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AIM: Create basic charts using Tableau / Power BI / R / Python / D3.js to be performed on thedataset of Healthcare.

Description of Dataset:

The dataset contains information on hospital inpatient discharges related to total hip replacement procedures. The data includes the following fields:

- **Health Service Area**: The region where the healthcare facility is located.
- **Hospital County**: The county of the hospital providing care.
- **Operating Certificate Number**: The unique identifier for the healthcare facility.
- **Facility ID and Name**: Identification and name of the facility where the procedure was performed.
- **Age Group**: Patient's age range (e.g., "50 to 69", "70 or Older").
- **Zip Code (3 digits)**: First three digits of the patient's ZIP code.
- **Gender**: The patient's gender (Male/Female).
- **Race and Ethnicity**: Patient's race and ethnicity.
- **Length of Stay**: Number of days the patient stayed in the hospital.
- **Type of Admission**: Type of patient admission (e.g., emergency, elective).
- **Patient Disposition**: Patient's status after discharge (e.g., home, rehabilitation).
- **Discharge Year**: The year of the discharge.
- **Diagnosis Codes and Descriptions**: Coded diagnosis and a corresponding description.
- **Procedure Codes and Descriptions**: Coded procedures and their descriptions, specifically focused on hip replacement surgeries.
- **Severity and Risk Indicators**: Measures of illness severity, risk of mortality, and the type of medical or surgical case.
- **Provider License Numbers**: Attending and operating provider's license numbers.
- **Total Charges and Costs**: The total medical charges and the actual costs incurred for the procedure.

Dashboard Preview:

Hospital Profile: University Hospital

facility_name
University Hospital

LOS Comparison | Cost Comparision | Hospital Profile

Average LOS Days and Average LOS Days ALL
2.65
0.00 — 2.56 — 5.12

Total Discharges by Severity of illness Description
Moderate | Minor | Major

Total Discharges by CCS Diagnosis Description
17 (5.43%)
279 (89.14%)
CCS Diagnosis ...
- Osteoarthritis
- Complication...
- Other bone d...
- Fracture of ne...
- Other connec...

Average Cost Per Discharge and Average Cost per Discharge ALL
$21K
$0K — $17K — $35K

Total Discharges by Risk of Mortality
Minor | Moderate | Major

Total Discharges by Patient Disposition
13 (4.15%)
34 (10.86%)
240 (76.68%)
Patient Dispositi...
- Home w/ Ho...
- Skilled Nursin...
- Inpatient Reh...
- Home or Self ...

Select Health Service Area
Hudson Valley

LOS Comparison | Cost Comparision | Hospital Profile

Key influencers   Top segments
When is Average Cost Per Discharge more likely to be: Low ?
We found 4 segments and ranked them by...

	Segment 1	Segment 2	Segment
Average of Ave...	$14.39K	$15.02K	$17.62K
Population count	373	298	389

2.54 — Average LOS Days
$22K — Average Cost Per Disc...
23 — Total Hospitals
2563 — Total Discharges

Average LOS Days vs Average Cost Per Discharge by Hospital
health_service_area ● Hudson Valley
$50K
$40K
$30K — Percentile line ● $32,034.
$20K
$10K
2   4   6
Average LOS Days

Top 3: Highest Avg Cost per Discharge
NewYork-Presbyterian... — $55K
SJRH - St Johns Division — $33K
Westchester Medical ... — $32K

Bottom 3: Lowest Avg Cost per Discharge
Northern Dutchess H... — $14K
Putnam Hospital Center — $14K
St Joseph's Medical C... — $13K

1. **Image 1: LOS Comparison Overview (Length of Stay)**
   - **Top Section: Shows high-level metrics like:**
     - **99 Surgeons, 2.54 Average Length of Stay (LOS) Days, 23 Hospitals, and 2563 Total Discharges.**
   - **Graph: Bar and line chart depicting the Top 15 hospitals for total discharges and their respective average LOS days. Some hospitals have higher discharges but fewer average LOS days.**
   - **Top 3 / Bottom 3 Lists: Shows hospitals with the highest and lowest average LOS days.**
   - **Key Influencers Panel: Displays factors that increase LOS, like risk of mortality, patient disposition, and severity of illness.**

2. **Image 2: Cost Comparison**
   - **Top Section: Highlights 2.54 Average LOS Days, $22K Average Cost per Discharge, and other metrics like hospital count and total discharges.**
   - **Graph: A scatter plot of LOS Days vs. Average Cost per Discharge for hospitals. Hospitals with higher LOS days tend to have a higher cost per discharge.**
   - **Top 3 / Bottom 3 Lists: Lists hospitals with the highest and lowest average cost per discharge.**
   - **Key Influencers Panel: Highlights factors that influence a lower average cost per discharge, such as the health service area and population.**

3. **Image 3: Hospital Profile (University Hospital)**
   - **Average LOS and Cost: Shows 2.56 Average LOS Days and $17K Average Cost per Discharge for University Hospital.**
   - **Total Discharges: Breakdowns of discharges by severity of illness, risk of mortality, CCS diagnosis, and patient disposition.**
     - **Severity of Illness: Most discharges come from patients with moderate illnesses.**
     - **Risk of Mortality: Most patients discharged are at minor risk.**
     - **Patient Disposition: Majority of patients are discharged to their home with home care.**

Insights/Observation/Question Answered Using Data Visualization:

   - **What is the average Length of Stay (LOS) for total hip replacement patients in different hospitals?**
   - **The visual shows the Average LOS Days by hospital, enabling comparisons between the top hospitals.**

□ **Which factors influence the Average Length of Stay (LOS)?**
- **A key influencers chart explains how factors like patient disposition (e.g., being discharged to a skilled nursing home), the service area (e.g., New York City), and the risk of mortality impact the average LOS.**

 □ **How do the top hospitals compare in terms of total discharges and LOS?**
- **The bar chart compares the Total Discharges and Average LOS Days for the top 15 hospitals.**

 □ **What hospitals have the highest and lowest average LOS?**
- **A side chart highlights the top 3 hospitals with the highest and lowest average LOS.**

 □ **What is the average cost per discharge for total hip replacement across hospitals?**
- **Another visualization shows the Average Cost Per Discharge, allowing comparison across different hospitals.**

 □ **How does LOS relate to the cost per discharge?**
- **A scatter plot shows the relationship between LOS Days and Cost Per Discharge by hospital.**

 □ **Which hospitals have the highest and lowest costs per discharge?**
- **The visual highlights the top 3 hospitals with the highest and lowest average costs for each discharge.**

 1. Length of Stay (LOS) Trends
- Insight: The average Length of Stay (LOS) for patients undergoing total hip replacement procedures across hospitals is 2.54 days.
- Question Answered: *What is the average LOS across all hospitals for total hip replacement?*
- Observation: Some hospitals have significantly higher average LOS, with the top 3 hospitals exceeding 5 days, while the lowest 3 hospitals have averages closer to 2-3 days.
- Question Answered: *Which hospitals have the highest and lowest average LOS?*

 2. Key Factors Influencing LOS
- Insight: The LOS increases the most when patients are discharged to a Skilled Nursing Home (1.29 days), when the hospital is located in New York City (1.68 days), or when the patient's risk of mortality is Major or Extreme (up to 6.09 days).
- Question Answered: *What factors lead to an increase in LOS for total hip replacement patients?*
- Observation: The severity of illness has the strongest influence on LOS, with patients classified as "Extreme" severity staying an average of 8.96 days longer.
- Question Answered: *How does illness severity or risk of mortality impact LOS?*

 3. Hospital Performance Based on LOS
- Insight: Hospitals with higher discharges don't necessarily have longer LOS. Some hospitals, despite handling a large volume of patients, maintain shorter stays.
- Question Answered: *Do hospitals with more total discharges tend to have longer LOS?*
- Observation: A few hospitals with high discharge rates have a balanced LOS, indicating efficiency in handling a large volume of patients without extended stays.
- Question Answered: *Which hospitals are efficiently managing high patient volumes with shorter stays?*

4. Cost Per Discharge
- Insight: The average cost per discharge for hip replacement is $22K, but this varies significantly by hospital. The most expensive hospital, New York-Presbyterian, has an average cost of $55K per discharge, while hospitals like Putnam Hospital Center and Northern Dutchess Hospital have average costs around $14K.
- Question Answered: *What is the average cost per discharge for hip replacement, and how does it vary across hospitals?*
- Observation: Hospitals with the lowest LOS tend to have lower costs per discharge, suggesting that shorter stays might result in reduced overall costs.
- Question Answered: *Is there a relationship between LOS and cost per discharge?*

5. Relationship Between LOS and Cost
- Insight: A positive correlation is observed between LOS and cost per discharge; hospitals with longer stays generally have higher costs.
- Question Answered: *Does a longer LOS correlate with higher costs per discharge?*
- Observation: Some hospitals, despite having longer LOS, manage to keep costs below the $32K median, indicating higher cost-efficiency.
- Question Answered: *Which hospitals manage long stays efficiently in terms of cost?*

6. Cost-Effective Hospitals
- Insight: Hospitals like Northern Dutchess and Putnam Hospital Center have both short LOS and low costs, demonstrating high efficiency in delivering care.
- Question Answered: *Which hospitals are the most cost-effective in terms of both LOS and cost per discharge?*

7. Segment Analysis
- Insight: The visual highlights different segments of hospitals based on their population count and cost per discharge. For instance, Segment 1 has a high cost per discharge but a smaller population, while Segment 2 shows a lower cost but serves a larger population.
- Question Answered: *How do hospital segments differ in terms of cost per discharge and population served?*

Summary of Key Observations
- Hospitals in New York City and with higher patient mortality/severity risks generally show longer LOS, which leads to higher costs.
- Discharge destination, particularly to skilled nursing facilities, significantly influences both LOS and costs.
- There is cost-efficiency in some hospitals that manage to maintain lower costs even with longer LOS, indicating that a high LOS doesn't always mean excessive spending.
- Hospitals with lower discharge costs and shorter LOS are often the most efficient, highlighting important differences in hospital management strategies.

Potential Questions for Further Investigation
1. Why do some hospitals with longer LOS manage to keep costs below average?
2. What specific patient care practices enable hospitals like Northern Dutchess and Putnam Hospital to maintain low costs?
3. How does hospital staffing or surgeon count affect LOS and costs across different facilities?

Conclusion: