# Patient Trends Analysis Project
# Executive Summary

## 1. Introduction

At the request of my manager, I conducted an open exploratory data analysis (EDA) on a healthcare dataset to identify any noteworthy trends, patterns, and anomalies. The goal was to uncover actionable insights that could support strategic decision-making in areas such as cost control, patient care optimization, and resource allocation. The analysis was performed using SQL (MySQL) for data transformation and querying, and Tableau was used to create interactive dashboards.

The **primary audience** for this analysis includes stakeholders responsible for hospital resource planning, such as operations managers, care coordinators, and administrative decision-makers.

## 2. Objective

The primary objective of this exploratory analysis is to examine healthcare data for patterns related to medical conditions, insurance coverage and admission types. By identifying cost drivers across age groups, the goal is to deliver clear, data-driven recommendations that help reduce unnecessary healthcare expenses and to support strategic decisions.

The decision to focus on age group analysis emerged after inspecting the dataset, where grouping patients into age groups (bins) revealed meaningful patterns in medical conditions and other variables such as insurance coverage across different life stages.

## 3. Data Overview

The analysis was based on a healthcare dataset containing approximately **55 000 records** organized across **15 columns**, provided in a single SQL table (CSV file).

## 4. Key Insights and Findings

### Medical Conditions by Age Group

- Medical conditions peak at ages 50-59, with 8 350 recorded cases.
- Hypertension and arthritis are most common among adults aged 70 and above.
- The 0-19 age group reports the fewest medical conditions, with 1 693 recorded cases, suggesting low chronic illness rates in youth.

### Insurance Providers by Age Group

- Cigna provides the highest coverage for age groups 20-29 and 30-39.
- UnitedHealthcare leads overall when combining all age group totals.

**Total Admissions by Age Group & Admission Type**

- Elective admissions peak for the age groups 30-39, 50-59 and 60-69.
- Emergency admissions stay consistent until 70, then slightly decrease.

## 5. Methodology

- **Data Cleaning:** Removed whitespace, handled nulls, and standardized fields using SQL.
- **Exploratory Data Analysis (EDA):** Used SQL to summarize trends by age, medical condition, insurance provider and admission type.
- **Visualization:** Built interactive Tableau dashboard with highlights, actions and filters to showcase EDA insights.

## 6. Recommendations

- **Target Preventive Care for Middle-Aged Adults (50-59)**
  Since medical conditions peak in this group, prioritize screening, lifestyle programs, and health education to reduce chronic disease burden.

- **Expand Geriatric Support Services**
  With high rates of hypertension and arthritis among the 70+ group, hospitals should strengthen chronic disease management and physical therapy offerings for older adults.

- **Invest Less in Pediatric Chronic Care Resources**
  The 0-19 age group reports the fewest conditions, indicating that chronic care resources can be reallocated toward older populations where the demand is higher.

- **Optimize Insurance Partnerships by Age**
  Given Cigna's strong presence in younger adults (20-39) and UnitedHealthcare's overall dominance, tailor insurance collaboration strategies based on patient age demographics for these two insurance providers.

- **Plan for Elective Procedure Demand in Key Age Bands**
  Increase capacity and scheduling flexibility for elective care in the 30-39, 50-59, and 60-69 age groups, where demand is highest.

- **Review Emergency Response Resources for 70+ Patients**
  Although emergency admissions slightly decrease in this age group, maintaining a high standard of emergency preparedness remains important due to the vulnerability of the elderly patients.

## 7. Impact

Implementing the recommendations is projected to:

- **Reduced Healthcare Costs** through early intervention and targeted preventive care in high-risk age groups (especially ages 50-59).
- **Improved Patient Outcomes** among elderly populations by enhancing chronic disease management programs tailored to conditions like hypertension and arthritis.
- **More Efficient Resource Allocation** by shifting pediatric chronic care resources toward adult and geriatric services, aligning support with actual demand.
- **Stronger Insurance Collaboration** resulting in better coverage options, streamlined billing, and increased patient satisfaction across age segments.
- **Optimized Elective Care Scheduling** that minimizes wait times and maximizes hospital capacity for peak demand age groups.
- **Sustained Emergency Care Readiness** for older adults, reducing complications and ensuring timely treatment despite lower admission volumes.

## 8. Next steps

- **Deepen Analysis** by investigating additional variables such as gender, billing amounts, and specific hospitals to understand their effects on medical conditions, insurance providers, and admission categories.
- **Automate Dashboards** for real-time tracking of key metrics using Tableau, enabling timely insights and proactive decision-making.
- **Collaborate with internal and external Stakeholders** (e.g., marketing, hospital administration, care teams and insurance providers) to validate findings and support strategic planning.

## Appendix

Link to Tableau Visualisation

Link to Github Repository