



# **Business Intelligence Use Case proposal**

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## **1. Industry : Healthcare**

The healthcare industry is a data-heavy sector that generates large volumes of structured and unstructured data on a daily basis. Hospitals and healthcare providers collect data related to patient demographics, admissions, diagnoses, treatments, staff utilization, medical resources, payment, and outcomes.

Effective use of this data is critical for improving patient experience, operational efficiency, and financial sustainability.

With increasing patient volumes, limited human and financial resources, and rising operational costs, hospitals are under constant pressure to optimize patient flow, reduce waiting times, and improve bed utilization while maintaining high standards of care.

Business Intelligence solutions play a notable role in transforming raw inconsistent healthcare data into interactive actionable insights for hospital administrators and decision-makers.

## **2. Organization Description :**

The organization in this use case is a mid-sized general hospital with approximately 39.2k patients, serving both emergency and scheduled ones. The hospital includes multiple departments such as Cardiology, Orthopedics, Gastroenterology, Pulmonology and Intensive Care Units (ICU).

The hospital uses an Electronic Health Record (EHR) system that stores detailed data on patient admissions, discharges, diagnoses, procedures, length of treatment visits, and resource usage. Although large amounts of data are available, reporting is mostly static and fragmented across departments, making it difficult for management to gain a holistic and real-time view of hospital performance.

### **3. Business Problem :**

Patient satisfaction scores are declining, and feedback shows that long waiting times are a major cause. Management wants to:

- Reduce average waiting time from about 80–90 minutes to under 45 minutes.
- Increase average satisfaction from about 2.9/5 to at least 4.0/5.
- Identify where and when waiting times are worst (department, time of day, day of week).
- Optimize staff allocation and appointment scheduling to improve flow.

### **4. Analytical questions :**

1. What is the average waiting time by department ?
2. Which hours of the day have the highest patient volume and longest waiting times?
3. Which days of the week show the worst waiting times?
4. How does waiting time affect patient satisfaction ( satisfaction when waiting time  $\leq 30$  min vs  $> 90$  min)? (we will measure patient satisfaction on a scale from 1 to 5)
5. Which doctors have the longest average waiting times and lowest satisfaction?
6. What percentage of visits exceed the 30-minute target wait time?
7. How does waiting time vary by age group (18–30, 31–50, 51–65, 65+)?
8. How do waiting times and satisfaction differ by department and insurance?
9. At what peak hour is the hospital most crowded, and what is the average waiting time then?
10. How do complaints relate to waiting time and satisfaction?

### **5. Key Performance Indicators(KPIs)**

#### **1. Average waiting time (minutes)**

- Avg Waiting Time=  $\frac{\Sigma \text{waiting time minutes of visits}}{\text{number of visits}}$

## 2. Average satisfaction score

- 1–5 rating (1 = very dissatisfied, 5 = very satisfied).
- Formula: mean of satisfaction

## 3. Percentage of visits exceeding target wait (30 minutes)

- % Exceeding Target =  $\frac{\text{visits with waiting time minutes} > 30}{\text{total visits}} * 100$

## 4. Average treatment duration (minutes)

- Mean of Treatment Duration Minutes.

## 5. Patient volume per hour

- Count of visits per hour of registration.

## 6. Doctor utilization rate (approximation)

- Doctor utilization rate =  $\frac{\text{total treatment minutes} * 100}{\text{number of doctors} * 480}$   
(Assuming 8-hour day = 480 minutes).

## 7. No-Show Rate

- No show rate =  $\frac{\text{missed appointments}}{\text{scheduled appointments}} \times 100$   
⇒ to test how reliable the patients' scheduling efficiency is .

## 8. Complaint rate

- Complaint rate =  $\frac{\text{count (complaint flagged)}}{\text{total visits}} \times 100$