Healthcare Data Insights: A Comprehensive SQL-Based Analysis

Project Objective

This project aims to analyze **healthcare data** using **SQL** to derive meaningful insights that can help hospitals, insurance providers, and medical professionals make **data-driven decisions**. The project covers essential areas such as **patient demographics, admission types, financial trends, hospital performance, and readmission risks**.

Link to Dataset: Data

Scope of the Analysis

This project is structured into three main sections:

1. **Basic Data Exploration**: Understanding patient distribution, hospital admissions, and common conditions.
2. **Financial and Insurance Analysis**: Assessing revenue, billing amounts, and insurance provider trends.
3. **Advanced Analysis & Predictive Insights**: Investigating patient readmissions, doctor performance, and multi-hospital visits.

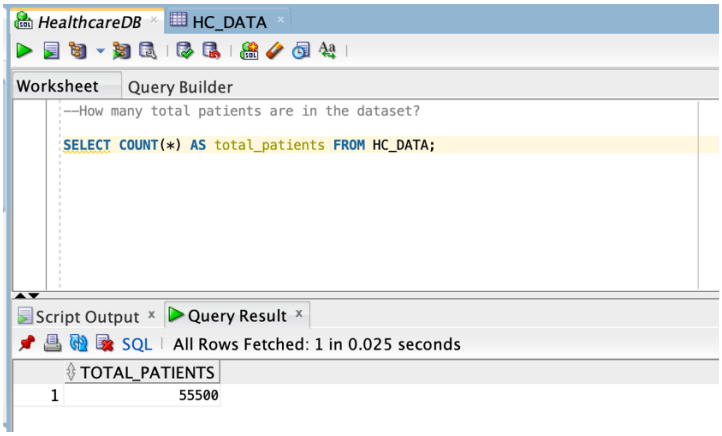
Data Insights & Query Explanations

Each query in this project serves a specific purpose and provides key insights:

1. Patient Demographics & Hospital Admissions

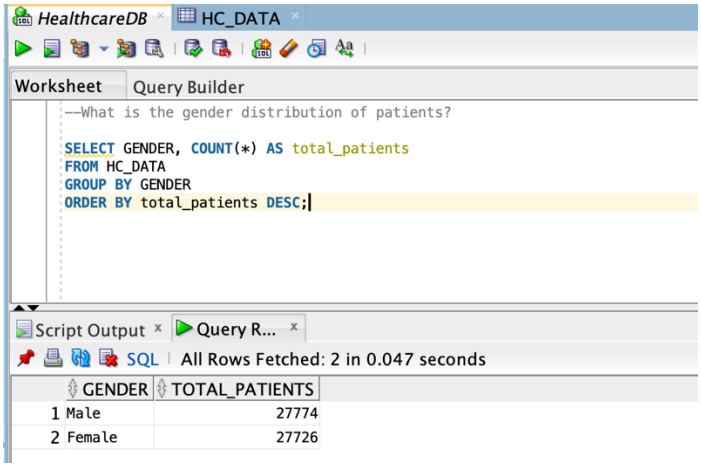
How many total patients are in the dataset?

- **Query:** We use `COUNT(*)` to get the total number of patient records.
- **Insight:** Helps in understanding the overall size of the dataset and hospital capacity planning.



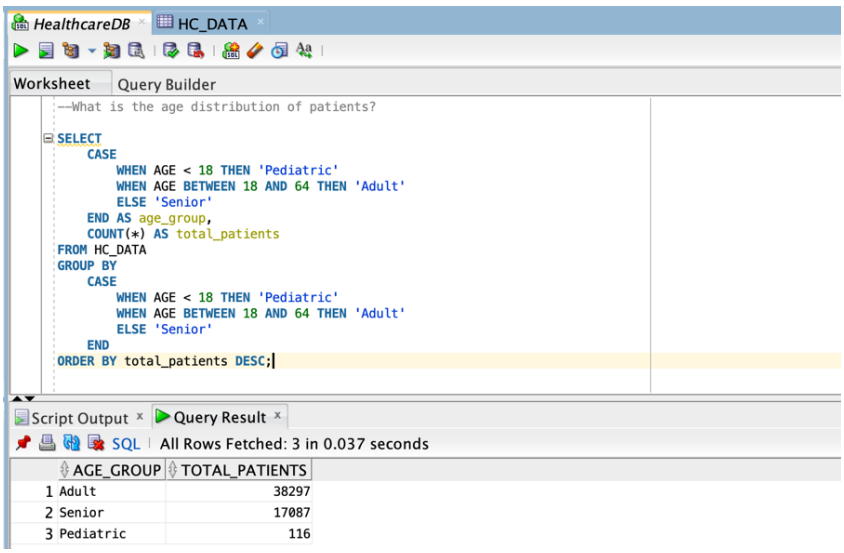
What is the gender distribution of patients?

- **Query:** We use `GROUP BY GENDER` and `COUNT(*)` to count the number of patients per gender.
- **Insight:** Hospitals can analyze gender-based healthcare needs and ensure equitable treatment facilities.



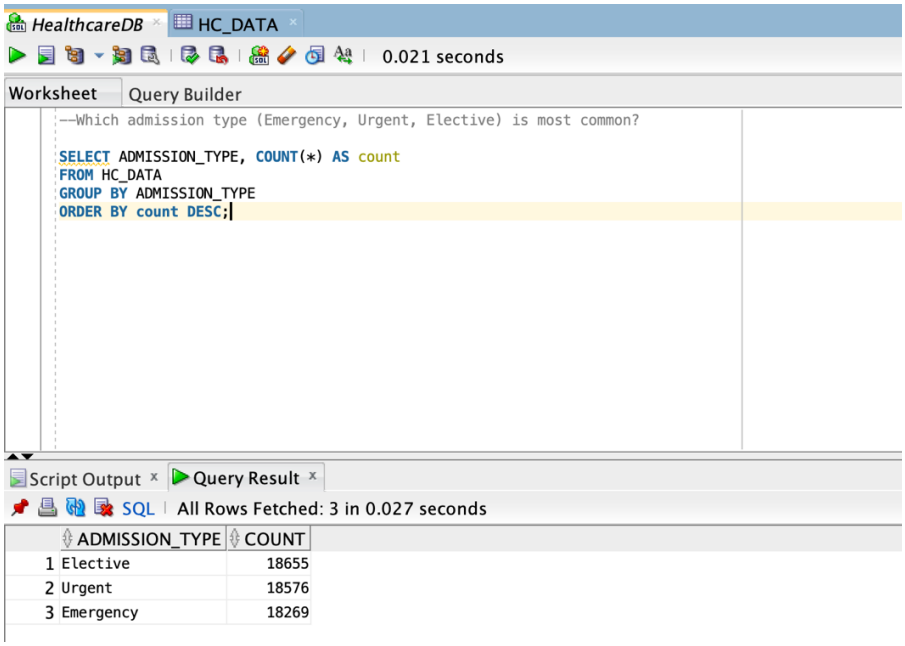
What is the age distribution of patients?

- **Query:** We classify patients into `Pediatric`, `Adult`, and `Senior` using a `CASE` statement and then count occurrences.
- **Insight:** Useful for planning age-specific healthcare programs and resource allocation.



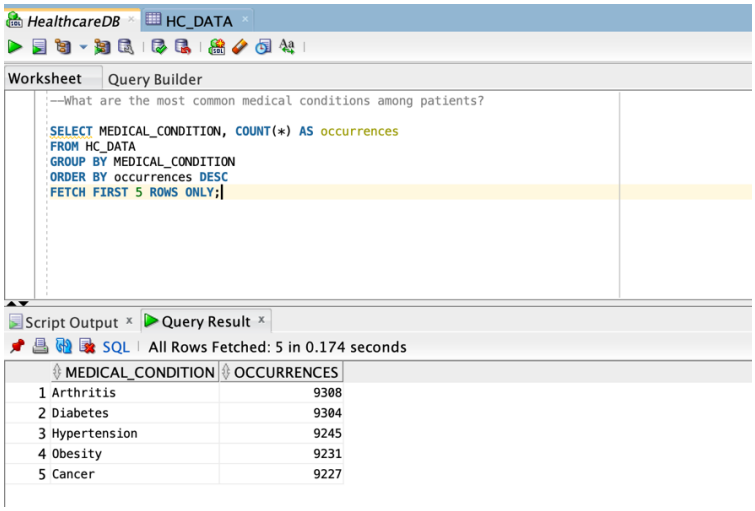
Which admission type (Emergency, Urgent, Elective) is most common?

- **Query:** Using `GROUP BY ADMISSION_TYPE`, we count occurrences to find the most frequent type.
- **Insight:** Helps hospitals in optimizing emergency response systems and elective surgery scheduling.



What are the most common medical conditions among patients?

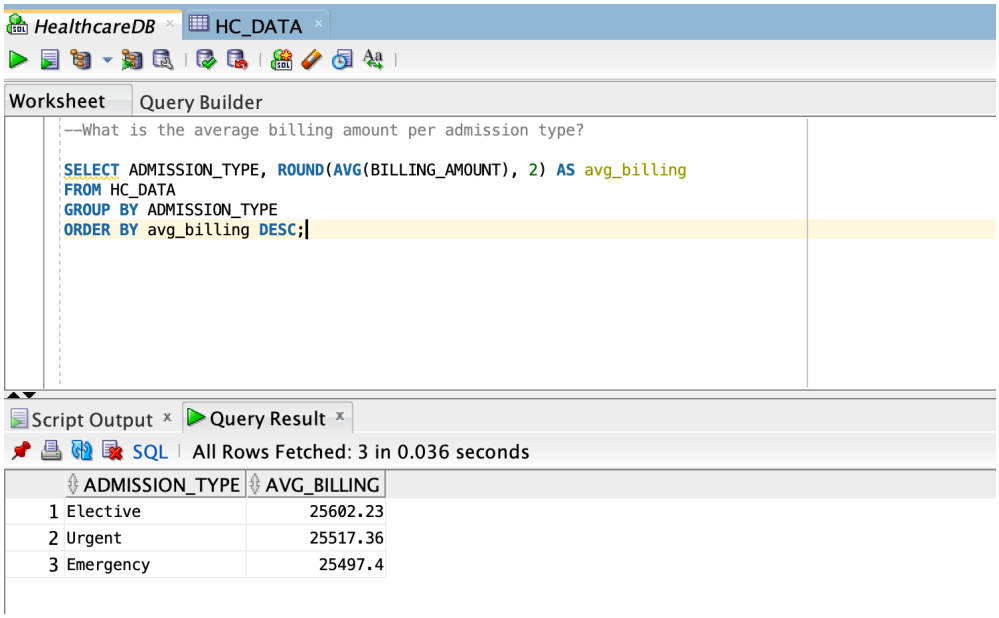
- **Query:** We use `GROUP BY MEDICAL_CONDITION` and `COUNT(*)`, sorting by the highest occurrence.
- **Insight:** Assists in prioritizing specialized treatments and ensuring the availability of necessary medications.



2. Financial & Insurance Analysis

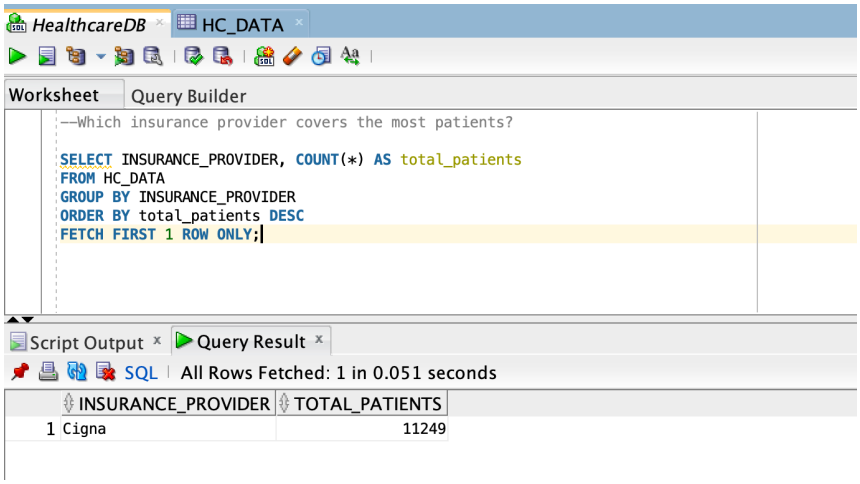
What is the average billing amount per admission type?

- **Query:** We use `AVG(BILLING_AMOUNT)` to compute the average billing for each admission type.
- **Insight:** Helps in setting pricing policies for different admission types.



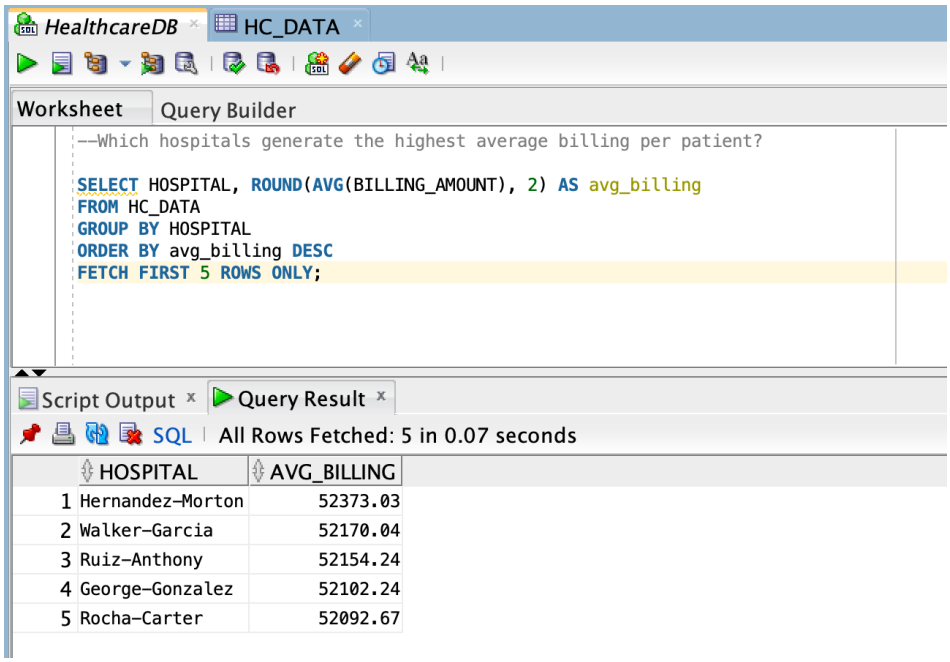
Which insurance provider covers the most patients?

- **Query:** Using `GROUP BY INSURANCE_PROVIDER` and `COUNT(*)`, we determine the most used insurance provider.
- **Insight:** Allows hospitals to understand which insurers they work with most frequently for better contract negotiations.



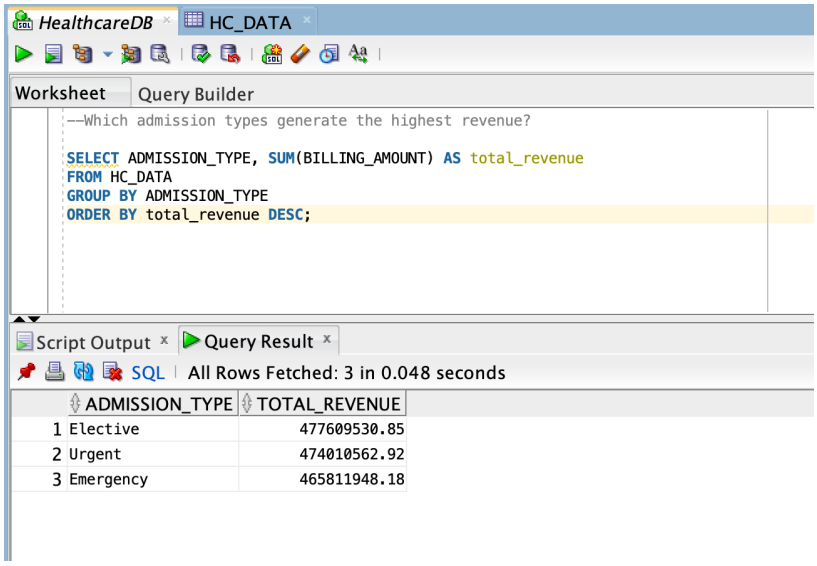
Which hospitals generate the highest average billing per patient?

- **Query:** We use `AVG(BILLING_AMOUNT)` with `GROUP BY HOSPITAL`, sorting results in descending order.
- **Insight:** Helps benchmark hospital revenue performance and financial efficiency.



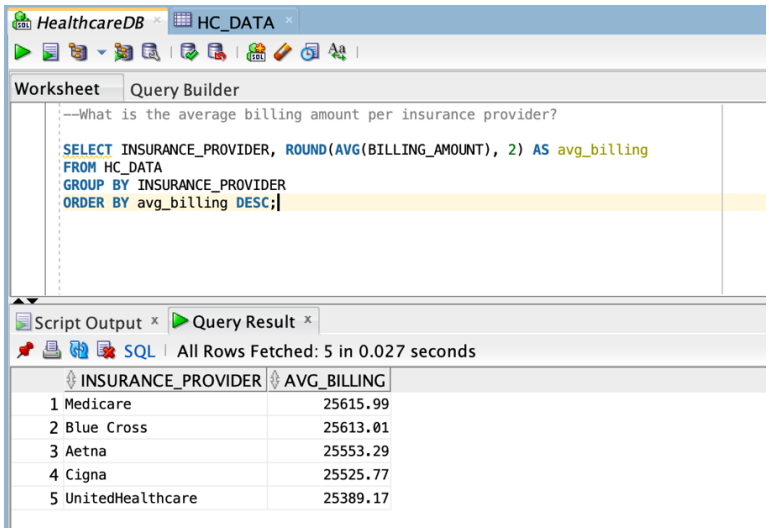
Which admission types generate the highest total revenue?

- **Query:** We use `SUM(BILLING_AMOUNT)` to find the total revenue per admission type.
- **Insight:** Guides hospitals in allocating resources to high-revenue departments.



What is the average billing amount per insurance provider?

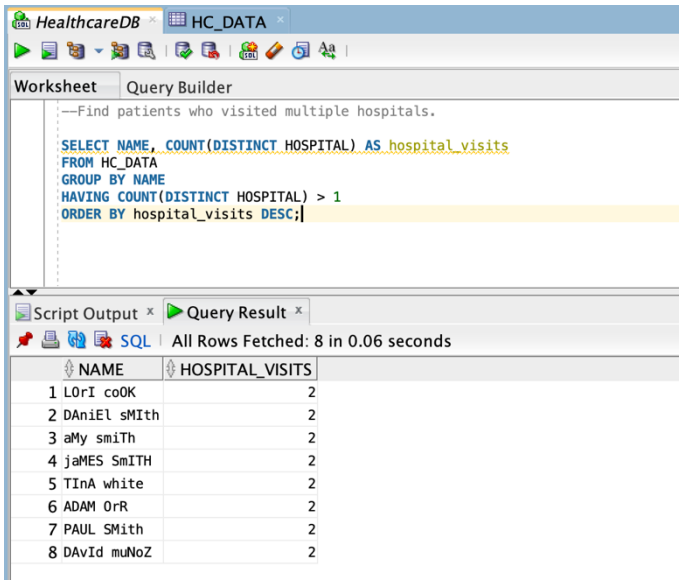
- **Query:** We use `AVG(BILLING_AMOUNT)` grouped by `INSURANCE_PROVIDER`.
- **Insight:** Helps in understanding cost variations across different insurance plans.



3. Advanced Healthcare Insights

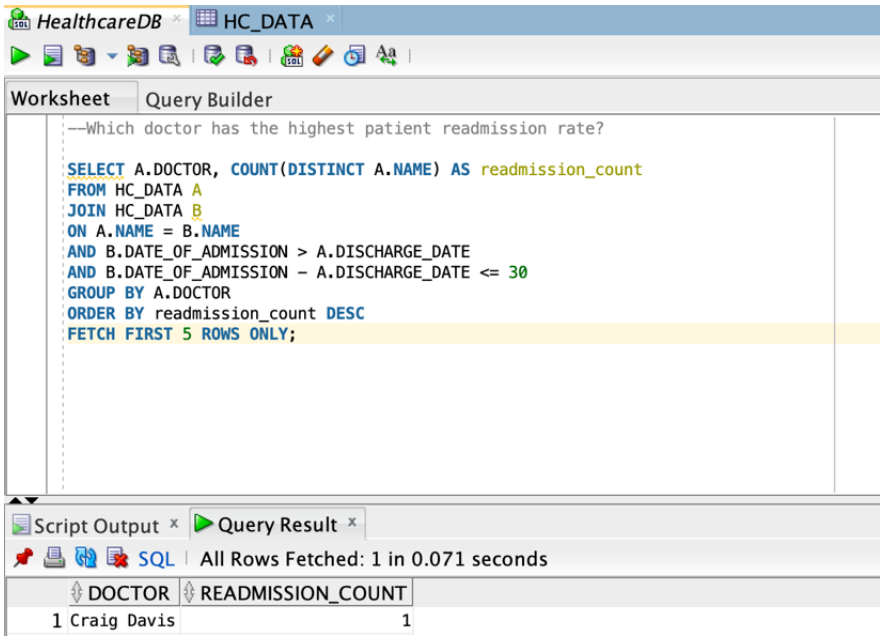
Find patients who visited multiple hospitals.

- **Query:** We use `COUNT(DISTINCT HOSPITAL)` with `HAVING COUNT(DISTINCT HOSPITAL) > 1` to identify such patients.
- **Insight:** Helps track patient loyalty and referral trends across hospitals.



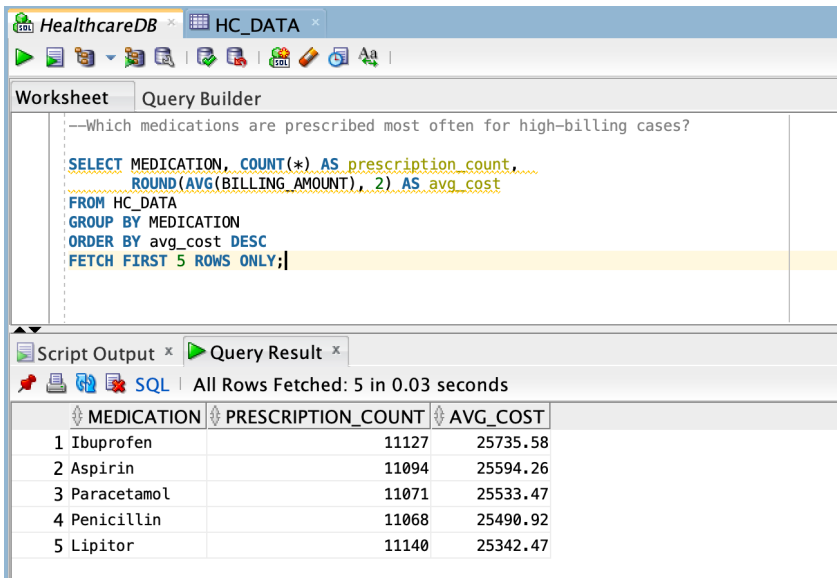
What is the readmission rate per doctor?

- **Query:** We perform a **self-join** on `HC_DATA` to track patients who were readmitted within 30 days, grouping by doctor.
- **Insight:** Evaluate doctor performance and effectiveness of treatment plans.



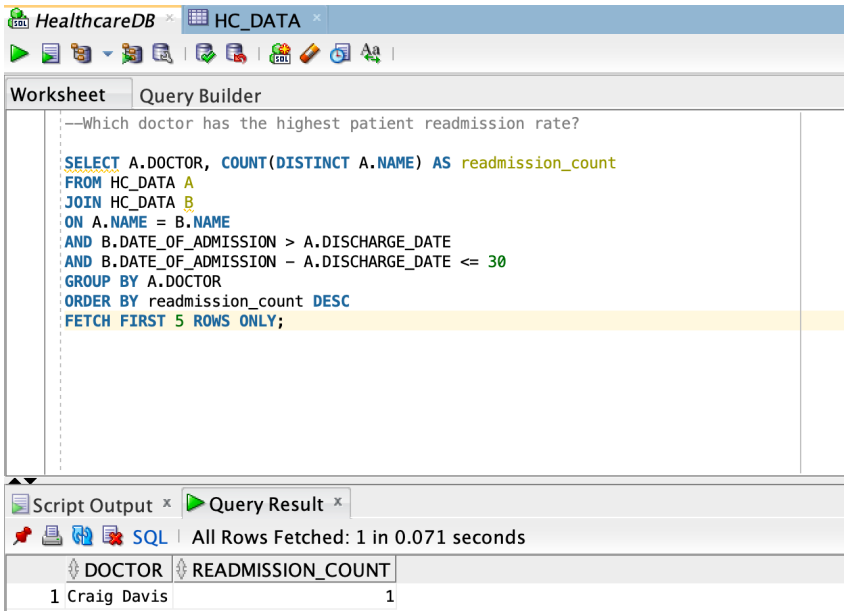
Which medications are prescribed most often for high-billing cases?

- **Query:** We use `GROUP BY MEDICATION`, count prescriptions, and calculate `AVG(BILLING_AMOUNT)`.
- **Insight:** Helps in understanding which medications are driving high treatment costs.



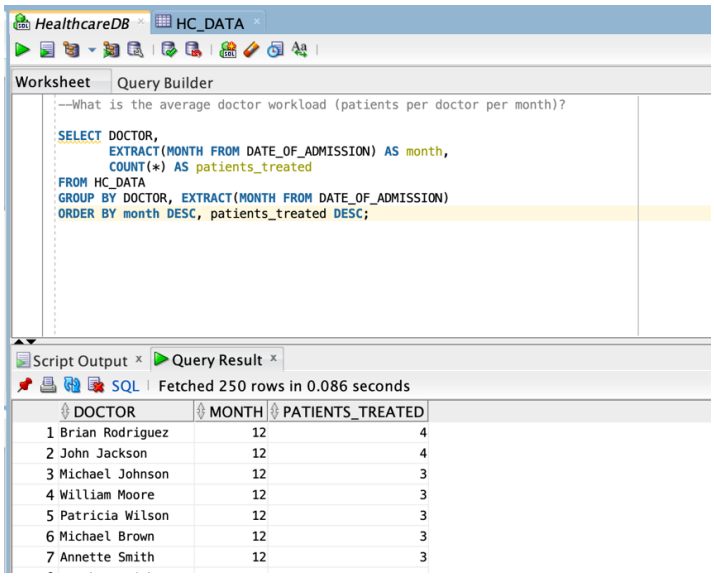
Which doctor has the highest patient readmission rate?

- **Query:** Using `JOIN` and `COUNT(DISTINCT NAME)`, we identify doctors with the highest number of returning patients.
- **Insight:** Assists hospitals in monitoring the **quality of care**.



What is the average doctor workload (patients per doctor per month)?

- **Query:** We use `EXTRACT(MONTH FROM DATE_OF_ADMISSION)`, `GROUP BY DOCTOR`, and `COUNT(*)`.
- **Insight:** Supports hospital scheduling and workload management for medical professionals



Conclusion

This project successfully demonstrates how **SQL can be utilized to analyze healthcare data**, providing **valuable insights into patient demographics, hospital efficiency, financial management, and medical trends**. By leveraging SQL queries, we uncovered key trends such as:

- The most common medical conditions requiring hospital attention.
- The distribution of admissions across different categories (Emergency, Urgent, Elective).
- Hospital revenue generation patterns based on admission types and insurance providers.
- The impact of doctor performance on patient readmission rates.
- The relationship between prescribed medications and billing costs.

Key Takeaways:

- Data-driven decisions can optimize hospital operations and resource allocation.
- Financial analysis of billing and insurance data can help maximize hospital revenue and improve pricing strategies.
- Tracking patient behavior (readmissions, hospital switching) aids in improving patient care