

# Outpatient Surgery and Sequelae

## An Analysis of the AAAASF Internet-based Quality Assurance and Peer Review Database

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### KEYWORDS

• Plastic and reconstructive surgery • Outpatient surgery • Sequelae

### KEY POINTS

- The Internet-based quality assurance and Peer Review Program (IBQAP) has demonstrated the safety of procedures performed in the outpatient setting through the analysis of outcomes, the future of patient care will be directed by evidence-based medicine.
- Large inpatient surgical databases, such as the National Surgical Quality Improvement Program, the Nationwide Inpatient Sample, and the National Trauma Database, have long existed to provide quality assurance and improvement data for the inpatient cohort of patients.
- The acquisition of large data sets related to surgical care can best be achieved through the Internet.
- However, the structure of the data points must encompass the entire care process, from preoperative preparation to postoperative management.
- When outcomes are analyzed in conjunction with the indications for a procedure and the manner that care was delivered, evidence-based medicine is the end product.

### INTRODUCTION

The number of surgical procedures performed in outpatient surgery facilities has increased dramatically over the past 20 years as a result of the development of safe standards for operation.<sup>1,2</sup> According to the National Center for Health Statistics, outpatient procedures performed in community hospitals in the United States increased from 16% in 1980 to 63% in 2005.<sup>3</sup> The growth of free-standing and office-based ambulatory surgery

facilities has exceeded the number of hospital-based facilities. However, legislation requiring accreditation or licensure of these facilities has been slow to evolve. At this time, half of the states do not require any oversight of outpatient facilities.

The specialty of Plastic and Reconstructive surgery has been instrumental in supporting accreditation and licensure for outpatient surgery. Founded by Plastic Surgeons, the American Association for Accreditation of Ambulatory Surgery

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Facilities (AAAASF), Inc was established in 1980 to develop an accreditation program to standardize and improve the quality of medical and surgical care in ambulatory surgery facilities while assuring the public of high standards for patient care and safety in an accredited facility. AAAASF now accredits single-specialty and multispecialty facilities accounting for most surgical specialties, including gastroenterology, podiatry, and oral and maxillofacial surgery. As the largest organization in the country that accredits office-based surgery centers, AAAASF has been engaged in the movement to mandate accreditation or licensure of outpatient surgery facilities nationally. AAAASF's main focus is safety and the improvement of patient care.<sup>4,5</sup>

In 1995 AAAASF championed AB 595 (Speier) in California that mandated accreditation or licensure for outpatient facilities in that state. In 2001 the American Society of Plastic Surgeons and the American Society for Aesthetic Plastic Surgery took a strong position in the effort to improve patient safety by mandating that their members operate only in accredited or licensed facilities.<sup>4,5</sup>

All surgical specialties now routinely perform some of their procedures on an outpatient basis. The outpatient surgery setting offers convenience, patient privacy and comfort, increased efficiency, and lower costs.

Those facilities that are accredited or licensed by the state, either free standing or office based, must comply with recognized standards of operation to safeguard patient care. Monitoring compliance with these standards is vital to ensure patient safety.

With this concept in mind, AAAASF, now the largest organization in the United States that accredits single-specialty or multispecialty office-based surgery centers, has taken the lead in evaluating compliance with standards through monitoring outcomes in their facilities. A major advance in this process was the development of the first Internet-based quality assurance database program (IBQAP).<sup>6</sup>

In recent years there have been numerous inpatient databases used to monitor surgical and medical outcomes, but there were no national databases providing an overview of outcomes in the outpatient arena. IBQAP was created in 1999 to fill that void.<sup>6</sup>

## DATA COLLECTION

AAAASF standards require all accredited facilities to institute an ongoing quality improvement program that monitors and evaluates the quality of patient care, creates methods to improve patient care, and identifies and corrects deficiencies within

their facilities. In adhering to this standard, all surgeons in accredited facilities must enter random case reports and all unanticipated sequelae into IBQAP. Peer review must be performed every 6 months. If peer review sources external to the facility are used to evaluate delivery of surgical care, the patient consent form is written to protect the confidentiality of the medical records, consistent with current HIPAA and other legal standards.

## PEER REVIEW

Peer review is performed either by a recognized peer review organization or by a physician other than the operating surgeon. A minimum of 6 random cases per surgeon using the facility must be reviewed, and for group practices, 2% of all cases performed. These random case reviews must include assessment of the following 7 items:

1. Thoroughness and legibility of the history and physical examination
2. Adequacy and appropriateness of the surgical consent form
3. Presence of appropriate laboratory, electrocardiographic, and radiographic reports
4. Presence of a dictated operative report or its equivalent
5. Anesthesia record for operations performed with intravenous sedation or general anesthesia
6. Presence of instructions for postoperative and follow-up care
7. Documentation of unanticipated sequelae.

All unanticipated operative sequelae must be entered, including, but not limited to, the following 9 defined categories:

1. Unplanned hospital admission
2. Unscheduled return to the operating room for complication of a previous procedure
3. Untoward complications of a procedure, such as infection, bleeding, wound dehiscence, or inadvertent injury to another body structure
4. Cardiac or respiratory problems during stay at the facility or within 48 hours of discharge
5. Allergic reaction to medication
6. Incorrect needle or sponge count
7. Patient or family complaint
8. Equipment malfunction leading to injury or potential injury to patient
9. Death

Each unanticipated operative sequela chart review includes the following 5 informational items, in addition to the operative procedure performed:

1. Identification of the problem
2. Immediate treatment or disposition of the case

- 3. Outcome
- 4. Analysis of reason for problem
- 5. Assessment of efficacy of treatment.

Morbidity and mortality data are entered and analyzed through the AAAASF mandated peer review program. Keyes and colleagues<sup>6</sup> first reported on outcomes data from the IBQAP system in 2004, recommending expansion of the range and scope of the collection process to enhance analysis further. Another article published in 2008 reported the incidence of deaths after outpatient surgery.<sup>7</sup>

ANALYSIS OF SEQUELAE  
Overview

AAAASF has grown dramatically in the past 10 years and now accredits surgeons from all surgical specialties, gastroenterology, oral and maxillofacial surgery, and podiatry. For this review, an analysis of outcomes on all procedures performed in AAAASF accredited facilities from 2001 through 2012 was conducted. There were a total of 7,629,686 procedures performed on 5,416,071 patients. Procedures performed by specialties other than plastic surgery are excluded from this study. There were 5,525,225 plastic surgery procedures performed on 3,922,202 patients. The average number of procedures performed per patient was 1.41.

There were 21,994 sequelae reported. The overall incidence of sequelae in all plastic surgery procedures was 0.40% or 1 in 251 procedures and, for cases, 0.56% or 1 in 178 cases. The average of procedures per case was 1.41.

The 5 most common surgical procedures performed were breast augmentation, abdominoplasty, mastopexy/reduction mammoplasty, liposuction, and facelift and related procedures (Fig. 1).

Abdominoplasty was the procedure most commonly associated with a sequela. The overall incidence of unanticipated sequelae with abdominoplasty was 0.925%. A comparison of sequelae rates for the top 5 procedures performed is shown in Fig. 2.

SEQUELAE TYPES  
Hematoma

Postoperative bleeding or hematoma was by far the most common complication (Fig. 3). There were 7931 hematomas, more than twice the number of infections in the reported time period. Fig. 4 shows the top 5 procedures and their number of hematomas. There were 535 patients hospitalized because of a hematoma, which is an incidence of 0.20% for all plastic surgery cases performed. Of hematomas, 6.75% were hospitalized. There were no deaths that occurred as a result of bleeding or hematoma. The increasing

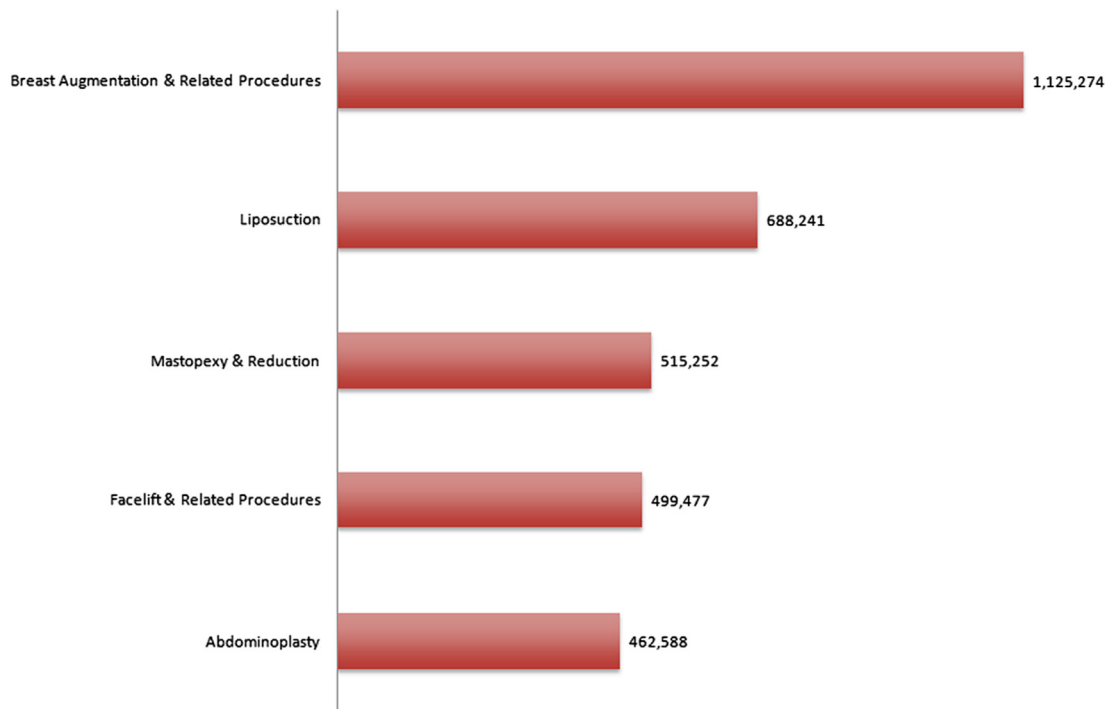


Fig. 1. Top 5 surgical procedures.

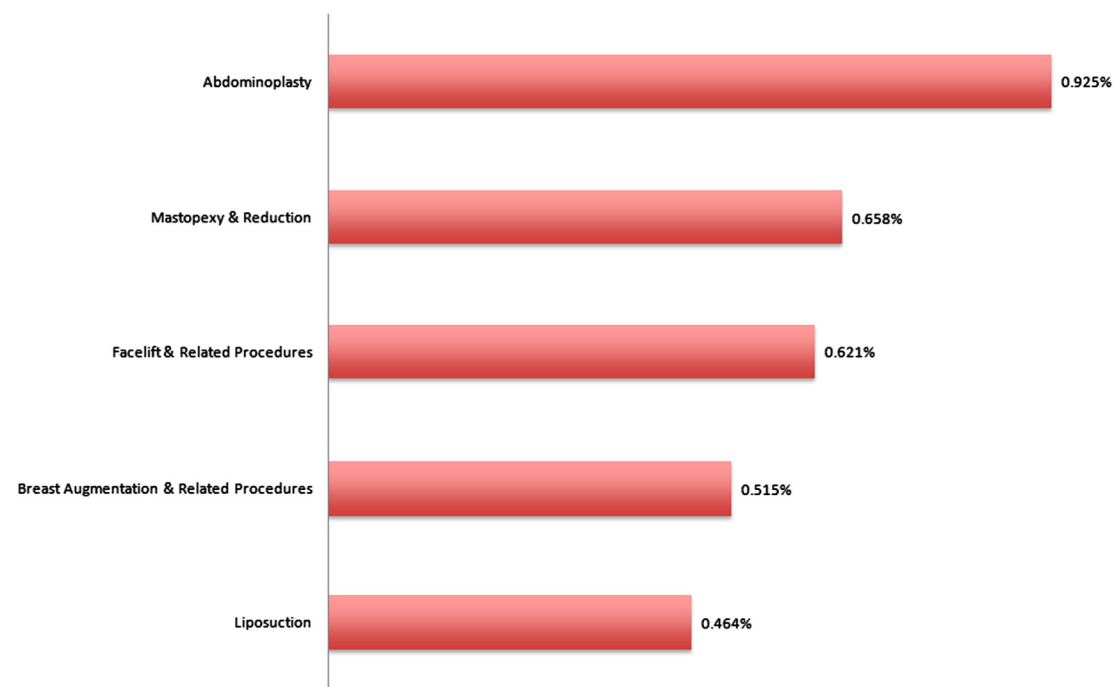


Fig. 2. Complication rate in common surgical procedures.

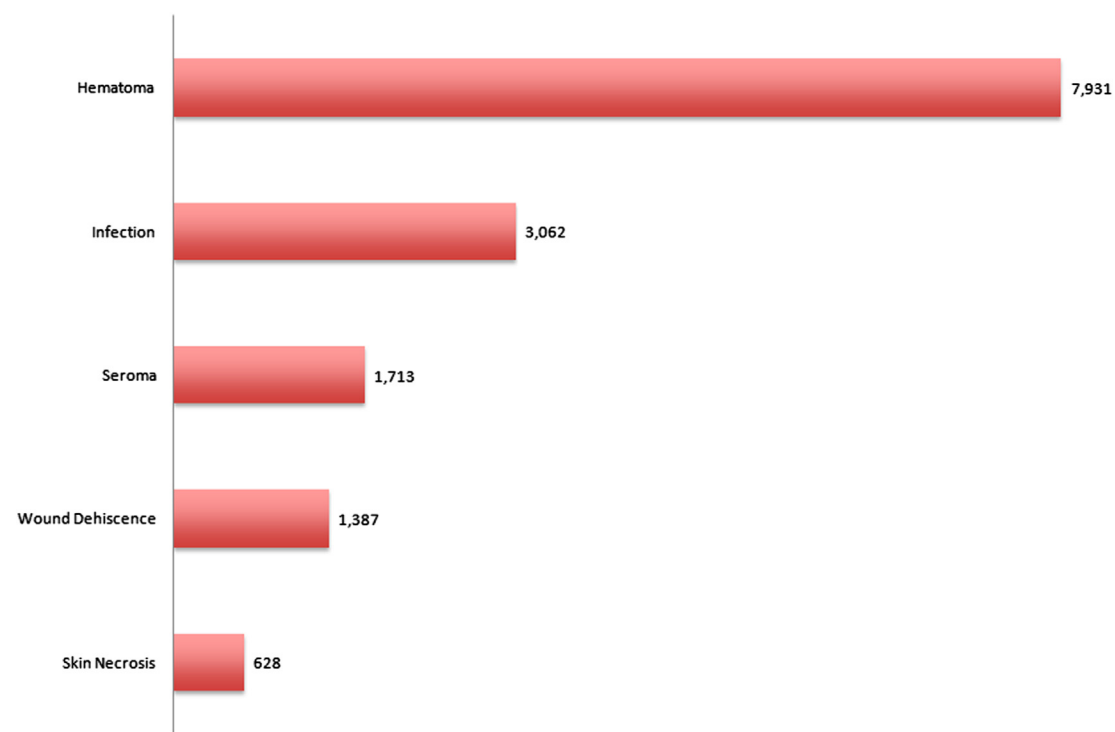
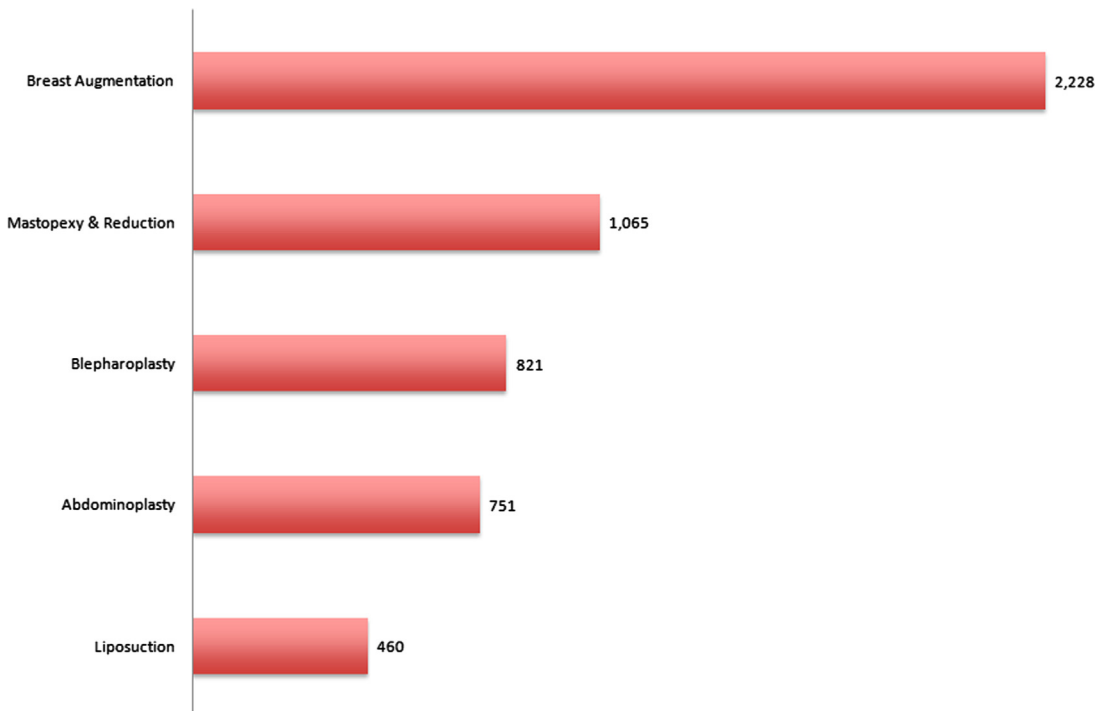


Fig. 3. Top 5 most common complications.



**Fig. 4.** Frequent procedures associated with hematoma.

awareness of the need for chemoprophylaxis to prevent the occurrence of venous thromboembolism (VTE) makes it likely that some of these patients received anticoagulation postoperatively. These data do not include information on chemoprophylaxis, but the updated IBQAP database will monitor this issue to determine incidence of bleeding as a result of its use.

### Infection

There were 3063 infections reported for the 3,922,202 cases performed. Infections were a rare complication with an incidence of 0.08% of all cases and 0.06% of procedures. Infection accounted for 14% of all sequelae. Infections were identified in 921 breast augmentations, 757 abdominoplasties, 582 mastopexies or related procedures, 517 liposuctions, and 346 facelifts or related procedures. The percentage of infections with specific procedures is shown in **Fig. 5**. The most common organisms cultured were *Staphylococcus aureus*, both methicillin-sensitive and methicillin-resistant, and *Serratia marcescens*. A more detailed report of infections in outpatient surgery is covered in another article in this volume.

### Venous Thromboembolism

VTE, deep venous thrombi (DVT), and pulmonary emboli (PE) are serious sequelae that occur in

procedures performed in either an inpatient or an outpatient surgery setting. There were 479 incidences of VTE including 215 DVTs and 264 PEs, an incidence of 0.012% or 1 in 8188 cases. Of the 264 PEs, 40 were fatal, representing a mortality rate of 15%.

There were 462,564 abdominoplasties performed in AAAASF facilities during the period reviewed. Approximately two-thirds of the time an abdominoplasty was combined with other surgical procedures. Combining abdominoplasty with 1 or 2 other procedures increased the risk of VTE and specifically PE. However, when abdominoplasty was combined with 3 procedures, the incidence did not increase. There were far fewer cases of abdominoplasty performed with 3 other procedures.

**Figs. 6 and 7** illustrate the incidence of VTE and PE occurring when an abdominoplasty was performed alone or in combination with other procedures. The occurrence of VTE in any abdominoplasty procedure was 0.066% or 1 in 1502. That compares to the overall risk of VTE in all plastic surgical procedures of 0.012%, or 1 in 8188. That equals an odds ratio of approximately 5.5 (95% CI 4.7–6.3) and a  $P$  value of  $<0.001$  using  $\chi^2$  analysis. All analyses were performed using STATA version 12 software (Stata Corp, College Station, TX, USA). Abdominoplasty is a procedure that has an increased risk of VTE, including both DVT and PE.

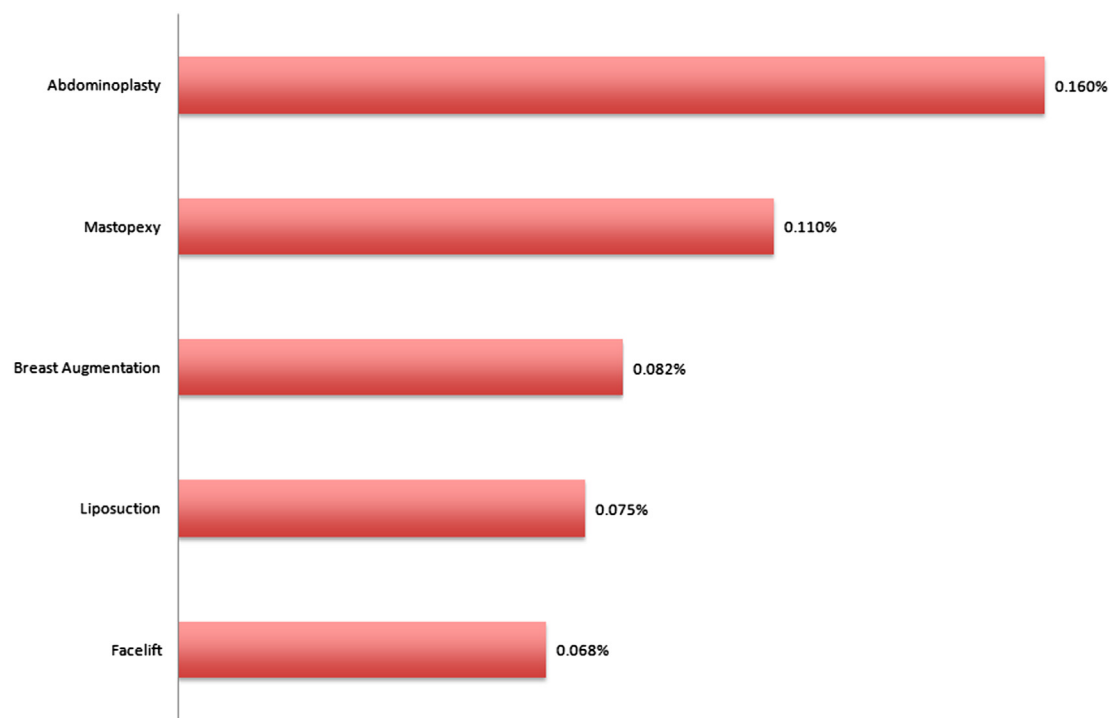


Fig. 5. Infection Rate of most common procedures.

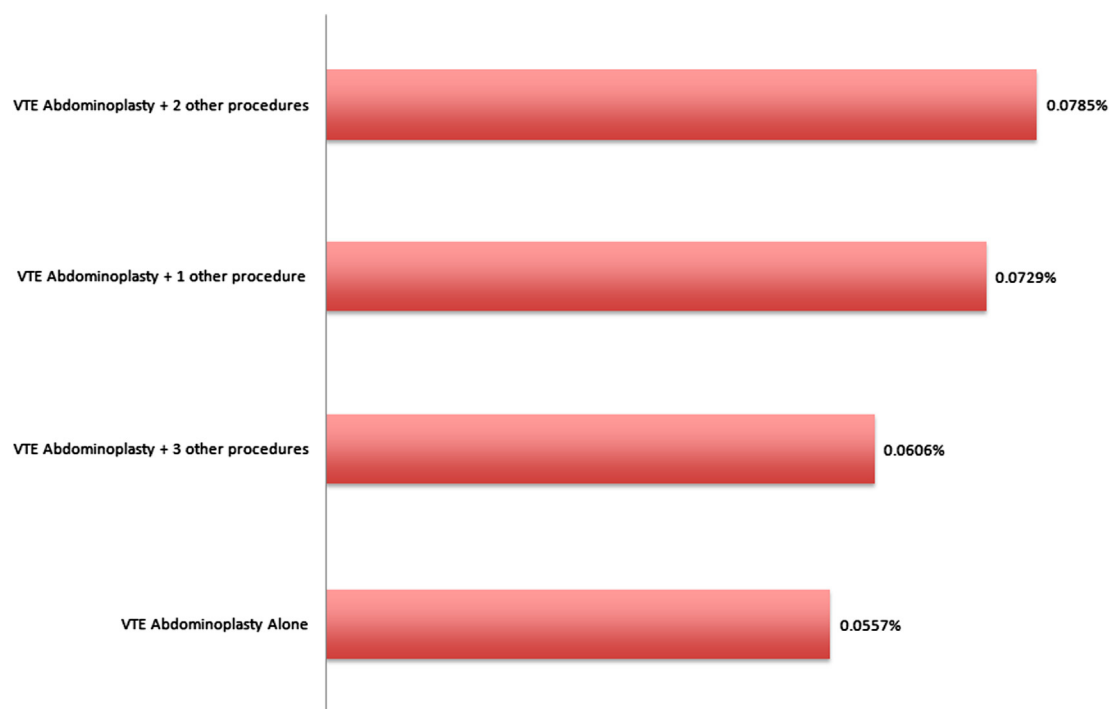


Fig. 6. Abdominoplasty and associated VTE rates.

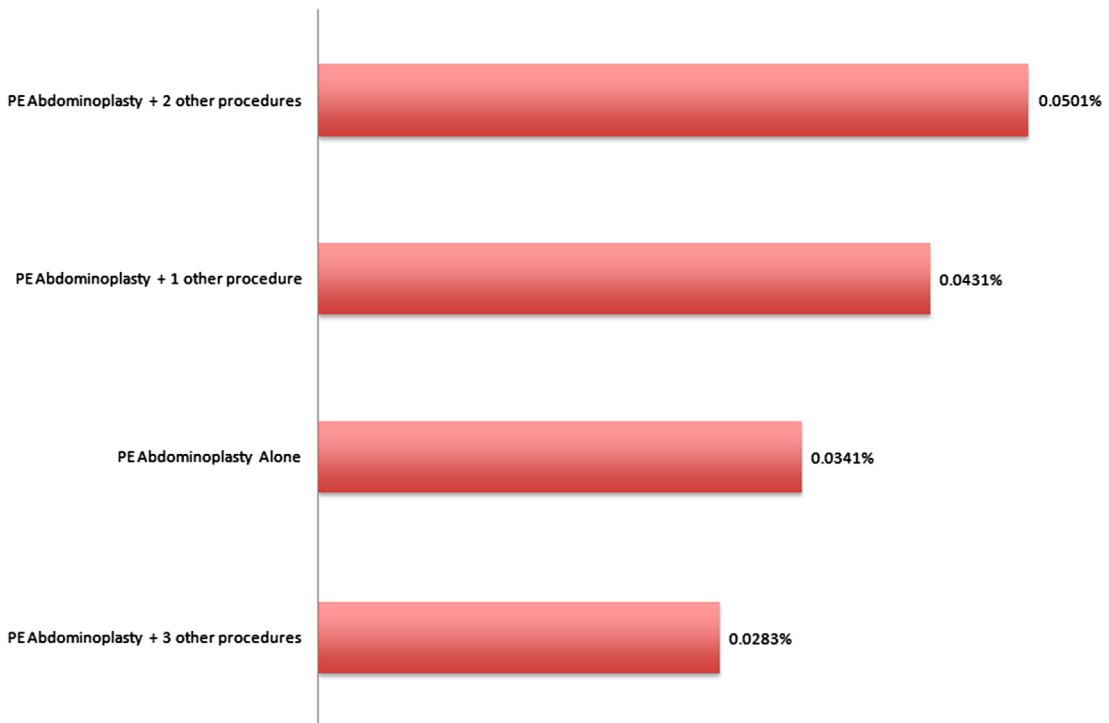


Fig. 7. Abdominoplasty and associated PE rates.

### ***Pneumothorax***

Pneumothorax, an uncommon sequela, occurred in 120 cases, an incidence of 0.0031%. Seventy-seven or one-half of the reported pneumothoraces occurred with breast augmentations. Detailed information on the breakdown of the occurrence of pneumothoraces by procedures can be found in Fig. 8.

### ***Mortality***

There were 94 deaths occurring between 2001 and 2012. Mortality is a rare occurrence in outpatient surgery, with an incidence of 0.0017% of all procedures or 0.0024% of total cases. The risk of death for a patient having any plastic surgery was approximately 1 in 41,726.

PE was by far the most common cause of death, with 40 cases of PE causing mortality. Of these 40 deaths, 26 were associated with abdominoplasty. Most fatal PEs, 20, were in cases where abdominoplasty was combined with other procedures. PE was previously reported as the leading cause of death in outpatient surgery in prior reports.<sup>7</sup> Other causes of mortality were cardiac arrhythmia, myocardial infarction, and drug overdose. Fig. 9 lists the causes of death within the study population.

### **DISCUSSION**

Hematomas or postoperative bleeding was the most common complication occurring in patients evaluated in this study. Bleeding was most frequently associated with breast augmentation.

Although mortality in an outpatient facility is a relatively rare occurrence, an understanding of what care interventions are necessary to reduce its incidence will come through improved data analysis. As previously reported, the most common cause of death was a PE, which in many instances is a preventable event. Numerous patient safety articles have been published describing preoperative evaluation for the prevention of pulmonary embolism using chemoprophylaxis.<sup>8–12</sup> Abdominoplasty is the procedure associated with the highest rate of sequelae and specifically VTE. In this study, abdominoplasty was the most frequently implicated surgery in patients with fatal PE. Abdominoplasty is associated with a 5.5 times greater risk for the development of VTE than any other plastic surgical procedures.

IBQAP data on VTE have led to the development of a new standard by AAAASF mandating documentation of the preoperative clinical evaluation of patients at risk for a VTE. This screening may be performed using the Caprini Evaluation Tool, guidelines set forth by the American College of

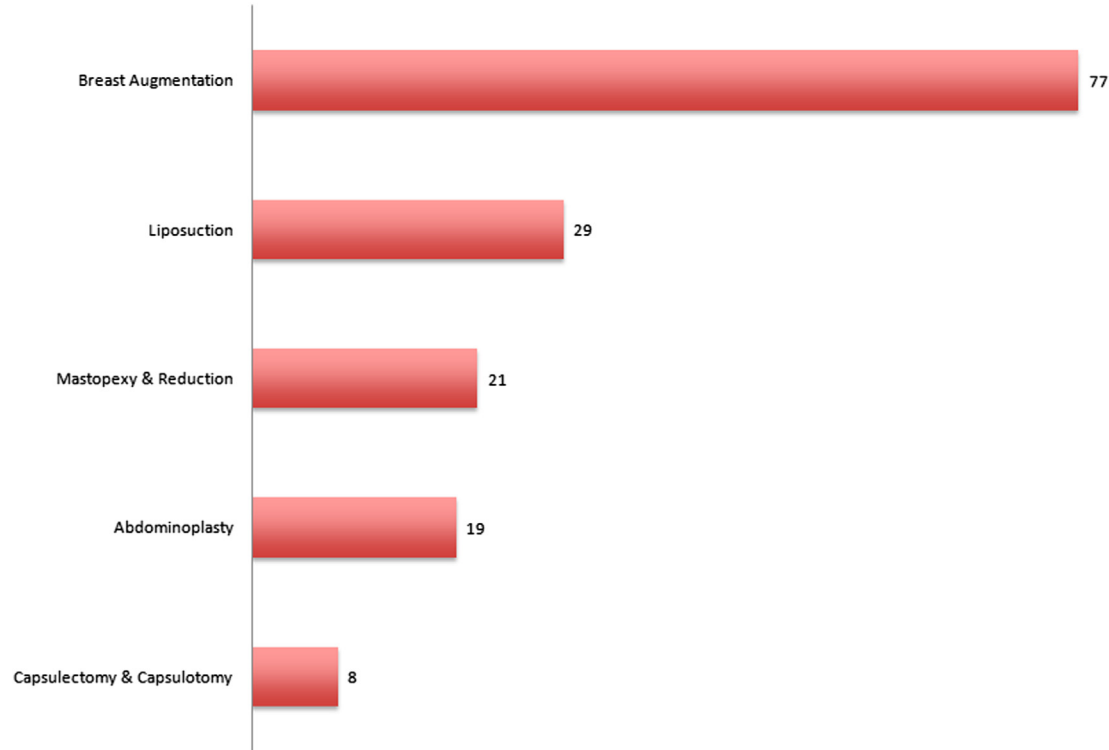


Fig. 8. Frequent procedures associated with pneumothorax.

Chest Physicians, or other comparable assessment guidelines.<sup>12</sup>

Pneumothorax, while exceeding rare, at approximately 0.0031% of cases, is a sequela that requires immediate attention in the operating room. Most of these cases were in patients having breast augmentation. Outpatient surgery facilities should be equipped to manage this complication.

Sporadic reports in the news about infections in outpatient surgery have raised the question about its frequency in the outpatient setting. In AAAASF accredited facilities, the incidence of infection is low. It is important to remember that not all infections begin in the surgery facility environment. Proper postoperative wound care is of the utmost importance in the postoperative environment.

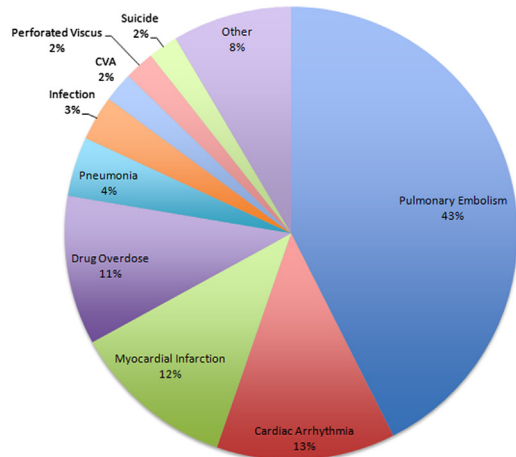


Fig. 9. Causes of death. CVA, cerebrovascular accident. CVA, cerebrovascular accident.

SUMMARY

Although Internet-based quality assurance and peer review data have demonstrated the safety of procedures performed in the outpatient setting through the analysis of outcomes, the future of patient care will be directed by evidence-based medicine. Large inpatient surgical databases, such as the National Surgical Quality Improvement Program, the Nationwide Inpatient Sample, and the National Trauma Database, have long existed to provide quality assurance and improvement data for the inpatient cohort of patients.<sup>13</sup> Internet-based quality assurance and peer review has led the way in the collection of data for outpatient surgery facilities.

The acquisition of large data sets related to surgical care can best be achieved through the Internet. However, the structure of the data points



must encompass the entire care process, from preoperative preparation to postoperative management. When outcomes are analyzed in conjunction with the indications for a procedure and the manner that care was delivered, evidence-based medicine is the end product. An example of this concept is the knowledge that chemoprophylaxis was or was not used in a procedure whose outcome resulted in the development of a VTE. The data collected in the AAAASF peer review system document the safety of outpatient surgery in their facilities, but there is room for improvement. The new system will have the ability to digitalize important aspects of the entire care process to enhance the value of the data. Centralization of data collection through the Internet from the multiple accrediting, licensing, and patient care managing entities will provides the means of assessing the surgical process to achieve this goal, which will evolve through the development of a data hub.

## REFERENCES

1. Rohrich RJ, White PF. Safety of outpatient surgery: is mandatory accreditation of outpatient surgery centers enough? *Plast Reconstr Surg* 2001;107:189.
2. 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.
3. 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(Suppl 4):6S–27S.
4. Iverson RA, Lynch DJ, the ASPS Task Force on Patient Safety in Office-Based Surgery Facilities. Patient safety in office-based facilities: II. Patient selection. *Plast Reconstr Surg* 2002;110:1785.
5. American Association for Accreditation of Ambulatory Surgical Facilities, Inc. AAAASF Standards and Checklist for Accreditation of Ambulatory Surgery Facilities. Mundelein (IL): American Association for Accreditation of Ambulatory Surgical Facilities; 1999.
6. Keyes GR, Singer R, Iverson RE, et al. Analysis of outpatient surgery center safety using an internet-based quality improvement and peer review program. *Plast Reconstr Surg* 2004;113(6):1760–70.
7. Keyes GR, Singer R, Iverson RE, et al. Mortality in outpatient surgery. *Plast Reconstr Surg* 2008;122(1):245–50 [discussion: 251–3].
8. Hoefflin SM, Bornstein JB, Gordon M. General anesthesia in an office-based plastic surgery facility: a report on more than 23,000 consecutive office based procedures under general anesthesia with no significant anesthetic complications. *Plast Reconstr Surg* 2001;107:243.
9. Singer R. General anesthesia in an office-based surgical facility: a report on more than 23,000 consecutive office-based procedures under general anesthesia with no significant anesthetic complications. *Plast Reconstr Surg* 2001;107:252 [discussion].
10. American Society of Plastic Surgeons and American Society for Aesthetic Plastic Surgery. Policy statement on accreditation of office facilities. Arlington (VA): American Society of Plastic Surgeons; Available at: <http://www.plasticsurgery.org/psf/psfhome/govern/officepol.cfm>. Accessed October 22, 2012.
11. Morello DC, Colon GA, Fredricks S, et al. Patient safety in accredited office surgical facilities. *Plast Reconstr Surg* 1997;96:1496.
12. Pannucci CJ, Bailey SH, Dreszer G, et al. Validation of the Caprini risk assessment model in plastic and reconstructive surgery patients. *J Am Coll Surg* 2011;212(1):105–12.
13. Reinke CE, Karakousis GC, Hadler RA, et al. Incidence of venous thromboembolism in patients undergoing surgical treatment for malignancy by type of neoplasm: an analysis of ACS-NSQIP data from 2005 to 2010. *Surgery* 2012;152(2):186–92.