

Guideline Awareness Disparities in Plastic Surgery: A Survey of American Society of Plastic Surgeons

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Background: The American Society of Plastic Surgeons (ASPS) clinical practice guidelines were constructed to help direct evidence-based surgical management in plastic surgery. Societal member awareness of the recommendations for breast reconstruction has yet to be studied among ASPS members.

Methods: Univariate and multivariate analyses were performed using electronic survey data from 243 ASPS members. Characteristics, including respondent demographics, practice distribution, and geographic locations, were correlated to the awareness of autologous and expander/implant-based reconstruction guidelines.

Results: Of the respondents, 52% and 35.7% reported awareness for autologous breast reconstruction and expander/implant-based reconstruction guidelines, respectively. Surgeons who performed more general and autologous breast reconstruction were more likely to be aware of autologous breast reconstruction and expander/implant-based guidelines ($P = 0.0034$ and 0.032). Autologous breast reconstruction guideline awareness was geographically disparate ($P = 0.031$), with greater awareness in the Northeast (OR, 4.5; 95% CI, 1.63–12.53; $P = 0.01$) and Southwest (OR, 3.91; 95% CI, 1.18–13.83; $P = 0.01$). Respondents with larger practice percentages of breast reconstruction and those with higher annual academic meeting attendance reported greater awareness of expander/implant-based guidelines ($P = 0.044$ and 0.040). Meeting attendance (OR, 2.14; 95% CI, 1.15–8.91; $P = 0.022$) and practice-based (OR, 3.14; 95% CI, 1.52–8.91; $P = 0.027$) awareness disparities were also appreciated on multivariate analysis.

Conclusions: Guideline awareness in plastic surgery varies by practice composition and geography. These findings can be used to help inform more targeted educational and implementation strategies in breast reconstruction.

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INTRODUCTION

In the United States, there remains substantial variability related to patient management for postmastectomy reconstructive breast surgery.^{1–5} This includes important factors, such as timing, locoregional reimbursement patterns, patient preference, surgical training, and logistical

factors, involved in patient care delivery.¹ Although some variability is to be expected, reconstructive efforts should be focused first and foremost at optimizing patient outcomes and satisfaction.^{6,7} What is more, applying general guidelines can help guide reconstructive care and normalize clinical practice patterns nationally.

To help provide best practice recommendations for breast reconstruction after mastectomy, the American Society of Plastic Surgeons (ASPS) developed the ASPS clinical practice guidelines. The aim of these was to consolidate and disseminate up-to-date patient management strategies for plastic surgeons.^{8,9} Specifically, the guideline recommendations provided by the ASPS workgroup proposed that both pedicled transverse rectus abdominis musculocutaneous and deep inferior

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epigastric perforator flaps were optimal and noninferior autologous breast reconstruction options based on existing literature.⁸ Additionally, another ASPS workgroup developed criteria for expander/implant-based reconstruction, which included a grade A recommendation for targeted informed consent discussions related to postoperative complications for patients with body mass index more than 25. It also advised the discussion of other risk

Table 1. Participant Demographics and Practice Characterization

Characteristic	No. Participants: n = 243 (%)
Age	
Under 35	6 (2.5)
35–44	62 (25.5)
45–54	76 (31.3)
55–64	68 (28.0)
65 and over	31 (12.8)
Gender	*No. Participants: n = 242 (%)
Men	184 (76.0)
Women	58 (23.9)
Years in practice (%)	
<10	72 (29.6)
10–24	97 (39.9)
≥25	74 (30.5)
Practice type	
Solo/shared-facility solo practice	103 (42.4)
Group practice	83 (34.2)
Academic practice	40 (16.5)
Employed physician	17 (7.0)
Geographic distribution	
Northeast	45 (18.5)
Southeast	70 (28.8)
Southwest	23 (9.5)
Midwest	57 (23.5)
Mountain West	8 (3.3)
Pacific West	40 (16.5)
Geographic area type	
Major metropolitan	83 (34.2)
Urban	37 (15.2)
Suburban	113 (46.5)
Rural	10 (4.1)
Cosmetic surgery	*No. Participants: n = 197 (%)
<10	41 (20.8)
10–50	99 (50.3)
≥50	57 (29.0)
Do you routinely perform breast reconstruction?	
Yes	205 (84.4)
No	38 (15.6)
Percentage of practice that is breast reconstruction	*No. Participants: n = 197 (%)
<10	30 (15.2)
10–50	119 (60.4)
≥50	48 (24.4)
Are you aware of the ASPS Guidelines for autologous breast reconstruction?	*No. Participants: n = 196 (%)
Yes	102 (52.0)
No	94 (58.0)
Are you aware of the ASPS guidelines for breast reconstruction with expanders and implants?	*No. Participants: n = 196 (%)
Yes	70 (35.7)
No	126 (64.3)
Percentage of practice that is autologous breast reconstruction	*No. Participants: n = 197 (%)
<10	102 (51.8)
10–50	72 (36.5)
>50	23 (11.7)
Annual meeting attendance (%)	*No. Participants: n = 197 (%)
Less than 1	57 (28.9)
1–3	127 (64.5)
4 or more	13 (6.6)

*Indicates the number of participants of the original survey that responded to a given question.

Takeaways

Question: What factors affect the awareness of national clinical practice guidelines for breast reconstruction among members of the American Society of Plastic Surgeons (ASPS) in the United States?

Findings: Clinical practice patterns, geography, and annual national meeting attendance play an important role in the awareness of breast reconstruction clinical guidelines among ASPS members.

Meaning: The disparities in guideline awareness highlight an important need for more targeted educational strategies in the space of breast reconstruction surgery.

factors such as diabetes (grade B) and radiation therapy (grade B) with patients before surgery.⁹

Although these recommendations are shared with members of ASPS through academic literature, online resources, and national meetings, little is known about general guideline awareness. In this study, we conducted a national survey examining guideline awareness related to postmastectomy breast reconstruction among the members of ASPS. We hypothesized that ASPS guideline awareness is independent of gender, age, or geographic characteristics. Disparities in awareness are likely independently attributable to practice-driven differences, although this warrants the following analysis.

METHODS

Survey Development

An IRB-approved survey focused on breast surgery guideline awareness in plastic surgery was produced at Duke University Medical Center by two content experts based on the ASPS clinical practice guidelines. These questions were created based on validated metrics from previous studies, reviewed by the reporting team, and pretested in representative members before survey administration.

Survey Implementation

An anonymous electronic survey was sent to 2542 ASPS members in the United States (approximately half) over a 3-month period from March to May 2019 using the Survey Monkey application. Additionally, two follow-up emails were sent out to nonresponders. The 27 questions in the survey focused on demographic information, practice data, patient management, guideline awareness, and recommendation adherence. Factors including training history were not included.

Statistical Analyses

Analyses were performed based on data available from responding participants. Demographic information and practice characteristics were subdivided categorically in relation to the awareness of autologous and implant-based breast reconstruction ASPS guidelines.

Table 2. Are You Familiar with the ASPS Evidence-based Guidelines for Autologous Breast Reconstruction?

Characteristic	Number Respondents: n = 196 (%)		P value	Significance
	Yes, n = 102 (%)	No, n = 94 (%)		
Age				
Under 35	3 (2.9)	2 (2.1)		
35–44	34 (33.3)	18 (19.1)		
45–54	28 (27.5)	32 (34.0)		
55–64	26 (25.5)	30 (31.9)		
65 and over	11 (10.8)	12 (12.8)	0.24	—
*Number Respondents: n = 195 (%)				
Gender	Yes, n = 101 (%)	No, n = 94 (%)	P value	
Male	77 (76.2)	77 (81.9)	0.38	—
Female	24 (12.3)	17 (8.7)		
Years in Practice				
<10	36 (35.3)	21 (22.3)	0.129	—
10–24	37 (36.3)	43 (45.7)		
>25	29 (28.4)	30 (31.8)		
Practice Setting				
Solo	34 (33.3)	40 (42.6)	0.418	—
Group	38 (37.3)	33 (35.1)		
Academic	22 (21.6)	13 (13.8)		
Employed	8 (7.8)	8 (8.5)		
Regional Distribution				
Northeast	24 (23.8)	12 (12.7)	0.031	*
Southeast	33 (32.7)	33 (35.1)		
Southwest	11 (10.8)	7 (7.4)		
Midwest	13 (12.7)	27 (28.7)		
Mountain	5 (4.9)	1 (1.1)		
Pacific West	16 (15.7)	14 (14.9)		

*Indicates that the related statistic has a *P* value < 0.05 and — indicates the statistic is not significant.

Fisher exact and Pearson chi-square tests were performed as appropriate based on contingency table size. Univariate and multivariate generalized linear regression models were prepared to test relevant participant characteristics against autologous breast reconstruction and implant-based breast reconstruction guideline awareness. Additionally, geographic mapping of guideline awareness was prepared as a choreograph of respondent percentages per region. Statistical analyses were performed in R (v. 4.0.3, The R Foundation for Statistical Computing). Two-tailed *P* values were calculated with a significance threshold level of 0.05.

RESULTS

Participant Demographic, Geographic, and Practice Characteristics

Of the initial surveys sent out to ASPS members (N = 2542), 243 (9.5%) participants responded. All demographic and clinical practice characteristics are summarized in Table 1. Of the respondents, 197 (81.1%) reported having some proportion of their practice dedicated to breast reconstruction. The majority of respondents were men (76.0%, n = 184), representing a diverse range of ages and years in practice (Table 1). Most respondents represented solo/shared-facility solo practices (42.4%, n = 103), followed by group practices (34.2%, n = 83). A minority of respondents were from academic practices (16.5%, n = 40). The respondents

were also distributed well across the country (Table 1). Regardless of geography, most practices were located in suburban (46.5%, n = 113) and metropolitan areas (34.2%, n = 83). Most participants routinely performed breast reconstruction (84.4%, n = 205), encompassing between 10% and 50% of their practice (60.4%, n = 119). Additionally, rates of cosmetic surgery varied across the cohort. Most respondents reported their practice encompassing 10%–50% cosmetic surgery (50.3%, n = 99) with only 29% reporting cosmetic practices of greater than 50% (Table 1).

ASPS Autologous Breast Reconstruction Guideline Awareness

Approximately half of participants reported awareness of the ASPS Evidence-based Clinical Practice Guidelines for autologous breast reconstruction (52.0%, n = 102 of 196) as seen in Table 1. Awareness of autologous reconstruction guidelines was not significantly associated with age, gender, years in practice, practice setting, area of practice, or annual meeting attendance (Table 2). Notably, there were some geographic variations in awareness (Fig. 1). There was also an association between percentage of general breast (*P* = 0.0034) and autologous breast reconstruction practice (*P* = 0.032) with guideline awareness (Fig. 1A). On multivariate analysis, both breast reconstruction practice percentages more than 50% and geographic location were independent predictors of guideline awareness (OR, 3.36; 95% CI, 1.07–11.01; *P* = 0.04) (Table 3).

ASPS Breast Expander/Implant Guideline Awareness

Approximately one-third of participants reported awareness of expander/implant-based guidelines (35.7%, n = 70 of 196) as seen in Table 1. There were no significant associations between awareness and gender, practice setting, regional distribution, geographic area (Fig. 1B), or percentage of cosmetic surgery practice. However, there was a significant association between percentage of general breast reconstruction practice and expander/implant guideline awareness, with those more than 50% reporting relatively higher levels of awareness (*P* = 0.044). Additionally, annual meeting attendance showed a significant association with guideline awareness, specifically for participants attending four or more national academic meetings (*P* = 0.05) (Table 4). On multivariate analysis, practices with breast reconstruction case volumes greater than 50% (OR, 3.14; 95% CI, 1.52–8.91) and yearly academic meeting attendance between 1 and 3 (OR, 3.14; 95% CI, 1.52–8.91) were independently linked to greater expander/implant-based guideline awareness (Table 5).

DISCUSSION

There has been a growing movement targeted toward cost transparency and high-quality health care in the United States.^{10–12} In response, the ASPS clinical guidelines were established to promote evidence-driven patient management in breast reconstruction surgery.^{8,9,13}

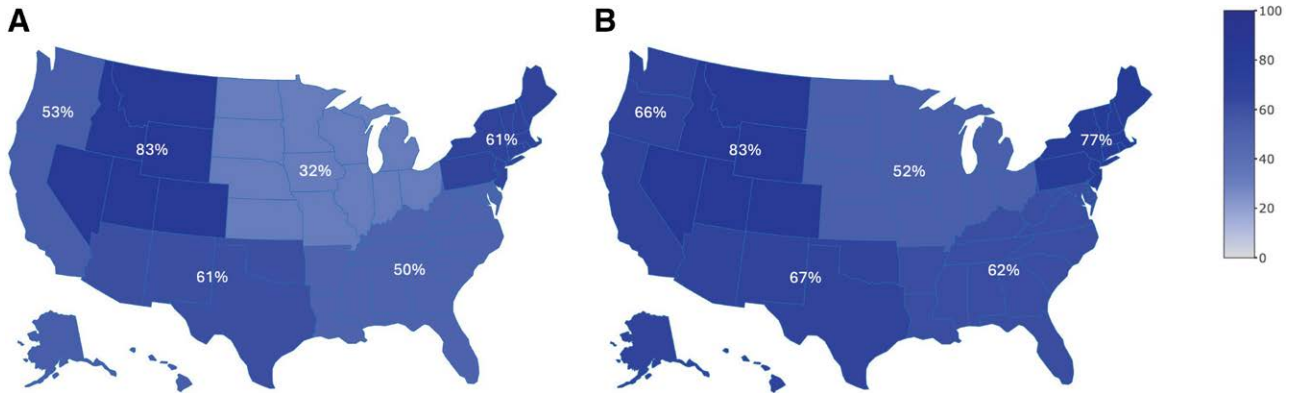


Fig. 1. Geographic percent of awareness by guidelines. (A) Autologous breast reconstruction. (B) Expander/implant-based breast reconstruction.

Despite these efforts, improving guideline awareness has proven challenging, with clear disparities between different specialties.^{14,15} Although primary care physicians report awareness up to 47.2%, surgical subspecialties lag behind their counterparts in medicine.¹⁴ Of the ASPS guidelines reviewed in this current study, 52.0% and 35.7% of ASPS respondents reported awareness for autologous breast reconstruction and expander-based reconstruction, respectively. These percentages prove comparable, if not better, than similar reports in other surgical subspecialties,¹⁴ but there were clear discrepancies in awareness worth highlighting. Notably, ASPS guideline awareness was associated with several factors including geography, percentage of practice devoted to breast and autologous breast reconstruction, and annual meeting attendance. However, the degree of association proved guideline-dependent.

Although previous studies have identified geographic practice variability in breast reconstruction in relation to plastic surgeon density and insurance coverage,^{16,17} our study is one of the first to investigate guideline awareness on a regional level. Awareness of autologous breast reconstruction guidelines was regionally variable, with respondents from the Mountain West, Northeast, and Southwest regions reporting higher relative rates than their geographic counterparts. These findings may be attributed to regional differences in surgical practice. Per the 2020 ASPS national survey data, approximately 26% breast reconstruction procedures occurred in the Mountain and Pacific West compared with only 18% in the Midwest.¹⁸ Our findings may also be attributed to the densities of hospital systems and academic centers in these regions,¹⁹ which potentially influences the implementation of evidence-driven practice.

We also found that practice characteristics affect guideline awareness—respondents in more subspecialized practices reported greater awareness of guidelines relevant to the surgical procedures they performed more frequently. Physicians with higher practice proportions of breast reconstruction reported greater awareness of both autologous and expander/implant-based reconstruction guidelines. Conversely, physicians with broader scopes of practice, but who continue to provide breast

reconstruction services, are less likely to report awareness of breast reconstruction guidelines despite performing relevant services; this poses an information gap that could likely affect perioperative care patterns.

Beyond awareness, there is currently little evidence linking guideline awareness in plastic surgery to changes in clinical practice. Additionally, innovations in clinical practice can be limited by external political, economic, and logistical constraints even when their value is recognized.^{20,21} To move toward better adoption, previous studies have emphasized the role of guideline formalization, cross-collaboration, and verification before dissemination.²² The tenets of implementation science can also be applied to help accelerate the adoption of proven clinical techniques in surgical practice.^{23,24} Although structured strategies have been postulated to promote practice innovation and standardization in plastic surgery,²⁴ further studies in this space are also needed to best translate societal level guidelines to clinical practice.

Table 3. Multivariate Analysis of ASPS Autologous Breast Reconstruction Guidelines by Characteristic

Characteristic	Awareness of Guidelines		
	Odds Ratio (95% CI)	P value	Significance
Percentage of Practice, Breast Reconstruction			
<10	REF		
10–50	1.86 (0.76–4.80)	0.18	—
>50	3.36 (1.07–11.01)	0.040	*
Percentage of Practice, Autologous Breast Reconstruction			
<10	REF		
10–50	1.49 (0.75–2.98)	0.24	—
>50	1.43 (0.46–4.69)	0.53	—
Percentage of Practice, Cosmetic			
<10	REF		
10–50	0.71 (0.32–1.42)	0.43	—
>50	0.56 (0.17–0.88)	0.25	—
Geographic Region			
Midwest	REF		—
Mountain West	7.97 (1.08–164.38)	0.075	—
Northeast	4.40 (1.63–12.63)	0.0044	**
Pacific West	2.76 (0.99–8.01)	0.056	—
Southeast	2.28 (0.96–5.64)	0.057	—
Southwest	3.91 (1.18–13.83)	0.029	*

*Indicates that the related statistic has a P value < 0.05.

** indicates < 0.01, and — indicates the statistic is not significant.

Table 4. Are You Familiar with the ASPS Evidence-based Guidelines for Expander/Implant Breast Reconstruction?

Characteristic	Number Respondents: n = 196 (%)		P value	Significance
	Yes, n = 126 (%)	No, n = 70 (%)		
Age				
Under 35	4 (3.2)	1 (1.4)		
35–44	38 (30.2)	14 (20.0)		
45–54	35 (27.8)	25 (35.7)		
55–64	33 (26.2)	23 (32.9)		
65 and over	16 (12.7)	7 (10.0)	0.38	—
*Number Respondents, n = 195 (%)				
Characteristic	Yes, n = 125 (%)	No, n = 70 (%)	P value	Significance
Gender				
Male	99 (78.6)	55 (78.6)		
Female	26 (20.6)	15 (21.4)	1	—
Years in Practice				
<10	42 (33.3)	15 (21.4)		
10–24	47 (37.3)	33 (47.1)		
>25	37 (29.4)	22 (31.4)	0.19	—
Practice Setting				
Solo	44 (34.9)	30 (42.9)		
Group	48 (38.1)	23 (32.9)		
Academic	24 (19.0)	11 (15.7)		
Employed	10 (7.9)	6 (8.6)	0.71	—
Regional Distribution				
Northeast	28 (22.2)	8 (11.4)		
Southeast	36 (28.6)	22 (31.4)		
Southwest	12 (9.5)	6 (8.6)		
Midwest	25 (19.8)	23 (32.9)		
Mountain	5 (4.0)	1 (1.4)		
Pacific West	20 (15.9)	10 (14.3)	0.21	—
Geographic Area				
Metropolitan	43 (34.1)	20 (28.6)		
Urban	20 (15.9)	12 (17.1)		
Suburban	58 (46.0)	35 (50.0)		
Rural	5 (4.0)	3 (4.3)	0.88	—
Percentage of Practice that is Cosmetic Surgery				
<10	28 (22.2)	13 (18.6)		
10–50	68 (54.0)	30 (43.9)		
>50	30 (23.8)	27 (38.6)	0.09	—
Do you Routinely Perform Breast Reconstruction?				
Yes	160 (100)	70 (100)		
No	—	—	1.0	—
Percentage Practice that of is Breast Reconstruction (%)				
<10	15 (11.9)	15 (21.4)		
10–50	74 (58.7)	44 (62.9)		
>50	37 (29.4)	11 (15.7)	0.044	*
Percentage of Practice that is Autologous Breast Reconstruction (%)				
<10	58 (46.0)	43 (61.4)		
10–50	51 (40.5)	21 (30.0)		
>50	17 (13.5)	6 (8.6)	0.114	—
Annual Meeting Attendance (Number Per Year)				
Less than 1	29 (23.0)	28 (40.0)		
1–3	87 (69.0)	39 (55.7)		
4 or more	10 (7.9)	3 (4.3)	0.04	*

*Indicates that the related statistic has a P value < 0.05 and — indicates the statistic is not significant.

Understanding the factors associated with differences in awareness patterns could prove important for more targeted guideline dissemination,²⁵ especially through regional and national academic meetings. We found surgeons who attended 1–3 annual meetings reported higher awareness of the ASPS expander/implant-based breast reconstruction guidelines relative to those who did not attend academic conferences. Although such findings are not necessarily causal, they do suggest that meetings could

Table 5. Multivariate Analysis of ASPS Guidelines for Expander/Implant Reconstruction by Characteristic

Characteristic	Awareness of Guidelines		P value	Significance
	Odds Ratio (95% CI)			
Percentage of Practice, Breast Reconstruction				
<10	REF			
10–50	1.60 (0.70–3.67)	0.26		
>50	3.14 (1.52–8.91)	0.027		*
Academic Meeting Attendance				
Less than 1	REF			
1–3	2.14 (1.15–8.91)	0.022		*
4 or more	2.95 (0.59–11.38)	0.26		—

*Undicates that the related statistic has a P value < 0.05 and — indicates the statistic is not significant.

serve as important opportunities for both guideline discussion and distribution.

Beyond the conventional mechanisms, virtual platforms and other technologic applications could prove useful for delivering targeted guideline-based information to the plastic surgery community. It is important to make such guidelines widely available. Emphasizing these guidelines on trusted sources, including the main website for ASPS, could improve accessibility for plastic surgeons.

Limitations

Our study has several limitations worth considering. As our study is survey-based, there is potential bias in the self-reported values of guideline awareness and other practice characteristics. As such, potential over and under reporting biases must be taken into consideration. There is also concern for nonresponder bias. Additionally, the primary aims of this study were targeted at understanding self-reported awareness. Future investigation pertaining to the effects of guideline awareness on clinical practice behavior is warranted. Although our response rate of approximately 10% is consistent with other survey reports in the literature,²² we additionally conducted a nonresponder analysis to ensure that our sample was adequately representative of the larger ASPS membership. Further justifications for the validity of our survey analysis can be seen in Supplemental Digital Content 1. (**See survey, Supplemental Digital Content 1**, which displays the survey results, <http://links.lww.com/PRSGO/C123>.)

CONCLUSIONS

Plastic surgeon awareness of the ASPS clinical guidelines varied by geographic location and practice composition. Guideline awareness was associated with differences in practice patterns. The discrepancies highlighted pose a need to use more targeted guideline dissemination efforts among surgeons with less specialized practices and in certain geographic regions.

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