A Comparative Analysis of Readmission Rates After Outpatient Cosmetic Surgery

Aesthetic Surgery Journal
2014, Vol. 34(2) 317–323

DOI:10.1177/1090820X13519796
www.aestheticsurgeryjournal.com
SAGE

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Abstract

Background: Despite the increasing scrutiny of surgical procedures, outpatient cosmetic surgery has an established record of safety and efficacy. A key measure in assessing surgical outcomes is the examination of readmission rates. However, there is a paucity of data on unplanned readmission following cosmetic surgery procedures.

Objectives: The authors studied readmission rates for outpatient cosmetic surgery and compared the data with readmission rates for other surgical procedures.

Methods: The 2011 National Surgical Quality Improvement Program (NSQIP) data set was queried for all outpatient procedures. Readmission rates were calculated for the 5 surgical specialties with the greatest number of outpatient procedures and for the overall outpatient cosmetic surgery population. Subgroup analysis was performed on the 5 most common cosmetic surgery procedures. Multivariate regression models were used to determine predictors of readmission for cosmetic surgery patients.

Results: The 2879 isolated outpatient cosmetic surgery cases had an associated 0.90% unplanned readmission rate. The 5 specialties with the highest number of outpatient surgical procedures were general, orthopedic, gynecologic, urologic, and otolaryngologic surgery; their unplanned readmission rates ranged from 1.21% to 3.73%. The 5 most common outpatient cosmetic surgery procedures and their associated readmission rates were as follows: reduction mammaplasty, 1.30%; mastopexy, 0.31%; liposuction, 1.13%; abdominoplasty, 1.78%; and breast augmentation, 1.20%. Multivariate regression analysis demonstrated that operating time (in hours) was an independent predictor of readmission (odds ratio, 1.40; 95% confidence interval, 1.08-1.81; $P = .010$).

Conclusions: Rates of unplanned readmission with outpatient cosmetic surgery are low and compare favorably to those of other outpatient surgeries.

Keywords

readmission, outpatient, cosmetic surgery, National Surgical Quality Improvement Program (NSQIP)

Accepted for publication August 8, 2013.

Undergoing cosmetic surgery in an outpatient surgical setting continues to be a popular option in the United States.[1] According to recent data from the American Society for Aesthetic Plastic Surgery (ASAPS), 1 700 000 cosmetic surgical procedures were performed in 2012.[2] The morbidity and mortality associated with these operations have remained consistently low,[3-9] despite the increased scrutiny over health care costs and medical outcomes that have affected all surgical specialties.

Outcomes-based research has attempted to provide details about specific procedures and specialties in an effort to define known risks and options for improving patient care. Hospital readmissions, in particular, have entered the forefront of health care, serving as a reflection of the quality of patient care and as a potential focus for

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cost-containment efforts.[10-14] Unplanned hospital readmissions affect health care participants in various ways, ranging from increased emotional strain to heightened medical-legal risk to heavier financial burdens. Across the entire Medicare beneficiary spectrum, 19.6% of patients are readmitted within 30 days of discharge, with concomitant costs totaling more than $17.5 billion.[15]

For the field of outpatient cosmetic surgery, there is a paucity of data on unplanned readmissions. Consequently, we conducted the first multi-institutional analysis of unplanned readmission after outpatient cosmetic surgery. Interest in the American College of Surgeons–National Surgical Quality Improvement Program (ACS-NSQIP) has surged in recent years, and the program provides a unique platform for investigating readmission rates after surgery. Examining these rates can yield benchmark values and detail the causes and risk factors associated with unplanned readmission.

METHODS

Data Sources

The NSQIP database is a prospectively maintained surgical outcomes data set that currently extracts information from more than 400 participating community and academic hospitals. Preoperative risk factors, intraoperative variables, and postoperative morbidity outcomes are recorded for each case by trained surgical clinical reviewers. Data are isolated through telephone interviews and operative and clinical notes. Interrater reliability (IRR) audits of selected participating sites help ensure the collected data are of the highest quality possible. The combined results of IRR audits completed to date revealed an overall interrater disagreement rate of approximately 1.8% for all assessed program variables.[16] (A link to a map and list of participating hospitals can be found at http://site.acsnsqip.org/participants/.)

The present study did not undergo institutional review board approval because it is a retrospective review of data that were de-identified prior to distribution to participating institutions. De-identified patient information is freely available to all institutional members who comply with the ACS-NSQIP Data Use Agreement. The Data Use Agreement implements the protections afforded by the Health Insurance Portability and Accountability Act of 1996 and the ACS-NSQIP Hospital Participation Agreement. The ACS-NSQIP and the hospitals participating in this program are the sources of the data used in the current study; however, these entities have not verified and are not responsible for the statistical validity of the data analysis or the conclusions derived by the authors.

Study Population

A review of the 2011 NSQIP data set was performed for all patients with "Plastics" recorded as their surgical specialty. *Current Procedural Terminology* (*CPT*) codes correlating with a list of the most common cosmetic procedures published by ASAPS were used to isolate cosmetic surgery cases.[17] The specific surgical procedures captured in this analysis included liposuction, mastopexy, breast augmentation, reduction mammaplasty, abdominoplasty, rhinoplasty, brachioplasty, buttock lift, upper thigh lift, and blepharoplasty. All cases with a cosmetic *CPT* code were included in the analysis.

Outcome Measures

The primary outcome of interest was unplanned readmission. The 2011 NSQIP data set includes 2 newly incorporated variables to track different readmissions: (1) the variable entitled "readmission" represents all-cause readmission, meaning readmission (to the same or another hospital) for any reason in the 30-day period after the index surgery, and (2) the variable entitled "unplanned readmission" is defined as "readmission (to the same or another hospital) for a postoperative occurrence likely related to the principal surgical procedure" within 30 days of the procedure.[16] We utilized the unplanned readmission variable to calculate readmission rates and provide a more focused investigation of the predictors of readmission.

"Surgical complication" was defined as having ≥1 of the following NSQIP postoperative adverse events: superficial surgical site infection (SSI), deep SSI, organ/space SSI, wound disruption/dehiscence, or graft/prosthesis failure. Medical complications included pneumonia, unplanned intubation, pulmonary embolism, failure to wean from a ventilator, renal insufficiency, progressive renal failure, urinary tract infection, stroke, coma, peripheral neurologic deficiency, cardiac arrest, myocardial infarction, bleeding requiring a transfusion, deep venous thrombosis (DVT), and sepsis or septic shock.

Risk-Adjustment Factors

Patient demographics and medical comorbidities were tracked as potential confounders. Demographic data included age and sex. Medical comorbidities included diabetes, dyspnea, ascites, renal disease, chronic obstructive pulmonary disease, current pneumonia, ventilator dependence, chronic steroid use, bleeding disorders, heart failure, and coronary disease (myocardial infarction within 6 months of operation, angina, previous coronary intervention, or surgery), as well as cerebrovascular disease (previous transient ischemic attack or stroke), peripheral vascular disease, disseminated cancer, weight loss of >10% body weight within 6 months of operation, current chemotherapy or radiotherapy, preoperative transfusion, and preoperative sepsis. Alcohol use (defined as >2 drinks per day) and active smoking status were tracked as behavioral risk factors.

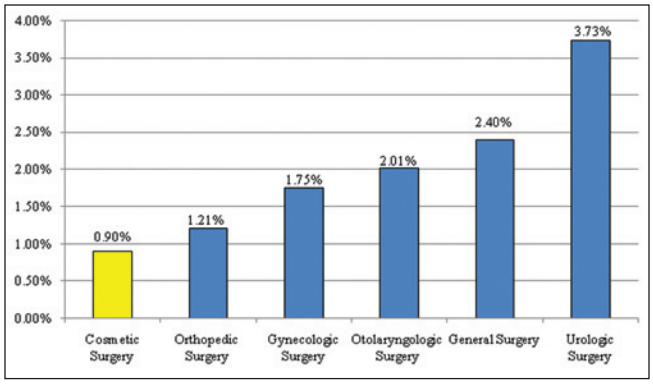

Figure 1. Readmission rates for outpatient surgery.

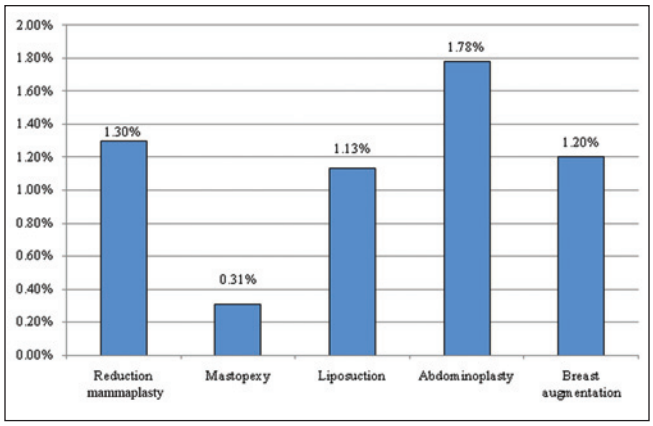

Figure 2. Subgroup analysis of readmission rates for the 5 most common outpatient cosmetic surgery procedures.

Statistical Analysis

The unplanned readmission rate was calculated for outpatient cosmetic surgery cases, as well as the 5 other surgical disciplines with the highest number of reported outpatient procedures (general, orthopedic, gynecologic, urologic, and otolaryngologic surgery). Subgroup analysis was performed on the 5 most common outpatient cosmetic surgery procedures captured in the NSQIP database: reduction mammaplasty, mastopexy, breast augmentation, liposuction, and abdominoplasty. Patient demographics, risk factors, and postoperative outcomes were tracked for readmitted and non-readmitted patients. Chi-square analysis and the Student *t* test were used to compare categorical and continuous variables, respectively.

Multivariate logistic regression models were used to determine predictors of unplanned readmission. Individual variables with ≥10 event occurrences showing prediction of readmission at a significance level of ≤0.20 in bivariate analysis were included in the multivariable models.

RESULTS

A total of 2879 outpatient cosmetic surgery cases were isolated from the NSQIP database. Twenty-six patients had an unplanned readmission, correlating with an overall readmission rate of 0.90% (Figure 1). The 5 disciplines with the highest number of outpatient procedures were general, orthopedic, gynecologic, urologic, and otolaryngologic surgery. Outpatient orthopedic surgery displayed the lowest readmission rate of the 5 tracked specialties (1.21%), and urologic surgery displayed the highest rate (3.73%; Figure 1). Subgroup analysis of the data showed that the 5 most common outpatient cosmetic surgery procedures in the NSQIP were reduction mammaplasty, mastopexy, breast augmentation, liposuction, and abdominoplasty. Among these procedures, abdominoplasty had the highest rate of readmission (1.78%), and mastopexy had the lowest rate (0.31%; Figure 2). Reduction mammaplasty, the most common procedure overall, had a readmission rate of 1.30%.

Demographic and other characteristics of readmitted patients were similar to those of patients not readmitted (Table 1). There were no significant differences in age, smoking status, alcohol use, or the presence of diabetes, hypertension, coronary disease, or cerebrovascular disease. Readmitted patients were heavier (body mass index [BMI] of 31.98 vs 28.52; $P = .007$), on average, and had higher rates of dyspnea (11.54% vs 2.07%; $P = .017$).

Nearly 65% of readmitted patients had a recorded complication, compared with 3.22% of non-readmitted patients ($P < .001$; Table 2). Specifically, 42.31% of readmitted patients experienced a surgical complication, and 26.92% had a medical complication. This is in contrast to only 2.80% and 0.53% of patients not readmitted, respectively. Furthermore, more than half (61.54%) of the readmitted patients underwent a reoperation.

Obesity (BMI ≥30) and operating time (in hours) were found to be significant in the initial bivariate screening and therefore were included in the final multivariate regression model. Logistic regression analysis showed that operating time (odds ratio, 1.40; 95% confidence interval, 1.08-1.81; $P = .010$) was a significant independent predictor of readmission following cosmetic surgery.

DISCUSSION

Outpatient day surgery has gained popularity in the United States in recent decades.[1,2] Its excellent safety record—documented by several national and international publications, including the American Association for Accreditation of Ambulatory Surgery Facilities—has earned it universal acceptance.[3-9,18-23] However, these studies were published mainly in the anesthesia literature and reported on surgical procedures with subgroup analysis that did not include cosmetic surgery as a distinct entity; rather, cosmetic procedures were often "diluted" under other categories such as breast, skin, or perhaps miscellaneous.[21] As a result, although cosmetic surgery is believed to be safe, very little is known about readmission

Table 1. Characteristics of the Study Population: Readmitted Patients vs Those Not Readmitted

Characteristic	Readmitted (n = 26)	Not Readmitted (n = 2853)	*P* Value
Age, mean ± SD, y	48.58 ± 13.88	45.22 ± 13.94	.221
BMI, mean ± SD	31.98 ± 8.93	28.52 ± 6.44	.007[a]
Diabetes	7.69	4.77	.336
Hypertension	34.62	22.36	.136
Smoking	7.69	11.78	.761
Alcohol use	6.67	1.18	.171
Dyspnea	11.54	2.07	.017[a]
Coronary disease	0	0.63	1.00
Cerebrovascular disease	0	0.28	1.00
ASA class 3 or 4	19.23	14.27	.410

Values are presented as percentages unless otherwise indicated. Abbreviations: ASA, American Society of Anesthesiologists; BMI, body mass index.
[a]Statistically significant difference ($P < .05$).

Table 2. Outcomes After Outpatient Cosmetic Surgery

Outcome	Readmitted (n = 26), %	Not Readmitted (n = 2853), %	*P* Value
Total complications	61.54	3.22	<.001[a]
Surgical complications	42.31	2.80	<.001[a]
Wound infection			
Superficial SSI	19.23	1.93	<.001[a]
Deep SSI	15.38	0.49	<.001[a]
Organ/space SSI	3.85	0.07	.027[a]
Wound dehiscence	15.38	0.39	<.001[a]
Medical complications	26.92	0.53	<.001[a]
Reoperation	61.54	0.60	<.001[a]

Abbreviation: SSI, surgical site infection.
[a]Statistically significant difference ($P < .05$).

after hospital outpatient cosmetic surgery. Therefore, the aim of our study was to benchmark readmission rates for outpatient cosmetic surgery, utilizing a prospectively maintained, multi-institutional database.

It is estimated that more than 80% of cosmetic surgery operations are performed in outpatient facilities.[24] The outpatient setting offers significant advantages, including cost reduction, convenience, and elimination of unnecessary hospitalizations.[25-27] On the other hand, potential disadvantages also exist, such as the lack of optimal management of immediate postoperative pain, nausea, vomiting, dizziness, and delayed treatment of acute bleeding.[22,28,29] Readmission and unanticipated admission following a surgical procedure are considered gold standard criteria to measure the safety and cost-effectiveness of ambulatory surgery. Readmission after cosmetic surgery has financial and emotional burdens for patients and their families and can cause unnecessary use of resources such as emergency room care.

Employing methods similar to those used by national organizations and in other studies,[10,29] the present study examined readmission rates up to 30 days following the index surgery. Our analysis showed that, among the 2879 tracked cases, only 26 patients had an unplanned readmission—translating to a readmission rate of 0.90%. This rate compared favorably with readmission rates for the 5 surgical specialties with the highest volume of outpatient surgery (range, 1.21%-3.73%). Further examination of cosmetic surgery readmissions in the context of postoperative complications showed that more than half of the

readmitted patients had a recorded complication (61.54%) and/or underwent a reoperation (61.54%). This correlated with a complication-specific readmission rate of 0.56%, which was slightly higher than the 0.15% rate demonstrated in a study of ambulatory surgery by Mezei and Chung[30]; however, scheduled readmissions were included in their analysis, which reduced the rate of complication-related readmission. Resident involvement (in less than 40% of tracked cases) did not influence the unplanned readmission rates in a significant manner.

The safety of outpatient plastic surgery was bolstered by our analysis of readmission rates for the 5 most common cosmetic surgery procedures in the NSQIP database. The readmission rates for these 5 operations (reduction mammaplasty, mastopexy, breast augmentation, liposuction, and abdominoplasty) were consistently low, ranging from 0.31% to 1.78%.

Additional evidence of the general safety of ambulatory surgery was provided by our analysis of the 5 most popular outpatient surgical procedures in the NSQIP (general, orthopedic, urologic, gynecologic, and otolaryngologic), all of which were associated with low rates of readmission (ranging from 1.21%-3.73%). These rates were similar to those reported in other studies and demonstrate the relatively low risk associated with such procedures.[23]

Analyzing the underlying cause of unplanned readmission after outpatient surgery is critical to improving outcomes and preventive measures. In a large prospective study of ambulatory surgical patients published in 1998, Fortier et al[31] showed that 36% of unplanned postoperative admissions were attributable to 4 aforementioned complications: pain, nausea and vomiting, dizziness, and acute bleeding. Several other studies have shown that pain is the most common symptom and reported reason for readmission.[32,33] As such, the American Society of Anesthesiologists has recognized pain and nausea in postanesthesia care unit management and discharge criteria since the publication by Fortier et al.[31] Although pain is not one of the variables included in the NSQIP database, we noted a trend toward higher readmission rates for presumably more painful procedures (eg, 0.31% for mastopexy vs 1.78% for abdominoplasty), which may be concordant with this finding. Our findings are distinct from those of Fortier et al[31] because we examined causes of readmission to the hospital rather than causes of unanticipated hospital admission after surgery in an ambulatory facility.

We also found, via multivariate logistic regression analysis, that operating time was an independent predictor of readmission. There is an established correlation between longer operations and a higher risk for complications, including pulmonary compromise, wound infection, and deep venous thrombosis and, consequently, a possible increase in pain and nausea. All of these factors likely contributed to the increased likelihood of hospital readmission in our study.[34,35] Longer operating times also can result from combination procedures, which remain a popular choice for cosmetic surgery patients. In our study, more than 50% of the unplanned readmissions were associated with combination cases; the most common of these was abdominoplasty and augmentation mammaplasty. Despite these inherent risks, the overall complication and readmission rates were low in this study.

Certain risk factors have specific influences on our specialty and may play a role in determining the safety of outpatient cosmetic surgery. Poorly controlled systemic hypertension is anecdotally associated with increased risk of postoperative bleeding in facial cosmetic surgery.[36,37] Although the incidence of hypertension was higher for readmitted patients than for patients not readmitted, the difference was not statistically significant. Additionally, poorly controlled hyperglycemia, active smoking, and high BMI may interfere with wound healing and skin-flap viability.[3,4] Only BMI was significantly higher for readmitted (vs non-readmitted) patients; however, in multivariate analysis, there was no significant difference in BMI.

This is the first study to document the 30-day readmission rate for outpatient cosmetic surgery and compare this rate with other surgical specialties. The data were extracted from a prospectively maintained, multi-institutional national database. However, the study does have several limitations. Because the database tracks postoperative outcomes for only 30 days, it was not possible to determine longer-term readmission rates. Moreover, certain variables germane to the field of plastic surgery, such as seroma and hematoma development, are not currently tracked in the database. The NSQIP database is revised annually, and it is our hope that it will soon include a broader range of postoperative complications.

Additionally, certain complications can be managed without hospital admission, and therefore "unplanned readmission" may not capture visits to a surgeon's office or an emergency room. This is especially true for plastic surgery; treatments for complications such as seroma aspiration and wound revisions are often provided in the surgeon's office and therefore may not be included in a multinational database.

Some patients in the current study had comorbidities not common to patients undergoing cosmetic surgery, such as dyspnea and chronic obstructive pulmonary disease (COPD). Therefore, we acknowledge that our study analyzes only a subgroup of cosmetic surgery patients. Moreover, the study population comprised "hospital outpatient" cases, and therefore the analysis does not include data for office-based procedures or certain ambulatory surgery centers. However, by benchmarking readmission rates for nearly 2900 cosmetic surgery patients drawn from hundreds of hospitals, we can provide accurate, independent, and multi-institutional data, which otherwise had not existed in the literature.

CONCLUSIONS

Outpatient cosmetic surgery has a low 30-day hospital readmission rate in comparison to other surgical specialties. Benchmark data such as these will serve to improve patient education efforts and confirm the safety of outpatient surgery.

Disclosures

The authors declared no potential conflicts of interest with respect to the research, authorship, and publication of this article.

Funding

Ms Mioton received a research scholarship through Vanderbilt University School of Medicine (NIH CTSA Grant UL1RR-024975). The authors received no other financial support for the research, authorship, and publication of this article.

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