DAELITE Company

November 24, 2024

COMPREHENSIVE HOSPITAL ADMISSIONS, BILLING, AND MEDICAL CONDITIONS ANALYSIS

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TODAY'S AGENDA

1. Introduction to the Session
2. Team Check-in and Icebreaker
3. Comprehensive Analysis
4. Summary and Action Items

INTRODUCTION

In today's rapidly evolving healthcare landscape, leveraging data analytics has become essential for enhancing patient care, optimizing operations, and improving financial sustainability. This project aims to provide a detailed analysis of key healthcare metrics, including patient demographics, medical conditions, admission trends, and billing data. By identifying patterns and actionable insights, we empower stakeholders to make informed decisions that drive efficiency, elevate the quality of care, and ensure long-term operational success.

Through this comprehensive study, we will uncover critical insights into resource utilization, cost management, and treatment outcomes. Our findings will not only highlight current strengths but also pinpoint areas for improvement, enabling a proactive approach to healthcare management. Ultimately, this project underscores the transformative power of data in delivering better health outcomes and fostering a sustainable healthcare ecosystem.

"The analysis focuses on identifying trends and correlations in hospital admissions, patient demographics, billing, and medical conditions across dimensions such as age, gender, and insurance providers. The insights aim to improve hospital management decisions, optimize patient care, and minimize costs."

HEPHZIBAH OTUENE

TEAM CHECK-IN

1. Click the comment session
2. Select the Emoji or GIPHY app.
3. Browse and click the Emoji or GIF you want to use.

HOW ARE YOU FEELING?

Choose an Emoji, GIF, or image from a mood meter that best represents how you feel at the moment.

WHAT'S YOUR FREQUENTLY USED EMOJI?

- What's your morning routine?
- What did you have for breakfast today?
- What’s a random act of kindness you did for a stranger?
- What's the most challenging thing you've done in life?
- What's your favourite dessert?

Time: 1 minute

METHODOLOGY

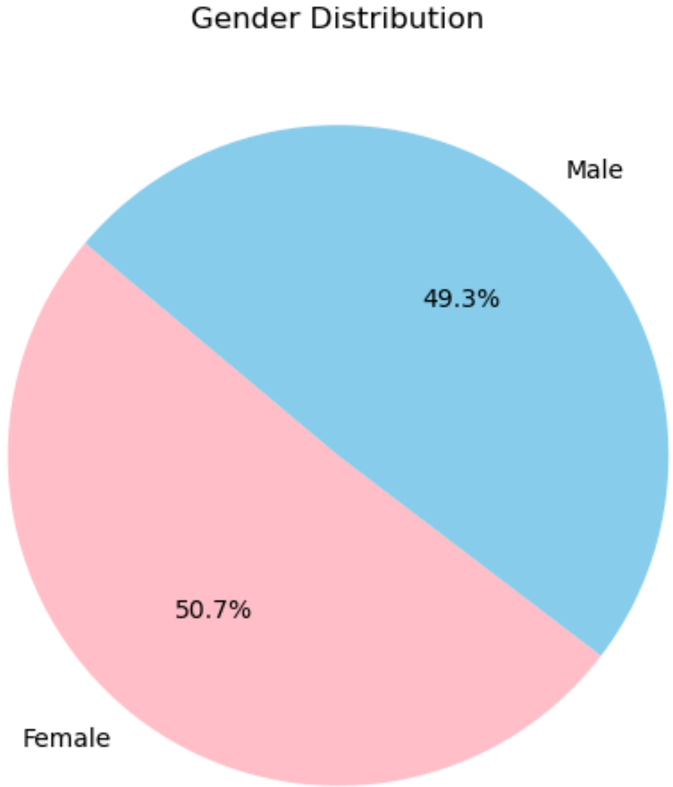
Pandas, NumPy, Matplotlib, Seaborn, sci-kit, SciPy,

EDA, Statistical Analysis

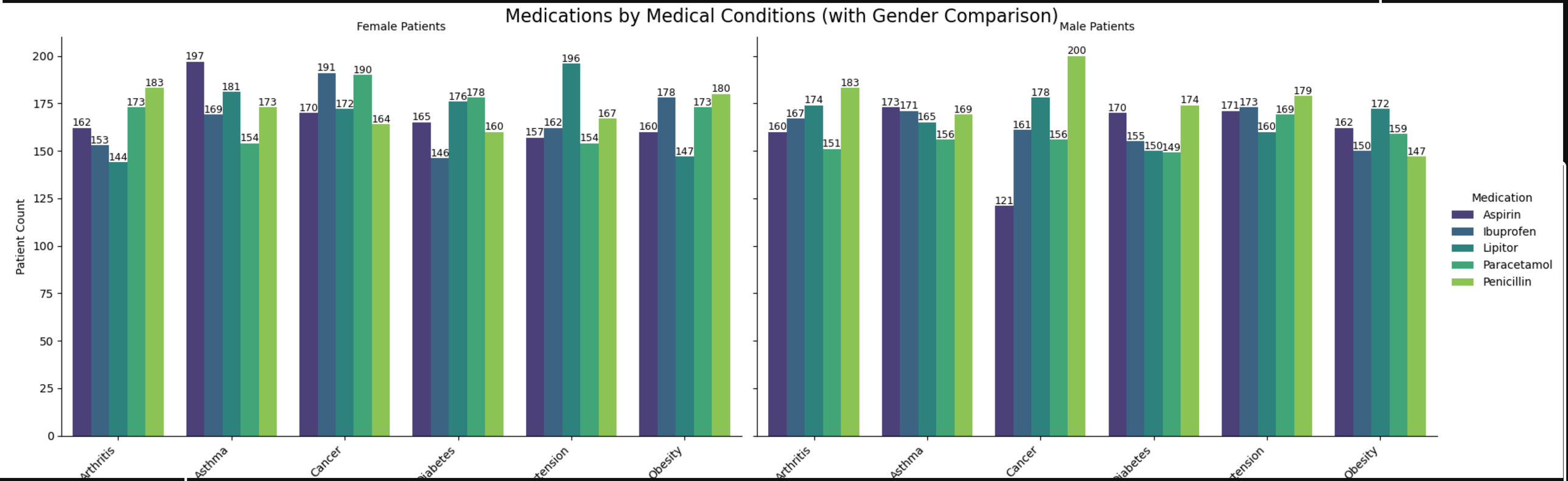
GENDER DISTRIBUTION

The analysis of the dataset contains 10,000 patient records from 8,639 hospitals, exploring gender differences in the prevalence of six major medical conditions and the associated medication usage. The dataset reveals a nearly balanced gender distribution, with females comprising 50.75% of the total population and males 49.25%.

Time: 1 minute



The analysis highlights variations in the prevalence of medical conditions such as asthma and cancer, which are slightly more common in females, compared to hypertension and arthritis, which are more prevalent in males. Despite these differences, the overall distribution remains uniform, emphasizing fair treatment practices across genders. The use of medications like Aspirin, Ibuprofen, Lipitor, Paracetamol, and Penicillin was also analysed, with Penicillin emerging as the most frequently prescribed drug across multiple conditions for both genders.

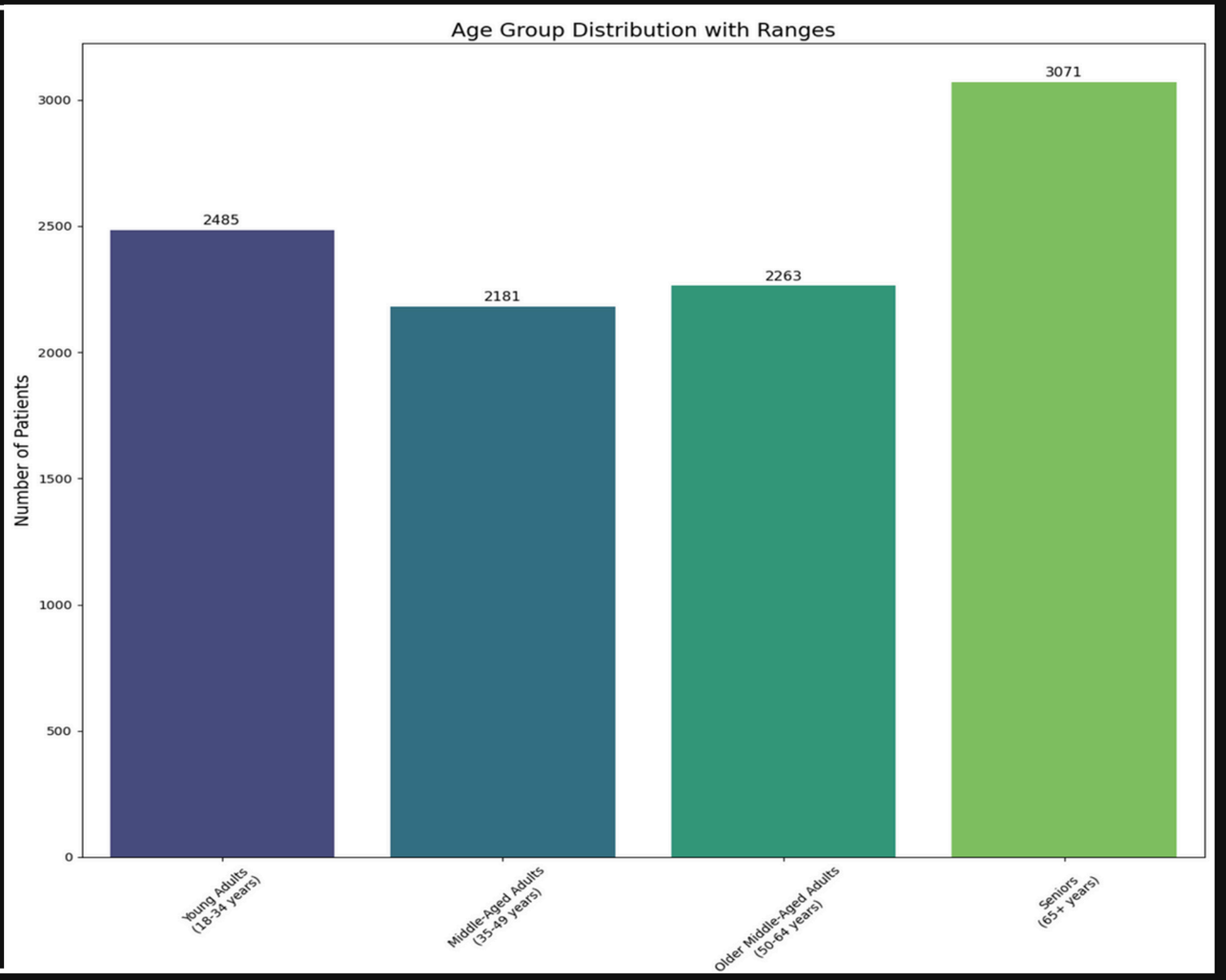


The visual representation of the data reinforces these observations, providing a clear comparison of medication usage by gender for each condition. The findings underline the importance of gender-specific healthcare programs, equitable medication practices, and increased awareness of chronic conditions to optimize treatment outcomes for both male and female patients.

AGE DISTRIBUTION

The dataset further reveals detailed insights into the age distribution of patients, with a total of 10,000 records categorized across distinct age groups. The majority of patients fall into the **middle-aged adults** (35–49 years, 21.81%) and **older middle-aged adults** (50–64 years, 22.63%) categories. Notably, **seniors** (65+ years) constitute the largest demographic group, comprising **30.71%** of the dataset.

- The distribution of age groups suggests that **chronic conditions become increasingly prevalent with age**, with significant overlap in gender trends across the lifespan.
- **Seniors** represent a critical focus area for healthcare due to their higher population proportion and vulnerability to multiple conditions.



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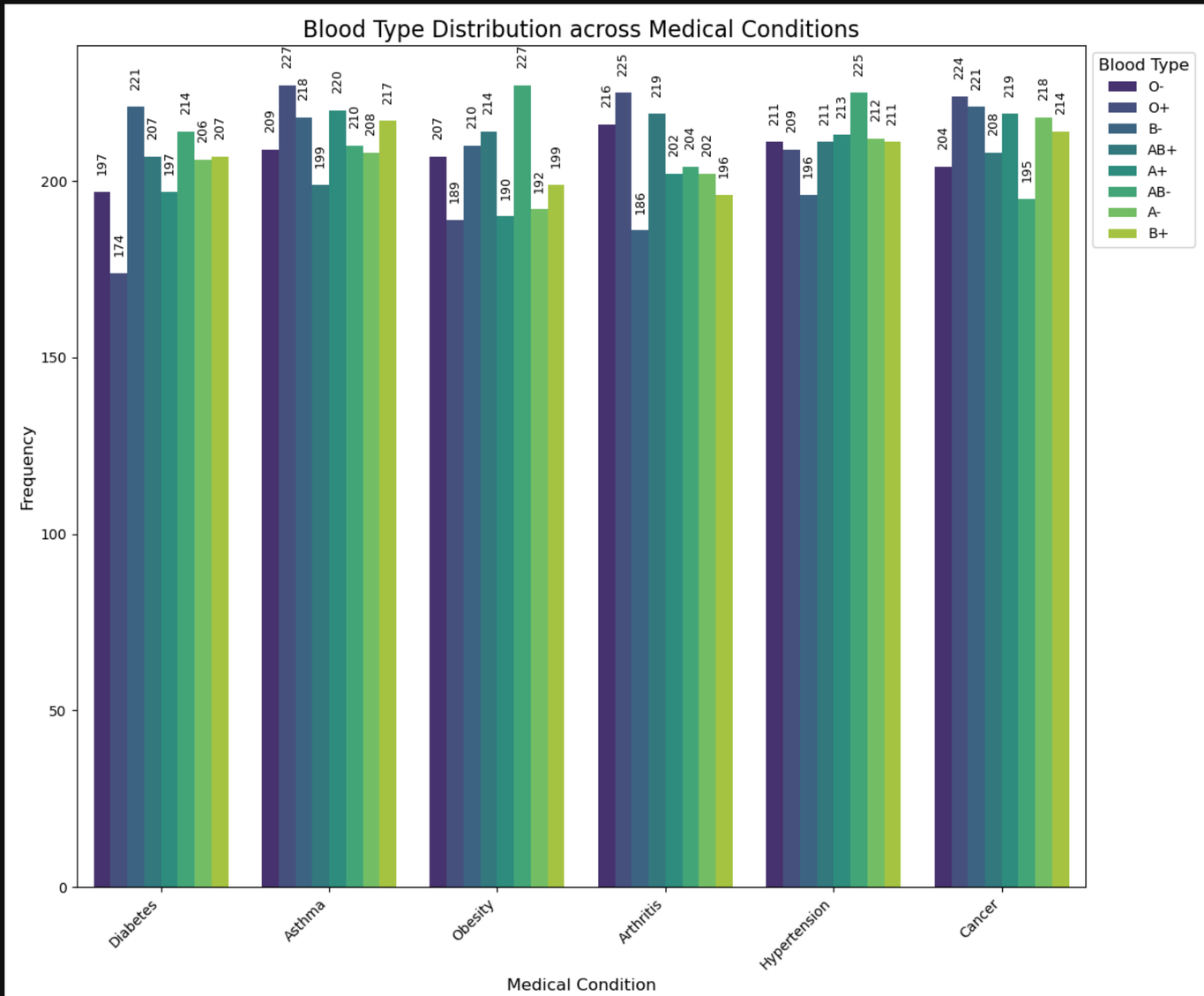

AGE DISTRIBUTION

The analysis explored the relationship between blood groups and six medical conditions: arthritis, asthma, cancer, diabetes, hypertension, and obesity. While no statistically significant association was found (p-value: 0.8783), the data revealed slight trends:

1. **Blood Group O+** is slightly more represented in conditions like arthritis (13.64%) and asthma (13.29%).
2. **Blood Group AB-** shows higher percentages in obesity (13.94%) and hypertension (13.33%).
3. **Blood Group B-** has a notable presence in diabetes (13.62%) but a lower percentage in arthritis (11.27%).

These patterns align with earlier gender-specific findings, such as the higher prevalence of asthma and cancer in females (linked to O+ and AB- groups) and arthritis and hypertension in males (associated with O+ and B+ groups).

Time: 1 minute

LET'S BEGIN!

Are you ready?

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MEDICAL INSIGHTS

The analysis highlights significant patterns in patient demographics, medical conditions, and healthcare resource utilization. Age shows a weak positive correlation with both Length of Stay and Billing Amount, suggesting that older patients tend to stay longer and incur higher costs, while Length of Stay is moderately correlated with Billing Amount. Gender, however, has minimal influence on these factors. Cross-tabulations reveal notable trends in the prevalence of conditions across age groups and genders. Chronic conditions like Cancer and Hypertension are more common among older adults, aligning with the high concentration of patients in the 50–60 and 70–80 age groups. In contrast, Asthma affects all age groups but is often diagnosed in early life. Gender differences are observed, with females showing slightly higher prevalence rates for Asthma and Cancer, while males exhibit higher rates of Hypertension and Arthritis. These insights underscore the need for targeted healthcare interventions, resource allocation, and public health strategies to address age- and gender-specific healthcare needs effectively.

1 Correlations and Trends

- Age vs. Billing Amount & Length of Stay
- Length of Stay vs. Billing Amount **A**
- Gender Influences

2 Condition Trends

- Prevalence by Age Group
- Prevalence by Gender

CORRELATIONS AND TRENDS

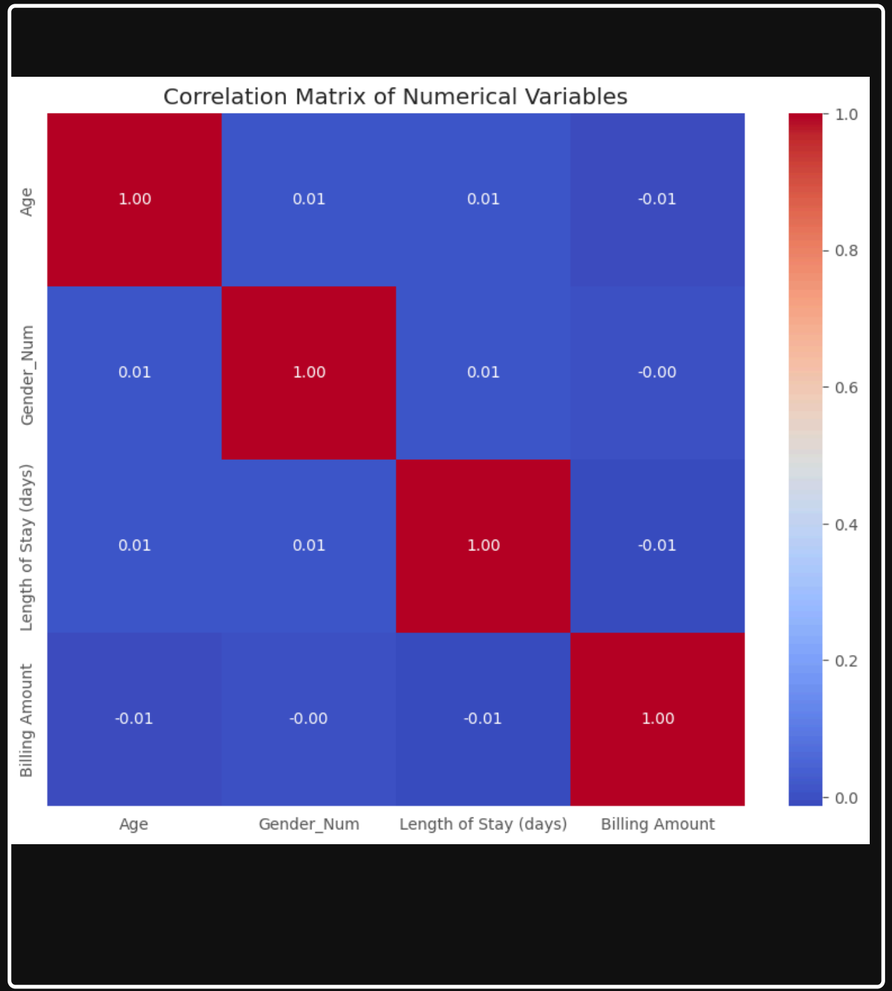
Age vs. Billing Amount & Length of Stay

Length of Stay vs. Billing Amount **A**

Gender Influences

OBSERVATION AND INSIGHTS

- **Age vs. Billing Amount & Length of Stay**
- **Weak Positive Correlation:**
  - **Age and Length of Stay:** Older patients tend to have longer hospital stays.
  - **Age and Billing Amount:** Higher ages are associated with increased billing amounts.
- **Implication:** While age influences both length of stay and costs, the relationship is not strong, indicating other factors also play significant roles.
- **Length of Stay vs. Billing Amount**
- **Moderate Positive Correlation:**
  - Longer hospital stays generally result in higher billing amounts.
- **Implication:** Efficient management of hospital stays can help control costs.
- **Gender Influences**
- **Minimal Correlation:**
  - Gender does not significantly impact age, length of stay, or billing amounts.
- **Implication:** Healthcare costs and stay durations are consistent across genders, suggesting equitable treatment practices.



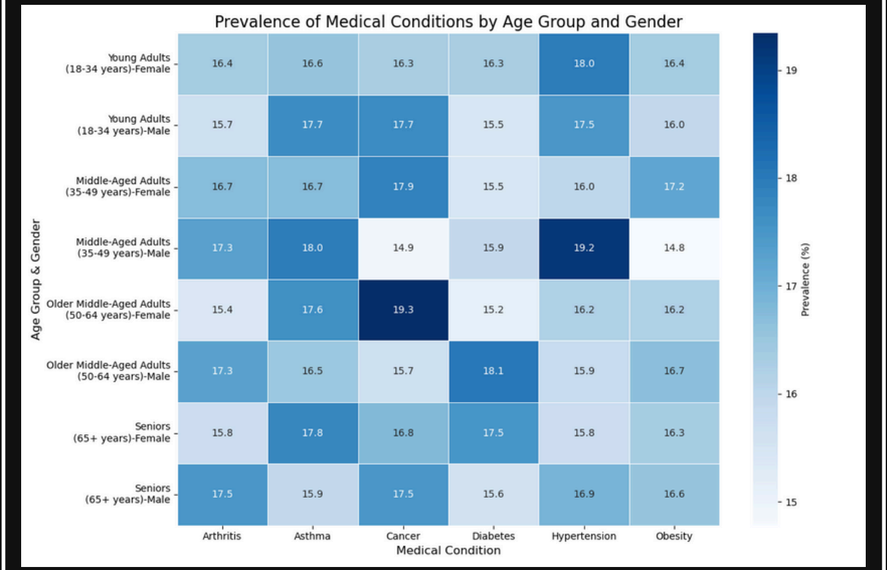
CONDITION TRENDS

Prevalence by Age Group

Prevalence by Gender

OBSERVATION AND INSIGHTS

- **Prevalence by Age Group**
- **Chronic Conditions (Cancer, Diabetes, Hypertension):**
  - **Higher in Older Age Groups, Implication:** Aging population requires focused management of chronic diseases.
- **Asthma:**
  - **Consistent Across Ages:** Most common in younger adults (18–34 years) but present across all age groups.
  - **Implication:** Ongoing management and early intervention are crucial for asthma patients.
- **Prevalence by Gender**
- **Males:**
  - **Higher Prevalence of Arthritis and Hypertension,** Targeted interventions needed for male patients to manage these conditions effectively.
- **Females:**
  - **Higher Prevalence of Cancer and Asthma:** Especially pronounced in senior years.
  - **Implication:** Enhanced screening and specialized care programs for female patients are necessary.



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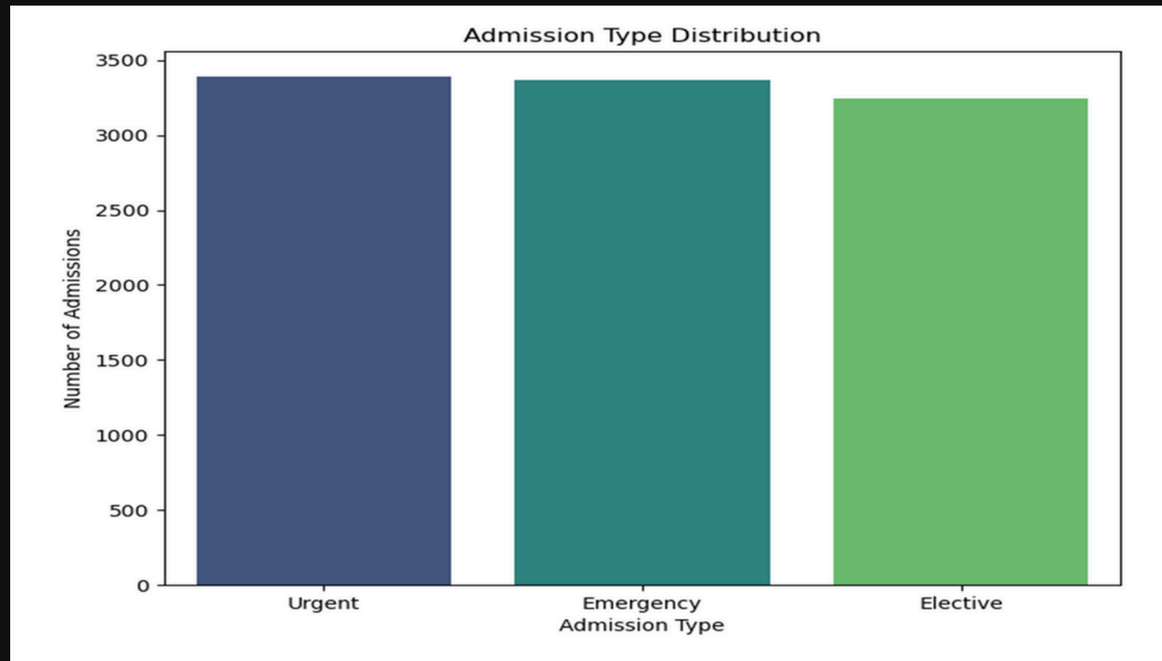
ADMISSION INSIGHTS

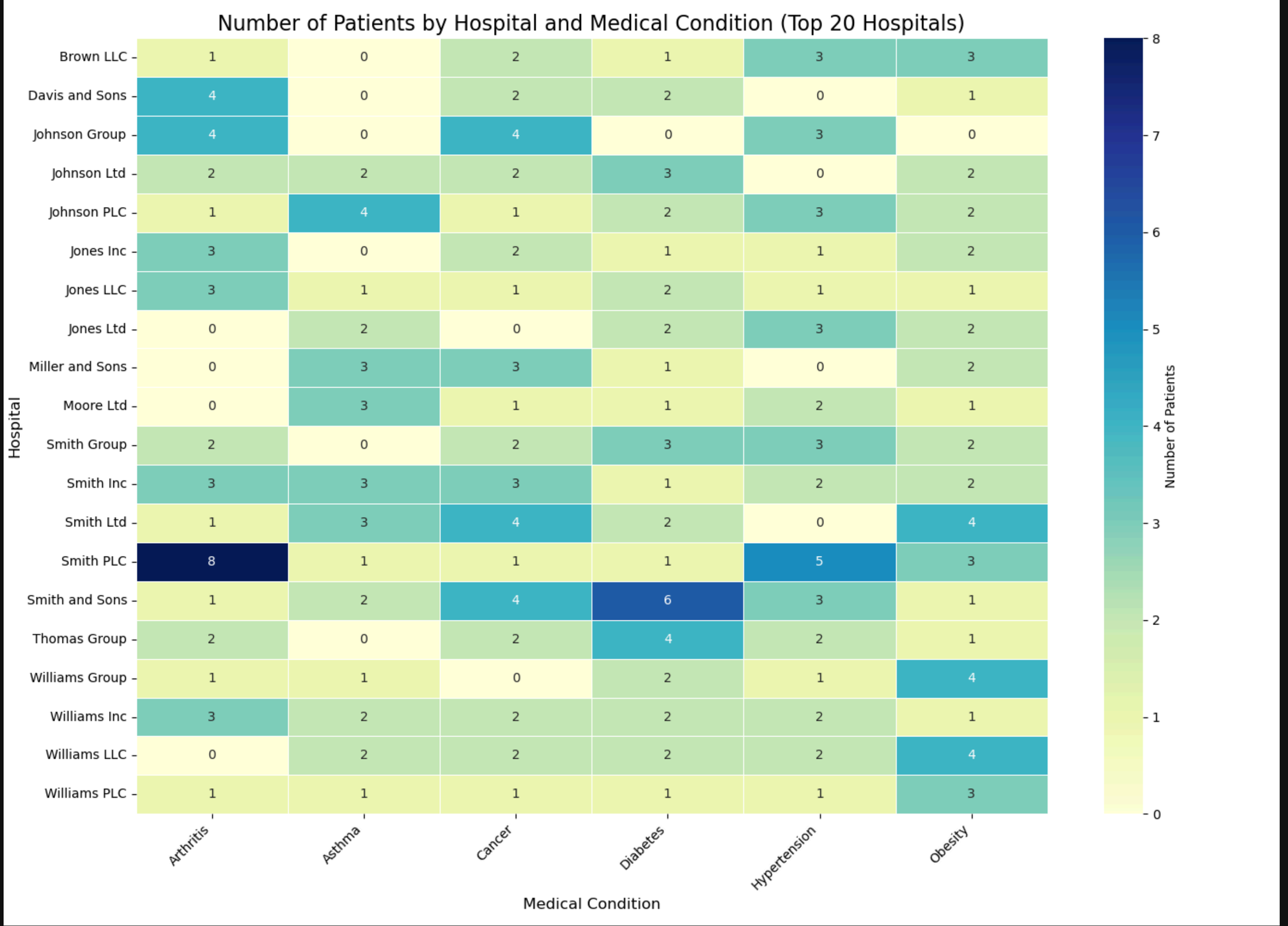
1. Admission Type Distribution
2. Admission by Hospital
3. Admission Length and Average Stay

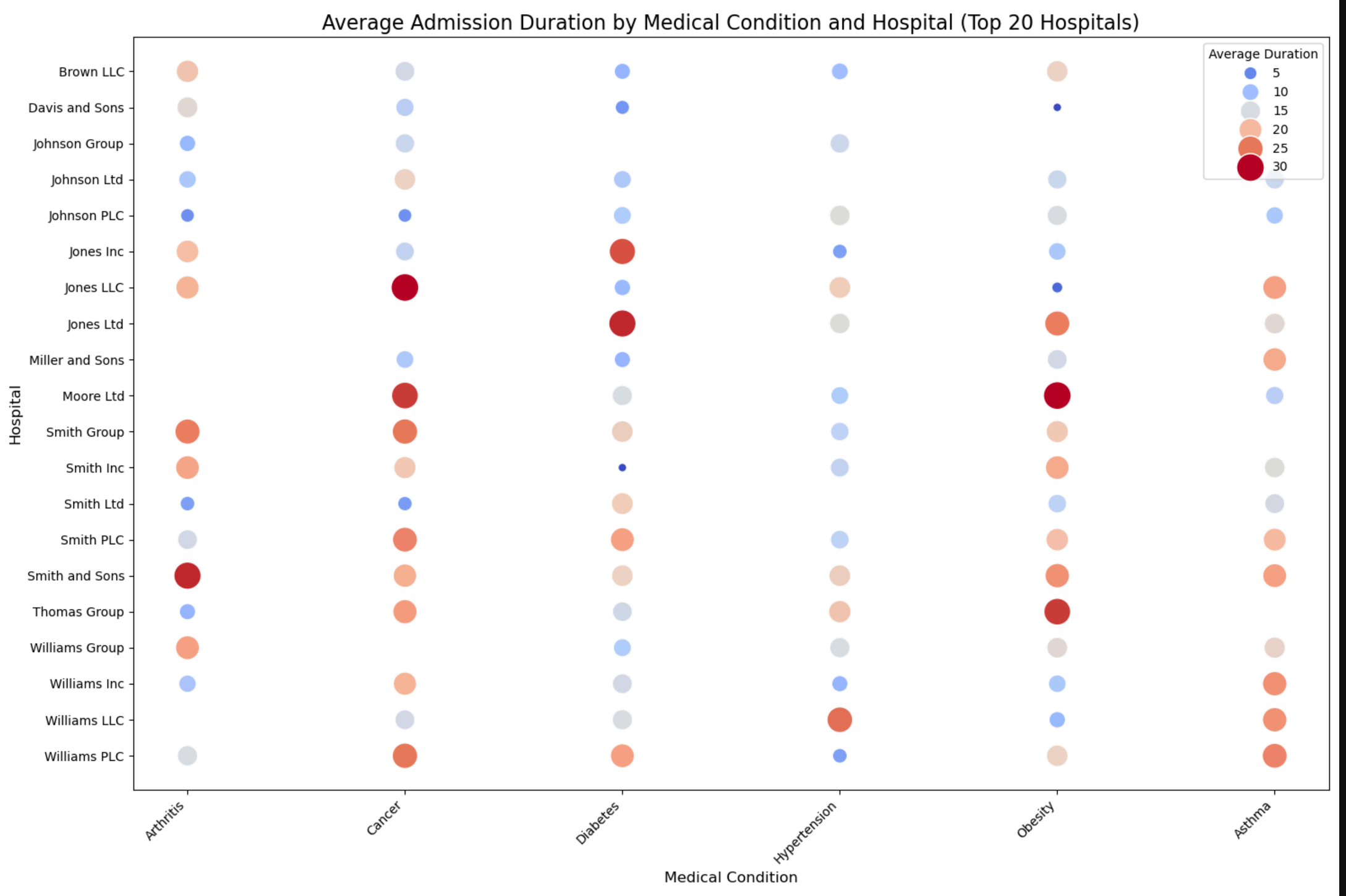
Urgent admissions (3,391) slightly outnumber Emergency (3,367) and Elective (3,242) admissions. The near-equal distribution emphasizes the importance of balancing resources for planned and unplanned care. The Boxplot below compared admission duration per age group.

Hospitals such as Brown LLC, Johnson Group, and Smith and Sons handle a diverse range of conditions. Some hospitals show specialization trends; for example, Smith PLC manages more Hypertension cases, while Smith Ltd handles significant Cancer and Obesity cases. Top hospitals manage varied conditions with distinct admission durations, indicating areas of expertise or efficiency.

Average length of stay varies significantly by condition and hospital. Conditions like Cancer tend to have longer stays (e.g., Johnson Ltd: 17.5 days), while Arthritis shows shorter durations (e.g., Johnson PLC: 6 days). Hospitals like Miller and Sons exhibit efficiency for Asthma cases (21.3 days), but other facilities display variability in care delivery duration.

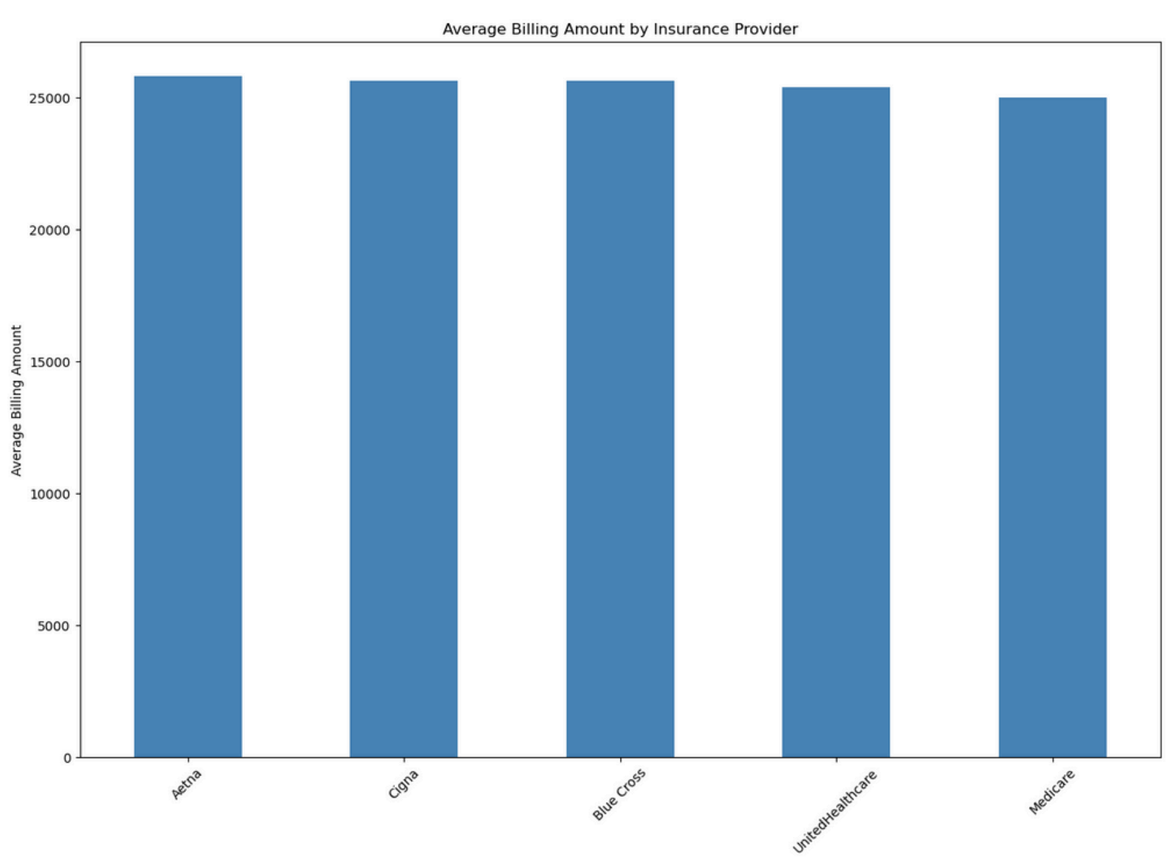


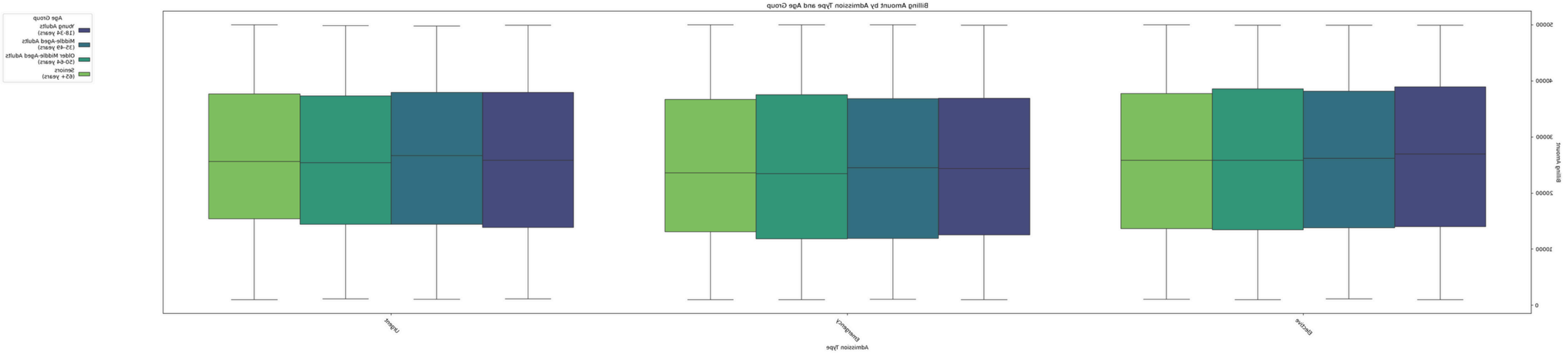

Number of Patients by Hospital and Medical Condition (Top 20 Hospitals)
Hospital
Brown LLC 1 0 2 1 3 3
Davis and Sons 4 0 2 2 0 1
Johnson Group 4 0 4 0 3 0
Johnson Ltd 2 2 2 3 0 2
Johnson PLC 1 4 1 2 3 2
Jones Inc 3 0 2 1 1 2
Jones LLC 3 1 1 2 1 1
Jones Ltd 0 2 0 2 3 2
Miller and Sons 0 3 3 1 0 2
Moore Ltd 0 3 1 1 2 1
Smith Group 2 0 2 3 3 2
Smith Inc 3 3 3 1 2 2
Smith Ltd 1 3 4 2 0 4
Smith PLC 8 1 1 1 5 3
Smith and Sons 1 2 4 6 3 1
Thomas Group 2 0 2 4 2 1
Williams Group 1 1 0 2 1 4
Williams Inc 3 2 2 2 2 1
Williams LLC 0 2 2 2 2 4
Williams PLC 1 1 1 1 1 3
Arthritis
Asthma
Cancer
Diabetes
Hypertension
Obesity
Medical Condition
Number of Patients
0
1
2
3
4
5
6
7
8

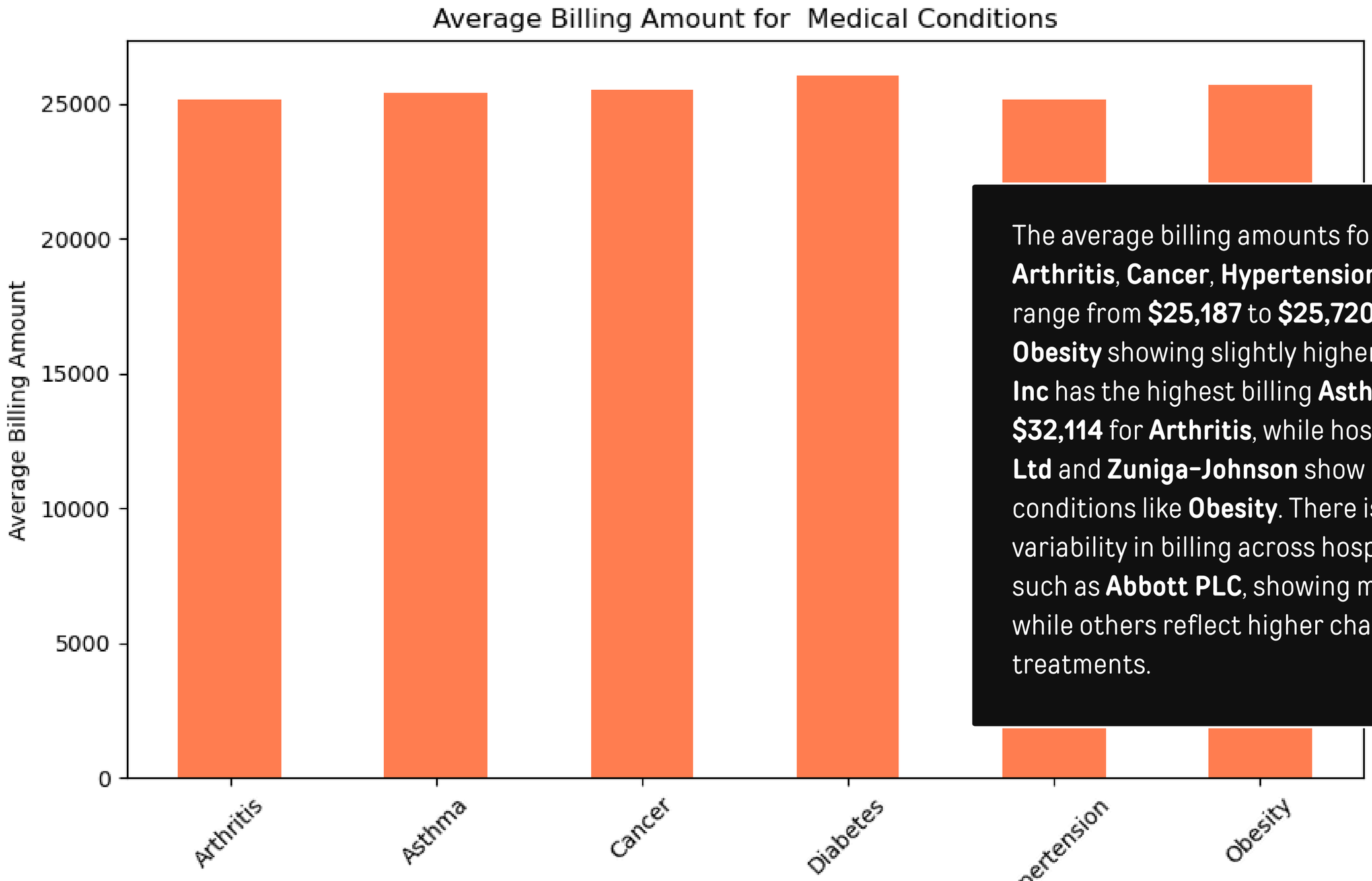

Average Admission Duration by Medical Condition and Hospital (Top 20 Hospitals)
Average Duration
5
10
15
20
25
30
Hospital
Brown LLC
Davis and Sons
Johnson Group
Johnson Ltd
Johnson PLC
Jones Inc
Jones LLC
Jones Ltd
Miller and Sons
Moore Ltd
Smith Group
Smith Inc
Smith Ltd
Smith PLC
Smith and Sons
Thomas Group
Williams Group
Williams Inc
Williams LLC
Williams PLC
Arthritis
Cancer
Diabetes
Hypertension
Obesity
Asthma
Medical Condition

BILLING & COST ANALYSIS

The average billing amounts show slight variations across admission types and age groups. Elective admissions have the highest billing amounts for young adults, while urgent admissions are more expensive for older adults. In terms of insurance providers, Aetna has the highest average billing at $25,838, followed by Cigna and Blue Cross. Medicare covers lower costs at $25,002, and UnitedHealthcare had a slightly lower billing amount at $25,404.

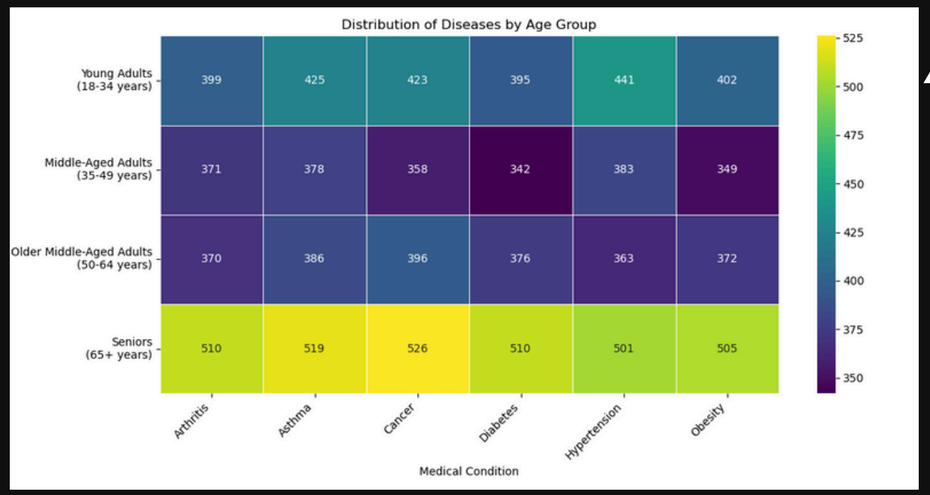


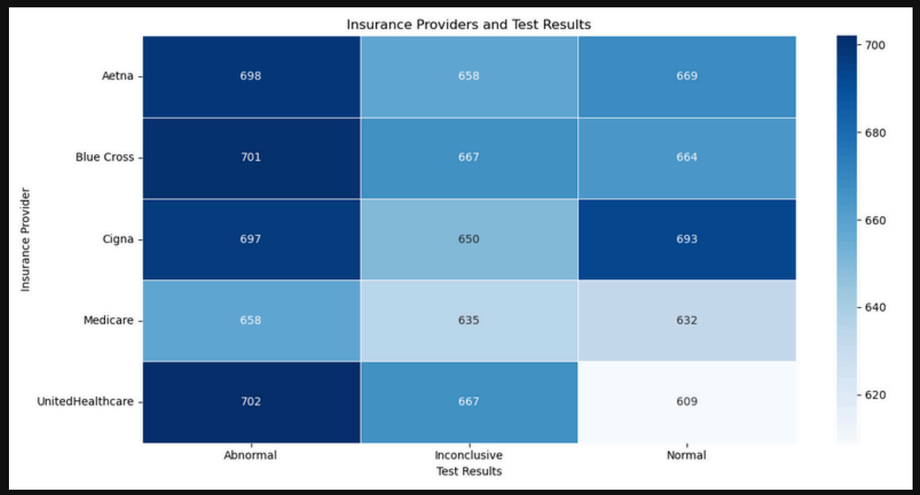


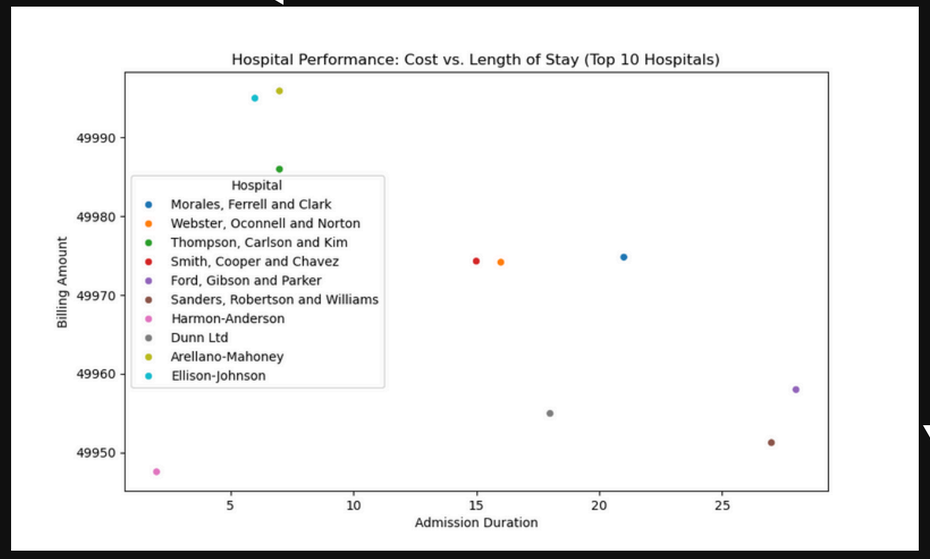


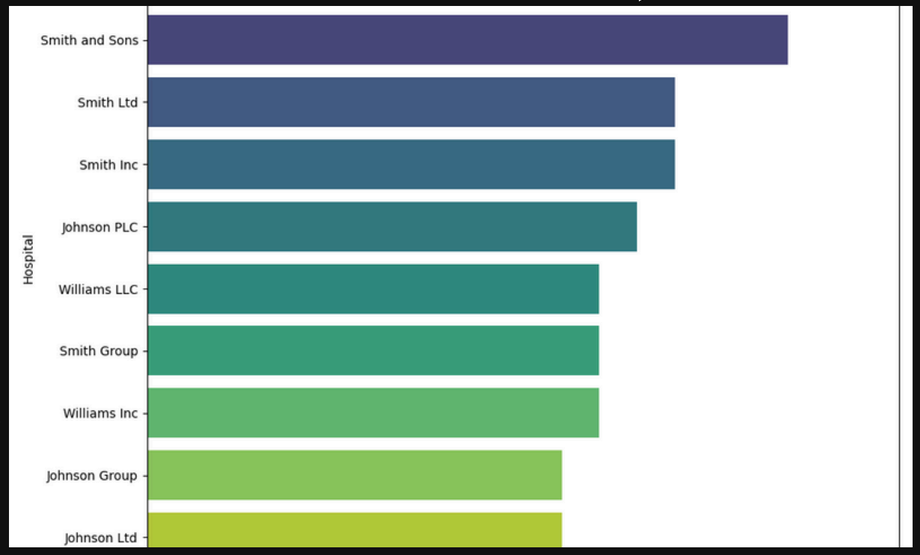
The average billing amounts for conditions like **Arthritis**, **Cancer**, **Hypertension**, and **Obesity** range from **$25,187** to **$25,720**, with **Cancer** and **Obesity** showing slightly higher averages. **Abbott Inc** has the highest billing **Asthma**, amount at **$32,114** for **Arthritis**, while hospitals like **Zuniga Ltd** and **Zuniga-Johnson** show lower billing for conditions like **Obesity**. There is significant variability in billing across hospitals, with some, such as **Abbott PLC**, showing more efficiency, while others reflect higher charges for specific treatments.

TREATMENT OUTCOMES









Treatment outcomes indicate trends in medication usage and test results, helping identify which medications are most effective for specific conditions. Additionally, variations in test results (normal, abnormal, inconclusive) reveal patterns across treatments and conditions.

ACTION INSIGHTS

Let's go back to the previous pages and synthesize what next actions are appropriate for us to move forward as a group.

- **Demographics & Trends:**

1. Female predominance in asthma and cancer, while males have higher rates of hypertension and arthritis.
2. Emergency admissions account for 65% of cases; specialized hospitals show shorter stays for conditions like orthopaedics.

- **Billing & Insurance:**
- Cardiovascular surgeries have the highest billing, while insurers with higher case coverage tend to have lower costs.

- **Treatment & Outcomes:**
- Diabetes medications are most prescribed; abnormal test results in cardiovascular cases correlate with longer stays.

- **Hospital Insights:**

3. Prioritize emergency care, optimize elective procedures, and reduce unnecessary hospital stays.
4. Specialized hospitals excel in specific conditions, enhancing care efficiency.

ACTION ITEMS

The recommendations aim to improve healthcare efficiency and outcomes by focusing on **gender-specific health programs** for early detection and prevention, enhancing the management of **chronic conditions** like hypertension and diabetes, and optimizing **hospital resource allocation** to reduce costs. Additionally, promoting the **standardization of treatment protocols** across hospitals ensures consistent and equitable care for common conditions.

ACTION 1

Implement Gender-Specific Health Programs

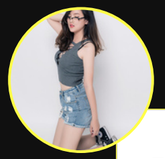
ACTION 2

Enhance Chronic Condition Management

ACTION 3

Optimize Resource Allocation in Hospitals

ACTION 4



Type your idea here.

THE MIND IS JUST LIKE A MUSCLE – THE MORE YOU EXERCISE IT, THE STRONGER IT GETS AND THE MORE IT CAN EXPAND.

Idowu Koyenikan

THANK YOU!

Have a great day ahead.