HOSPITAL ANALYSIS

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OBJECTIVES

To analyze hospital patient data to uncover insights into patient demographics, operational efficiency, and satisfaction trends. By investigating admission patterns, wait times, and satisfaction scores across departments and patient groups, this project aims to identify actionable opportunities to enhance patient experience and optimize hospital resource allocation.

1. **Analyze Patient Demographics**: Understand the distribution of patient demographics (age, gender, race) to identify patterns in hospital admissions.
2. **Evaluate Operational Efficiency**: Assess patient wait times and their impact on satisfaction scores to identify areas for operational improvement.
3. **Investigate Department Referral Patterns**: Examine referral trends across departments to optimize resource allocation.
4. **Measure Patient Satisfaction**: Analyze patient satisfaction scores in relation to admission status, wait times, and demographics to improve patient experience.
5. **Identify Admission Trends**: Explore patterns in patient admissions over time to support hospital capacity planning.

SCHEMA

Table Name: Hospital	
Database Name: Hospital	
Field	**Type**
Id	text
Admission_Date	datetime
First_Inital	text
Last_Name	text
Gender	text
Age	int
Race	text
Department_Referral	text
Admission_Flag	text
Satisfaction_Score	text
Wait_time	int

1) WHAT IS THE AVERAGE PATIENT AGE BY GENDER AND RACE?

```
SELECT Gender, Race, ROUND(AVG(Age),2) AS Avg_Age FROM hospital
GROUP BY Gender, Race
ORDER BY Avg_Age DESC;
```

GENDER	RACE	AVG_AGE
Female	Two or More Races	41.77
Female	Asian	40.62
Male	Pacific Islander	40.51
Male	White	40.19
Female	White	40.17
Male	Declined to Identify	39.82
Male	African American	39.79
Male	Native American/Alaska Native	39.39
Male	Two or More Races	39.27
Female	African American	39.21
Female	Pacific Islander	39.09
Male	Asian	39.08
Female	Native American/Alaska Native	38.54
Female	Declined to Identify	38.53

2) HOW MANY PATIENTS WERE ADMITTED VERSUS NOT ADMITTED BASED ON THE PATIENT ADMISSION FLAG ?

```
SELECT Admission_Flag, COUNT(Id) AS Total FROM Hospital
GROUP BY Admission_Flag
ORDER BY Total DESC;
```

ADMISSION_FLAG	TOTAL
TRUE	4612
FALSE	4604

3) WHAT IS THE DISTRIBUTION OF PATIENT ADMISSIONS BY DEPARTMENT REFERRAL?

```
SELECT Department_Referral, COUNT(Id) AS Total FROM Hospital
GROUP BY Department_Referral
ORDER BY Total DESC;
```

Department_Referral	Total
None	5400
General Practice	1840
Orthopedics	995
Physiotherapy	276
Cardiology	248
Neurology	193
Gastroenterology	178
Renal	86

4) WHAT IS THE AVERAGE PATIENT SATISFACTION SCORE FOR EACH DEPARTMENT REFERRAL?

```
SELECT Department_Referral, ROUND(AVG(Satisfaction_Score),2) AS Average_Score FROM Hospital
GROUP BY Department_Referral
ORDER BY Average_Score DESC;
```

Department_Referral	Average_Score
Gastroenterology	1.76
Physiotherapy	1.50
Cardiology	1.47
Neurology	1.45
Orthopedics	1.42
General Practice	1.38
None	1.32
Renal	1.22

5) HOW DOES PATIENT WAITTIME VARY BY PATIENT ADMISSION FLAG?

```
SELECT Admission_Flag, ROUND(AVG(Wait_time),2) AS Avg_Wait_Time FROM hospital
GROUP BY Admission_Flag;
```

Admission_Flag	Avg_Wait_Time
FALSE	35.55
TRUE	34.97

6) WHAT IS THE TREND OF PATIENT ADMISSIONS OVER TIME BASED ON PATIENT ADMISSION DATE?

```
SELECT DATE_FORMAT(ADMISSION_DATE, '%Y - %M') AS Admission_Month, COUNT(ID) AS Total
FROM HOSPITAL

GROUP BY Admission_Month

ORDER BY Total DESC;
```

Admission_Month	Total
2024 - August	530
2024 - May	519
2024 - January	513
2023 - June	506
2024 - March	506
2023 - August	494
2023 - October	493
2023 - December	489
2024 - July	488
2024 - June	485
2023 - May	480
2023 - April	479
2024 - October	471
2023 - September	469
2024 - April	469
2024 - September	466
2023 - July	464
2023 - November	464
2024 - February	431

7) WHICH PATIENT RACE HAS THE HIGHEST AVERAGE PATIENT SATISFACTION SCORE?

```
SELECT RACE, ROUND(AVG(SATISFACTION_SCORE),2) AS Average_Score FROM HOSPITAL
GROUP BY RACE
ORDER BY AVERAGE_SCORE DESC
LIMIT 1;
```

RACE	Average_Score
Pacific Islander	1.43

8) HOW DOES PATIENT SATISFACTION SCORE CORRELATE WITH PATIENT WAITTIME?

```
SELECT
    CASE
        WHEN Wait_Time <= 10 THEN '0-10'
        WHEN Wait_Time <= 20 THEN '11-20'
        ELSE '21+'
    END AS Wait_Time_Range,
    ROUND(AVG(Satisfaction_Score), 2) AS Avg_Satisfaction
FROM hospital
WHERE Satisfaction_Score IS NOT NULL AND Wait_Time IS NOT
NULL
GROUP BY Wait_Time_Range
ORDER BY Avg_Satisfaction DESC;
```

Wait_Time_Range	Avg_Satisfaction
0-10	1.58
11-20	1.44
21+	1.34

9) WHAT IS THE COUNT OF PATIENTS BY PATIENT GENDER AND DEPARTMENT REFERRAL?

```
SELECT DEPARTMENT_REFERRAL, GENDER, COUNT(ID) AS Total FROM HOSPITAL
GROUP BY GENDER, DEPARTMENT_REFERRAL
ORDER BY Total DESC;
```

DEPARTMENT_REFERRAL	GENDER	Total
None	Male	2771
None	Female	2629
General Practice	Male	934
General Practice	Female	906
Orthopedics	Male	542
Orthopedics	Female	453
Physiotherapy	Female	139
Physiotherapy	Male	137
Cardiology	Male	130
Cardiology	Female	118
Gastroenterology	Female	100
Neurology	Female	100
Neurology	Male	93
Gastroenterology	Male	78
Renal	Male	44
Renal	Female	42

10) WHICH AGE GROUP (E.G., 0-18, 19-35, 36-50, 51+) HAS THE LONGEST AVERAGE PATIENT WAITTIME?

```
SELECT
    CASE
        WHEN AGE <= 20 THEN '0-20'
        WHEN AGE <= 30 THEN '21-30'
        WHEN AGE <= 40 THEN '31-40'
        WHEN AGE <= 50 THEN '41-50'
        WHEN AGE <= 60 THEN '51-60'
        WHEN AGE <= 70 THEN '61-70'
        ELSE '71+'
    END AS Age_Group,
    ROUND(AVG(Wait_time),2) As Total
FROM HOSPITAL
GROUP BY Age_group
ORDER BY Total DESC;
```

Age_Group	Total
31-40	35.61
71+	35.60
21-30	35.59
0-20	35.29
41-50	35.16
51-60	34.90
61-70	34.64

11) HOW MANY PATIENTS WERE ADMITTED ON WEEKENDS VERSUS WEEKDAYS BASED ON PATIENT ADMISSION DATE?

```
SELECT
    CASE
        WHEN date_format(ADMISSION_DATE, '%W') IN ('Saturday', 'Sunday') THEN 'Weekend'
            ELSE 'Weekdays'
    END AS Days,
    COUNT(ADMISSION_DATE) AS Total
FROM HOSPITAL
WHERE Admission_Flag = ‘True’
GROUP BY Days
ORDER BY Total DESC;
```

Days	Total
Weekday	3269
Weekend	1343

12) WHAT IS THE AVERAGE PATIENT SATISFACTION SCORE FOR PATIENTS ADMITTED VERSUS NOT ADMITTED?

```
SELECT ADMISSION_FLAG, ROUND(Avg(Satisfaction_Score),2) AS Avg_Satisfaction FROM HOSPITAL
GROUP BY ADMISSION_FLAG
ORDER BY Avg_Satisfaction DESC;
```

ADMISSION_FLAG	Avg_Satisfaction
FALSE	1.37
TRUE	1.36

13) WHICH DEPARTMENT REFERRAL HAS THE HIGHEST NUMBER OF NON-ADMITTED PATIENTS?

```
SELECT Department_Referral, COUNT(Department_Referral) As Total from Hospital
WHERE Admission_Flag = 'False'
GROUP BY Department_Referral
ORDER BY Total DESC
LIMIT 1;
```

Department_Referral	Total
None	2664

14) HOW DOES PATIENT SATISFACTION SCORE VARY BY PATIENT AGE AND PATIENT GENDER?

```
SELECT
    CASE
        WHEN AGE <= 20 THEN '0-20'
        WHEN AGE <= 30 THEN '21-30'
        WHEN AGE <= 40 THEN '31-40'
        WHEN AGE <= 50 THEN '41-50'
        WHEN AGE <= 60 THEN '51-60'
        WHEN AGE <= 70 THEN '61-70'
        ELSE '71+'
    END AS Age_Group,Gender,ROUND(AVG(SATISFACTION_SCORE),2) AS Avg_Satisfaction FROM HOSPITAL
GROUP BY Age_Group,Gender
ORDER BY Avg_Satisfaction DESC;
```

Age_Group	Gender	Avg_Satisfaction
31-40	Female	1.51
41-50	Male	1.50
21-30	Female	1.48
51-60	Male	1.45
61-70	Male	1.40
0-20	Male	1.38
21-30	Male	1.38
71+	Male	1.37
41-50	Female	1.33
61-70	Female	1.31
31-40	Male	1.30
0-20	Female	1.29
51-60	Female	1.24
71+	Female	1.20

15) WHAT IS THE MONTHLY AVERAGE PATIENT WAITTIME FOR EACH DEPARTMENT REFERRAL?

```
SELECT Department_Referral, DATE_FORMAT(Admission_Date, '%Y - %m') AS
Admission_Month,ROUND(AVG(Wait_Time),2) AS Avg_Wait_Time FROM HOSPITAL

GROUP BY DEPARTMENT_REFERRAL, Admission_Month

ORDER BY avg_wait_time DESC;
```

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Department_Referral	Admission_Month	Avg_Wait_Time
Renal	2024 - 06	52.00
Renal	2023 - 04	50.00
Physiotherapy	2023 - 12	46.50
Cardiology	2023 - 07	46.33
Neurology	2024 - 09	44.90
Renal	2023 - 11	44.50
Physiotherapy	2024 - 02	44.14
Renal	2023 - 06	43.50
Neurology	2023 - 06	42.87
Gastroenterology	2023 - 08	42.63
Neurology	2023 - 07	42.22
Gastroenterology	2023 - 12	41.88
Cardiology	2023 - 11	41.85
Cardiology	2024 - 05	41.45
Physiotherapy	2023 - 04	41.27
Gastroenterology	2024 - 02	41.00
Neurology	2024 - 02	41.00
Renal	2024 - 03	40.67
Cardiology	2024 - 06	40.62
Gastroenterology	2024 - 04	40.00
Physiotherapy	2023 - 06	39.33
Gastroenterology	2023 - 05	39.33
Physiotherapy	2024 - 09	39.33
Neurology	2024 - 03	39.20
Orthopedics	2024 - 01	39.15
Cardiology	2024 - 02	39.00
Neurology	2023 - 05	38.91
Renal	2024 - 01	38.80
Renal	2024 - 07	38.75

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Department_Referral	Admission_Month	Avg_Wait_Time
Cardiology	2024 - 08	38.67
Gastroenterology	2023 - 10	38.67
Cardiology	2024 - 07	38.55
Gastroenterology	2023 - 06	38.45
General Practice	2023 - 08	38.12
Physiotherapy	2024 - 01	38.07
Neurology	2024 - 10	38.00
Physiotherapy	2023 - 09	37.88
Orthopedics	2024 - 06	37.72
Neurology	2024 - 01	37.67
Neurology	2023 - 12	37.64
Physiotherapy	2024 - 05	37.60
Physiotherapy	2024 - 04	37.47
General Practice	2024 - 02	36.97
None	2024 - 01	36.85
Physiotherapy	2024 - 08	36.78
Orthopedics	2024 - 04	36.64
Neurology	2023 - 08	36.63
Orthopedics	2023 - 07	36.54
Orthopedics	2024 - 05	36.37
General Practice	2023 - 11	36.30
None	2023 - 08	36.29
Orthopedics	2024 - 03	36.29
Cardiology	2023 - 08	36.29
None	2024 - 02	36.28
Orthopedics	2023 - 11	36.28
Cardiology	2024 - 03	36.27
General Practice	2023 - 04	36.25
Cardiology	2023 - 06	36.25

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Department_Referral	Admission_Month	Avg_Wait_Time
Orthopedics	2024 - 08	36.13
Renal	2023 - 12	36.13
None	2023 - 10	36.11
None	2024 - 07	36.10
General Practice	2024 - 08	36.05
Gastroenterology	2024 - 01	36.00
Renal	2023 - 07	36.00
None	2024 - 05	35.94
None	2024 - 09	35.90
Gastroenterology	2024 - 05	35.88
Physiotherapy	2024 - 06	35.82
General Practice	2024 - 03	35.81
None	2024 - 03	35.78
Gastroenterology	2024 - 06	35.75
Neurology	2023 - 04	35.73
Gastroenterology	2023 - 11	35.57
Physiotherapy	2023 - 05	35.55
None	2023 - 06	35.51
Gastroenterology	2024 - 03	35.50
Orthopedics	2024 - 07	35.45
Orthopedics	2024 - 02	35.43
General Practice	2023 - 05	35.28
General Practice	2024 - 06	35.19
Neurology	2024 - 06	35.17
Neurology	2024 - 05	35.13
None	2024 - 04	35.09
Physiotherapy	2023 - 07	35.00
None	2024 - 10	34.96
Neurology	2024 - 08	34.93
General Practice	2023 - 09	34.92
None	2024 - 06	34.86
Gastroenterology	2024 - 08	34.80
Orthopedics	2023 - 08	34.76
None	2023 - 12	34.73
Neurology	2024 - 07	34.71
None	2023 - 04	34.67

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Department_Referral	Admission_Month	Avg_Wait_Time
General Practice	2023 - 07	34.61
Cardiology	2023 - 05	34.58
None	2024 - 08	34.51
Physiotherapy	2023 - 10	34.47
General Practice	2024 - 05	34.44
None	2023 - 09	34.41
Physiotherapy	2024 - 03	34.36
Gastroenterology	2023 - 09	34.27
None	2023 - 11	34.25
Orthopedics	2023 - 09	34.21
None	2023 - 05	34.20
General Practice	2023 - 06	34.19
General Practice	2023 - 10	34.05
General Practice	2024 - 04	34.03
Orthopedics	2023 - 06	34.00
Renal	2023 - 09	34.00
General Practice	2024 - 09	33.92
General Practice	2023 - 12	33.85
None	2023 - 07	33.79
Physiotherapy	2023 - 11	33.68
Cardiology	2024 - 09	33.67
Renal	2024 - 04	33.67
General Practice	2024 - 10	33.39

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Department_Referral	Admission_Month	Avg_Wait_Time
Neurology	2023 - 10	33.27
General Practice	2024 - 01	33.22
Renal	2023 - 08	33.17
Cardiology	2024 - 04	33.15
Orthopedics	2024 - 10	33.04
Renal	2024 - 05	33.00
General Practice	2024 - 07	32.86
Cardiology	2023 - 12	32.72
Orthopedics	2023 - 12	32.66
Gastroenterology	2023 - 04	32.58
Orthopedics	2023 - 10	32.33
Orthopedics	2023 - 04	32.20
Gastroenterology	2024 - 07	32.09
Neurology	2023 - 11	31.50
Neurology	2024 - 04	31.40
Cardiology	2024 - 01	31.36
Orthopedics	2024 - 09	31.30
Gastroenterology	2024 - 10	31.00
Orthopedics	2023 - 05	30.91
Renal	2023 - 05	30.83
Gastroenterology	2024 - 09	30.64
Physiotherapy	2024 - 10	30.41
Cardiology	2023 - 04	30.17
Renal	2024 - 09	30.17
Cardiology	2023 - 10	30.00
Renal	2023 - 10	29.67
Gastroenterology	2023 - 07	29.63
Renal	2024 - 08	29.57
Physiotherapy	2023 - 08	29.36

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Department_Referral	Admission_Month	Avg_Wait_Time
Physiotherapy	2024 - 07	29.08
Renal	2024 - 10	28.00
Renal	2024 - 02	27.50
Cardiology	2023 - 09	27.38
Cardiology	2024 - 10	27.38
Neurology	2023 - 09	23.86

RECOMMENDATION

Based on the insights, the following strategies are recommended:

1) Enhance Triage for Non-Specialized Referrals:

•Improve triage training to ensure accurate department referrals, reducing the "None" category. Introduce decision-support tools to guide staff in directing patients to departments like General Practice or Orthopedics, especially for non-admitted patients.

2) Reduce Wait Times for Non-Admitted Patients and Key Age Groups:

•Implement fast-track processing for non-admitted patients, such as dedicated check-out kiosks. Optimize scheduling for the 31-40 age group by increasing appointment availability or streamlining administrative tasks during peak hours.

3) Improve Satisfaction in Low-Performing Departments:

•Conduct patient feedback surveys in the Renal department to pinpoint issues (e.g., staff communication, facility quality). Increase staffing or equipment during high-wait months (e.g., June) and adopt best practices from Gastroenterology, which scores highest (1.76).

4) Balance Resource Utilization Across Time Periods:

Boost staffing and bed capacity in August and other high-admission months, using predictive analytics to anticipate demand. Expand weekend clinic hours or staffing to distribute admissions more evenly and improve patient access.

5) Tailor Services for Demographic-Specific Needs:

Investigate factors driving Pacific Islander satisfaction (e.g., cultural sensitivity) and apply them to other groups. Develop targeted interventions for low-scoring groups, such as improved communication for Females aged 71+ and Males aged 31-40. Address low Renal referral counts (44 Males, 42 Females) with outreach to ensure equitable access.

6) Minimize Wait Times to Boost Satisfaction:

Implement real-time wait time tracking and patient notifications to manage expectations. Prioritize process improvements in departments with high wait times, such as Cardiology (46.33 minutes in July 2023) and Neurology (44.90 minutes in September 2024), by optimizing scheduling or adding resources during peak months.