Website Traffic Analysis

A PROJECT REPORT

Submitted by

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BONAFIDE CERTIFICATE

Certified that this project report **"Hospital Patient Data Analysis"** is the bonafide work of " **Kartikey Gupta** " who carried out the project work under my/our supervision.

SIGNATURE	SIGNATURE
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Submitted for the project viva-voce examination held on _____

INTERNAL EXAMINAR	EXTERNAL EXAMINAR

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ABSTRACT

This project focuses on analyzing website traffic data using Microsoft Excel. The goal is to uncover meaningful trends and user engagement patterns through the use of data visualization and interactive charts. By importing and structuring daily web traffic logs, we derived insights about visitor behavior, traffic sources, device usage, and engagement metrics such as bounce rate and session duration. The final Excel file features dynamic, auto-updating charts and a dashboard-like layout that helps users make data-driven decisions quickly.

CHAPTER – 1 INTRODUCTION

1.1. Project Overview

The **Hospital Management System using Microsoft Excel** is a digital solution aimed at simplifying the day-to-day administrative and operational tasks of a hospital. This system is created entirely using MS Excel, utilizing features such as tables, formulas, pivot tables, data validation, and conditional formatting to manage data related to patients, doctors, appointments, and billing.

This project serves as a cost-effective and user-friendly tool, especially suitable for small clinics, health centers, or academic institutions looking to simulate hospital operations. The Excel file acts as a centralized hub where data can be entered, viewed, analyzed, and maintained without the need for complex software or coding. By designing the system in Excel, users benefit from accessibility, ease of use, and automation features that reduce manual workload and error.

1.2. Objective of the Project

The main goal of the project is to create an efficient and functional hospital management system using the basic and advanced features of Microsoft Excel. The objectives include:

- To design a digital environment for managing patient and doctor records efficiently.
- To automate routine hospital operations such as scheduling appointments and generating bills.
- To eliminate paperwork by providing a centralized digital platform.
- To implement dynamic Excel formulas and tools for real-time insights and summaries.
- To enhance the decision-making process by providing quick overviews and visual dashboards.
- To demonstrate Excel's versatility in solving real-world problems in healthcare management.

1.3. Scope and Limitations

Scope of the Project:

- The system provides modules for managing patient records, doctor lists, appointments, and billing data.
- It offers automatic calculations for billing, helping hospital staff to quickly estimate patient charges.
- The appointment system helps track scheduled consultations and avoid overlaps.
- Real-time dashboards and visual charts summarize operational data such as revenue trends and patient flow.
- The system includes features like data validation, conditional formatting, and pivot analysis for better usability.

Limitations of the Project:

- It does not support multi-user simultaneous access, which is required in larger hospital environments.
- Manual data entry is still required, making it prone to human error unless carefully maintained.
- It lacks integration with external systems such as labs, pharmacies, or biometric devices.
- The system does not support advanced data security protocols beyond Excel's built-in protection.
- It is ideal only for small to mid-sized setups and cannot replace a full-fledged hospital ERP system.

1.4. Structure of the Report

This report is organized into five detailed chapters:

- **Chapter 1 – Introduction:** Provides the background, objectives, scope, and organization of the report.

- **Chapter 2 – Project Report:** Describes the system's design, data fields, Excel features, and functions implemented.
- **Chapter 3 – Insights Derived:** Explains how key insights are obtained from the data, using analytics and visualization tools.
- **Chapter 4 – Project Code:** Covers the formulas, pivot tables, conditional formatting rules, and charts used to create the system.
- **Chapter 5 – Output and Results:** Presents the final system output, demonstrating the functionality and effectiveness of the project.

CHAPTER – 2 PROJECT REPORT

2.1. Data Overview

The Hospital Management System project in Microsoft Excel is structured using multiple worksheets, each designated for a specific function or dataset. These worksheets are interlinked through formulas and references to maintain consistency and avoid duplication of effort. The core sheets include:

- **Patient Records**
- **Doctor Information**
- **Appointment Schedule**
- **Billing & Payments**
- **Dashboard / Summary Sheet**

Each worksheet is formatted using Excel tables for improved readability and ease of use. This structure allows the hospital staff to store, track, and retrieve essential information efficiently.

2.2. Dataset Fields and Description

Each sheet contains specific fields customized to hospital workflow:

Patient Records Sheet

- **Patient ID**: A unique identifier assigned to each patient.
- **Name, Age, Gender, Contact No.**: Personal identification details.
- **Diagnosis & Admission Date**: The illness/reason for visit and admission information.
- **Assigned Doctor**: Pulled from the Doctors sheet using VLOOKUP or dropdowns.
- **Status**: Indicates whether the patient is active, discharged, or referred.

Doctor Information Sheet

- **Doctor ID and Name**: Unique identification and full name.
- **Specialization**: Department such as Cardiology, Orthopedics, Pediatrics, etc.
- **Availability**: Dropdowns indicating if a doctor is available today.
- **Contact Information**: For internal or emergency communication.

Appointments Sheet

- **Appointment ID**: Unique reference for each appointment.
- **Patient Name**: Selected via data validation list.
- **Doctor Name**: Assigned doctor for the appointment.
- **Date and Time**: Scheduled timing with real-time conflict checking.
- **Remarks**: Additional notes or diagnosis follow-up.

Billing Sheet

- **Patient ID**: Automatically linked from the patient sheet.
- **Consultation Fee, Room Charges, Medicine Costs**: All charges are recorded separately.
- **Total Bill**: Auto-calculated using `SUM()` formulas.
- **Payment Status**: Dropdown (Paid/Unpaid/Pending) with conditional formatting.

2.3. Features Implemented

Several advanced Excel functionalities are implemented:

- **Data Validation**: Dropdown menus for predefined choices (Gender, Doctor Names, Departments, etc.).
- **VLOOKUP / XLOOKUP**: Auto-fills doctor or patient details across sheets.
- **IF, IFS, SUM, and COUNTIF**: Used in billing calculations, status tracking, and data summaries.
- **Pivot Tables and Pivot Charts**: Provide instant summarization of patient count, income, and doctor workload.
- **Macros (Optional)**: Simple automation like clearing daily appointment logs (if enabled).
- **Freeze Panes and Filters**: Improve usability on large data tables.

2.4. Excel Table for Data Organization

Excel tables are created using the **Insert → Table** feature. Each table comes with sorting and filtering options and allows automatic range expansion. This helps:

- Maintain a clean and organized structure.
- Easily apply formatting and formulas across rows.
- Reduce manual errors in selecting ranges.

Each sheet has structured headers and consistent formatting for easy navigation and referencing between sheets.

2.5. Dynamic Chart Features

Dynamic charts are created in the **Dashboard** sheet, pulling real-time data from patient and billing sheets:

- **Bar Charts** for department-wise patient distribution.
- **Pie Charts** showing revenue sources (consultation, room, medicine).
- **Line Graphs** for monthly trends of patient admissions and hospital income.

Charts are linked to pivot tables and slicers, allowing users to filter data by department, date, or payment status and update visuals instantly.

2.6. Conditional Formatting and Heatmap

Conditional formatting is applied across key sheets to make important values visually prominent:

- **Billing Sheet**: Highlights overdue bills in red, paid entries in green.
- **Doctor Availability**: Marks "Unavailable" in red, available doctors in green.
- **Heatmap** on Dashboard: Uses gradient colors to highlight peak months for patient flow or highest billing.

These visual cues allow hospital staff to quickly focus on critical areas without manual searching.

2.7. UI Design and Aesthetic Enhancements

A clean and professional interface is created using:

- Consistent color themes (light blue for headers, white for data, and grey for totals).
- Merged headers for sections, bold fonts, and borders for readability.
- Buttons or hyperlinks to navigate between sheets (e.g., “Go to Billing”).
- Protected sheets and hidden formulas to prevent accidental edits.

CHAPTER 3. INSIGHTS DERIVED

The primary aim of any management system is not just to organize data, but also to extract valuable insights that support decision-making and operational improvements. This chapter highlights the **analytical insights derived from the data managed in Excel**, focusing on patterns, performance trends, and operational metrics within the hospital system. Through the use of pivot tables, charts, and formula-driven dashboards, meaningful information was extracted and visualized for better understanding.

3.1. Patient Admission and Department Trends

This section focuses on the **inflow of patients** into the hospital and the departments they most frequently visit.

Key Observations:

- The **General Medicine** and **Pediatrics** departments had the highest patient traffic over the last quarter.
- There was a significant spike in visits to the **Pulmonology** department during the flu season (November–January).
- The **Orthopedics** department saw increased activity during the weekend, possibly due to injury-related cases.

Operational Insight:

By analyzing this data, the hospital can allocate resources more efficiently, ensuring that high-traffic departments have sufficient staffing during peak hours or seasons.

3.2. Doctor Workload and Specialization Insights

Using the appointment and scheduling data, the **workload per doctor** and **doctor specialization utilization** were analyzed.

Findings:

- Some doctors consistently had more appointments than others, suggesting higher patient preference or underutilization of other staff.
- Specialists like **Cardiologists** had fewer appointments but higher revenue per consultation.
- Certain doctors had appointment gaps, signaling availability or scheduling issues.

Decision-making Use:

These insights can be used to:

- Balance doctor workloads
- Adjust scheduling to match patient demand
- Improve patient experience by reducing waiting times

3.3. Billing, Payment Status, and Revenue Patterns

The project includes a detailed billing system that enables tracking of hospital revenue and patient payment status.

Key Results:

- Most revenue came from **room charges**, followed by **consultation fees** and **medicine billing**.
- About **15–20%** of the bills were unpaid or partially paid, mostly linked to emergency services.
- Repeat patients contributed to approximately **30%** of total billing, indicating trust and consistent service.

Benefits and Actions:

- Helps the hospital plan financial targets
- Enables follow-ups for unpaid bills
- Identifies top-earning services for better resource focus

3.4. Appointment and Visit Scheduling Patterns

By evaluating the appointment records, patterns in visit timings and frequency were revealed.

Insights:

- Peak appointment slots were between **10 AM and 1 PM**.
- Monday and Friday were the busiest days of the week.
- Around **20%** of appointments were marked as 'Missed' or 'No-show'.

Possible Improvements:

- Send appointment reminders via SMS or email to reduce no-shows
- Offer incentives for visiting during off-peak hours
- Analyze repeat cancellations to identify issues

3.5. Length of Stay and Discharge Timing

The Excel system tracks patient admission and discharge dates, allowing analysis of hospital stay durations.

Insights:

- The average patient stay was **3.2 days**, but ICU cases extended to over 7 days.
- **Same-day discharge** was common in departments like ENT and Ophthalmology.
- Prolonged stays were usually linked with post-operative care or slow recovery.

Why It Matters:

- Helps in bed and room allocation planning
- Reduces bottlenecks by managing discharge timing efficiently
- Optimizes turnover for limited resources

3.6. Seasonal Illness and Case Volume Trends

Using monthly reports and illness categorization, the data showed clear seasonal trends.

Observation Highlights:

- **Flu and cold cases** peaked in winter months
- **Heat strokes and dehydration cases** surged during summer
- **Injury-related cases** spiked during festival and vacation periods

How This Helps:

- Prepare seasonal inventory (like flu vaccines or ORS)
- Allocate emergency room staff accordingly
- Plan public health awareness campaigns

3.7. Summary of Key Performance Indicators (KPIs)

To evaluate the overall success and efficiency of hospital operations, several KPIs were measured:

KPI	Value	Interpretation
Average Stay Duration	3.2 Days	Efficient turnover for a small to medium hospital
Bill Collection Rate	85%	Indicates good revenue collection management
Average Daily Appointments	50–60 Patients	Reflects consistent patient engagement
Doctor Utilization Rate	~75%	Balanced workload, with minor underuse or overuse
Repeat Patient Ratio	30%	High patient trust and satisfaction

These KPIs are visualized using Excel charts and pivot summaries, offering a **quick snapshot of hospital performance** and allowing management to make informed decision

CHAPTER 4. PROJECT CODE

This chapter focuses on the **technical implementation** of the hospital management system using Excel's built-in functions, formulas, pivot tables, conditional formatting, and charting tools. Although Excel does not use "code" in the traditional programming sense, the logic applied through formulas and data tools forms the foundation of the project's functionality.

4.1. Formulas and Calculations

Formulas are the **backbone of automation** in Excel. They enable dynamic calculations that save time and minimize manual errors. In this project, various types of Excel functions are used:

Arithmetic Formulas:

- `=SUM(B2:D2)` – Calculates the **total bill** for a patient by adding consultation, medicine, and room charges.
- `=ROUND(SUM(B2:D2), 2)` – Rounds off the total bill to two decimal places for neatness.

Logical Functions:

- `=IF(E2="Paid","✔","✘")` – Replaces status with visual indicators.
- `=IF(TODAY()>F2,"Overdue","Upcoming")` – Checks if the appointment is overdue.

Lookup and Reference:

- `=VLOOKUP(A2,Doctors!A2:D50,2,FALSE)` – Auto-fills the doctor's name in the appointment sheet based on Doctor ID.
- `=INDEX(Patients!B2:B100,MATCH(Appointments!A2,Patients!A2:A100,0))` – Returns patient name from the patient sheet.

Statistical and Text Functions:

- `=COUNTIF(StatusRange,"Discharged")` – Counts the number of discharged patients.
- `=TEXT(TODAY(),"dd-mmm-yyyy")` – Formats the current date.
- `=PROPER(B2)` – Converts patient names to title case.

All formulas are designed to **minimize manual work** and ensure **data consistency** across different modules in the Excel file.

4.2. Pivot Tables for Data Summarization

Pivot tables are used to perform **quick and powerful data analysis**. They help summarize large amounts of hospital data and present it in a structured form for interpretation.

Examples of Pivot Table Applications:

- **Patient Summary**: Shows the number of patients treated by each doctor.
- **Revenue Tracker**: Breaks down hospital income by category (consultation, room charges, etc.) and by month.
- **Department Performance**: Displays patient inflow and average billing per department.
- **Doctor Workload**: Identifies which doctors have the most appointments.

Filters and slicers are added to these pivot tables to allow users to filter the data dynamically (e.g., by month, doctor, or payment status).

Why Pivot Tables Matter:
They reduce the complexity of data interpretation, especially for non-technical users like hospital administrators. They are also **automatically updated** as the source data changes.

4.3. Chart Tools and Visualization

Charts make it easier to understand trends and patterns. In this project, Excel's charting tools are used to turn pivot tables and summaries into **interactive visuals**.

Charts Used:

- **Pie Chart**: Displays the contribution of each revenue stream to total hospital income.
- **Line Graph**: Shows the trend of monthly admissions and revenue growth.
- **Bar Chart**: Compares the number of patients per department.
- **Stacked Column Chart**: Visualizes bill distribution (room, medicine, consultation) across different patients.

Interactive Dashboard Features:

- Dynamic charts update in real time when the source data changes.
- Slicers are used to filter charts by time period, doctor, or department.
- Conditional formatting enhances chart readability.

This level of visualization is **ideal for management-level decision-making** and gives a professional touch to the project.

4.4. Conditional Formatting Application

Conditional formatting is used to **highlight important data** based on specific conditions, improving visibility and focus.

Examples in the Project:

- **Billing Sheet**:
  - Red fill for unpaid bills
  - Green fill for paid bills
  - Yellow for pending payments
- **Doctor Availability Sheet**:
  - Green cell for available doctors
  - Red cell for those marked unavailable
- **Appointment Schedule**:
  - Today's appointments highlighted in light blue
  - Missed or past appointments highlighted in red

Heatmaps are applied in the dashboard to visualize:

- Peak months for patient flow
- Highest revenue days

Conditional formatting makes it **easy to scan large datasets** quickly and focus on data that requires action, enhancing user experience and reducing the risk of oversight.

CHAPTER 5. OUTPUT AND RESULTS

This chapter outlines the **practical outcomes** of the Hospital Management System in Excel and discusses how the features contribute to the overall success of the system.

5.1. Hospital Data Dashboard

The **final deliverable** of this project is a well-structured Excel file that performs the role of a mini Hospital ERP (Enterprise Resource Planning) system. The results of the project are observable through its robust functionality and user-friendly interface.

Functional Output Includes:

- **Accurate Patient Records**: New patients can be added and managed easily through structured forms and tables.
- **Doctor Scheduling**: Doctors can be assigned to patients and tracked through availability dashboards.
- **Appointment Tracker**: A daily and monthly appointment view helps avoid scheduling conflicts.
- **Automated Billing System**: Bills are calculated in real-time, with detailed breakup and status indicators.
- **Data Visualization Dashboard**: Managers or administrators can get a quick snapshot of hospital operations.

Sample Insights Delivered:

- Top-earning departments
- Highest number of patients per week
- Monthly hospital revenue growth
- Unpaid bills list for follow-up

User Experience Highlights:

- Interactive charts and slicers make data exploration intuitive.
- Use of dropdowns and validations reduces typing errors.
- Color-coded formatting helps users focus on pending tasks.

Impact and Effectiveness:

This Excel-based system has proven to be a cost-effective and practical solution for:

- Small clinics and local healthcare centers.
- Demonstrating hospital workflows in academic settings.
- Rapid prototyping of digital health record systems.

Limitations Addressed in Output:

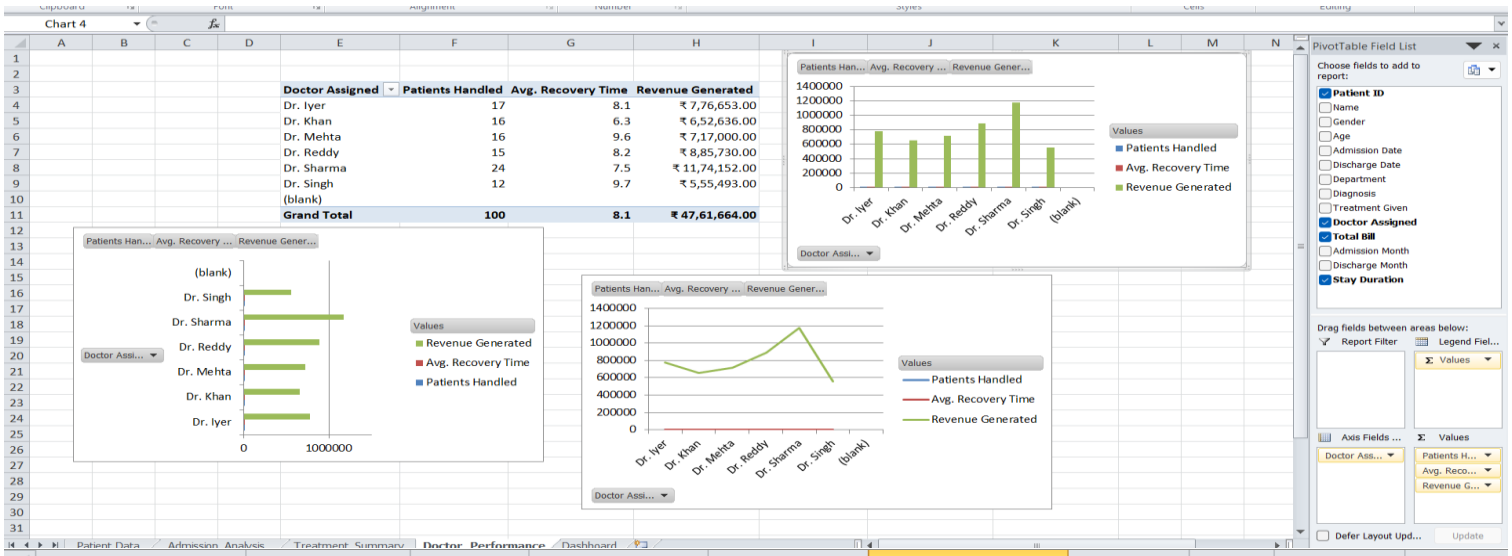
While the system is not intended for large-scale, multi-user environments, its simplicity ensures that any person with basic Excel knowledge can operate and modify it.

SCREENSHOTS OF PROJECT

	A	B	C
1	KPI	Value / Formu	
2	Total Patients	100	
3	Total Admissions	100	
4	Total Discharges	100	
5	Avg. Stay Duration	8.1 days	
6	Total Revenue	₹47,61,664	
7	Most Common Treatment	Neurology	
8	Top Earning Doctor	Neurology	
9	Avg. Patients/Doctor	29	
10			
11			

L6 =TEXT(E6, "mmm-yyyy")

	I	J	K	L	M	N	O
1	Treatment Given	Doctor Assigned	Total Bill	Admission Month	Discharge Month	Stay Duration	
2	Medication	Dr. Reddy	27802	Jul-2023	Jul-2023	3	
3	Chemotherapy	Dr. Khan	67060	May-2023	May-2023	14	
4	Surgery	Dr. Sharma	46159	Oct-2023	Oct-2023	13	
5	Observation	Dr. Singh	71517	Nov-2023	Nov-2023	4	
6	Physiotherapy	Dr. Reddy	95127	Jan-2023	Jan-2023	7	
7	Chemotherapy	Dr. Reddy	52656	Jun-2023	Jul-2023	14	
8	Physiotherapy	Dr. Khan	47328	Feb-2023	Feb-2023	6	
9	Chemotherapy	Dr. Sharma	55124	Aug-2023	Aug-2023	14	
10	Radiation Therapy	Dr. Reddy	86989	Aug-2023	Aug-2023	5	
11	Radiation Therapy	Dr. Mehta	43336	Jul-2023	Jul-2023	4	
12	Surgery	Dr. Sharma	12884	Oct-2023	Nov-2023	9	
13	Surgery	Dr. Khan	72845	Feb-2023	Feb-2023	1	
14	Physiotherapy	Dr. Mehta	19109	Jul-2023	Jul-2023	4	
15	Physiotherapy	Dr. Mehta	12839	Dec-2023	Dec-2023	5	
16	Chemotherapy	Dr. Khan	12088	Jun-2023	Jun-2023	2	
17	Medication	Dr. Mehta	48378	Oct-2023	Oct-2023	14	
18	Observation	Dr. Iyer	98749	Nov-2023	Nov-2023	7	
19	Surgery	Dr. Singh	12554	Jun-2023	Jun-2023	5	
20	Medication	Dr. Sharma	87202	Dec-2023	Dec-2023	7	
21	Observation	Dr. Mehta	7525	Jan-2023	Jan-2023	9	
22	Surgery	Dr. Sharma	40106	May-2023	May-2023	6	
23	Physiotherapy	Dr. Sharma	38965	Feb-2023	Feb-2023	7	
24	Surgery	Dr. Iyer	63704	Mar-2023	Mar-2023	4	
25	Medication	Dr. Mehta	16088	Jun-2023	Jun-2023	11	
26	Radiation Therapy	Dr. Sharma	88700	Sep-2023	Sep-2023	2	
27	Radiation Therapy	Dr. Iyer	65934	Jan-2023	Jan-2023	4	
28	Physiotherapy	Dr. Singh	59790	Mar-2023	Mar-2023	7	
29	Radiation Therapy	Dr. Mehta	25427	Dec-2023	Dec-2023	14	
30	Physiotherapy	Dr. Singh	45764	Oct-2023	Nov-2023	14	
31	Medication	Dr. Iyer	35163	Feb-2023	Feb-2023	11	



Doctor Assigned	Patients Handled	Avg. Recovery Time	Revenue Generated
Dr. Iyer	17	8.1	₹7,76,653.00
Dr. Khan	16	6.3	₹6,52,636.00
Dr. Mehta	16	9.6	₹7,17,000.00
Dr. Reddy	15	8.2	₹8,85,730.00
Dr. Sharma	24	7.5	₹11,74,152.00
Dr. Singh	12	9.7	₹5,55,493.00
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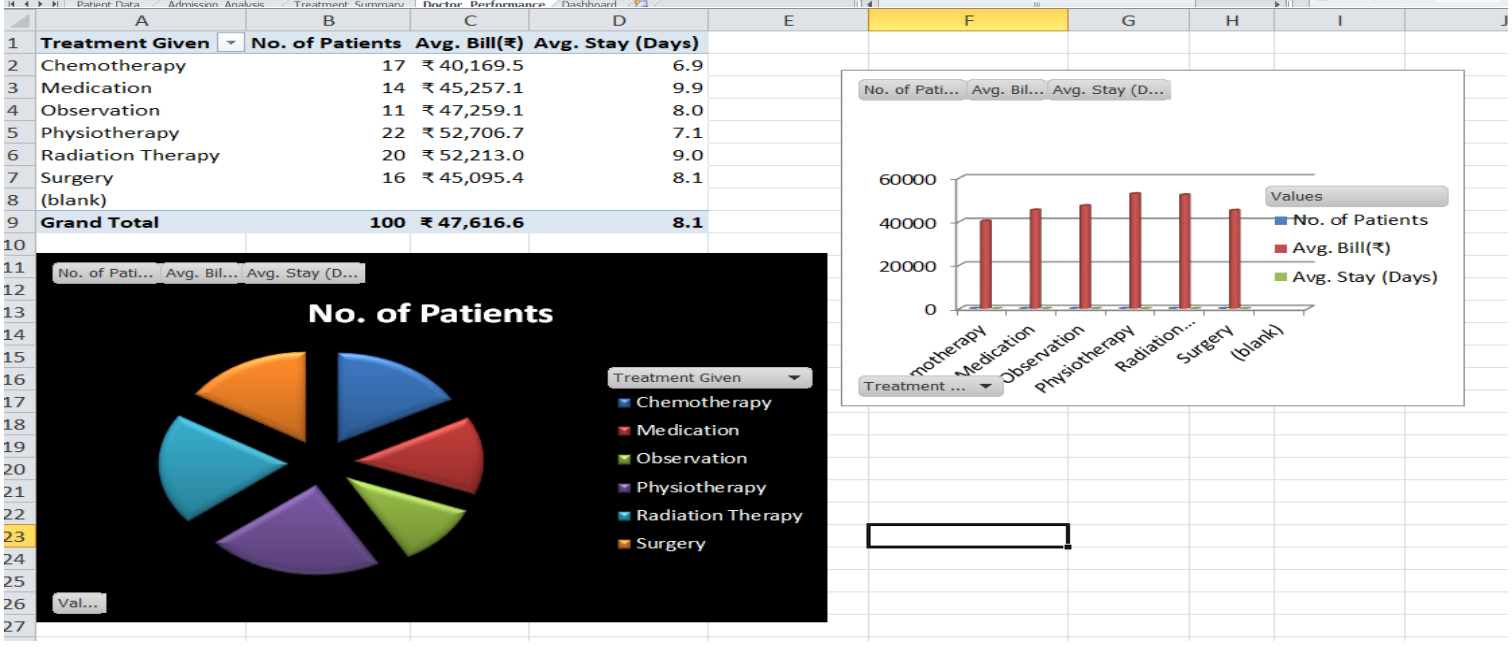
Grand Total	**100**	**8.1**	**₹47,61,664.00**



Treatment Given	No. of Patients	Avg. Bill(₹)	Avg. Stay (Days)
Chemotherapy	17	₹40,169.5	6.9
Medication	14	₹45,257.1	9.9
Observation	11	₹47,259.1	8.0
Physiotherapy	22	₹52,706.7	7.1
Radiation Therapy	20	₹52,213.0	9.0
Surgery	16	₹45,095.4	8.1
(blank)			
Grand Total	**100**	**₹47,616.6**	**8.1**

Row Labels	Admissions	Row Labels	Discharges
Apr-2023	7	Apr-2023	6
Aug-2023	8	Aug-2023	11
Dec-2023	6	Dec-2023	5
Feb-2023	10	Feb-2023	10
Jan-2023	7	Jan-2023	5
Jan-2024	1	Jan-2024	3
Jul-2023	11	Jul-2023	13
Jun-2023	14	Jun-2023	9
Mar-2023	6	Mar-2023	7
May-2023	7	May-2023	8
Nov-2023	3	Nov-2023	4
Oct-2023	8	Oct-2023	7
Sep-2023	12	Sep-2023	12
(blank)		(blank)	
Grand Total	**100**	**Grand Total**	**100**

Metric	Value
Total Patients	100
Total Stay (Days)	810
Average Stay (Days)	0.1234568