Massachusetts General Hospital
Excellence in patient care every day

Performance Overview

Filters:

Quarter, Month — All

Patient Status — All

Ethinicity — All

Race — All

Gender — All

Age Group — All
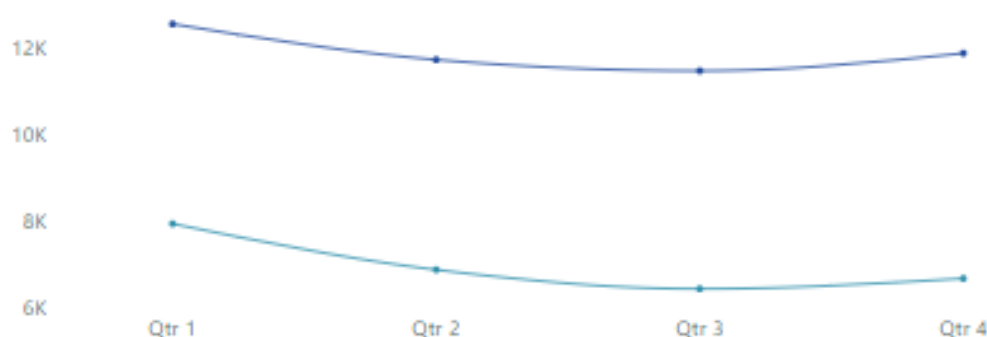
Marital Status — All

County, City — All

Encounter Class — All

Payer — All

Clear all filters

Revenue	Encounters	Total Patients	Avg Cost Per Visit
$100.86M	27,874	974	$3.62K
LY: -- --	LY: -- --	LY: -- --	LY: -- --

Procedures	Admissions	Re-admission %	Avg Stay (Hr)
47,701	1,136	55.72%	1.81
LY: -- --	LY: -- --	LY: --	LY: -- --

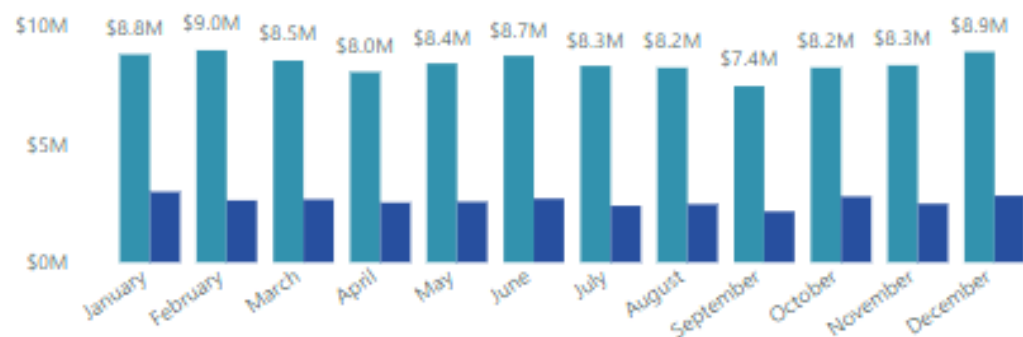| Total Coverage	Coverage Rate	Avg Coverage
$31.09M	30.83%	$1.12K
LY: -- --	LY: -- --	LY: -- --

Key metrics over time

Year	Patients	Revenue	Avg Cost per visit	Average stay (Hr)	Encounters	Single visit encounters	Follow-up encounters	Procedural Encounters	Procedures
2011	409	$4.4M	$3,299.4	1.98	1,335	1177	158	399	1,184
2012	559	$9.1M	$4,303.2	1.66	2,105	1915	190	1232	4,561
2013	570	$10.1M	$4,049.7	2.08	2,495	2299	196	1429	4,922
2014	630	$12.0M	$3,101.9	1.38	3,872	3473	399	2451	6,279
2015	553	$10.1M	$4,103.3	1.73	2,467	2244	223	1333	4,664
2016	552	$8.4M	$3,418.4	1.91	2,454	2264	190	1381	4,115
2017	546	$9.6M	$4,067.6	2.45	2,358	2169	189	1326	4,601
2018	535	$8.7M	$3,812.4	1.48	2,289	2100	189	1183	3,967
2019	514	$8.9M	$4,004.0	2.04	2,231	2052	179	1263	4,278
2020	518	$9.7M	$3,834.2	2.34	2,517	2329	188	1263	4,457
2021	649	$9.2M	$2,600.2	1.38	3,530	3349	181	1306	4,388
2022	104	$0.7M	$3,128.8	1.14	221	212	9	100	266
Total	**974**	**$100.9M**	**$3,618.5**	**1.81**	**27,874**	**25583**	**2,291**	**14666**	**47,682**

No. of Encounters & Procedures over time

● Total encounters ● Total Procedures

Revenue and Insurance coverage over time

● Revenue ● Insurance Coverage

Revenue by month: January $8.8M, February $9.0M, March $8.5M, April $8.0M, May $8.4M, June $8.7M, July $8.3M, August $8.2M, September $7.4M, October $8.2M, November $8.3M, December $8.9M

Massachusetts General Hospital
Excellence in patient care every day

Performance Overview

MAVEN ANALYTICS

Year filter: 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022

Filters

Quarter, Month — All
Patient Status — All
Ethinicity — All
Race — All
Gender — All
Age Group — All
Marital Status — All
County, City — All
Encounter Class — All
Payer — All

Clear all filters

KPI cards

Revenue: $100... LY: --
Proce... 47,... LY: --
Encounters
Total Patients
Avg Cost Per Visit

Total Revenue by Weekday

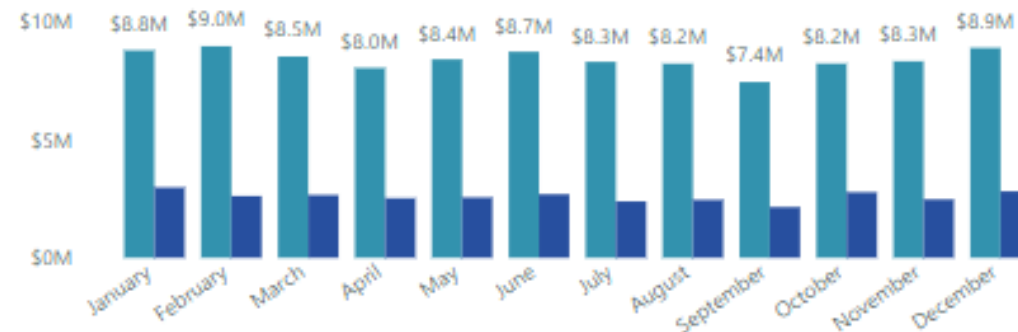| Weekday	Total Revenue
Sun	$9.0M
Mon	$17.9M
Tue	$17.0M
Wed	$20.1M
Thu	$11.6M
Fri	$13.7M
Sat	$11.6M

Key metrics over time

Year	Patients	Revenue	Avg Cost per visit	Average stay (Hr)	Encounters	Single visit encounters	Follow-up encounters	Procedural Encounters	Procedures
2011	409	$4.4M	$3,299.4	1.98	1,335	1177	158	399	1,184
2012	559	$9.1M	$4,303.2	1.66	2,105	1915	190	1232	4,561
2013	570	$10.1M	$4,049.7	2.08	2,495	2299	196	1429	4,922
2014	630	$12.0M	$3,101.9	1.38	3,872	3473	399	2451	6,279
2015	553	$10.1M	$4,103.3	1.73	2,467	2244	223	1333	4,664
2016	552	$8.4M	$3,418.4	1.91	2,454	2264	190	1381	4,115
2017	546	$9.6M	$4,067.6	2.45	2,358	2169	189	1326	4,601
2018	535	$8.7M	$3,812.4	1.48	2,289	2100	189	1183	3,967
2019	514	$8.9M	$4,004.0	2.04	2,231	2052	179	1263	4,278
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2021	649	$9.2M	$2,600.2	1.38	3,530	3349	181	1306	4,388
2022	104	$0.7M	$3,128.8	1.14	221	212	9	100	266
Total	**974**	**$100.9M**	**$3,618.5**	**1.81**	**27,874**	**25583**	**2,291**	**14666**	**47,682**

No. of E... (encounters)

Total encounters ● Total Procedures

(Line chart over years 2011–2022)

Revenue and Insurance coverage over time

● Revenue ● Insurance Coverage

Month	Revenue
January	$8.8M
February	$9.0M
March	$8.5M
April	$8.0M
May	$8.4M
June	$8.7M
July	$8.3M
August	$8.2M
September	$7.4M
October	$8.2M
November	$8.3M
December	$8.9M

Massachusetts General Hospital
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Admissions & Re-Admissions

MAVEN ANALYTICS

| 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |

Quarter, Month
All

Patient Status
All

Ethinicity
All

Race
All

Gender
All

Age Group
All

Marital Status
All

County, City
All

Encounter Class
All

Payer
All

Clear all filters

Admission Encounters
134
LY: 81 ▲ 53

Admitted Patients
28
LY: 37 ▼ -9

Re-admission %
76.87%
LY: 43.21% ▲

Avg Admi. Stay (Hr)
24.00
LY: 24.70 ▼ -0.03

Admitted Patients & Re-admission Rate over time
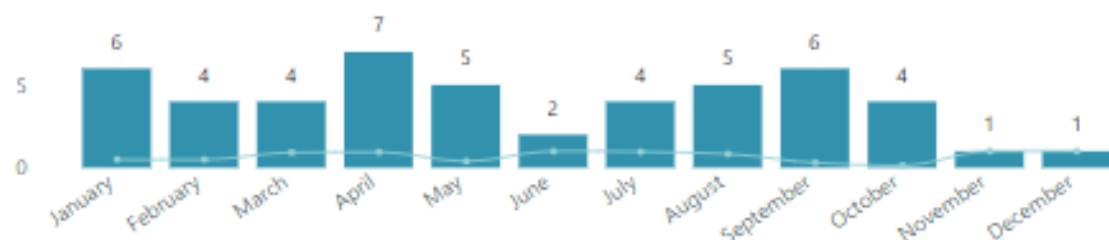
● Admitted Patients ● Re-admission Rate

Month	Value
January	6
February	4
March	4
April	7
May	5
June	2
July	4
August	5
September	6
October	4
November	1
December	1

No. of Admissions & Re-Admissions over time

● No. of Admissions ● No. of Re Admissions

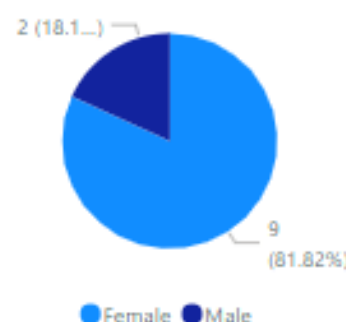| Month	No. of Admissions	No. of Re Admissions
January	8	
February	6	3
March	27	25
April	20	19
May	5	3
June	6	
July	28	27
August	12	10
September	13	
October	7	
November	1	
December	1	

Qtr 1 Qtr 2 Qtr 3 Qtr 4
2019
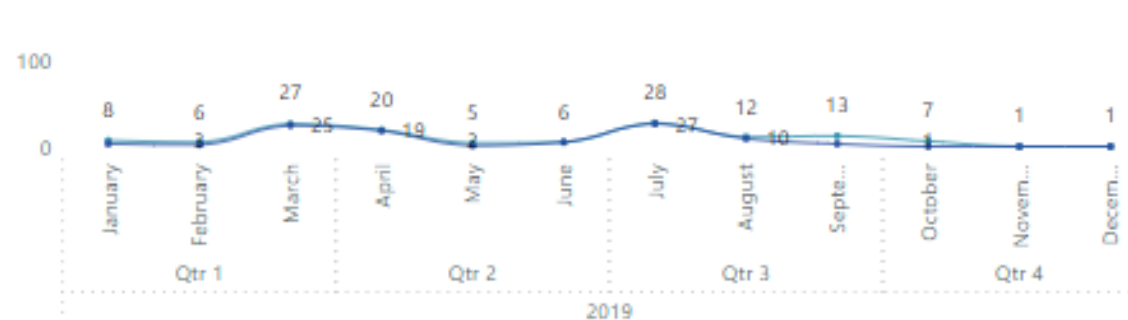
Key metrics of Admissions & Re-admissions

Year	Admitted Patients	Avg Admi. Stay (Hr)	Avg Admi. Cost Per Visit $	Avg Admi. coverage $	Re-admission %
2019	28	24.00	$2,912.5	$925.0	76.9%
Total	28	24.00	$2,912.5	$925.0	76.9%

No. of Re-admitted Patients

By Age Group
3 (27.27%)
4 (36.36%)
4 (36.3...)
● 60 to 80 ● 80 above ● 40 to 60

By Gender
2 (18.1...)
9 (81.82%)
● Female ● Male

Massachusetts General Hospital
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Admissions & Re-Admissions

MAVEN ANALYTICS

| 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |

Quarter, Month
All

Patient Status
All

Ethinicity
All

Race
All

Gender
All

Age Group
All

Marital Status
All

County, City
All

Encounter Class
All

Payer
All

Clear all filters

Admission Encounters	Admitted Patients	Re-admission %	Avg Admi. Stay (Hr)
1,136	154	55.72%	29.58
LY: -- --	LY: -- --	LY: --	LY: -- --

Admitted Patients & Re-admission Rate over time

● Admitted Patients ● Re-admission Rate

20, 35, 39, 48, 37, 33, 35, 37, 28, 47, 35, 3
(2011–2022)

No. of Admissions & Re-Admissions over time

● No. of Admissions ● No. of Re Admissions

No. of Admissions: 83, 93, 134, 119, 69, 111, 124, 126, 81, 134, 72, 55
No. of Re Admissions: 55, 45, 86, 56, 70, 78, 103, 35, 16, 19, 4
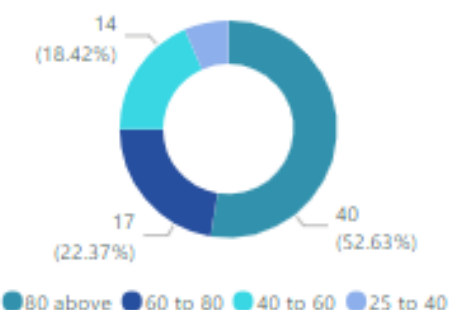(2011–2022)

Key metrics of Admissions & Re-admissions

Year	Admitted Patients	Avg Admi. Stay (Hr)	Avg Admi. Cost Per Visit $	Avg Admi. coverage $	Re-admission %
2011	20	24.02	$12,697.5	$6,605.2	66.3%
2012	35	24.00	$9,033.3	$4,977.9	48.4%
2013	39	28.14	$6,265.2	$3,221.7	64.2%
2014	48	24.15	$8,371.3	$2,278.7	58.0%
2015	37	25.28	$9,549.3	$2,921.8	50.5%
2016	33	24.00	$6,734.2	$2,367.7	56.5%
2017	35	34.67	$6,939.8	$1,598.3	61.9%
2018	37	24.70	$6,458.3	$674.1	43.2%
2019	28	24.00	$2,912.5	$925.0	76.9%
2020	47	61.44	$14,051.6	$9,984.8	22.2%
2021	35	51.78	$7,111.5	$4,775.0	34.5%
2022	3	24.00	$743.1	$529.4	25.0%
Total	**154**	**29.58**	**$7,762.6**	**$3,253.1**	**55.7%**

No. of Re-admitted Patients
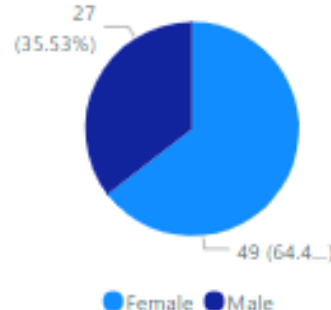
By Age Group

14 (18.42%)
17 (22.37%)
40 (52.63%)

● 80 above ● 60 to 80 ● 40 to 60 ● 25 to 40

By Gender

27 (35.53%)
49 (64.4...)

● Female ● Male

Massachusetts General Hospital
Excellence in patient care every day

Financial Performance

MAVEN ANALYTICS

| 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |

Quarter, Month
All

Patient Status
All

Ethinicity
All

Race
All

Gender
All

Age Group
All

Marital Status
All

County, City
All

Encounter Class
All

Payer
All

Clear all filters

Revenue	Total Coverage	Patient Payment	Coverage Rate	Avg Coverage	Avg Cost Per Visit
$100.86M	$31.09M	$69.77M	30.83%	$1.12K	$3.62K
LY:	LY:	LY:	LY:	LY:	LY:
-- --	-- --	-- --	--	-- --	-- --

Key metrics over time

Year	Revenue	Revenue Growth	Patient Payment	Encounters Base Cost	Incremental Costs	Coverage	Coverage %	Avg coverage	Avg Cost Per Visit	Procedures Base Cost
2011	$4.4M		$2.31M	$145.07K	$4.26M	$2.1M	47.5%	$1,565.65	$3,299.4	$2.76M
2012	$9.1M	↑ 105.7%	$6.18M	$239.32K	$8.82M	$2.9M	31.7%	$1,365.01	$4,303.2	$9.48M
2013	$10.1M	↑ 11.5%	$6.68M	$288.64K	$9.82M	$3.4M	33.9%	$1,371.94	$4,049.7	$10.83M
2014	$12.0M	↑ 18.9%	$8.46M	$462.43K	$11.55M	$3.6M	29.6%	$917.26	$3,101.9	$12.53M
2015	$10.1M	↓ -15.7%	$7.15M	$283.62K	$9.84M	$3.0M	29.4%	$1,204.86	$4,103.3	$10.60M
2016	$8.4M	↓ -17.1%	$6.24M	$274.73K	$8.11M	$2.2M	25.7%	$877.34	$3,418.4	$8.83M
2017	$9.6M	↑ 14.3%	$6.60M	$270.75K	$9.32M	$3.0M	31.2%	$1,268.02	$4,067.6	$10.20M
Total	**$100.9M**		**$69.77M**	**$3,238.84K**	**$97.62M**	**$31.1M**	**30.8%**	**$1,115.44**	**$3,618.5**	**$104.87M**

Total Cost & Coverage amounts by Encounter class

● Base Cost ● Incremental Costs ● Patient Pay ● Coverage

Ambulatory
Outpatient
Urgentcare
Emergency
Wellness
Inpatient

$0M $20M $40M
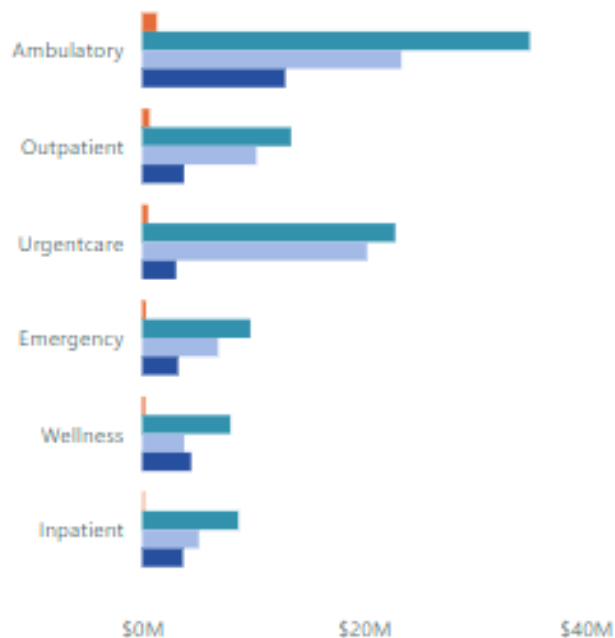
Revenue Growth % over time

200%

105.65%

18.87%   14.34%   2.36% 8.04% -4.89%
0%   -15.72%
11.55%   -9.02%
        -17.13%

-92.47%

2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022
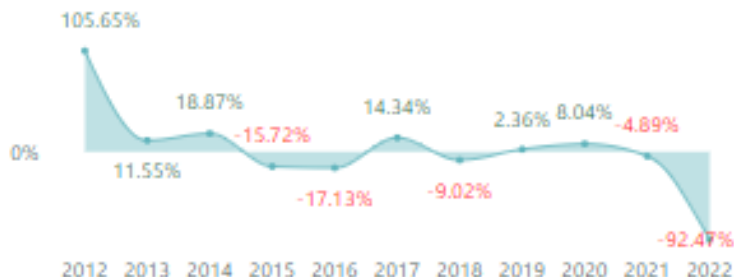
Average Costs & Coverage over time

● Avg cost per visit ● Avg insurance coverage ● Avg Patient Payment
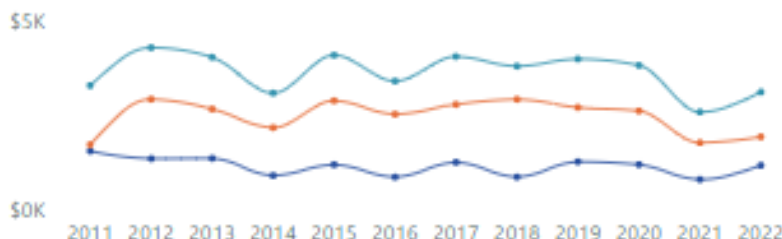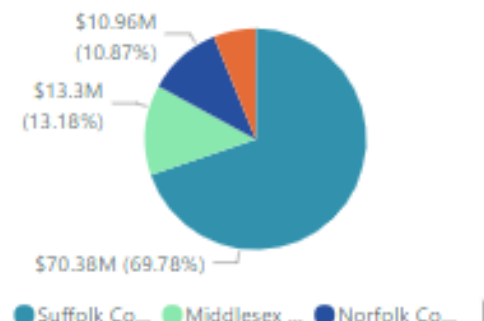
$5K

$0K

2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022

Total Revenue by County

$10.96M (10.87%)

$13.3M (13.18%)

$70.38M (69.78%)

● Suffolk Co... ● Middlesex ... ● Norfolk Co...

Massachusetts General Hospital
Excellence in patient care every day

Patient Outcomes

MAVEN ANALYTICS

| 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |

Quarter, Month
All

Patient Status
All

Ethinicity
All

Race
All

Gender
All

Age Group
All

Marital Status
All

County, City
All

Encounter Class
All

Payer
All

Clear all filters

Patient Demographics

Full Name	Status	Age	Gender	City	Ethnicity	Race	Encounters	Admissions	Admission Rate	Procedures
Mr. Abel Smitham	Deceased	89	Male	Boston	Hispanic	White	27			59
Mr. Abraham Ruec...	Deceased	86	Male	Cambridge	Nonhispanic	White	59	53	89.83%	300
Mr. Ad√°n Feliciano	Deceased	86	Male	Boston	Hispanic	Black	1			
Mr. Ad√°n Olivera	Alive	35	Male	Revere	Hispanic	White	6			1
Mr. Adolph Kshleri...	Alive	97	Male	Somerville	Nonhispanic	Black	25			78
Mr. Adrian Gleason	Alive	70	Male	Boston	Hispanic	Black	1			1
Mr. Ahmed Kreiger	Alive	58	Male	Cambridge	Nonhispanic	White	1			
Mr. Aldo Hoeger	Alive	83	Male	Boston	Nonhispanic	White	2			
Mr. Alec Little	Deceased	82	Male	Boston	Nonhispanic	White	23			54
Total							**27,874**	**1,136**	**4.08%**	**47,682**

Top 5 Encounter Reasons

Reason	Value
Chronic conge...	1.7K
Hyperlipidemia	1.6K
Normal pregn...	1.3K
Viral sinusitis (...	0.7K
Malignant neo...	0.7K

0K — 1K
Total encounters

Encounters Description & Reason

Show Reason

Encounter Description	Patients	No. of Encounters	No. of Admissions
Administration of vaccine to produ...	514	1,003	
Admission to hospice (procedure)	21	21	21
Admission to intensive care unit (p...	23	38	38
Admission to surgical department	13	13	13
Allergic disorder follow-up assess...	1	1	
Allergic disorder initial assessment	1	1	
Asthma follow-up	20	98	
Cardiac Arrest	4	4	
Consultation for treatment	104	469	
Total	**974**	**27,874**	**1,136**

Procedures Description & Reason

Show Description

Procedure Reason	Patients	No. of Procedures	No. of Encounters
Acute bronchitis (disorder)	207	249	249
Acute respiratory failure (disor...	2	12	2
Acute viral pharyngitis (disorder)	57	59	59
Appendicitis	2	2	2
Atrial Fibrillation	78	1,744	1744
Bullet wound	3	3	3
Cardiac Arrest	4	12	4
Chronic congestive heart failur...	23	103	51
Chronic obstructive bronchitis...	12	170	95
Total	**612**	**10,756**	**5356**

Top 5 Procedure Reasons

Reason	Value
Normal...	5.7K
Atrial Fi...	1.7K
Malign...	0.8K
Non-s...	0.3K
Hypoxe...	0.3K
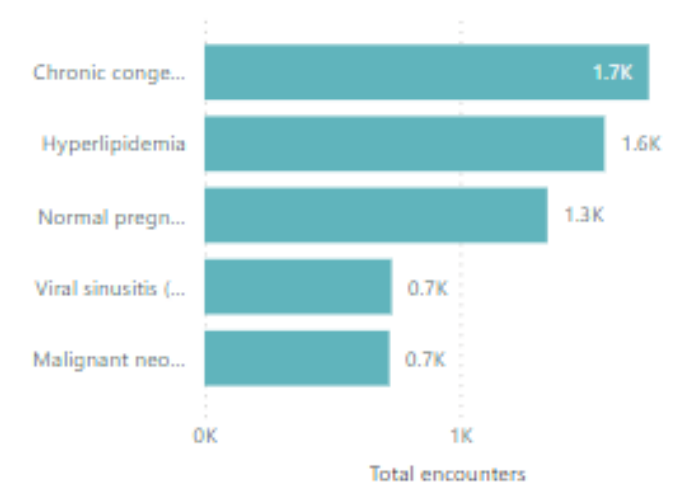
0K — 5K
Total Procedures
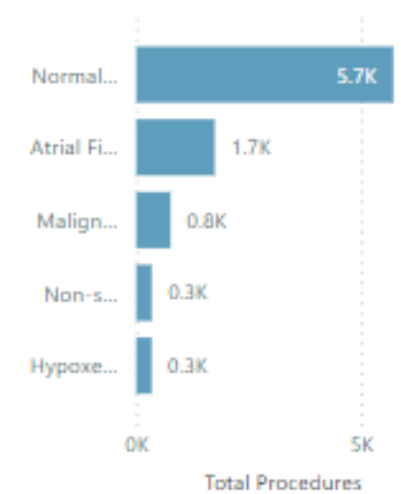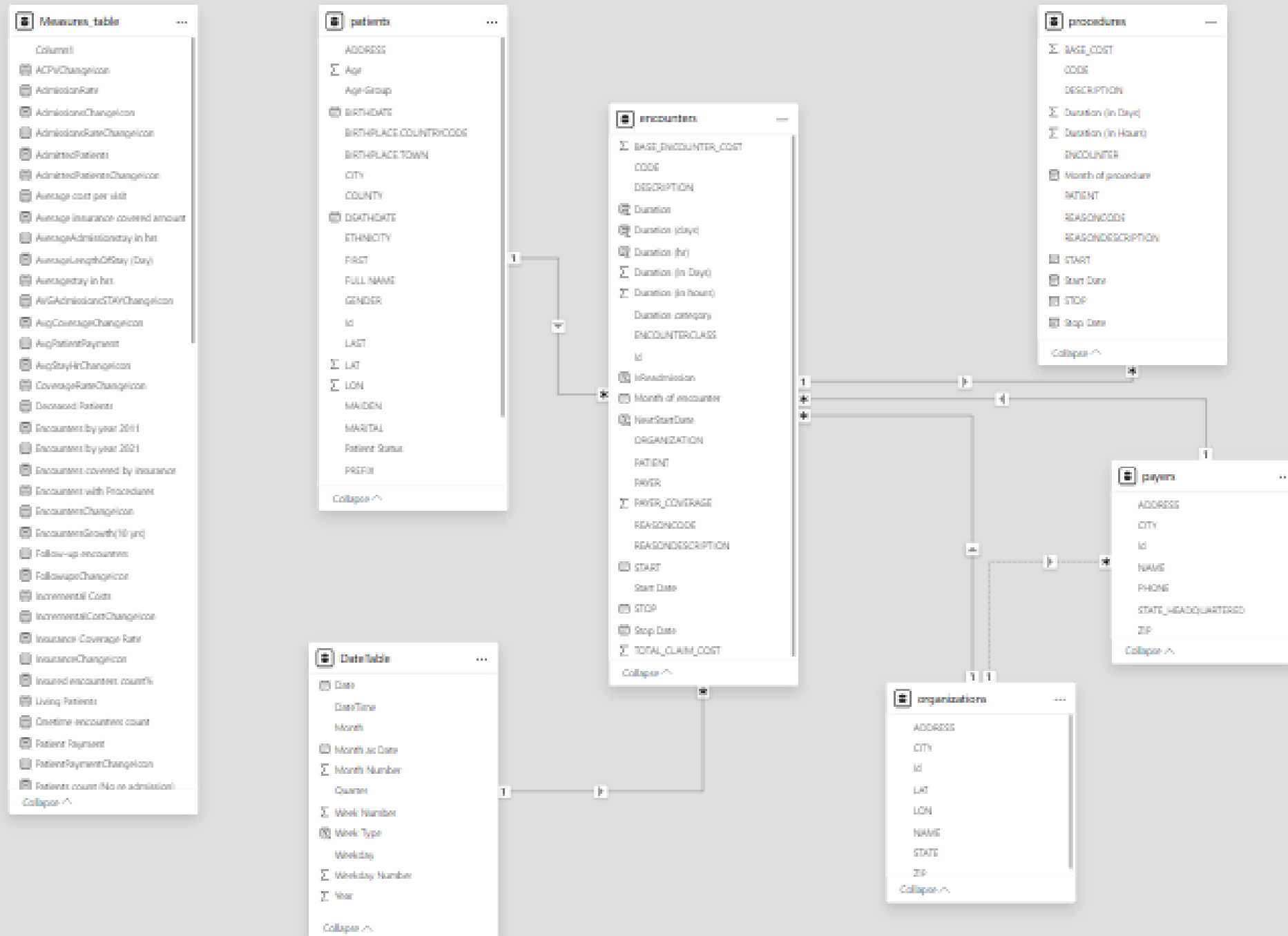
Hospital Patient Records Dashboard

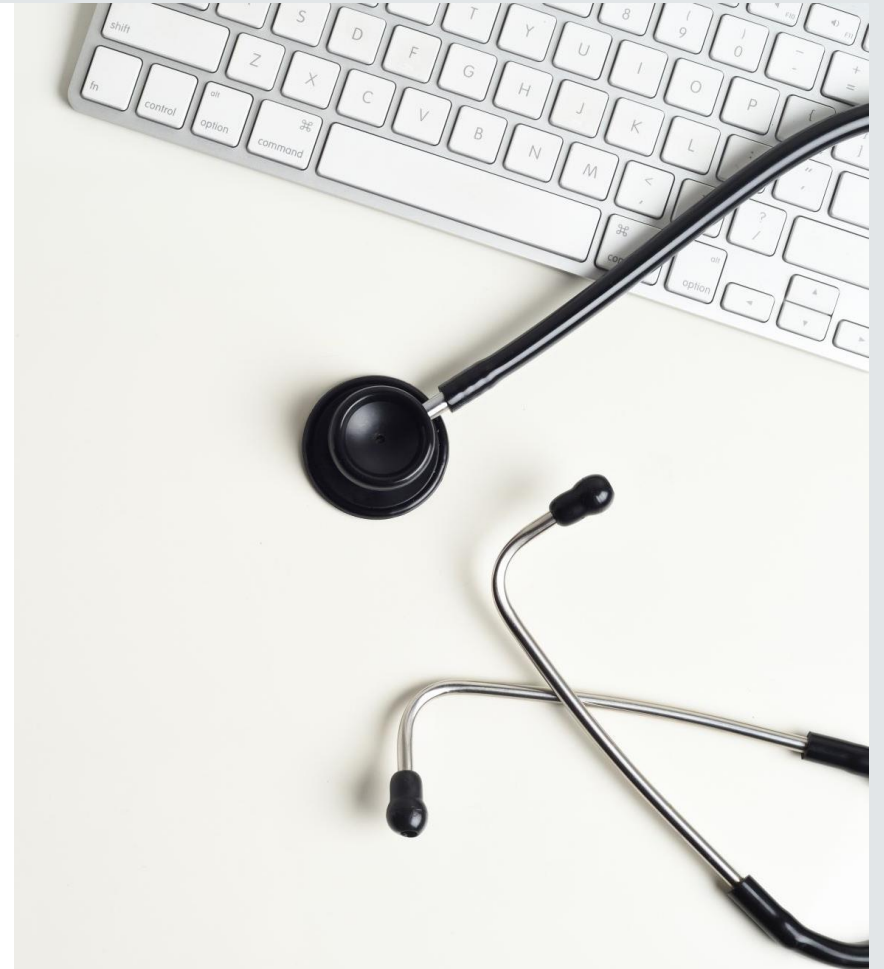## MASSACHUSETTS GENERAL HOSPITAL (MGH)

Created by: Abdul Basith

Project

- The Project has been conducted by Maven Analytics (Link).

- For the Maven Hospital Challenge, I would have to play the role of an analytics Consultant for **'Massachusetts General Hospital (MGH)'**.

Objectives

- Build a high-level KPI report for the executive team of **Massachusetts General Hospital (MGH)**.

- Questions to be answered;

1. How many patients have been admitted or readmitted over time?

2. How long are patients staying in the hospital, on average?

3. How much is the average cost per visit?

4. How many procedures are covered by insurance?

Data Set

- Synthetic data on ~1k patients of 'Massachusetts General Hospital' from **2011-2022**, including information on patient demographics, insurance coverage, and medical encounters & procedures.

- *Filtered 2022 for accurate and meaningful analysis while finding growth %, as there are only January and February data for patient admissions*

Data Preparation Overview – Power Query

- **Data Import and Integration:** Gathered data from five CSV files into Power Query.

- **Custom Columns:** Added columns for encounter and procedure durations, patient status, and age groups.

- **Blank Values Handling:** Replaced blank values with 'N/A' or 'No info.'

- **Outlier Removal:** Eliminated records with unusually long durations in outpatient, ambulatory, inpatient, and emergency encounters to maintain data integrity.

Data Preparation Overview – DAX

- **Data Modeling:** Established relationships between tables.

- **Calendar Table:** Created to link encounter and procedure dates.

- **Week Type Column:** Added to categorize days as Weekend or Weekday for trend analysis.

- **Calculated Columns:**

- **NextStartDate:** Identifies the next admission date for the same patient.

- **IsReadmission:** Flags if the encounter is a readmission within 30 days of discharge.

- *Admissions Definition: Defined admissions as hospital stays of 15 hours or more and readmissions as any subsequent admission within 30 days of the previous admission, regardless of encounter class.*

Key Measures

1. Total Revenue
2. Revenue Growth %
3. Total Admission
4. No. of Re-admissions
5. Re-admission Rate
6. Total Cost Covered by Insurance
7. Average Stay
8. No. of Patients (Alive and Deceased), and so on...

Maven Recommended Analysis

- How many patients have been admitted or readmitted over time?

- How long are patients staying in the hospital, on average?

- How much is the average cost per visit?

- How many procedures are covered by insurance?

Analysis Insights

➢ **How many patients have been admitted or readmitted over time?**

- 154 Patients have been admitted over time with 1136 encounters

- The re-admission rate over time is 55.72%. Which means almost half of the admitted patients have been re-admitted within 30 days.

- I have defined admissions as hospital stays of 15 hours or more and re-admissions as any subsequent admission within 30 days of the previous admission, regardless of encounter class.
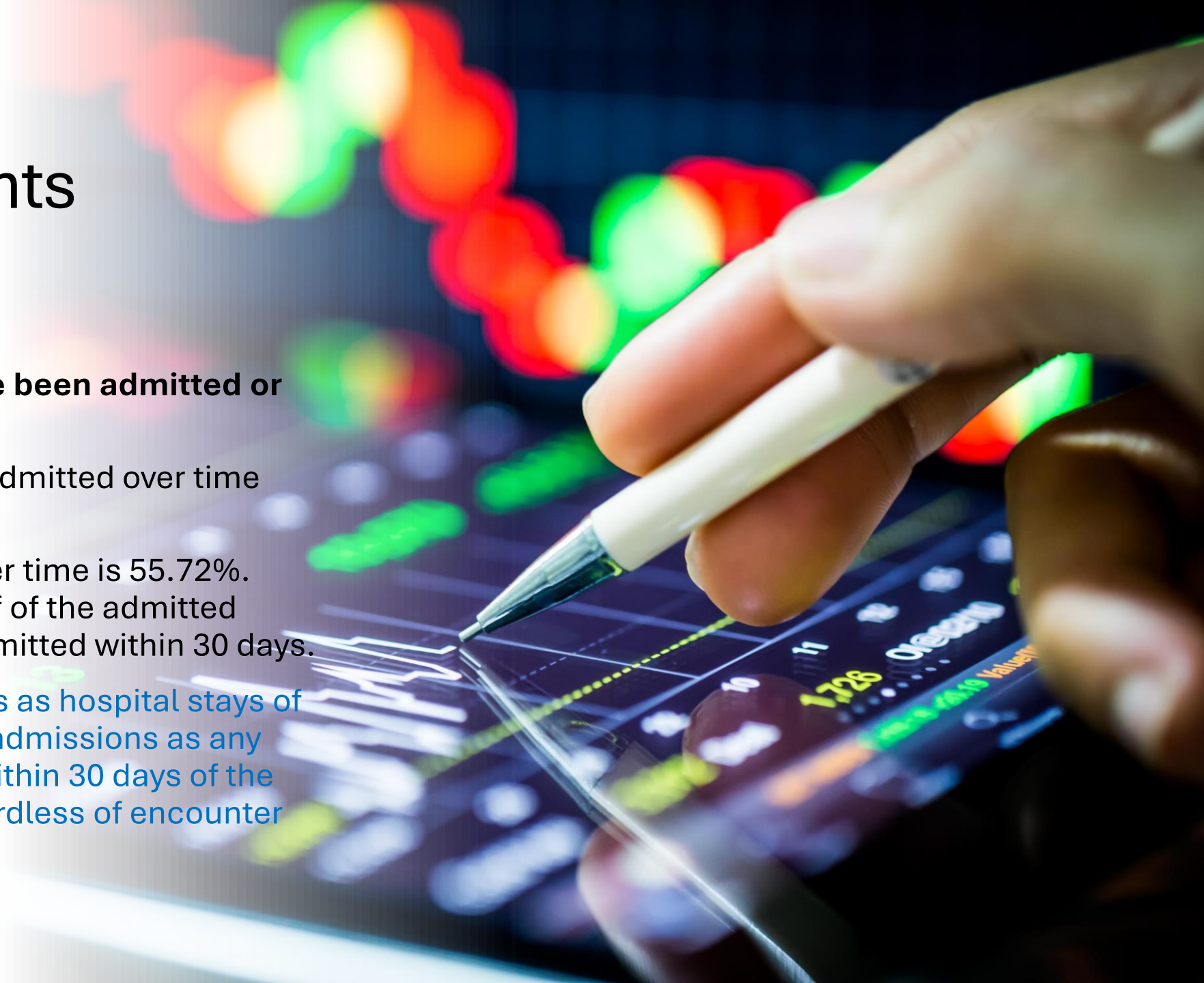
Analysis Insights

➢ **How long are patients staying in the hospital, on average?**

- On average patients have been staying in hospital around 1.81 hours for normal encounters

- Considering admissions, 29.58 hours is the average hospital stay.

- Please note that I have eliminated records with unusually long durations in outpatient, ambulatory, inpatient, and emergency encounters to maintain data integrity.

Analysis Insights

➢ **How much is the average cost per visit?**

- $3.62K is the average cost per visit.

- $2.50K is the average payment made by patients after deducting the coverage amount

Analysis Insights

➢ **How many procedures are covered by insurance?**

- 32,580 procedures are covered by insurance.

- Total procedures are 47,701.

- So, 68.3% of procedures are covered by insurance

Thank you