Healthcare Analysis

Focused on Pediatrics


INTRODUCTION

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This healthcare analysis project focuses on leveraging data-driven insights to enhance the efficiency, quality, and patient experience within the hospital setting. As an aspiring data analyst, I'm drawn to healthcare data for its complexity and the potential to make a real difference in people's lives. The healthcare industry offers a compelling arena where data analysis drives better patient care. I could see myself as a future healthcare data analyst, making a meaningful impact on patient outcomes.

Instances: 101766

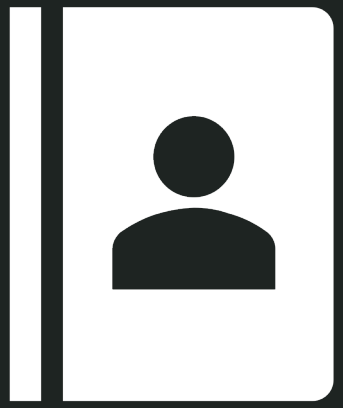
Attributes: 47

This Original Dataset is from Diabetes 130-US Hospitals for years 1999-2008:
https://archive.ics.uci.edu/dataset/296/diabetes+130-us+hospitals+for+years+1999-2008

INTRODUCTION

This analysis comprises two main parts: a broad examination of all patients in the dataset and a detailed focus on pediatric patients. The first part explores various patient demographics and medical specialties, while the second part delves into pediatric patient characteristics, length of stay, readmission rates, and associated specialties.

This analysis is done using MySQL.



PATIENT INFORMATION

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What is the distribution of all patients by race, gender, and age?

What is the average time spent in the hospital by race, gender, and age?

Which medical specialties have the most patients?

What is the distribution of all patients by race, gender, and age?

```sql
SELECT
    race,
    COUNT(*) AS patient_count
FROM
    demographics
GROUP BY
    race
ORDER BY patient_count DESC;
```

race	patient_count
Caucasian	53520
AfricanAmerican	12898
?	1913
Hispanic	1512
Other	1171
Asian	504

```sql
SELECT
    gender,
    COUNT(*) AS patient_count
FROM
    demographics
GROUP BY
    gender
ORDER BY patient_count DESC;
```

gender	patient_count
Female	38025
Male	33490
Unknown/In…	3

```sql
SELECT
    age,
    COUNT(*) AS patient_count
FROM
    demographics
GROUP BY
    age
ORDER BY patient_count DESC;
```

age	patient_count
[70-80)	18182
[60-70)	15952
[50-60)	12418
[80-90)	11705
[40-50)	6811
[30-40)	2678
[90-100)	1970
[20-30)	1119
[10-20)	530
[0-10)	153

What is the average time spent in the hospital by race, gender, and age?

```sql
SELECT
    d.age,
    ROUND(AVG(time_in_hospital),2) AS avg_time_in_hospital
FROM
    demographics d
JOIN
    health h
ON
    d.patient_nbr = h.patient_nbr
GROUP BY
    d.age
ORDER BY
    d.age;
```

Gender

gender	Avg_length_of_stay
Female	4.48
Male	4.3
Unknown/In…	3.33

Age

age	avg_time_in_hospital
[0-10)	2.54
[10-20)	3.19
[20-30)	3.58
[30-40)	3.78
[40-50)	4.05
[50-60)	4.13
[60-70)	4.38
[70-80)	4.59
[80-90)	4.81
[90-100)	4.78

Race

race	avg_time_in_hospital
?	4.27
AfricanAmerican	4.51
Asian	3.95
Caucasian	4.39
Hispanic	4.08
Other	4.27

Which medical specialties have the most patients?

```sql
SELECT
    medical_specialty,
    COUNT(*) AS count
FROM
    health
WHERE
    medical_specialty <> '?'
GROUP BY
    medical_specialty
ORDER BY
    count DESC;
```

medical_specialty	count
InternalMedicine	14635
Emergency/Trauma	7565
Family/GeneralPractice	7440
Cardiology	5352
Surgery-General	3099
Nephrology	1613
Orthopedics	1400
Orthopedics-Reconstructive	1233
Radiologist	1140
Pulmonology	871
Psychiatry	854
Urology	685
ObstetricsandGynecology	671
Surgery-Cardiovascular/Thoracic	652
Gastroenterology	564

Summary

Patient demographic is diverse. The majority consists of Caucasians or African Americans ages 50+.

Patients stay longer in the hospital as they get older. Gender and race had little difference in length of stay.

Internal Medicine saw the most patients. Emergency and General Practice were next with roughly 50% less patients.


PEDIATRICS

PEDIATRICS

What is the distribution of pediatric patients by race and gender?

How many patients were admitted under pediatric medical specialties?

What is the distribution of race on pediatric specialties?

What is the average length of stay for pediatric patients?

Is their length of stay longer or short than the average patients stay under all specialties?

What percent of pediatric patients stay longer than the average amount of time for all patients?

How many pediatric patients are readmitted following discharge?

What is the distribution pf admission types when readmitted?

What is the gender distribution of pediatric patients?

```sql
USE patient;
SELECT
    d.gender,
    COUNT(*) AS patient_count
FROM demographics AS d
JOIN health AS h
ON d.patient_nbr = h.patient_nbr
WHERE h.medical_specialty LIKE '%Pediatric%'
GROUP BY d.gender
ORDER BY d.gender;
```

gender	patient_count
Female	311
Male	269

What is the distribution of pediatric patients by race?

```sql
USE patient;
SELECT
    d.race,
    COUNT(*) AS patient_count
FROM demographics AS d
JOIN health AS h
ON d.patient_nbr = h.patient_nbr
WHERE h.medical_specialty LIKE '%Pediatric%'
GROUP BY d.race
ORDER BY d.race;
```

race	patient_count
Caucasian	406
AfricanAmerican	143
Hispanic	10
Other	9
?	6
Asian	6

How many patients were admitted under pediatric medical specialties?

```sql
USE patient;
SELECT COUNT(*) AS pediatric_patients
FROM
    health
WHERE
    medical_specialty LIKE '%pediatric%';
```

pediatric_patients
580

What is the distribution of race on pediatric specialties?

```sql
SELECT
    h.medical_specialty,
    COUNT(CASE WHEN d.race = 'Caucasian' THEN 1 ELSE NULL END) AS Caucasian,
    COUNT(CASE WHEN d.race = 'AfricanAmerican' THEN 1 ELSE NULL END) AS African_American,
    COUNT(CASE WHEN d.race = 'Asian' THEN 1 ELSE NULL END) AS Asian,
    COUNT(CASE WHEN d.race = 'Hispanic' THEN 1 ELSE NULL END) AS Hispanic,
    COUNT(CASE WHEN d.race = 'Other' THEN 1 ELSE NULL END) AS Other,
    COUNT(CASE WHEN d.race = '?' THEN 1 ELSE NULL END) AS '?'
FROM
    demographics d
LEFT JOIN
    health h
ON
    d.patient_nbr = h.patient_nbr
WHERE
    h.medical_specialty LIKE '%pediatric%'
GROUP BY
    h.medical_specialty;
```

medical_specialty	Caucasian	African_Americ...	Asian	Hispanic	Other	?
Pediatrics-Endocrinology	108	43	1	4	3	0
Pediatrics	186	53	3	3	4	5
Pediatrics-CriticalCare	53	27	2	2	2	1
Anesthesiology-Pediatric	8	10	0	1	0	0
Cardiology-Pediatric	4	3	0	0	0	0
Pediatrics-Pulmonology	24	1	0	0	0	0
Surgery-Pediatric	6	2	0	0	0	0
Pediatrics-EmergencyMedicine	2	1	0	0	0	0
Pediatrics-Hematology-Oncology	3	1	0	0	0	0
Pediatrics-Neurology	9	1	0	0	0	0
Pediatrics-AllergyandImmunology	3	0	0	0	0	0
Pediatrics-InfectiousDiseases	0	1	0	0	0	0

What is the average length of stay for pediatric patients?

```sql
SELECT
    ROUND(AVG(time_in_hospital),2) AS Average_length_of_stay_Peds
FROM health
WHERE medical_specialty LIKE '%pediatrics%';
```

Average_length_of_stay_Peds
3.44

Is their length of stay longer or short than the average patients stay under all specialties?

```sql
SELECT
    ROUND(AVG(time_in_hospital),2) AS Average_length_of_stay
FROM health;
```

Average_length_of_stay
4.4

Pediatric patient stay is shorter than the average patient

What percent of pediatric patients stay longer than the average amount of time for all patients?

```sql
SELECT
    (COUNT(CASE WHEN health.medical_specialty LIKE '%pediatric%' AND health.time_in_hospital >
avg_stay.avg_length_of_stay THEN 1 END) /
     COUNT(CASE WHEN health.medical_specialty LIKE '%pediatric%' THEN 1 END)) * 100 AS percentage_above_average
FROM
    health
CROSS JOIN
    (SELECT AVG(time_in_hospital) AS avg_length_of_stay FROM health) AS avg_stay;
```

percentage_above_average
18.9655

How many pediatric patients are readmitted following discharge?

readmitted_within_30_days	readmitted_after_30_days	not_readmitted
25	167	388

```sql
SELECT
    SUM(CASE WHEN readmitted = '<30' THEN 1 ELSE 0 END) AS readmitted_within_30_days,
    SUM(CASE WHEN readmitted = '>30' THEN 1 ELSE 0 END) AS readmitted_after_30_days,
    SUM(CASE WHEN readmitted = 'NO' THEN 1 ELSE 0 END) AS not_readmitted
FROM
    health
WHERE
    medical_specialty LIKE '%pediatric%';
```

What is the distribution of admission types when readmitted?

```sql
SELECT
    SUM(CASE WHEN number_outpatient = '1' THEN 1 ELSE 0 END) AS outpatient_count,
    SUM(CASE WHEN number_inpatient = '1' THEN 1 ELSE 0 END) AS inpatient_count,
    SUM(CASE WHEN number_emergency = '1' THEN 1 ELSE 0 END) AS emergency_count
FROM
    health
WHERE
    medical_specialty LIKE '%pediatric%'
    AND readmitted IN ('<30', '>30');
```

outpatient_count	inpatient_count	emergency_count
13	29	5

Are there notable pediatric success stories?

```sql
WITH avg_time AS (SELECT AVG(time_in_hospital) AS avg_time FROM health)
SELECT
    h.patient_nbr,
    h.admission_type_id,
    h.medical_specialty,
    h.num_lab_procedures,
    h.readmitted,
    d.age,
    d.race,
    d.gender,
       ROUND(h.num_lab_procedures) AS rounded_num_lab_procedures
FROM patient.health h
JOIN demographics d ON h.patient_nbr = d.patient_nbr
WHERE h.admission_type_id = 1
  AND h.time_in_hospital < (SELECT avg_time FROM avg_time)
  AND h.medical_specialty LIKE '%pediatric%'
  AND h.readmitted = 'NO'
  AND (d.age LIKE '%[0-10)%' OR d.age LIKE '%[10-20)%')
ORDER BY rounded_num_lab_procedures DESC;
```

patient_nbr	admission_type...	medical_specialty	num_lab_procedures	readmitted	age	race	gender
21534219	1	Pediatrics	78	NO	[10-20)	Caucasian	Female
10799190	1	Pediatrics	77	NO	[0-10)	Caucasian	Female
17327511	1	Pediatrics	73	NO	[0-10)	Other	Male
5890392	1	Pediatrics	73	NO	[10-20)	Caucasian	Male
84073707	1	Pediatrics	72	NO	[0-10)	AfricanAmerican	Male
4984353	1	Pediatrics-CriticalCare	71	NO	[10-20)	Asian	Female
22897152	1	Pediatrics	70	NO	[0-10)	Caucasian	Female
114322203	1	Pediatrics	69	NO	[10-20)	AfricanAmerican	Female
1566414	1	Pediatrics-CriticalCare	66	NO	[0-10)	Caucasian	Female
16195455	1	Pediatrics-CriticalCare	66	NO	[0-10)	Caucasian	Female
1647108	1	Pediatrics	66	NO	[0-10)	Caucasian	Female
21643254	1	Pediatrics	66	NO	[10-20)	Caucasian	Male
5067369	1	Pediatrics-CriticalCare	65	NO	[10-20)	Hispanic	Male
59955255	1	Pediatrics	65	NO	[10-20)	Caucasian	Male
17944479	1	Pediatrics	64	NO	[10-20)	Caucasian	Male
20839779	1	Pediatrics-CriticalCare	64	NO	[10-20)	Caucasian	Female

Summary

580 pediatric patients were admitted.

The average length of stay for a pediatric patient is 3.44 days, which is shorter than the average hospital stay of 4.4 days.

18.96% of pediatric patients stay longer than 4,4 days

33.1% are readmitted, mostly after 30 days of discharge.

Most readmitted pediatric patients are inpatients.

The top pediatric successes were admitted for specialty 'Pediatrics' or 'Critical Care'.

KEY INSIGHTS

KEY INSIGHTS

18.96% of pediatric patients staying longer than the hospital average suggests that a significant number of pediatric patients may experience more severe or complex health conditions.

However, the average stay for most pediatric patients is below the hospital average. Hospitals can leverage this information to optimize resource allocation, streamline pediatric care processes, and potentially reduce costs associated with longer hospitalizations.

KEY INSIGHTS

33.1% of pediatric patients are readmitted, mostly after 30 days of discharge, which highlights the importance of follow-up care and ongoing support for this demographic.

Most readmitted patients are inpatients, indicating that their health conditions require hospitalization. This raises questions about the effectiveness of the initial treatment and the need for long-term care.

KEY INSIGHTS

Internal Medicine, Emergency, and General Practice are the top specialties seeing patients. This information can guide resource allocation and staffing decisions to ensure adequate care, optimizing staffing levels, resources, and improving operational efficiency.

Patients stay longer in the hospital as they get older which is consistent with the expectation that older individuals may have more complex health issues that require extended treatment

WHAT'S NEXT?

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To further this analysis, I would seek out additional data in the following areas:

Financial

Detailed financial data provides insights into the hospital's economic health, including revenue sources, costs, and profitability by department. Analyzing this data identifies areas for cost reduction, revenue optimization, and financial sustainability, enhancing hospital efficiency.

Patient Satisfaction

Access to surveys is essential for understanding the patient experience. Analyzing responses uncovers areas needing improvement in patient care, communication, and facilities, fostering higher satisfaction, loyalty, and operational performance.

Patient Flow

Collecting data on hospital patient flow, including admission, discharge, and transfers, is vital for operational efficiency. Analyzing it identifies bottlenecks, inefficiencies, and improvement opportunities in bed management, patient routing, and throughput, ensuring timely and effective care delivery.

THANK YOU

My name is Alton Pace and I am pivoting my career into data analytics. If you enjoyed this presentation, please consider connecting with me on LinkedIn!

Portfolio Contact

I appreciate your time and feedback.