

HEALTHCARE DASHBOARD

**A Major Project Report
Submitted in Partial fulfillment for the award of
Bachelor of Engineering in
DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE**

**Submitted to
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MAJOR PROJECT REPORT

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Under the supervision of
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**ARTIFICIAL INTELLIGENCE AND DATA SCIENCE
Lakshmi Narain College of Technology, Bhopal (M.P.)
Session Dec 2024**

LAKSHMI NARAIN COLLEGE OF TECHNOLOGY, BHOPAL

DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE



CERTIFICATE

This is to certify that the work embodied in this project work entitled “Hospital Dashboard” has been satisfactorily completed by the **Smriti Vishwakarma**(0103AD223D04). It is a bonafide piece of work, carried out under the guidance in **Department of Computer Science & Engineering- Artificial Intelligence and Data Science, Lakshmi Narain College of Technology, Bhopal** for the partial fulfillment of the **Bachelor of Engineering** during the academic year 2024-25.

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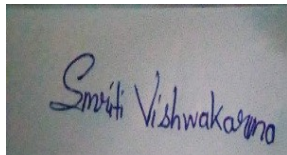
ACKNOWLEDGEMENT

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We would also thank our institution and all the faculty members without whom this project work would have been a distant reality.

Signature

A rectangular box containing a handwritten signature in blue ink. The signature appears to read 'Smriti Vishwakarma'.

Smriti Vishwakarma[0103AD223D04]

HEALTH- CARE DASHBOARD

SMRITI VISHWAKARMA

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CHAPTER 1

PROBLEM DOMAIN

1.Introduction

1.1Introduction

Healthcare organizations face numerous challenges in managing clinical, operational, and financial data. The complexity of healthcare data, regulatory requirements, and the need for efficient decision-making demand robust and intuitive data visualization tools. Power BI, a leading data analytics and visualization platform, is widely used in healthcare to address these challenges by transforming raw data into actionable insights. This report explores the specific problem domains in healthcare and how Power BI dashboards can provide solutions.

1.2Problem Definition

The primary problem in healthcare is the complexity and fragmentation of data that can impede timely and effective decision-making. The goal of a healthcare dashboard using Power BI is to centralize data, provide actionable insights, enable real-time monitoring, and support predictive analytics to improve patient care, operational efficiency, financial performance, and compliance. Power BI's user-friendly interface, powerful data integration capabilities, and robust visualization options make it an ideal tool for overcoming these challenges

CHAPTER 2

MAJOR OBJECTIVE & SCOPE OF PROJECT

2.1 OBJECTIVE OF HEALTHCARE DASHBOARD

The objective of a healthcare dashboard using Power BI is to provide healthcare organizations with a centralized, visual, and interactive platform for data analysis and decision-making. These objectives aim to enhance patient care, improve operational efficiency, optimize financial management, and support regulatory compliance. Here are the main objectives of using Power BI for healthcare dashboards:

- 1. Centralized Data Integration and Visualization:-** To consolidate and visualize healthcare data from various sources such as Electronic Health Records (EHR), financial systems, laboratory information systems, HR databases, and more, in one unified dashboard.
- 2. Real-Time Monitoring and Decision Support:-** To provide real-time monitoring of key performance indicators (KPIs) and metrics related to clinical, operational, and financial data.
- 3. Enhancing Patient Care and Clinical Outcomes:** To track and visualize clinical performance metrics such as patient outcomes, treatment effectiveness, readmission rates, and adherence to care protocols.

4. Improving Operational Efficiency: To optimize hospital workflows by identifying bottlenecks in patient flow, reducing wait times, and ensuring efficient use of resources like staff, beds, and medical equipment.

5. Financial Performance and Cost Management: To provide transparency into financial metrics such as revenue, expenses, budgeting, billing, claims, and cost analysis.

6. Compliance and Regulatory Monitoring:--To track compliance with healthcare standards and regulatory requirements (e.g., HIPAA, Joint Commission standards) through dashboards that monitor patient safety incidents, infection rates, and other key indicators.

Key Benefits of Achieving These Objectives

- **Improve Quality of Care:** By providing clearer insights into patient data, enabling better clinical decision-making.
- **Enhance Efficiency:** Through optimized resource utilization, reduced administrative tasks, and streamlined workflows.
- **Boost Financial Stability:** With enhanced revenue tracking, cost control, and budgeting capabilities.
- **Strengthen Compliance:** With accurate tracking and monitoring of regulatory standards.
- **Empower Decision-Making:** Offering a clear visual representation of complex data, allowing for quicker and more effective decisions

2.1 SCOPE OF HOSPITALS DASHBOARD

The scope of a hospital dashboard using Power BI outlines what the dashboard will cover and the boundaries within which it will operate. This scope is critical to defining what data will be included, the target users, the key metrics, the systems it will integrate with, and the functionalities it will provide. Here's a breakdown of the typical scope of a hospital dashboard using Power BI:

1. Data Sources and Integration

- **Scope:** Integrate data from multiple healthcare-related systems and databases such as:
 - **Electronic Health Records (EHR)** for patient information, medical history, and clinical notes.
 - **Laboratory Information Systems (LIS)** for lab results and diagnostics.
 - **Radiology Information Systems (RIS)** for imaging and radiology reports.
 - **Financial Systems** for billing, budgeting, revenue cycle management, and expenses.
 - **Human Resource (HR) Systems** for staff management, scheduling, and productivity.
 - **Supply Chain Systems** for inventory, equipment, and medical supplies.

2. Key Metrics and Performance Indicators

- **Scope:** Track and visualize a wide range of Key Performance Indicators (KPIs) across different hospital departments, such as:
 - **Clinical KPIs:** Average length of stay, patient readmission rates, infection rates, treatment success rates, and patient outcomes.
 - **Operational KPIs:** Bed occupancy rates, patient wait times, emergency department performance, and workflow efficiency.

- **Financial KPIs:** Revenue per patient, billing efficiency, cost per service, claim denial rates, and departmental budgets.
- **Patient Satisfaction KPIs:** Patient feedback scores, Net Promoter Score (NPS), and survey results.
- **Staff Productivity KPIs:** Staff-to-patient ratios, shift compliance, overtime hours, and staff workload distribution.

3. User Roles and Access Levels

- **Scope:** Provide role-based access to the dashboard with personalized views for different users, including:
- **Executives and Administrators:** High-level dashboards focusing on strategic decision-making, financial health, and hospital-wide performance.
- **Clinicians and Medical Staff:** Dashboards with patient-specific data, clinical outcomes, and treatment efficacy.
- **Nurses and Frontline Staff:** Dashboards for daily patient management, workload monitoring, and real-time alerts.
- **IT and Data Analysts:** Access to deeper data analysis, drill-down reports, and data quality assessments.

4. Real-Time Data Visualization and Analytics

- **Scope:** Provide real-time or near-real-time data visualization to enable:
 - Live tracking of critical metrics such as patient admissions, bed occupancy, ER activity, and patient flow.
 - Real-time alerts for anomalies, such as sudden increases in patient readmissions, critical lab results, or safety incidents.
 - Interactive visualizations like heatmaps, drill-downs, and filters for exploring data trends.

5. Predictive and Advanced Analytics

- **Scope:** Incorporate predictive analytics and machine learning models using Power BI's integration with Azure or other advanced analytics platforms to:
 - Forecast patient demand, resource needs, and seasonal trends in patient volume.
 - Predict potential bottlenecks in workflows and suggest solutions.
 - Identify patients at high risk for readmission or complications.

6. Reporting and Custom Dashboards

- **Scope:** Provide customizable reports and dashboards tailored to the specific needs of different departments and stakeholders, including:
 - Pre-built templates for common healthcare reports (e.g., monthly financial performance, clinical outcomes overview).
 - Custom reports based on specific queries or departmental needs.
 - Exportable reports in formats like PDF, Excel, or PowerPoint for external sharing.

7. Compliance and Regulatory Monitoring

- **Scope:** Include dashboards to monitor compliance with healthcare standards and regulations, such as:
 - Patient privacy and data security metrics aligned with HIPAA.
 - Monitoring clinical practices to ensure they meet Joint Commission standards or other accreditation requirements.
 - Tracking safety incidents and infection control measures.

8. Resource and Inventory Management

- **Scope:** Manage and track the utilization of hospital resources and inventory, including:
- Visualization of resource allocation (staff, equipment, and rooms) and usage patterns
- Monitoring inventory levels of critical supplies, medications, and equipment.
- Alerts for low stock levels or expiring supplies.

9. Patient and Clinical Data Analysis

- **Scope:** Analyze and visualize patient-specific and clinical data for:
 - Patient demographics, medical history, and care outcomes.
 - Analysis of diagnosis and treatment patterns.
 - Visualization of disease prevalence, clinical pathways, and patient outcomes.

10. User Interaction and Dashboard Functionality

- **Scope:** Provide an interactive user interface with features such as:
 - Drill-down capabilities to explore data from a high-level view down to specific details.
 - Filters and slicers for segmenting data by time periods, departments, demographics, etc.
 - Custom visualization tools (graphs, pie charts, bar charts, trend lines, etc.) for different types of analysis.
 - Interactive maps for visualizing data by location, such as infection hotspots or resource distribution.

11. Data Security and Privacy

- **Scope:** Ensure that all data visualized and managed through the Power BI dashboard adheres to strict data security protocols, including:
 - Data encryption both at rest and in transit.
 - Role-based access control to limit who can view or modify specific data.
 - Compliance with healthcare privacy laws like HIPAA for sensitive patient data.

12. Data Refresh and Maintenance

- **Scope:** Schedule regular data refresh cycles to ensure that the dashboard always presents the latest information, with options for:
 - Automatic data refresh intervals (daily, hourly, or real-time).
 - Manual refresh options for on-demand data updates.
 - Maintenance schedules for database and system updates.

CHAPTER 3

PROBLEM ANALYSIS AND REQUIRED SPECIFICATION

PROBLEM ANALYSIS

1. Fragmented Data Sources

- Healthcare organizations operate with multiple data sources—Electronic Health Records (EHR), lab systems, radiology information, financial databases, and inventory management systems—that often function in isolation.
- Power BI Solution: Power BI can integrate data from multiple sources into a single dashboard, providing a unified view of hospital data. This reduces data silos and offers a holistic perspective for better decision-making.

2. Large Volume of Complex Data

- **Problem:** Healthcare generates a massive amount of data, including patient records, clinical results, operational data, and financial transactions, which is challenging to manage and interpret.
- Power BI Solution: Power BI's visualization capabilities can simplify complex data into understandable visuals such as charts, graphs, and KPIs. This makes it easier to identify trends, spot anomalies, and extract actionable insights.

3. Inconsistent Data Quality and Accuracy

- **Problem:** Data inconsistencies, inaccuracies, and missing data are common in healthcare due to manual entry errors, legacy systems, and lack of standardization across departments.

- **Power BI Solution:** Power BI includes data cleaning and transformation tools through Power Query, which can automate data validation, correct inconsistencies, and ensure data integrity before visualization.

4. Lack of Real-Time Data for Decision-Making

- **Problem:** Healthcare decisions often require real-time data, but many systems are not capable of providing up-to-date information, leading to decisions based on outdated data.
- **Power BI Solution:** Power BI can support real-time data visualization by connecting to live data sources, allowing healthcare providers to monitor ongoing operations and respond quickly to emergencies.

5. Challenges in Monitoring Performance Metrics

- **Problem:** Hospitals need to track various Key Performance Indicators (KPIs) to monitor clinical, operational, and financial performance, but gathering and interpreting this data is challenging.
- **Power BI Solution:** Power BI allows for the creation of customized dashboards with relevant KPIs, enabling easy monitoring of clinical outcomes, operational efficiency, and financial health. Performance can be tracked over time, with trends visualized to aid in analysis.

6. Inefficient Workflow and Resource Management

- **Problem:** Hospitals often face challenges with managing resources like staff, beds, equipment, and supplies, leading to inefficiencies in patient care and hospital operations.
- **Power BI Solution:** Power BI dashboards can visualize resource allocation, usage patterns, and workflow bottlenecks. This allows hospital administrators to optimize resource allocation and improve operational efficiency.

7. Limited Predictive Insights for Planning

- **Problem:** Healthcare facilities often rely on retrospective data for planning, lacking predictive analytics to anticipate future trends and resource needs.
- **Power BI Solution:** Power BI's integration with Azure Machine Learning or R provides predictive analytics capabilities. Hospitals can forecast patient admissions, predict outbreaks, and plan resources accordingly, enabling proactive decision-making.

8. Difficulty in Ensuring Compliance and Tracking Regulations

- **Problem:** Compliance with healthcare regulations (e.g., HIPAA) and standards can be difficult to track and ensure without specialized monitoring tools.
- **Power BI Solution:** Power financial BI dashboards can be customized to track compliance metrics, patient safety indicators, and other regulatory requirements, reducing manual efforts and enhancing oversight.

9. Financial Management Complexity

- **Problem:** Managing the health of a hospital involves tracking revenues, expenses, billing, cost-per-service, and budgets across departments, which can be complex.
- **Power BI Solution:** Financial dashboards in Power BI offer clear visibility into billing cycles, revenue, expenses, and budgeting. This enables hospital management to control costs, identify revenue opportunities, and manage budgets effectively.

10. Limited Patient Satisfaction and Engagement Tracking

- **Problem:** Understanding patient satisfaction and engagement levels is critical for improving healthcare services, but tracking these metrics consistently is difficult.

- **Power BI Solution:** Power BI can centralize patient feedback data, visualize trends in patient satisfaction, and provide insights into areas requiring improvement.

11. User Experience Challenges with Existing Tools

- **Problem:** Existing healthcare data tools may have complex interfaces or lack user-friendly features, making it difficult for non-technical staff to use effectively.
- **Power BI Solution:** Power BI is known for its user-friendly interface, drag-and-drop functionality, and interactive dashboards, making it accessible for non-technical staff while still providing powerful data analysis tools.

REQUIREMENT SPECIFICATION

1.Functional Requirements

These are the core features and capabilities that the healthcare dashboard should include:

a. Data Integration

The dashboard must integrate seamlessly with multiple data sources such as:

- Electronic Health Records (EHR)
- Laboratory Information Systems (LIS)
- Radiology Information Systems (RIS)
- Financial Systems
- HR and Staffing Databases
- Supply Chain Management Systems
- Enable a comprehensive and unified view of hospital data.

b. Data Visualization

- The dashboard should offer diverse and interactive data visualization options such as:
 - Charts (bar, line, pie, stacked)
 - Graphs (time series, scatter, and trend)
 - Heatmaps for spatial analysis
 - Gauges for KPIs
 - Maps for geographical data analysis
- Make complex data more understandable for quick analysis and decision-making.

c. Role-Based Access Control

- Implement role-based access to data with user-specific dashboards for:
 - Executives (financial and strategic overview)
 - Clinicians (patient data, clinical metrics)
 - Nurses (patient care workflows)
 - IT/Data Analysts (data drill-down and analysis)
- Ensure data security and relevance by restricting access based on user roles.

d. Key Performance Indicators (KPIs)

Track and display critical KPIs, including:

- Clinical Metrics (length of stay, readmission rates, infection rates)
- Operational Metrics (patient wait times, ER throughput)
- Financial Metrics (revenue, expenses, cost per service)
- Resource Metrics (bed occupancy, equipment utilization)

Provide a clear view of performance and highlight areas needing improvement.

e. Data Filtering and Drill-Down Capabilities

- Requirement: Allow users to filter data and perform drill-downs for deeper analysis, using parameters such as:
 - Date and time ranges
 - Department or location
 - Patient demographics (age, gender, etc.)
 - Diagnosis and treatment types

f. Real-Time Data Updates

- Provide real-time or near-real-time data updates for critical metrics, including:
 - Patient admission and discharge
 - Emergency room status
 - Staff availability and scheduling
- Support timely decision-making, especially in urgent or emergency scenarios.

g. Customizable Reports and Dashboards

- Offer options for creating customizable reports and dashboards for different departments, with export options to PDF, Excel, or PowerPoint

2. Non-Functional Requirements

These requirements focus on the quality, performance, and usability aspects of the dashboard:

a. Performance

- The dashboard should perform smoothly with minimal latency, even when handling large volumes of data (e.g., millions of patient records).
- Metrics: Page loading time should not exceed 3 seconds for any view; data refresh should be completed within 10 seconds for real-time metrics.
- Ensure a fast and responsive user experience.

b. Usability

- The dashboard should have an intuitive user interface with easy navigation, user-friendly filters, and clear visualizations.
- Ensure users of all technical skill levels can use the dashboard effectively with minimal training.

c. Scalability

- The dashboard should be scalable to accommodate:
 - Increasing data volume (as the hospital grows or integrates with new systems)
 - Additional users without performance degradation
- Support future expansion and evolving organizational needs.

d. Data Security and Privacy

- Implement data security measures that comply with healthcare standards, including:
 - HIPAA compliance for patient data privacy
 - Encryption for data at rest and in transit
 - Audit trails for data access and modifications
- Ensure patient data protection and maintain compliance with legal regulations.

3. Technical Requirements

These are the technology-related specifications necessary to support the healthcare dashboard:

a. Platform and Environment

- Use Power BI as the primary data visualization tool, leveraging Power BI Service (cloud) or Power BI Desktop.
- Provide a robust, cloud-based or on-premise solution for data analysis.

b. Database and Data Storage

- Utilize secure databases and data lakes for storing integrated data (e.g., Azure SQL Database, SQL Server, Data Lake).
- Ensure reliable, high-performance data storage with advanced querying capabilities.

c. Data Connectivity

- Support connectivity to various data sources via APIs, ODBC, Excel, SQL, and cloud data platforms (e.g., Azure, AWS, Google Cloud).
- Facilitate seamless data integration from diverse systems.

d. Automation and Scheduled Data Refresh

- Automate data refresh processes to update the dashboard at defined intervals (hourly, daily) or in real-time.
- Maintain data accuracy without manual intervention.

e. Mobile Compatibility

- Ensure that the dashboard is accessible on mobile devices through Power BI Mobile, with optimized mobile-friendly views.
- Enable healthcare professionals to access critical data on the go.

4. User Requirements

These are the expectations and needs of the end-users who will interact with the healthcare dashboard:

a. Ease of Use

- Users should be able to navigate the dashboard with minimal technical training. The interface should be clean, organized, and logically structured.
- Increase user adoption and engagement by simplifying complex data.

b. Training and Support

- Requirement: Provide comprehensive training materials, user manuals, and ongoing support for end-users.
- Ensure effective use of the dashboard and address user queries promptly.

c. Customizability

- Users should have the ability to create custom views, set personal alerts, and adjust visualizations based on their preferences.
- Meet diverse user needs and enhance the personalization of data analysis.

5. Reporting Requirements

These specify the types of reports that the dashboard should generate and their characteristics:

a. Standard Reports

- Generate standard reports for clinical, operational, and financial performance (e.g., monthly clinical performance, quarterly financial summary).
- Provide routine insights into key areas of hospital performance.

b. Custom Reports

- Allow users to create custom reports based on ad-hoc queries, with the ability to drill down into specific data points.
- Address specific departmental needs and facilitate detailed analysis.

c. Exportable and Shareable Reports

- Requirement: Enable reports to be easily exported to common formats (Excel, PDF, PowerPoint) and shared via email or embedded in other platforms (e.g., SharePoint, Teams).
- Purpose: Facilitate collaboration and communication across teams.

6. Data Governance Requirements

These requirements ensure that the data within the dashboard is accurate, reliable, and well-governed:

a. Data Quality Checks

- Implement mechanisms to validate and clean data, ensuring that data used in reports is accurate and reliable.
- Maintain trust in the data presented to decision-makers.

b. Data Documentation

- Provide clear documentation on data sources, transformations, and definitions for metrics and KPIs.
- Enhance transparency and understanding of the data.

CHAPTER 4

DETAILS DEFINE (MODELING & ERD/DFD)

Chart and Graph

4.1 Model view :

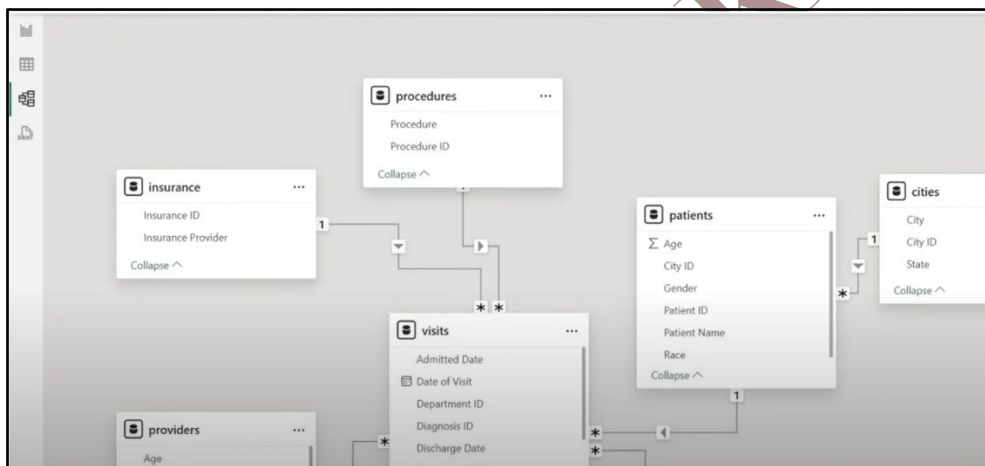
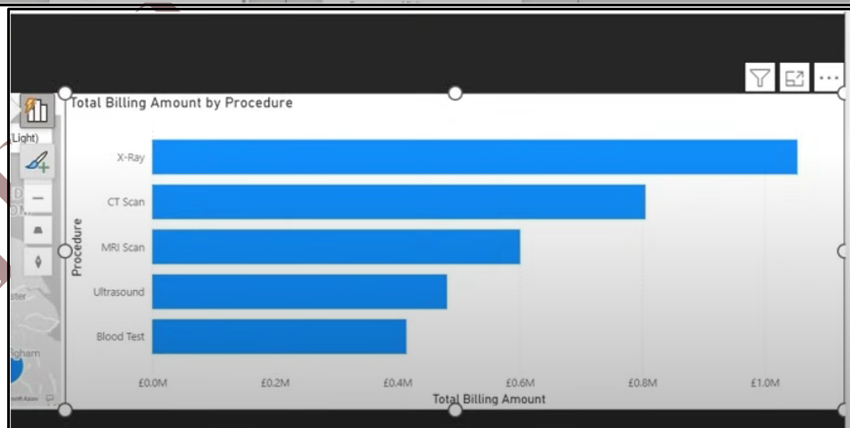


Fig4.1

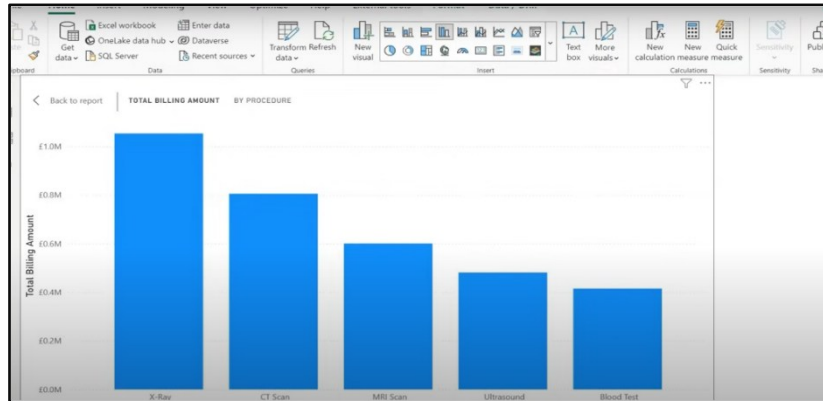
Total



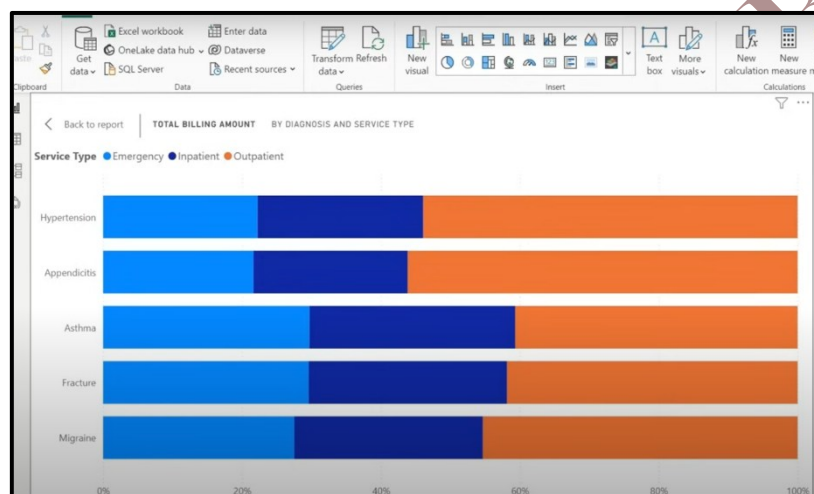
4.2 Average Percentage

Fig 4.2 Average Total Percentage %

19

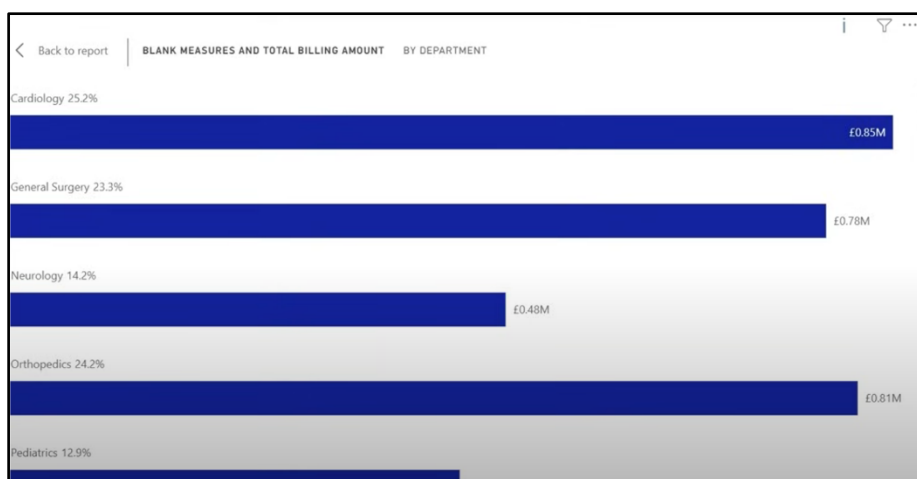


4.2.1



procedure

4.2.2 Diagnosis & Services Types



4.2.3 Diagnosis

20

Fig-



4.2.4

Department

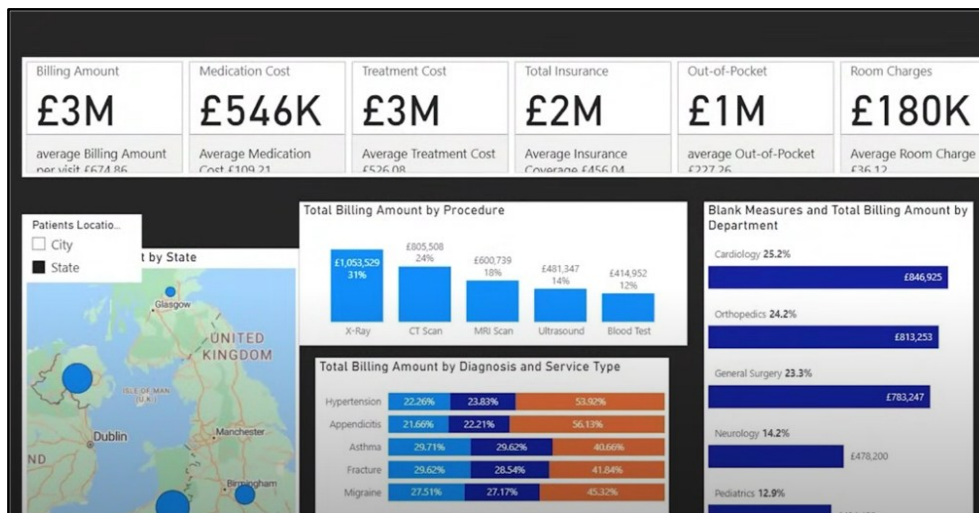


Fig-4.3 View of Dashboard

Fig-4.4 light view of Dashboard

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CHAPTER 5

HARDWARE AND SOFTWARE REQUIREMENT

5.1SOFTWARE:

- Power BI desktop
- Microsoft Excel
- Microsoft power point
- Power BI services/ report /power query
- Browser-Chrome
- My SQL Database

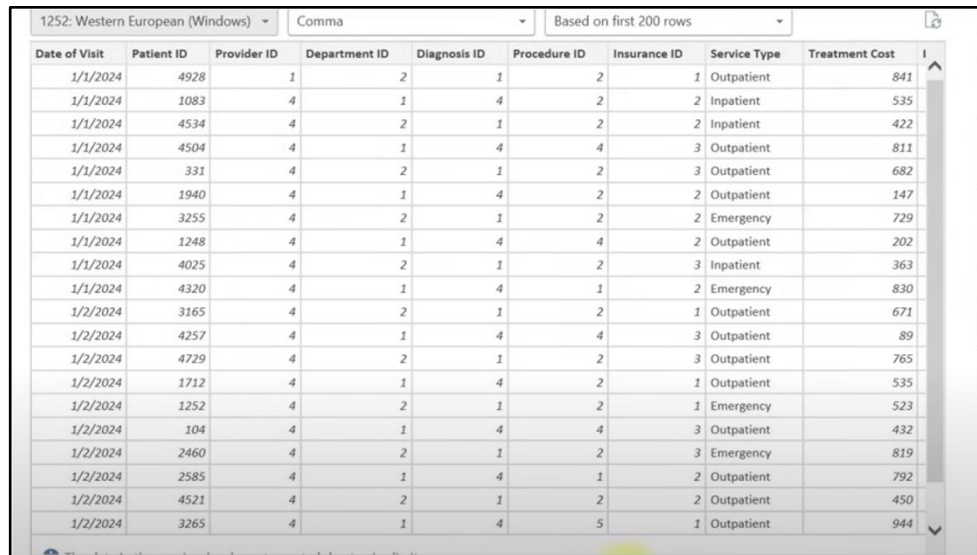
5.2HARDWARE

- Processor ---- AMD Ryzen 5 5500U with Radeon Graphics 2.10 GHz
- Installed RAM ---- 16.0 GB (13.8 GB usable)
- System type ----- 64-bit operating system, x64-based processor
- Network: ----- High-speed internet (10 Mbps+)

CHAPTER 6

SNAPSHOTS OF INPUT & OUTPUT

6.1 Importing data

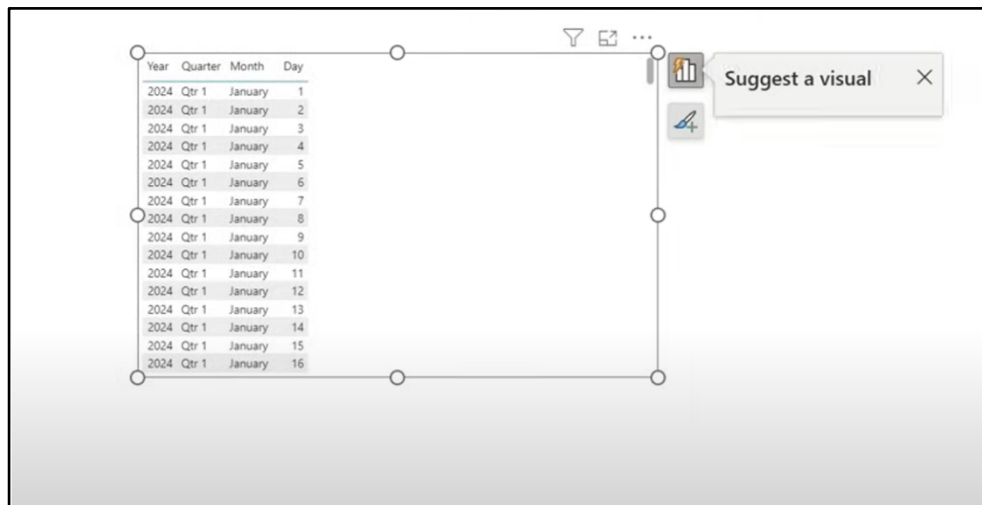


1252: Western European (Windows) Comma Based on first 200 rows

| Date of Visit | Patient ID | Provider ID | Department ID | Diagnosis ID | Procedure ID | Insurance ID | Service Type | Treatment Cost |
|---------------|------------|-------------|---------------|--------------|--------------|--------------|--------------|----------------|
| 1/1/2024 | 4928 | 1 | 2 | 1 | 2 | 1 | Outpatient | 841 |
| 1/1/2024 | 1083 | 4 | 1 | 4 | 2 | 2 | Inpatient | 535 |
| 1/1/2024 | 4534 | 4 | 2 | 1 | 2 | 2 | Inpatient | 422 |
| 1/1/2024 | 4504 | 4 | 1 | 4 | 4 | 3 | Outpatient | 811 |
| 1/1/2024 | 331 | 4 | 2 | 1 | 2 | 3 | Outpatient | 682 |
| 1/1/2024 | 1940 | 4 | 1 | 4 | 2 | 2 | Outpatient | 147 |
| 1/1/2024 | 3255 | 4 | 2 | 1 | 2 | 2 | Emergency | 729 |
| 1/1/2024 | 1248 | 4 | 1 | 4 | 4 | 2 | Outpatient | 202 |
| 1/1/2024 | 4025 | 4 | 2 | 1 | 2 | 3 | Inpatient | 363 |
| 1/1/2024 | 4320 | 4 | 1 | 4 | 1 | 2 | Emergency | 830 |
| 1/2/2024 | 3165 | 4 | 2 | 1 | 2 | 1 | Outpatient | 671 |
| 1/2/2024 | 4257 | 4 | 1 | 4 | 4 | 3 | Outpatient | 89 |
| 1/2/2024 | 4729 | 4 | 2 | 1 | 2 | 3 | Outpatient | 765 |
| 1/2/2024 | 1712 | 4 | 1 | 4 | 2 | 1 | Outpatient | 535 |
| 1/2/2024 | 1252 | 4 | 2 | 1 | 2 | 1 | Emergency | 523 |
| 1/2/2024 | 104 | 4 | 1 | 4 | 4 | 3 | Outpatient | 432 |
| 1/2/2024 | 2460 | 4 | 2 | 1 | 2 | 3 | Emergency | 819 |
| 1/2/2024 | 2585 | 4 | 1 | 4 | 1 | 2 | Outpatient | 792 |
| 1/2/2024 | 4521 | 4 | 2 | 1 | 2 | 2 | Outpatient | 450 |
| 1/2/2024 | 3265 | 4 | 1 | 4 | 5 | 1 | Outpatient | 944 |

Fig-6.1

6.2 Creating tables (dates)



Year Quarter Month Day

| | | | |
|------|-------|---------|----|
| 2024 | Qtr 1 | January | 1 |
| 2024 | Qtr 1 | January | 2 |
| 2024 | Qtr 1 | January | 3 |
| 2024 | Qtr 1 | January | 4 |
| 2024 | Qtr 1 | January | 5 |
| 2024 | Qtr 1 | January | 6 |
| 2024 | Qtr 1 | January | 7 |
| 2024 | Qtr 1 | January | 8 |
| 2024 | Qtr 1 | January | 9 |
| 2024 | Qtr 1 | January | 10 |
| 2024 | Qtr 1 | January | 11 |
| 2024 | Qtr 1 | January | 12 |
| 2024 | Qtr 1 | January | 13 |
| 2024 | Qtr 1 | January | 14 |
| 2024 | Qtr 1 | January | 15 |
| 2024 | Qtr 1 | January | 16 |

Suggest a visual

Fig-6.2

6.3 Date difference

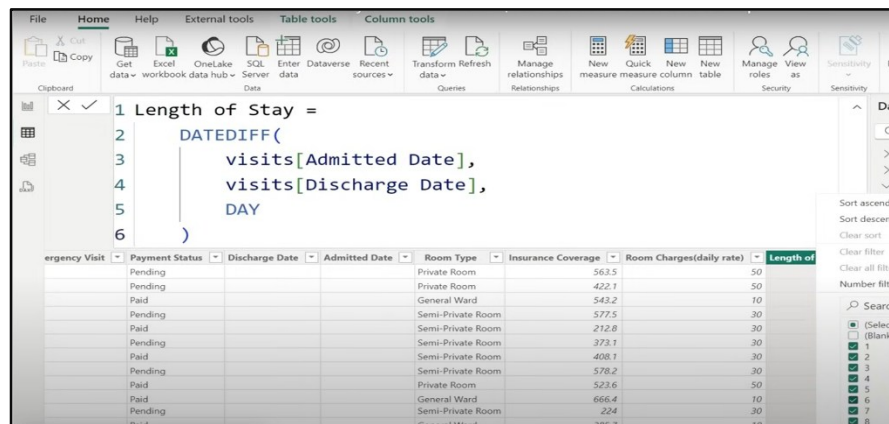


Fig-6.3 Date Different

6.4 Visiting tables

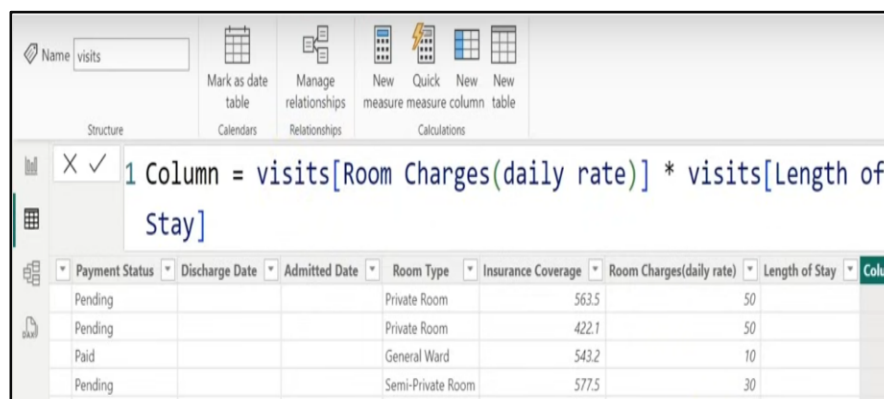


FIG-6.4

6.5 Group Measures

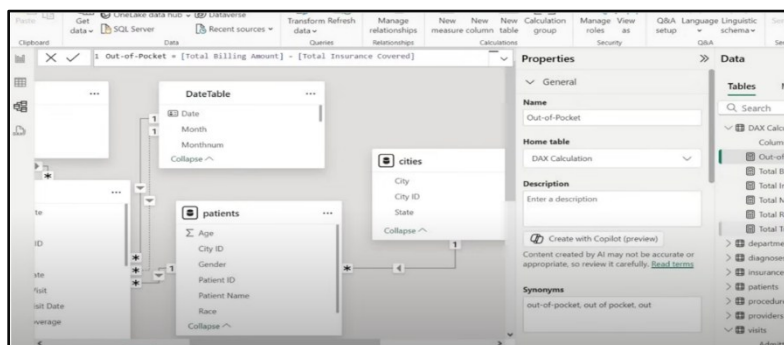


Fig -6.5 relationship between tables

6.6 OUTPUT

| | | | | | |
|--|---------------------------------|--------------------------------|------------------------------------|-------------------------------|----------------------------|
| Billing Amount | Medication Cost | Treatment Cost | Total Insurance | Out-of-Pocket | Room Charges |
| £3M | £546K | £3M | £2M | £1M | £180K |
| Average Billing Amount per visit £674.86 | Average Medication Cost £109.21 | Average Treatment Cost £526.08 | Average Insurance Coverage £456.04 | average Out-of-Pocket £227.26 | Average Room Charge £36.12 |

Fig-6.5.1Averages of totals amount

| Procedure | Total Billing Amount | All Billing Amount |
|------------|----------------------|--------------------|
| X-Ray | £1,053,529 | 31% |
| CT Scan | £805,508 | 24% |
| MRI Scan | £600,739 | 18% |
| Ultrasound | £481,347 | 14% |
| Blood Test | £414,952 | 12% |
| Total | £3,356,075 | 100% |

Fig-6.5.2 Percentage Grand Totals

| Emergency Visit | Payment Status | Discharge Date | Admitted Date | Room Type |
|-----------------|----------------|----------------|---------------|-------------------|
| 1 | Paid | null | null | N/A |
| 2 | Paid | null | null | Semi-Private Room |
| 3 | Paid | null | null | Semi-Private Room |
| 4 | Paid | null | null | N/A |
| 5 | Paid | null | null | N/A |
| 6 | Paid | null | null | N/A |
| 7 | Paid | null | null | Semi-Private Room |
| 8 | Paid | null | null | N/A |
| 9 | Paid | null | null | Semi-Private Room |
| 10 | Paid | null | null | Private Room |
| 11 | Paid | null | null | N/A |
| 12 | Paid | null | null | N/A |
| 13 | Paid | null | null | N/A |
| 14 | Paid | null | null | N/A |
| 15 | Paid | null | null | Private Room |
| 16 | Paid | null | null | N/A |
| 17 | Paid | null | null | Semi-Private Room |
| 18 | Pending | null | null | N/A |
| 19 | Paid | null | null | N/A |
| 20 | Paid | null | null | N/A |
| 21 | Paid | null | null | Private Room |

Fig -6.3

6.6 Cities And State-wise

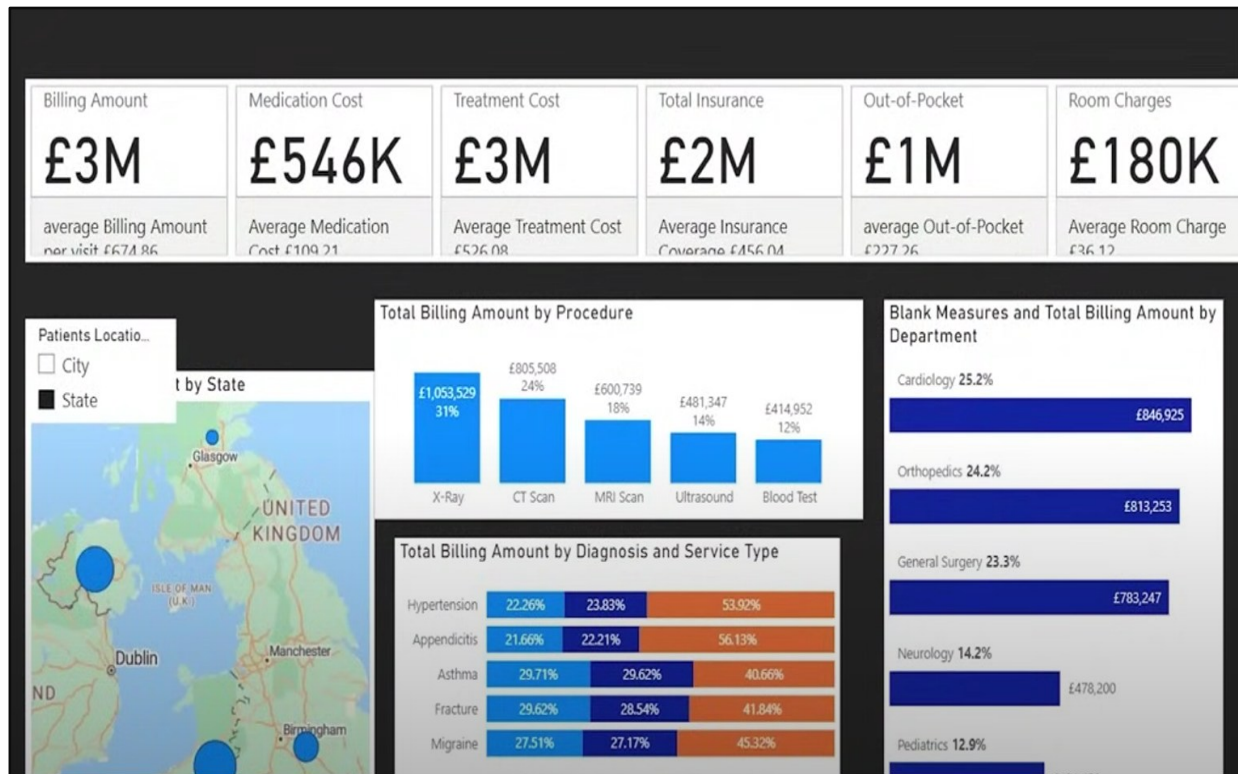


Fig -6.6 State-cities

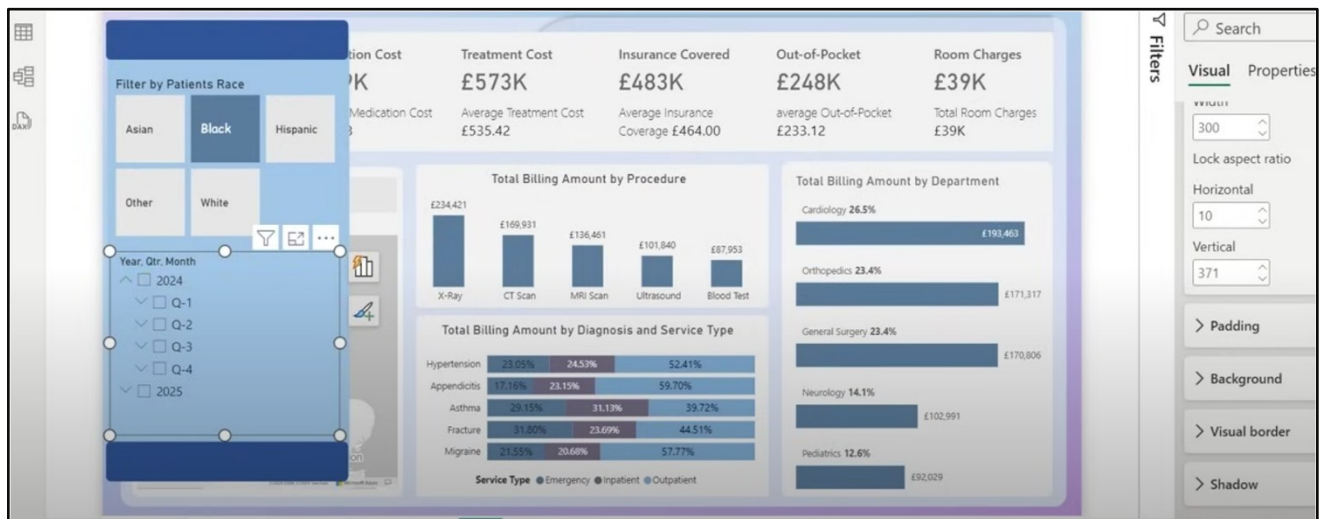


Fig -6.6.1 Patient-Wise



Fig – 6.6.2

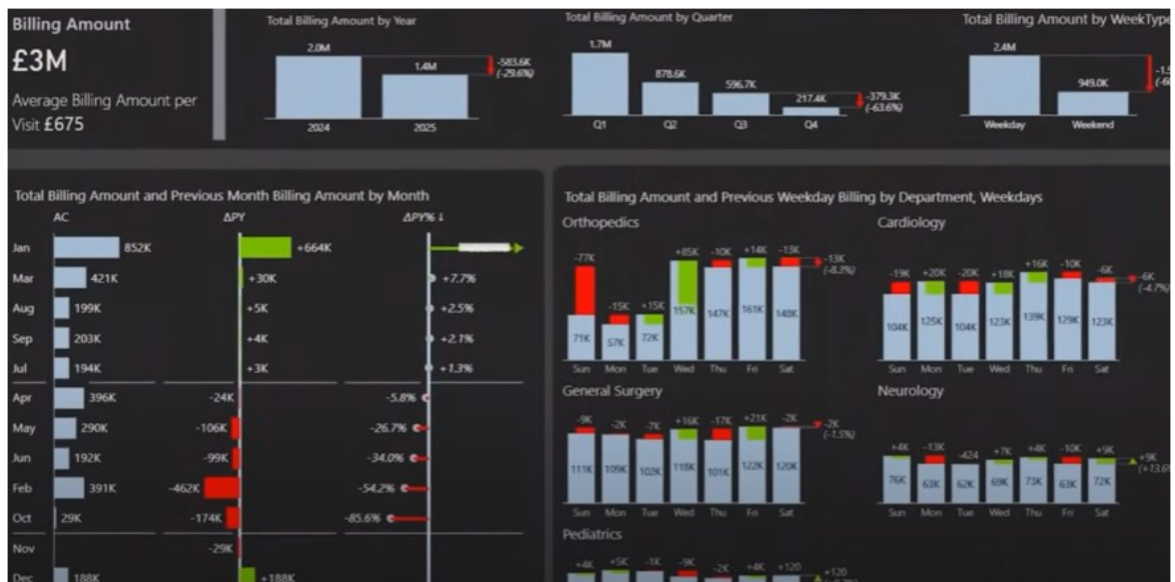


Fig 6.6.3

CHAPTER 7

CODING

Coding and Queries

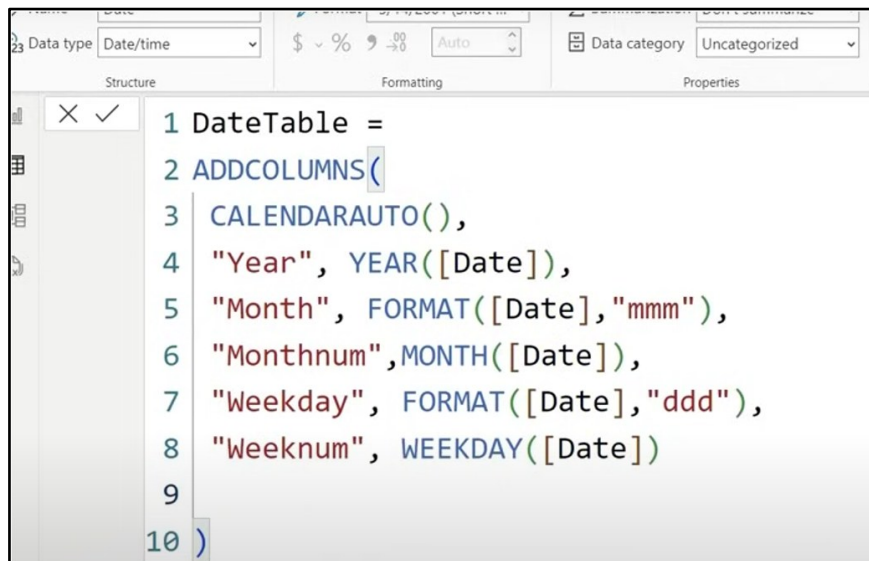


Fig-7.Creating date tables

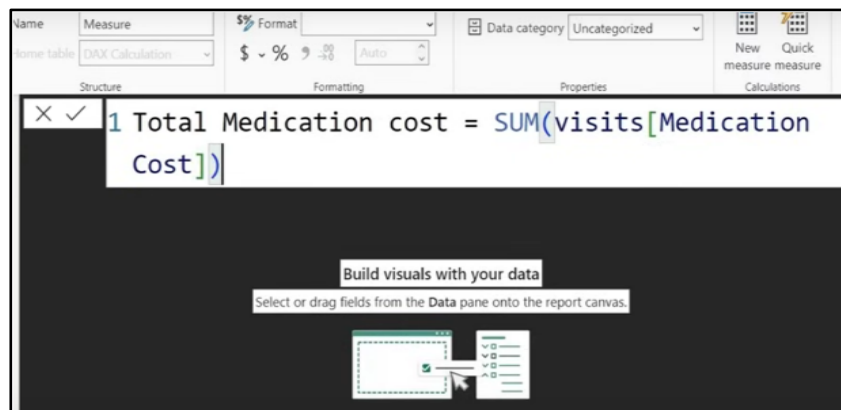


Fig -7.1Using SUM Function

```

1 DataTable =
2 ADDCOLUMNS(
3     CALENDARAUTO(),
4     "Year", YEAR([Date]),
5     "Month", FORMAT([Date], "mmm"),
6     "Monthnum", MONTH([Date]),
7     "Weekday", FORMAT([Date], "ddd"),
8     "Weeknum", WEEKDAY([Date]),
9     "Qtr", "Q-" & FORMAT([Date], "Q"),
10    "WeekType", IF(WEEKDAY([Date])=1 || WEEKDAY([Date])=7,
11    "Weekend", "Weekday")
12 )

```

Fig- 7.2 Creating Quarters

Name: visits

Structure: Mark as date table, Manage relationships, New measure, Quick measure, New column, New table

1 Column = visits[Room Charges(daily rate)] * visits[Length of Stay]

| Payment Status | Discharge Date | Admitted Date | Room Type | Insurance Coverage | Room Charges(daily rate) | Length of Stay | Column |
|----------------|----------------|---------------|-------------------|--------------------|--------------------------|----------------|--------|
| Pending | | | Private Room | | 563.5 | 50 | |
| Pending | | | Private Room | | 422.1 | 50 | |
| Paid | | | General Ward | | 543.2 | 10 | |
| Pending | | | Semi-Private Room | | 577.5 | 30 | |

Fig -7.3 Date difference

Name: Total Room Charges

Format: Whole number

1 Total Room Charges =

2 SUMX(

3 visits,

4 visits[Room Charges(daily rate)]

5 visits[Length of Stay]

6)

180K Total Room Charges

Fig -7.4 Create measures

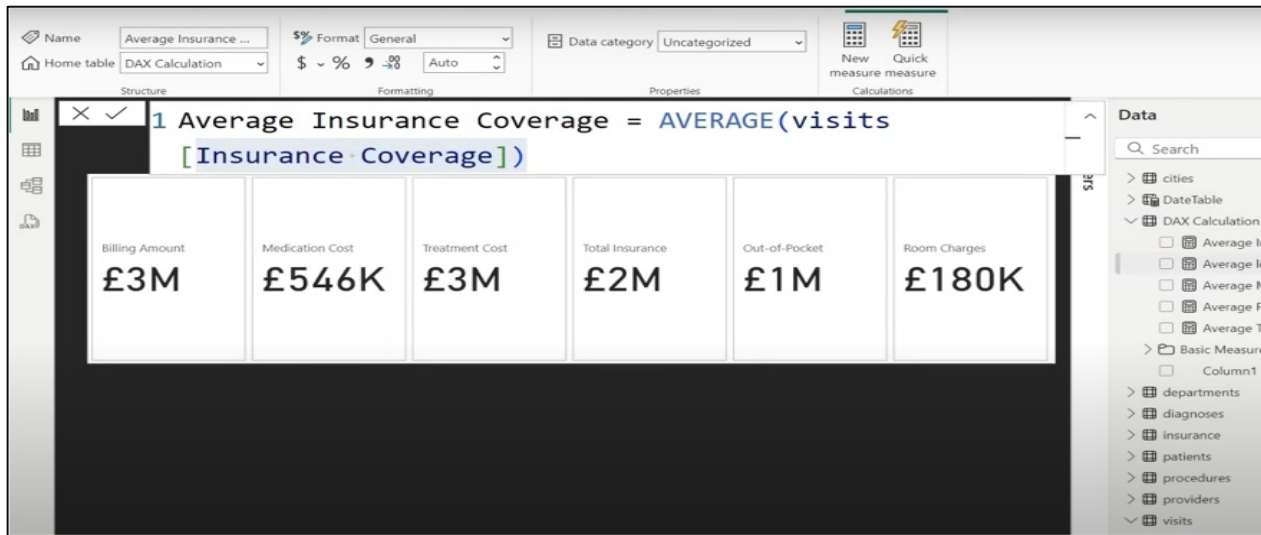


Fig-7.5 Group Measures

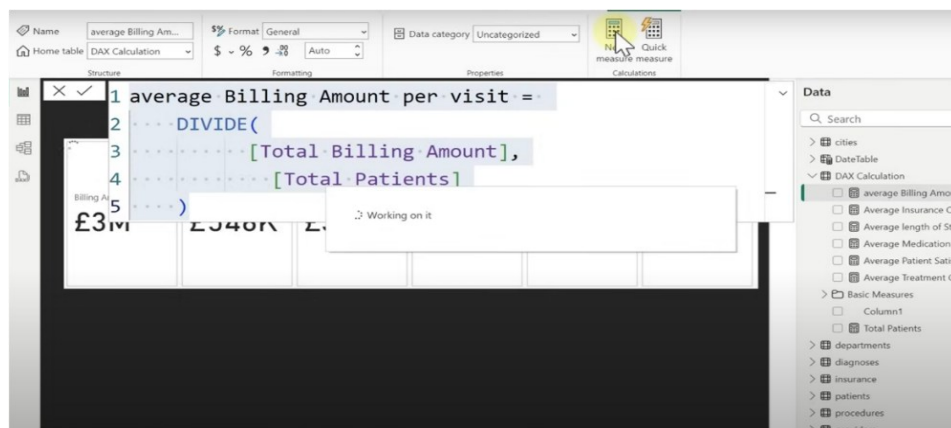


Fig -7.6 Average Billing Amount

CHAPTER 8

PROJECT LIMITATION AND FUTURE SCOPE

8.0 PROJECT LIMITATION

1.Data Quality and Accuracy

The effectiveness of the Power BI dashboard is highly dependent on the Quality and accuracy of the data being fed into it. Poor data quality, incomplete data entries, or inaccuracies in existing data sources can lead to misleading insights

2. Offline Accessibility

Power BI dashboards primarily function online, and offline access can be limited, especially for interactive features. This can be a problem in scenarios where constant internet access is not available.

3. Data Integration Challenges

Integrating data from multiple healthcare systems (EHR, LIS, RIS, financial systems) can be complex. These systems often have different data formats, structures, and standards, making it challenging to create a unified view.

4. Performance Issues with Large Datasets

Power BI can struggle with performance when handling extremely large Datasets (e.g., millions of patient records, detailed medical history data). Performance may degrade with slow loading times, sluggish responsiveness, and lagging updates.

5. Cost Considerations

The cost of implementing and maintaining a Power BI dashboard can be significant, especially if advanced features (like Power BI Premium), custom visuals, or external integrations are required

6. Data Visualization Complexity

Complex visualizations can sometimes overwhelm users, especially if they are not familiar with interpreting data graphics. Too many visual elements or overly detailed charts can lead to confusion rather than clarity

7. Dependency on Data Infrastructure

The Power BI dashboard's efficiency and performance are heavily dependent on the underlying data infrastructure. Issues with data pipelines, storage systems, or APIs can disrupt data flow and availability.

8. User Adoption and Training Requirements

Healthcare staff, especially those who are not familiar with data analysis tools, may find it challenging to adopt Power BI dashboards without proper training. The complexity of interpreting visual data can also be a barrier.

1.2 FUTURE SCOPE

1. Advanced Predictive and Prescriptive Analytics Integrate machine learning and artificial intelligence (AI) algorithms to enhance predictive and prescriptive analytics capabilities.

2. Data-Driven Financial Optimization Employ advanced analytics for more precise financial optimization.

3.Enhanced Telehealth and Remote Monitoring Analytics Expand the dashboard to include data analytics for telehealth services and remote patient monitoring.

4. Machine Learning for Predictive Maintenance and Staff Management :-Utilize machine learning models to predict maintenance needs for medical equipment and optimize staff management.

5. AI-Driven Clinical Decision Support Systems (CDSS) Integrate AI-driven Clinical Decision Support Systems within the dashboard for real-time clinical guidance.

6. Enhanced Mobile Compatibility and Augmented Reality (AR) Improve mobile compatibility and explore the use of Augmented Reality (AR) for healthcare professionals.

7 .IoT Data Analytics and Smart Hospital Capabilities Leverage the Internet of Things (IoT) to create smart hospital dashboards.

8 .Personalized and Patient-Centric Dashboards Develop dashboards that cater specifically to patient needs, providing a personalized view of their health data.

- <https://www.kaggle.com/datasets>
- <https://www.kaggle.com/datasets/abdulqaderasiirii/hospital-patient-data>
- <https://www.bing.com/search?FORM=U523DF&PC=U523&q=google>
- <https://www.kaggle.com/datasets/himanshunegi2000/hospitals-in-india-dataset>

