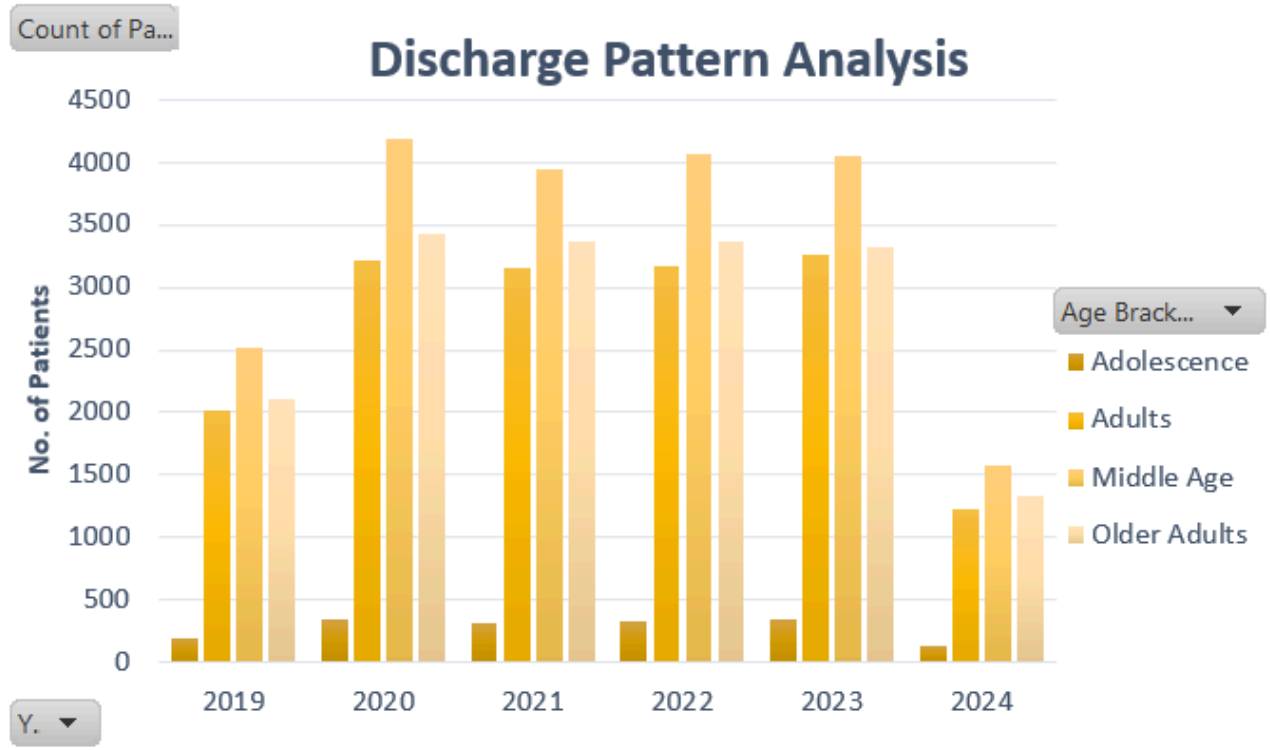

Count of Test ...
Test Result Patterns by Condition
3200
3150
3100
3050
3000
2950
2900
2850
No. of Test Results
Arthritis
Asthma
Cancer
Diabetes
Hypertension
Obesity
Test Resul...
Abnormal
Inconclusive
Normal
Medical Conditions
Medical Co...


Count of Pa...
Most utilized Rooms
50
40
30
20
10
0
NO. OF PATIENTS
104
147
208
209
214
268
274
279
286
299
359
368
389
392
393
420
446
458
486
491
496
TOP PERFORMING ROOMS
Year
2019
2020
2021
2022
2023
2024
Room Nu...


Count of Pa...
Doctor Caseload by Year
Patient Volume
10
8
6
4
2
0
Christopher Smith
David Smith
James Smith
John Johnson
John Smith
Matthew Smith
Michael Johnson
Michael Smith
Michael Williams
Robert Johnson
Robert Smith
Doctor
Doc...
Ye...
2019
2020
2021
2022
2023
2024


Count of Pa...
Emergency Admissions per Year
2024
2023
2022
2021
2020
2019
Y.
0
1000
2000
3000
4000
No. of Patients


Count of Pa...
Hospital Capacity Performance
45
40
35
30
25
20
15
10
5
0
No. of Patients
Group Smith
Johnson Inc
Johnson PLC
LLC Smith
Ltd Smith
Smith Group
Smith Inc
Smith LLC
Smith Ltd
Smith PLC
Hospital
Ye...
2024
2023
2022
2021
2020
2019


Hosp...
Count of Pa...
Discharge Pattern Analysis
4500
4000
3500
3000
2500
2000
1500
1000
500
0
No. of Patients
2019
2020
2021
2022
2023
2024
Y..
Age Brack...
Adolescence
Adults
Middle Age
Older Adults