August 23, 2025

Hospital Emergency Room Analysis Dashboard Report

Period Covered: April 2023 – October 2024

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Executive Summary

The Hospital Emergency Room Analysis Dashboard has been developed to address critical challenges in emergency care delivery, including long patient wait times, uneven staff utilization, and resource bottlenecks. By transforming raw hospital data into actionable insights, the dashboard provides leadership with a comprehensive view of emergency room (ER) performance across monthly trends, patient flow, and resource efficiency.

This solution enables stakeholders to monitor key performance indicators such as **average wait time, patient inflow, staff allocation, admission vs. discharge trends, and treatment delays**. With page-wise analysis—ranging from a high-level monthly overview to detailed patient-level data—the dashboard empowers decision-makers to both understand current bottlenecks and proactively optimize service delivery.

Key insights highlight issues such as **peak-hour congestion, underutilization of staff in certain shifts, and longer-than-benchmark wait times**. Recommendations derived from the analysis focus on **better staff scheduling, digital triage adoption, preventive community programs, and targeted operational interventions**.

Ultimately, the dashboard enhances hospital operational efficiency, reduces patient dissatisfaction, and supports **data-driven decision-making** for long-term healthcare quality improvement.

Business Question & Objective

Hospitals face critical challenges in managing emergency rooms (ERs), including:

- Long waiting times leading to poor patient satisfaction
- Overcrowding and bottlenecks during peak periods
- Imbalanced staff allocation and resource mismanagement
- Lack of real-time visibility into patient flow and admissions

Business Question:
How can we improve operational efficiency, patient experience, and resource allocation in the Emergency Room using data-driven insights?

Objective:
To design a **Power BI Emergency Room Dashboard** that enables stakeholders to:

- Monitor **patient inflow, waiting times, and admissions**
- Track **demographics, referral patterns, and busy periods**

- Measure **satisfaction levels and service delivery gaps**
- Support **data-driven staffing and resource decisions**

Approach & Methodology

To solve this business problem, the following steps were undertaken:

Step 1: Requirement Gathering

- Discussions with ER stakeholders identified the following KPIs:
    - Total Patients
    - Avg. Wait Time & Treatment Duration
    - % Patients Seen within 30 minutes
    - Admission Status (Admitted vs. Not Admitted)
    - Referral Departments
    - Patient Demographics (Age, Gender, Race)
    - Satisfaction Score

Step 2: Data Collection

- Extracted datasets from hospital patient management systems (April 2023 – October 2024).
- Included patient visits, timestamps, demographics, admission details, referrals, and survey responses.

Step 3: Data Cleaning & Transformation

- Removed duplicates and null values.
- Standardized date and time formats.
- Derived calculated fields (wait times, admission ratios, etc.).
- Categorized patients by severity (critical, moderate, mild).

Step 4: Data Modeling

- Built a **star schema model**:
    - Fact Table: Patient Visits
    - Dimension Tables: Patients, Doctors, Departments, Dates
- Created relationships for trend and demographic analysis.

Step 5: Dashboard Development (Power BI)

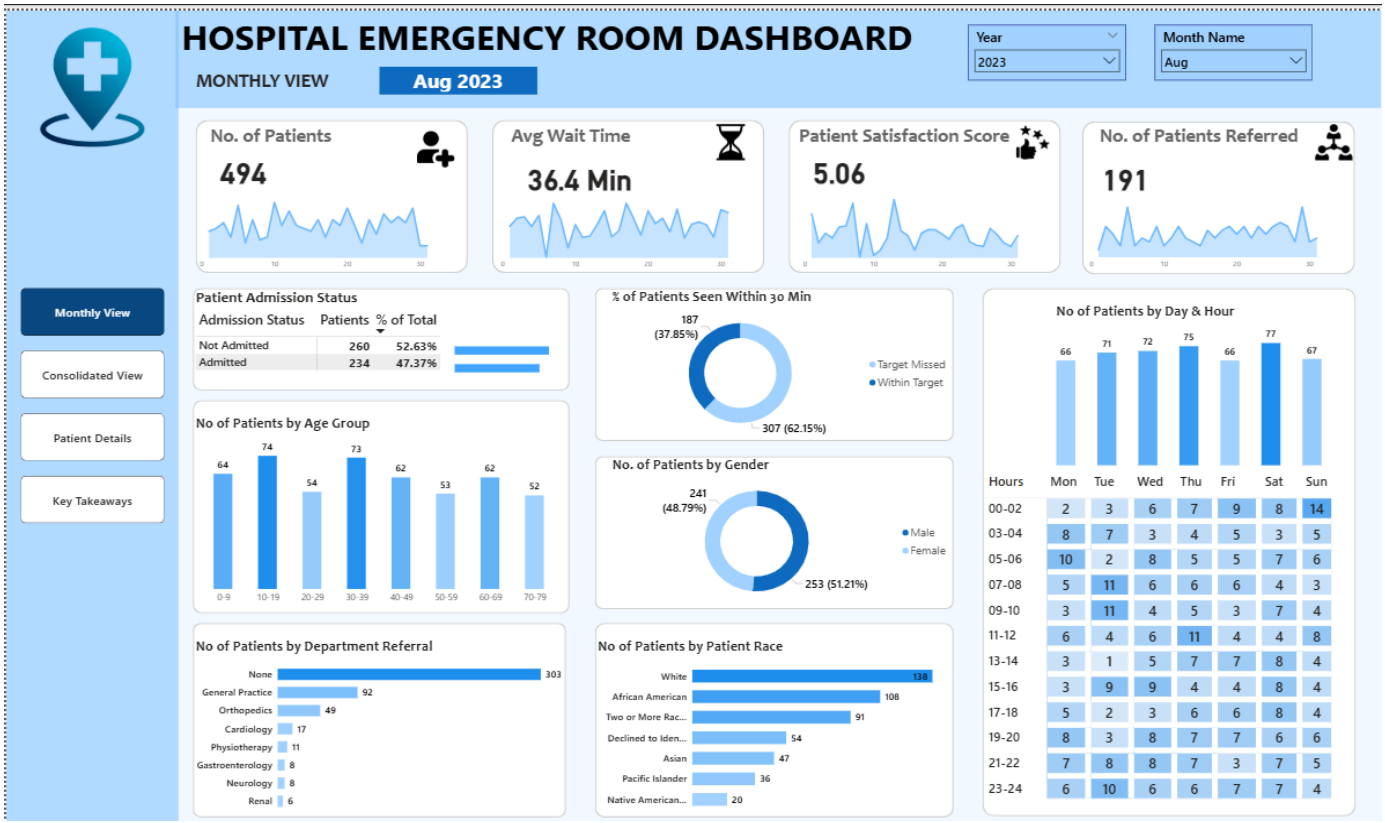
- Designed with hospital-friendly theme & drill-down capabilities.
- Pages created:
    1. Monthly Report (August 2023 as an example)
    2. Consolidated Long-Term Report (Apr 2023 – Oct 2024)
    3. Patient Details Page
    4. Key Takeaways Page

Step 6: Insights & Recommendations

- Each page analyzed for business meaning.
- Actionable recommendations proposed for hospital leadership.

Dashboard Analysis & Insights

PAGE 1: MONTHLY REPORT



This report presents the performance of the hospital emergency room for **August 2023**, covering **494 patients**. The dashboard provides key insights into patient flow, demographics,

wait times, satisfaction levels, and referral patterns. The objective of this analysis is to evaluate monthly performance and highlight opportunities for operational improvements.

Dashboard Analysis

1. Number of Patients

- **494 patients** visited the ER during August 2023.
- Patient inflow was steady throughout the month with minor fluctuations.

Business Insight:
Consistent patient visits indicate predictable ER demand without major spikes.

Recommendation:
Maintain current staffing levels but allocate flexible staff during weekends when demand slightly increases.

2. Average Wait Time (36.4 Minutes)

- The **average waiting time** was **36.4 minutes**, exceeding the optimal benchmark of 30 minutes.

Business Insight:
High wait times contribute to reduced patient satisfaction and increased operational pressure.

Recommendation:

- Introduce **fast-track triage** for less severe cases.
- Employ **additional nursing staff** during peak hours.
- Consider **digital queue systems** to streamline flow.

3. Patient Satisfaction Score (5.06/10)

- Average satisfaction score was **5.06**, reflecting moderate patient experience.

Business Insight:
Long wait times and peak-hour congestion are likely driving dissatisfaction.

Recommendation:

- Improve **communication with patients** about wait expectations.
- Enhance **comfort in waiting areas** (seating, updates, basic amenities).
- Monitor feedback trends to target key dissatisfaction drivers.

4. Admission Status

- **47.37% admitted** (234 patients).
- **52.63% not admitted** (260 patients).

Business Insight:
Nearly half of patients required admission, highlighting a significant proportion of critical cases.

Recommendation:

- Ensure **bed availability** and optimize **inpatient transfers**.
- Explore a **fast-discharge process** for stable patients to free up space.

5. Patients Seen Within 30 Minutes

- **62.15%** were seen within target time.
- **37.85%** missed the 30-minute target.

Business Insight:
Delays impact patient flow and satisfaction, showing that **1 in 3 patients face waiting delays**.

Recommendation:

- Reallocate staff to **triage & diagnostics** during high-demand periods.
- Consider a **real-time monitoring dashboard** for queue status.

6. Patient Age Distribution

- Highest visits: **10–19 years (74 patients)** and **30–39 years (73 patients)**.
- Lowest visits: **20–29 years (54 patients)**.

Business Insight:
Younger populations (teenagers and young adults) are frequent ER users, possibly due to accidents, injuries, or acute illnesses.

Recommendation:

- Collaborate with schools/universities for **health awareness programs**.
- Strengthen preventive care initiatives for **youth and young adults**.

7. Patient Gender

- **Female (51.21%)** slightly higher than **Male (48.79%)**.

Business Insight:
Balanced gender distribution; no significant operational impact.

Recommendation:
Maintain existing gender-neutral care practices.

8. Department Referrals

- Most patients required **no referral (303)**.
- Among referrals: **General Practice (92)**, **Orthopedics (49)**, Cardiology (17).

Business Insight:
The ER resolves most cases internally; however, General Practice and Orthopedics are in higher demand.

Recommendation:

- Improve ER-to-specialist **coordination protocols**.
- Ensure **availability of Orthopedic and GP specialists** during peak times.

9. Patient Race Distribution

- **White (138)** and **African American (108)** patients were the largest groups.
- Others: Multi-racial (91), Asian (47), Native American (20).

Business Insight:
The ER serves a diverse population, requiring culturally sensitive approaches.

Recommendation:

- Provide **multilingual resources**.
- Train staff in **cultural competency** to improve patient engagement.

10. Patients by Day & Hour

- **Busiest days:** Friday (75), Saturday (77), Sunday (67).
- **Peak hours:** Late night and early mornings (00:00–06:00).

Business Insight:
High demand during weekends and night shifts increases strain on staff.

Recommendation:

- **Increase staff coverage** during late nights and weekends.
- Prepare **surge plans** (on-call staff, rapid triage) for weekend spikes.

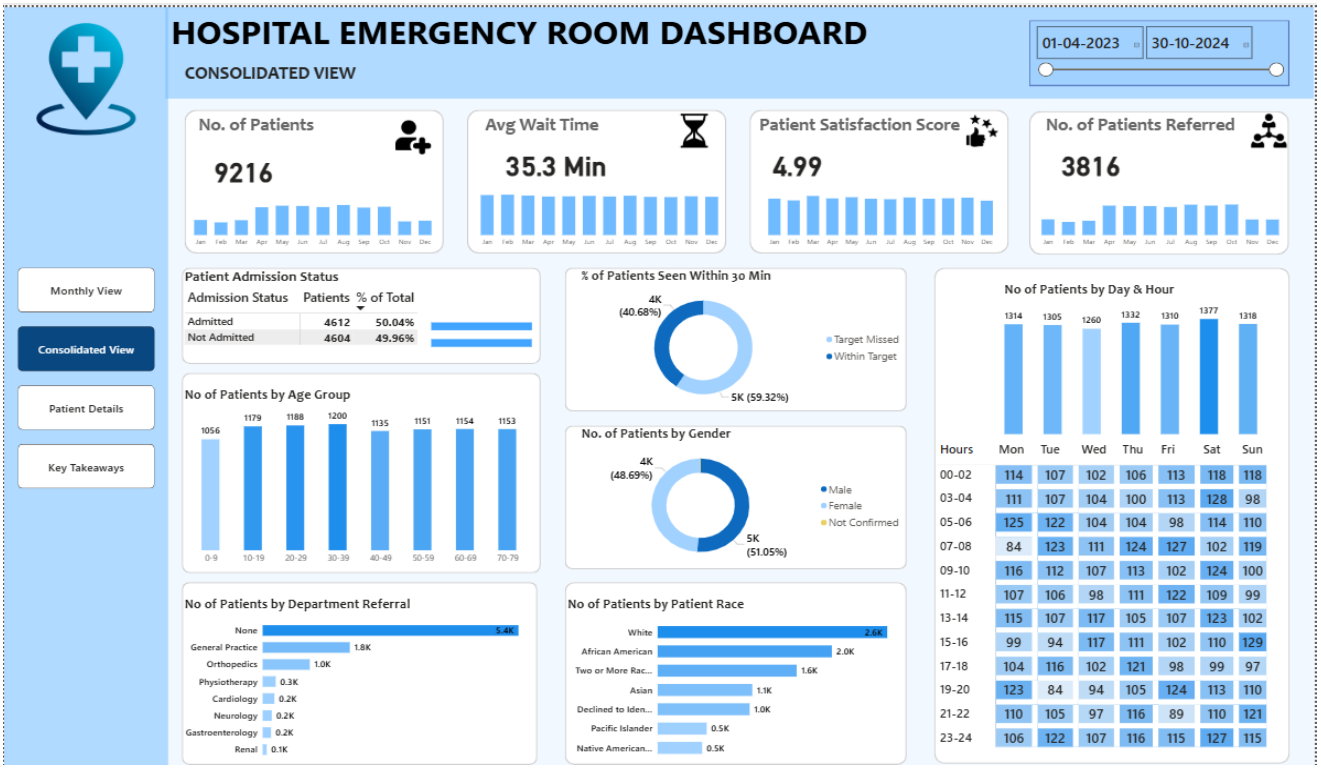
Summary & Recommendations

The August 2023 dashboard highlights:

- **High wait times (36.4 min)** → Need for triage efficiency.
- **Moderate satisfaction (5.06/10)** → Improve patient experience.
- **Weekend & night spikes** → Adjust staff rosters accordingly.
- **High referrals to GP & Orthopedics** → Strengthen specialist availability.
- **Youth & young adults dominate visits** → Preventive health initiatives required.

Overall Recommendation:
To improve ER performance, the hospital should **reduce waiting times, align staffing with peak demand, enhance patient experience, and strengthen referral systems**.

PAGE 2 : CONSOLIDATED REPORT (Apr 2023 – Oct 2024)



This consolidated report analyzes ER performance over a period of **19 months**, covering **9,216 patients**. The dashboard presents a holistic view of patient demographics, wait times, referrals, and satisfaction levels. The aim is to identify long-term trends and provide actionable insights for sustained performance improvement.

Dashboard Analysis

1. Number of Patients

- **9,216 patients** attended the ER in the last 19 months.
- Patient flow was steady across months, with no extreme fluctuations.

Business Insight:
The ER experiences **consistent demand**, suggesting predictable patient inflows and stable operational workload.

Recommendation:
Maintain staffing levels but plan for **incremental increases** if seasonal surges occur (e.g., flu season, winter months).

2. Average Wait Time (35.3 Minutes)

- Average wait time remains **above the 30-minute benchmark**, though slightly better than the August 2023 monthly snapshot (36.4 mins).

Business Insight:
Persistent delays indicate a **systemic capacity issue**, not just a monthly anomaly.

Recommendation:

- Implement **process automation** (triage kiosks, AI-driven prioritization).
- Expand **rapid assessment units** to reduce congestion.

3. Patient Satisfaction Score (4.99/10)

- Average satisfaction is **below average**, and no major improvements are seen across the months.

Business Insight:
Satisfaction remains a long-term concern, likely due to consistent delays and peak-hour overcrowding.

Recommendation:

- Enhance **patient engagement** through real-time updates on waiting status.
- Provide **post-care follow-ups** to build trust and improve feedback scores.

4. Admission Status

- **50.04% admitted (4,612 patients)**.

- **49.96% not admitted (4,604 patients)**.

Business Insight:
Nearly half of ER visits result in admission, indicating a high share of critical or complex cases.

Recommendation:

- Improve **bed management systems** to handle high admissions smoothly.
- Explore **short-stay units** for cases requiring brief observation.

5. Patients Seen Within 30 Minutes

- **59.32% met the 30-minute target**, while **40.68% missed**.

Business Insight:
Almost **2 out of 5 patients face delays**, affecting satisfaction and outcomes.

Recommendation:

- Assign **dedicated fast-track teams** for minor cases.
- Introduce **real-time performance dashboards** for triage staff to monitor queues.

6. Patient Age Distribution

- Highest groups: **20–29 years (1,188)** and **10–19 years (1,179)**.
- Other age groups are evenly distributed (1,100–1,150 range).

Business Insight:
Young adults and teenagers are the **primary ER users**, consistent with accident-prone and acute-illness demographics.

Recommendation:

- Launch **community safety campaigns** (road safety, injury prevention).
- Strengthen **preventive care outreach** for youth populations.

7. Patient Gender

- **Female: 51.05%**, **Male: 48.69%**.
- Balanced gender distribution over time.

Business Insight:
Gender balance remains consistent, requiring no targeted interventions.

Recommendation:
Continue with **gender-neutral care policies** and ensure equitable facilities.

8. Department Referrals

- Majority handled without referral (**5.4K patients**).
- Top referrals: **General Practice (1.8K)** and **Orthopedics (1.0K)**.

Business Insight:
General Practice and Orthopedics consistently emerge as high-demand referral areas.

Recommendation:

- Allocate **dedicated Orthopedic & GP shifts** to ER.
- Establish **direct specialist consultation channels** to reduce delays.

9. Patient Race Distribution

- Largest groups: **White (2.6K)**, **African American (2.0K)**, **Two or More Races (1.6K)**.
- Asian (1.1K) and Declined to Identify (1.0K) are also notable groups.

Business Insight:
ER caters to a **diverse racial mix**, requiring inclusivity in service delivery.

Recommendation:

- Provide **multilingual communication materials**.
- Train staff in **cultural sensitivity** to improve trust and satisfaction.

10. Patients by Day & Hour

- **Busiest days:** Saturday (1,377), Sunday (1,318), Friday (1,310).
- **Peak hours:** Early morning (03:00–06:00) and late evening (18:00–23:00).

Business Insight:
Weekends and night shifts are the **most resource-intensive periods**.

Recommendation:

- Strengthen **weekend and night coverage** with additional staff.
- Introduce **rotational staffing models** to reduce burnout.
- Enhance **tele-triage systems** during high-volume hours.

Summary & Recommendations

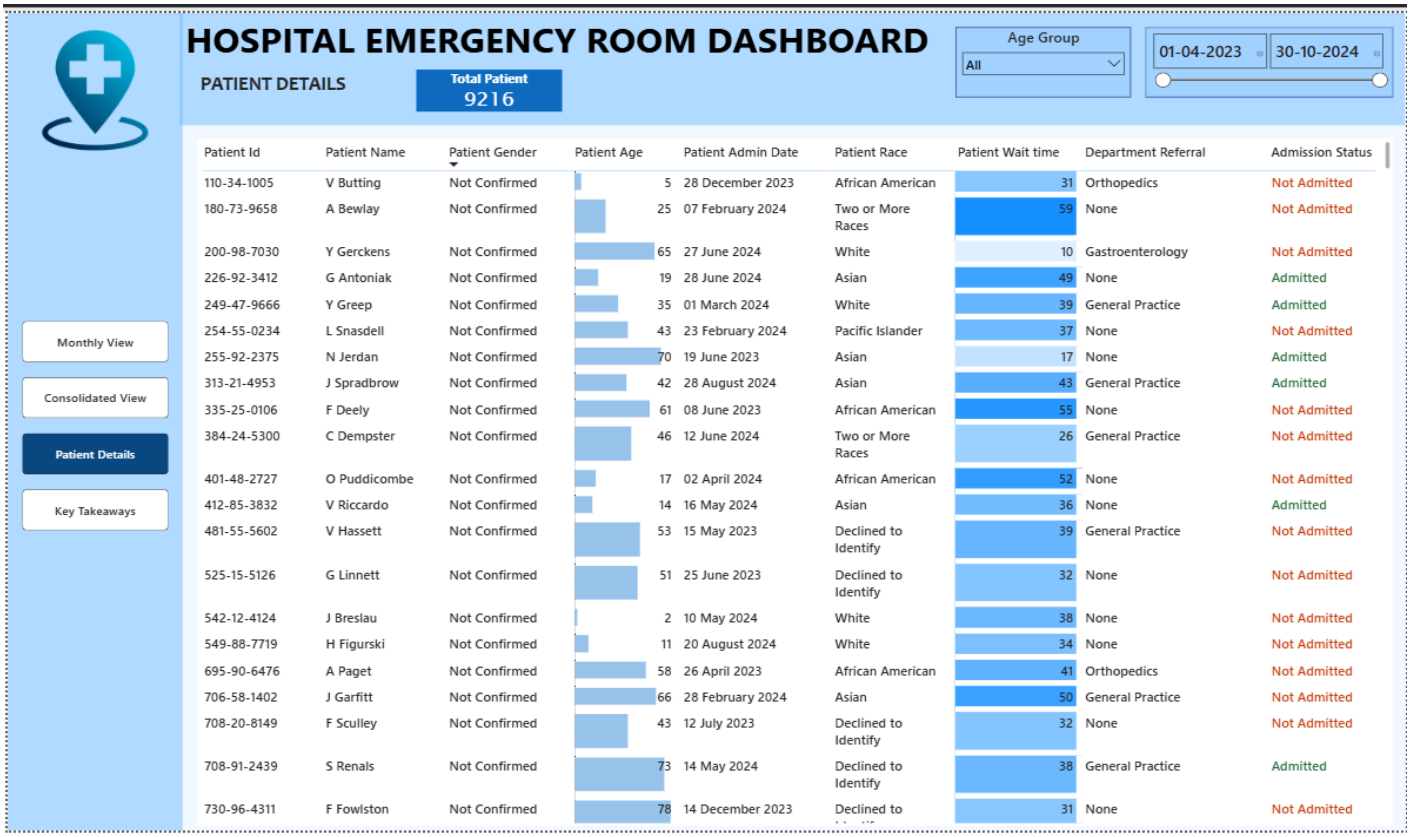
The consolidated 19-month analysis reveals:

- **Sustained wait time issues (35.3 mins avg)** → Need for systemic triage improvements.

- **Low patient satisfaction (4.99/10)** → Experience must be prioritized.
- **Weekend & night peaks** → Staff scheduling adjustments are critical.
- **High admissions (50%)** → Efficient bed management is vital.
- **Orthopedics & GP top referrals** → Ensure specialist availability.
- **Young adults dominate visits** → Invest in preventive outreach programs.

Overall Recommendation:
To improve long-term ER efficiency, the hospital should focus on **process optimization, better resource allocation during peak times, enhancing patient experience, and strengthening specialist referral systems**

PAGE 3 : PATIENT DETAILS



The Patient Details page provides a **granular, patient-level view** of the ER dataset, covering **9,216 patients** between April 2023 and October 2024. Unlike the Monthly and Consolidated dashboards (which provide performance insights), this section is designed as an **interactive lookup tool** for stakeholders.

Dashboard Features & Usage

1. Patient Search and Filtering

- Stakeholders can filter patients by:
    - **Age Group**
    - **Date Range (01-Apr-2023 to 30-Oct-2024)**
    - **Admission Status** (Admitted vs. Not Admitted)
    - **Department Referral**

Business Value:
This feature enables quick retrieval of patient information for audits, case reviews, or department-specific performance tracking.

2. Patient Information Displayed

Each patient record contains the following details:

- **Patient ID & Name** (anonymized for confidentiality)
- **Gender & Age**
- **Admin Date** (date of ER visit)
- **Race**
- **Wait Time (minutes)**
- **Department Referral** (if any)
- **Admission Status**

Business Value:

- Enables management to trace individual patient journeys.
- Supports **quality audits** (e.g., checking if long wait times align with patient satisfaction issues).
- Facilitates **performance monitoring** of referral departments.

3. Practical Use Cases for Stakeholders

- **Operations Team:** Can investigate **high wait-time cases** and analyze causes of admission delays.
- **Quality Team:** Can cross-check **satisfaction surveys** against patient demographics.

- **Department Heads:** Can review **referrals** (e.g., Orthopedics or General Practice) and assess load-sharing.
- **Executives/Board:** Can ensure compliance with **diversity, inclusion, and service equity** standards by reviewing racial and gender-level distributions.

Business Insight & Recommendation

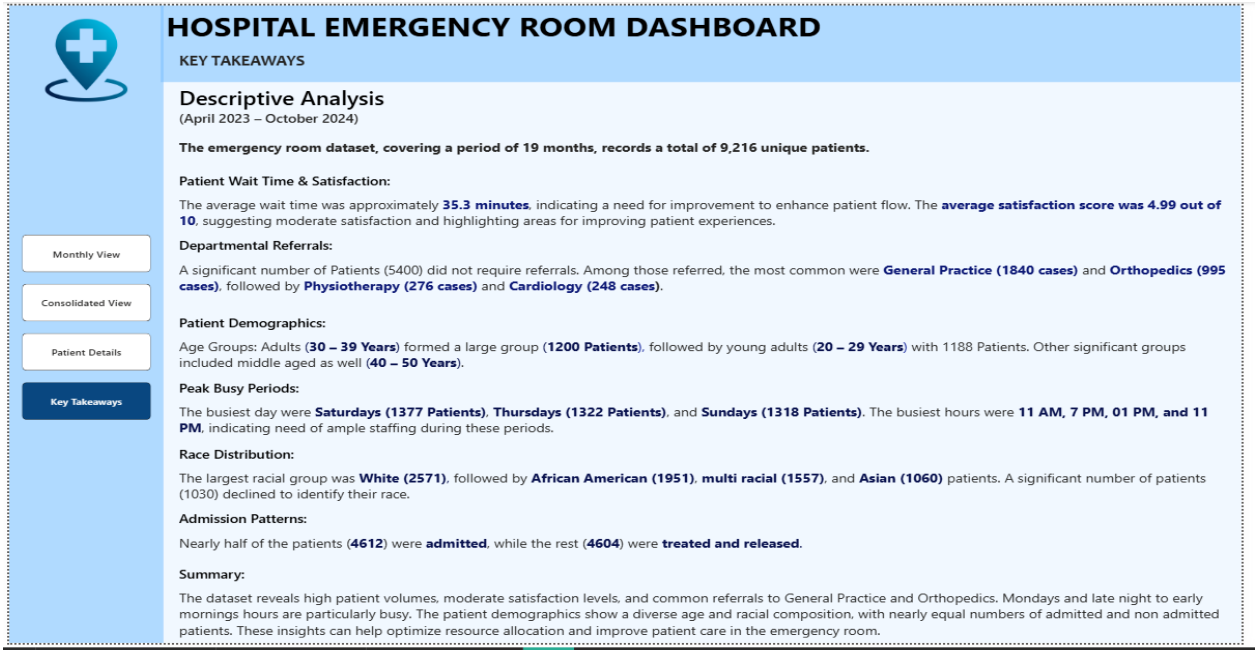
While the Patient Details dashboard is primarily for **data transparency and traceability**, it indirectly supports:

- **Trend validation:** Confirms whether insights from the Monthly and Consolidated dashboards align with actual patient-level records.
- **Operational efficiency:** Helps identify outliers (patients with unusually high wait times or repeated referrals).
- **Strategic planning:** Provides evidence for staffing adjustments in high-referral departments.

Recommendation:

- Use this page as a **drill-down tool** during monthly/quarterly review meetings.
- Establish a **patient case audit protocol** (e.g., randomly sample 10% of cases with wait times > 50 minutes for root cause analysis).
- Integrate with **Electronic Health Records (EHRs)** to streamline clinical insights alongside operational ones.

PAGE 4 : KEY TAKEAWAYS



The *Key Takeaways* section provides a consolidated summary of insights from the Hospital Emergency Room dataset, covering the period from April 2023 to October 2024. This page presents the overall performance, patient demographics, referral patterns, and workload distribution in a descriptive format. It is designed to give stakeholders a quick yet comprehensive understanding of emergency room operations without requiring them to analyze each individual chart.

Key Findings & Insights

1. **Patient Wait Time & Satisfaction**
    - The average patient wait time was **35.3 minutes**, indicating scope for improvement in patient flow and efficiency.
    - The patient satisfaction score was **4.99 out of 10**, suggesting moderate satisfaction levels and the need to enhance service quality.
2. **Departmental Referrals**
    - A significant proportion of patients (**5,400**) did not require any referral.
    - Among referred patients, the top departments were:
        - **General Practice:** 1,840 cases
        - **Orthopedics:** 995 cases
        - **Physiotherapy:** 276 cases
        - **Cardiology:** 248 cases
    - This trend highlights the departments under most pressure for follow-up care.
3. **Patient Demographics**
    - The majority of patients belonged to the **30–39 age group (1,200 patients)**, followed by **20–29 years (1,188 patients)**.
    - Middle-aged patients (40–50 years) also formed a significant portion, indicating that the ER caters largely to working-age adults.
4. **Peak Busy Periods**
    - **Busiest days:** Saturday (1,377 patients), Thursday (1,322 patients), and Sunday (1,318 patients).
    - **Peak hours:** 11 AM, 1 PM, 7 PM, and 11 PM.
    - This indicates the need for optimized staffing and resource allocation during these timeframes.

5. **Race Distribution**
    - The largest racial group was **White (2,571 patients)**, followed by **African American (1,951)**, **Multiracial (1,557)**, and **Asian (1,060)**.
    - A notable number of patients (**1,030**) declined to identify their race, which can limit the accuracy of demographic-based insights.
6. **Admission Patterns**
    - Nearly half of the patients (**4,612; 50.04%**) were admitted.
    - The rest (**4,604; 49.96%**) were treated and released.
    - This shows a balanced admission-to-discharge ratio, which is useful for capacity planning.

Recommendations

1. **Reduce Wait Times**
    - Implement fast-track protocols for less critical cases to reduce overall waiting time.
    - Leverage digital triage systems to streamline patient flow.
2. **Improve Patient Satisfaction**
    - Introduce feedback-driven service improvements.
    - Enhance communication and patient support during peak wait times.
3. **Strengthen High-Demand Departments**
    - Allocate additional resources to **General Practice** and **Orthopedics**, as they account for the majority of referrals.
    - Explore partnerships with outpatient clinics to manage overflow.
4. **Optimize Staffing During Peak Periods**
    - Schedule more medical and support staff on **weekends** and during **identified peak hours**.
    - Consider staggered shifts to ensure adequate coverage at late-night and early-morning hours.
5. **Address Demographic Needs**
    - Since the majority of patients are **young and middle-aged adults**, consider targeted health awareness programs (e.g., workplace injury prevention, lifestyle-related illness management).

- Improve cultural and linguistic inclusivity, given the diverse racial distribution.

6. **Admission vs. Non-Admission Balance**
    - Since half of patients are not admitted, develop robust **discharge planning and follow-up care pathways** to reduce unnecessary readmission

4. Summary & Business Value

The Hospital Emergency Room Analysis Dashboard provides a **comprehensive, data-driven view** of ER operations.

- **Business Understanding:** Helps administrators understand patient flow, bottlenecks, and resource constraints.
- **Efficiency Gains:** Reduces wait time, prevents overcrowding, and improves staff allocation.
- **Quality of Care:** Ensures more patients are treated timely, reducing *Left Without Treatment* cases.
- **Strategic Planning:** Identifies demand patterns, helping hospitals prepare for seasonal peaks.

Overall Recommendation:
Hospitals can **improve patient satisfaction, reduce costs, and enhance operational efficiency** by acting on the insights from this dashboard—such as investing in resources where shortages exist, optimizing staff schedules, and introducing digital triage systems.