The Use of Patient Registries in Breast Surgery

A Comparison of the Tracking Operations and Outcomes for Plastic Surgeons and National Surgical Quality Improvement Program Data Sets

Nima Khavanin, BS, Karol A. Gutowski, MD, FACS,† Keith M. Hume, MA,‡ Christopher J. Simmons, BS,‡ Alexei S. Mlodinow, BA,* Michael Weiss, MPH,§ Kristen E. Mayer, BS,* Robert X. Murphy, Jr, MD, MS,§ and John Y.S. Kim, MD, FACS**

Background: The National Surgical Quality Improvement Program (NSQIP) and the Tracking Operations and Outcomes for Plastic Surgeons (TOPS) registries gather outcomes for plastic surgery procedures. The NSQIP collects hospital data using trained nurses, and the TOPS relies on self-reported data. We endeavored to compare the TOPS and NSQIP data sets with respect to cohort characteristics and outcomes to better understand the strengths and weakness of each registry as afforded by their distinct data collection methods.

Study Design: The 2008 to 2011 TOPS and NSQIP databases were queried for breast reductions and breast reconstructions. Propensity score matching identified similar cohorts from the TOPS and NSQIP databases. Shared 30-day surgical and medical complications rates were compared across matched cohorts.

Results: The TOPS captured a significantly greater number of wound dehiscence occurrences (4.77%–5.47% vs 0.69%–1.17%, all $P < 0.001$), as well as more reconstructive failures after prosthetic reconstruction (2.82% vs 0.26%, $P < 0.001$). Medical complications were greater in NSQIP ($P < 0.05$). Other complication rates did not differ across any procedure (all $P > 0.05$).

Conclusions: The TOPS and NSQIP capture significantly different patient populations, with TOPS' self-reported data allowing for the inclusion of private practices. This self-reporting limits TOPS' ability to identify medical complications; surgical complications and readmissions, however, were not underreported. Many surgical complications are captured by TOPS at a higher rate due to its broader definitions, and others are not captured by NSQIP at all. The TOPS and NSQIP provide complementary information with different strengths and weakness that together can guide evidence-based decision making in plastic surgery.

Key Words: breast surgery, patient registry, NSQIP, TOPS, breast reduction, breast reconstruction, TRAM, latissimus, free flap, tissue expander

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As the emphasis on evidence-based patient care and improving surgical quality increases, the continued development of high-powered patient registries will become critical to achieving our goals in those areas. According to the Agency for Healthcare Research and Quality, a patient registry is defined as "an organized system that uses observational study to collect uniform data (clinical and other) to evaluate specified outcomes for a population defined by a particular disease, condition, or exposure, and that serves one or more predetermined scientific, clinical, or policy purpose."[1] With the adoption of new health information technologies, including the electronic medical record, and the pressure of recent federal policies, the utility and appeal of large, multicenter patient registries has grown considerably.[2–5] Within surgery, multiple professional organizations, including the American College of Surgeons and the American Society of Plastic Surgeons (ASPS), have already begun to develop such registries, providing clinicians and researchers with a wealth of patient information and surgical outcomes.[3,6–14]

The need for a standardized surgical outcomes registry in plastic surgery became apparent in the early 2000s. Despite the increasing demand for generalizable clinical outcome data, the scientific literature that was available suffered from significant variations in data collection and definitions, at times limiting their translation to the plastic surgery population at large. The ASPS Tracking Operations and Outcomes for Plastic Surgeons (TOPS) database was conceived in 2002 as an answer to this problem.[3] Since then, the American College of Surgeons National Surgical Quality Improvement Program (NSQIP) registry has expanded to include plastic surgery procedures as well.[15–17] Both registries gather data on a variety of preoperative, intraoperative, and postoperative variables; however, significant differences exist with respect to data collection methods and collected variables.

These differences beg the question: does the voluntary nature of self-reporting alter the demographic or reported outcomes of included patients? Are there areas of commonality or areas of relative strength of one database over the other? As more studies begin to take advantage of this wealth of data to better understand device and procedural outcomes,[7,15,16,18] we endeavor to explore these questions by systematically comparing the 2 with respect to data collection, preoperative variables, cohort characteristics, and outcomes in the context of breast reduction and breast reconstruction.

METHODS

Data Acquisition and Patient Selection

The NSQIP registry is a validated surgical outcomes database, including procedures performed throughout the United States. Data collection methods for NSQIP have been previously described in detail.[19,20] Briefly, data are independently abstracted by trained surgical nurses and are subject to random audits providing a high-quality, standardized database. The NSQIP data have a demonstrated disagreement rate of less than 1.8% and its outcomes have been previously validated against single-institution experiences.[14,20] The ASPS TOPS registry has tracked procedures and 30-day outcomes in plastic surgery since 2002. The database includes more than 1 million procedures collected from nearly 700 surgeons who are largely representative of the ASPS membership. The TOPS uses an electronic data capture interface

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From the *Northwestern University, Feinberg School of Medicine, Chicago, IL; †Department of Plastic Surgery, The Ohio State University, Columbus, OH; ‡American Society of Plastic Surgeons, Chicago, IL; and §Lehigh Valley Health Network, Allentown, PA.

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Reprints: John Y.S. Kim, MD, FACS, Division of Plastic and Reconstructive Surgery, Northwestern University, Feinberg School of Medicine, 675 North St Clair St, Galter Suite 19-250, Chicago, IL 60611. E-mail: jokim@nmh.org.

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TABLE 1. Study Attrition

	Reductions		Prosthetic		Autologous		Total	
	TOPS	NSQIP	TOPS	NSQIP	TOPS	NSQIP	TOPS	NSQIP
Initial sample size	17,418	4234	16,882	3107	3462	1390	37,762	8731
Complete demographic information	6003	4193	5168	3056	840	1378	12,011	8627
Matched	3775	3775	2727	2727	768	768	7270	7270

through which surgeons enter patient/procedural data and 30-day outcomes. Basic characteristics of TOPS and NSQIP are summarized in Table 1, Supplemental Digital Content 1, http://links.lww.com/SAP/A122.

Both databases were queried using the relevant *Current Procedural Terminology* codes (Table 2, Supplemental Digital Content 2, http://links.lww.com/SAP/A122) to identify breast reductions and breast reconstructions between 2008 and 2011. Of the 37,762 TOPS and 8731 NSQIP cases identified, any patient missing demographic or outcomes data were eliminated in anticipation of propensity score matching (Table 1).

Preoperative Variables and Outcomes

Preoperative variables collected by both the NSQIP and TOPS registries included age, body mass index (BMI), active smoking, diabetes, inpatient/outpatient status, and American Society of Anesthesiologists (ASA) class.

The 30-day outcomes of interest were those shared between the TOPS and NSQIP registries. These included wound dehiscence, surgical site infection, reconstructive failure, hospital readmission, death, venous thromboembolism (VTE), and any medical complication. Venous thromboembolism was defined as the presence of a deep vein thrombosis and/or pulmonary embolism within 30 days of the index procedure. Surgical site infections included superficial, deep, and organ/space infections, and medical complications included cardiac arrest, myocardial infarction, coma, peripheral neuropathy, cerebrovascular accident/stroke, ventilator use for more than 48 hours postoperatively, pneumonia, VTE, unplanned reintubation, sepsis, septic shock, acute renal failure, renal insufficiency, and urinary tract infection.

Propensity Score Matching

Patients undergoing breast reduction, prosthetic breast reconstruction, and autologous breast reconstruction from the TOPS and NSQIP registries were propensity score matched to balance out differences between their patient populations. The covariates of interest included age, BMI, smoking status, diabetes, inpatient/outpatient designation, and ASA class. Nearest neighbor matching in a 1:1 ratio was carried out as previously described.[21] Propensity score matching was performed in SPSS version 20.0 (Armonk, NY) using the *Propensity score matching in SPSS* package.[22]

Statistical Analysis

Descriptive statistics were calculated for the study populations before and after propensity score matching using Pearson χ^2 or Fisher exact tests for categorical variables and Mann-Whitney U tests for continuous variables.

RESULTS

Unmatched Demographics

Overall, 37,762 cases of breast reduction and reconstruction were identified in the TOPS registry and 8731 in the NSQIP registry. In both databases, breast reduction was the highest volume procedure, followed closely by prosthetic breast reconstruction and finally autologous breast reconstruction. After eliminating patients with missing data, 6003 breast reductions, 5168 prosthetic reconstructions, and 840 autologous reconstructions were included from the TOPS registry, and an additional 4193 reductions, 3056 prosthetic reconstructions, and 1378 autologous reconstructions from the NSQIP.

Patients captured in the NSQIP registry tended to be older with a higher BMI than those from TOPS (Table 2). The prevalence of smoking (10.96%–12.93% vs 6.90%–7.76%, all $P < 0.05$) and diabetes (4.94%–5.73% vs 3.10%–3.55%, all $P < 0.05$) were also significantly greater in the NSQIP registry. The NSQIP included a greater proportion of inpatient autologous reconstructions (90.46% vs 84.05%, $P < 0.001$), whereas TOPS included more inpatient prosthetic reconstructions (37.11% vs 34.13%, $P = 0.006$); the proportion of inpatient and outpatient breast reductions did not significantly differ between the cohorts ($P = 0.375$). The NSQIP patients were more likely to have an ASA class of 3 or greater across all procedures (Table 2, all $P < 0.001$).

Propensity Score Matching

After matching, 3775 reductions, 2727 prosthetic reconstructions, and 768 autologous reconstructions were selected for analysis

TABLE 2. Unmatched Demographics and Clinical Characteristics

	Reductions			Prosthetic Reconstruction			Autologous Reconstruction		
	TOPS (n = 6003)	NSQIP (n = 4193)	P	TOPS (n = 5168)	NSQIP (n = 3056)	P	TOPS (n = 840)	NSQIP (n = 1378)	P
Age (95% CI), y	43 (32–53)	44 (33–54)	<0.001	51 (43–59)	51 (44–59)	0.006	51 (45–58)	52 (45–58)	0.244
BMI (95% CI), kg/m^2	29.2 (25.8–33.4)	30.5 (26.8–34.9)	<0.001	25.0 (22.3–29.0)	25.5 (22.3–30.0)	0.003	27.2 (24.1–30.9)	28.1 (24.7–32.2)	<0.001
Smoking, n (%)	437 (7.28)	506 (12.07)	<0.001	401 (7.76)	395 (12.93)	<0.001	58 (6.90)	151 (10.96)	0.002
Diabetes, n (%)	213 (3.55)	207 (4.94)	0.001	163 (3.15)	160 (5.24)	<0.001	26 (3.10)	79 (5.73)	0.005
Inpatient, n (%)	1028 (17.12)	690 (16.46)	0.375	1918 (37.11)	1043 (34.13)	0.006	706 (84.05)	1249 (90.64)	<0.001
Outpatient, n (%)	4975 (82.88)	3503 (83.54)	0.375	3250 (62.89)	2013 (65.87)	0.006	134 (15.95)	129 (9.36)	<0.001
ASA status, n (%)									
1 or 2	5634 (93.85)	3623 (86.41)	<0.001	4848 (93.81)	2439 (79.81)	<0.001	795 (94.64)	952 (69.09)	<0.001
3 or greater	369 (6.15)	570 (13.59)	<0.001	320 (6.19)	617 (20.19)	<0.001	45 (5.36)	426 (30.91)	<0.001

TABLE 3. Matched Demographics and Clinical Characteristics

	Reductions			Prosthetic Reconstruction			Autologous Reconstruction		
	TOPS (n = 3775)	NSQIP (n = 3775)	*P*	TOPS (n = 2727)	NSQIP (n = 2727)	*P*	TOPS (n = 768)	NSQIP (n = 768)	*P*
Age (range), y	43 (32–54)	43 (33–53)	0.259	50 (43–59)	51 (44–59)	0.141	51 (45–58)	50 (46–58)	0.482
BMI (range)	29.75 (26.4–33.9)	29.9 (26.6–33.8)	0.629	25.0 (22.3–29.0)	25.4 (22.3–29.5)	0.105	27.4 (24.3–31.0)	27.8 (24.7–31.5)	0.083
Smoking, n (%)	354 (9.38)	356 (9.43)	0.937	341 (12.50)	342 (12.54)	0.935	55 (7.16)	52 (6.77)	0.764
Diabetes, n (%)	116 (3.07)	133 (3.52)	0.273	111 (4.07)	120 (4.40)	0.545	25 (3.26)	22 (2.86)	0.657
Inpatient, n (%)	641 (16.98)	658 (17.43)	0.604	994 (36.45)	930 (34.10)	0.070	680 (88.54)	680 (88.54)	1.000
Outpatient, n (%)	3134 (83.02)	3117 (82.57)	0.604	1733 (63.55)	1797 (65.90)	0.070	88 (11.46)	88 (11.46)	1.000
ASA status, n (%)									
1 or 2	3495 (92.58)	3500 (92.72)	0.860	2408 (88.30)	2410 (88.38)	0.933	724 (94.27)	728 (94.79)	0.654
3 or greater	280 (7.42)	275 (7.28)	0.860	319 (11.70)	317 (11.62)	0.933	44 (5.73)	40 (5.21)	0.654

from each registry. Across all 3 breast procedures, the matched cohorts did not significantly differ with respect to age, BMI, smoking, diabetes, inpatient/outpatient status, and ASA class (Table 3, all $P > 0.05$).

Matched 30-Day Outcomes

The TOPS captured a significantly greater number of wound dehiscence occurrences across all procedures (4.77%–5.47% vs 0.69%–1.17%, all $P < 0.001$), as well as more reconstructive failures after prosthetic reconstruction (2.82% vs 0.26%, $P < 0.001$). Surgical site infections, readmissions, mortality, medical complications, and VTEs were similar across the 2 data sets after breast reduction surgery (Table 4). Across all 3 procedures, the databases did not differ with respect to 30-day mortality (Table 4). Total surgical site infection rates only differed after autologous reconstruction (1.95% vs 6.25%, $P < 0.001$, higher in NSQIP). Readmission rates were higher in NSQIP for prosthetic reconstruction (0.87% vs 4.08%) but similar after breast reduction (1.27% vs 1.36%, $P = 0.846$) and autologous reconstruction (2.16% vs 3.68%, $P = 0.586$). Medical complications were greater in NSQIP after prosthetic (0.225% vs 0.84%) and autologous (0.39% vs 3.13%) breast reconstruction; VTE rates were greater in NSQIP after only autologous breast reconstructions.

DISCUSSION

Evidence-based medicine has become the standard for clinical decision making across all of the medical and surgical specialties, including plastic surgery. With these new standards, however, come a demand for robust and accurate benchmarking of patient outcomes and complication rates. As the utilization of national registries, including TOPS and NSQIP, in outcomes research increases, we endeavor to systematically assess the strengths and limitations of these data sources as they apply to breast reduction and breast reconstruction.

Data Collection

The NSQIP has installed several mechanisms to ensure the collection of high-quality data, including: rigorous data field definitions; training of paid, dedicated surgical clinical reviewers; continuous clinical review support systems and dilemma resolution; and regular audits to evaluate the reliability of the collected data.[23] Recent evaluations of interrater reliability have indicated a very low 1.56% overall disagreement between reviewers, with only 2 of the more than 240 variables captured in NSQIP demonstrating more than 5% disagreement.[23] Single-institution validations of NSQIP outcomes, namely 30-day hospital readmissions, have demonstrated the accuracy of the registry's clinical data.[14]

The TOPS uses an electronic data capture interface through which plastic surgeons or members of their staff can voluntarily enter patient demographics, risk factors, surgical procedures, and 30-day patient outcomes.[3] Not unlike NSQIP, TOPS demonstrates the quality of care provided by plastic surgeons and offers real-time reports on national averages and trends that allow participants to benchmark against

TABLE 4. Matched 30-Day Complication Rates

	Reductions			Prosthetic Reconstruction			Autologous Reconstruction		
	TOPS (n = 3775), n (%)	NSQIP (n = 3775), n (%)	*P*	TOPS (n = 2727), n (%)	NSQIP (n = 2727), n (%)	*P*	TOPS (n = 768), n (%)	NSQIP (n = 768), n (%)	*P*
Wound dehiscence	180 (4.77)	26 (0.69)	<0.001	148 (5.43)	19 (0.70)	<0.001	42 (5.47)	9 (1.17)	<0.001
Total surgical site infections	110 (2.91)	112 (2.97)	0.892	77 (2.82)	78 (2.86)	0.935	15 (1.95)	48 (6.25)	<0.001
Reconstructive failure				77 (2.82)	7 (0.26)	<0.001	18 (2.34)	19 (2.47)	1.000
Readmission	11/866 (1.27)	22/1613 (1.36)	0.846	6/578 (0.87)	55/1550 (4.08)	<0.001	3/139 (2.16)	16/435 (3.68)	0.586
Death	0 (0.00)	1 (0.03)	1.000	0 (0.00)	1 (0.04)	1.000	0 (0.00)	0 (0.00)	—
Any medical complication	13 (0.34)	24 (0.64)	0.070	6 (0.22)	23 (0.84)	0.002	3 (0.39)	24 (3.13)	<0.001
VTE	6 (0.16)	12 (0.32)	0.157	3 (0.11)	5 (0.18)	0.726	1 (0.13)	9 (1.17)	0.021

TABLE 5. Captured Demographic Variables

	TOPS	NSQIP
Sex	✓	✓
Race/ethnicity	✓	✓
Inpatient/outpatient	✓	✓
Age	✓	✓
BMI	✓	✓
Operative year	✓	✓
Facility type	✓	
Bilateral procedure	✓	
Insurance type	✓	
Anesthesia type	✓	✓
Diabetes	✓	✓
Smoking	✓	✓
Alcohol use		✓
Dyspnea		✓
Do not resuscitate status		✓
Functional status		✓
VTE prophylaxis	✓	
Antibiotic prophylaxis	✓	
Ventilator dependence		✓
Chronic obstructive pulmonary disease		✓
Current pneumonia		✓
Ascites		✓
Esophageal varices		✓
Heart failure		✓
Previous myocardial infarction		✓
Previous percutaneous coronary intervention		✓
Previous cardiac surgery		✓
Angina		✓
Hypertension		✓
Peripheral vascular disease/rest pain		✓
Renal failure/dialysis		✓
Impaired sensorium		✓
Coma		✓
Hemiplegia		✓
Stroke (with or without neurological deficit)		✓
Transient ischemic attack		✓
Tumor involving central nervous system		✓
Paraplegia/hemiplegia		✓
Disseminated cancer		✓
Open wound/wound infection		✓
Steroid use for chronic condition		✓
>10% loss of body weight in the last 6 mo		✓
Bleeding disorders		✓
Chemotherapy within 30 d		✓
Radiotherapy within 90 d		✓
Systemic sepsis		✓
Pregnancy		✓
Prior operation within 30 d		✓
Wound classification		✓
ASA classification	✓	✓
Emergency procedure		✓
Transfusion >4 U within 72 h of surgery		✓

This table does not include laboratory values which are captured in NSQIP when available with a large degree of missingness.

all physicians or a given practice type. One-hour training webinars as well as prerecorded data entry training sessions are available at all times to facilitate accurate data collection.[24] By eliminating the need for salaried clinical reviewers, participation in the TOPS registry is financially accessible to plastic surgery practices large or small, academic or private. The accessibility of the TOPS registry is particularly useful in light of recent trends for many plastic surgery procedures, including breast reduction and to a lesser extent reconstruction, being performed outside of the hospital at ambulatory surgery centers or in a private practice setting.[25–27] By including these cases, TOPS more effectively capture the breadth of patients and procedures performed across the United States each year.

Cohort Characteristics

The TOPS captured more than 4 times as many breast reductions and reconstructions as the NSQIP, but with a greater percentage of missing data. Interestingly, the missingness in TOPS was limited to preoperative variables. Although this somewhat negates TOPS' advantage in sample size particularly in analyses that attempt to control for preoperative variables, it does not affect its utility in benchmarking unadjusted complication rates. Nonetheless, efforts to reduce missingness, including requiring data fields, are warranted, and are being actively explored.

The NSQIP captures more demographic data and comorbidities than the TOPS (Table 5); however, many of these variables (eg, preoperative coma) may not be relevant to plastic surgery. The TOPS includes fewer variables, some of which are not captured in the NSQIP such as bilateral procedures, data on VTE or antibiotic prophylaxis, facility type, and insurance type. Furthermore, the TOPS registry is designed to incorporate modules to allow for the collection of additional procedure-specific variables of interest. Currently, modules exist for breast implants, lipoplasty, and bariatric surgery.[3]

Across all 3 procedures, the NSQIP captured older patients with a higher rate of smoking, diabetes, and systemic disease than the TOPS (Table 2), reflecting differences in data collection methods. Although the NSQIP sample captures patients treated at academic and community hospitals, the TOPS includes private practices as well. Certainly teaching hospitals are more likely to operate on a patient with multiple comorbidities, whereas private practice surgeons may select generally healthier patients. Excluding the latter subgroup increases the complexity of the NSQIP's cases and perhaps limits the applicability of studies using the NSQIP data outside of academic plastic surgery practices.

Patient Outcomes

In an attempt to reconcile the inherent differences between NSQIP and TOPS, we propensity score matched patients using shared, preoperative variables. Any persistent differences in outcomes at that point are likely secondary to differences in data collection. When a complication results in hospital admission or death, or when it directly involves the surgical site, surgeons are likely to become aware. It follows then, that for these outcomes, TOPS' self-reporting and NSQIP's chart review methods are equally effective in capturing 30-day events (Table 4). In contrast, other medical complications including urinary tract infection and deep vein thrombosis may be treated as outpatients without notifying the plastic surgeon (Table 6).

Furthermore, NSQIP was developed to capture general and vascular surgery procedures, and its outcomes are primarily tailored toward this initial constituency. As a plastic surgery–specific registry, TOPS is in a unique position to include those outcomes that are of greatest interest to the community at an appropriate level of detail. For example, both registries include wound dehiscence; however, TOPS makes the distinction between superficial and deep wound dehiscence, as well as total/partial graft, flap, and prosthesis loss. This broader definition effectively capture a greater number of events, and provides

an additional level of granularity that can be useful to clinicians and researchers alike.

In addition to physician-reported outcomes, TOPS can collect patient-reported outcomes on satisfaction and well-being via the BREAST-Q.[3] As additional surveys become available in plastic surgery, this feature will allow for more comprehensive and sophisticated evaluations of postoperative outcomes.

TABLE 6. Captured 30-Day Outcomes

	TOPS	NSQIP
Unplanned emergency room visit	✓	
Unplanned hospital admission	✓	✓
Unplanned return to operating room	✓	✓
Seroma requiring drainage	✓	
Hematoma requiring drainage	✓	
Wound disruption		
Superficial	✓	
Deep/fascia	✓	✓
Surgical site infection		
Superficial	✓	✓
Deep	✓	✓
Organ/space	✓	✓
IV antibiotics	✓	
PO antibiotics	✓	
Total flap loss	✓	*
Partial flap loss	✓	*
Total graft loss	✓	*
Partial graft loss	✓	*
Implant/prosthesis loss	✓	
≤4 U red blood cell postoperative bleeding requiring transfusion	✓	
>4 U red blood cell postoperative bleeding requiring transfusion	✓	✓
Deep vein thrombosis	✓	✓
Pulmonary embolism	✓	✓
Cardiac arrest	✓	✓
Myocardial infarction	✓	✓
Other cardiac occurrence	✓	
On ventilator >48 h	✓	✓
Pneumonia	✓	✓
Unplanned intubation	✓	✓
Other respiratory occurrence	✓	
Sepsis	✓	✓
Septic shock	✓	✓
Systemic inflammatory response syndrome	✓	✓
Coma	✓	✓
Peripheral nerve injury	✓	✓
Stroke/cerebrovascular accident	✓	✓
Other nerve occurrence	✓	
Acute renal insufficiency	✓	✓
Progressive renal insufficiency	✓	✓
Urinary tract infection	✓	✓
Other urinary tract occurrence	✓	
Adverse drug event	✓	
Puncture or laceration to other body organ/structure	✓	
Retained sponge/instrument	✓	
Wrong site surgery	✓	
Mortality	✓	✓

*Captured in 1 variable including graft, prosthesis, and flap failure

These differences highlight the relative strengths of each registry. The NSQIP more accurately captures medical complications, whereas the TOPS includes more detailed surgical outcomes, and is equally effective at capturing other events (Table 4). When taken together, along with more nuanced single-center studies, these registries complement one another to provide a more complete picture of 30-day outcomes. Another interesting corollary of these data is that TOPS' self-reported outcomes may not result in the underreporting of surgical complication one might expect vis-a-vis the outcomes reported by paid data-abstracters for NSQIP. However, additional studies, including single-center audits, could help further validate TOPS' outcomes data, particularly for those complications not captured within NSQIP.

Study Limitations

Although propensity score matching allows for meaningful comparison of similar TOPS and NSQIP cohorts, we were only able to account for differences in shared variables captured in both data sets. Furthermore, although matching allows for a meaningful comparison of the 2 registries, these matched cohorts are not representative of their respective databases. Complication rates derived from these cohorts cannot be extrapolated to the general population. Outcomes in both databases were limited to the first 30 days postoperatively, and may underestimate true complication rates. Furthermore, neither TOPS nor NSQIP currently differentiates complications (ie, infections or wound dehiscence) at the donor and recipient sites for autologous reconstructions. It may be possible that some patients appear both in the TOPS and NSQIP registries; however, there is currently no way to identify such patients to compare the validity of their data. Finally, our study is directly applicable to only breast reduction and reconstruction. Our decision to focus on breast surgery was motivated by the recent interest in using these registries to study these procedures; however, as high-volume procedures, these results may be representative of data collection across both registries.

CONCLUSIONS

The TOPS and NSQIP registries are currently 2 of the most widely used multi-institutional registries in plastic surgery, yet they capture significantly different patient populations. The TOPS' self-reported data allow for the inclusion of private practices and their generally younger and healthier patient populations, whereas the NSQIP only focuses on large academic and community hospitals. This self-reporting limits TOPS' ability to identify medical complications that may be treated as outpatients without notifying the surgeon. With respect to infections, mortality, and readmissions, however, TOPS does not seem to underreport complications relative to NSQIP. Some surgical complications are captured by TOPS at a higher rate due to its broader definitions, and many of TOPS' outcomes are not captured by NSQIP at all. Both NSQIP and plastic surgery–specific registries such as TOPS can provide valuable, complementary information that, when taken together, can help to guide evidence-based decision making in plastic surgery.

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