Is Our Effort Appropriately Valued? An Analysis of Work Relative Value Units in Immediate Breast Reconstruction

Andres F. Doval, M.D.
Andrew C. Gratzon, M.D.
Virginia Neese, M.S.
John W. Shuck, M.D.
Jeffrey Friedman, M.D.
Anthony Echo, M.D.

Houston, Texas

**Background:** The work relative value units system was developed as a quantifier of physician labor, technical skill, and training time required to complete surgical procedures. Thus, more complex surgical procedures that require greater technical skills and are more time consuming should yield a greater compensation. It is known that prosthetic breast reconstruction reimburses more per hour than autologous breast reconstruction. However, there are limited data comparing work relative value units and operative times in breast reconstruction procedures. Therefore, this study aims to compare mean operative times and work relative value units per minute across three different modalities of breast reconstruction.

**Methods:** A retrospective analysis of the American College of Surgeons National Surgical Quality Improvement Program database was performed to identify all patients undergoing implant-, pedicle-, and free flap–based reconstruction over a 6-year period. Calculation and comparison of median operative times, work relative value units, and dollars per minute was performed.

**Results:** A total of 3135 patients were included in the analysis: 2249 (71.7 percent) underwent immediate implant-based reconstruction, 745 (23.8 percent) underwent immediate free flap–based breast reconstruction, and 141 (4.5 percent) underwent immediate pedicle flap–based reconstruction. Patients were distributed in unilateral and bilateral cases. Consistently, median operative time was greater for free flap breast reconstruction, followed by pedicle flap– and implant-based reconstruction (p < 0.0001). However, work relative value units per minute and dollars per minute were found to be higher for prosthetic reconstruction in all comparisons (p < 0.0001).

**Conclusion:** In the authors’ analysis, more complex and time-consuming procedures resulted in a lower reimbursement in dollars and work relative value units per minute for the procedure. (Plast. Reconstr. Surg. 146: 502, 2020.)

From the Institute for Reconstructive Surgery, Houston Methodist Hospital, Weill Cornell Medicine; and Texas A&M College of Medicine, Texas A&M University.

Received for publication May 24, 2019; accepted February 20, 2020.

Presented at Plastic Surgery The Meeting 2019, 88th Annual Meeting of the American Society of Plastic Surgeons, in San Diego, California, September 20 through 23, 2019.

Copyright © 2020 by the American Society of Plastic Surgeons

DOI: 10.1097/PRS.0000000000007054

Disclosure: The authors did not receive any funding for this study. They have no financial disclosures and report no conflicts of interest.

Related digital media are available in the full-text version of the article on www.PRSJournal.com.
in eight women will be diagnosed with breast cancer within their lifetime. Although the number of mastectomies has remained relatively stable, there has been a 62 percent increase in breast reconstructions performed between 2009 and 2014. The Women’s Health and Cancer Rights Act of 1998 (H.R.616) extended benefits allowing for reconstruction of both breasts following mastectomy. This coverage includes all stages of reconstruction: symmetry, prostheses, and treatment of complications following reconstruction. Along the same line, the Breast Cancer Patient Education Act of 2015 (H.R.2540) directed the Department of Health and Human Services to establish an education program that provides breast reconstruction coverage information to patients who were anticipating surgery. There are several factors that could be contributing to the rise in breast reconstruction procedures, including heightened patient awareness through these two acts, improvement in surgical techniques with correlating improved patient-reported outcomes, and more women opting for contralateral prophylactic mastectomies.

Although there is a well-established rise in the number of breast reconstruction procedures, there are disparities in the approaches and surgical techniques used by plastic surgeons. Increases in implant-based reconstruction have outpaced those of tissue-based reconstruction, and it has become the dominant reconstructive method. Historically, it is known that implant-based breast reconstruction reimburses considerably more per hour than autologous breast reconstruction. Furthermore, literature has shown that work relative value units may not always correlate to increased complexity and time spent per case. This disparity has been shown in pediatric, cardiology, general surgery, and orthopedic surgery. However, there are limited data comparing work relative value units and operative times in breast reconstruction procedures. Therefore, this study aims to compare mean operative times, work relative value units per minute, and dollars per minute in implant-based, pedicle-based, and free flap-based immediate breast reconstruction procedures.

PATIENTS AND METHODS

Database

Patients that underwent immediate postmastectomy breast reconstruction procedures were identified using the American College of Surgeons National Surgical Quality Improvement Program database. This registry was developed as an effort of the American College of Surgeons to improve surgical quality of care and has been a valued source of outcome data since its introduction in 2004. It collects information regarding over 150 variables, including preoperative risk factors, intraoperative variables, and 30-day postoperative mortality and morbidity outcomes in procedures performed by surgeons of 11 different specialties. Currently, over 709 hospitals around the United States participate in the registry, including academic, private, and community hospitals. This study had institutional review board exemption and was conducted following the principles outlined by the Declaration of Helsinki.

Data Collection and Variables Included

Identification of Breast Reconstruction Modalities

All patients undergoing breast reconstruction procedures were identified over a 6-year period (2012 to 2017). Patients were identified and categorized using the CPT codes in the following modalities of immediate breast reconstruction: (1) implant-based reconstruction with tissue expanders; (2) pedicle transverse rectus abdominis musculocutaneous (TRAM) flap; and (3) free flap-based reconstruction. (See Table, Supplemental Digital Content 1, which shows the CPT codes used for the analysis, http://links.lww.com/PRS/E140.) In addition, cases were subdivided in unilateral and bilateral reconstructions.

Identification of Immediate Breast Reconstruction Cases

The identification of immediate breast reconstruction cases was performed using the mastectomy CPT codes included in the concurrent procedure variable (“CONCURR”) within the National Surgical Quality Improvement Program database (see Table, Supplemental Digital Content 1, http://links.lww.com/PRS/E140). This variable identifies an additional operative procedure performed by a different surgical team or surgeon and under the same anesthetic time. It is important to highlight that the operative times identified using this methodology include the mastectomy and the reconstruction times in all three groups.

By the same token, identification of unilateral versus bilateral cases was performed based on the number of CPT codes assigned to each patient (e.g., cases with two CPT codes for implant-based reconstruction were counted as bilateral cases). The same is true for the other two modalities of breast reconstruction included.
Identification of Work Relative Value Units and Mean Operative Time

To control for changes in the work relative value unit values assigned to each procedure over time, the variable name “WORKRVU” was used to collect the work relative value unit information during the years analyzed. The variable name “OPTIME” was used to identify the total operative times with the aforementioned inclusion criteria. Patients with additional procedures at the time of mastectomy and reconstruction were excluded. Moreover, outliers were identified and deleted to minimize their influence with respect to our analysis. These were defined as z scores more than 3 SD away from the mean within each group analyzed.

Data Analysis

Work Relative Value Units per Minute

For each case, the work relative value units per minute was calculated by dividing the work relative value units value in the operative time. Then, the mean work relative value units per minute was calculated for each one of the three groups analyzed. It is important to note that, when calculating the work relative value units per minute for bilateral cases, the productivity was tracked at 100 percent of the work relative value units for each code.

Dollars per Minute

Using the 2019 relative value unit–to-dollar conversion factor ($36.0991 per relative value unit) reported by the Centers for Medicare and Medicaid Services, the dollars per minute was calculated by multiplying the conversion factor by the work relative value units per minute for each case within all three groups analyzed.

Bilateral Cases

The total collection was determined to be 150 percent of a unilateral case, which follows the multiple procedure reduction in bilateral procedures set by the Centers for Medicare and Medicaid Services. This means that for bilateral cases, the work relative value units value used for our analysis was two times the work relative value units for unilateral cases (e.g., work relative value units for a unilateral implant, 18.5; work relative value units for bilateral implants, 37). However, when calculating the reimbursement, this was based on 150 percent of productivity. This means that if a unilateral implant yielded $5.16 dollars per minute, the bilateral will not be doubled but will be 150 percent of the productivity calculated based on the work relative value units tracked at 100 percent.

Statistical Analysis

Median and interquartile range were used to describe non normally distributed data. To identify and eliminate outliers in our data sets, z scores were calculated within each group. The Kruskal-Wallis test was used for univariate analysis to determine significant differences in median work relative value units, median operative time, median work relative value units per minute, and median dollars per minute between the three groups. The significance level was defined at a value of \( p < 0.05 \). IBM SPSS Version 25.0 (IBM Corp., Armonk, N.Y.) was used for all statistical analyses.

RESULTS

A total of 3135 patients were included in the analysis. Immediate implant-based reconstruction accounted for 71.7 percent of the cases (2249 cases), followed by autologous pedicle flap [141 cases (4.5 percent)], and autologous free flap [745 cases (23.8 percent)].

Work Relative Value Units

During the study period, the work relative value unit value for the CPT codes analyzed did not change over time. The work relative value units for unilateral implant-based reconstruction, unilateral pedicle TRAM flap, and unilateral free flap were 18.5, 26.8, and 42.6, respectively (\( p < 0.0001 \)). The highest work relative value units was for free flap breast reconstruction, followed by pedicle TRAM flap, and then tissue expander–based reconstruction.

Median Operative Times

Unilateral Cases

The free flap group had the higher median operative time with 7.4 hours (range, 1.8 to 13.9 hours), followed by the pedicle TRAM flap group with 4.5 hours (range, 1.0 to 11.2 hours), and the tissue expander group with 2.5 hours (range, 0.5 to 6.7 hours). The difference in operative times between the three groups was statistically significant (\( p < 0.0001 \)) (Table 1).

Bilateral Cases

Bilateral free flaps had the highest median operative time of 9.1 hours (range, 3.0 to 15.5 hours), followed by pedicle TRAM flap reconstruction with 6.9 hours (range, 2.4 to 14.2 hours), and tissue expander–based reconstruction with 3.1 hours (range, 0.7 to 7.3 hours). The difference in operative times between the three groups was statistically significant (\( p < 0.0001 \)) (Table 2).
Median Work Relative Value Units per Minute

Unilateral Cases

Of the three modalities of breast reconstruction analyzed, the work relative value units per minute was significantly higher for tissue expander–based reconstruction with 0.1178 work relative value units per minute, followed by pedicle flap (0.098 work relative value units per minute), and free flap (0.095 work relative value units per minute) ($p < 0.0001$) (Table 1).

Bilateral Cases

Similarly, in bilateral cases, a significantly higher work relative value units per minute was found for tissue expander–based reconstruction (0.1963 work relative value units per minute), followed by free flap (0.1563 work relative value units per minute), and pedicle TRAM flap (0.1441 work relative value units per minute) ($p < 0.0001$) (Table 2). No significant differences in terms of work relative value units per minute were found between free flap and pedicle flap breast reconstructions in unilateral and bilateral cases ($p = 0.999$ and $p = 0.691$, respectively).

Dollars per Minute

Unilateral Cases

Tissue expander–based reconstruction yielded the higher reimbursement per minute: $4.24$ dollars, followed by the pedicle TRAM flap and free flap–based reconstruction with $3.54$ and $3.42$ dollars, respectively ($p < 0.0001$) (Table 1).

Bilateral Cases

Bilateral tissue expander–based reconstruction yielded $7.07$ dollars, followed by free flap– and pedicle TRAM flap–based reconstruction with $5.19$ and $5.63$ dollars, respectively ($p < 0.0001$) (Table 2).

DISCUSSION

Medicine is constantly changing, and practice models are continuing to evolve. The era of the solo practitioner is fading away as more physicians are becoming employed by hospitals and academic institutions. Understanding how compensation is distributed for our work and time is an important part of a functional practice.

This is the first study analyzing reimbursement of the reconstructive plastic surgeon based on work relative value units assigned to different modalities of immediate breast reconstruction at a national level. Generally speaking, our analysis demonstrated that implant-based reconstruction is the dominant modality of breast reconstruction in the United States, which is in line with previous reports. Interestingly, we found that more complex and time-consuming procedures such as autologous-based breast reconstruction yielded significantly less reimbursement per minute operating for plastic surgeons in unilateral and bilateral cases when compared to less time-consuming procedures such as tissue expander–based reconstruction.

Although the work relative value units are higher for free flap and pedicle flap–based breast reconstructions, after accounting for the mean operative time spent in each modality of reconstruction, and calculating work relative value units per minute and dollars per minute, implant-based reconstruction yielded significantly more reimbursement than the other modalities of breast reconstruction.

Previous studies have analyzed this topic in numerous fields within medicine. In 2017, Sodhi et al. conducted an annualized cost difference analysis comparing primary versus revision total hip arthroplasty, arguing that revision cases are more complex, requiring longer operative time, greater

| Table 1. Unilateral Immediate Breast Reconstruction |
|-----------------------------------------------|
| Unilateral Implant | Unilateral Pedicle TRAM Flap | Unilateral Free Flap | $p$ |
|---------------------|-----------------------------|---------------------|----|
| Total               | 1407                        | 116                 | 324|
| wRVU                | 18.5                        | 26.8                | 42.6| $<0.0001$|
| Operative time, hr  | 2.5                         | 4.5                 | 7.4 | $<0.0001$|
| Median wRVU/min     | 0.1178                      | 0.098               | 0.095| $<0.0001$|
| Median $$/min       | 4.24                        | 3.54                | 3.42| $<0.0001$|
| $$/hr               | 254.4                       | 212.4               | 205.2|$<0.0001$|
| wRVU, work relative | IQR                         | Range               |     |
| value units; IQR,   | 1.4                         | 2.4                 | 3.4 |                |
| interquartile range.| 0.5–6.7                     | 1.0–11.2             | 1.8–13.9|                |

| Table 2. Bilateral Immediate Breast Reconstruction |
|-----------------------------------------------|
| Bilateral Implant | Bilateral Pedicle TRAM Flap | Bilateral Free Flap | $p$ |
|-------------------|-----------------------------|---------------------|----|
| Total             | 842                         | 25                  | 421|
| wRVU              | 37                          | 53.6                | 85.2| $<0.0001$|
| Operative time, hr| 3.1                         | 6.9                 | 9.1 | $<0.0001$|
| Median wRVU/min   | 0.1963                      | 0.1441              | 0.1563| $<0.0001$|
| Median $$/min     | 7.07                        | 5.19                | 5.63| $<0.0001$|
| $$/hr             | 424.2                       | 311.4               | 337.8| $<0.0001$|
| wRVU, work relative | IQR                         | Range               |     |
| value units; IQR, | 2.0                         | 3.1                 | 2.6 |                |
| interquartile range.| 0.7–7.3                     | 2.4–14.2             | 3.0–15.5|                |
technical skills, and more aftercare. Surprisingly, they found that dollars per minute, dollars per case, and dollars per day were significantly higher for primary cases ($ p < 0.001$). Moreover, after conducting their annualized cost difference analysis, they found a $113,052 annual cost difference for surgeons only performing primary total hip arthroplasty.\textsuperscript{14}

Similarly, in 2014, Shah et al. analyzed 11 high-volume general surgery procedures and correlated them with operative time, length of stay, and morbidity and mortality, arguing that those are proxies of physical and cognitive time invested by surgeons in the care of their patients. They found a poor correlation between relative value units and patient length of stay and operative time across all surgical procedures analyzed. Along the same line, they also reported that relative value units moderately correlated with morbidity and serious adverse events.\textsuperscript{11}

Specifically in plastic surgery, Sheckter et al. published an interesting article using the Blue Health Intelligence database, which is a national database that prospectively collects data of patients enrolled in BlueCross/BlueShield association plans across the United States. In line with our findings, they found a notable variation in reimbursements for breast reconstruction markets across the United States, arguing that increasing physician payments for either flaps or implants was associated with driving that particular reconstructive method.\textsuperscript{9}

The relative value unit system was developed as a metric of physician work and productivity. The assignment of relative value units to each procedure is under the discretion of a committee known as the Relative Value Scale Update Committee.\textsuperscript{19} The expert panel’s assessment takes into consideration physicians’ time (including preoperative evaluation/visits, operation length, postoperative hospital care, and 90-day office visits), assistants’ time, supplies, and equipment involved in patient care to make their decisions. As an example, when a patient underwent tissue expander-based reconstruction, follow-up visits and the supplies required for expansion are built in.

In a recent publication in the New England Journal of Medicine, Chan et al. demonstrated that the operative time is particularly an influential factor for the relative value unit calculations. In this study, service times used in evaluating their sample of surgical procedures ($ n = 293$) explained 81 percent of the variance in the work relative value units assigned to those procedures.\textsuperscript{20}

Based on these considerations, it is clear why free flap breast reconstruction has the highest work relative value units assigned: this procedure requires more time and more surgical training, and because this is a more complex operation, patients have a longer length of stay than with other modalities of reconstruction. Specifically, for our analysis, the mean length of stay for free flap breast reconstruction was 4.2 days compared with implant- and pedicle-based breast reconstruction (1.1 and 3.5 days, respectively; $ p < 0.0001$). Nonetheless, our analysis demonstrated that a higher work relative value unit was not sufficient after accounting for operative times, work relative value units per minute, and dollars per minute.

The surgical approach to perform a breast reconstruction is a preference-sensitive scenario in which several factors are involved, including patient characteristics, provider expertise, and patient/surgeon preferences, among others.\textsuperscript{9,21} Regardless of the technique of breast reconstruction used, this procedure improves body image, sexuality, patient satisfaction, and quality of life.\textsuperscript{22,23} Regarding autologous breast reconstruction, the literature has delineated important advantages of this surgical approach. Several authors have demonstrated that women who underwent autologous breast reconstruction are significantly more satisfied with their breasts than women who underwent implant-based reconstruction.\textsuperscript{24–26} Quality-of-life and cost-analysis studies argued that in a long-term setting, health-related quality of life after autologous breast reconstruction significantly surpasses this measurement when compared with implant-based reconstruction. Moreover, autologous transfer is cost-effective in the long term because of the lower rate of reoperations attributable to implant-related complications and implant exchange.\textsuperscript{27,28}

As patients have become more inclined to research their disease process and potential surgical treatments, we as physicians have the important role of recommending a surgical plan that is both right for the patient and respects her wishes. The ability to use autologous tissue versus implant reconstruction is available to the plastic surgeon; what is decided should ultimately benefit the patient, without ulterior motive. Unfortunately, disparities in physician reimbursement may have an influence in this process. In a recent publication, Sheckter et al. conducted a stochastic analysis demonstrating that favorable physician payments for either flaps or implants was associated with influencing that particular reconstructive method.\textsuperscript{9}

After analyzing this subset of patients on a national basis, it is apparent that the current work relative value units assigned for autologous-based breast reconstruction does not reflect the labor, additional microsurgical training, and longer duration of hospitalization. Although superior
patient-related outcomes and long-term cost effectiveness have been proven for autologous breast reconstruction, the growth of this approach in the United States has been outpaced by implant-based reconstruction. The disparity in reimbursement could be an explanation for this trend.

With this study, we expect to provide important information that is needed when negotiating with insurance companies or hospitals that want their surgeons performing microsurgery breast reconstruction. By using the most recent data available from the National Surgical Quality Improvement Program database, we were able to demonstrate the actual work relative value units per minute and dollars per minute. Although surgeons can estimate from the own experience the reimbursement per unit of time, this study gives us real numbers.

Finally, by demonstrating that surgeons are making less per unit of time for a free flap breast reconstruction compared with tissue expander reconstruction, this could help the surgeon justify his or her volume to hospital administrators or justify additional reimbursement from private insurers. Moreover, this can help surgeons decide in their own practice whether it is worth performing a microsurgical breast reconstruction or to refer patients to someone else.

Limitations

There are limitations to the present analysis. A retrospective review of a national database is always subject to data entry errors, misinterpretation, and overestimation or underestimation of results. The identification of immediate breast reconstruction cases was conducted based on concurrent mastectomy procedures, which included time required to perform mastectomy and reconstruction. Moreover, data of other components of the work relative value unit system such as preoperative services and postoperative visits were not included because the National Surgical Quality Improvement Program database does not account for these variables.

Furthermore, although identification and elimination of outliers was performed, we encountered operative times that do not correlate with the surgical procedure attached to each CPT code (either very long or very short operative times). This could be because of errors in manual data entry, cancelled cases that were coded as completed, or intraoperative complications that we could not identify. However, the mean operative time of the three modalities of reconstruction seem reasonable based on the experience of the senior authors of this project.

We are aware that more than one CPT code can be used to identify the different surgical approaches used for breast reconstruction. However, only the most common CPT code for each modality was used to identify the procedures in each group. Lastly, this study did not analyze the impact of revision operations among the various modalities of breast reconstruction that may impact physicians’ reimbursement.

CONCLUSIONS

In our analysis, more complex and time-consuming procedures resulted in a lower reimbursement in work relative value units and dollars per minute. Regarding breast reconstruction, the current established work relative value units assigned to the different surgical approaches compensate implant-based reconstruction procedures at a higher rate than autologous-based approaches when taking time into consideration. Finally, it is important to know the numbers when negotiating with your institution or with insurance companies.

REFERENCES

1. Berenson RA, Rich EC. US approaches to physician payment: The deconstruction of primary care. J Gen Intern Med. 2010;25:613–618.
2. AAPC. What is CPT? Available at: https://www.aapc.com/resources/medical-coding/cpt.aspx. Accessed November 12, 2019.
3. Introduction to relative units and how Medicare reimbursement is calculated. Available at: http://labor.alaska.gov/wc/med-serv-comm/cms_rvu_calculations.pdf. Accessed November 12, 2019.
4. American Cancer Society. Cancer Statistics Center: 2019 breast cancer estimates. Available at: https://cancerstatisticscenter.cancer.org/?_ga=2.125147598.553883183.1551284377-213925162.1548787738!/. Accessed February 10, 2020.
5. Miller AM, Steiner CA, Barrett ML, Fingar KR, Elixhauser A. Breast reconstruction surgery for mastectomy in hospital inpatient and ambulatory settings, 2009-2014. In: Healthcare Cost and Utilization Project Statistical Briefs. Rockville, Md: Agency for Healthcare Research and Quality; 2017:1–20.
6. Molinari S. H.R.616: Women’s Health and Cancer Rights Act of 1997. Available at: https://www.congress.gov/bill/105th-congress/house-bill/616. Accessed November 13, 2019.
7. Lance L. H.R.2540 - Breast Cancer Patient Education Act of 2015. Available at: https://www.congress.gov/bill/114th-congress/house-bill/2540. Accessed November 15, 2019.
8. Panchal H, Matros E. Current trends in postmastectomy breast reconstruction. Plast Reconstr Surg. 2017;140(Advances in Breast Reconstruction):7S–13S.

Anthony Echo, M.D.
Institute for Reconstructive Surgery
Houston Methodist Hospital
6560 Fannin Street
Scurlock Tower, Suite 2200
Houston, Texas 77030
aecho@houstonmethodist.org
Twitter: @AnthonyEchoMD
Instagram: @anthonyechomd
9. Sheckter CC, Panchal HJ, Razdan SN, et al. The influence of physician payments on the method of breast reconstruction. *Plast Reconstr Surg*. 2018;142:434e–442e.

10. Alderman AK, Storey AF, Nair NS, Chung KC. Financial impact of breast reconstruction on an academic surgical practice. *Plast Reconstr Surg*. 2009;123:1408–1413.

11. Shah DR, Bold RJ, Yang AD, Khatri VP, Martinez SR, Canter RJ. Relative value units poorly correlate with measures of surgical effort and complexity. *J Surg Res*. 2014;190:465–470.

12. Balasubramanian S, Kipps AK, Smith SN, Tacy TA, Selamet Tierney ES. Pediatric echocardiography by work relative value units: Is study complexity adequately captured? *J Am Soc Echocardiogr*. 2016;29:1084–1091.

13. Schwartz DA, Hui X, Velopulos CG, et al. Does relative value unit-based compensation shortchange the acute care surgeon? *J Trauma Acute Care Surg*. 2014;76:84–92; discussion 92–94.

14. Sodhi N, Piuzzi NS, Khlopas A, et al. Are we appropriately compensated by relative value units for primary vs revision total hip arthroplasty? *J Arthroplasty* 2018;33:340–344.

15. Peterson J, Sodhi N, Khlopas A, et al. A comparison of relative value units in primary versus revision total knee arthroplasty. *J Arthroplasty* 2018;33(Suppl)S39–S42.

16. American College of Surgeons. American College of Surgeons National Surgical Quality Improvement Program. Available at: https://www.facs.org/quality-programs/acsnsqip/about/history. Accessed October 6, 2018.

17. Epstein S, Tran BN, Cohen JB, Lin SJ, Singhal D, Lee BT. Racial disparities in postmastectomy breast reconstruction: National trends in utilization from 2005 to 2014. *Cancer* 2018;124:2774–2784.

18. Aliu O, Zhong L, Chetta MD, et al. Comparing health care resource use between implant and autologous reconstruction of the irradiated breast: A national claims-based assessment. *Plast Reconstr Surg*. 2017;139:1224e–1231e.

19. American Medical Association; RVS Update Committee (RUC). An introduction to the RUC. Available at: https://www.ama-assn.org/about/rvs-update-committee-ruc/rvs-update-committee-ruc. Accessed February 15, 2020.

20. Chan DC, Huynh J, Studdert DM. Accuracy of valuations of surgical procedures in the Medicare fee schedule. *N Engl J Med*. 2019;380:1546–1554.

21. Ng SK, Hare RM, Kuang RY, Smith KM, Brown BJ, Hunter-Smith DJ. Breast reconstruction post mastectomy: Patient satisfaction and decision making. *Ann Plast Surg*. 2016;76:640–644.

22. Pusic AL, Matros E, Fine N, et al. Patient-reported outcomes 1 year after immediate breast reconstruction: Results of the Mastectomy Reconstruction Outcomes Consortium Study. *J Clin Oncol*. 2017;35:2499–2506.

23. Doval AF, Lamelas AM, Daly LT, et al. Deep inferior epigastric artery perforator flap breast reconstruction in women with previous abdominal incisions. *Ann Plast Surg*. 2018;81:560–564.

24. Eltahir Y, Werners LL, Dreise MM, Zeijlmans van Emmichoven IA, Werker PM, de Bock GH. Which breast is the best? Successful autologous or alloplastic breast reconstruction: Patient-reported quality-of-life outcomes. *Plast Reconstr Surg*. 2015;135:43–50.

25. Yueh JH, Slavin SA, Adesiyun T, et al. Patient satisfaction in postmastectomy breast reconstruction: A comparative evaluation of DIEP, TRAM, latissimus flap, and implant techniques. *Plast Reconstr Surg*. 2010;125:1585–1595.

26. Tønseth KA, Hakland BM, Tindholdt TT, Abyholm FE, Stavem K. Quality of life, patient satisfaction and cosmetic outcome after breast reconstruction using DIEP flap or expandable breast implant. *J Plast Reconstr Aesthet Surg*. 2008;61:1188–1194.

27. Hu ES, Pusic AL, Waljee JF, et al. Patient-reported aesthetic satisfaction with breast reconstruction during the long-term survivorship period. *Plast Reconstr Surg*. 2009;124:1–8.

28. Razdan SN, Cordeiro PG, Albornoz CR, et al. Cost-effectiveness analysis of breast reconstruction options in the setting of postmastectomy radiotherapy using the BREAST-Q. *Plast Reconstr Surg*. 2016;137:510e–517e.