**Healthcare Patient Billing and Admission Analysis Report (2019–2024)**

**1. Outline**

This report presents an analytical breakdown of patient billing and admission patterns in the healthcare sector from 2019 to 2024. It explores trends across insurance providers, admission types, age groups, genders, medical conditions, and hospitals, delivering actionable insights for stakeholders to improve financial performance and patient care efficiency.

**Sections Covered:**

* Introduction
* Story of Data
* Data Splitting and Preprocessing
* Pre-Analysis
* In-Analysis
* Post-Analysis and Insights
* Data Visualizations & Charts
* Recommendations and Observations
* Conclusion
* References & Appendices

**2. Introduction**

**Objective of the Project:**  
To analyze patient billing and admission data to uncover trends, identify top-performing insurance providers and hospitals, and provide actionable insights into revenue generation strategies in healthcare.

**Problem Being Addressed:**  
Rising healthcare costs demand efficient billing systems and optimized patient admissions. The analysis addresses how billing varies across demographics, providers, and hospitals to help decision-makers improve financial outcomes.

**Key Datasets and Methodologies:**

* Datasets: Patient billing records (2019–2024), hospital information, insurance provider data.
* Methodologies: Excel-based analysis using Pivot Tables, data visualization tools, and statistical summarization.

**3. Story of Data**

**Data Source:**  
Internal hospital records compiled from billing departments and admission logs across multiple facilities.

**Data Collection Process:**  
Extracted digitally through Electronic Health Records (EHR) systems and consolidated into a unified Excel database.

**Data Structure:**  
Each row represents an individual billing instance with variables like insurance provider, admission type, hospital name, patient age group, gender, and medical condition.

**Important Features and Their Significance:**

* **Insurance Provider:** Influences billing revenue; identifies top payers.
* **Admission Type:** Determines cost intensity (e.g., elective vs. emergency).
* **Medical Condition:** Impacts overall treatment cost.
* **Hospital:** Affects revenue due to variation in services and cost structures.

**Data Limitations or Biases:**

* Potential data gaps from incomplete hospital records.
* Slight bias toward hospitals with higher patient volumes.

**4. Data Splitting and Preprocessing**

**Data Cleaning:**  
Removed duplicate billing entries, standardized hospital names, and corrected missing admission dates.

**Handling Missing Values:**  
Missing billing amounts were imputed using median values per admission type.

**Data Transformations:**  
Aggregated billing totals per category (e.g., insurance provider, age group) and derived average revenue metrics.

**Data Splitting:**

* **Dependent Variable:** Billing Amount
* **Independent Variables:** Insurance Provider, Admission Type, Age Group, Gender, Medical Condition, Hospital

**Industry Context:**  
Healthcare industry, specifically hospital revenue management.

**Stakeholders:**

* Hospital Management
* Financial Controllers
* Health Insurance Companies
* Policy Makers

**Value to the Industry:**  
Optimizing billing efficiency, aligning insurance contracts, and identifying profitable patient segments.

**5. Pre-Analysis**

**Key Trends:**

* Elective admissions generate the highest billing revenue.
* Medicare is the top insurance provider by average billing.
* Johnson PLC hospital billed the most.

**Potential Correlations:**

* Higher billing amounts associated with chronic conditions like Diabetes and Obesity.
* Age groups 33–52 and 53–72 show similar billing patterns.

**Initial Insights:**  
Elective admissions are significantly more profitable than emergency or urgent cases, indicating a revenue opportunity through planned procedures.

**6. In-Analysis**

**Unconfirmed Insights:**

* Is the billing difference between genders statistically significant?
* Does hospital choice influence average billing more than admission type?

**Recommendations:**

* Promote elective admissions to increase revenue.
* Prioritize collaboration with Medicare for reimbursement plans.
* Optimize services at high-revenue hospitals like Johnson PLC.

**Analysis Techniques Used in Excel:**

* Pivot Tables for summarizing billing data.
* Bar Charts and Pie Charts for visual comparisons.
* Line Graphs for trend analysis over time.

**7. Post-Analysis and Insights**

**Key Findings:**

* **Top Insurance Provider:** Medicare ($25,615.99 average billing)
* **Top Admission Type:** Elective ($25,602.23)
* **Top Medical Condition:** Diabetes ($238,539,725.49)
* **Top Hospital:** Johnson PLC ($1,084,202.69)
* **Total Average Revenue:** $25,539.32

**Comparison with Initial Findings:**  
Initial trends were validated, particularly the dominance of elective admissions and Medicare in billing revenue.

**8. Data Visualizations & Charts**

**Charts and Graphs:**

* Bar Chart: Billing by Insurance Provider
* Line Graph: Billing by Date of Admission
* Pie Charts: Billing by Age Group and Gender
* Bar Chart: Billing by Admission Type
* Bar Chart: Billing by Medical Condition
* Bar Chart: Billing by Hospital

**Explanation of Visualizations:**

* The **line graph** reveals a billing dip in 2020, possibly due to the pandemic.
* The **bar charts** highlight key contributors to revenue, especially Medicare and Johnson PLC.
* The **pie charts** show minimal gender-based billing variance.

**9. Recommendations and Observations**

**Actionable Insights:**

* **Elective Focus:** Increase elective procedures through targeted scheduling.
* **Insurance Strategy:** Strengthen Medicare partnerships for higher billing returns.
* **Chronic Condition Management:** Enhance services for diabetes and obesity to maximize treatment revenue.

**Optimizations or Business Decisions:**

* Develop incentive plans for elective admissions.
* Expand high-performing hospital facilities.
* Review insurance reimbursement policies to negotiate better rates.

**Unexpected Outcomes:**

* Despite Medicare being a public insurer, it outperforms private insurers in billing revenue, which may require re-evaluation of private insurer contracts.

**10. Conclusion**

**Key Learnings:**  
Elective admissions and chronic conditions are significant revenue drivers. Medicare is a consistent top payer, and hospital-specific strategies influence billing outcomes.

**Limitations:**  
Data lacks patient-level longitudinal follow-up. Limited demographic details (e.g., region) may restrict deeper insights.

**Future Research:**

* Explore patient outcomes vs. billing to assess efficiency.
* Add regional data for geographic trend analysis.
* Analyze cost vs. revenue for profitability assessment.

**11. References & Appendices**

**References:**

* Hospital Billing Systems (Internal Data)
* Insurance Reimbursement Policies (Medicare, Cigna, Aetna)

**Appendices:**

* Dashboard Snapshot (Refer to provided visual)
* Excel Pivot Table Snapshots
* Detailed Hospital Billing Breakdown