Healthcare Operations Analysis : Uncovering Trends in Treatment Delays, Costs and Patient Behaviour.

This project analyses healthcare appointment and treatment records across four relational tables: appointments, doctors, patients, and treatments. The objective was to uncover patterns in delays, cancellations, treatment costs, doctor performance, and patient demographics to support data-driven decision-making in healthcare operations.

Tools Used

Pandas for data cleaning and validation

SQL for analysis (joins, views, aggregations, subqueries)

Key Insights

- Performed data wrangling in Pandas, including column creation/removal, null handling, data type conversion, date extraction, renaming, transforming raw data into analysis ready data.
- Found a 53-day average delay between appointment and treatment; delays were longest for public insurance and rural patients.
- Identified top-performing doctors and departments, with Dr. Mary Perkins and Neurology leading in revenue and completed treatments.
- Highlighted female patients as more likely to cancel, and private insurance patients having the highest average treatment costs.
- Delivered a 24-question insight-driven SQL report covering cost trends, delays, cancellations, patient behaviour, and provider performance.

Recommendations

- Reduce Treatment Delays: Prioritize scheduling improvements for public insurance holders and rural patients, who face the longest wait times.
- Target High-Cancellation Demographics: Implement reminder systems or flexible scheduling for female patients, who show higher cancellation rates.
- Optimize Doctor Workload: Allocate more resources to high-performing doctors like Dr. Mary Perkins, and investigate underutilized staff for possible redistribution or training.
- Improve Data Quality Checks: Enforce date validation rules at data entry to prevent future inconsistencies such as treatment dates before appointment dates.

Conclusion

This project demonstrates how thoughtful data cleaning in Pandas combined with advanced SQL querying can surface critical inefficiencies in healthcare operations. From treatment delays and insurance disparities to doctor productivity and cost management, the insights derived offer a clear path for process improvement. The analysis not only answers complex business questions but also supports strategic decisions for resource allocation, patient engagement, and data integrity.