

# Healthcare Dashboard Data Summary Report

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### About the dataset

The provided data encompasses various aspects of healthcare operations, including patient demographics, satisfaction scores, wait times, and departmental referrals. The datasets include detailed records from multiple tables such as "Raw\_0\_table\_1", "Hospital\_Data\_1\_table\_1", "KPIs\_2\_table\_1", "CSAT\_by\_month\_3\_table\_1", "Age\_Bracket\_4\_table\_1", "Patients\_\_Wait\_Time\_5\_table\_1", and "Dashboard\_6\_table\_1".

Key columns in these datasets include `date`, `patient_id`, `patient_gender`, `patient_age`, `patient_sat_score`, `patient_race`, `patient_admin_flag`, `patient_waittime`, and `department_referral`. The data spans from 2022 to 2023, with patient ages ranging from 1 to 79 years and satisfaction scores from 0 to 10.

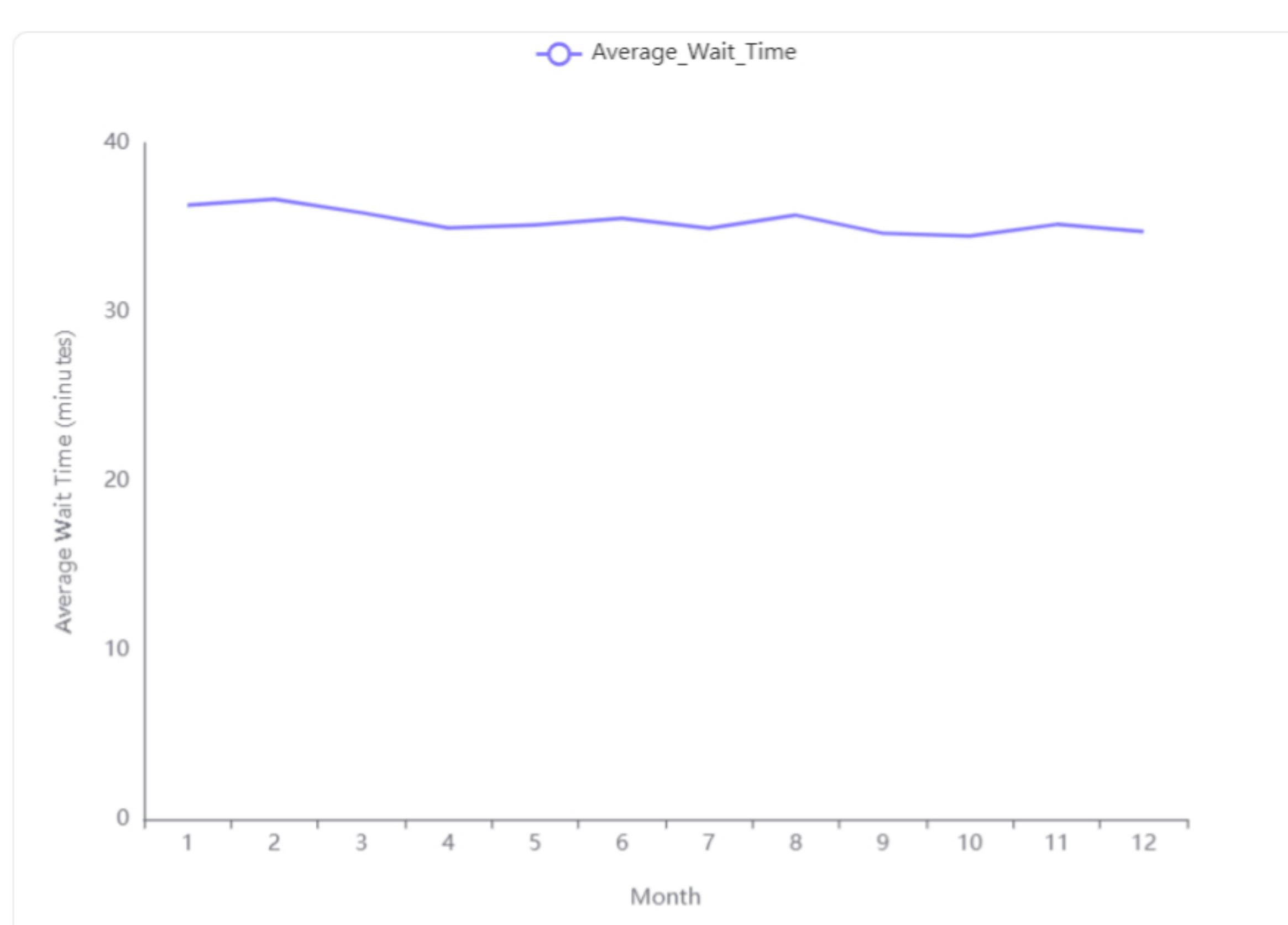
From the sample data, we observe that patient wait times vary significantly, with a mean of approximately 35 minutes. The average patient satisfaction score is around 4.3, indicating moderate satisfaction levels. The data also reveals that the majority of patients are referred to the Emergency department, and there is a diverse representation of patient races, including White, African American, and Asian.

The "Age\_Bracket\_4\_table\_1" dataset shows a fairly even distribution of patient counts across different age groups, with each group having around 1,200 patients. The "Patients\_\_Wait\_Time\_5\_table\_1" dataset highlights that wait times fluctuate slightly throughout the day, with the highest average wait time recorded at 37.22 minutes.

Overall, the data provides a comprehensive overview of patient demographics, satisfaction, and operational metrics, which can be instrumental in identifying areas for improvement in healthcare services.

### Relevant Inquiries

#### Q1.What are the trends in patient wait times over different months?



Monthly Average Wait Times

- **January:** 36.32 minutes
- **February:** 36.67 minutes
- **March:** 35.88 minutes
- **April:** 34.97 minutes
- **May:** 35.15 minutes
- **June:** 35.54 minutes
- **July:** 34.97 minutes
- **August:** 35.73 minutes
- **September:** 34.66 minutes
- **October:** 34.50 minutes
- **November:** 35.19 minutes
- **December:** 34.76 minutes

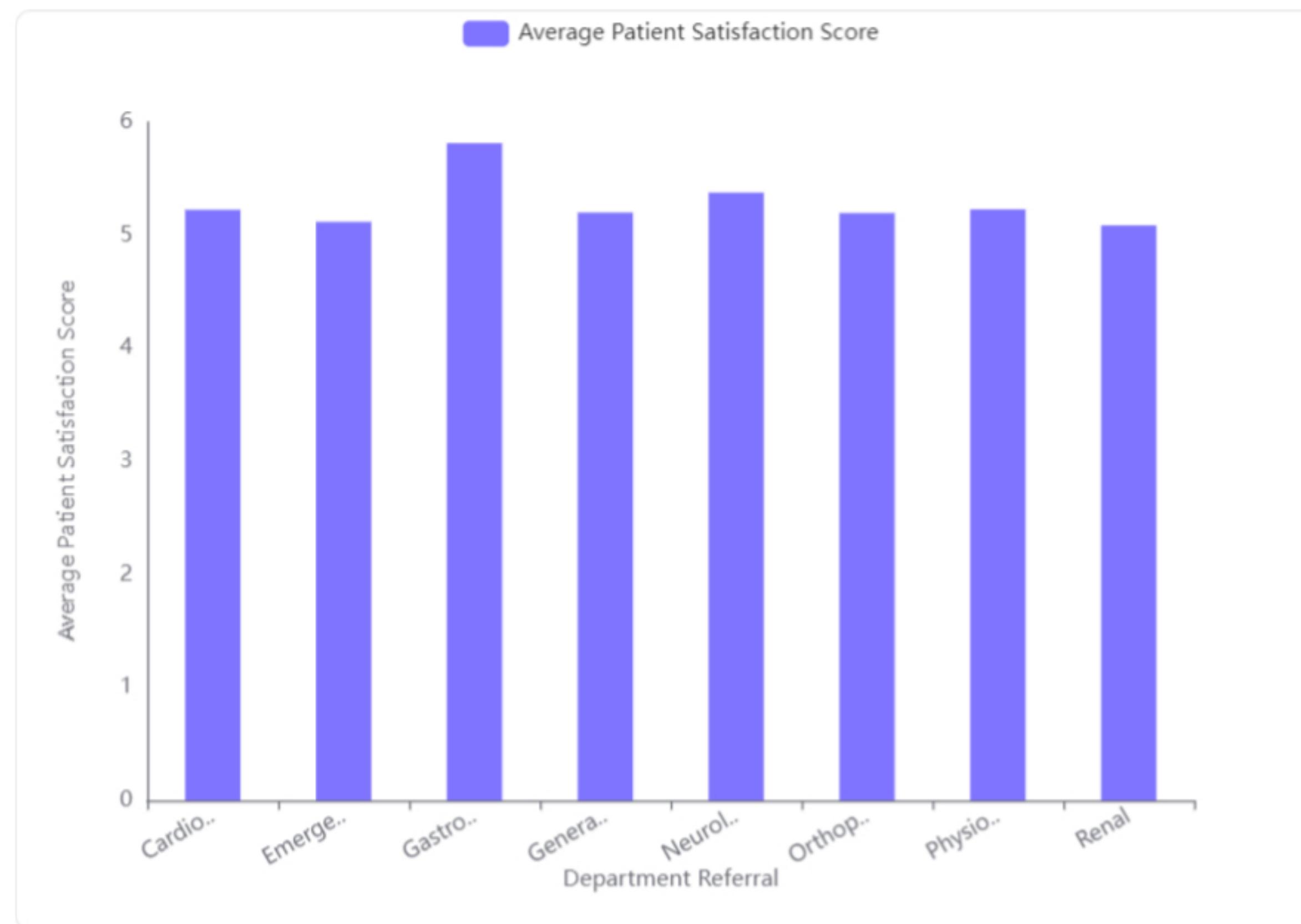
#### Visualization of Trends

- **Highest Wait Time:** February, with an average wait time of 36.67 minutes.
- **Lowest Wait Time:** October, with an average wait time of 34.50 minutes.
- **General Trend:** There is a noticeable decline in wait times from January to April, followed by fluctuations throughout the rest of the year.

#### Conclusion and Insights

- **Seasonal Variation:** The data indicates that patient wait times are generally higher at the beginning of the year and tend to decrease towards the middle of the year, with some fluctuations in the latter half.
- **Potential Factors:** The variations in wait times could be influenced by seasonal factors, such as flu season in the winter months, which might increase patient visits and consequently wait times. Further investigation into specific causes for these trends could provide more actionable insights.

#### Q2. How does the average patient satisfaction score vary by department referral?



#### Average Patient Satisfaction Scores

- **Cardiology:** 5.23
- **Emergency:** 5.12
- **Gastroenterology:** 5.81
- **General Practice:** 5.20
- **Neurology:** 5.38
- **Orthopedics:** 5.20
- **Physiotherapy:** 5.23
- **Renal:** 5.09

#### Visualization of Scores

- The bar chart illustrates the **average patient satisfaction scores** for each department referral.
- **Gastroenterology** has the highest average score, while **Renal** has the lowest.

#### Conclusion and Insights

- **Gastroenterology** has the highest patient satisfaction score, indicating a higher level of patient satisfaction in this department.
- **Renal** has the lowest patient satisfaction score, suggesting potential areas for improvement in patient care or services.
- Overall, the average patient satisfaction scores across departments are relatively close, with a mean score of 5.28 and a standard deviation of 0.23, indicating consistent patient satisfaction levels across different departments.

### Q3. Analyze the correlation between patient wait time and patient satisfaction score to determine if longer wait times impact patient satisfaction.



#### Data Extraction and Merging

- **Merged Data:** The data from 'Healthcare\_Dashboard.Raw\_0\_table\_1.csv' and 'Healthcare\_Dashboard.Hospital\_Data\_1\_table\_1.csv' were successfully merged.
- **Columns Extracted:** The relevant columns extracted include `patient_id`, `patient_sat_score_raw`, `patient_waittime_raw`, `patient_sat_score_hospital`, and `patient_waittime_hospital`.
- **Sample Data:** The sample data includes patient IDs and their corresponding satisfaction scores and wait times from both raw and hospital datasets.

#### Correlation Calculation

- **Correlation Coefficient:** The correlation coefficient between patient wait time and patient satisfaction score is **-0.03**.
- **Interpretation:** This indicates a very weak negative correlation, suggesting that longer wait times have a minimal impact on patient satisfaction scores.

#### Scatter Plot Visualization

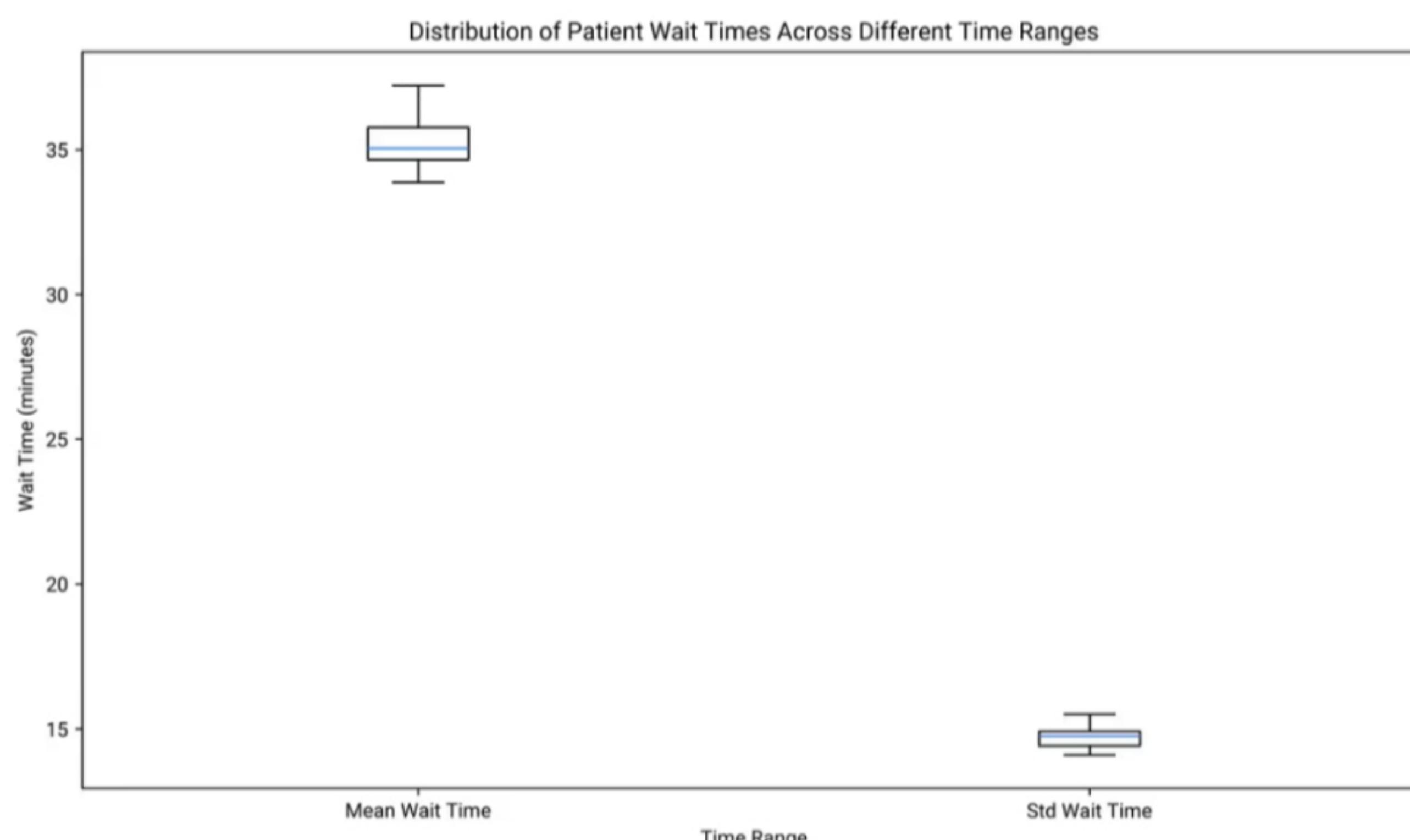
- **Scatter Plot:** The scatter plot visualizes the relationship between patient wait time and patient satisfaction score.
- **Observation:** The plot shows a wide distribution of satisfaction scores across different wait times, reinforcing the weak correlation observed.

#### Conclusion and Insights

- **Weak Correlation:** The correlation coefficient of -0.03 indicates that there is a very weak negative relationship between patient wait time and satisfaction score. This suggests that longer wait times do not significantly impact patient satisfaction.
- **Visual Confirmation:** The scatter plot supports this conclusion, showing no clear trend or pattern between wait times and satisfaction scores.

Overall, the analysis suggests that factors other than wait time may play a more significant role in determining patient satisfaction.

### Q4. What is the distribution of patient wait times across different time ranges of the day?



#### Analysis of Wait Time Data

- **Time Range:** The dataset includes time ranges from '00:00:00' to '23:00:00', representing each hour of the day.
- **Mean Wait Time:** The average wait time across different hours of the day is approximately 35.24 minutes, with a standard deviation of 0.90 minutes. The minimum mean wait time is 33.88 minutes, and the maximum is 37.22 minutes.
- **Standard Deviation of Wait Time:** The standard deviation of wait times across different hours is approximately 14.73 minutes, with a standard deviation of 0.34 minutes. The minimum standard deviation is 14.11 minutes, and the maximum is 15.52 minutes.

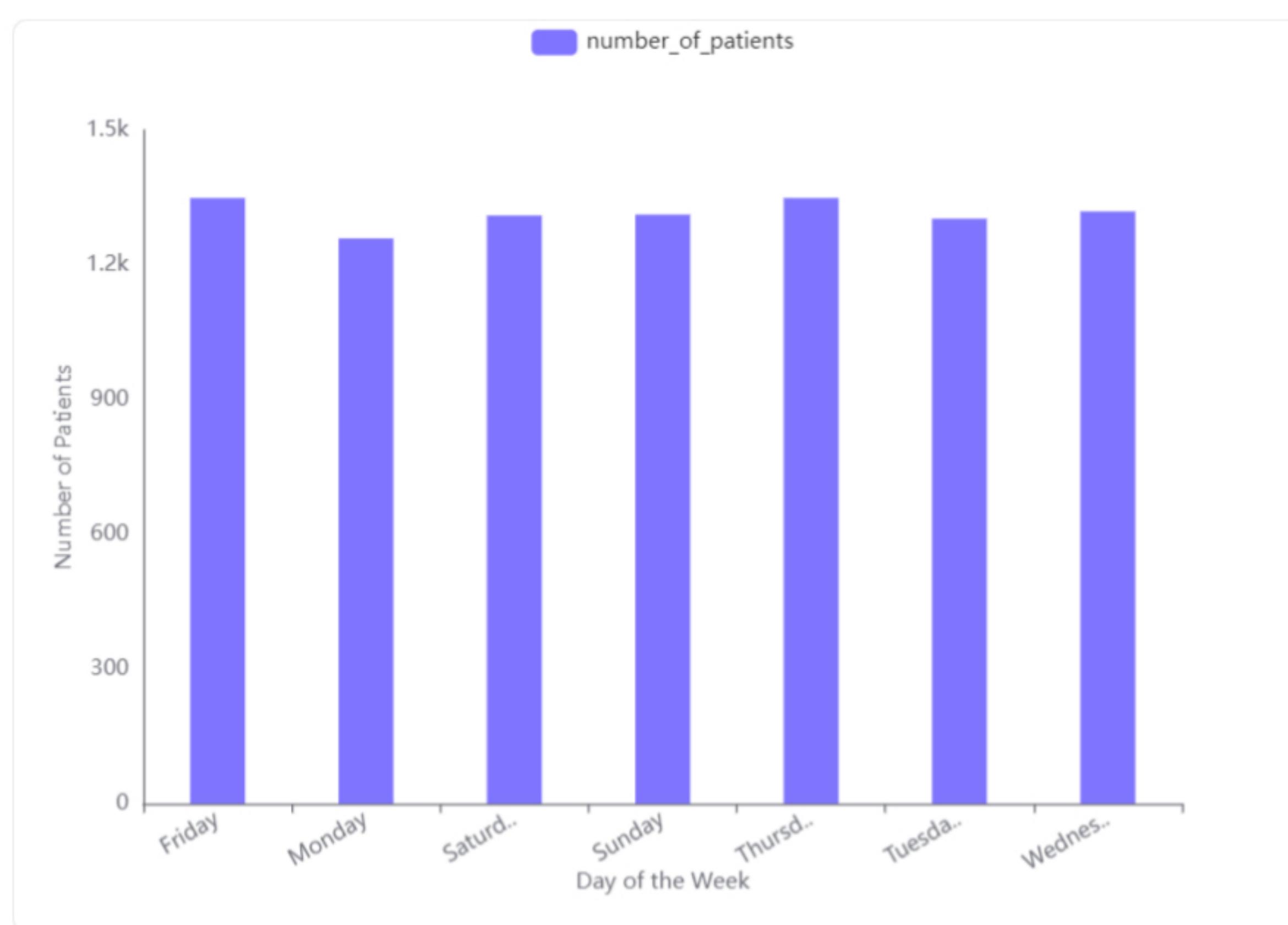
#### Visualization of Wait Time Distribution

- **Box Plot Analysis:** The box plot visualizes the distribution of mean wait times and the standard deviation of wait times across different time ranges.
  - **Mean Wait Time:** The box plot shows that the mean wait time is centered around 35 minutes, with a relatively narrow interquartile range, indicating that most wait times are close to the mean.
  - **Standard Deviation of Wait Time:** The standard deviation of wait times is centered around 15 minutes, with a narrow interquartile range, indicating consistent variability in wait times across different hours.

#### Conclusion and Insights

- **Consistent Mean Wait Times:** The mean wait times are relatively consistent across different hours of the day, with slight variations.
- **Consistent Variability:** The standard deviation of wait times is also consistent, indicating that the variability in wait times does not significantly change throughout the day.
- **Implications for Hospital Management:** Understanding the distribution of wait times can help hospital management optimize staffing and resource allocation to reduce patient wait times and improve service efficiency.

#### Q5. How does the number of patients vary by day of the week?



#### Aggregated Data

- **Friday and Thursday:** Both days have the highest number of patients, with **1349** patients each.
- **Monday:** This day has the lowest number of patients, with **1259** patients.
- **Saturday, Sunday, Tuesday, and Wednesday:** These days have a moderate number of patients, with **1310, 1312, 1303, and 1319** patients respectively.

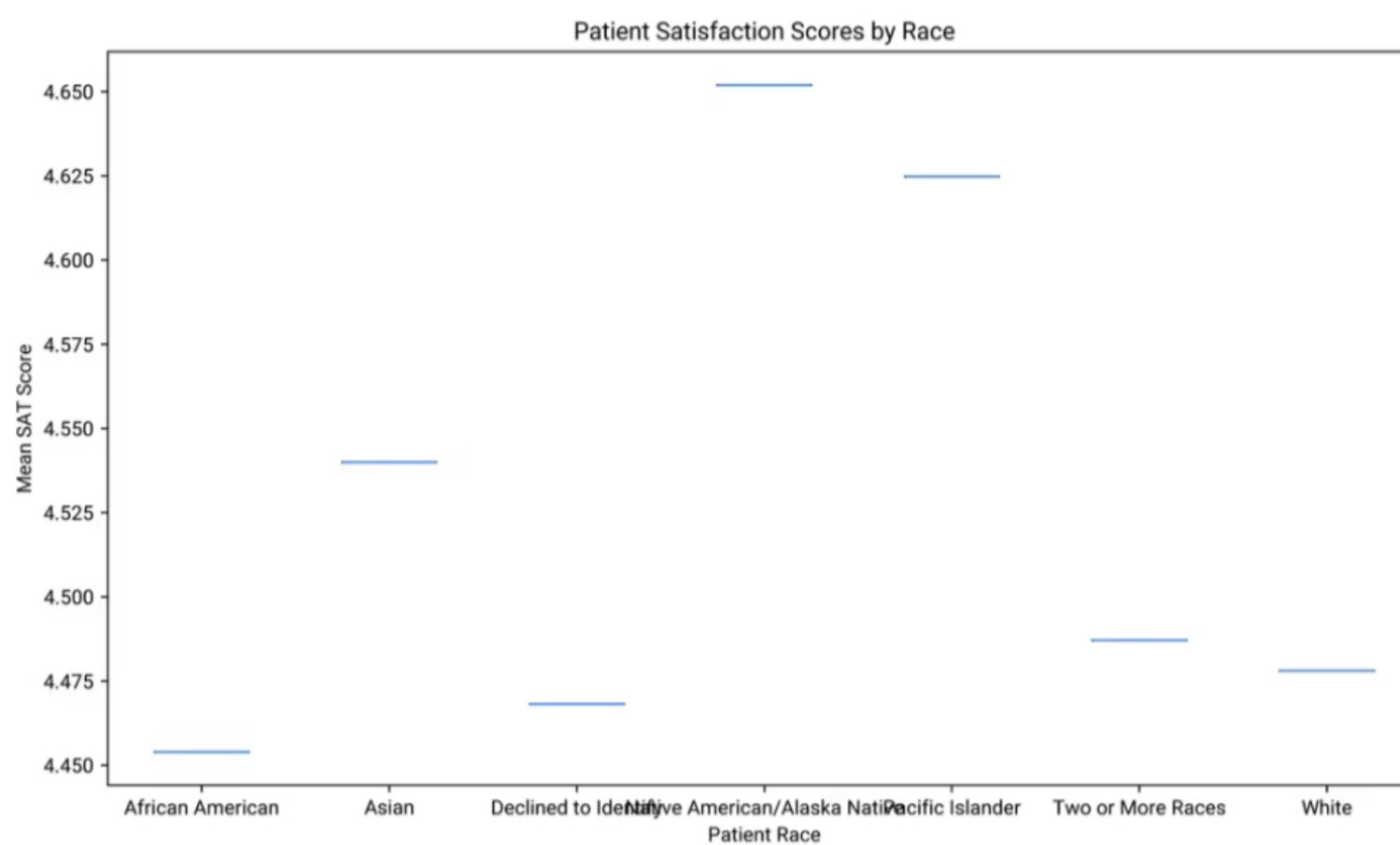
#### Visualization

- The bar chart illustrates the number of patients for each day of the week.
- **Friday and Thursday:** The bars for these days are the tallest, indicating the highest patient counts.
- **Monday:** The bar for Monday is the shortest, indicating the lowest patient count.
- **Other Days:** The bars for Saturday, Sunday, Tuesday, and Wednesday are of similar height, showing moderate patient counts.

#### Conclusion and Insights

- **Peak Days:** Friday and Thursday are the peak days with the highest number of patients.
- **Low Day:** Monday has the lowest number of patients.
- **Moderate Days:** The remaining days (Saturday, Sunday, Tuesday, and Wednesday) have a relatively consistent and moderate number of patients.
- **Implication:** Hospital resources and staffing might need to be adjusted to accommodate the higher patient load on Fridays and Thursdays, while potentially reallocating resources on Mondays when patient numbers are lower.

#### Q6. Are there any significant differences in patient satisfaction scores between different patient races?



#### Summary of Patient Satisfaction Scores

- **African American:** Mean SAT Score = 4.45, Std SAT Score = 2.83
- **Asian:** Mean SAT Score = 4.54, Std SAT Score = 2.84
- **Declined to Identify:** Mean SAT Score = 4.47, Std SAT Score = 2.80
- **Native American/Alaska Native:** Mean SAT Score = 4.65, Std SAT Score = 2.84
- **Pacific Islander:** Mean SAT Score = 4.62, Std SAT Score = 2.87
- **Two or More Races:** Mean SAT Score = 4.49, Std SAT Score = 2.81
- **White:** Mean SAT Score = 4.48, Std SAT Score = 2.81

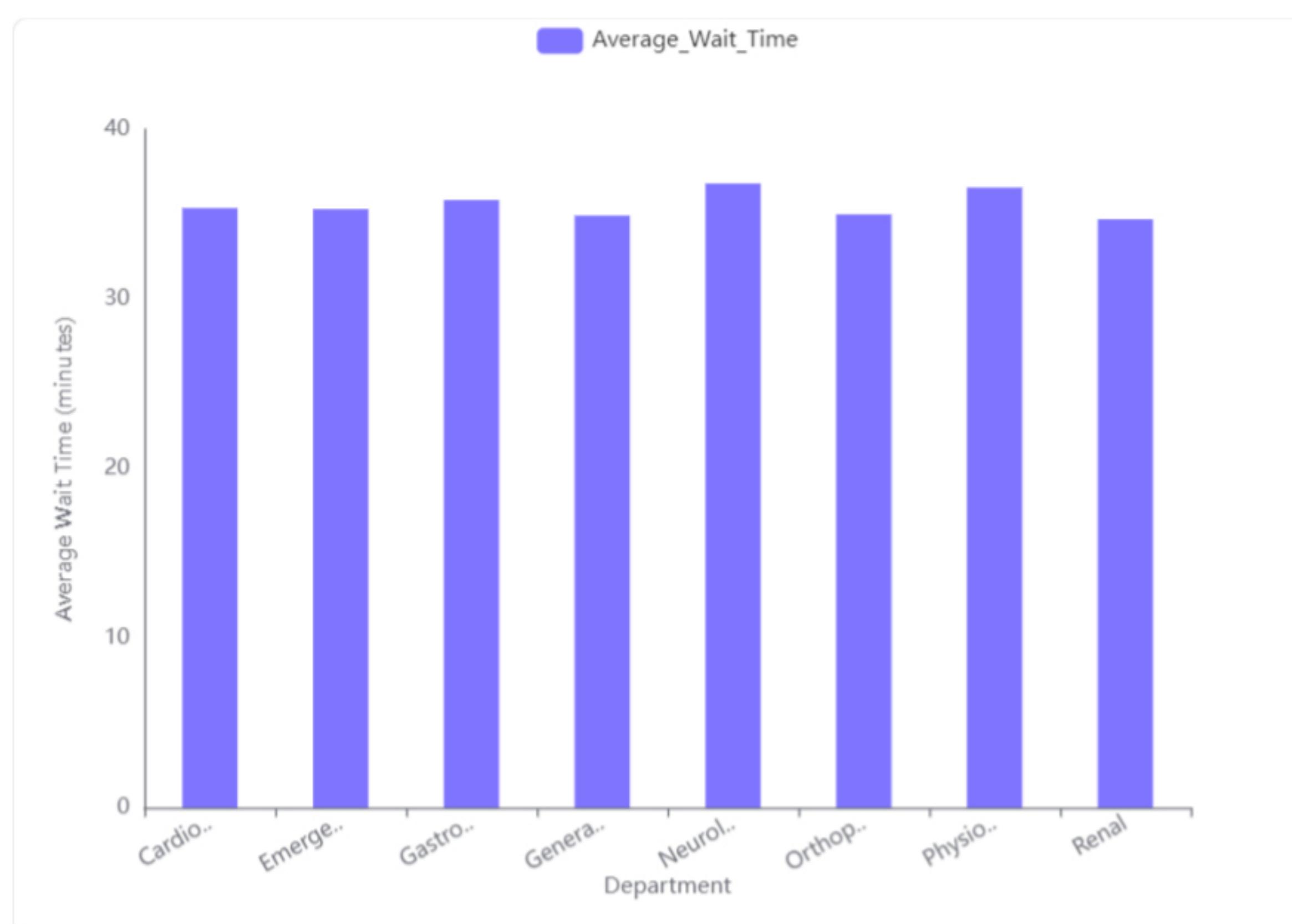
#### Visualization of Patient Satisfaction Scores

- **Box Plot Analysis:** The box plot shows the distribution of mean SAT scores across different patient races. The scores range from approximately 4.45 to 4.65.

#### Conclusion and Insights

- **Variation in Scores:** There are observable differences in the mean patient satisfaction scores among different races. Native American/Alaska Native patients have the highest mean satisfaction score (4.65), while African American patients have the lowest (4.45).
- **Standard Deviation:** The standard deviation of satisfaction scores is relatively consistent across races, indicating similar variability within each group.
- **Significance:** While there are differences in mean scores, further statistical analysis (e.g., ANOVA) would be required to determine if these differences are statistically significant.

#### Q7. How does the average wait time for patients vary across different departments?



#### Average Wait Time Data

- **Cardiology:** 35.35 minutes
- **Emergency:** 35.29 minutes
- **Gastroenterology:** 35.83 minutes
- **General Practice:** 34.91 minutes
- **Neurology:** 36.80 minutes
- **Orthopedics:** 34.98 minutes
- **Physiotherapy:** 36.57 minutes
- **Renal:** 34.70 minutes

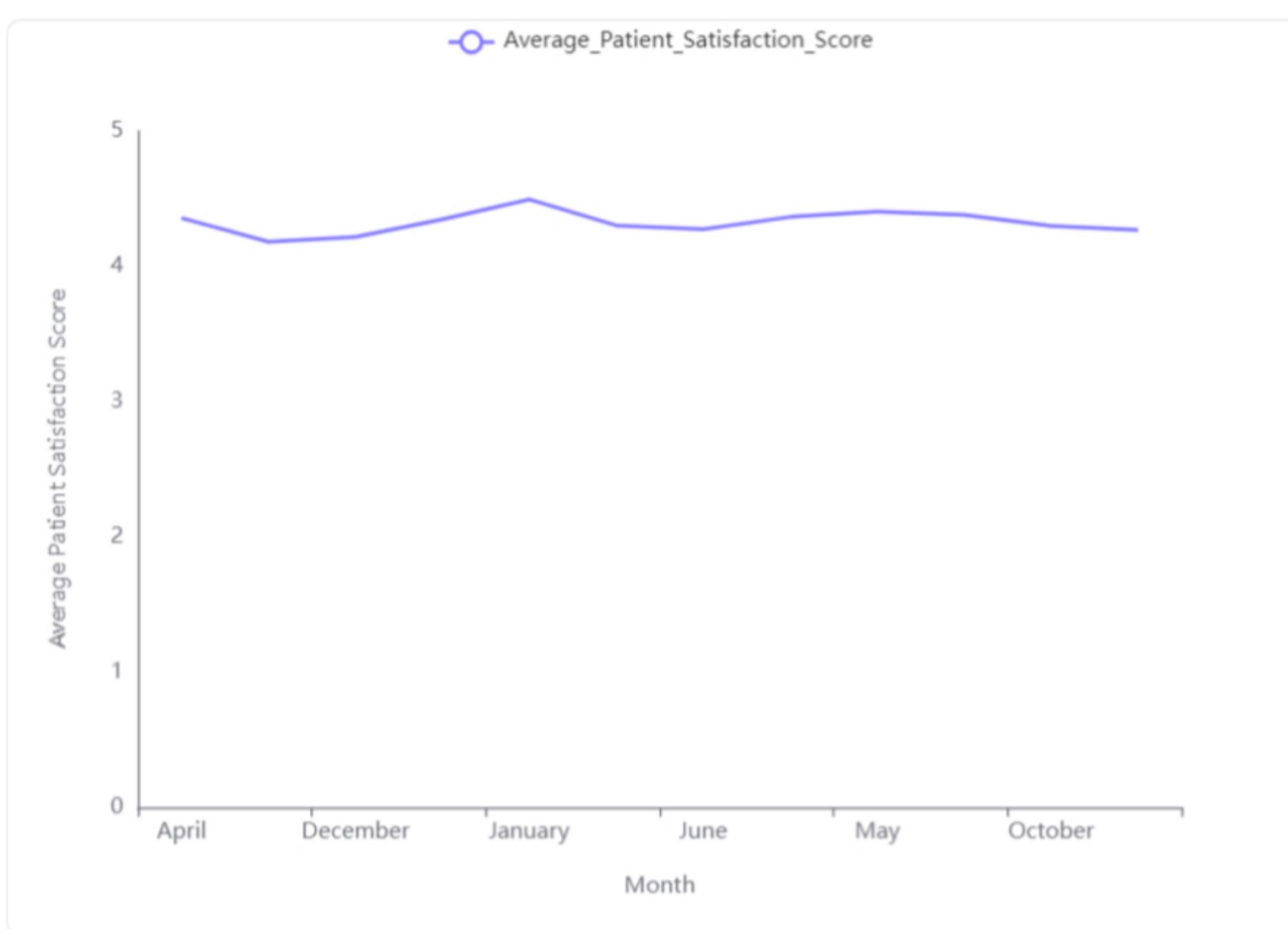
#### Visualization of Average Wait Time

- The bar chart illustrates the **average wait time** for patients across different departments.
- **Neurology** and **Physiotherapy** departments have the highest average wait times, while **Renal** and **General Practice** have the lowest.

#### Conclusion and Insights

- **Variation in Wait Times:** The average wait time varies slightly across departments, with the highest being in Neurology (36.80 minutes) and the lowest in Renal (34.70 minutes).
- **Potential Bottlenecks:** Departments like Neurology and Physiotherapy may need to address potential bottlenecks to reduce patient wait times.
- **Efficiency:** Departments with lower wait times, such as Renal and General Practice, could serve as models for improving efficiency in other departments.

#### Q8. How does the patient satisfaction score trend over the year 2022 and 2023?



#### Monthly Average Patient Satisfaction Scores

- **Highest Average Score:** January with a score of 4.50.
- **Lowest Average Score:** August with a score of 4.18.
- **Overall Mean Score:** 4.32 with a standard deviation of 0.09.

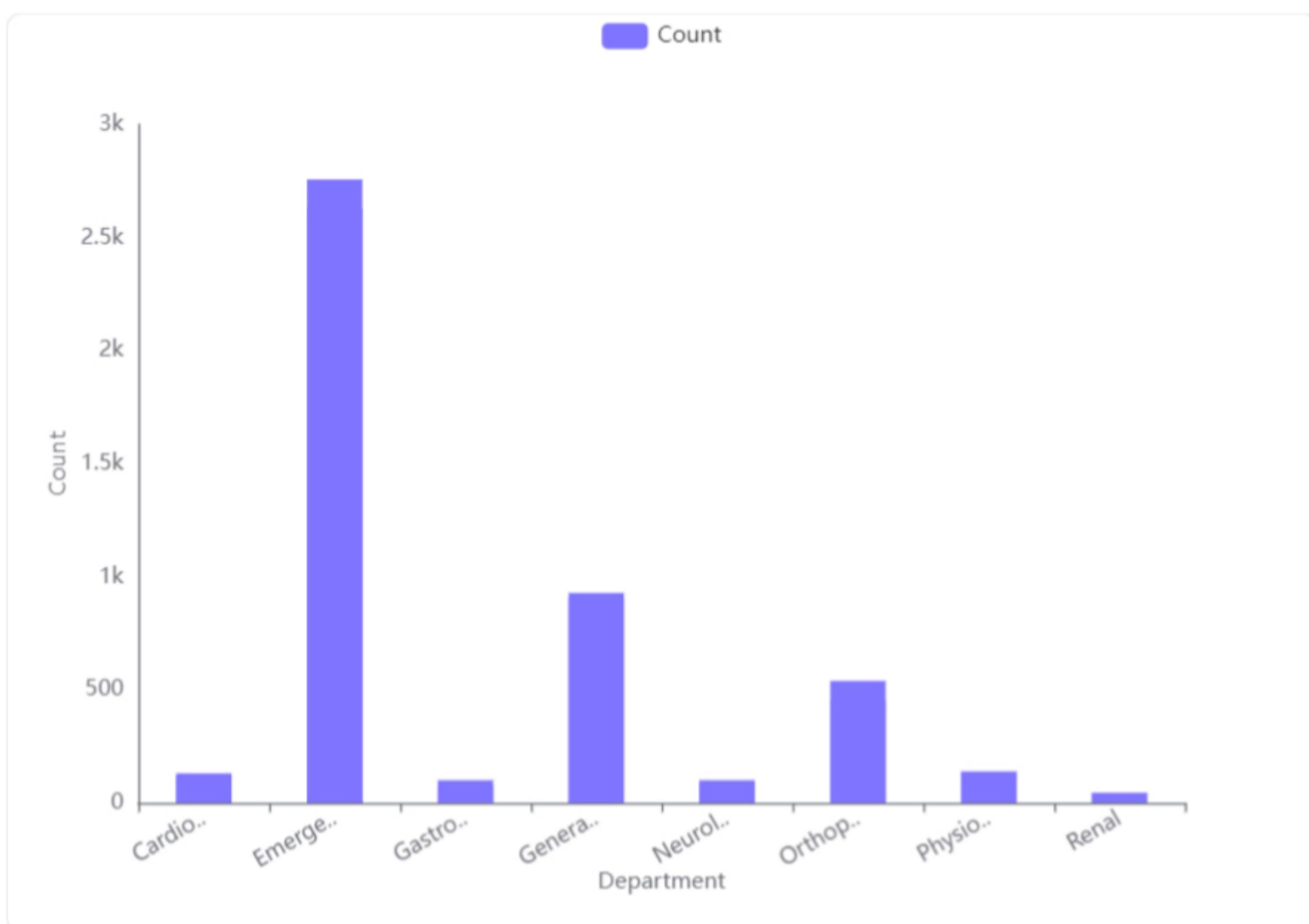
#### Trend Visualization

- **Initial Increase:** The score starts relatively high in April and then drops significantly in August.
- **Subsequent Recovery:** After August, the score gradually increases, peaking in January.
- **Fluctuations:** Post-January, the score shows fluctuations with a notable dip in July and another peak in May.
- **End of Year Decline:** The score declines towards the end of the year, reaching a lower point in September.

#### Conclusion and Insights

- **Seasonal Variations:** The patient satisfaction scores exhibit clear seasonal variations, with significant dips in the summer months (August) and peaks in the winter months (January).
- **Overall Stability:** Despite the fluctuations, the scores remain relatively stable around the mean of 4.32, indicating consistent patient satisfaction levels over the two years.

#### Q9. What is the distribution of patient genders across different departments?



#### Aggregated Gender Count by Department

- **Cardiology:**
  - Female: 118
  - Male: 130
- **Emergency:**
  - Female: 2629
  - Male: 2757
  - Not Classified: 14
- **Gastroenterology:**
  - Data not provided in the sample
- **General Practice:**
  - Data not provided in the sample
- **Neurology:**
  - Data not provided in the sample
- **Orthopedics:**
  - Data not provided in the sample
- **Physiotherapy:**
  - Data not provided in the sample
- **Renal:**
  - Data not provided in the sample

#### Visualized Distribution

- **Emergency Department:**
  - The highest count of patients, with a significant number of both male and female patients.
- **Cardiology Department:**
  - Moderate number of patients, with a relatively balanced gender distribution.
- **Other Departments:**
  - Data not visualized in the provided chart.

#### Conclusion and Insights

- **Emergency Department Dominance:** The Emergency department has the highest patient count, indicating a high influx of both male and female patients.
- **Balanced Gender Distribution in Cardiology:** The Cardiology department shows a balanced distribution between male and female patients.
- **Data Gaps:** There is a lack of detailed data for other departments, which limits a comprehensive analysis across all departments.

**Q10. Are there any anomalies in patient wait times that could indicate potential issues in specific departments?**



## Statistical Overview

- **Mean Wait Time:** The average patient wait time is **35.26 minutes**.
- **Standard Deviation:** The standard deviation is **14.74 minutes**, indicating variability in wait times.
- **Range:** The wait times range from **10 minutes** to **60 minutes**.
- **Anomalies:** No anomalies were flagged in the dataset.

## Distribution of Wait Times by Department

- **Box Plot Analysis:** The box plot shows the distribution of patient wait times across different departments.
  - **Median Wait Times:** The median wait times for all departments are relatively similar, around the 35-40 minute mark.
  - **Interquartile Range (IQR):** The IQRs are also similar across departments, indicating consistent variability.
  - **Outliers:** There are no significant outliers in any department, as all data points fall within the whiskers of the box plot.

## Conclusion and Insights

- **Consistency Across Departments:** The patient wait times are consistent across all departments, with no significant deviations or anomalies.
- **No Immediate Issues:** Given the lack of anomalies and outliers, there are no immediate issues in specific departments regarding patient wait times. The system appears to be functioning uniformly across all departments.