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# A Review of Abdominoplasty and Lipectomy Post-Operative Management and Comorbidities at LVHN

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## Background

### History

Abdominoplasty and lipectomy date back to the late 1800s at the dawn of what would be considered the modern surgical era. The origin of body contouring started in 1870 with the resection of abdominal skin and fat to be able to conduct reduction of massive umbilical hernias. In this scenario the surgeons would remove the pannus as if facilitated the repair and had a favorable cosmetic outcome. Figure 1 below demonstrates this original technique which lead to the removal of the umbilicus [1]. The procedure became more common and began to evolve. By 1905 a new technique for repairing large hernias utilizing a transverse abdominal incision was reported. This technique was the first umbilical sparing technique. Later a German physician would develop the clever leaf incision which was a combination of a vertical and oblique incision and the technique can be seen in Figure 2 [1].

As the practice became more common new techniques were developed in a continually evolving environment to find the best solution to resection of the abdominal wall fat and excessive skin. Some of the techniques were umbilical sparing while others were not. One such umbilical sparing implored the resection and transplant of the umbilicus to its new location to maintain the aesthetics of the patient. Each technique involved various aspects some requiring undermining of the abdominal wall while others did not [2]. Some of the various techniques can be viewed below in the following chart, tables and figures [1].

The primary goal of surgeries during this period was not aesthetics but removal of excessive tissue limiting the surgery. Surgeries of the late 1800s and early 1900s were risky due to lack of infection control and safety issues with anesthesia. Due to the inherent risks with surgeries they were only done when absolutely required. It wasn't until much later when advances made operations safer that abdominoplasty and lipectomy became more acceptable as the main treatment of a condition specifically for aesthetic reasons. By the 1950s to 1980s surgical procedures, anesthesia, and infection control had come far enough that a reassessment of abdominoplasty as a strictly aesthetic procedure to treat laxity of the skin and abdominal musculature began [3].

### Changes to insurance

With the ever growing cost of health care, insurance providers have been changing how they reimburse hospitals and physicians for the care they provide. In years past hospitals billed for each step of care provided and were reimbursed on a Fee for service (FFS). The changing demographic has become that insurance providers will reimburse hospitals and physicians a specific amount based on the diagnosis and operation, value-based reimbursement. It then falls to the hospital to effectively manage all of the patients care for that specific sum.

The changing demographic is in response to the rising cost of health care which according to the Center for Medicare and Medicaid Services in 2015 in the US grew 5.8% from the previous year reaching \$3.2 trillion or \$9,500 per person. This represented 17.8% of GDP in 2015 [4]. In a review of costs according to the Kaiser Family Foundation, the average cost per night in a non-profit hospital, in 2015, in the US was \$2,413 and for the state of Pennsylvania it was \$2,377 [5]. The goal of value-based care is to incentivize delivery of efficient, cost effective, quality care. Value-based reimbursement is intended to eliminate any incentive to do more when not indicated that may be present under a FFS model [6].

With the changes to reimbursement hospitals have noticed their overall reimbursement decreasing. This is seen in all parts of health care including the OR. Reimbursement as a whole for operations has been decreasing. An assessment of reimbursement for general surgical procedures demonstrated the complex nature of health care billing. Reimbursement depended on a number of factors including insurance provider, physician, specific modifier codes, and region. The assessment did find an overall declining trend for reimbursement of various general surgery procedures [7].

### Changing Trends

With the climate what it is and declining reimbursement it has forced hospitals and health systems to reevaluate costs and where costs can be eliminated. As noted above the changes have had some of the desired effect, forcing hospitals to review the care they provide and where they can limit costs while still providing quality care [8]. One of the areas health systems have been targeting is operations which have traditionally required patients to be admitted for a single night post operatively for observation. With better surgical practices, close follow up, and an assessment of outcomes there has been a growing trend transitioning these operations from inpatient to ambulatory.

A number of factors play into whether or not an operation can be done as an ambulatory or inpatient case. The most significant of which is the consideration of anesthesia. Procedures done under general anesthesia usually require admission which is how abdominoplasty and lipectomy had been done. In the 1994 and 1995 a study was done that showed abdominoplasty could be done under conscious sedation with comparable safety as to historical general anesthesia [9]. Since this study abdominoplasty performed under conscious sedation has become more common. Key factors with this involved proper patient selection. Other studies have been done utilizing conscious sedation and local anesthetics. One such study published in 2006 found it safe to perform abdominoplasty and lipectomy utilizing conscious sedation and local and region anesthetics. Specifically this study looked at the use of rib blocks [9]. It further confirmed the viability of conscious sedation as an option combined with local and region anesthesia to conduct abdominoplasty as an outpatient procedure.

Patient selection plays a key role in the safe conduction of ambulatory operations. Many factors such as comorbidities must be assessed to determine if a patient is a good candidate for ambulatory operations. In the original study in the mid 90's they showed patients with an ASA of 1 or 2 had no significant risk of negative outcomes from conscious sedation [9]. Other factors play key roles as well such as adverse events during surgery and post operative complications. One study showed that the seven types of adverse events identified as predictors of a prolonged post operative stay were all modifiable, with excessive pain and post operative nausea and vomiting being the two primary post operative complications leading to a longer stay [10].

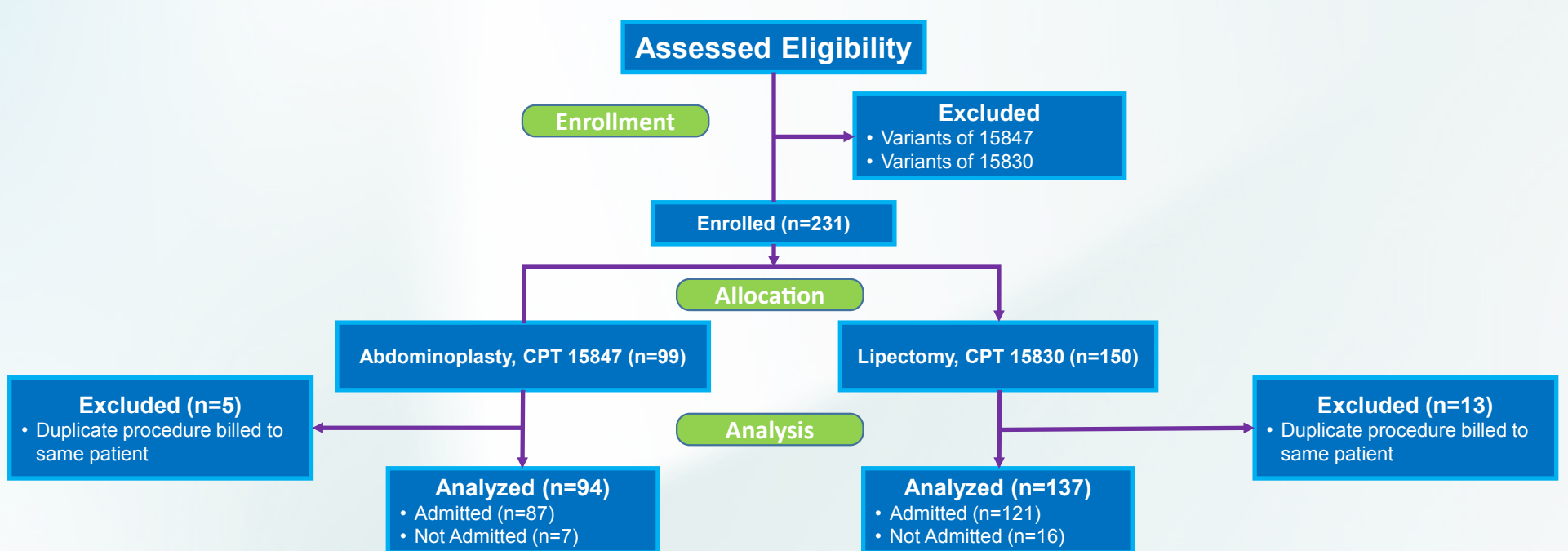
All these factors considered, from changing trends in insurance, to evolving trends in patients care and anesthesia, to average cost for a single night stay, warrants a review of the practice patterns at LVHN to assess where it stands, what improvements can be made, as well as keeping up to date on what the best practices are. This project will act as a quality improvement tool and attempt to establish a baseline of the current admission practices for abdominoplasty and lipectomy.

## Problem Statement

With a growing trend in conducting procedures as outpatient instead of inpatient with a short post operative stay due to decreasing insurance reimbursement, how do LVHN practice patterns align with the growing trend.

## Methods

This was a quality improvement retrospective chart review looking at all patients receiving an abdominoplasty or lipectomy from the plastic surgery department in the Lehigh Valley Health Network (LVHN) system from August of 2013 until August of 2016. A database of all the patients receiving an abdominoplasty or lipectomy was established based on the corresponding CPT codes, 15847 and 15830 respectively. The database was stratified to look at a number of factors including: Age, BMI, Smoking Status, Diabetes (DM), Coronary Artery Disease (CAD), Hypertension (HTN), Chronic Obstructive Pulmonary Disease (COPD), History of hyperemesis, History of Opioid use, Post operative Admission, and Length of post operative admission. Patients who had a variant of one of the CPT codes were not included. Some patients received both an abdominoplasty and a lipectomy and these patients were included in the final database. Patients were not excluded based on age, sex or any other criteria. The criteria for inclusion was that they had one procedure billed under the CPT code of 15847 or 15830. This yielded a total of 250 procedures split into 2 groups, abdominoplasty having 99 and lipectomy 150. In these 2 groups some patients had a CPT code listed twice. Because of how the database was compiled it generated duplicates for some patients. In these cases the duplicate CPT code was deleted so each patient could only represent 1 entry per category resulting in 137 patients who received a lipectomy and 94 who received an abdominoplasty. Of all the 137 patients 94 patients had both abdominoplasty and lipectomy. All 137 patients received a lipectomy. Of those 137 only 43 received only a lipectomy. All 94 patients who received an abdominoplasty also received a lipectomy. The two groups of 137 and 94 patients, lipectomy and abdominoplasty respectively, were analyzed separately and compared.



## Results

Of the 250 procedures 18 were duplicates on the same patient, 5 abdominoplasty and 13 lipectomy, leaving 231 procedures analyzed. Of the 231 procedures analyzed 94 were abdominoplasty and 137 were lipectomy. In this there were only 137 distinct patients. All 137 patients received a lipectomy, 94 of the patients received abdominoplasty and lipectomy. All the patients receiving an abdominoplasty also received a lipectomy. Table 1 shows the breakdown of the admission rates comparing patients who received an abdominoplasty to those who received a lipectomy. For patients admitted for abdominoplasty or lipectomy, 80.46% and 71.31% respectively, were admitted for only a single night and discharged home after. Of those admitted for abdominoplasty or lipectomy, 10.34% and 10.71% respectively, were admitted for 2 nights. Maximum number of nights admitted for those receiving an abdominoplasty or lipectomy was 7 days and 11 days respectively. The average age of those who underwent a lipectomy was older than those who underwent an abdominoplasty, 48.58 years old and 46.51 years old respectively. In contrast Table 3 shows the average age of those admitted for abdominoplasty and lipectomy, 46.31 years old and 48.31 years old respectively, verse those not admitted for abdominoplasty or lipectomy, 49 years old and 51.13 years old respectively, was less. This showed the average age of those not admitted was higher than the patients that were admitted. Table 1 also shows that of the patients undergoing abdominoplasty or lipectomy, 7.45% and 11.68% respectively, were discharged home with no hospital stay. Comparing the admission rates of the 2 groups there doesn't seem to be a large difference between the 2 demographics with the vast majority of the patients being admitted for only a single night. Looking in Table 2 and Table 3 the patients comorbidities are stratified by procedure and admission. Those not admitted for both procedures had a lower rate of smoking and hypertension for patients undergoing either procedure as compare with the patients who were admitted. The rate of diabetes in the admitted patients was lower than those discharged home with no post operative admission. The other factors analyzed were mixed as can be seen in Table 2 and Table 3, Table 4, and Table 5 show the distribution of patients admitted by the number of days they were admitted for. This can be seen graphically in Figure 1 and Figure 2. The numbers show a large left sided skew towards very short admissions tailing off to the right of the figures.

Table 1.			
	Abdominoplasty (15847)	Lipectomy (15830)	Combined
Number of admits	87	121	208
Discharged home	7	16	23
Average nights stayed	1.40	1.88	1.68
Total nights of admit	122	228	350
Longest admit (days)	7	11	11
Patients staying 1 night	70	87	157
Percent admitted staying 1 night	80.46%	71.31%	75.48%
Percent not admitted	7.45%	11.68%	9.96%
Percent admitted staying 2 nights	10.34%	10.74%	10.58%
Total number of patients	94	137	231
Average age of admitted	46.31	48.31	
Average age not admitted	49	51.13	
Average age	46.51	48.58	

Table 2.					
	HTN	HTN % of Group	COPD	COPD % of Group	Average Age
15830 admitted	44	36.36%	6	4.96%	48.31
15830 not admitted	3	18.75%	3	18.75%	51.13
15847 admitted	27	31.03%	2	2.30%	46.31
15847 not admitted	0	0.00%	0	0.00%	49

Table 3.					
	Smoking Status	Smoking % of Group	DM	DM % of Group	CAD
15830 admitted	15	12.40%	19	15.70%	2
15830 not admitted	0	0.00%	4	25.00%	2
15847 admitted	10	11.49%	10	11.49%	1
15847 not admitted	0	0.00%	1	14.29%	0

Table 4. 15830		
Number of Days	Number of Patients	Percent of Patients
1	87	71.90%
2	13	10.74%
3	6	4.96%
4	3	2.48%
5	4	3.31%
6	0	0.00%
7	4	3.31%
8	1	0.83%
9	2	1.65%
10	0	0.00%
11	1	0.83%
TOTAL	121	100.00%

Table 5. 15847		
Number of Days	Number of Patients	Percent of Patients
1	70	80.46%
2	9	10.34%
3	3	3.45%
4	2	2.30%
5	2	2.30%
6	0	0.00%
7	1	1.15%
TOTAL	87	100.0%

Figure 1. Number of Patients Admitted by Number of Days

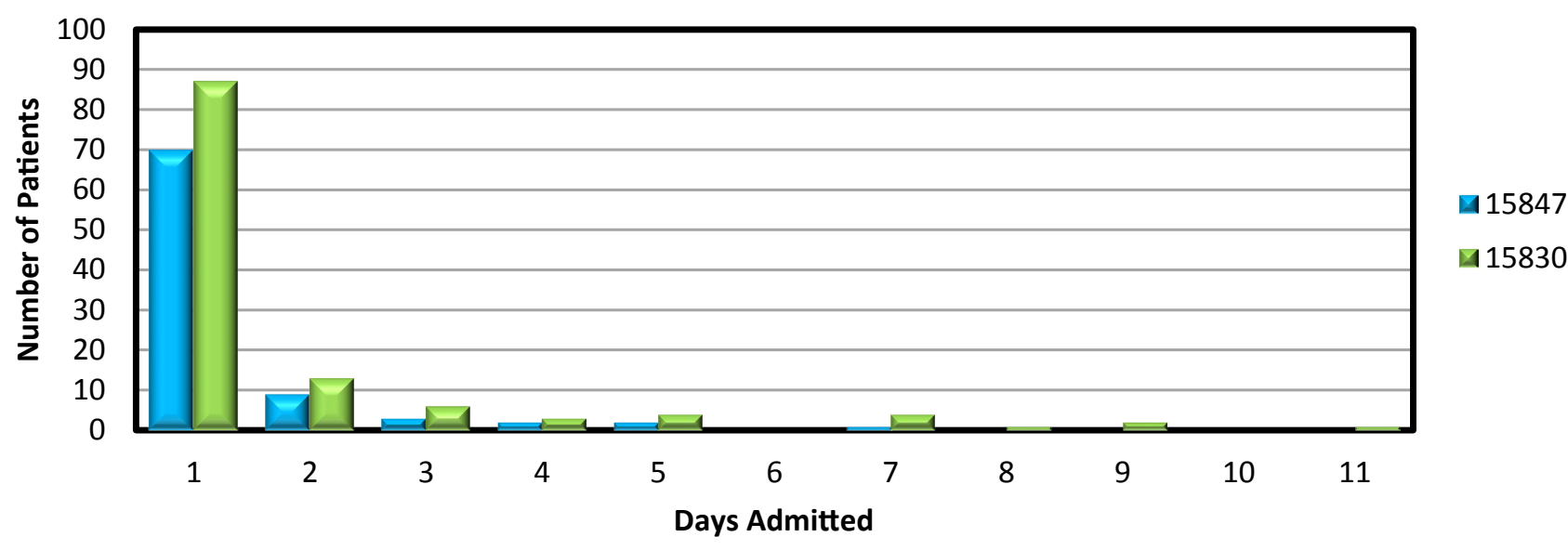


Figure 1: Overall and progression free survival compared by right and left side for all colon malignancies as well as stage IV showing that R sided malignancies have better outcomes.

Figure 2. Percent of All Patients Admitted in Each Group by Number of Days

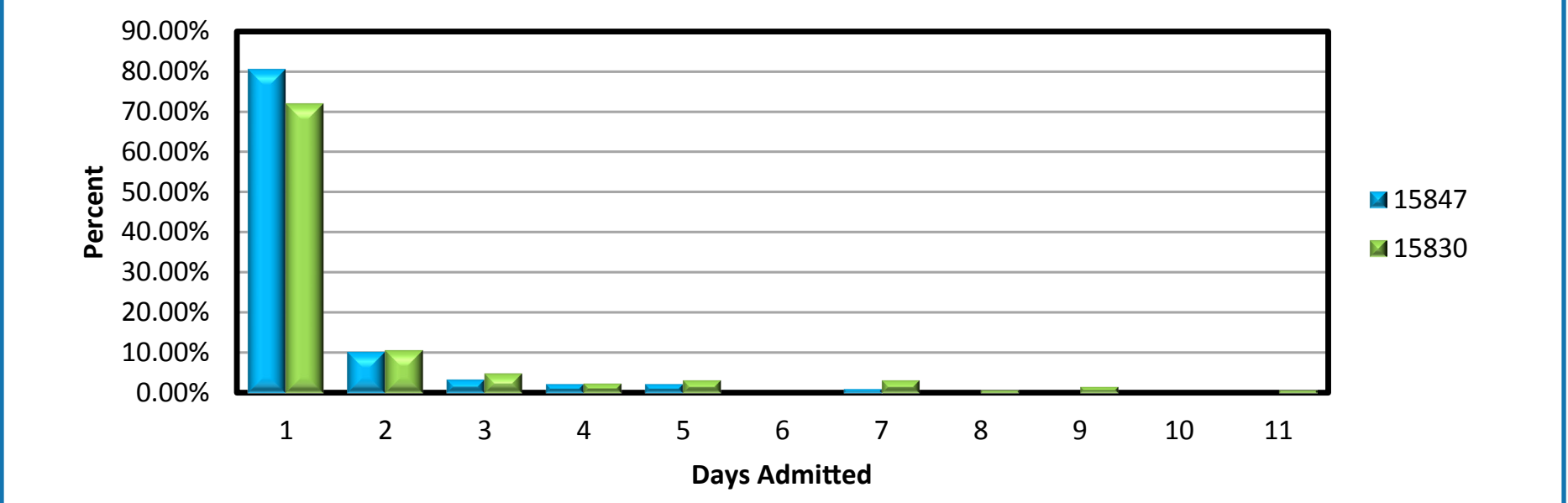


Figure 2: Tumor classification based on location demonstrating that stage IV population is similar to entire population of colon malignancies proportionally.

## Discussion

The aim of this QI project was to establish a baseline understanding of the current and recent practices surrounding postoperative management with regard to admission of patients undergoing abdominoplasty and lipectomy. To help focus the project the patient population analyzed was limited to 2 CPT codes 15847 and 15830 representing abdominoplasty and lipectomy respectively. The patients were stratified by various factors including Age, BMI, Smoking Status, Diabetes (DM), Coronary Artery Disease (CAD), Hypertension (HTN), Chronic Obstructive Pulmonary Disease (COPD), History of hyperemesis, History of Opioid use to see if there was any noticeable correlation between these factors and admission rates. While some of the stratifying factors did correlated others did not and no real discernible trend was noticed between the populations of admitted verse non admitted patients. They key trend obtained from the project was the rate of admission and the length of these admissions. The vast majority of patients were admitted for only a single night. As previously mentioned according to the Kaiser Family Foundation, the average cost per night in a non-profit hospital, in 2015, in the US was \$2,413 and for the state of Pennsylvania it was \$2,377. While some patients will still require admission many likely don't. With close outpatient follow up and careful patient selection physicians could discharge patients home the same day as surgery helping to reduce the overall cost of the care provided, cost to the hospital, and cost to insurance providers.

The project had a number of limitations, the most significant being the number of patients. While the size of the study itself as a whole was ok the two populations, patients undergoing abdominoplasty and lipectomy, were virtually indistinguishable from each other. Of the 137 patients analyzed all of them had la lipectomy, 94 of them had both procedures an abdominoplasty and lipectomy, and 43 had only a lipectomy. This is likely the reason the two groups correlated so strongly for rates of admission, and average length of stay. The project inclusion criteria being based on the two specific CPT codes limited the number of patients that would have otherwise met the general parameters of the study design. A larger volume of patients who all underwent similar surgeries would increase the power of this study as well as give a broader view of the practices for abdominoplasty and lipectomy at LVHN. Various CPT codes can be used for relatively similar procedures and in the future opening the study to include more CPT codes for each group could help to show trends between the 2 groups as well as a general trend for these types of abdominal surgeries. In some of the cases the patient was operated on by more than just the plastic surgery team. In these cases their length of stay may have been dictated by the other team or the extent of the surgical procedures the patient underwent. In more than 1 occasion the patients had full hysterectomies, other gynecological surgeries, and hernia repair. This factor was not addressed nor were these patients excluded from the analysis.

Building off this QI project the for the future other factors could be evaluated to look for trends in admissions to help determine if there are additional factors not seen here which lead to the physicians decision to admit the patient. Including an evaluations of post operative complications and readmission rates of these patients would give another data point to see how many patients are being readmitted or are later admitted after being discharged straight home after the operation. As mentioned above the inclusion criteria could be increased to include patients undergoing similar surgeries that are coded different but clinically equivalent to give a wider breath of patients to full view the practice patterns of the physicians at LVHN. Future studies should endeavor to add an addition exclusion criteria limiting the database to patients who only had operations conducted by the plastic surgery department.

## SELECT

This QI project demonstrates various aspects relating back to the principles of SELECT, most significantly being health systems. With the adapting conditions of health care reimbursement hospitals must stay up to date on their practices constantly seeking to improve to provide the best, most cost efficient health care. Evidence based medicine is a key principle to improving patient care. Knowing the best practices is only part of the puzzle though. Understanding the practices at an institution can help to illuminate where these best practices can be applied. With the ever changing landscape of medicine it may not always be readily apparent and this is the reason for quality improvement. Secondly the project encompasses patient centered care. Patient centered care is not just about providing the most or best health care to patients but also the most cost effective. Avoiding unnecessary procedures or tests is obvious but this applies to unnecessary admissions as well. While it may seem like a patient is getting more care by being admitted, being admitted puts patients at increased risk for hospital acquired infections. Limiting unnecessary risks is key to patient centered care just as much as limiting unnecessary costs where we can.

The goals of this project were to better understand the quality improvement process to help me be able to utilize it and apply it later in my career as well as help the surgeons at LVHN understand their current practices as they align with evolving trends in care. The process has given me a strong base in quality improvement process as regards to gathering the basic data and analyzing it to understand the current practice patterns of an institution. At this point I have only had brief interactions with my mentor and team with regards to the results of the project. As it stands I have made them aware of the initial findings that were presented in the submission of the abstract when the data had been analyzed only for admission rates and length of stay. Even so at that point it was met with positive feedback as they were not aware to the extent that these patients were being admitted for only a limited time. To this effect I believe the project has helped me understand the trends and help to inform the plastic surgeon department to these trends.

## Conclusions

The current practice patterns reflect a strong tendency to admit patients after both procedures. Both procedures, lipectomy and abdominoplasty, showed the vast majority of patients that were admitted, were only admitted for 1 night, 71% and 80% respectively. Of the patients who underwent a lipectomy or abdominoplasty, only 11% and 7% respectively were treated as outpatients. This shows the current practice is still largely in favor of admitting these patients for a single night postoperatively. The median number of nights patients were admitted for in both cases, lipectomy and abdominoplasty, was 1 night. This shows while the average number of nights is slightly greater than 1 for both operations this is largely due to a small number of the patients acting more as outliers pulling the average up. Evaluating the various comorbidities demonstrated no real noticeable trends. The patients discharged home tended actually to be older than those admitted which goes against conventional thought that older patients would likely need more care. The comorbidities that were evaluated did not support that the admitted patients were potentially sicker and thus needed admission. Further evaluation looking into other complications postoperatively as well as readmission rates could help to show the decreased need for postoperative stay with regard to these two procedures leading to decreased health care costs and potentially post operative complications.

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