Healthcare Provider Performance Analysis (Interactive Power BI Dashboard)

1. Project Overview

This project analyzes healthcare billing and operational data using Power BI. It provides key financial, departmental, and temporal insights that help healthcare administrators make data-driven decisions to optimize billing efficiency, reduce costs, and improve patient service delivery. The dashboard includes both Light Mode and Dark Mode designs, along with Trend Analysis for month-over-month and weekday comparisons.

2. Business Objectives

- Identify which departments generate the most revenue.
- Understand how insurance coverage affects patient out-of-pocket expenses.
- Analyze billing trends across years, quarters, months, and weekdays.
- Compare weekday versus weekend performance.
- Determine which procedures and diagnoses contribute the most to billing revenue.

3. Key Metrics (KPI)

KPI	Description
Total Billing Amount	Overall revenue generated from all healthcare services.
Average Billing per Visit	Average billing value per patient visit.
Total Insurance Coverage	Portion of billing covered by insurance policies.
Out-of-Pocket Cost	Amount paid directly by patients.
Treatment Cost	Overall cost incurred for patient treatment.
Room Charges	Revenue generated from inpatient room utilization.

4. Dashboard Insights

The dashboard highlights the following key insights:

- Cardiology, Orthopedics, and General Surgery departments contribute over 70% of total billing revenue.

- Approximately 66% of all billing is covered by insurance, reducing financial burden on patients.
- Outpatient and diagnostic services, such as X-rays and CT scans, dominate the billing distribution.
- Quarterly trends show the highest revenue in Q1, with gradual decline toward Q4, suggesting seasonality.
- Weekday revenue is approximately 60% higher than weekend revenue, indicating dependence on weekday operations.
- Neurology department shows consistent weekday growth (+13.6%), signaling potential for expansion.

5. Trend Analysis

The trend analysis provides a temporal view of financial performance:

- Year-over-Year Comparison: A 29.6% decline in total billing from 2024 to 2025.
- Quarterly Trends: Q1 records the highest billing ($1.7M), while Q4 shows the lowest ($217K).
- Month-over-Month (CM vs PM): January shows peak recovery (+352.7%), followed by mid-year decline.
- Weekday vs Weekend: Billing is heavily concentrated on weekdays ($2.4M) compared to weekends ($949K).
- Departmental Weekday Trends: Neurology (+13.6%) and Pediatrics (+0.2%) show growth; Orthopedics and Cardiology face mild contraction.

6. Tools and Techniques Used

Tools: Microsoft Power BI, Power Query Editor

Techniques: Data Cleaning, Data Modeling (Star Schema), DAX Measures, Visualization Design (Light/Dark Mode)

7. Sample DAX Measures

1. DateTable = ADDCOLUMNS(

CALENDARAUTO(),

"Year", YEAR([Date]),

```
"Month", FORMAT([Date], "mmm"),
"Monthnum", MONTH([Date]),
"Weekday", FORMAT([Date], "ddd"),
"Weeknum", WEEKDAY([Date]),
"Qtr", "Q-"&FORMAT([Date], "Q"),
"WeekType", IF(WEEKDAY([Date])=1 || WEEKDAY([Date])=7, "Weekend", "Weekday")
)
```

2. Total Billing Amount = [Total Medication cost]+[Total Room Charges]+[Total Treatment Cost]
3. % Department = DIVIDE([Total Billing Amount], CALCULATE([Total Billing Amount],ALL(departments[Department])))

8. Business Recommendations

- Enhance focus on top-performing departments like Cardiology and Orthopedics.
- Increase weekend operational hours to balance patient flow.
- Leverage Neurology's positive growth by promoting specialized services.
- Introduce engagement programs in Q3-Q4 to address revenue dips.
- Optimize insurance processes to maintain or exceed 66% coverage rate.

9. Key Learnings

Through this project, I strengthened my Power BI skills in data modeling, DAX calculations, and analytical storytelling. It also enhanced my understanding of healthcare operations, cost structures, and performance monitoring using business intelligence tools.

10. Conclusion

This Power BI project successfully visualizes healthcare performance data, enabling decision-makers to track key financial metrics, identify underperforming departments, and make informed operational improvements. The analysis provides a clear roadmap for boosting efficiency, increasing revenue, and enhancing patient outcomes.