



Bryant University

HONORS THESIS

“Profitability” Analysis A Comparative analysis of profitability among hospital departments within Massachusetts

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ABSTRACT

The United States has a very unique healthcare system. The different layers of variance from care coordination, case management to utilization in all parts of healthcare makes the system really complex. With the continuous evolution in the healthcare system including changes in healthcare laws and payment methods, the profitability and financial sustainability of hospitals have become aspects of utmost importance not only to the hospitals but also to the people in general. My senior thesis focuses on the determination of the financial sustainability of hospitals. To understand that, I conducted a comparative analysis of profitability among different departments in a hospital with a comparison across the hospitals within Massachusetts. I focused specifically on 62 acute-care hospitals in Massachusetts. I collected the data from CHIA (Center of Health information and analysis) for the year of 2016 and 2017. I used the reports provided to trace the revenue and direct expenses of each department to evaluate their segment margins. Departments with significantly high segment margins reflect the true cost of healthcare that increases the overall cost of healthcare. The results revealed that some departments have higher segment margins than others and a few departments that seemed to be generating a lot of revenue had actually a very low segment margin.

INTRODUCTION

According to the 2019 report released by the American Hospital Association (AHA), there are 6,210 hospitals in the United States. All the hospitals consume “massive amounts of human and financial resources (1)”. These institutions provide a wide variety of services from surgery to counselling and prescription services. With the evolution of society and technology, there have been a lot of changes in the healthcare industry. The constrained competition within the healthcare industry is providing a platform for mediocre quality of care and unsustainable, rising healthcare costs.

My senior thesis focuses on the comparative analysis of the profitability among the different departments of a hospital and a comparison across the hospitals in Massachusetts. My thesis uses the cost reports collected from CHIA, an agency located in Boston, to evaluate the segment margin of each department across all the acute-care hospitals within Massachusetts. I believe that looking at the revenue generated by each department does not give an accurate picture of the financial sustainability of that specific department. The true cost of health care is embedded in the understanding of the net profit/loss generated by the departments because there might be departments that seem profitable but are actually incurring a lot more direct expenses than they can manage.

LITERATURE REVIEW

Healthcare in the US

The Health care delivery system in the US is probably the most complex in the world. It differs from those of other nations in three notable ways: it relies on multiple sources of private financing, it covers less population in comparison to other developed nations and yet, it costs a lot more. These facts can be verified by the comparison of the US healthcare system with that in other OECD nations. OECD (Organization of Economic Cooperation and Development) is an intergovernmental organization that includes 36 countries – most of which are developed nations.

The comparison of the US healthcare system with that of other OECD countries indicates that in 2013, the US spent \$8,713 per person on healthcare in comparison to the OECD average of \$3,453. Total US health expenditure accounted for 16.4% of the national GDP compared to the OECD average of 8.9%. 52% of the healthcare expenditure in the US was privately financed in comparison to almost a quarter across other nations. Yet, more Americans (15.5%) lacked coverage for basic set of services except Greece where the rate was 21 % (Jha, 2012).

History of Healthcare

Based on the earliest formalized records, America's history of healthcare dates back to the end of 19th century. Due to the industrial revolution, more people started working in steel mills but the dangerous nature of work led to workplace injuries. At that time, unions started to emerge in order to prevent their members from financial losses caused due to injury or illness and that's when they began to offer forms of sickness protection.

In the 1990s, the push for a more organized medicine began. It was led by the American Medical Association (AMA), which started to grow. Later, the 26th President of the United States, Theodore Roosevelt, started the campaign platform that included a national health insurance program. In 1920's after World War I, the cost of healthcare became a more important matter as the hospitals started to charge more than what an average citizen could pay. In 1929, Baylor University came up with a solution of "Blue Cross" where a person could buy an insurance for only 50 cents a month that would cover them when they get sick. In 1930's when the Great Depression hit, healthcare became a major topic of discussion. During this time, the Social Security Act of 1935 emerged that created a system of "old age" benefits, allowing coverage for people who were unemployed or disabled.

In 1945, by the end of World War II, Harry Truman proposed a nationalized insurance program which included all Americans.

In 1962, John F. Kennedy tried to pass the bill attempting to cover the elderly people. By this time, the National Health care expenditure was tracked down and he knew that the increasing health care expenditure would affect the senior citizen class the most. He urged Congress to pass his bill. However, this idea of Medicare shut down as the campaign failed against the opposition. Lastly, it was revived by Lyndon Johnson in 1965.

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Later Richard Nixon was able to accomplish the expansion of Medicare through the Social Security Amendment of 1972. This was further facilitated by the efforts of Bill Clinton who tried to provide universal health care. However, it failed due to the opposition from big businesses, increasing national deficit and the complexity of the bill overall.

Finally, in 2010 President Obama signed the Affordable Care Act (ACA) into law which was signed with the purpose of making it easier for insurance companies as well as the public to access healthcare.

Changes in the health spending

The total national health expenditure has increased significantly over time. It can be demonstrated in the graph below:

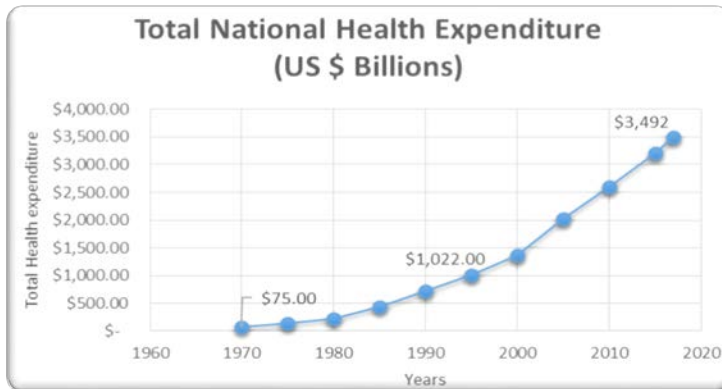


Figure 1: Total National health expenditure in US \$ Billions

The graph demonstrates that the total national healthcare expenditure reported in 1970 was \$75 billion which then rose to approximately \$1 trillion dollars by 2000 and it more than tripled to \$3.5 trillion in 2017.

The total national health expenditure on a per capita basis has been also on an exponential increase since 1970. It is indicated by the graph below:

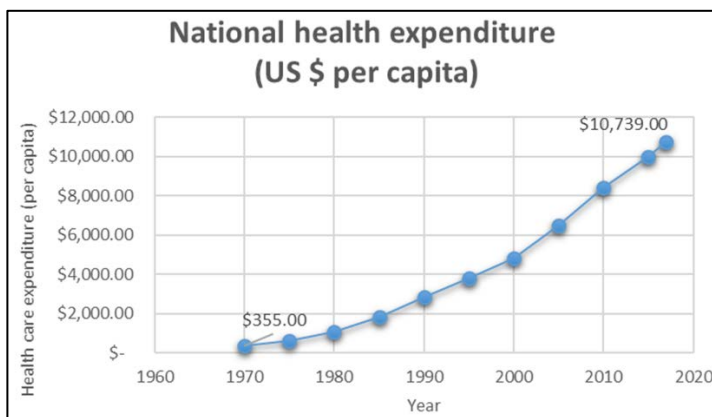


Figure 2: Total National health expenditure per capita in US \$

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The graph above illustrates that the healthcare expenditure per capita has risen from \$355 per person in 1970 to \$10,739 per person in 2017. The rapidly increasing health expenditure indicates the need to understand the causes of the rise in the spending.

Comparison of US Healthcare expenditure with other OECD nations

The comparison of the US healthcare expenditure with other nations as of 2017 indicates that the US leads with a percentage of 17.8% when compared on the basis of health spending as a percentage of GDP followed by UK, Germany, Sweden, France, Netherlands, Switzerland, Denmark, China, Japan and Australia as represented in the graph below:

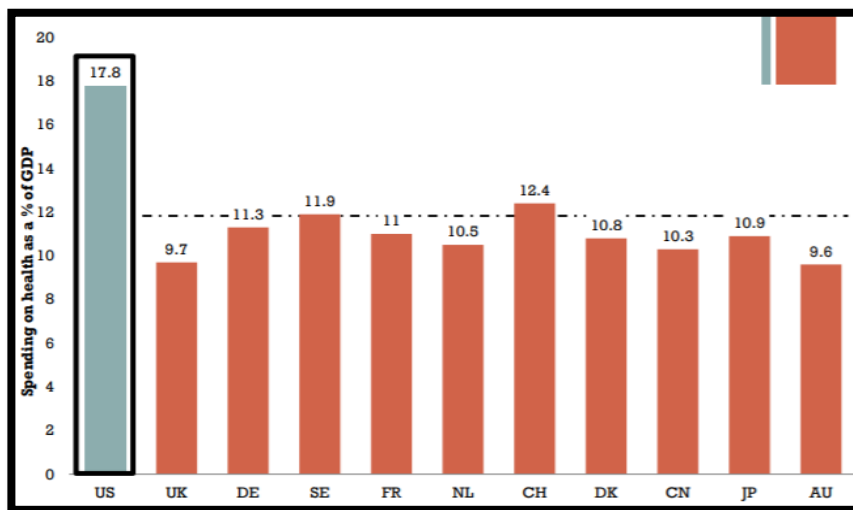


Figure 3: Health Care spending in the United States and Other high income countries, Jha (2018)

The high healthcare spending in the US can be explained using three rationales (Jha, 2018):

- Higher number of average doctor visits in comparison to other countries: On an average the number of doctor visits in the US are lower than that of other countries. The average mean is 6.6 while the average for the US alone is 4 which translates to the fact that an average American goes to the doctor four times a year and hence, the

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lower number of doctor visits in comparison to other nations contradicts the explanation for high healthcare expenditure in the US.

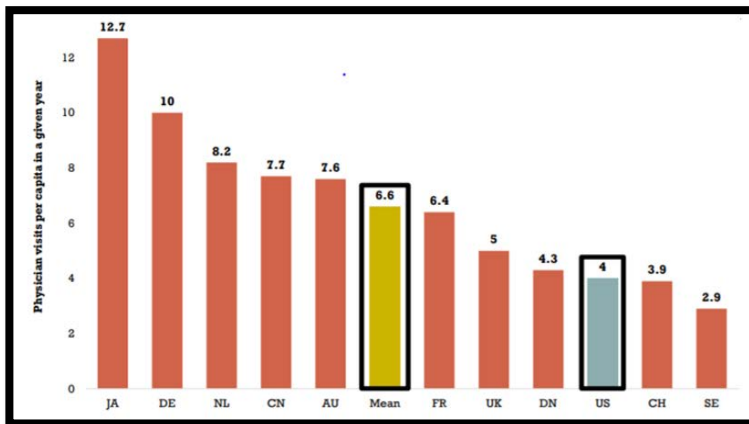


Figure 4: Health Care Spending in the United States and Other High-Income Countries, Jha (2018)

- Higher number of hospitalizations in comparison to other OECD nations: This rationale stems from the possibility that maybe there are a higher number of uninsured people in the US which could be a reason why doctor visits are so few. People without insurance tend to wait until they are really sick, causing more hospitalizations and expenditure. However, the research indicates that the US has a lower number of

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hospitalizations when compared on the basis of discharges per 1000 people. The US has an average value of 125 hospitalizations in comparison to the mean value of 149.

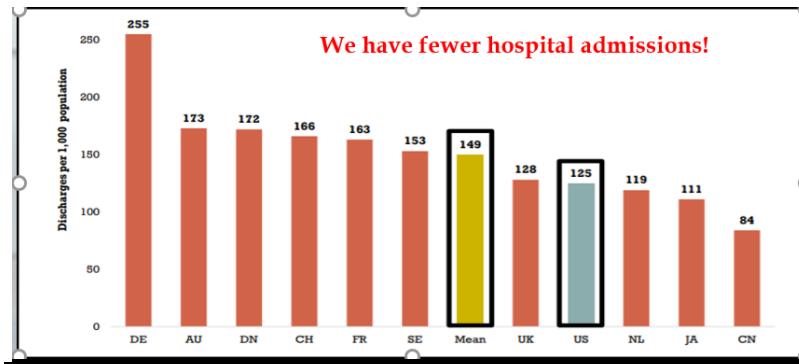


Figure 5: Health Care Spending in the United States and Other High-Income Countries, Jha (2018)

- Higher number of tests/procedures conducted in the US hospitals in comparison to other OECD nations: Results indicate that some tests are conducted more in the US than other nations while some procedures conducted are lesser in number. Hence, on an average, the US does not exceed the rest of the world significantly with regards to the number of tests conducted.

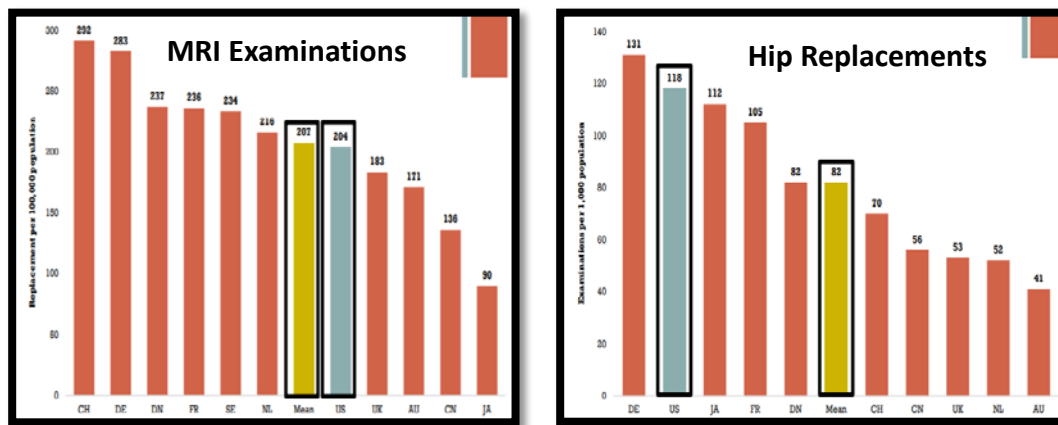


Figure 6: Health Care Spending in the United States and Other High-Income Countries, Jha (2018)

Therefore, these reasons cannot be attributed to the high healthcare expenditure in the US.

A Brief look at the structure of a hospital

According to AHA (American Hospital Association), hospitals in the US can be categorized in three main types depending on their functionality – general, specialized and teaching.

General hospitals treat many kinds of diseases. Specialized hospitals tend to have trauma centers, rehabilitation hospitals, children’s hospitals, seniors’ hospitals, and hospitals to address specific conditions. A teaching hospital is generally attached to a medical school to train medical students and nurses (Patrick, 2017).

Based on the ownership, AHA categorizes them as profit and non-for-profit and governmental hospital. According to the latest report of AHA, there are 6,210 hospitals all over the US – out of which 2,968 are not-for-profit, 1,322 are for-profit while 1,920 are governmental hospitals. They can be further divided into acute care and non-acute care hospitals. Acute care hospitals are the ones directed towards short term treatments like an injury, episode of illness and an urgent medical conditions. 92% of the hospitals in the US are acute care hospitals. On the contrary, non-acute care hospitals are directed towards long term treatment like surgery centers or even long term clinics.

Departments within a hospital

Based on the type of care and services provided by a hospital, they can be separated into two levels of care – Intensive care units, Non-intensive care units. Intensive care units are the areas meant for seriously ill patients who need specialized care such as intensive monitoring and advance life support. They include certain departments such as Pediatric intensive care unit (PICU) or Neonatal intensive care units (NICU). Non-intensive care units are the ones that provide lower levels of care and constitute most of the departments in a hospital including medical units, surgical units and specific departments such as pediatrics, cardiology, neurology etc. Lastly, there are other units providing specialty care such as burn, oncology wards etc.

The Becker's Ambulatory Surgery Centers (ASC) review of 2016 lists the five most and least profitable hospital departments. Five most profitable departments include: Neurosurgery, thoracic surgery, orthopedic surgery, vascular and plastic surgery while the five least profitable departments include pediatric infectious disease, hematology and oncology, endocrinology, pediatrics and preventative medicine.

Healthcare payment methods

There are multiple ways of healthcare payment methods in the US including self-pay, employee sponsored plans, Medicare and Medicaid. Self-pay is when a patient pays out of pocket for a medical procedure. Private individual health plan is when a consumer buys insurance from a company. Employee sponsored plan is when someone buys through an employer. Medicare is a federally funded program that provides health care coverage to people over 65 or with end stage renal disease. Medicaid is a joint health program that assists low-income families.

The majority of the US citizens have health insurance plans. However, rising premiums and decreasing quality of the policies is causing problems. The lack of insurance coverage is profoundly impacting the country. There were 28.9 million uninsured people in the country as of 2017 which makes up to 10.7% of the population. Coverage by employer-provided insurance is very inconsistent. Firms with more number of low-wage workers tend to provide less access to their employees than companies with less number of wage workers (Kaiser, 2015).

Coverage trend in Massachusetts

Coverage is defined as “unique Massachusetts residents with primary, medical membership in the 14 largest commercial payers, MassHealth (Medicaid), and Medicare (CHIA report, 2019)”. The healthcare expenditure coverage trend in Massachusetts for the year of 2017 shows an increase in the enrollment for commercial insurance and Medicare but a decrease in MassHealth as shown as follows:

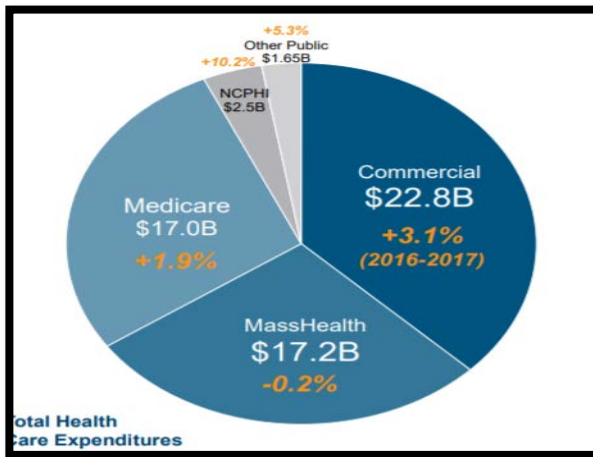


Figure 7: CHIA Annual report, September 2018

Factors of US Hospitals associated with improved profit margins

It is very essential to understand the financial performance of hospitals because of the declining margins from Medicare and Medicaid and lower reimbursements. Hospitals are adopting several strategies to combat the increasing financial pressure. Some strategies include changes in accounting system where a patient might be up coded to a higher level of severity, facilitating more reimbursed, diagnostic related group (DRG). Another strategy involves providing more profitable services. Third strategy includes changing the mix of patients served – from less reimbursed public insurance enrollees to better reimbursed privately insured patients. Lastly, hospitals could increase their prices or lower their costs. Reducing costs may involve taking measures such as reducing the length of the stay of the patients.

The Association between hospital margins and quality of care

Research conducted by Ly DP and Jah AK, indicates that there is a direct relation between hospital margins and quality of care which makes it very important to look at the operating margins of hospitals. The increased competition among private sector payers has resulted in increasing financial pressure on hospitals (MedPAC, 2005). At the same time, hospitals are being held accountable for high quality of care, making the financial environment for hospitals very challenging..

Increasing financial pressure on hospitals results in lower segment margins. National metrics on quality indicate that there is a direct association between hospital margin and quality of care. In one of the research studies conducted by Encinosa & Bernard DM (2005), operating margin of acute care hospitals was evaluated to conclude that the patients have significantly higher odds of having adverse safety events when hospital margins decline over time.

Additionally, there is a consistent negative relationship between operating margin and readmission rates. In the findings of the research conducted by Dan Ly and Ashish Jha (2012), operating margins varied substantially across hospitals, lower margins led to lower quality of care and hospitals with low margins were more likely to close or merge. As said by Jha, in simpler terms, “No margin, no mission.”

Impact of Hospital Service Line Profitability on the Likelihood of Readmission

The direct relationship between the hospital service line profitability and the quality of care can be reflected in the readmission rates. Reduction in payment for care will lead to a reduction in expected profitability if the expected costs of care remain constant (Navathe et al.). In one of the studies conducted by Amol Navathe, he included hospitals that reported costs in three consecutive years to understand the relationship between profitability and readmission rates. The study involved 4,822 hospitals. The data was analyzed to calculate the profitability by calculating the average service line markups across the national sample of hospitals over three years while the readmission rates were calculated based on if the discharged patient was readmitted within 30 days of discharge.

The results of the study revealed high profit margins in departments like Medical cardiology, Gastroenterology, Invasive cardiology, Pulmonology and Surgical orthopedics. These departments also revealed a lower readmission rate.

RESEARCH METHODOLOGY

The project was designed to be an integration of quantitative and qualitative study of financial sustainability of hospital departments. In order to accomplish this, I focused on the state of Massachusetts. I used the cost reports collected by CHIA (Center for Health Information and Analysis) to focus on 62 acute care hospitals located within Massachusetts. Each hospital had over 80 departments that were evaluated as part of this research study.

The access to the reports was requested from CHIA in October 2018 and then again in January 2019 because the access to the portal can only be granted for a few months. 21 cost reports were available for each year as listed: Basic summary, financial summary, Statistics, Supplemental, stats and revenue by payer, Gross patient service revenue, reclassifications, adjustments, direct expenses, FS reconciliations, financials, observation, general and statistic cost, stepdown including capital, stepdown excluding capital, statistic ancillary, patient expense including capital, patient expense excluding capital, Drug discount program (340 B), physician compensation and reclass organ acquisition from special cost centers.

Each report was extracted as an Excel file and thoroughly evaluated to trace the revenue and direct expense by department.

- Financial summary file was used to extract revenue by department. Columns were sorted to only extract gross revenue by each department for 62 hospitals using Kutools add-in. The first two rows including tab number and heading were merged followed by concatenation with the third row including the department name. The file was edited in a way to display the Hospital name, Organization Id (a unique ID used for

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each hospital) followed by the revenue by each department organized in an alphabetical order. Files from both 2016 and 2017 were merged with the addition of another column indicating the year.

- Direct expense file was used to extract expenses by each department. Columns were sorted exactly like the Financial summary file followed by the merging of cells and organization of the file. Files from 2016 and 2017 were merged together.
- Edited financial summary and direct expense files were merged together into a separate file indicating revenue and expense sorted by year and by department.
- The merged file was then used to calculate by segment margin of each department as a percentage of revenue by subtracting direct expense from revenue of each department and finally dividing it by revenue.
- Segment margin report was exported as a separate file and imported into Tableau after adding an extra row including the average of the segment margin of each department of all hospitals.
- In Tableau, Name, Org ID and year were set as dimensions. All the departments were imported as measures. Columns were used to display names of the hospitals and measure names while rows were used to display measure values.

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- Filters for Hospital names and departments were added.
- Similarly, gross revenue of each department was extracted from the merged Excel sheet using the Kutools add in and imported into Tableau using Name, Org Id and year as dimensions and departments as measures.
- Filters for hospitals and departments were added.
- Finalized worksheets were exported into dashboards for better representation of segment margin and revenue of each department on an average and by each hospital.

Why focus on Massachusetts?

A state as small as Massachusetts reported an annual healthcare expenditure of \$61.1 billion for 2017. For 2017, the total healthcare expenditure per capita was below the 3.6% benchmark set by the Health Policy Commission (HPC). As per the Annual report on the Performance of Massachusetts Health Care System, total healthcare expenditure (or THCE) for Massachusetts did grow but only by 1.6% which translates to \$8,907 per resident.

Even though that is a significant number, it is still good news for Massachusetts because the health expenditure per capita is still below the national average of \$10,799.

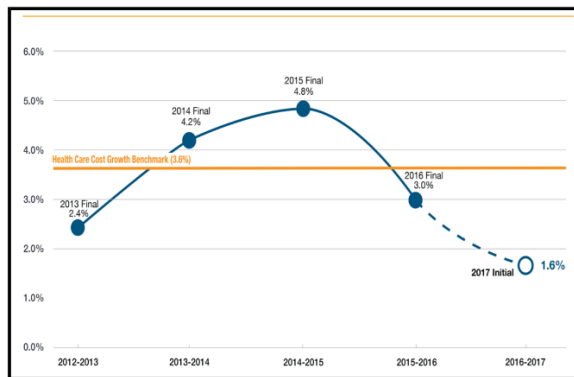


Figure 8: THCE per capita growth for 2017, Annual health care report by MHPC

This means that the health expenditure in Massachusetts is growing but is still contained which is why I chose to analyze what are the drivers of the THCE in Massachusetts.

CHIA

CHIA or Center for Health information and analysis is an agency based in Boston. Their mission is to “be the agency of record for Massachusetts health care information, to responsibly steward sensitive and confidential data, and to objectively report reliable and meaningful information about the quality, affordability, utilization, access, and outcomes of the Massachusetts health care system.”

CHIA’s database includes Massachusetts all-payer claims database, payer data reporting, information on Massachusetts hospitals, acute hospital case mix database, and Massachusetts financial performance information

For this study, I used the acute hospital case database, Hospital financial performance reports and Long term care database.

RESULTS AND ANALYSIS

The average gross revenue of each department across all the hospitals is represented in the graph below:

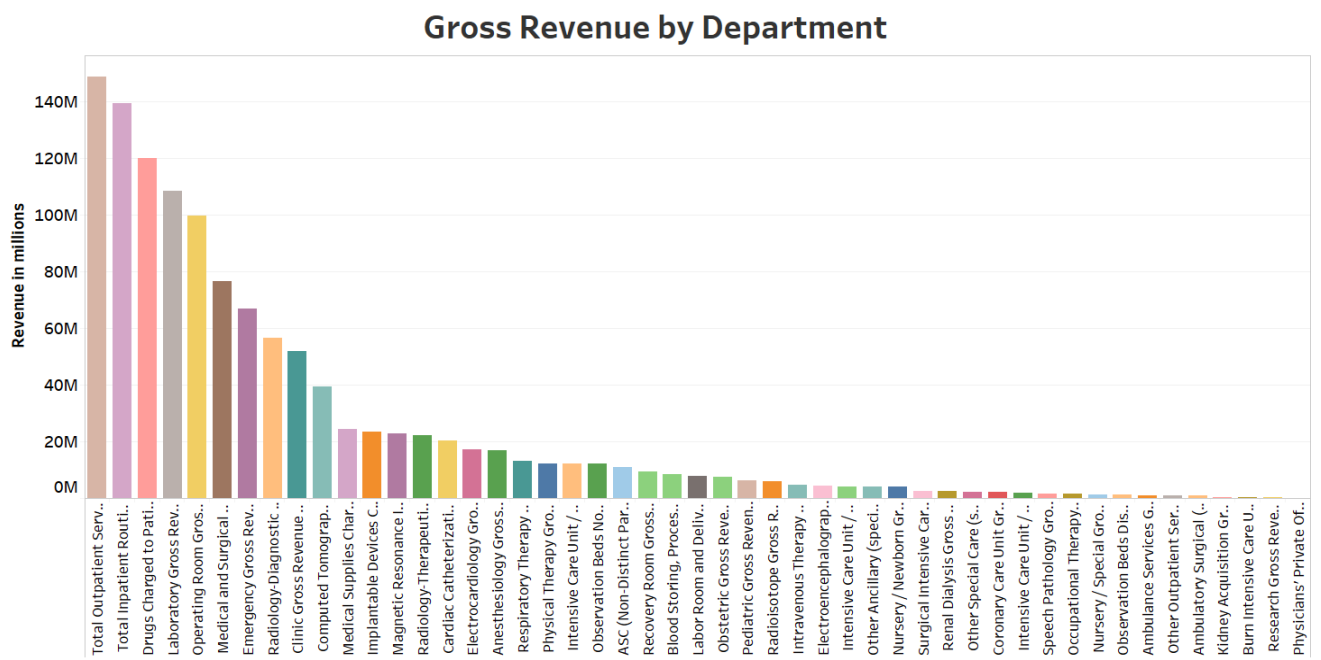


Figure: 9 Average gross revenue of each department across all the hospitals

The graph indicates the average gross revenue across departments. It demonstrates that some departments outperform others by a significant percentage when it comes to revenue. Some of the high revenue generating departments are: drugs charged to customers, laboratory, operating room, medical and surgical, emergency, radiology and medical supplies charged to

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the customers. It is interesting to note that on an average pediatrics department seem to be generating as per the graph.

Pareto rule application

The Pareto principle (also known as the 80/20 rule, the law of the vital few, or the principle of factor sparsity) states that, for many events, roughly 80% of the effects come from 20% of the causes.

In this case, the application of Pareto rule revealed that 80% of the average revenue generated by all the departments is streamlined to only 13 departments. The total average revenue generated by all the departments across the hospitals was calculated to be \$1.2 trillion and 80% of the revenue (\$970 billion) is generated by the following departments:

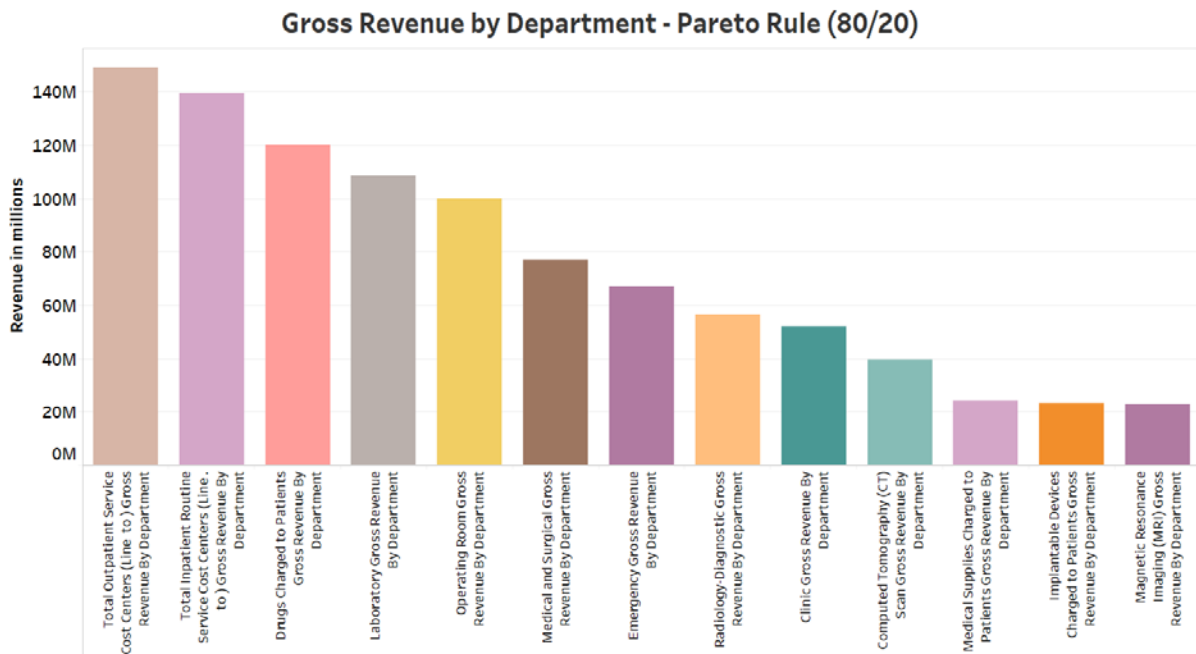


Figure 10: Gross Revenue – Pareto rule

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The above graph shows that these departments make up 80% of the average revenue generated by all the departments.

Segment Margin

Measure of revenue generated by a department is not an accurate representation of the financial sustainability. Hence, segment margin was calculated. Segment margin is the amount of net profit/ loss generated by a portion of business. It is a true representation of financial sustainability of a department.

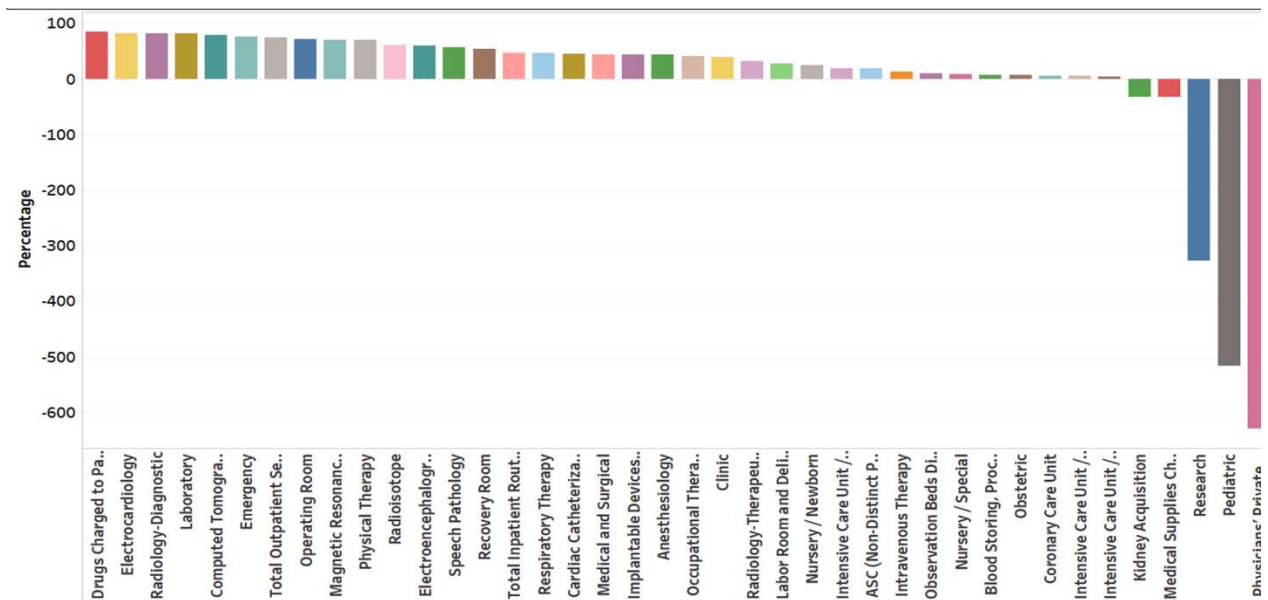


Figure 11: Segment margin as a percentage of a revenue across departments

The graph above demonstrates the segment margin as a percentage of revenue. It illustrates that some departments generate more revenue compared to the expenses incurred in comparison to others.

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Some of the departments in this graph are consistent with the departments represented in the revenue graph including drugs charged to patients, electro radiology, laboratory, operating room etc. However, other departments like radiology, research, medical supplies charged to customers are inconsistent with the revenue graph. This indicates that even though some departments seemed like they were generating a lot of revenue, they were actually in the negative with respect to segment margin, implying that the expenses incurred by these departments exceeded the revenue.

Some of the most significant departments with notable observations are displayed as follows:

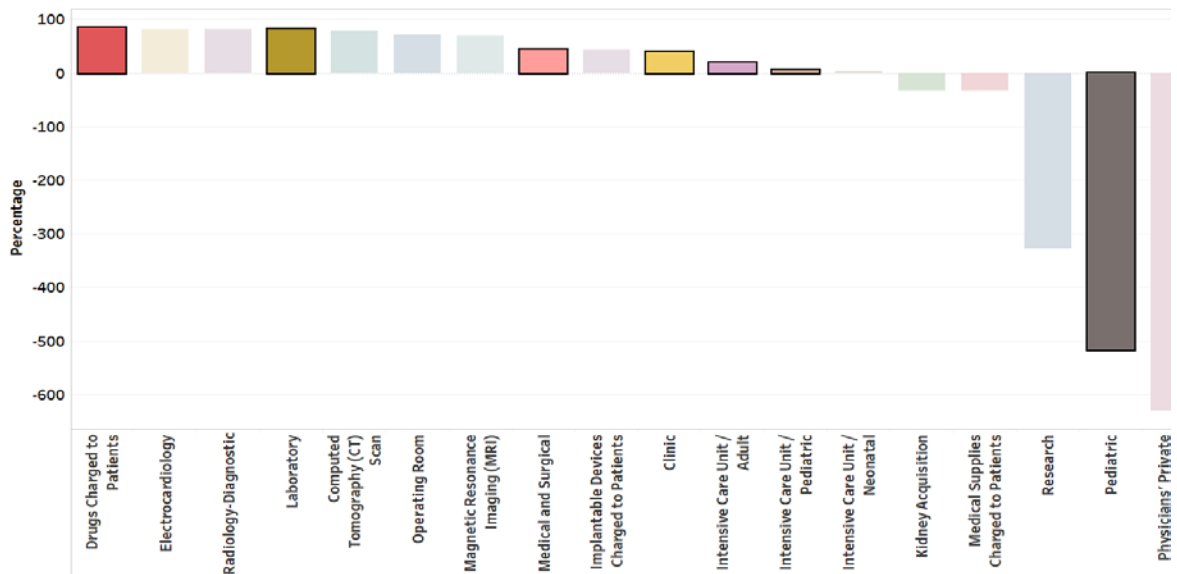


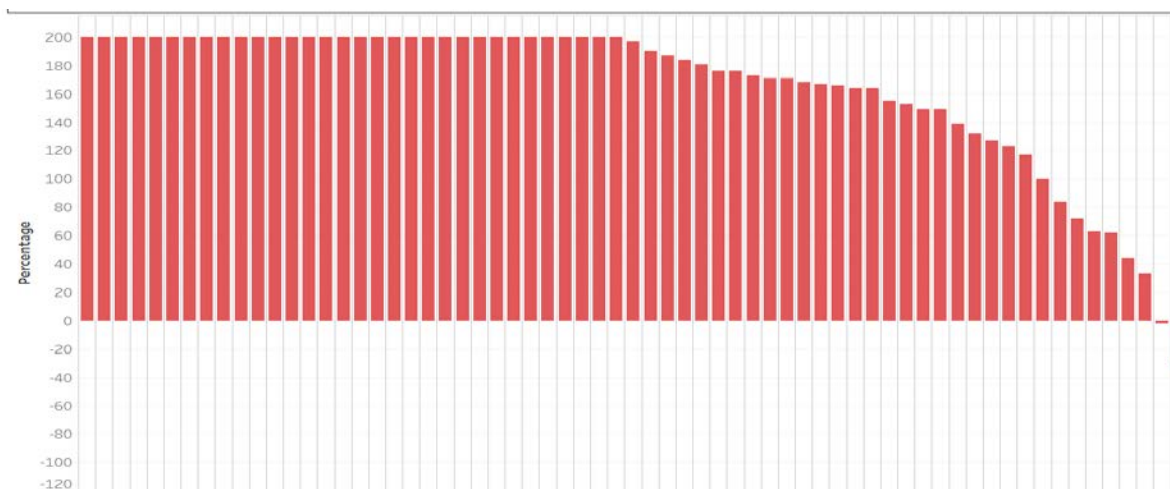
Figure 12: Significant departments with segment margin as a percentage

KEY FINDINGS

Some of the notable observations while looking at the graphs are:

1. Drugs charged to patients

The huge segment margin of a 100% indicates that the revenue generated by due to the drugs charged to patients is twice as much as the expenses incurred for it. In order to further break it down, I looked at the segment margin for drugs across all the hospitals and the graph is displayed as below:



drugs could be because the government in the US does not regulate prices of prescription drugs. The opaque system of rebates makes it a complex industry.

2. Pediatrics

One of the notable observations for segment margin in comparison to revenue is the Pediatrics department. The revenue graph suggests that the department is making seemingly large revenues on average. However, the segment margin of the department is in a negative region indicating that the department is losing money on an average. The pattern is consistent all over the US as the department is slowly turning into an outpatient visit in most of the hospitals. Some of the reasons for this include “unnecessary CT scan scans, excessive antibiotic use, errors in dosing, wrong diagnosis (Wells, 2018).” Pediatrics has typically been a financial loss for most of the hospitals because it is a labor intensive unit that requires a lot of personnel to accomplish basic procedures which eventually leads to less patients being treated. Lastly, reimbursements are much less in the department, resulting in losses.

3. ICU/PICU:

One of the key observations while comparing segment margins of ICU and PICU are that an adult ICU is making a significant amount of profit while a pediatric ICU is almost making a negligible amount of profit. It is again possible that PICU is a more labor intensive than a normal ICU, incurring more expenses and thus reducing the segment margin.

CONCLUSION

Financial pressures have forced hospitals to reduce costs. Hospitals are pursuing sustainability efforts for a wide range of reasons and in a variety of reasons, with leaders seeking solutions that work best for their organization (Hret, 2014) Some hospitals are implementing energy efficiencies (Memorial Hermann Health system) while other by purchasing environmentally responsible computers (Kaiser Permanete). While accessing the sustainability, revenue is used as a measure to decide if the hospital should implement strategies to reduces costs or not.

However, before any of that takes place, it is essential to understand the “true of cost of healthcare.” Revenue does not give an accurate picture of the financial sustainability of the cost of healthcare. Hence, it is important to evaluate the profitability/ segment margin by subtracting the expense from the revenue and then equating it to revenue.

Segment margin for individual departments is important information for decisions about expansion or contraction of departments because the effect on profitability is critical to forecast cash flow and hence make short-term financing decisions.

Segment margin is an important measure in understanding the financial sustainability of a department and is critical for managers to consider in their resource-allocation decision.

Moreover, there is a direct correlation between the operating margin and the quality of care. Hence, it is important to examine the operating margin rather than looking just at the revenue. It is important to look the specific departments to analyze their margins and see if that can be brought down – drugs being the most common one. There should be enforcement on reducing the cost of production and increasing the transparency in pricing.

Another approach is to apply Activity Based Costing (ABC) to unprofitable departments to better understand how costs arise in those departments. It is likely they are not charging enough for the true cost of services rendered. They can use the ABC system to justify costs to insurance companies to argue for higher reimbursements.

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