



# Analyzing Healthcare Data in Power BI

*Aspiring Data Analyst  
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# Part I - Analyze Data

# Metadata

Hospital Discharges		
Column	Description	Datatype
health_service_area	Description of the health service area in which the hospital is located.	text
hospital_county	Description of the county in which the hospital is located.	text
operating_certificate_number	The facility Operating Certificate Number as assigned by New York State Department of Health.	text
facility_id	Permanent Facility Identifier (PFI).	number
facility_name	The name of the facility where services were performed based on the Permanent Facility Identifier (PFI), as maintained by the NYSDOH Division of Health Facility Planning	text
age_group	Age in years at time of discharge. Grouped into the following age groups: 0 to 17, 18 to 29, 30 to 49, 50 to 69, and 70 or Older.	text
zip_code_3_digits	The first three digits of the patient's zip code. Blank for: - population size less than 20,000 or cell size less than 10 on population classification strata. "OOO" are Out of State zip codes.	text
gender	Patient gender: (M) Male, (F) Female, (U) Unknown.	text
race	Black/African American, Multi, Other Race, Unknown, White. Other Race includes Native Americans and Asian/Pacific Islander.	text
ethnicity	The ethnicity of the patient: Spanish/Hispanic Origin, Not of Spanish/Hispanic Origin, Multi, Unknown	text
length_of_stay	The total number of patient days at an acute level and/or other than acute care level (excluding leave of absence days) (Discharge Date - Admission Date) + 1. Length of stay greater than or equal to 120 days has been aggregated to 120+ days.	text
type_of_admission	A description of the manner in which the patient was admitted to the health care facility: Elective, Emergency, Newborn, Not Available, Trauma, Urgent.	text
patient_disposition	The patient's destination or status upon discharge.	text
discharge_year	The year (CCYY) of discharge.	number
ccs_diagnosis_code	AHRQ Clinical Classification Software (CCS) Diagnosis Category Code. More information on the CCS system may be found at the direct link: <a href="http://www.hcup-us.ahrq.gov/toolssoftware/ccs/ccs.jsp">http://www.hcup-us.ahrq.gov/toolssoftware/ccs/ccs.jsp</a>	number
ccs_diagnosis_description	AHRQ Clinical Classification Software (CCS) Diagnosis Category Description. More information on the CCS system may be found at the direct link: <a href="http://www.hcup-us.ahrq.gov/toolssoftware/ccs/ccs.jsp">http://www.hcup-us.ahrq.gov/toolssoftware/ccs/ccs.jsp</a>	text
ccs_procedure_code	AHRQ Clinical Classification Software (CCS) ICD-9 Procedure Category Code. More information on the CCS system may be found at the direct link: <a href="http://www.hcup-us.ahrq.gov/toolssoftware/ccs/ccs.jsp">http://www.hcup-us.ahrq.gov/toolssoftware/ccs/ccs.jsp</a>	number
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apr_drg_code	The APR-DRG Classification Code in Calendar Year 2011, Version 28 of the APR-DRG Grouper.	number
apr_drg_description	The APR-DRG Classification Code Description in Calendar Year 2011, Version 28 of the APR-DRG Grouper. <a href="http://www.health.ny.gov/statistics/sparc/sydoc/appg.htm">http://www.health.ny.gov/statistics/sparc/sydoc/appg.htm</a>	text
apr_mdc_code	All Patient Refined Major Diagnostic Category (APR MDC) Code. APR-DRG Codes 001-006 and 950-956 may group to more than one MDC Code. All other APR-DRGs group to one MDC category.	number
apr_mdc_description	All Patient Refined Major Diagnostic Category (APR MDC) Description.	text
apr_severity_of_illness_code	The APR-DRG Severity of Illness Code: 1, 2, 3, 4	number
apr_severity_of_illness_description	All Patient Refined Severity of Illness (APR SOI) Description. Minor (1), Moderate (2), Major (3), Extreme (4).	text
apr_risk_of_mortality	All Patient Refined Risk of Mortality (APR ROM). Minor (1), Moderate (2), Major (3), Extreme (4).	text
apr_medical_surgical_description	The APR-DRG specific classification of Medical, Surgical or Not Applicable.	text
attending_provider_license_number	The professional license number, issued by the New York State Department of Education, used to identify the physician or other health care professional primarily responsible for the care of the patient.	text
operating_provider_license_number	The professional license number, issued by the New York State Department of Education, used to identify the physician or other health care professional who performed the principal procedure.	text
total_charges	Total charges for the discharge.	number
total_costs	Total estimated costs for the discharge.	number

# Load the Dataset

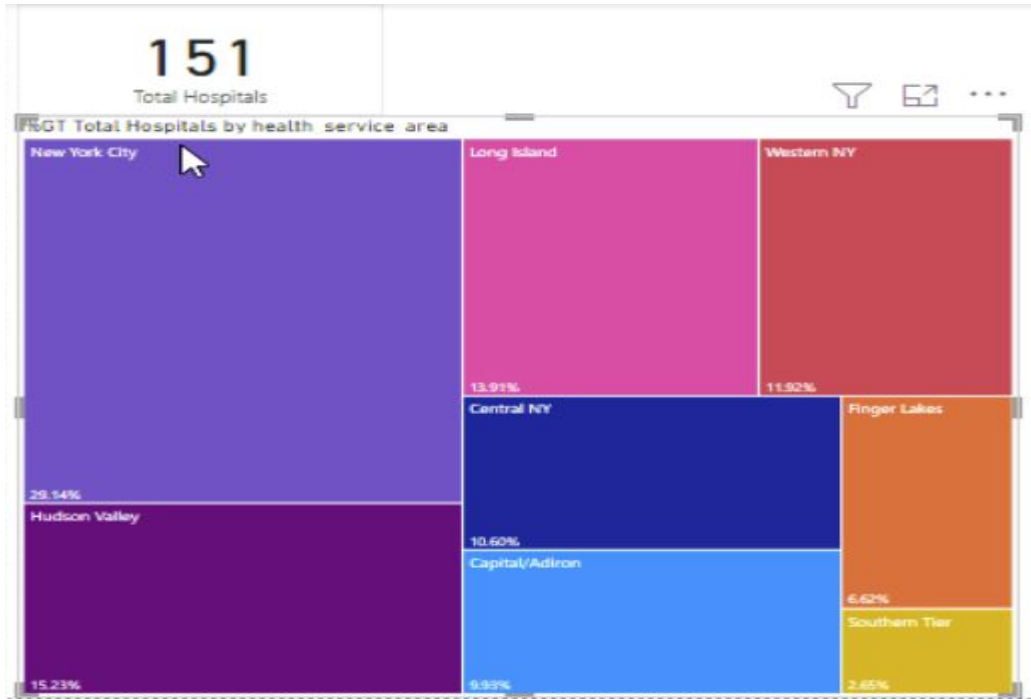
Data is hospital\_inpatient\_discharge\_total\_hipreplacement

Renamed that long table name to hospital\_discharges

Data Profiling was done on the entire dataset to investigate the column distribution

Topmost procedure descriptions frequently reported is Hip Replacements

# Hospitals - Total Number of Hospitals and Distribution



151 total hospitals.

New York has the highest. Has 29.14% of total hospitals.  
Has 44 hospitals.

# Total Discharges and distribution based on age and gender



## Discharge by Gender

Female - 53.7%

>70 yrs - ~ 22.31%

50-69 yrs - ~32.2%

Male - 46.3%

>70 yrs - ~ 13.4%

50-69 yrs - ~32.0%

# Average Length of Stay

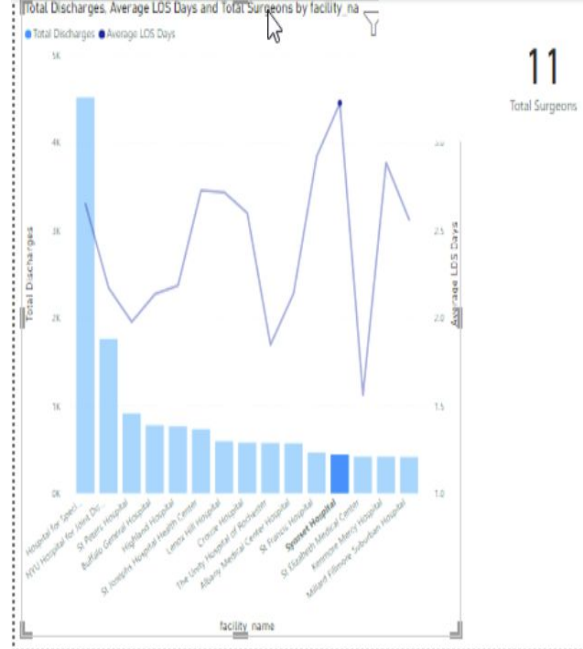
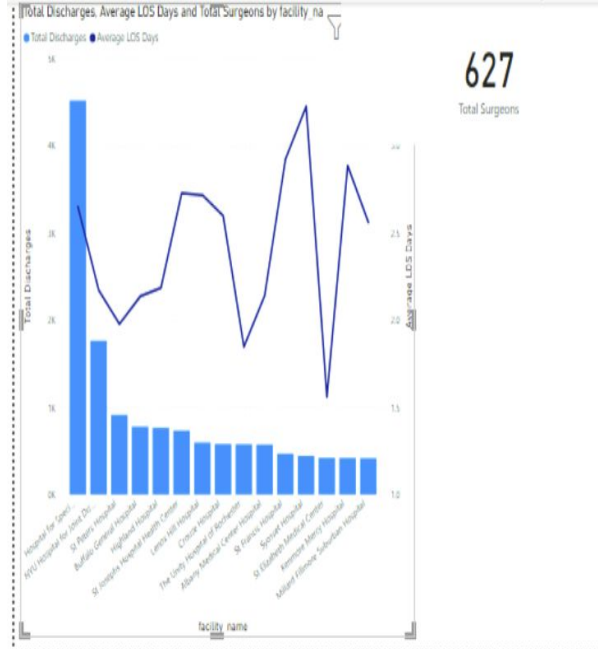


Created a column for Age\_bin where I categorize age into Age 50+ and < 50 years category.

Males aged 50 or older stayed in hospital for 2.53 days for their elective hip replacement procedure.

Females aged 50 or older stayed in hospital for 2.77 days for their elective hip replacement procedure.

# Initial Comparison of Hospitals



Syosset Hospital has the highest average LOS days(3.22) and there were 11 surgeons that conducted elective hip replacement surgeries.

Hospitals Discharges LOS Hospital Comparison



Hospitals Discharges LOS Hospital Comparison





## Part II - Analyze Hospital performance and Benchmarking

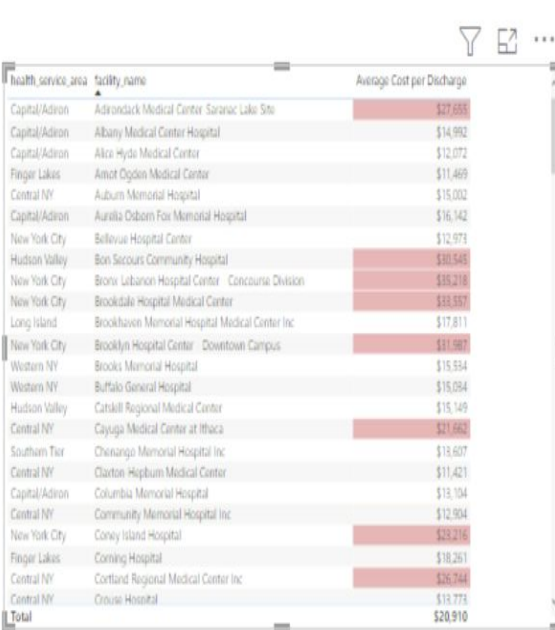
- Recap: There are 151 hospitals in New York state that did Hip replacement surgical procedure
- 26 thousand discharges.
- Patients stayed an average of 2.65 days for the procedure,
- Observed significant variability between hospitals.
- We looked at some demographics like age and gender
- Need to find out what is behind the variability in LOS, or what the most significant factors are.

<input checked="" type="checkbox"/> Column distribution <input checked="" type="checkbox"/> Column profile		<input type="checkbox"/> Always allow Go to Column Columns	Advanced Editor Parameters	Query Dependencies Dependencies
Preview				
tics	Value distribution			
26594	HIP REPLACEMENT,TOT/PRT			
0	OT OR THER PRC ON JOINT			
0	BLOOD TRANSFUSION			
23	OT OR THER PRCS ON BONE			
10	OT NON-OR THER PRC MUSC			
0	OT DX PRCS ON MUSC/SKEL			
AMPUT...	OTHER THERAPEUTIC PRCS			
TRTMNT...	TRTMNT,FRAC HIP/FEMUR			
	OT OR THER PRC SKN/BRST			

We see two main procedures and we are focussing only on Hip Replacement

# Average Cost Per Discharge based on Facility name and Health Service Area

**\$60K**  
Average Cost per Discharge



health_service_area	facility_name	Average Cost per Discharge
Capital/Adirondack	Adirondack Medical Center Saranac Lake Site	\$27,695
Capital/Adirondack	Albany Medical Center Hospital	\$14,992
Capital/Adirondack	Alta Hyde Medical Center	\$12,072
Finger Lakes	Amor Ogden Medical Center	\$11,469
Central NY	Auburn Memorial Hospital	\$15,002
Capital/Adirondack	Aurika Osborn Fox Memorial Hospital	\$16,142
New York City	Bellevue Hospital Center	\$12,971
Hudson Valley	Bon Secours Community Hospital	\$80,545
New York City	Bronx Lebanon Hospital Center - Concourse Division	\$85,218
New York City	Brookdale Hospital Medical Center	\$88,957
Long Island	Brookhaven Memorial Hospital Medical Center Inc	\$17,811
New York City	Brooklyn Hospital Center - Downtown Campus	\$11,987
Western NY	Brooks Memorial Hospital	\$15,554
Western NY	Buffalo General Hospital	\$15,084
Hudson Valley	Cattell Regional Medical Center	\$15,149
Central NY	Cayuga Medical Center at Ithaca	\$21,662
Southern Tier	Chenango Memorial Hospital Inc	\$18,607
Central NY	Clarton Hopburn Medical Center	\$11,421
Capital/Adirondack	Columbia Memorial Hospital	\$13,104
Central NY	Community Memorial Hospital Inc	\$12,804
New York City	Coney Island Hospital	\$28,216
Finger Lakes	Corning Hospital	\$18,261
Central NY	Cortland Regional Medical Center Inc	\$26,764
Central NY	Crouse Hospital	\$19,778
Total		\$20,910

Applied Conditional Formatting to highlight the background color based on the Average Cost per Discharge measure.

So, Average cost per discharge and Average LOS vary per facility

# Calculating relative differences

Quantify relative difference between each hospital vs overall state average

**\$60K**  
Average Cost per Discharge

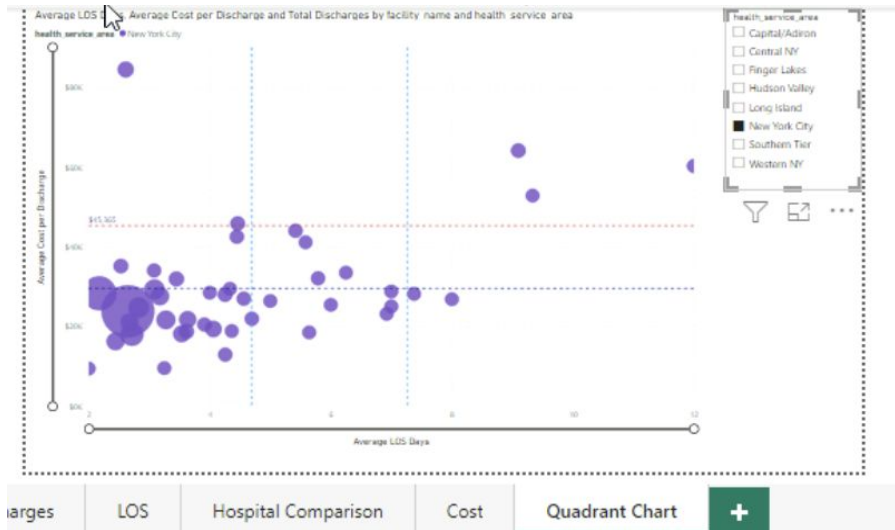
Health service area	Facility name	Average Cost per Discharge	Average LOS Days	% Var Average Cost per Discharge	% Var Average LOS Days
Western NY	Eastern Niagara Hospital - Lockport Division	\$26,528	3.92	26.03%	32.07%
Capital/Adirondack	St. Elizabeth's Hospital	\$14,182	2.77	-52.78%	-4.89%
New York City	St. Vincent's Hospital Center	\$25,085	7.02	19.97%	164.07%
Western NY	Oneida County Medical Center	\$11,624	2.02	-33.89%	-23.89%
Finger Lakes	F. F. Thompson Hospital	\$14,125	2.38	-11.10%	-10.36%
Central NY	Easton-St. Lukes Healthcare St. Lukes Division	\$25,941	2.47	24.09%	-9.04%
New York City	Hushong Hospital Medical Center	\$44,702	5.42	170.18%	104.73%
Finger Lakes	Geneva General Hospital	\$17,974	3.08	4.88%	16.32%
Capital/Adirondack	Glenn Falls Hospital	\$15,525	3.46	-24.32%	33.68%
Long Island	Good Samaritan Hospital Medical Center	\$39,020	2.76	86.60%	5.39%
Hudson Valley	Good Samaritan Hospital of Sullivan	\$26,881	2.88	38.32%	1.43%
New York City	Harlem Hospital Center	\$9,471	2.03	-54.77%	-24.57%
Hudson Valley	HealthAlliance Hospital Marys Avenue Campus	\$25,598	2.24	3.38%	-15.38%
Finger Lakes	Highland Hospital	\$11,175	2.78	-46.56%	-17.64%
New York City	Hospital for Special Surgery	\$27,259	2.85	14.10%	-0.10%
Long Island	Huntington Hospital	\$18,106	3.04	-13.41%	16.89%
New York City	Interfaith Medical Center	\$55,508	9.37	153.11%	252.07%
New York City	Jacobi Medical Center	\$25,493	6.02	21.97%	126.29%
New York City	Jamaica Hospital Medical Center	\$10,910	4.36	-9.57%	64.90%
Long Island	John T. Mather Memorial Hospital of Port Jefferson New York Inc.	\$16,179	2.48	-8.28%	-6.67%
Western NY	Kanawha Mercy Hospital	\$14,707	2.89	-28.77%	18.07%
New York City	Kings County Hospital Center	\$60,383	12.00	188.67%	352.59%
New York City	Lenox Hill Hospital	\$18,020	2.72	-13.67%	2.47%
New York City	Lincoln Medical & Mental Health Center	\$18,556	5.64	-11.28%	112.82%
New York City	Long Island Jewish Forest Hills	\$26,280	4.25	14.10%	60.46%
New York City	Long Island Jewish Medical Center	\$16,798	2.44	-22.88%	-7.88%
New York City	Long Island Jewish Schweidman Children's Hospital Division	\$26,493	3.84	26.10%	88.18%
Total		\$20,910	2.85	0.00%	0.00%

Is Discharges LOS Hospital Comparison Cost +

Kings County Hospital center in New York City has an average LOS days of 12.0 days and a whopping 352.59% higher than the state average.

## Highlighting the outliers

Which hospital stand out as an outliers when it comes to the combined picture of LOS and cost of our patient population.



There are five facilities with a significantly higher average cost per discharge in New York City

What is the driving higher cost and LOS? Root cause analysis- next slide

# How to create a new column surgical program size?

- Created a table called surgical\_program\_size\_summary by using :
- Surgical\_program\_size\_summary = summarizecolumns(
  - facility\_name(hospital\_name), total discharges and total surgeons)
- Using Data modeling, connected the main table hospital\_discharges to our new table by facility\_name
- Created a new group for the column Total Discharges and specified the bin\_size of 200
- Created a new column called surgical\_program\_size and made it a field which will hold values like “<=200”, “200-399”, “400-599”, “>=600”. Used DAX formula by utilizing SWITCH(true()),[total\_discharges] = 0, “<=200”.....)
- Using this, we identified 9 facilities that were grouped under 400-599 total annual discharges.
- Integrate this new column for larger **Root Cause Analysis**

# Root Cause- Analyze Average LOS days in association with eight factors

Risk of mortality

Severity of illness description

Age

Gender

Surgical Program size

Health service area

Patient disposition

Diagnostic description



Analyze Average cost of discharge in association with eight factors:

Risk of mortality

Severity of illness description

Age

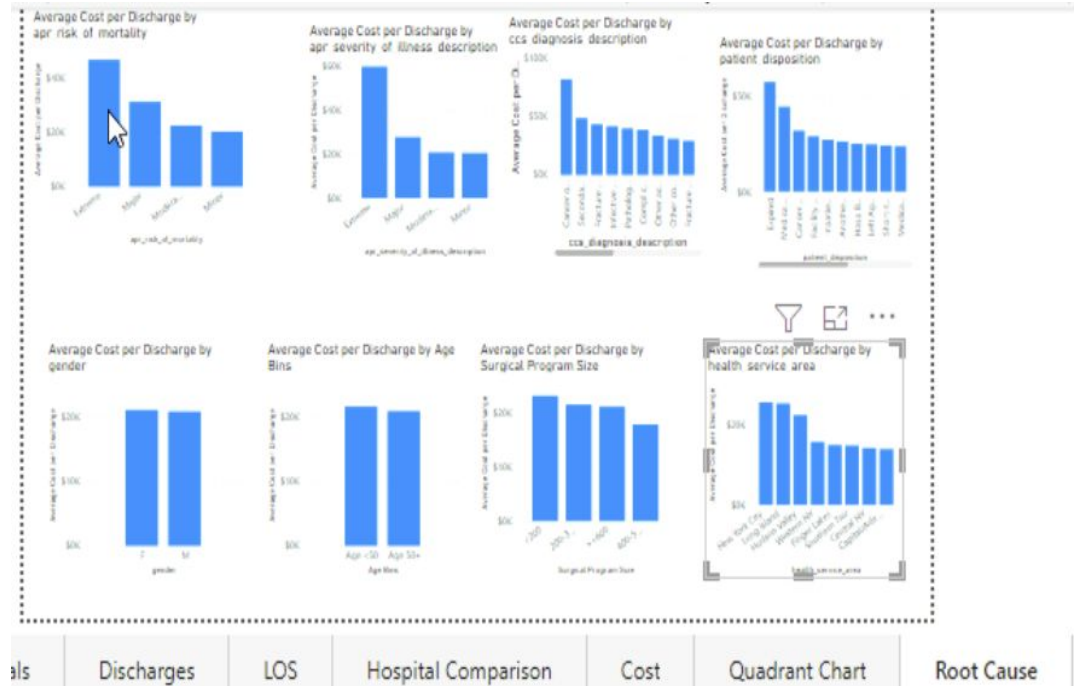
Gender

Surgical Program size

Health service area

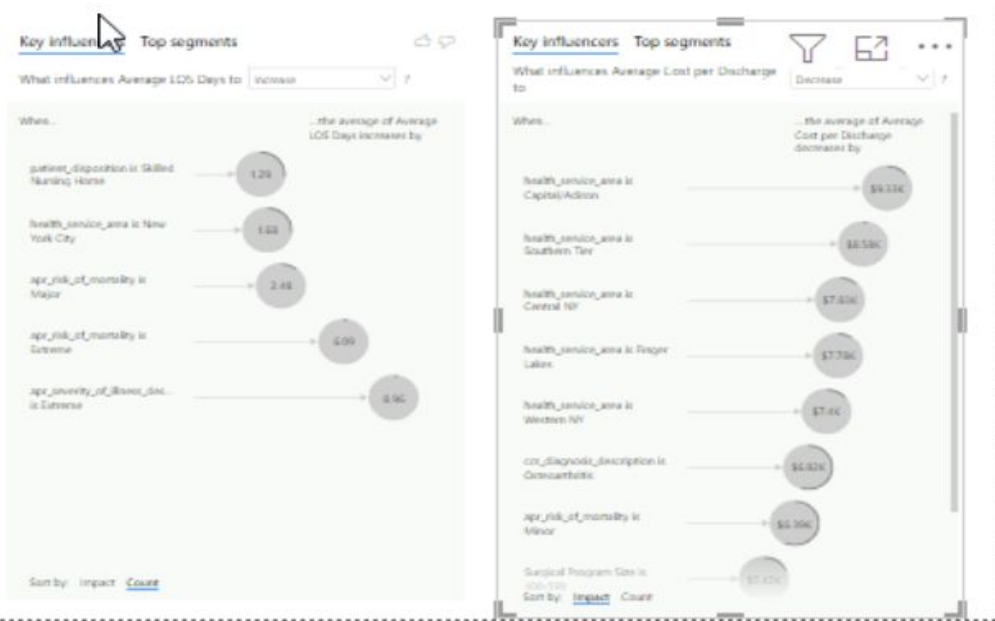
Patient disposition

Diagnostic description



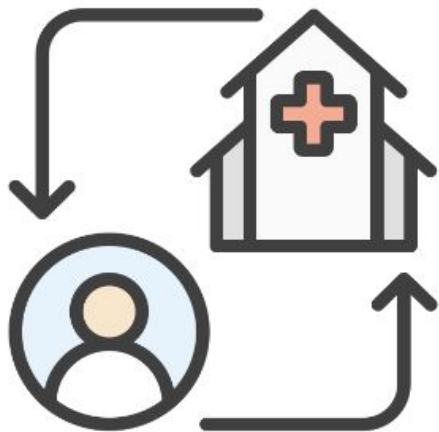


# Key Influencers for Average cost of discharge

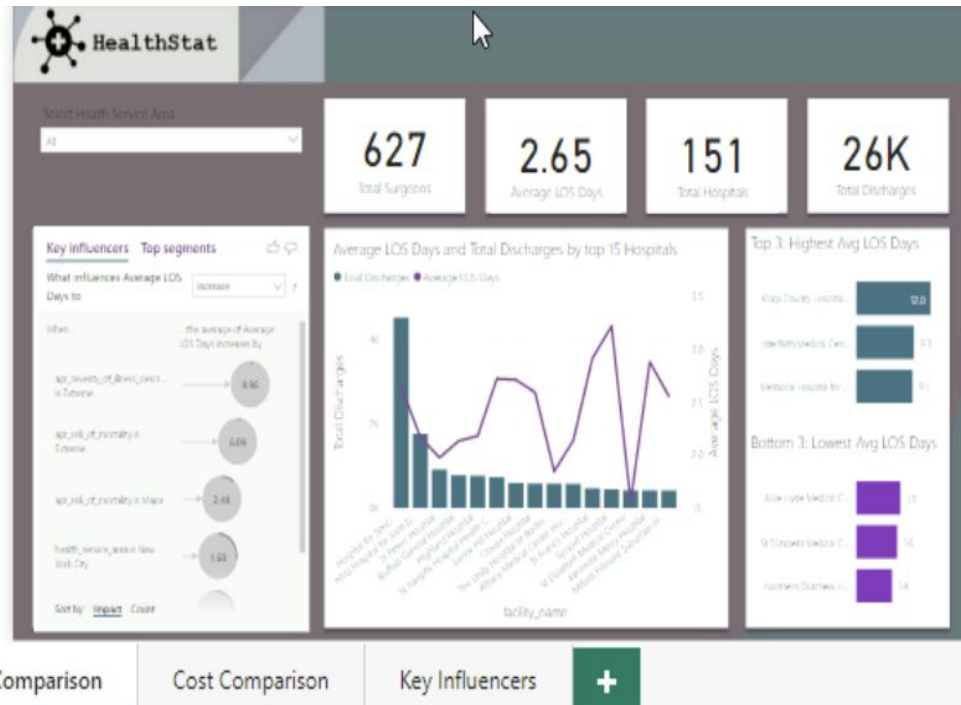


	Discharges	LOS	Hospital Comparison	Cost	Quadrant Chart	Root Cause
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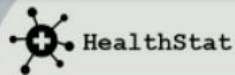
## Key insights uncovered



- Average cost per discharge was \$20,910
- Top influencers increasing average LOS and cost:
  - Extreme illness severity
  - Extreme/ Major mortality risk
  - Hospitals in New York City
  - Patient disposition to skilled nursing home



Strong memorial hospital from Finger Lakes region had the highest average LOS days of 4.86



Select Health Service Area

Capital/Adirondack

Select all

☒ Capital/Adirondack

☐ Central NY

☐ Finger Lakes

☐ Hudson Valley

☐ Long Island

☐ New York City

Cost per discharge (dollars)

health\_service\_area is Capital/Adirondack → \$9.33K

health\_service\_area is Southern Tier → \$8.58K

health\_service\_area is Central NY → \$7.83K

health\_service\_area is Finger Lakes → \$7.78K

Sort by: **Impact** Count

2.39

Average LOS Days

\$14K

Average Cost per Discharge

15

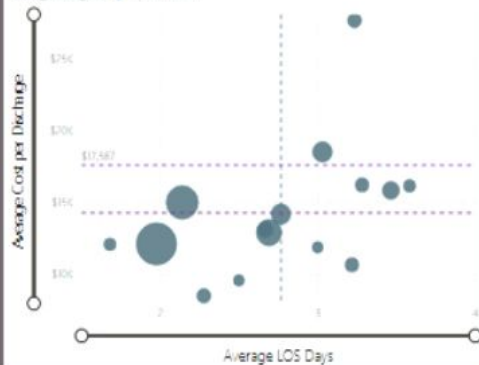
Total Hospitals

2542

Total Discharges

Average LOS vs Average Cost per Discharge by Hospital

health\_service\_area: Capital/Adirondack



Top 3: Highest Avg Cost per Discharge

Adirondack Medical C.	\$13.5K
Mary Imogene Bassett	\$12.5K
Nathan I. Rose Hosp.	\$12.0K

Bottom 3: Lowest Avg Cost per Discharge

Saratoga Hospital	\$10.7K
The University of Med.	\$10.6K
St. Mary's Healthcare	\$8.5K

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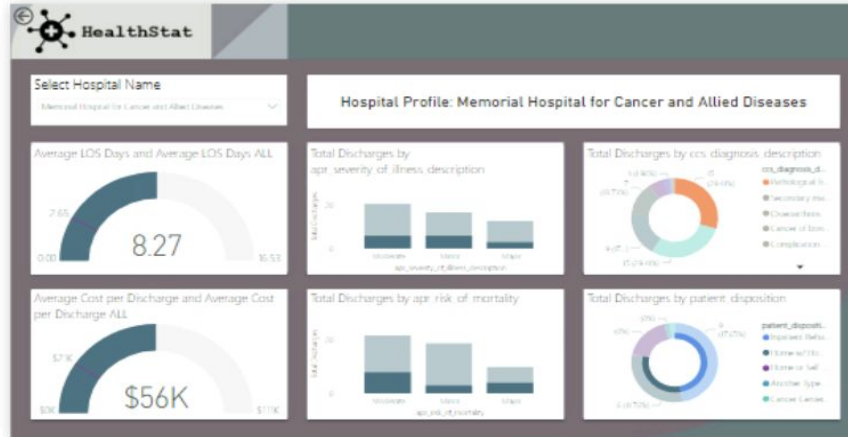
Cost Comparison

Key Influencers



# Deep-dive profile view by hospital

Question 1: For the Memorial hospital for the Cancer and Allied diseases, what was the length of stay days for patients with the diagnosis of “Pathological Fracture”?



Patients diagnosed with a pathological fracture at the Memorial hospital for the Cancer and Allied diseases stayed on average of 8.27 days for their Hip replacement surgery

# Final Dashboard with Navigator Button panel

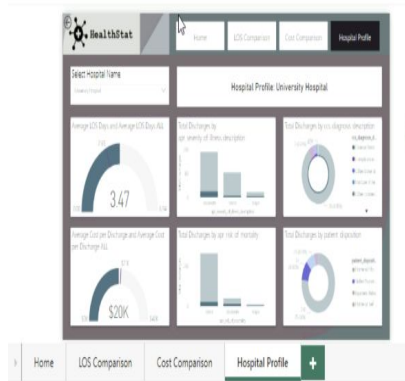
Question 1: For the University hospital, give one findings from the Hospital Profile dashboard and a bonus finding...?



Patients discharged to a skilled nursing home had a higher average LOS days than the overall state average and an average cost per discharge of \$20K (as shown in the fig.)

Bonus:

1. Diagnosis group of Osteoarthritis had 2.48 average LOS days with an average cost per discharge \$17K
2. Patients discharged with Home w/ home health services had lower average LOS than state average LOS days
3. Patients with major illness severity had both a higher LOS and higher cost per discharge than the state average



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# Final Report

