**HEALTHCARE COST OPTIMIZATION TOOL**

**INTRODUCTION**

The healthcare field is dynamically changing, and it requires new innovative approaches to ensure affordable treatment to the patients and profits to the healthcare providers. Healthcare costs are increasing rapidly, so the need of developing the pricing strategies that is profitable to the healthcare providers as well as prioritizes the patient’s need and experience.

The research focuses on optimizing the healthcare packages from the patient centric perspective. By analysing the historic treatment cost, patient demographics, insurance, length of stay and payment behaviours, we aim to create a pricing model that serve the needs and financial situation of the patients. The model would suggest the best suited hospital for patients based on the type of treatment, pricing, location.

**BACKGROUND**

According to the research, 4.3 trillion dollars were spent in healthcare sector in US for the year 2021 which is approximately 18.3% of the GDP. This figure is estimated to rise to approximately 5.1 trillion dollars which is an average annual growth rate of around 4.6 percent. This rapid growth depicts the alarming need for pricing optimization required for both patients and institutions.

The primary issues in current healthcare sectors are outlined below

**Affordability**

Current pricing models often lack transparency and do not adequately reflect the diverse financial situations of patients, leading to potential barriers to access for those in need. The patients often do not have access to the comparative pricing for different treatments at various hospitals.

**Increase in cost structure**

The rising prices of the drugs, staff salaries, medical supplies and hospital maintenance costs contribute to the increase the patient’s fees. Clear communication about the costs can build trust with patients and empower them to make informed healthcare choices which is lacking in current situation.

**Insurance Variability**

Variations in insurance coverage and payment patterns lead to inconsistencies in patient costs, complicating the pricing landscape and it affects patient access to care.

**Technological Advancements**

Innovations in medical technology and treatments, while beneficial, often come with higher costs.

**OBJECTIVE OF THE RESEARCH**

This research focuses on creating a price optimization tool from a patient-centric perspective. By analyzing the historical treatment costs, patient demographics, payment behaviors, insurance and length of stay, we aim to create a pricing tool that would suggest the best suited hospital for patients based on the type of treatment, pricing and location.

* **Enhance Affordability and Accessibility**

To enhance the affordability, develop a tool that cater to different income levels and insurance statuses of the patients, thereby increasing affordability.

* **Improve Transparency in Pricing**

Create clear, straightforward pricing tool that helps patients understand their costs, including potential out-of-pocket expenses based on the treatment and insurance coverage.

* **Promote Health Literacy**

Provide resources that help patients understand healthcare costs, insurance coverage, and

free treatment facility.

**RESEARCH QUESTIONS**

* How do patient demographics (e.g., income levels, insurance status, and health conditions) influence their perceptions of affordability and accessibility in healthcare services?
* What data-driven pricing models can be developed to optimize healthcare packages that balance affordability for patients with profitability for hospitals?

**DATA SOURCES**

Data sources for the project have been collected from various open data sources available online.

References used for the project are:

<https://data.cms.gov/provider-data/dataset/c7us-v4mf#data-table>

[https://www.healthcarepricetool.com/faq?\_gl=1\*10lltqy\*\_gcl\_au\*MTY3NTgxMTgzNi4xNzI2Njg5MDY4](https://www.healthcarepricetool.com/faq?_gl=1*10lltqy*_gcl_au*MTY3NTgxMTgzNi4xNzI2Njg5MDY4)

<https://corgis-edu.github.io/corgis/csv/hospitals/>

<https://healthdata.gov/dataset/Hospital-Price-Transparency-Enforcement-Activities/xznk-szy5/about_data>

By utilizing these diverse data sources, we are creating a patient-centric pricing tool.

**DATA ANALYSIS**

Our data analysis process includes investigating about the pricing trends based on location and treatment type. Here's a breakdown of our planned analytical approach:

* Data Collection: We plan to gather data from various sources, such as government reports, statistics, online articles and community organizations. This will involve acquiring both historical and recent data related to healthcare sector.
* Data Cleaning: We will perform data cleaning to ensure the accuracy and consistency of the datasets. This includes handling null values, standardizing data formats, and ensuring data consistency.
* Data Integration: We will integrate data from different sources, combining information on homelessness statistics, housing market trends, and economic indicators into a unified dataset for analysis.
* Exploratory Data Analysis (EDA): Using Python and SQL, we will conduct EDA to understand the distributions, patterns, and relationships within the data. This will involve creating visualizations and summary statistics to gain insights.
* Data Visualization and Reporting: To effectively communicate the project findings, we will make use of Table, for creating interactive and informative dashboards, charts, and maps.

**EXPECTED OUTCOMES**

Through the thorough analysis of historical data, we aim to create the following outcomes

* **Identification of Cost Disparities**

Outling the clear insights into how the cost of medical procedures varies based on patient income level and insurance coverage. Also, Quantifying any significant price differences between insured and uninsured patients.

* **Data-Driven Recommendations for patients**

A tool that helps patients understand and predict healthcare expenses based on their financial situation and insurance coverage, enabling more informed financial planning

**CONCLUSION**

The healthcare cost optimization tool successfully identifies and addresses significant differences in medical procedure costs based on treatment procedure and insurance status. Through comprehensive data analysis, the project exposes that healthcare pricing is often incompatible, leading to inequalities in access to care and financial burden, particularly for low-income and uninsured individuals.

In conclusion, this project leverages Exploratory Data Analysis (EDA) and Predictive Analytics to uncover critical insights into healthcare cost disparities based on type of diseases and insurance status. Through EDA, the project identifies patterns, relationships, and anomalies in the data, providing a clear understanding of how costs vary across different patient groups. Building on these insights, Predictive Analytics is used to model and forecast future healthcare costs, enabling more accurate predictions of procedure prices for various patient demographics. access to care for all patients.