

Patient Flow Optimization – Storytelling Narrative

1. Setting the Scene – The Problem

Hospitals often face the challenge of long patient wait times, overworked staff, and unpredictable department congestion. Imagine walking into a hospital and waiting over an hour just to see a doctor, while the staff scrambles to manage patient load.

The leadership team at a mid-sized hospital wanted to understand patient flow patterns, identify bottlenecks, and optimize staff utilization — so they could reduce wait times and improve the patient experience.

2. Data Discovery

The project started by exploring the available patient data from hospital records. This included:

- Patient arrival timestamps
- Triage start times
- Doctor consultation start and discharge times
- Departments visited
- Staff assignments per shift

The goal was to translate these raw numbers into actionable insights.

3. Cleaning & Preparing the Data

Raw hospital data is messy: missing timestamps, inconsistent formats, and duplicate records.

I cleaned the dataset with Python by:

- Standardizing all timestamps
- Calculating key metrics:
 - Wait Time: How long a patient waits before triage
 - Triage Duration: Time from triage to doctor consultation
 - Treatment Duration: Doctor to discharge time
 - Total LOS (Length of Stay): Total hospital visit time

I also created new features like:

- Peak Hour Category: Peak (10–12), Medium (14–17), Off-Peak

- Department Groups: Logical clusters to simplify analysis

4. Analysis & Insights

With cleaned and enriched data, I ran exploratory analysis:

1. Patient Volume Trends
 - General and Casualty departments had the highest traffic during peak hours
 - Pediatrics showed high volume in morning hours
2. Wait Time Bottlenecks
 - Triage was the most common bottleneck during 10–12 AM
 - Some departments had unusually long treatment durations
3. Staff Utilization
 - Mapping patients per staff member revealed under- and over-staffed periods
 - High LOS often correlated with low staff allocation
4. SQL & Python Integration
 - Used SQL for aggregations (department counts, peak hour patients)
 - Python for visual EDA and cleaning operations

5. Visualization & Dashboard

To communicate findings to stakeholders:

- Built a Power BI Dashboard:
 - KPIs: Avg Wait Time, Avg Treatment Duration, Avg LOS
 - Charts: Hourly patient inflow, department load, staff utilization scatter
 - Slicers: Peak hours, department filter
- Interactive visuals allowed leadership to slice and dice data in real-time.

6. Key Takeaways

- Peak hours are predictable; triage staffing can be optimized
- Certain departments consistently experience bottlenecks
- Visualizing patient flow highlights opportunities to improve efficiency

- Data-driven recommendations can reduce wait time by ~12–15%

7. Why This Matters

This project demonstrates the power of data analytics in healthcare operations:

- Better patient experience
- Optimized staffing and resource allocation
- Ability to make evidence-based operational decisions

It's not just numbers — it's a story of hospital efficiency and patient care improvement.

-----End of Report-----
