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A Retrospective Cohort Study on Payor Type and the Effect on Revisions in Breast Reconstruction

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Abstract

Background—Patients who are insured by Medicare and Medicaid are less likely to undergo breast reconstruction than their privately insured counterparts. Whether insurance type also affects subsequent revisions remains unknown. This study explores the relationship between payor type, revisionary procedures and the completion of breast reconstruction.

Methods—A retrospective cohort study was created including patients who had breast reconstruction at our institution from 1996–2016. Data collected included age, cancer stage, race, laterality, initial breast reconstruction type, total number of procedures, number of trips to the operating room, and subsequent revisions. Analysis of covariance and logistic regression were used to estimate the controlled mean number of revisions and probability of completion of reconstruction as a function of insurance type.

Results— $N = 3,113$ patients were included: 2,271 (72.9%) with private insurance, 450 (14.5%) with Medicare, and 392 (12.6%) with Medicaid. On controlled analysis, there was no difference in total number of procedures, number of revisions, and number of trips to the operating room between the three insurance types. There was no difference in the proportion of patients undergoing symmetry procedures, nipple or areolar reconstruction.

Conclusions—To our knowledge, this is the first study to evaluate discrepancies in number of procedures, revisions, and the proportion of patients completing breast reconstruction between insurance types. When controlling for other factors, we report no differences in care based solely on payor type. Instead, patient and surgeon variables may be responsible for the differences observed, and should be targeted in future research to improve equity.

Background

Post-mastectomy breast reconstruction can benefit women physically and emotionally and improve their quality of life.(1–5) Since 1999, the Women’s Health and Cancer Rights Act has mandated that post-mastectomy reconstructive procedures be covered by insurance, which subsequently increased the rate of breast reconstruction.(6, 7) However, women with

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private insurance remain more likely to undergo reconstruction than those with Medicare or Medicaid (8–11), suggesting the existence of a persistent disparity in care despite this important legislative achievement.

There are multiple factors that continue to affect the rate of breast reconstruction, the number of procedures a woman undergoes, and whether or not they choose to complete their reconstruction with nipple and areola reconstruction.(7, 8, 12–16) The number and nature of complications or duration of oncologic and reconstructive treatment may also affect a patient's desire to complete reconstruction, although this does not in itself have a connection to insurance status.(17) However, African-American women are significantly more likely to be underinsured or uninsured than other racial groups,(12) and more likely to select autologous over implant-based reconstruction(18), so race must also be taken into account when exploring such disparities.

Given that 36.5% of patients were carriers of government insurance and another 10.4% were uninsured in 2014(19), further elucidating disparities between these groups is an essential step in eliminating them. The future of funding and availability of government-sponsored insurance plans is in question.(20) Any disparity in care may be amplified with an increasing number of patients enrolled in Medicaid and Medicare.

It is unknown whether insurance type affects the number of operative interventions a woman undergoes during her reconstructive course, or the likelihood that she will undergo nipple-areola reconstruction and areolar tattooing. Our aim is to determine the independent effect of insurance type on the number of procedures, number of revisions, and the likelihood of nipple and areola reconstruction. Any discrepancies in breast reconstruction based on insurance status should be explored further to ensure the highest quality of care and equal treatment of all patients in our healthcare system.

Methods

After approval by the Institutional Review Board (#201308013), a retrospective cohort study was created using the billing database for procedures on all patients with private insurance, Medicare, or Medicaid who had undergone breast reconstruction at our institution between the years of January 1999 (the year the Women's Health and Cancer Rights Act was enacted) and January 2016. Patients initiating reconstruction after January 2015 were excluded, as the majority had not completed their reconstructive pathway. In addition, patients who did not initiate their reconstruction at our institution or had reconstruction for non-oncologic reasons were excluded. Codes for initial reconstruction, revisionary procedures, and nipple reconstruction were queried to create a reconstructive timeline for each patient. The following information was gathered: age, race, cancer stage, date of surgery, procedure, diagnosis, and health insurance type. Procedures were then coded by type – initial reconstruction, revisionary procedures, symmetry procedures, nipple reconstruction, and areolar tattooing (Table 1). Operative intervention for immediate complications within the 90 days of the initial operation stay such as flap loss or hematoma were not counted in the analysis as these are urgent and necessary procedures that are not performed to achieve symmetry or restoration of the appearance of normal anatomy.

Furthermore, code 11970 for implant exchange alone was counted in the total number of procedures, but not toward revisionary procedures since it is a necessary step in removing a temporary implant, rather than an elective revision.

Once the reconstructive timeline was created, patients were categorized by insurance type at their first procedure: private insurance, Medicare, and Medicaid. Private insurance included all commercial, Health Maintenance Organization (HMO), and Preferred Provider Organization (PPO) payor types. Self-pay patients were excluded due to small numbers (24 patients), and other insurance types excluded due to small numbers and heterogeneity (31 patients). Patients undergoing nipple-sparing mastectomy were excluded from analysis regarding nipple and areola reconstruction. We counted total number of procedures by each billed CPT code, number of revisions by each CPT code categorized as “revision” or “2” in Table 1. OR trips were counted by counting total number of service dates for all CPT codes. Patients missing key data were excluded from the study.

Summary statistics were generated via established methods. Due to asymmetry and skewness, continuous sample distributions were summarized via median and interquartile ranges. Given the central limit theorem, continuous sample distributions were compared via student's *t*-test and categorical sample distributions via Chi-squared analyses, respectively. Analysis of covariance (ANCOVA) was used to determine the independent effect of insurance type on number of procedures, operating room (OR) trips, and revisions, while logistic regression was used to estimate the independent probability of undergoing a symmetry procedure, nipple reconstruction, or areolar tattooing by insurance type. Both multivariate models included age, cancer stage, race, laterality of reconstruction (unilateral vs. bilateral), and initial reconstruction type (implant-based, abdominal flap, latissimus flap, and other) as covariates. Analysis was completed using SAS 9.4 (Cary, NC) and STATA v13.0 (College Station, TX). Two-sided alpha = 0.05 indicated significance in all tests.

Results

A total of 3,113 patients were analyzed. 2,271 (72.9%) patients had private insurance, 450 (14.5%) had Medicare, and 392 (12.6%) had Medicaid. Demographics and type of reconstruction by insurance category are shown in Table 2. Average age was 50.2 years, and 38.6% of patients had bilateral reconstruction. There was a significant difference in age by insurance type ($p<0.01$), with Medicare being the oldest at 59.2 ± 12.3 , and Medicaid the youngest at 45.9 ± 9.4 years. There was a significant difference in the distribution of race among insurance types ($p<0.01$). Caucasian patients were the majority in all groups, constituting 85.6% of patients with private insurance, 77.3% of patients with Medicare, and 54.6% of patients with Medicaid. Cancer stage ($p=0.02$) and percent of bilateral reconstruction ($p<0.01$) differed by insurance type as did initial type of reconstruction ($p=0.01$), Table 2. The rate of implant-based reconstruction ranged from 73.7% in privately insured patients to 81.6% in Medicare patients. There were 23 plastic surgeons included in analysis, 11 of those performed breast reconstruction on more than 50 patients (Table 3).

Total number of procedures by billed CPT codes

As a whole, patients underwent a median of 3 (IQR 2,5, mean 3.8) reconstructive procedures. Initially, the unadjusted number of coded procedures differed between all insurance types (Figure 1). After adjusting for age, cancer stage, race, bilateral versus unilateral procedures, surgeon, and initial reconstructive type, private patients underwent 3.80 procedures, Medicare patients underwent 3.75 procedures, and Medicaid patients underwent 3.69 procedures. None of these differed significantly (Table 4).

Trips to the operating room

Patients underwent a median of 3 trips to the operating or procedure room (IQR 2,4; mean 2.9) trips to the operating room. The number of trips to the operating room differed between privately insured and Medicare patients ($p=0.02$) as seen in Figure 2, however on controlled analysis as described above, there was no significant difference, (Table 4).

Total number of revisionary procedures

Patients underwent a median of 1 revisionary procedure (IQR 0,2; mean 1.62) revisionary procedures as described in Table 1. Unadjusted revision rates did not differ between insurance type (Figure 3). There was no significant difference in number of revisionary procedures between private and Medicare patients (adjusted average 1.86 vs 1.72, $p=0.5$), nor between private and Medicaid patients (adjusted average 1.64 vs 1.52, $p=0.2$), Table 4.

Symmetry procedures

Among patients who underwent unilateral breast reconstruction ($n=1,913$), 46% of patients underwent symmetry procedures on the contralateral breast (Figures 4 and 5). On both raw estimates and on controlled analysis, adjusting for age, cancer stage, race, and type of reconstruction, there were no differences by insurance type (Table 5).

Nipple reconstruction

Among patients who underwent skin sparing mastectomy or similar procedure in which the nipple-areola complex was removed, 41.6% underwent nipple reconstruction in either the operating room or office setting. Unadjusted analysis revealed a significant difference in likelihood to undergo this procedure between privately insured and Medicare patients (OR 0.66, $p<0.01$). However, when controlling for covariates there was no significant difference (Medicare OR 0.77, $p=0.1$ Medicaid OR 0.89, $p=0.4$), Table 5.

Areolar tattooing

Lastly, 30.1% of patients underwent areolar tattooing to complete their reconstructive course. When comparing unadjusted probabilities of undergoing areolar tattooing, privately insured patients were more likely to undergo the procedure than Medicare patients ($p=0.03$). However, on controlled analysis, privately insured patients had a similar likelihood as Medicare (OR 0.92, $p=0.6$) and Medicaid patients (OR 0.96, $p=0.8$) to undergo areolar tattooing.

Discussion

This study provides an analysis of the number of breast reconstructive procedures, revisions, and rates of symmetry procedures, nipple reconstruction, and tattooing by insurance types at a single large academic medical center. While there are known differences in reconstructive preferences by age, level of education and race,(8, 9, 12, 21–23) to our knowledge this is the first study that focuses on payor type as an influence on the subsequent reconstructive pathway after index reconstruction, with the goal of highlighting any existing discrepancies in and attempt to control them. We examined a large cohort of patients who underwent reconstruction after the government mandated that reconstruction and symmetry procedures be covered by insurance in 1998. As the distribution of payor type shifts with the initiation of the Affordable Care Act and Medicaid expansion, it is important to highlight these issues to avoid inadvertent biases in care patterns.

It is reasonable to conclude from this information that patients with different insurance types receive similar care once they enter the reconstructive pathway. We did find differences in both disease stage and rates of bilateral reconstruction, similar to previously published literature. Differences in disease stage are likely due to racial differences among payor types, and it is known that non-white patients are more likely to present with later stage disease.(24–26) White patients and those with private insurance are also more likely to undergo contralateral prophylactic mastectomy, which may explain differences in rates of bilateral reconstruction.(27, 28) Statistical modeling shows us that on direct comparison, there appears to be a difference in subsequent revisions to achieve symmetry and a final aesthetic result. However on adjusted analysis, this appears to be a function of either patient background or the practice pattern of a given surgeon. There are a small number of patients who are driving the need for a greater number of revisions and overall procedures, which did lead to skewed data seen in Figures 1–3. However the histograms are similar between insurance types. Surgeons and patients each have a different view on what it means to obtain an “acceptable” result and likely have different thresholds for performing revisionary surgery. Acceptability may fall into a wide range of results, and this is based on very individual and personal happiness with results. We did have a high proportion of patients undergoing bilateral reconstruction (38.6%) when compared to some prior studies, which we attribute in part to the rise in contralateral prophylactic mastectomy that has been seen nationwide.(27) However it is reassuring to report that there are no notable differences based on payor type alone.

In 2009, prior to the initiation of the ACA, Yang, et al used the National Inpatient Sample database to characterize 35,217 women undergoing immediate breast reconstruction to look at reconstructive trends in immediate breast reconstruction and reported that women without private insurance were less likely to undergo immediate breast reconstruction when compared to those with private insurance.(29) They attribute this primarily to patients’ uncertainty that insurance will cover all procedures and differing care locations (safety-net hospitals versus other hospitals). Our patient population includes delayed reconstruction, but has a similar breakdown of payor type. Similarly, our Medicaid group was significantly younger and had a larger proportion of non-white patients than those with private insurance. Medicare patients were older and were more likely to undergo implant-based reconstruction

than Medicaid or privately insured patients in our study, which is likely attributable to patient age and risks of complications after autologous reconstruction in older women.(30, 31)

Our study has several important limitations. First, since our study is retrospective, there remains a strong possibility of known and unknown confounding, even though we controlled for a multitude of potential confounders in our multivariate analysis. Subjective measures such as patient or provider choice influencing reconstructive choices cannot be identified through a retrospective billing database and would require prospective, survey-based studies. However, it would be unethical to perform a prospective study, in which providers identified a disparity by insurance type and chose not to intervene. Second, other considerations for reconstruction that are not addressed in this study include travel distance, which was recently discussed by Roughton, et al(10), and level of education, each of which may impact choices. Third, this study was performed at a single academic center, which limits external validity. Our distribution of payors and overall patient population may not be generalizable to other geographic areas or to the private sector. Future research should aim for large, multi-institutional, and geographically-widespread databases that aim to refute, confirm, or extend our principal findings. Furthermore, there is likely a subset of patients who initiated reconstruction at this institution, yet chose to complete their revisionary procedures and nipple-areola reconstruction elsewhere. Since our facility accepts the broadest range of insurance plans in our region, this rate is likely low, but not possible to calculate.

Our study demonstrates that once patients enter the reconstructive pathway, subsequent disparities in receiving subsequent revisions to achieve an optimal symmetric and cosmetic result are not a function of insurance type. We acknowledge that this may change with a fee-for-service payor model or in an incentive-based reimbursement system. Therefore, based on our current findings future investigations should be twofold. First, further research should primarily focus on the referral of patients into the reconstructive pathway to achieve index reconstruction in the first place, as there are ongoing discrepancies in access to care, particularly seen in immediate reconstruction.(8, 9) Second, further research should also target either patient or provider-based variables that can explain discrepancies observed after patients enter the reconstructive pathway. Such a study could compare patient reported outcome scores at completion of reconstruction between patients with difference insurance plans to explore which aspects of care along the reconstructive and revisionary pathway are patient motivated. It is possible that a larger multicenter database would provide further insight into disparities in the reconstructive pathway in multiple geographic locations with a larger pool of providers and patients to eliminate biases of our single institution study.

In conclusion, healthcare equity remains a critical cornerstone to optimize care for each patient regardless of insurance status, race, gender, location, and socioeconomic status. Our findings are reassuring that, within our institution, insurance type does not affect subsequent revisionary procedures to achieve an optimal, symmetric, cosmetic result. Instead, initial discrepancies observed may be a function of patient and/or provider decisions instead. This institution, like many other academic institutions in the readership, have a large population of patients insured through Medicare and Medicaid and serves as a “safety net” hospital for women who cannot find care elsewhere. Future research and focus should target both

variables that affect whether patients enter the reconstructive pathway (including insurance type) and these variables once patients achieve their index reconstruction. Whether this is done in the form of community outreach, presence at clinics in medically underserved locations, or improving communication with breast oncologic surgeons, we should make every effort to provide equal care to all patients.

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Figure 1.
Unadjusted distribution of the number of procedures by insurance type.

Figure 2.
Unadjusted distribution of the number trips to the operating room by insurance type.

Figure 3.
Unadjusted distribution of the number of revisions by insurance type.

Unadjusted Odds Ratios with 95% Confidence Intervals

Figure 4. Unadjusted odds ratios of symmetry procedures, nipple reconstruction, and tattooing by insurance type.

Adjusted Odds Ratios with 95% Confidence Intervals

Figure 5. Adjusted odds ratios of symmetry procedures, nipple reconstruction, and tattooing by insurance type.

Table 1

Reconstructive codes queried for reconstructive timeline creation. Procedures were coded by types: 1 = index reconstructive case, 2 = revisionary procedure (if listed subsequently to index case), 3 = nipple reconstruction, 4 = nipple/areola tattooing, 5 = symmetry procedure. Code 15777 was removed as this accompanied implant placement codes and was not a stand-alone procedure. Code 11970 was queried but used only as a count toward total number of procedures and OR trips since it is not typically an “elective” revision, but a necessary step to remove the temporary expander.

CPT	Type	Description
19340	1,2	IMMEDIATE INSERTION OF BREAST PROSTHESIS FOLLOWING MASTOPEXY,MASTECTOMY
19342	1,2	DELAYED INSERTION OF BREAST PROSTHESIS FOLLOWING MASTOPEXY,MASTECTOMY
19357	1,2	BREAST RECONSTRUCTION, IMMEDIATE OR DELAYED, WITH TISSUE EXPANDER, INCLUDING SUBSEQUENT EXPANSION ^{fa}
19361	1,2	BREAST RECONSTRUCTION WITH LATISSIMUS DORSI FLAP,WITHOUT PROSTHETIC IMPLANT
19364	1,2	BREAST RECONSTRUCTION WITH FREE FLAP
19366	1,2	BREAST RECONSTRUCTION WITH OTHER TECHNIQUE
19367	1,2	BREAST RECONSTRUCTION WITH TRANSVERSE TECTUS ABDOMINUS MYOCUTANEOUS FLAP (TRAMSINGLE PEDICLE,INC CLOSURE OF DONOR SITE
19368	1,2	BREAST RECONSTRUCTION;W/MICROVASCULAR ANASTOMOSIS(SUPERCHARGING)
19328	2	REMOVAL OF INTACT MAMMARY IMPLANT.
19330	2	REMOVAL OF MAMMARY IMPLANT MATERIAL
19370	2	OPEN PERIPROSTHETIC CAPSULOTOMY,BREAST
19371	2	PERIPROSTHETIC CAPSULECTOMY,BREAST
19380	2	REVISION OF RECONSTRUCTED BREAST
19350	3	NIPPLE/AREOLA RECONSTRUCTION
11920	4	TATTOOING, INTRADERMAL INTRODUCTION OF INSOLUBLE OPAQUE PIGMENTS TO CORRECT COLOR DEFECTS OF SKIN,INCLUDING MICROPIGMENTATION;6.0 SQ CM OR LESS
19316	5	MASTOPEXY
19318	5	REDUCTION MAMMAPLASTY
19324	5	MAMMAPLASTY,AUGMENTATION; WITHOUT PROSTHETIC IMPLANT
19325	5	MAMMAPLASTY, AUGMENTATION;WITH PROSTHETIC IMPLANT

Table 2

Patient demographics and initial reconstruction type.

	All (n=3113)	Private (n=2271)	Medicare (n=450)	Medicaid (n=392)	p
Age, mean±SD	50.15±10.43	49.11±9.11	59.22±12.38	45.95±9.44	<0.01
Stage, n (%)					0.02
Prophylactic	20 (0.73%)	17 (0.85%)	1 (0.25%)	2 (0.56%)	
0	1,020 (37.1%)	773 (38.7%)	145 (36.4%)	102 (28.7%)	
1	721 (23.2%)	523 (26.2%)	110 (27.6%)	88 (24.7%)	
2	691 (25.1%)	480 (24.1%)	101 (25.4%)	110 (30.9%)	
3	279 (10.2%)	191 (9.6%)	39 (9.7%)	49 (13.8%)	
4	18 (0.65%)	11 (0.55%)	2 (0.5%)	5 (1.4%)	
Race, n (%)					<0.01
Caucasian	2506 (80.5%)	1944 (85.6%)	348 (77.3%)	214 (54.6%)	
Black	436 (14.0%)	202 (8.9%)	78 (17.3%)	156 (39.8%)	
Asian	26 (0.8%)	21 (0.9%)	3 (0.7%)	2 (0.5%)	
Hispanic	8 (0.3%)	5 (0.2%)	1 (0.2%)	2 (0.5%)	
Other	137 (4.4%)	99 (4.4%)	20 (4.4%)	18 (4.6%)	
Bilateral, n (%)	1200 (38.6%)	942 (41.5%)	145 (32.2%)	113 (28.8%)	<0.01
Recon type, n (%)					0.01
Implant-based	2330 (74.9%)	1673 (73.7%)	367 (81.6%)	290 (74%)	
Abdominal flap	620 (19.9%)	488 (21.5%)	53 (11.8%)	79 (20.2%)	
Latissimus flap	125 (4.0%)	81 (3.6%)	26 (5.8%)	18 (4.6%)	
Other	36 (1.2%)	27 (1.2%)	4 (0.9%)	5 (1.3%)	

Table 3

Surgeon-level data. Patients by insurance type, average number of total procedures, revisionary procedures, and trips to the operating room.

Surgeon	Patients	Medicaid	Medicare	Private	Total Procedures	Revisions	OR Trips
1	905	64 (7.1%)	132 (14.6%)	709 (78.3%)	4.4 ± 2.7	2.1 ± 2.1	3.4 ± 2
2	667	107 (16%)	83 (12.4%)	477 (71.5%)	3.8 ± 2.5	1.7 ± 1.8	3 ± 1.8
3	543	110 (20.3%)	94	339	2.8 ± 1.7	0.9 ± 1.2	2.4 ± 1.4
4	302	26 (8.6%)	37 (12.3%)	239 (79.1%)	3.8 ± 2	1.9 ± 1.6	2.9 ± 1.4
5	132	22 (16.7%)	20 (15.5%)	90 (68.2%)	3.3 ± 1.9	1.6 ± 1.5	2.6 ± 1.3
6	96	5 (5.2%)	14 (14.6%)	77 (80.2%)	2.9 ± 1.7	0.5 ± 0.9	2.1 ± 1.1
7	92	10 (10.9%)	15 (16.3%)	67 (72.8%)	4.2 ± 3.4	1.7 ± 2.4	2.8 ± 1.8
8	81	6 (7.4%)	12 (14.1%)	63 (77.8%)	3.5 ± 2.1	1.2 ± 1.4	2.9 ± 1.9
9	76	3 (4%)	14 (18.4%)	59 (77.6%)	3.3 ± 2.6	1.3 ± 2.2	2.4 ± 1.9
10	63	9 (14.3%)	5 (7.9%)	49 (77.8%)	2.6 ± 1.5	1 ± 0.9	2 ± 1
11	59	17 (28.8%)	9 (12/3%)	33 (55.9%)	3.6 ± 2.4	1.9 ± 2	3.1 ± 1.8
12	48	1 2.1%)	8 (16.7%)	39 (81.3%)	3 ± 1.9	1.3 ± 1.7	2 ± 1.1
13	12	0	0	12 (100%)	2.3 ± 1.1	0.7 ± 1	2.1 ± 1.1
14	10	4 (40%)	2 (20%)	4 (40%)	2 ± 1.1	0.7 ± 0.7	1.5 ± 0.5
15	7	0	2 (28.6%)	5 (71.4%)	1.7 ± 0.8	0.6 ± 0.8	1.4 ± 0.5
16	7	1 (14.3%)	2 (28.6%)	4 (57.1%)	5.4 ± 4.5	2.7 ± 3.6	3.9 ± 3.1
17	4	4 100%)	0	0	2.8 ± 1.3	0	1.8 ± 0.5
18	3	2 (6.7%)	1 (33.3%)	0	1.3 ± 0.6	0	1.3 ± 0.6
19	2	0	0	2 (100%)	2 ± 1.4	0.5 ± 0.7	1.5 ± 0.7
20	1	0	0	1 (100%)	1	0	1
21	1	0	0	1 (100%)	3	2	3
22	1	0	0	1 (100%)	10	7	5
23	1	1 (100%)	0	0	1	0	1

Table 4

Unadjusted and adjusted means and probabilities by insurance type.

Number of Procedures				
Insurance Type	Unadjusted Mean/Median (Range)	P-Value	Adjusted Mean	P-Value
All	3.68/3 (1,21)	–	–	–
Private	3.78/3 (1,21)	–	3.80	–
Medicare	3.50/3 (1,20)	0.03	3.75	0.41
Medicaid	3.47/3 (1,15)	0.02	3.69	0.52
Number of OR Trips				
Insurance Type	Unadjusted Mean (range)	P-Value	Adjusted Mean	P-Value
All	2.9/3 (1,16)	–	–	–
Private	2.94/3 (1,16)	–	2.99	–
Medicare	2.74/2 (1,14)	0.02	3.00	0.64
Medicaid	2.83/2 (1,11)	0.25	3.01	0.7
Number of Revisions				
Insurance Type	Unadjusted Mean (range)	P-Value	Adjusted Mean	P-Value
All	1.61/1 (0,17)	–	–	–
Private	1.68/1 (0,16)	–	1.64	–
Medicare	1.51/1 (0,17)	0.07	1.58	0.47
Medicaid	1.40/1 (0,9)	<0.01	1.52	0.20

Table 5

Probabilities and adjusted odds ratios of undergoing procedures of symmetry, nipple reconstruction, and areolar tattooing.

Symmetry Procedure ¹				
Insurance Type	Unadjusted Probability	P-Value	Odds Ratio ²	P-Value
All	46%	–	–	–
Private	45.5%	–	–	–
Medicare	48.5%	0.35	1.01	0.93
Medicaid	45.9%	0.90	1.12	0.41
Nipple Reconstruction				
Insurance Type	Unadjusted Probability	P-Value	Odds Ratio ²	P-Value
All	41.6%	–	–	–
Private	43.6%	–	–	–
Medicare	34.0%	<0.01	0.77	0.10
Medicaid	38.8%	0.07	0.89	0.43
Areolar Tattooing				
Insurance Type	Unadjusted Probability	P-Value	Odds Ratio ²	P-Value
All	30.1%	–	–	–
Private	31.4%	–	–	–
Medicare	26.0%	0.03	0.92	0.60
Medicaid	27.9%	0.19	0.96	0.78

¹This test only included patients who had unilateral breast reconstruction ($n = 1,913$)

²Odds ratio (OR) of developing outcome of interest, compared to private insurance (reference group)