Case Report on Trial Performance and Patient Monitoring

Project Provider: Infotact Solutions
Project Name: Clinical Trial Patient Recruitment and Adherence Monitoring
Project Duration: Two month (Internship)
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Executive Summary

Pharmaceutical companies and CROs often face delays and cost overruns when clinical trial sites underperform in patient recruitment and when adherence is not centrally tracked. This project builds a centralized dashboard that allows real-time monitoring of recruitment, adherence, and site performance.

It helps identify bottlenecks, predict dropouts, and improve decision-making — saving both time and money.

Introduction

Clinical trials involve managing large amounts of patient and site data. ***Tracking recruitment and ensuring patient adherence*** are key challenges that impact trial success. This project aims to simplify this process by using data analytics tools to visualize trial performance clearly and efficiently. The dashboard provides insights into patient trends, site efficiency, and dropout patterns for better control and faster decisions.

Project Objectives

- To monitor patient recruitment and adherence in real time.
- To identify underperforming sites and low adherence patterns.
- To analyze dropout reasons and trends.
- To support data-driven decisions in clinical trial management.

Tools and Technologies

The project uses Excel ⇨ SQL ⇨ Python ⇨ Power BI to manage and analyze clinical trial data.

- Excel - initial data cleaning and formatting.
- SQL - extract and prepare patient-level data efficiently.
- Python - deeper analysis, trend identification, and data transformation.
- Power BI - build an interactive and visually rich dashboard for real-time insights.

Dashboard Design & Pages Overview

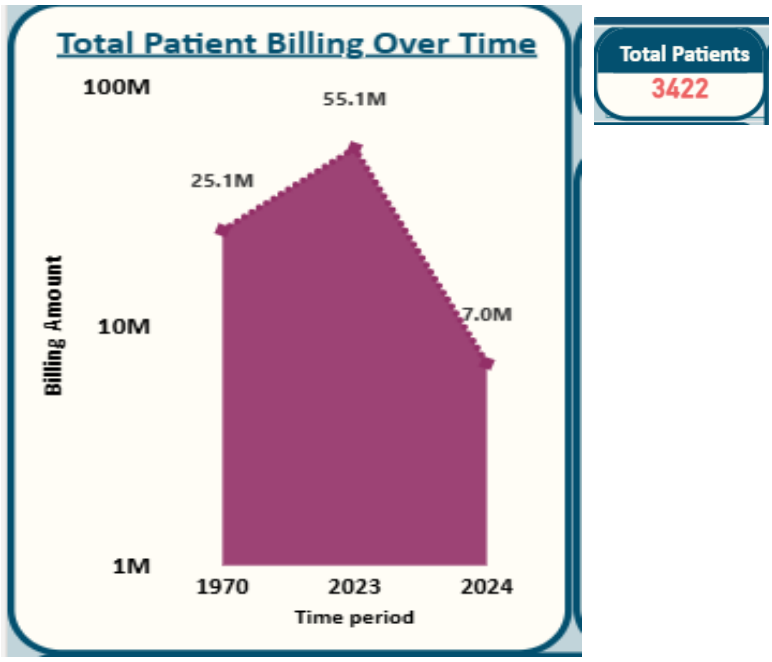
Details	Recruitment & Site Overview (Page 1)	Adherence & Dropout Insights (Page 2)
KPI's	Avg billing amount, Avg adherence (%), Total Patients, Trial duration days	Avg billing amount, Avg adherence (%), Total Patients, Avg age
Slicers	Gender, Admission type, Site ID	Gender, Admission Type, Admission Date
Charts	1) Total Patient Billing Over Time 2) Average Adherence Over Time 3) Condition Severity Breakdown of Patients 4) Average Adherence by Medication Type 5) Dropout Reason Distribution 6) Site Performance Overview	1) Top 10 Patients by Billing 2) Patient Distribution by Condition Severity & Medication 3) Condition Severity Breakdown by Gender 4) Billing by Admission Type & Medication 5) Patient Distribution by Age 6) Dropout Pattern Over Time

Dashboard Analysis & Findings

Some sample key question and answers with explanations are given below;

Q1: How many patients are in the trial, and how is billing distributed?

Chart Used: *Total Patients Billing Over Time*



Explanation:

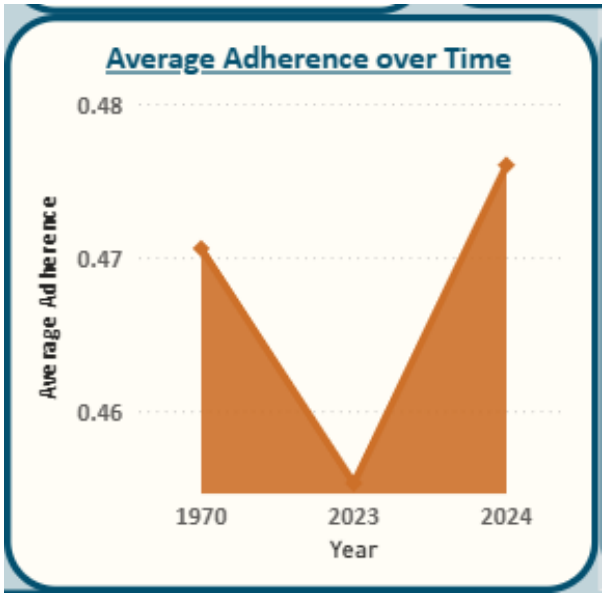
This chart shows the number of patients in the trial and how their billing amounts change over time. The X-axis shows the time period, and the Y-axis shows the total billing amount.

Answer:

- The trial has around **3422** patients.
- **In 2023, the total billing peaked** at 55.1M, indicating high patient engagement and adherence levels. However**, in 2024, billing dropped significantly** to 7.0M, ***mainly due to decreased patient adherence*** and ***fewer completed visits during that period***.

Q2: What is the patient adherence trend over time?

Chart Used: *Average adherence over time*



Explanation:

The chart shows how adherence changes during the trial. The X-axis shows time period, and the Y-axis shows average adherence %.

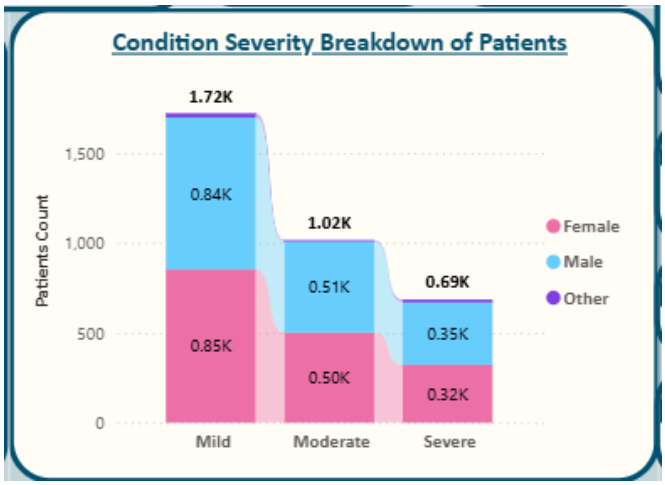
Answer:

- **Adherence is highest during 2024, with lower adherence observed in 2023.**

- In 2023, the trial had a ***higher number of patients*** but showed ***lower adherence,*** indicating that while recruitment was strong, many patients struggled to stay consistent with the protocol.
- In 2024**,** the ***patient count decreased,*** but ***adherence improved,*** suggesting better patient engagement and closer site monitoring.

Q3: Which condition severity groups have most patients?

Chart Used: *Patient Distribution by Condition Severity*



Explanation:

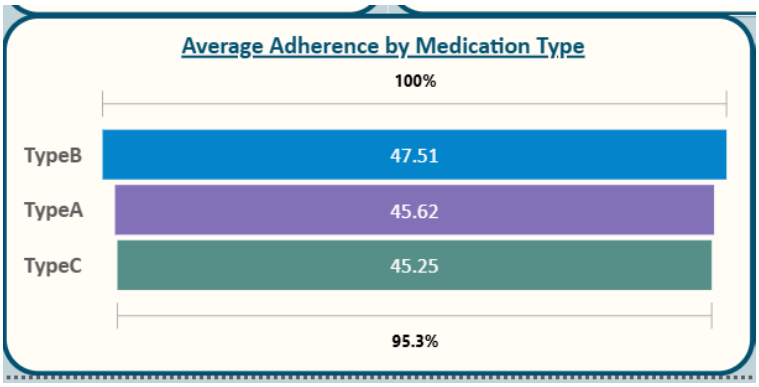
The chart shows the number of patients by mild, moderate, or severe conditions.

Answer:

- Most patients are in ***Mild***, which is important for trial planning and adherence tracking.

Q4: Which medications have highest or lowest adherence?

Chart used: *Adherence by Medication Type*



Explanation:

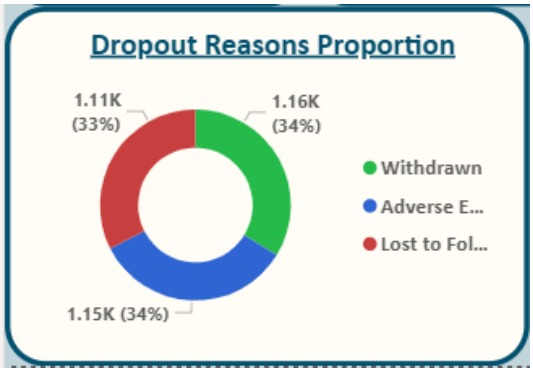
The chart compares adherence across different medications.

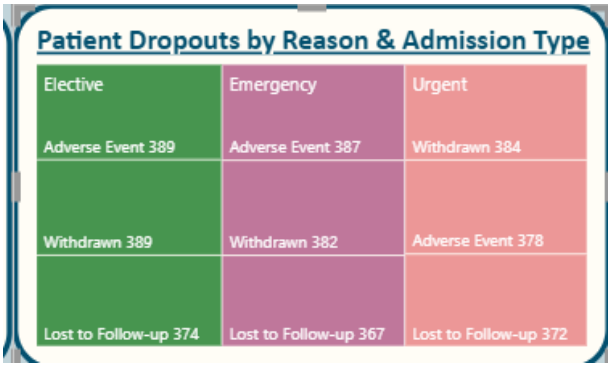
Answer:

- Medication ***Type B*** has the ***highest adherence,*** while ***Type C*** shows ***lower adherence.***
- This insight helps target follow-ups or patient guidance for lower-adherence medications.

Q5: Why are patients dropping out?

Chart used: Dropout reason Proportion & along with condition severity and Admission type





Explanation:

The chart shows how patient dropouts change over time, broken down by condition severity and admission type, helping identify which patient groups and time periods experience higher attrition.

Answer:

- Patients are dropping out mainly due to three nearly equal reasons- ***Withdrawn (34%)***, ***Adverse Events (34%),*** and ***Lost to Follow-up (33%).***

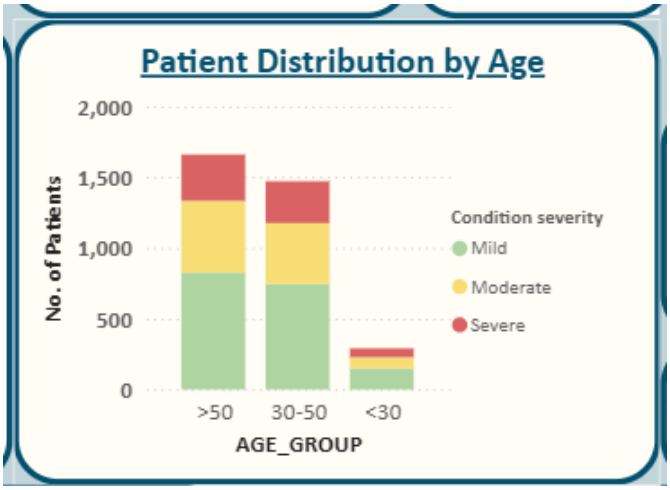
By admission type:

- **Elective:** Withdrawals and adverse events dominate.
- **Emergency:** Mostly adverse events and withdrawals.
- **Urgent:** Withdrawals lead, followed by adverse events and lost to follow-up.

Dropouts result from a mix of medical factors, voluntary withdrawals, and follow-up gaps, suggesting the need for improved monitoring, follow-up, and side-effect management.

Q6: How does patient distribution vary by age?

Chart used: Patient Distribution by Age



Explanation:

The chart shows patient counts across different age groups.

Answer:

- The patient distribution by age is ***heavily concentrated in the older age groups***, peaking dramatically in the **61-70** range and remaining high through the **71-80** range. Enrollment drops off sharply for patients under 60 years old

Q7: How do dropout reasons impact billing performance?

Chart used: Billing by Admission Type & Dropout Reason

Billing Trends by Admission Type and Medication

ADMISSION_TYPE	TypeA	TypeB	TypeC	Total
Elective	25,496.53	25,256.35	26,248.18	**25,625.57**
Emergency	24,858.11	25,817.01	24,857.67	**25,169.47**
Urgent	24,861.65	26,159.20	26,097.94	**25,629.24**
Total	**25,072.97**	**25,749.66**	**25,753.34**	**25,475.37**

Explanation:

This analysis connects financial data with patient behavior, showing how different dropout reasons affect total billing or reimbursement.

Answer:

- ***Elective admissions consistently result in the highest average billing across all medication types***, while Medication Type B is the most resource-intensive treatment, regardless of the admission type it's paired with. In contrast, ***Emergency admissions generally have the lowest average billing.***

Key Insights

The dashboard shows key areas that need attention to improve clinical trial results:

- **Site Performance:** Some sites have fewer patients and low adherence. They need more support and better communication.
- **Adherence Trends:** There are certain time periods when adherence drops. Finding the reasons can help keep patients active.
- **Medication & Condition Severity:** Adherence changes with medication type and condition level. More follow-ups can improve results.
- **Dropouts:** The chart shows when and why patients leave the trial. Early action can help reduce dropout rates.
- **Recruitment:** Billing and patient data help find slow-performing sites and improve the recruitment process.

Recommendations

- Support low-performing sites.
- Send reminders to improve adherence.
- Track site and patient performance often.
- Use dropout insights to keep patients engaged.

Conclusions

- Dropouts mainly due to withdrawals, adverse events, and lost to follow-up.
- Adherence varies by age, medication, admission type, and site.
- Improving monitoring, site support, and focus on high-risk groups can reduce dropouts and keep trials on schedule.