Healthcare Data Analysis using SQL and Power BI

Project Report

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Summary:

This project focuses on analyzing a **synthetic healthcare dataset of 54,966 patient records** using **SQL and Power BI** to uncover meaningful insights.

The main aim was to understand **patient admissions, medical conditions, doctor performance, insurance distribution, and test results**.

Data cleaning and transformation were performed to remove duplicates, handle missing values, and calculate important metrics such as **average length of stay** and **abnormal test result percentage**.

A Power BI dashboard was created to visualize the findings through key performance indicators (KPIs) and charts, helping demonstrate **real-time healthcare analytics and decision-making**.

1. Project Objective

To analyze patient admissions, medical conditions, billing, and test result outcomes using SQL for aggregation and Power BI for visualization. The report presents key KPIs, SQL queries used, and dashboard insights.

2. Dataset Description

Dataset Size: 54,966 records

Key fields: Name, Age, Gender, Blood Type, Medical Condition, Date of Admission, Doctor, Hospital, Insurance Provider, Billing Amount, Room Number, Admission Type, Discharge Date, Medication, Test Results

3. SQL Queries Used

Total Patient Count

```
SELECT COUNT (DISTINCT Patient_ID) AS Total_Patient FROM
healthcare_dataset;
```

Top 5 Medical Conditions

```
SELECT Medical_Condition, COUNT(*) AS Patient_Count FROM
healthcare_dataset GROUP BY
Medical_Condition ORDER BY Patient_Count DESC LIMIT 5;
```

Top 5 Insurance Providers

```
SELECT Insurance_Provider, COUNT(*) AS Total_Patients FROM
healthcare_dataset GROUP BY
Insurance_Provider ORDER BY Total_Patients DESC LIMIT 5;
```

Average Billing per Patient

```
SELECT ROUND(AVG(Billing_Amount), 2) AS Avg_Billing FROM
healthcare_dataset;
```
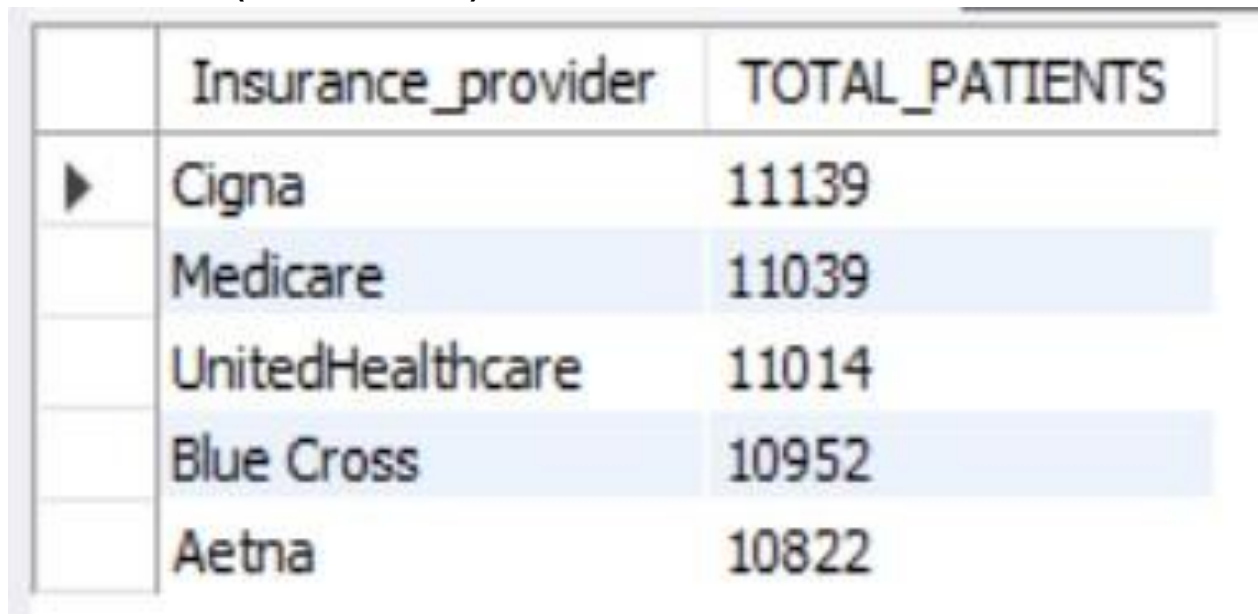
Abnormal Test Percentage

```
SELECT ROUND((SUM(CASE WHEN Test_Result = 'Abnormal' THEN 1 ELSE 0
END) * 100.0)/COUNT(*), 2)
AS Abnormal_Percentage FROM healthcare_dataset;
```

Average Length of Stay

```
SELECT ROUND(AVG(Length_of_Stay), 0) AS Avg_Length_Stay FROM
healthcare_dataset;
```

4. SQL Results (Screenshots)

Insurance_provider	TOTAL_PATIENTS
Cigna	11139
Medicare	11039
UnitedHealthcare	11014
Blue Cross	10952
Aetna	10822

Screenshot 1: Top Insurance Providers (SQL result)

Medical_condition	TOTAL_PATIENTS
Arthritis	9218
Diabetes	9216
Hypertension	9151
Obesity	9146
Cancer	9140

Screenshot 2: Top Medical Conditions (SQL result)

AVERAGE_STAY
15

Screenshot 3: Average Billing Output
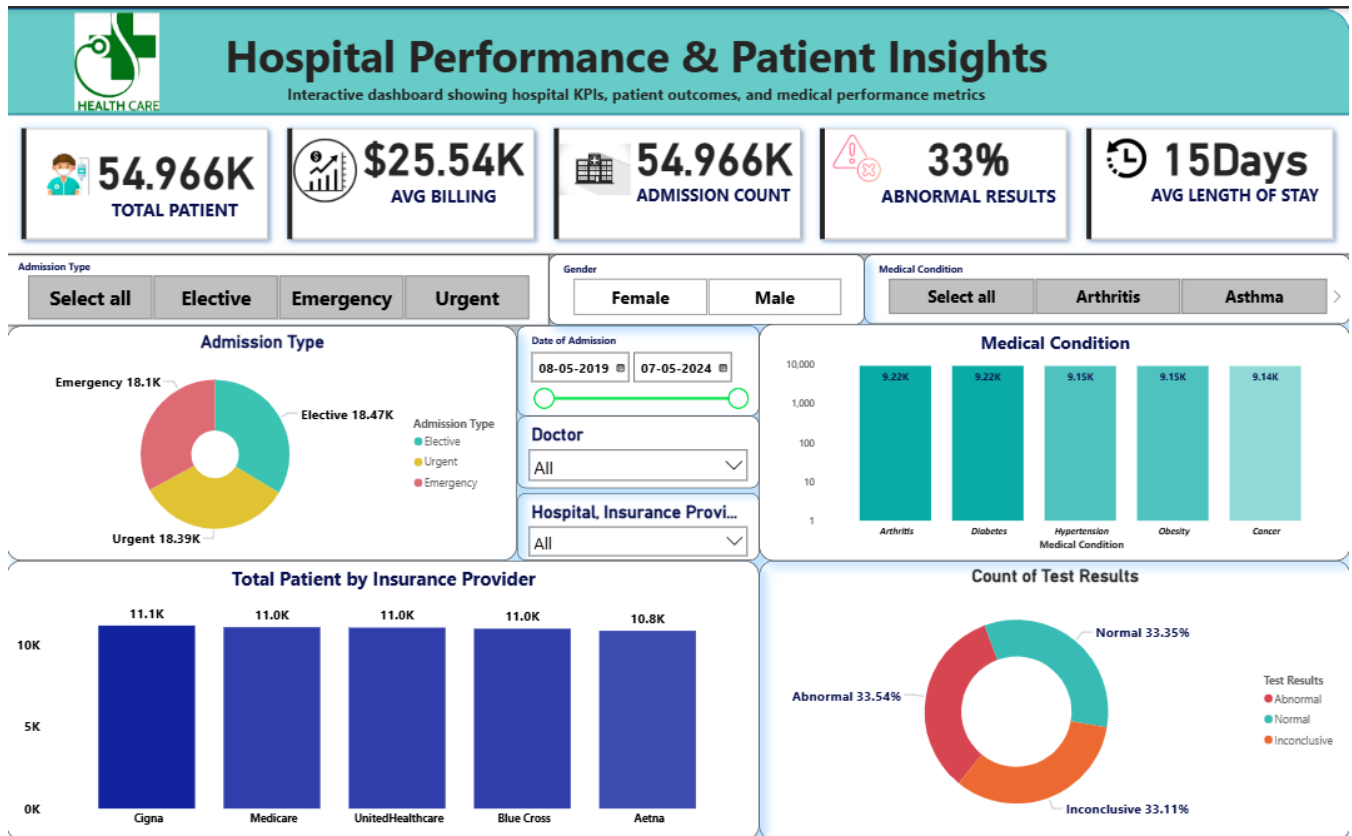
ABNORMAL_PERCENTAGE
▶ 33.54

Screenshot 4: Abnormal Test Result Percentage

AVERAGE_AMOUNT
▶ 25544.31

Screenshot 5: Average Length of Stay Output

Admission_Type	Patients_Count
Urgent	18391
Emergency	18102
Elective	18473

Screenshot 6: Admission Type Distribution

5. Power BI Dashboard & Key Insights

Total Patients: 54,966 total patient records; provides dataset scale for analysis.

Average Billing Amount: Average billing per patient is approximately ■25,544.31 (or $25.5K).

Average Length of Stay: Average stay is 15 days, indicating typical treatment durations.

Abnormal Test Results: About 33.54% of test results are abnormal, highlighting cases needing follow-up.

Admission Type Distribution: Admissions are balanced across Elective, Urgent, and Emergency types.

Top Medical Conditions: Arthritis and Diabetes are the most frequent conditions in the dataset.

6. Conclusion & Recommendations

The analysis provides actionable insights for hospital administration. Key recommendations:
1. Investigate causes of high abnormal test result rate and improve diagnostic procedures.
2. Implement preventive care programs for top chronic conditions (Diabetes, Arthritis).
3. Review billing and stay duration to optimize cost efficiency and patient turnover.
4. Use the dashboard for monthly monitoring and drill-down analysis by hospital/doctor.

Appendix

Tools used: SQL, Power BI, Excel, DAX

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