

Patient-Reported Outcomes for Breast Cancer

Sarah E. Tevis, MD¹, Ted A. James, MD MHCM², Henry M. Kuerer, MD PhD¹, Andrea L. Pusic, MD³, Katharine A. Yao, MD⁴, James Merlino, MD⁵, and Jill Dietz, MD⁶

¹Department of Breast Surgical Oncology, The University of Texas MD Anderson Cancer Center, Houston, TX; ²Beth Israel Deaconess Medical Center/Harvard Medical School, Boston, MA; ³Dana-Farber/Brigham and Women's Cancer Center, Boston, MA; ⁴Northshore University HealthSystem, Evanston, IL; ⁵Press Ganey Associates, South Bend, IN; ⁶Case Western Reserve School of Medicine, Cleveland, OH

ABSTRACT Patient-reported outcomes (PROs) provide insight into how patients perceive health and treatment effects, how treatments impact outcomes, and are helpful in determining how disease and surgical interventions impact many aspects of a patients' life. Commonly utilized metrics include survival and disease control, degree of recovery and functional status, access to treatment, treatment-related complications, health-related quality of life, and long-term consequences of therapy. The key to value-based, patient-centered health care is systematically incorporating patient input into the measures that they consider to be the most important outcomes for a particular medical condition while minimizing costs of care. This manuscript reviews the development and validation of multiple available PROs in breast surgical oncology and reconstruction, their impact in improving patient-physician communication and treatment outcome, and potential for impacting reimbursement. The implementation of PROs can be complex and challenging and care must be taken to minimize the potential for survey fatigue by patients and the potential financial burden for implementation, maintenance, and analyses of collected data. Because there is an increased emphasis in providing high-value care for cancer patients, the widespread incorporation of transparent breast-specific PROs stratified by treatments received and disease stage will be essential in delivering exceptional quality care.

Historically, clinical outcomes, such as survival and recurrence, were used to assess quality of care in oncologic surgery. Clinical outcomes continue to be important; however, they are no longer sufficient when assessing outcomes in breast surgical oncology. More recently, additional performance metrics have been focused on structure and processes of care as well as outcomes that patients find most important.^{1,2} Patient-reported outcomes (PROs) are defined as any report of the status of a patient's health condition that comes directly from the patient, without interpretation of the patient's response by a clinician or anyone else.³

PROs provide insight into how patients perceive health and treatment effects, how treatments impact outcomes, and are helpful to determine how disease and surgical interventions impact many aspects of patients' lives.⁴ As described in Table 1, commonly utilized metrics include survival and disease control, degree of recovery and functional status, access to treatment, treatment-related complications, health-related quality of life, and long-term consequences of therapy.⁵ PROs not only have the potential to monitor changes in individual patients throughout the course of their treatment but also may provide information to support patients in shared decision-making, serve as a measurement of patient-centered care, allow hospitals to monitor outcomes of care over time, play a role in value-based payments, and identify targets for quality improvement efforts.^{4,6,7}

PROS IN BREAST SURGICAL ONCOLOGY

An evaluation of randomized, controlled trials (RCTs) in cancer patients identified 447 RCTs with PROs identified as an endpoint from 2004 to 2013.⁸ Of those studies, the most common disease site found to have PROs as an endpoint was breast with 123 RCTs. PROs were the

TABLE 1 Classes of patient-reported outcomes

Survival	Overall survival
	Disease-free survival
Disease control	Distant recurrence
	Locoregional recurrence
Recovery	Activities of daily living
	Functional status
	Return to work
	Frailty
	Treatment related symptoms
Access to treatment	Time to treatment
Postoperative complications	Reoperation
	Readmission
	Surgical site infection
	Lymphedema/arm dysfunction
	Seroma/hematoma
	Endocrine and chemotherapy related complications
	Emergency department evaluation
Long-term outcomes	Body image
	Cosmetic satisfaction
	Decisional satisfaction
	Fatigue
	Health-related quality of life
	Pain
	Physical well-being
	Preservation of fertility
	Psychosocial well-being
Sexual well-being	

primary endpoint in 24% of RCTs and the secondary endpoint in 76% of RCTs. Howell and colleagues similarly performed a systematic review of PROs utilized in routine cancer clinical practice and found that PROs were most commonly utilized with breast cancer patients.⁹ The PRO used most often was the European Organization for Research and Treatment of Cancer (EORTC-QoL C30), which was commonly paired with disease-specific modules and the Hospital Anxiety and Depression Scale. A review of the BREAST-Q measure, which addresses outcomes related to breast reconstruction, found increasing annual numbers of publications using BREAST-Q 5 years after the development of the measure (from < 5 to 20).¹⁰

A review of 10 PRO metrics in oncologic breast surgery by Chen et al. summarized the PRO measures, methodology for development of measures, and psychometric properties.¹¹ We have listed commonly used PRO metrics in breast surgery in Table 2. Most measures were developed using expert opinion, literature review, and patient

focus groups or interviews.⁴ A weakness of some metrics was lack of patient involvement in PRO development, while strengths of breast surgery PROs included focus on surgery specific measures and formal psychometric evaluation of the metrics.¹¹

BENEFITS OF PROS

Implementation of PROs have been found to result in improvements in clinical outcomes, symptom management, resource utilization, and patient engagement.¹ A RCT to evaluate 12 PROs in cancer patients found a trend toward improved survival in the PRO group versus standard care (75 vs. 69%, $p = 0.05$).¹² The authors also noted longer adherence to chemotherapy (mean 8.2 vs. 6.3 months, $p = 0.002$), decrease in hospitalizations (45% vs. 49%, $p = 0.08$), and fewer visits to the emergency room (34% vs. 41%, $p = 0.02$) in the PRO group.¹² Furthermore, health-related quality of life (HRQOL) at 6 months improved more often in the intervention group (34 vs. 18%, $p < 0.001$) compared with the standard of care group.

A literature review demonstrated a positive correlation between the use of PROs and improved patient satisfaction in 13 of 16 studies.⁹ Additionally, two RCTs of PROs demonstrated a positive association with patient satisfaction, although neither study reached statistical significance.⁹ When PRO data are provided to patients in an easy to interpret format, it will allow patients to monitor their own outcomes over time, which may improve patient engagement and satisfaction.¹³

Monitoring of patient symptoms with PROs has been found to increase provider response to symptoms with increased referrals for psychosocial issues and treatment for pain. Furthermore, improvement in patient symptoms persisted at subsequent follow-up visits.⁹ Collection of PROs before clinic visits has the potential to set priorities for the clinical encounter and allow providers to prioritize patient concerns to make the most of patient-clinician communication during office visits.¹³ Figure 1 demonstrates how PROs can be tracked by clinicians over time. This data can be reviewed at each clinic visit to stimulate conversation about patient symptoms and satisfaction, which may lead to more effective and efficient patient-provider communication.

A RCT evaluating PROs vs standard of care demonstrated an improvement in HRQOL at 6 months in the intervention group (34 vs. 18%) and found fewer declines in quality of life in the intervention group (38 vs. 53%, $p < 0.001$).¹² The mean HRQOL also decreased less in the PRO group compared with standard of care (1.4 vs. 7.1 point drop, $p < 0.001$).

TABLE 2 Commonly used patient-reported outcomes in breast surgical oncology

Area	PRO measure	Development	Number of items	Psychometric analysis	Specific measures
Body image	Body Image after Breast Cancer Questionnaire (BIBCQ)	Expert opinion Literature review Patient interviews	53	Verified reliability and validity	Vulnerability, body stigma, limitations, body concerns, transparency, arm concerns
Body image	Hopwood Body Image Scale (HBIS)	Expert opinion Literature review Patient interviews	10	Adequate reliability, validity, sensitivity, and consistency	Body image changes
Body image	Polivy Body Image Scale (PBIS)	Body image scale Expert opinion	13	Demonstrated internal consistency, reliability, and validity	Body image, Self-concept, Satisfaction with intimate relationships
Breast reconstruction	Michigan Breast Reconstruction Outcomes Study (MBROS) Satisfaction Survey	Expert opinion	7		Patient satisfaction after reconstruction
Breast reconstruction	MBROS Body Image Questionnaire	Expert Opinion	9	Adequate internal consistency	Physical appearance after reconstruction
Breast reconstruction	BREAST-Q	Expert Opinion Focus Groups Literature Review Patient Interviews	Varies based on number of modules included	Adequate test retest reliability and validity	Satisfaction and surgery related quality of life
General breast cancer	European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ-BR23)	Expert opinion Literature review Patient interviews	23	Adequate reliability, clinical and cross culture validity, and sensitivity to change over time	Body image, sexuality, and symptoms
General breast cancer	Functional Assessment for Cancer Therapy-Breast Cancer (FACT-B)	Expert opinion Patient interviews	44	High internal consistency and reliability, test-retest reliability	Multidimensional quality of life
Lumpectomy	Breast Cancer Treatment Outcome Scale (BCTOS)	Expert opinion Literature review	22		Perceived aesthetic and functional status after lumpectomy and radiation
Mastectomy	Mastectomy Attitude Scale (MAS)	Unknown	33	Reliability was low for life outlook and openness	Attitudes and expectations of patients

PROS AND REIMBURSEMENT

As the focus on oncologic outcomes shifts from survival and recurrence to long-term outcomes and patient-centered care, hospital reimbursement has already been linked to patient experience and outcomes, such as complications, readmissions, and reoperations.^{14,15} It is likely that reimbursement also will be tied to PROs as hospital reimbursement shifts from fee-for-service to value-based care. PROs will not only become a meaningful way to capture quality-of-life issues that are important to patients but also will allow payors to monitor value of care more broadly.

In 2015, Congress passed the Medicare Access and Children's Health Insurance Program Reauthorization Act (MACRA) with the goal of tying Medicare reimbursement to outcomes and value of care as opposed to volume.¹⁶ The Quality Payment Program (QPP) focuses on enhancing value of care by continuing to improve patient outcomes, while also reducing costs by standardization to improve cost efficiency. Currently there are seven claims-based measures reported through MACRA; however, in the near future additional nonclaims-based PRO measures may be added. It is imperative that providers and hospital administration learn about PROs and implement them before it is mandated and linked to reimbursement.

DEVELOPMENT OF PROS/METHODOLOGY

Figure 2 demonstrates an outline of the steps to developing and validating PRO measures. Some studies focus on development of metrics that are sensitive and specific to the intervention of interest (i.e., nipple-sparing mastectomy), whereas others try to create PROs that are more generalizable across populations.¹⁷ Involvement of all potential stakeholders, including providers, staff, family members, and most importantly, patients is key when developing PRO metrics.⁶

It is important to understand gaps in resources and information use before data collection so the process can be streamlined.⁶ Choosing consistent measures and scales for metrics also is important in ensuring that the data collected will be useful.⁶ Instrument psychometric properties, including validity, reliability, and responsiveness, also should be measured and validated.^{2,4,7} Other important factors to report when considering PRO methodology include: compliance, timing of assessments, and how missing data was handled.²

The Patient Reported Outcome Measurements Over Time in Oncology (PROMOTION) registry evaluates RCTs, PRO methodology, analysis, and study validity.¹⁸ The PROMOTION registry has been able to improve the methodology of PRO assessment in prostate cancer RCTs over time and continues to monitor for areas where PRO methodology is poor or needs improvement.¹⁸ An addition to the Consolidated Standards of Reporting Trials (CONSORT) for RCTs, CONSORT PRO also provides guidance where PROs are primary or secondary endpoints in RCTs.¹⁹ The CONSORT PRO guidelines indicate that PROs should be identified as an endpoint in the abstract, a description of the hypothesis of PROs and relevant domains should be provided, evidence of the instrument's validity and reliability should be provided or cited, statistical approaches for dealing with missing data should be explicitly stated, and PRO specific limitations of study findings and generalizability of results should be discussed.¹⁹

When interpreting PROs, the clinical significance and presentation of results should be taken into consideration.² There should be a standardized framework and process for analyzing and scoring data.^{6,20} Data also should be made available for research and quality improvement work.^{6,21}

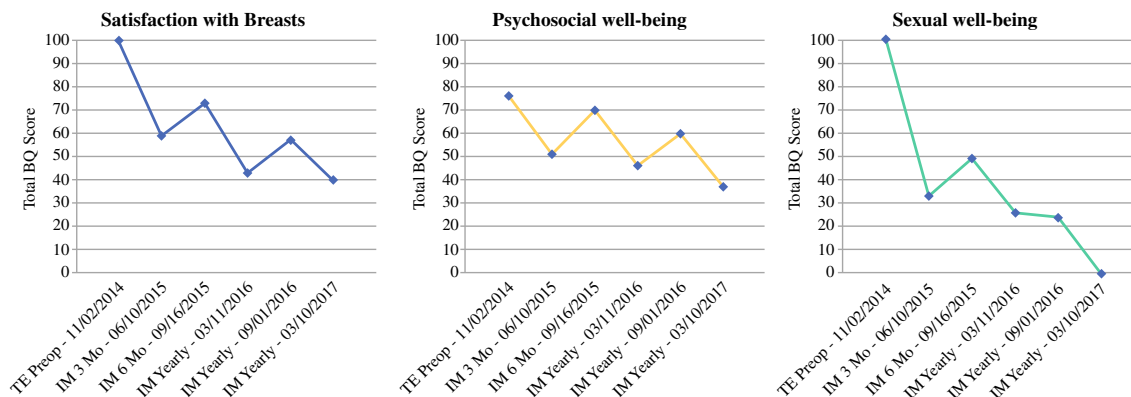


FIG. 1 Provider review of BREAST-Q patient-reported outcome data. Data can be reviewed at each clinic visit to stimulate conversation about patient symptoms and satisfaction, which may lead to more effective and efficient patient-provider communication

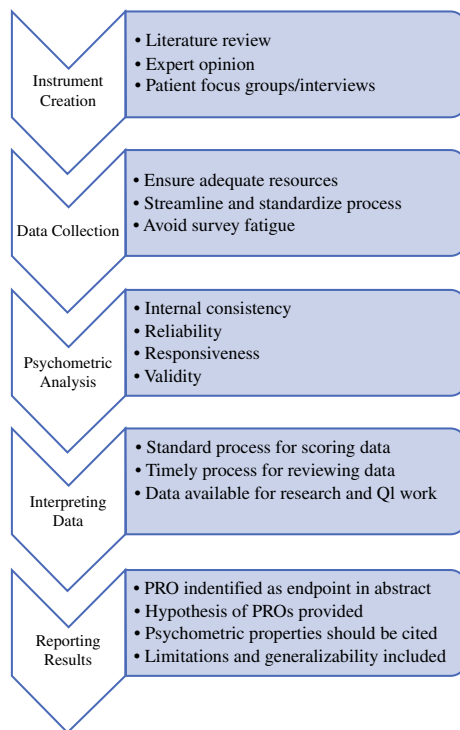


FIG. 2 Development of patient-reported outcomes. Outline of creation of PRO metrics, data collection, analysis of metrics, and how results can be interpreted and reported

CHALLENGES TO IMPLEMENTATION OF PROS

There are many challenges to the implementation of PROs, and no standardized method for integrating PROs into the usual workflow have been established.²² There is a potential for a substantial burden to patients, with varying number of questions and time needed to complete PRO measures. Patients with multiple health conditions or who utilize the health care system frequently may receive many different surveys resulting in survey fatigue. Patients also may have difficulty completing surveys due to poor health.^{4,6,13} Additionally, patients may not have access to the technology required to complete PROs and predefined times for data collection may not align with clinic visits requiring patients to complete PROs from home.^{6,13} While PRO data may be used by patients to track their health outcomes, if there is a lack of focus on the patient as the end user they may have difficulty viewing and interpreting their data.¹³

There is a financial burden to institutions who wish to implement PROs, and there are currently no financial incentives for widespread implementation of PROs.²² Furthermore, there is an increased burden on providers and staff with implementation of PROs and the associated cost of staff training and time to monitor PRO data. Data management and analyses is resource-intensive. To

implement PROs, the clinical workflow needs to be reworked, and providers who can dedicate time to evaluating PROs need to be identified.^{4,13} More importantly, there is a need to respond to severe or worsening symptoms in a timely fashion to ensure patient safety both during normal clinic hours and on nights and weekends.¹³

Concerns related to collection of data include that most PROs are collected through patient portals, which many patients do not use and which may not be readily captured by the electronic health record.²² There also is no commonly accepted terminology for PRO metrics and some have raised concerns about the reliability of patient-generated data.^{13,22} In addition, there are many PRO surveys to choose from making it difficult to compare data across studies, and while there are many established measures, there are metrics that are important to patients that are not well represented in PRO measures (i.e., end of life care).

There are many challenges to interpreting PRO data. There is a need for normative data for comparison.⁷ There also is a potential for response bias and undersampling of patient populations who may not have access to the technology required to complete PROs, such as patients of low socioeconomic status.^{7,9} In addition, missing data needs to be acknowledged and accounted for when reporting data. Providers need to have the ability to easily view PRO data to respond efficiently to patient symptoms and effect changes for both individual patients and identify areas for quality improvement.²²

Also, an unintended consequence of PRO data collection may be an increased focus on patients as consumers with a focus on short-term satisfaction (i.e., overprescribing pain meds or reluctance to discuss patient conditions such as obesity or smoking) rather than long-term cancer care outcomes. Patient satisfaction as measured by the Hospital Consumer Assessment of Healthcare Providers survey has not been found to correlate with patient outcomes and has recently been tied to hospital reimbursement.^{23,24} Because PROs are likely to be tied to reimbursement in the future, it is imperative that measures focus on specific outcomes that are important to patients.

KEYS TO SUCCESS/FUTURE WORK

While there are many inherent challenges, PROs have already been successfully implemented. One of the keys to success has been physician or team champions with support from institutional leadership.^{20,22} To ensure that PROs are patient-centered, patients should be integral in the development, implementation, and interpretation of data.¹³ Both patients and providers may benefit from having immediate access to PRO data for participation in shared decision making.^{7,20,25} The burden of PRO data collection can be

minimized for both patients and providers by optimizing workflows, keeping surveys short, and minimizing the number of surveys for patients with multiple medical conditions and high hospital utilization.^{9,20}

Utilization of technologic advances, including ability to complete measures electronically and integration of PROs in the EHR, may facilitate both completion of PRO measures by patients as well as review of data by providers.^{7,13,25} The ability to link PRO metrics with other EHR data will enable researchers to evaluate effectiveness of interventions, assess quality of care, and monitor pharmacovigilance.²² Automation of PRO workflow can allow providers to be notified if worsening or severe symptoms are reported so that patients can be contacted and interventions can be undertaken in a timely fashion.¹³

PROs are adding a much needed focus on patient centered care to the traditional measures of quality of care.^{7,25} It is likely that in the future PROs will be tied to reimbursement as a quality measure, PRO data may be incorporated into transparent performance measures, and patients could use PRO data to guide their selection of surgeons and institutions.^{1,26} If PROs are tied to provider reimbursement, there should be appropriate condition-specific measures and scales to evaluate performance. In addition, reimbursement models should be transparent to providers.^{1,20}

In breast surgical oncology, PROs have been utilized and most published studies focus on overall satisfaction with their breasts postoperatively. To improve comprehensive evaluations of outcomes in breast cancer patients, more work is needed to assess psychosocial, sexual, and physical well-being domains.¹⁰ Normative data has been published with the BREAST-Q scale; however, there is a need for normative data for other breast surgical oncology specific measures.²⁷

CONCLUSIONS

Because there is an increased emphasis in providing high-value care in cancer patients, the addition of metrics, such as PROs to traditional clinical measures of high-quality care, are becoming increasingly more common. While there are many challenges to implementing PROs, they are not insurmountable and the benefits of using PROs to monitor symptoms in individual patients, assist in shared decision making, implement quality improvement work, and has the potential to play a role in value-based payments for surgical oncology care. Keys to the successful implementation of PROs requires strong physician leadership and institutional support, utilization of technological advancements, engagement of patients and family

members, and automated and rapid return of PRO data to providers to respond to patient symptoms quickly and accelerate quality improvement work.

FINANCIAL DISCLOSURE JM is an employee of Press Ganey, Inc. TJ is a speaker and executive coach for StuderGroup. None of the authors has any commercial interest or conflict to disclose related to the present work.

REFERENCES

- Sharma R, Shulman LN, James T. The future of quality improvement in breast cancer: patient-reported outcomes. *Am J Med Qual.* 2017;32:469–71.
- Winters ZE, Benson JR, Pusic AL. A systematic review of the clinical evidence to guide treatment recommendations in breast reconstruction based on patient-reported outcome measures and health-related quality of life. *Ann Surg.* 2010;252:929–42.
- Administration USDoHaHSFaD. Guidance for industry patient-reported outcome measures: use in medical product development to support labeling claims. 2009.
- Cano S, Klassen AF, Scott A, et al. Health outcome and economic measurement in breast cancer surgery: challenges and opportunities. *Expert Rev Pharmacoecon Outcomes Res.* 2010;10:583–94.
- Fayanju OM, Mayo TL, Spinks TE, et al. Value-based breast cancer care: a multidisciplinary approach for defining patient-centered outcomes. *Ann Surg Oncol.* 2016; 23:2385–90.
- LS, KL. Institute for Healthcare Improvement Patient-Reported Outcomes. 2015.
- Voineskos SH, Nelson JA, Klassen AF, Pusic AL. Measuring patient-reported outcomes: key metrics in reconstructive surgery. *Annu Rev Med.* 2018;69:467–79.
- Efficace F, Fayers P, Pusic A, et al. Quality of patient-reported outcome reporting across cancer randomized controlled trials according to the CONSORT patient-reported outcome extension: a pooled analysis of 557 trials. *Cancer.* 2015;121:3335–42.
- Howell D, Molloy S, Wilkinson K, et al. Patient-reported outcomes in routine cancer clinical practice: a scoping review of use, impact on health outcomes, and implementation factors. *Ann Oncol.* 2015;26:1846–58.
- Cohen WA, Mundy LR, Ballard TN, et al. The BREAST-Q in surgical research: a review of the literature 2009–2015. *J Plast Reconstr Aesthet Surg.* 2016;69:149–62.
- Chen CM, Cano SJ, Klassen AF, et al. Measuring quality of life in oncologic breast surgery: a systematic review of patient-reported outcome measures. *Breast J.* 2010; 16: 587–97.
- Basch E, Deal AM, Kris MG, et al. Symptom monitoring with patient-reported outcomes during routine cancer treatment: a randomized controlled trial. *J Clin Oncol.* 2016; 34: 557–65.
- Lavallee DC, Chenok KE, Love RM, et al. Incorporating patient-reported outcomes into health care to engage patients and enhance care. *Health Aff (Millwood).* 2016;35:575–82.
- VanLare JM, Conway PH. Value-based purchasing—national programs to move from volume to value. *N Engl J Med.* 2012;367:292–5.
- Jencks SF, Williams MV, Coleman EA. Rehospitalizations among patients in the Medicare fee-for-service program. *N Engl J Med.* 2009;360:1418–28.
- Nabhan C, Jeune-Smith Y, Klinefelter P, et al. Challenges, Perceptions, and Readiness of Oncology Clinicians for the MACRA Quality Payment Program. *JAMA Oncol.* 2018;4:252–53.
- Pusic AL, Chen CM, Cano S, et al. Measuring quality of life in cosmetic and reconstructive breast surgery: a systematic review

- of patient-reported outcomes instruments. *Plast Reconstr Surg.* 2007;120:823–37; discussion 838-9.
18. Efficace F, Rees J, Fayers P, et al. Overcoming barriers to the implementation of patient-reported outcomes in cancer clinical trials: the PROMOTION Registry. *Health Qual Life Outcomes.* 2014;12:86.
 19. Calvert M, Blazeby J, Altman DG, et al. Reporting of patient-reported outcomes in randomized trials: the CONSORT PRO extension. *JAMA.* 2013;309:814–22.
 20. Squitieri L, Bozic KJ, Pusic AL. The role of patient-reported outcome measures in value-based payment reform. *Value Health.* 2017;20:834–6.
 21. Javid SH, Lawrence SO, Lavalley DC. Prioritizing patient-reported outcomes in breast cancer surgery quality improvement. *Breast J.* 2017;23:127–37.
 22. Basch E. Patient-reported outcomes—harnessing patients’ voices to improve clinical care. *N Engl J Med.* 2017;376:105–8.
 23. Kennedy GD, Tevis SE, Kent KC. Is there a relationship between patient satisfaction and favorable outcomes? *Ann Surg.* 2014;260:592–8; discussion 598-600.
 24. Tevis SE, Schmocker RK, Kennedy GD. Can patients reliably identify safe, high quality care? *J Hosp Adm.* 2014;3:150–60.
 25. Pezold ML, Pusic AL, Cohen WA, et al. Defining a Research Agenda for Patient-Reported Outcomes in Surgery: Using a Delphi Survey of Stakeholders. *JAMA Surg.* 2016;151:930–6.
 26. Dunham AL, Ramirez LD, Vang CA, et al. Profiling surgeon performance for breast cancer lumpectomy by composite measurement of reoperations, cosmetic outcomes, and patient preferences. *Ann Surg Oncol.* 2018.
 27. Mundy LR, Homa K, Klassen AF, et al. Breast cancer and reconstruction: normative data for interpreting the BREAST-Q. *Plast Reconstr Surg.* 2017;139:1046e–55e.