Innovation & Entrepreneurship Hub for Educated Rural Youth (SURE Trust – IERY)

HOSPITAL EMERGENCY ROOM DASHBOARD USING POWER BI

The Domain of the Project:
Healthcare Analytics / Business Intelligence

Under the guidance of
Siddhika Shah (Data Analyst- Power BI)

By
Ms. Rishitha Narala (B. Tech CSE)

Period of the project:

January 2025 to June 2025

SURE TRUST
PUTTAPARTHI, ANDHRA PRADESH

Declaration

The project titled ***"Hospital Emergency Room Dashboard"*** has been mentored by **Ms. Siddhika Shah**, organized by SURE Trust, from January 2025 to June 2025. This initiative aims to benefit educated unemployed rural youth by providing hands-on experience in industry-relevant projects, thereby enhancing employability.

I, **Mrs. Rishitha Narala**, hereby declare that I have solely worked on this project under the guidance of my mentor. This project has significantly enhanced my practical knowledge and skills in the domain.

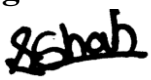
Name
Ms. Rishitha Narala

Signature
Rishitha Narala

Mentor

Ms. Siddhika Shah
Data Analyst- Power BI

Signature



Seal & Signature

Prof. Radha Kumari
Executive Director & Founder
SURE Trust

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EXECUTIVE SUMMARY

This project focuses on developing an interactive Power BI dashboard that visualizes key metrics in a Hospital Emergency Room (ER) activity, focusing on patient low, wait times, satisfaction, and demographic trends. The dashboard is segmented into three interactive views: Monthly View, Consolidated view, and Patient Details, offering both granular and aggregate insights into hospital ER operations. This Dashboard enables stakeholders to monitor ER performance, identify patterns, and optimize resource allocation based on patient behaviour and healthcare delivery trends.

The Monthly View provides a high-level overview of ER performance trends over time, making it easier to spot seasonal patterns and peak traffic periods. The Consolidated View aggregates data across departments and patient categories, enabling decision-makers to evaluate overall efficiency and identify bottlenecks in care delivery. Meanwhile, the Patient Details section drills down into individual patient records, highlighting specific wait times, treatment satisfaction scores, and demographic information such as age, gender, and visit purpose. Together, these views create a holistic understanding of how the ER functions on both macro and micro levels.

By leveraging the dynamic and interactive capabilities of Power BI, this dashboard empowers hospital staff and stakeholders to make data-driven decisions aimed at improving patient care and operational efficiency. It supports resource planning, enhances service delivery, and enables early identification of service delays or underperformance. Moreover, the dashboard can be scaled or customized for other departments within the healthcare facility, ensuring its long-term applicability in strategic planning and performance evaluation.

INTRODUCTION

Background and Context:

Emergency Rooms (ERs) are critical components of the healthcare system, acting as the first point of contact for patients requiring urgent medical attention. Efficient management of ER operations including patient intake, wait times, referrals, and satisfaction is essential for delivering timely and quality care. In today's data-driven healthcare environment, visual analytics tools like Power BI are being increasingly adopted to transform raw hospital data into actionable insights.

Problem Statement:

Hospitals often ace challenges such as:

- Long patient waits times
- Unequal distribution of resources
- Inconsistent referral and admission patterns
- Lack of real-time performance monitoring

Traditional reporting methods are often static and time-consuming, making t difficult to derive quick insights or adapt to emerging trends.

Scope and Limitations:

This project covers ER data from Monthly View (April 2023), Consolidated View (April 2023-October 2024), Patient Details. It shows trends by age, gender, race, time, and referrals. However, real-time data and predictive analysis are not included.

Innovation Component:

Interactive Navigation Tabs (Monthly View, Consolidated View, Patient Details) or seamless user experience. Hourly Heat Maps and Age/Gender/Race Demographics help uncover deep insights at a glance. Integrated KPIs Cards show real-time key metrics. Drill-down Capability in patient details allows detailed inspection of individual records.

PROJECT OBJECTIVES

- Monitor ER Performance:
  Track key metrics like number of patients, average wait time, referrals, and satisfaction scores.
- Visualize Patient Demographics:
  Analyses data by age group, gender, and race to understand patient diversity and trends.
- Identify Peak Hours and Days:
  Use time-based visuals to spot high-traffic hours and days for better staff and resource planning.
- Enable Data-Driven Decisions:
  Use interactive dashboards to support hospital administrators in improving efficiency.
- Compare Monthly vs Consolidated Views:
  Provide both individual monthly views and overall consolidated data for a comprehensive understanding of ER operations over time.
- Evaluate Department Referrals:
  Track which departments refer the most patients to the ER to help optimize interdepartmental coordination.
- Assess Admission Efficiency:
  Monitor how many patients are admitted vs. not admitted and how quickly they are seen, especially within the 30-minute target.
- Support Resource Allocation:
  Help decision-makers allocate staff, equipment, and resources more efficiently based on data trends.
- Improve Patient Satisfaction:
  Identify areas of delay or inefficiency that impact patient satisfaction and recommend actions for service improvement.
- Ensure Transparency in Reporting:
  Make it easy for stakeholders to understand ER performance with visually clear and well-structured dashboards.

METHODOLOGY AND RESULTS

Tools Used:

- Microsoft Power BI: For data modelling, visualization, and dashboard creation.
- Excel: Used for data storage.
- DAX (Data Analysis Expressions)

Methodology and Data Collection Approach:

- Data Collection:
  Imported ER data and date table from Excel into Power BI.
- Data Cleaning & Transformation:
  Removing Duplicates, Handled missing values.
- Data Modelling:
  Created relationship between tables.
- DAX Measures Created: Total Patients
  Average Wait Time Patient
  Satisfaction Score Dashboard
  Design: Monthly View
  Consolidated View Patient Details

Key Dashboard Insights:

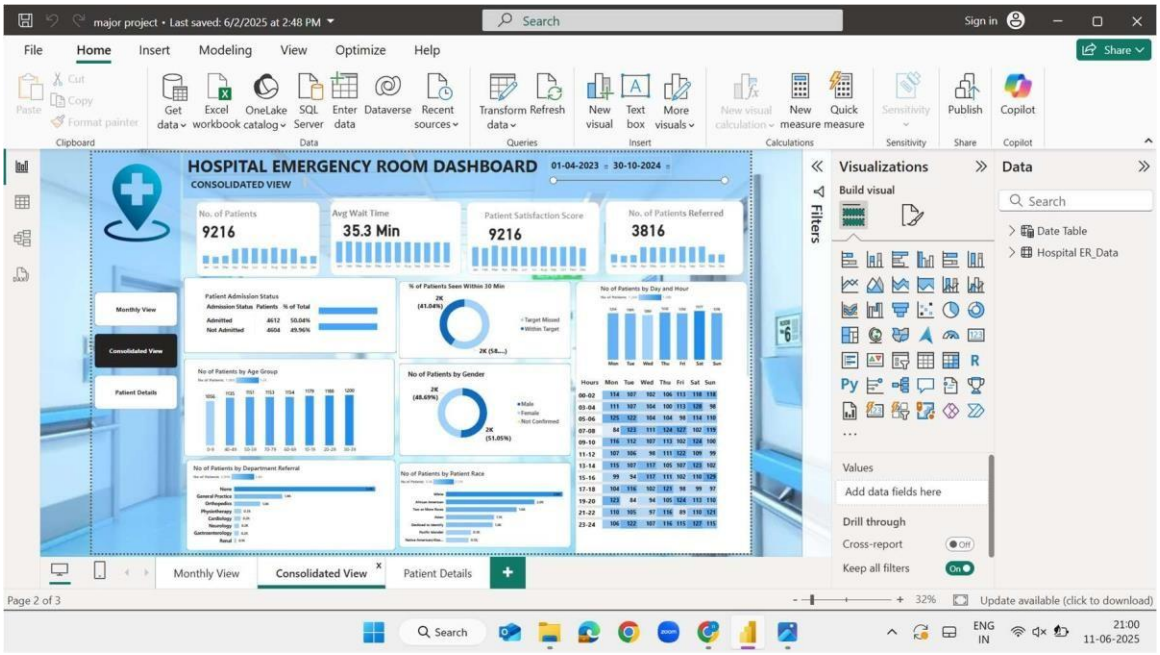
- Monthly View
  1. Total Patients (April 2023) :479
  2. Average Wait Time: 34.9 min
  3. Referrals: 216
  4. Admission Rate: 49.48%
- Consolidated View
  1. Total patients (Apr 2023 – Oct 2024): 9,216
  2. Average Wait Time: 35.3 min
  3. Referrals: 3,816

- Patient Details
    1. Tabular view of individual records
    2. Month, Gender, Race, Referral, and Admission.
    3. Useful for tracking specific patient histories.

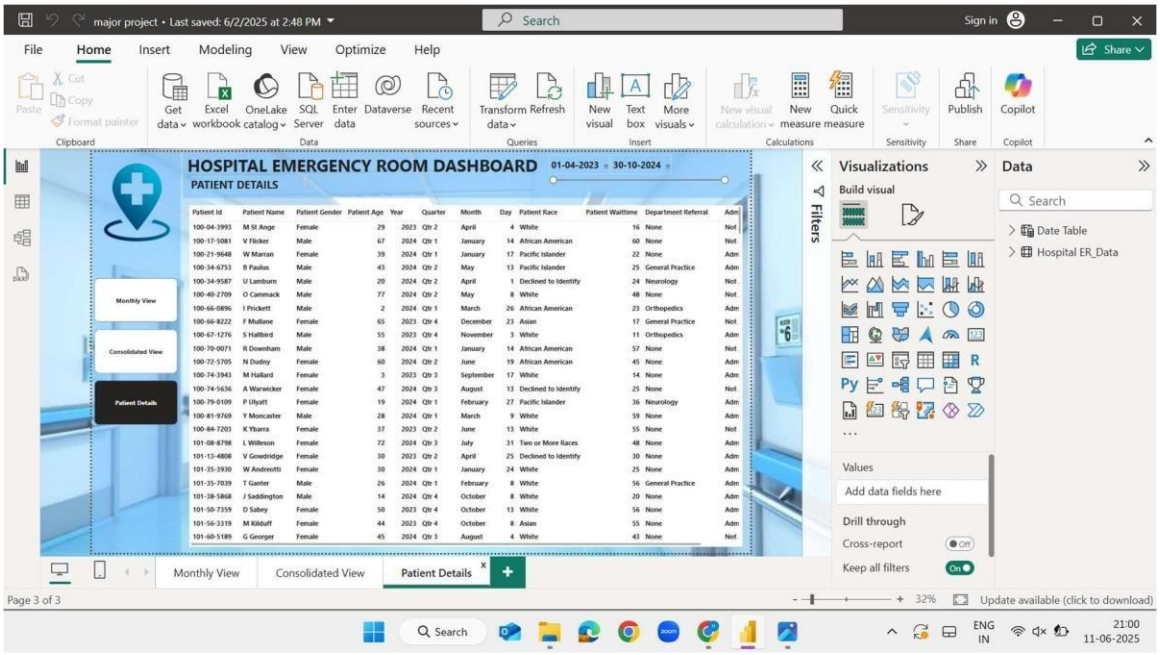
Project Hardware and Working Screenshots:

Monthly View Dashboard

Consolidated View Dashboard



Patient Details Dashboard



LEARNING AND REFLECTION

Technical Skills Gained:

- Power BI Proficiency
- Data Modelling
- DAX Functions
- Data Cleaning
- Time Intelligence

Experience Gained:

- Improved Power BI Skills:
  Gained hands-on experience in building professional dashboards using various visualizations like bar charts, line graphs, and pie charts.

- Learned Data Cleaning & Modelling:
  Worked with Power Query to clean and transform data and created relationships between tables for accurate reporting.

- Used DAX for Insights:
  Created DAX measures to calculate KPIs like average wait time, total patients, and satisfaction scores.

- Designed Interactive Reports:
  Built interactive dashboards with filters, slicers, and navigation buttons for user-friendly analysis.

- Enhanced Data Analysis Thinking:
  Understood how to derive meaningful insights from raw hospital data and represent them clearly through visuals.

CONCLUSION AND FUTURE SCOPE

Conclusion:

The Power BI dashboards effectively visualize key aspects of hospital emergency room operations, including patient volume, wait times, demographics, and referrals. With monthly, consolidated, and detailed patient views, the dashboards support hospital staff in making faster, data-driven decisions. The insights help identify peak times, admission trends, and department referrals, leading to better resource planning and improved patient care.

Future Scope:

- Real-Time Data Integration: Connect live hospital databases to track ER activity in real time.
- Predictive Analytics: Use machine learning to forecast patient inflow and required resources.
- Mobile Dashboard Access: Enable staff to monitor ER performance on mobile devices.
- Expanded Metrics: Include doctor availability, treatment durations, and follow-up outcomes.
- Cross-Department Insights: Link ER data with other departments for end-to-end patient flow analysis.