Predictors of Readmission after Outpatient Plastic Surgery

Lauren M. Mioton, B.S.
Donald W. Buck II, M.D.
Aksharananda Rambachan, B.A.
Jon Ver Halen, M.D.
Gregory A. Dumanian, M.D.
John Y. S. Kim, M.D.

Nashville and Memphis, Tenn.; and Chicago, Ill.

Background: Hospital readmissions have become a topic of focus for quality care measures and cost-reduction efforts. However, no comparative multi-institutional data on plastic surgery outpatient readmission rates currently exist. The authors endeavored to investigate hospital readmission rates and predictors of readmission following outpatient plastic surgery.
Methods: The 2011 National Surgical Quality Improvement Program database was reviewed for all outpatient procedures. Unplanned readmission rates were calculated for all 10 tracked surgical specialties (i.e., general, thoracic, vascular, cardiac, orthopedics, otolaryngology, plastics, gynecology, urology, and neurosurgery). Multivariate logistic regression models were used to determine predictors of readmission for plastic surgery.
Results: A total of 7005 outpatient plastic surgery procedures were isolated. Outpatient plastic surgery had a low associated readmission rate (1.94 percent) compared with other specialties. Seventy-five patients were readmitted with a complication. Multivariate regression analysis revealed obesity (body mass index ≥30), wound infection within 30 days of the index surgery, and American Society of Anesthesiologists class 3 or 4 physical status as significant predictors for unplanned readmission.
Conclusions: Unplanned readmission after outpatient plastic surgery is infrequent and compares favorably to rates of readmission among other specialties. Obesity, wound infection within 30 days of the index operation, and American Society of Anesthesiologists class 3 or 4 physical status are independent predictors of readmission. As procedures continue to transition into outpatient settings and the drive to improve patient care persists, these findings will serve to optimize outpatient surgery use. (*Plast. Reconstr. Surg.* 133: 173, 2014.)
CLINICAL QUESTION/LEVEL OF EVIDENCE: Risk, III.

Hospital readmission has been under scrutiny for many years for its contribution to higher medical bills and increased health care costs.[1–5] In an attempt to help contain health care costs, the current administration instituted the Hospital Readmissions Reduction Program through the Patient Protection and Affordable Care Act. This program plans to publish 30-day readmission rates and penalize hospitals that display above average hospital readmission rates.[6–8] Although it is unknown whether planned expansion of this program will apply to all medical fields in due time, the use of readmission data extends to prevention measures as well.[9–12] Specifically, exploring such data may allow for the calculation of preoperative predictors of readmission and subsequently permit insurers to pool resources for those patients at greatest risk. Therefore, it behooves us to investigate readmission rates and causes of readmission in outpatient plastic surgery; at the present time, there is a paucity of data on readmission following outpatient procedures in our field and there are no clear benchmarks comparing our field to other surgical fields.

With enhancements in patient safety and improvements in anesthesia administration, outpatient surgery has evolved into a safe option for many plastic surgery patients. Comfort

From the Vanderbilt School of Medicine; the Division of Plastic and Reconstructive Surgery, Northwestern University, Feinberg School of Medicine; and the Department of Plastic and Reconstructive Surgery, University of Tennessee.
Received for publication March 14, 2012; accepted May 14, 2013.

DOI: 10.1097/01.prs.0000436833.11442.8d

Disclosure: *None of the authors has a financial interest in any of the products, devices, or drugs mentioned in this article.*

with outpatient plastic surgery is evident by its ever-growing popularity—represented by continued gains in prevalence over recent decades.[13–18] Although the shift toward ambulatory surgery has occurred across numerous surgical specialties in the United States, no other field embodies this transition better than plastic surgery, with recent reports indicating that over 80 percent of aesthetic plastic surgery operations use outpatient facilities.[19]

Outpatient procedures present a variety of appealing options to patients and physicians, including reduced health care costs, comfortable operative settings, and consistent nursing and anesthesia care.[20,21] Studies showing that certain outpatient plastic surgery operations have low mortality rates and complication profiles compared to corresponding inpatient procedures have only helped expand on these associated advantages.[20–26] A transition to outpatient surgery is important to health care reform, as it is associated with lower costs.[27] Nevertheless, little is known about readmission rates in this setting, and without such critical outcomes data, it will be more difficult to improve processes (and thereby avoid potential future punitive action from regulatory agencies).

Previous literature reports that readmission rates among multiple specialties following ambulatory surgery vary from 0.58 to 3.00 percent.[28–30] When investigating specific outpatient procedures, such as laparoscopic cholecystectomy and laparoscopic hysterectomy, the rate is as high as 5.7 percent.[31,32] Although there have been a few investigations into the causes of unplanned hospital admission following outpatient procedures, to date there is little information with regard to independent predictors of readmission after discharge.[33–35] Likewise, despite the prevalence of outpatient procedures performed in plastic surgery, there is a paucity of information regarding hospital readmission rates and predictors for readmission after outpatient plastic surgery in particular. Thus, the purpose of our study was to investigate hospital readmission following outpatient plastic surgery using a validated surgical outcomes database representing over 400 hospitals across the United States.

PATIENTS AND METHODS

Data Source

The American College of Surgeons National Surgical Quality Improvement Program is a nationally validated, risk-adjusted, outcomes-based program used to measure and improve the quality of surgical care. Details of the program and its participants can be found on their Web site (http://site.acsnsqip.org). All operations are performed in an accredited hospital operating room (either inpatient or outpatient) under general or local anesthesia according to surgeon and anesthesiologist discretion. Trained research nurses at each of the participating institutions collect data using a systematic sampling of surgical operations. According to protocol, 240 Health Insurance Portability and Accountability Act of 1996–compliant variables are collected for each encounter. Among these variables, the primary surgical service is tracked and defined by the participating hospital. We infer that "plastics" represents surgeons who are specialty trained through an independent or integrated residency program. Audits conducted to date have shown a 1.96 percent disagreement rate for program variables.[36]

Patient Population

The American College of Surgeons National Surgical Quality Improvement Program 2011 participant use file was retrospectively reviewed for all outpatient procedures; outpatient status was defined by each hospital and is thought to include patients who were discharged on the same day of surgery. The 153,228 isolated outpatient procedures were subsequently stratified by primary surgical team (i.e., general, vascular, cardiac, neurosurgery, urology, gynecology, orthopedics, otolaryngology, plastics, and thoracic).

Outcomes

The primary outcome was 30-day unplanned readmission. The National Surgical Quality Improvement Program database incorporated two new variables concerning readmission into its 2011 data set. The variable entitled "readmission" represents all-cause readmission—readmission to the same or another hospital for any reason in the 30-day period after the index operation. 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.[37] Although it is not specifically stated, we assume that this definition does not include additional outpatient procedures for complications. We used the unplanned readmission variable to calculate readmission rates and provide a more focused investigation into predictors of readmission.

Surgical complication was defined as having one or more of the following National Surgical Quality Improvement Program postoperative adverse events: superficial surgical-site infection, deep surgical-site infection, organ/space surgical-site infection, wound disruption/dehiscence, or graft/prosthesis failure. Medical complications included pneumonia, unplanned intubation, pulmonary embolism, failure to wean from 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, and sepsis/septic shock.

Risk-Adjustment Factors

Patient demographics and medical comorbidities were tracked as potential cofounders. Demographic data collected included age, sex, and race. Medical comorbidities included obesity, diabetes, dyspnea, ascites, renal disease, chronic obstructive pulmonary disease, current pneumonia, ventilator dependence, chronic steroid use, bleeding disorders, heart failure, myocardial infarction within 6 months of the operation, peripheral vascular disease, disseminated cancer, weight loss greater than 10 percent body weight within 6 months of surgery, wound infection within 30 days of surgery, current chemotherapy or radiotherapy, neurologic deficit, preoperative transfusion, and preoperative sepsis. Alcohol use, defined as more than two drinks per day, and smoking status were also tracked as behavioral risk factors. The specific definition of wound infection, according to the National Surgical Quality Improvement Program, is as follows: "patients with evidence of an open wound (including surgical wounds) that communicates to the air by direct exposure, with or without cellulitis or purulent exudates."[37]

Statistical Analysis

Readmission rates after outpatient surgery were calculated for each tracked specialty. Although the overall readmission rate for plastic surgery was calculated using all 7005 included patients, rates were also determined for the five most common outpatient plastic surgery procedures independently (reduction mammaplasty, revision of breast reconstruction, breast reconstruction with tissue expander, augmentation with implant, and delayed reconstruction with prosthesis after mastectomy). Patient demographics, risk factors, and postoperative outcomes were calculated through frequency analysis.

Multivariate logistic regression models were used to determine predictors of unplanned readmission. Individual variables with greater than or equal to 10 event occurrences showing prediction of readmission at a significance level of 0.20 or less in the bivariate analysis were included in the multivariable models. C-statistics for discrimination and Hosmer-Lemeshow tests for calibration were computed to assess the goodness-of-fit model.

RESULTS

A total of 153,228 outpatient cases were isolated from the 2011 National Surgical Quality Improvement Program data set. Seven-thousand five (4.6 percent) of those cases had "plastics" recorded as their primary surgical team and were included in our study. The readmission rates associated with outpatient procedures in each tracked surgical specialty are displayed in Figure 1. The rates were significantly different ($p < 0.05$). Outpatient plastic surgery operations had a low associated hospital admission rate (1.94 percent) compared with other specialties. Table 1 lists the readmission rates for the five most common outpatient plastic surgery procedures, which accounted for 3310 of the total 7005 cases analyzed in this study. Of these five procedures, breast reconstruction with tissue expander proved to have the highest readmission rate, with 4.14 percent, and breast augmentation had the lowest rate, with 0.23 percent.

The majority of readmitted patients were women, which is an accurate reflection of the overall outpatient plastic surgery population (Table 2). The most common comorbidity was hypertension (35.29 percent).

Of the 136 readmitted patients, 75 had at least one recorded complication (Fig. 2). Over 65 percent of those complications were surgical, with the remaining defined as medical. Patients who were readmitted and had a recorded complication were organized into cohorts based on the number of associated complications (one, two, or three). There were 58 patients who had one complication, nearly 75 percent of which were surgical. Deep surgical-site infection was the most prevalent surgical complication, followed by superficial surgical-site infection, organ/space surgical-site infection, wound disruption, and graft/prosthesis failure. For patients with two recorded complications, nearly 54 percent were surgical. Wound disruption was the most common surgical complication in this cohort, followed by deep surgical-site infection and organ/space surgical-site infection. Medical complications proved to be the main

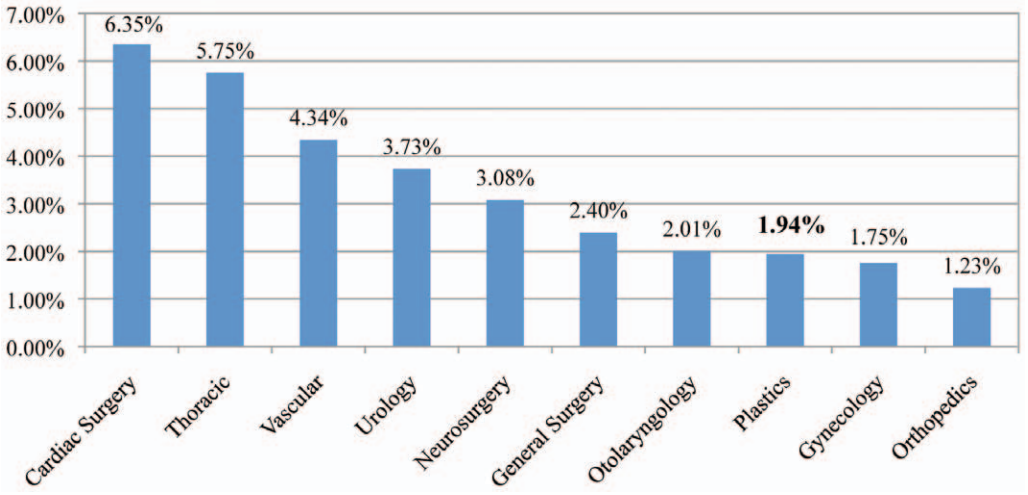

Fig. 1. Hospital readmission rates following outpatient surgery by subspecialty. The readmission rates associated with cardiac surgery, thoracic, vascular, and urology were significantly different ($p < 0.05$) when compared to those of plastic surgery.

Table 1. Hospital Readmission Rates Associated with the Top Five Most Common Outpatient Plastic Surgery Procedures*

CPT Code	No.	Description	Readmission Rate (%)
19318	1501	Reduction mammaplasty	2.00
19380	563	Revision of breast reconstruction	1.24
19357	435	Breast reconstruction with tissue expander	4.14
19325	430	Augmentation with implant	0.23
19342	381	Delayed reconstruction with prosthesis after mastectomy	2.10

CPT, Current Procedural Terminology.
*Most common procedures were determined by primary CPT code frequency.

Table 2. Characteristics of Patients Readmitted following Outpatient Plastic Surgery

Characteristics	Readmitted
Female sex	84.44%
Age	52.46 ± 14.46 yr
BMI	31.54 ± 8.52
Diabetes	9.56%
Smoking	15.44%
Dyspnea	7.35%
COPD	2.21%
Hypertension	35.29%

BMI, body mass index; COPD, chronic obstructive pulmonary disease.

contributor (66.67 percent) in patients with three listed complications. Deep surgical-site infection was the most common surgical complication.

Risk-adjusted multivariate regression analysis revealed obesity (body mass index ≥30), wound infection within 30 days before the index operation, and American Society of Anesthesiologists class 3 or 4 physical status as significant predictors for readmission following outpatient plastic surgery (Table 3). Other variables, including operative time, did not provide a statistically significant increased risk. Having a wound infection within 30 days of the index operation carried the greatest risk of readmission with an odds ratio of 3.02 (95 percent CI, 1.74 to 5.24; $p < 0.001$). This was followed by preoperative American Society of Anesthesiologists class 3 or 4 physical status with an odds ratio of 2.26 (95 percent CI, 1.51 to 3.36; $p < 0.001$). Obesity carried an 88 percent increased risk of hospital readmission after an outpatient procedure.

DISCUSSION

Readmissions have become an important focus of quality improvement and cost-reduction efforts, as evidenced by the recent institution of the Hospital Readmissions Reduction Program.[9–12,38,39] Despite this being an important topic, there remains a paucity of reliable data on readmission, especially in the field of surgery. Some studies have suggested that 30-day readmissions are more often related to a patient's medical condition than to the operation itself, whereas others have noted postoperative complications to be the root cause of surgical readmissions. We consider unplanned readmissions

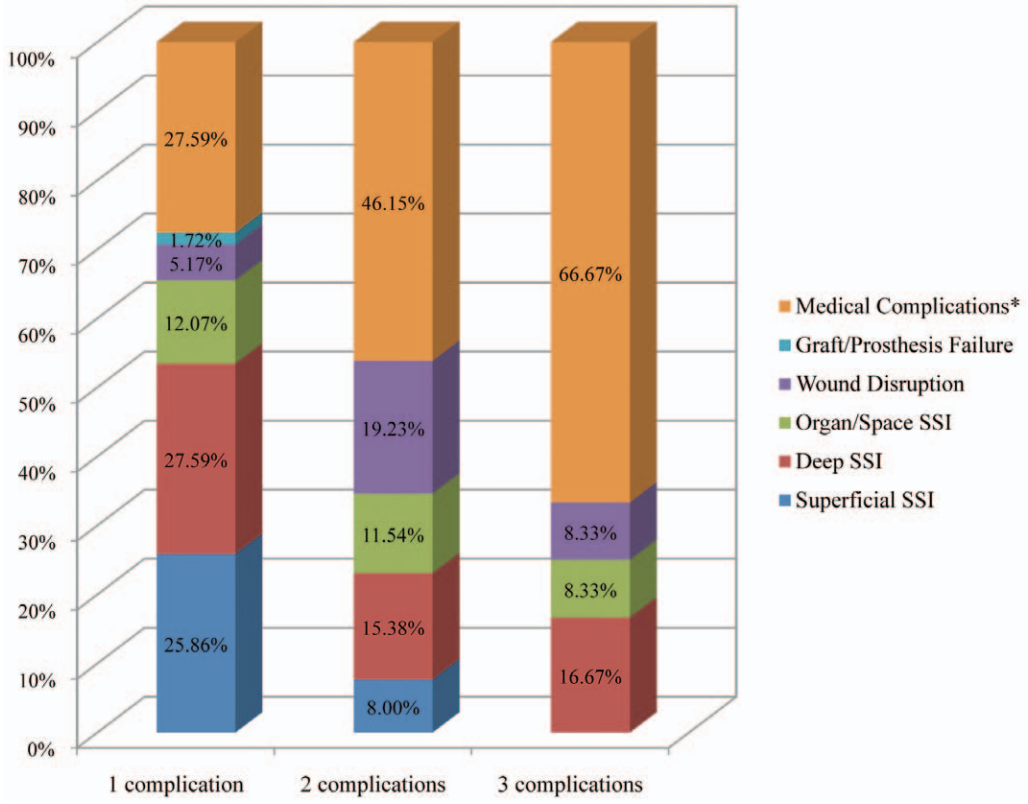

Fig. 2. Types of complications leading to readmission based on the number of complications recorded per surgical case. *Medical complications include pneumonia, unplanned intubation, pulmonary embolism, failure to wean from ventilator, renal insufficiency, progressive renal failure, urinary tract infection, stroke, coma, peripheral neurologic deficiency, cardiac arrest, myocardial infarction, bleeding requiring a transfusion, deep venous thrombosis, and sepsis/septic shock. *SSI*, surgical-site infection.

to be important in plastic surgery because of potential increasing governmental oversight and, more importantly, the opportunity they present to improve patient care.

The field of plastic and reconstructive surgery has been at the forefront in the use of outpatient procedures and has emphasized patient safety throughout this effort.[18,26,40] Although outpatient plastic surgery is seen as a safe field, there remain inherent risks with surgery that may predispose patients to an increased likelihood for readmission. Therefore, isolating preventable readmissions is a challenge. With this in mind, we proposed that a better and more useful starting point was to isolate unplanned readmissions and to evaluate predictors of this adverse event.

Using the 2011 National Surgical Quality Improvement Program database, which tracks

Table 3. Risk-Adjusted Multivariate Regression

	Readmission			
Variable	**OR**	**95% CI**		***p***
Age older than 50 yr	1.227	0.837	1.801	0.295
Obesity (BMI ≥30)	1.877	1.306	2.698	0.001*
Diabetes	0.919	0.491	1.72	0.791
Dyspnea	1.771	0.885	3.543	0.106
Hypertension	0.904	0.591	1.381	0.639
Wound infection within 30 days before surgery	3.024	1.744	5.243	<0.001*
ASA class 3 or 4	2.256	1.514	3.362	<0.001*
Operative time, hr	1.123	0.989	1.275	0.075
HL test = 0.546				
C-statistic = 0.680				

BMI, body mass index; ASA, American Society of Anesthesiologists; HL, Hosmer-Lemeshow.
*Denotes significant value, $p < 0.05$.

unplanned readmissions apart from all-cause readmissions (as defined earlier under Patients and Methods), we were able to calculate an unplanned readmission rate of 1.94 percent for outpatient plastic surgery, a rate that compares favorably with other surgical specialties, as evidenced in Table 1. Likewise, when stratifying according to five of the most common plastic surgery procedures performed in the outpatient setting, the rate ranged from 0.23 to 4.14 percent. For comparison, the unplanned readmission rate for the 3045 outpatient mastectomies captured in the data set was 3.7 percent. Although it is unclear from the present study what factors have led to such a low readmission rate, experience-driven improvements in patient care and surgical techniques in outpatient plastic surgery with concomitant enhancements in patient selection are likely contributors.

Examination of readmissions revealed that more than half occurred with at least one complication. Of the patients with only one complication listed, deep surgical-site infection was the most common singular complication. In patients who were readmitted with two or more complications, surgical-site infections also proved to be the most prevalent, followed by wound disruption and graft/prosthesis failure. These are not necessarily unexpected results, as patients undergoing plastic surgery in an outpatient setting are often relatively healthy and therefore may not be at increased risk for medical complications frequently associated with preoperative comorbidities. In addition, some outpatient plastic surgery procedures may be considered less invasive with relatively shorter operative times, allowing for abbreviated postoperative recovery periods and making medical complications related to immobility less likely. We hope these results will serve as benchmark data regarding surgical-site infections and their involvement in readmissions after outpatient plastic surgery.

Although previous studies have investigated predictors of unplanned hospital admission following outpatient surgery, few have examined predictors for readmission after initial discharge.[32] Through our multivariate regression analysis, we found American Society of Anesthesiologists class 3 or 4 physical status, obesity, and wound infection within 30 days of the operation to be significant predictors of readmission after outpatient plastic surgery. We did not include albumin levels in our analysis, because only 25.6 percent of the outpatient plastic surgery procedures had recorded preoperative albumin levels. Analysis of this variable would therefore not have been representative of the entire population. Considering that plastic surgery involves the manipulation of soft tissues and soft-tissue spaces, it is not surprising that a history of wound infection within 30 days before the index operation predisposes patients to postoperative complications and subsequent hospital readmission. It is known that obese patients are at increased risk for wound healing issues and subsequent infection. These factors are likely important contributors to their overall increased risk of postoperative readmission following outpatient plastic surgery. Lastly, individuals who had an American Society of Anesthesiologists classification of 3 or 4, which reflects systemic disease and the level of baseline health, could have been less mobile or had wound healing problems that predisposed them to medical and surgical complications. These findings have been reported in the general surgical literature as well.[41–43]

Knowing that American Society of Anesthesiologists class 3 or 4 physical status, obesity, and recent wound infection serve as risk factors for readmission after outpatient plastic surgery, plastic surgeons may implement even more tailored selection methods for elective outpatient procedures. Specifically, elective procedures may be delayed, if possible, for individuals with a noted wound infection within 30 days before their scheduled operation. In addition, resources allocated for preventing complications may become more focused on systems-wide practices such as the comprehensive unit-based safety program created by Wick et al. to reduce surgical-site infections.[41] However, given that outpatient plastic surgery covers a broad range of anatomical areas and procedures, the success of broad, sweeping solutions may be unlikely. Nevertheless, these findings provide valuable insight into the role of particular influences on trackable outcomes. Knowledge regarding risk factors for readmission will possibly contribute to patient education and help manage patient expectations following outpatient plastic surgery.

It should be noted that the Centers for Medicare & Medicaid Services enforces reimbursement penalties based on all-cause readmissions within 30 days. Using this methodology, both readmissions attributable to the index hospital stay and those not directly related to the initial inpatient stay are included in quality-of-care calculations. Facilities and physicians may therefore be penalized for readmissions not related to their direct care, creating financial consequences for events that are not preventable by the hospital and medical team. We chose to focus our study on "unplanned readmission," which the National Surgical Quality Improvement Program defines as

readmission related directly to the index operation, to provide detailed data regarding reasons for readmission and predictors of readmission. It is our hope that the Centers for Medicare & Medicaid Services and future health care regulation measures acknowledge the difference between all-cause readmission and unplanned readmissions, as we have delineated in our study.[41,44]

This investigation is not without limitations. The National Surgical Quality Improvement Program database tracks only 30-day outcomes, thereby limiting the evaluation of long-term complications and hospital readmission outside of the 30-day window. Furthermore, the database does not record all variables germane to plastic surgery, such as seroma development. We also acknowledge that aesthetic patients may constitute a separate cohort from reconstructive patients in plastic surgery. However, we were hesitant to remove aesthetic cases from the "plastics" population, as similar cases were noted on other services (including rhinoplasty in otolaryngology and panniculectomy in general surgery). In addition, over half of these aesthetic procedures occurred concurrently with a nonaesthetic procedure. Despite these shortcomings, the numerous advantages attributed to this robust and validated database serve to counterbalance any associated limitations. By using a surgical outcomes database that encompasses data from over 400 participating hospitals, and includes over 7000 outpatient plastic surgery patients, we have provided potentially valuable information regarding the rate of hospital readmission and predictors for readmission following plastic surgery.

CONCLUSIONS

Unplanned readmission after outpatient plastic surgery is infrequent and compares favorably to rates of readmission among other specialties. Obesity, wound infection within 30 days before the index operation, and American Society of Anesthesiologists class 3 or 4 physical status are independent predictors of readmission. As procedures continue to transition into outpatient settings and efforts to reduce costs and improve patient care continue, these findings will serve to optimize outpatient surgery use.

John Y. S. Kim, M.D.
Division of Plastic and Reconstructive Surgery
Northwestern University
Feinberg School of Medicine
675 North St. Clair Street
Galter Suite 19-250
Chicago, Ill. 60611
jokim@nmh.org

ACKNOWLEDGMENT

Lauren M. Mioton, B.S., is funded on a research scholarship through Vanderbilt University School of Medicine by National Institutes of Health Clinical and Translational Science Award Grant UL1RR024975.

DISCLAIMER

Deidentified patient information is freely available to all institutional members who comply with the American College of Surgeons National Surgical Quality Improvement Program Data Use Agreement. The Data Use Agreement implements the protections afforded by the Health Insurance Portability and Accountability Act of 1996 and the American College of Surgeons National Surgical Quality Improvement Program Hospital Participation Agreement.

The American College of Surgeons National Surgical Quality Improvement Program and the hospitals participating in the American College of Surgeons National Surgical Quality Improvement Program are the source of the data used herein; they have not verified and are not responsible for the statistical validity of the data analysis or the conclusions derived by the authors.

REFERENCES

1. Hockenberry JM, Burgess JF Jr, Glasgow J, Vaughan-Sarrazin M, Kaboli PJ. Cost of readmission: Can the Veterans Health Administration (VHA) experience inform national payment policy? *Med Care* 2013;51:13–19.
2. Jencks SF, Williams MV, Coleman EA. Rehospitalizations among patients in the Medicare fee-for-service program. *N Engl J Med.* 2009;360:1418–1428.
3. Orszag PR, Emanuel EJ. Health care reform and cost control. *N Engl J Med.* 2010;363:601–603.
4. Medicare Payment Advisory Commission. *A Path to Bundled Payment around a Rehospitalization. Report to the Congress: Reforming the Delivery System.* Washington, DC: Medicare Payment Advisory Commission; 2005:83–103.
5. Centers for Medicare & Medicaid Services. Application of incentives to reduce avoidable readmissions to hospitals. *Fed Reg.* 2008;73:23673–23675.
6. Centers for Medicare & Medicaid Services. Readmission Reduction Program. Available at: http://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/Readmissions-Reduction-Program.html. Accessed January 13, 2013.
7. Patient Protection and Affordable Care Act Pub L No. 111-148 §3025(a), 124 Stat 119,408 (2010).
8. Hospital Readmissions Reduction Programs. *Fed Reg.* 2011;76:51663–51665.
9. Fontanarosa PB, McNutt RA. Revisiting hospital readmissions. *JAMA* 2013;309:398–400.
10. McCarthy D, Johnson MB, Audet AM. Recasting readmissions by placing the hospital role in community context. *JAMA* 2013;309:351–352.
11. Vaduganathan M, Bonow RO, Gheorghiade M. Thirty-day readmissions: The clock is ticking. *JAMA* 2013;309:345–346.

12. Joynt KE, Jha AK. Characteristics of hospitals receiving penalties under the Hospital Readmissions Reduction Program. *JAMA* 2013;309:342–343.
13. American Society of Plastic Surgeons. Pathways to Preventing Adverse Outcomes in Ambulatory Surgery. Available at: http://www.plasticsurgery.org/pathwaystoprevention. Accessed January 21, 2013.
14. Iverson RE; ASPS Task Force on Patient Safety in Office-Based Surgery Facilities. Patient safety in office-based surgery facilities: I. Procedures in the office-based surgery setting. *Plast Reconstr Surg.* 2002;110:1337–1342; discussion 1343–1346.
15. Iverson RE, Lynch DJ; ASPS Task Force on Patient Safety in Office-Based Surgery Facilities. Patient safety in office-based surgery facilities: II. Patient selection. *Plast Reconstr Surg.* 2002;110:1785–1790; discussion 1791.
16. Haeck PC, Swanson JA, Iverson RE, et al. Evidence-based patient safety advisory: Patient selection and procedures in ambulatory surgery. *Plast Reconstr Surg.* 2009;124:6S–27S.
17. Failey C, Aburto J, de la Portilla HG, Romero JF, Lapuerta L, Barrera A. Office-based outpatient plastic surgery utilizing total intravenous anesthesia. *Aesthet Surg J.* 2013;33: 270–274.
18. Starling J III, Thosani MK, Coldiron BM. Determining the safety of office-based surgery: What 10 years of Florida data and 6 years of Alabama data reveal. *Dermatol Surg.* 2012;38:171–177.
19. Cullen KA, Hall MJ, Golosinskiy A. Ambulatory surgery in the United States, 2006. *Natl Health Stat Report* 2009;11:1–25.
20. Blaine CM, Subbio CR, Eid SM, Murphy RX Jr. Reduction mammaplasty trends: A quality and fiscal analysis update. *Ann Plast Surg.* 2012;69:344–346.
21. Peng L, Norris EJ. Outpatient surgery. Available at: http://www.emedicinehealth.com/outpatient_surgery/article_em.html. Accessed February 13, 2013.
22. Byrd HS, Barton FE, Orenstein HH, et al. Safety and efficacy in an accredited outpatient plastic surgery facility: A review of 5316 consecutive cases. *Plast Reconstr Surg.* 2003;112:636–641; discussion 642.
23. Hancox JG, Venkat AP, Coldiron B, Feldman SR, Williford PM. The safety of office-based surgery: Review of recent literature from several disciplines. *Arch Dermatol.* 2004;140:1379–1382.
24. Egrari S. Outpatient-based massive weight loss body contouring: A review of 260 consecutive cases. *Aesthet Surg J.* 2012;32:474–483.
25. Keyes GR, Singer R, Iverson RE, et al. Mortality in outpatient surgery. *Plast Reconstr Surg.* 2008;122:245–250; discussion 251.
26. Rohrich RJ, White PF. Safety of outpatient surgery: Is mandatory accreditation of outpatient surgery centers enough? *Plast Reconstr Surg.* 2001;107:189–192.
27. Poulose BK, Shelton J, Phillips S, et al. Epidemiology and cost of ventral hernia repair: Making the case for hernia research. *Hernia* 2012;16:179–183.
28. Coley KC, Williams BA, DaPos SV, Chen C, Smith RB. Retrospective evaluation of unanticipated admissions and readmissions after same day surgery and associated costs. *J Clin Anesth.* 2002;14:349–353.
29. Mezei G, Chung F. Return hospital visits and hospital readmissions after ambulatory surgery. *Ann Surg.* 1999;230:721–727.
30. Majholm B, Engbæk J, Bartholdy J, et al. Is day surgery safe? A Danish multicentre study of morbidity after 57,709 day surgery procedures. *Acta Anaesthesiol Scand.* 2012;56:323–331.
31. Sherigar JM, Irwin GW, Rathore MA, Khan A, Pillow K, Brown MG. Ambulatory laparoscopic cholecystectomy outcomes. *JSLS* 2006;10:473–478.
32. Alperin M, Kivnick S, Poon KY. Outpatient laparoscopic hysterectomy for large uteri. *J Minim Invasive Gynecol.* 2012;19:689–694.
33. Gold BS, Kitz DS, Lecky JH, Neuhaus JM. Unanticipated admission to the hospital following ambulatory surgery. *JAMA* 1989;262:3008–3010.
34. Fleisher LA, Pasternak LR, Lyles A. A novel index of elevated risk of inpatient hospital admission immediately following outpatient surgery. *Arch Surg.* 2007;142:263–268.
35. Fortier J, Chung F, Su J. Unanticipated admission after ambulatory surgery: A prospective study. *Can J Anaesth.* 1998;45:612–619.
36. Shiloach M, Frencher SK Jr, Steeger JE, et al. Toward robust information: Data quality and inter-rater reliability in the American College of Surgeons National Surgical Quality Improvement Program. *J Am Coll Surg.* 2010;210:6–16.
37. American College of Surgeons, National Surgical Quality Improvement Program. User Guide for the 2011 Participant Use Data File. Available at: http://site.acsnsqip.org/wp-content/uploads/2012/03/2011-User-Guide_Final.pdf. Accessed January 16, 2013.
38. Seaman A. Poor U.S. hospitals likeliest to pay readmission fine. *NBC News,* Reuters Health, January 22, 2013. Available at: http://www.nbcnews.com/id/50552902/t/poor-us-hospitals-likeliest-pay-readmission-fine/. Accessed February 13, 2013.
39. Serrie J. More than 2,200 hospitals face penalties under ObamaCare rules. *Fox News,* August 23, 2012. Available at: http://www.foxnews.com/politics/2012/08/23/more-than-2200-hospitals-face-penalties-for-high-readmissions/#ixzz2KtBPnTyh. Accessed February 13, 2013.
40. Rosen H, Barrios LM, Reinisch JF, Macgill K, Meara JG. Outpatient cleft lip repair. *Plast Reconstr Surg.* 2003;112:381–387; discussion 388.
41. Wick EC, Hobson DB, Bennett JL, et al. Implementation of a surgical comprehensive unit-based safety program to reduce surgical site infections. *J Am Coll Surg.* 2012;215:193–200.
42. de Campos-Lobato LF, Campos-Lobato LF, Wells B, et al. Predicting organ space surgical site infection with a nomogram. *J Gastrointest Surg.* 2009;13:1986–1992.
43. Davenport DL, Bowe EA, Henderson WG, Khuri SF, Mentzer RM Jr. National Surgical Quality Improvement Program (NSQIP) risk factors can be used to validate American Society of Anesthesiologists Physical Status Classification (ASA PS) levels. *Ann Surg.* 2006;243:636–641; discussion 641.
44. Hansen LO, Young RS, Hinami K, Leung A, Williams MV. Interventions to reduce 30-day rehospitalization: A systematic review. *Ann Intern Med.* 2011;155:520–528.