Power BI Dashboard Project Overview

Project Name: Hospital Waitlist Summary

Project Purpose:
This dashboard was developed by following a YouTube tutorial [link] with the objective of strengthening my ability to build data visuals, understand data structure in Power BI, and deepen my skills in data modeling and insight communication. While the tutorial provided a foundation, I encountered several challenges and roadblocks, which led me to improve the model, clean the data more rigorously, and optimize performance.

Schema & Data Modeling

Aspect	What the Tutorial Had	Problem I Encountered	What I Did
Data Schema	A single large table created by appending inpatient and outpatient data in Power BI.	No formal star schema. Fact table overloaded with responsibilities.	Introduced dimension tables (e.g., Dim_Date, Dim_CaseType) to normalize and structure data.
Data Modeling	Only one relationship (Specialty Mapping → Specialty Name in fact table).	Poor relationships, no calendar intelligence, and slow performance.	Rebuilt the data model using a proper star schema and multiple clean dimension tables.

Data Source & Preparation

Aspect	What the Tutorial Had	Problem I Encountered	What I Did
Connection	Connected to folders containing multiple Excel files.	Folder connection slowed refresh and processing significantly.	Combined all files in Excel beforehand, then loaded a clean file directly into Power BI.
File Format	Four files for each of inpatient and outpatient data (2018–2021), loaded as folders.	Redundant overhead during query folding, poor data refresh behavior.	Merged and cleaned the data in Excel, imported as a single structured file.

Data Cleaning & Transformation

Cleaning Action	Description
Trimmed and cleaned column headers	Removed special characters and ensured consistency across all columns.

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Removed unused columns	Identified columns (e.g., `Specialty_HIPE`) that were not used in visuals or measures.
Standardized case types and specialties	Unified naming conventions between inpatient and outpatient datasets.
Removed duplicates	Ensured no repeated rows in dimension tables to avoid many-to-many joins.
Converted data types	Ensured `Archive_Date` and other time-related fields were properly formatted as date types.

Performance & Troubleshooting

! Issues Identified

- Folder connections were inefficient and increased load time.
- The visuals would disappear entirely when filters returned no data.
- Line charts caused fetching errors when filtered by case type or date.
- Tooltip pages showed on one visual but not another due to unmatched titles and missing data, primarily for outpatient data.
- Large dataset (over 449,000 rows) stressed Power BI due to inefficient query structure.

✓ Optimization Steps Taken

- Replaced folder connections with a clean single Excel source file.
- Used DAX to create **HasData** checks for each visual, although integration with line charts is still limited.
- Cleaned all columns, removed blanks, ensured relationships were one-to-many with no ambiguity, checked spelling errors, and handled missing data.
- Created `Dim_Date` with proper calendar intelligence and marked it as a date table.
- Adjusted DAX measures for total, average, and median calculations to prevent fetching and calculation errors.
- Created tooltip pages with better sizing (320×200px), including dynamic date values.

What I Learned

- Even if a tutorial doesn't follow best practices, **understanding why modeling matters** will help build scalable and responsive dashboards.
- Cleaning the data **outside of Power BI (e.g., in Excel)** can drastically improve performance before import.
- Power BI's **folder connection is powerful**, but adds performance overhead if not structured properly.

- **Dimension tables** are critical, even with small unique value sets, for clean modeling and better visual behavior.
- Creating **dynamic DAX measures** that respond to slicers (e.g., SWITCH between Average/Median) requires careful planning and testing.

Remaining Limitations / Areas for Improvement

Issue	Notes on Attempts and Status
No Data Message in Line Charts	Tried card overlays and `HasData` measures, but line charts still disappear entirely.
Fetching Errors from Line Chart Filters	Resolved in most cases by improving data model and limiting DAX complexity. Some edge cases remain.
Tooltip Rendering Delay	Better with optimized tooltip size, but may still lag with large visuals.
Switch Measures Naming in Tooltip	Renamed measures to friendly names, though chart tooltips still inherit DAX measure name.

Final Result

- The final dashboard **loads faster**, has **no fetching errors**, and handles data more cleanly.
- All charts and slicers are now **connected via proper relationships** using a **star schema**.
- Measures and tooltips dynamically adjust based on **user interaction with slicers**.
- The structure is now scalable, easy to maintain, and can be extended to other KPIs or datasets.

Ongoing Development

I am continuously refining this dashboard and my approach to Power BI by:

- Exploring new DAX patterns
- Practicing clean data modeling principles
- Planning to transition to Python for larger data cleaning tasks
- Seeking to build more robust dynamic visuals and conditional alerts in reports

🔄 Update & Refinements

As the dashboard evolved, several adjustments were made to improve stability and usability:

- **Removal of Date Filter Due to Fetching Errors**
  Initially, a date slider (based on Archive Date) was included for user-driven date filtering. However, repeated fetching errors occurred when users dragged the slider beyond the available date range in the dataset. Power BI could not retrieve non-existent dates, causing the entire dashboard to become unresponsive. Even attempts to limit the slicer's range through filtering did not fix the issue.

- To ensure performance and avoid confusion for end users, the date slicer was removed. Instead, analysis is now driven by **specialty** and **case type filters**, which continue to provide meaningful insights. Additionally, a **detailed table** on a separate page supports date-based analysis where needed, making the removal of the slicer a safe and strategic choice.

2. Handling Outliers: Median vs. Average Toggle
The dataset was externally sourced (via a YouTube tutorial), and the creator flagged the presence of outliers, although without providing specifics, both **average** and **median** metrics were incorporated.

- **Average** was used to provide a standard benchmark of total waitlist values across the selected filters.
- **Median** was added to reduce the influence of extreme values and provide a clearer view of central tendency.
  A switch was created to toggle between these metrics, allowing users to choose the most appropriate measure for their analysis.

- **Line Chart Visibility Issues & No Data Message Limitation**
  The dashboard includes two line charts—one for **Day Case & Inpatient**, and one for **Outpatient**. Each is filtered to display relevant case types. When interacting with one chart (e.g., selecting points on the Day Case & Inpatient line), the other chart may disappear if no corresponding data exists.

- Although a DAX-based message ("No Data Available") was created and performs well in other visuals, Power BI does not display this message when an entire visual is filtered out. This behavior appears to be a limitation in how Power BI processes blank results within filtered charts. At present, this behavior is retained and may be revisited as new Power BI features or workarounds become available.

Acknowledgment

A heartfelt thank you to the creator of the tutorial and the YouTube channel [Pivotalstats] that served as the foundation for this project. While the tutorial provided a structured walkthrough, it also gave me the opportunity to encounter, investigate, and resolve real-world data modeling and dashboarding challenges. These moments of discovery were invaluable in developing a deeper understanding of Power BI and data storytelling.

I am especially grateful for the clarity and structure the host brought to the content, and for making advanced concepts more approachable. This project would not have reached its current depth without that initial guidance.