

Aesthetic Training in Plastic Surgery Residency

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Summary: Training in aesthetic surgery is a core element in a plastic surgery residency program. Nevertheless, in the past, many studies have shown the lack of resident confidence in aesthetic procedures upon graduation. In recent years, a number of efforts have been made to address this concern, including increasing the required residency aesthetic case requirements and the integration of resident aesthetic clinics to increase exposure and independence in this aspect of training. Numerous studies have been conducted to evaluate the efficacy of these resident-run clinics and have substantiated their value as an important educational tool in residency training and validated their safety in patient care. In fact, survey studies have shown that though residents today show a markedly increased confidence in their training when compared with the past, they still feel there is room for improvement in areas such as facial and minimally invasive surgeries, along with procedures that require higher patient volume to refine. In this article, we review the current state of aesthetic surgery training during plastic surgery residency and discuss future directions in the field. (*Plast Reconstr Surg Glob Open* 2020;8:e2895; doi: 10.1097/GOX.0000000000002895; Published online 17 July 2020.)

INTRODUCTION

The American Society of Plastic and Reconstructive Surgeons was formed by a disparate group of physicians, each with elements of plastic and reconstructive surgery, in 1931.^{1,2} Although the founding members of this group came from different surgical backgrounds, they identified a common need to develop the field of plastic surgery as its own discipline. At the time, educational models for plastic surgery were fragmented, which largely involved observational preceptorship programs under well-recognized surgeons, without significant opportunity for active trainee participation.¹ To better train future generations of plastic surgeons in a formalized manner, the American Board of Plastic Surgery (ABPS) was created in 1938, and a standardized resident training curriculum was developed.²

The decades following the formation of the ABPS saw significant surgical advancement and refinement in plastic surgery subspecialties, including in aesthetic surgery. This has been at least partially driven by the increase in public demand for aesthetic procedures and reflected

by the dramatic rise in the number of these procedures being performed today.³ This demand has also led to the incorporation of aesthetic surgery training in other specialties, such as otolaryngology, dermatology, and ophthalmology.^{2,4-6} For example, 2 different studies found that lasers, fillers, neuromodulators, chemical peels, and mole removal were the most commonly taught aesthetic dermatological procedures and that the majority of dermatological residents planned to incorporate these procedures into their future practice.^{5,6}

The ABPS and plastic surgery residency programs have made substantial efforts to improve the deficient areas in aesthetic training.^{2,7,8} For example, plastic surgery governing bodies have made changes to the residency requirements, the most significant of which include increasing the number of required aesthetic cases, adding an additional year to residency training, and making more stringent the prerequisite requirements for independent residency programs.^{9,10} Moreover, the majority of institutions have also adopted resident-run aesthetic clinics as an additional setting for residents to develop and refine more their hands-on aesthetic skills under appropriate supervision. These clinics remain a major component of current aesthetic training, allowing residents a training opportunity focused on increased autonomy and practical application of skills through every facet of the patient experience.¹¹⁻¹⁴ Residents also have aesthetic training through published journals, courses, and conferences by leading plastic surgery societies, such as the American Society of Plastic Surgeons and the American Society for Aesthetic Plastic Surgery.^{4,15,16} Additional efforts to improve resident education include the development and

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Received for publication February 6, 2020; accepted April 9, 2020.

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DOI: 10.1097/GOX.0000000000002895

Disclosure: The authors have no financial interest to declare in relation to the content of this article.

enhancement of elective community rotations, incorporation of digital education resources, incorporation of simulation into training programs, and the utilization of standardized patients.^{2,7,17}

This article examines the landscape of current aesthetic training, including a specific influence of resident aesthetic clinics and an evaluation of how residents and program directors perceive aesthetic education, and explores future directions to further improve the trainee experience.

TRAINEE PERCEPTION OF CURRENT AESTHETIC TRAINING

In recent years, there has been increased emphasis on aesthetic surgery training in both integrated and independent plastic surgery residency programs, driven by increased societal demand for these procedures. In 2014, the Accreditation Council for Graduation Medical Education (ACGME) mandated an increase in required aesthetic case workload for residents from 50 to 150 cases, including in almost all major aesthetic procedures, and a higher caseload requirement for injectable aesthetic treatments.^{10,12} Before this change, a survey-based study conducted by Oni et al⁷ found that 55.7% of senior residents felt “prepared” or “very prepared” for integrating cosmetic surgery into their future practice, with 31.5% of respondents reporting that they felt the need for a cosmetic fellowship. This survey demonstrated that senior resident respondents felt greatest confidence with breast reduction, breast augmentations, abdominoplasty, and mastopexy procedures and the least confidence with facelift, lower blepharoplasty, browlift, rhinoplasty, and hair transplant procedures.⁷ Momeni et al⁸ published another survey-based study in 2014, which showed that approximately one-third of senior resident respondents from both integrated (34.8%) and independent (30.8%) programs felt that additional aesthetic surgery training was necessary. Similar to previous studies, this survey also found respondents expressing higher confidence with breast reduction and abdominoplasty procedures and lower confidence with rhinoplasties, with 87% of respondents stating that they would want further training in rhinoplasty if given additional time during residency.⁸

Following the increase in required resident aesthetic cases, there has been a commensurate increase in aesthetic surgery confidence among residents. Kraft et al¹²

conducted a longitudinal evaluation of senior resident perspectives regarding the changes in aesthetic curricula in 2014 and in 2017. This survey-based study found that in 2014, 67% of responding residents did not have a dedicated aesthetic rotation, compared with 34% without a dedicated aesthetic rotation in 2017.¹² In addition, in 2014, only 36% of resident respondents felt comfortable integrating aesthetic surgery into their practice, when compared with 59% of resident respondents in 2017. Furthermore, 68% of responding residents felt that the increase in case requirements had a positive impact on their aesthetic training.¹² Table 1 summarizes key findings in the literature ascertaining opinions regarding aesthetic training at present and in the past.

RESIDENT CLINICS

Resident-run clinics have become an important component of residency training in aesthetic surgery. These clinics were first initiated in 1989 and were popularized following the 2014 requirement to increase the minimum number of aesthetic cases in training.¹⁸ In 2014, the majority of ACGME-accredited plastic surgery residency programs did not have a dedicated resident aesthetic clinic.⁹ However, Kraft et al¹² found that the percentage of programs with resident aesthetic clinics increased following the increase in aesthetic case requirements, with 33% of resident respondents with resident-run clinics at their institution in 2014 compared with 47% in 2017.

Although there is some variability among institutions, most resident aesthetic clinic rotations occur in the last year of training (“chief-resident aesthetic clinics”), which ensures an appropriate level of knowledge and competence.¹⁹ In this capacity, the chief resident functions to schedule new patients, perform preoperative evaluations, and formulate surgical plans.^{14,19,20} One study by Brandel et al²¹ discussed the standardized process that one institution used for rhinoplasty consultations in the resident aesthetic clinic, which included 4 main parts: primary patient contact, resident evaluation, secondary patient contact, and postoperative plan. For the primary patient contact, the residents performed an initial evaluation of the patient, including discussion of the procedure, risks, benefits, and results, all with attending physician supervision. Next, for the resident evaluation part, the resident presents their evaluation of the patient and their operative plan

Table 1. Summary of Key Findings Regarding Past and Current Aesthetic Training

Author	Journal	Year Published	Key Finding in Study
Oni et al ⁷	<i>Aesthetic Surgery Journal</i>	2011	Only 55.7% of residents felt prepared to integrate plastic surgery into their practice before ACGME mandated changes
Momeni et al ⁹	<i>Plastic Surgery International</i>	2014	34.8% of integrated-model residents and 30.8% of independent-model residents felt additional aesthetic training was necessary after residency
Momeni et al ⁹	<i>Plastic Surgery International</i>	2014	Survey respondents had higher confidence with breast and abdomen surgeries and lower confidence with rhinoplasties
Kraft et al ¹²	<i>Aesthetic Surgery Journal</i>	2019	After ACGME mandated increase in aesthetic training, 59% of resident respondents in 2017 felt comfortable with aesthetics, when compared with 36% in 2014
Kraft et al ¹²	<i>Aesthetic Surgery Journal</i>	2019	68% of survey respondents felt increased aesthetic workload positively impacted training

to faculty, who then discuss and ensure that the plan is safe and achieves the patient-desired goals. The secondary patient contact involves more specific patient education, including discussion of the operative technique, reasonable expectations, and the typical postoperative course, again with attending physician supervision. The thorough process of obtaining informed consent is also performed during this visit. The surgery is then performed and the final part, the postoperative plan, begins. Their postoperative plan includes postoperative clinic visits on days 1, 3, 7, and 14, though this could be modified for different types of procedures.²¹ The main aspect of the postoperative plan is to ensure close follow-up of patients, ensuring proper care, and monitoring for any signs of complications.

A critical part of the resident aesthetic clinic experience is ensuring that patients understand that trainees will play a greater role in patient care, but remaining under appropriate supervision. According to one study, resident supervision was performed by a rotating staff physician in 71.9% of clinics, with the remaining clinics supervised by a community physician.¹¹ In the same study, the authors found that over 60% of resident respondents felt they had complete autonomy in the preoperative and postoperative setting, while only 27.4% felt they had complete autonomy in regard to the operative technique.¹¹ Although the level of resident autonomy in the operating room varies based on many factors, residents report a greater level of comfort with aesthetic procedures following the integration of these clinics into training.¹⁹ Patients are followed postoperatively in the resident clinic. This is a symbiotic relationship, in that residents gain valuable experience and practice, while patients are offered surgery at subsidized costs to incentivize treatment at the training clinic.^{14,19,20} Additionally, this teaching modality gives residents surgical decision-making responsibilities designed to resemble post-residency practice—something that residents feel other teaching modalities are unable to accomplish.⁴

Under appropriate attending physician supervision, resident clinics yield consistently safe and successful results for all stakeholders. Patient outcomes for resident-run clinics have been studied exhaustively since the advent of their creation. A study conducted in 2010 by Pyle et al²⁰ was the first to examine outcomes, revealing a 14.4% revision rate of procedures in the studied resident clinic, which they found comparable to standard revision rates for board-certified plastic surgeons based on their review of available literature. Next, in 2014, Koulaxouzidis et al²² found that one resident clinic performed 273 aesthetic procedures, with a 9.7% total complication rate. Another resident cosmetic clinic examined by Qureshi et al²³ in 2016 showed a complication rate of 1.7% across 175 procedures. Alternatively, in 2017, Brandel et al²¹ found that rhinoplasties done in a resident clinic across 3 years showed a 29% complication rate, including asymmetry (10.5%), breathing difficulty (15.8%), and septal perforation (2.6%), although there was a 0% infection rate, and none of these complications required surgical revision. Importantly, both these results were considered acceptable rates within the plastic surgery standards.^{21,23}

The medicolegal aspects of the resident clinics, though less thoroughly studied, are another important facet of monitoring and assessing the safety of the patients treated in resident clinics. First, one survey-based study by Hultman et al²⁴ in 2014 found that 26% of respondents answered that their resident clinic had been involved in a lawsuit. Hultman et al²⁴ further documented that the majority of respondents had resident clinics that were self-insured for malpractice. In contrast, in 2006, Pu et al²⁵ performed a 10-year retrospective review of a resident clinic that treated 482 patients and performed 805 procedures and found that there was no litigation brought against any resident or attending surgeon involved. Furthermore, in studies reviewing their institution's resident clinics, Qureshi et al,²³ with 175 cases between 2010 and 2015, and Brandel et al,²¹ with 146 cases between 2012 and 2015, both found that no litigation has been brought against anyone involved in either of the clinics studied. Despite minimal legal action documented in the literature, the medicolegal aspect of resident clinics has been cited as one of the limitations for the development and growth of resident clinics.^{24,26,27}

In addition to the traditional assessment of complications as an evaluation of surgical outcomes, patient satisfaction is an essential measure of success in aesthetic surgery.²⁸ As such, patient-reported satisfaction has been a major point of scrutiny in resident-run clinics, as there was initial concern that increased trainee involvement would translate to inferior patient satisfaction rates. Early studies conducted by Freiberg et al^{18,28} found that 96.6% of patients were pleased with their results, 93% of patients would make the same decision again, and 93% of patients would recommend the resident clinics to others. Brandel et al²¹ used a 1- to 5-point Likert scale-based survey to investigate patient perspectives regarding their overall experience, if they would recommend the clinic to their friends/family, resident professionalism, knowledge, and confidence and found that patients rated residents highly in each category, with average scores all above 4.3. Koulaxouzidis et al²² reported a high degree of satisfaction among 110 patients who were treated at a resident clinic and subsequently completed a Client Satisfaction Questionnaire-8, which is a peer-reviewed and frequently used survey to assess client satisfaction. Iorio et al²⁹ also described a 91% satisfaction rate for patients who had undergone facial fillers performed by residents, as determined by the FACE-Q, a patient-reported outcome questionnaire that evaluates patient satisfaction with their facial appearance, health-related quality-of-life, and satisfaction with the process of care they received in the clinic. This trend is similar across other survey-based studies, which consistently describe high levels of patient contentment, further validating the utility of resident clinics.^{14,21,22,29}

The core advantage of resident aesthetic clinics is the degree of autonomy provided to the trainees. However, despite their widespread approval among attending physicians, residents, and patients, resident clinics have not universally become included in plastic surgery curricula. As of 2017, only 60%–70% of plastic surgery residency programs had incorporated resident aesthetic clinics.^{4,11}

A number of factors contribute to this lack of universal incorporation, including but not limited to, inadequate funding and patient volume, liability issues, and insufficient faculty availability and oversight. In particular, the shift in focus toward mitigation of liability risk given the modern medicolegal climate has become a notable impediment to further growth of resident clinics.^{24,26,27} Nevertheless, existing resident-run clinics appear to be flourishing and operating at a high level.⁴ These clinics remain poised to continually improve in the future, to the benefit of educators, residents, and patients alike. A summary of key literature regarding the efficacy of resident-run clinics can be found in [Table 2](#).

RESIDENT AND ATTENDING PHYSICIAN PERSPECTIVES

In most plastic surgery residencies, the majority of aesthetic training for residents occurs in the residents' senior years. Junior residents typically have minimal exposure to aesthetic cases, whereas senior residents have exposure to a wider range of aesthetic procedures, largely by managing their institution's resident aesthetic clinic.¹³ Consequently, there is a distinction in the opinions of senior and junior residents, with junior residents expressing less confidence with aesthetic procedures. There may also be a discrepancy when comparing integrated and independent programs. A survey conducted by Momeni et al⁸ found that no significant differences were noted between aesthetic case workload and level of confidence between integrated and independent program residents. However, more recent literature shows that chief residents in the independent programs are significantly less comfortable with aesthetic surgery than their peers in the integrated programs.¹³ Though the exposure that integrated residents have to aesthetic cases is relatively less in junior years of training, it is still markedly more than what independent residents receive.^{13,30} Given the inconsistency in the literature, the comparison between aesthetic training in independent and integrated programs warrants further insight and research.

Interestingly, residents' opinions do not always correspond to the opinions of their program directors. This gap was examined by Hashem et al,⁴ whose analysis of 3 different national surveys demonstrated that while program directors largely rated their residents' aesthetic skills as

acceptable across all types of aesthetic surgery, residents did not always feel the same way, especially in facial aesthetic surgery. However, both residents and program directors agreed that across aesthetic surgery, the highest level of confidence was found in procedures involving the breast and abdomen, perhaps due to a higher volume of cases pertaining to these areas and a greater margin for error in these anatomical spaces, allowing for increased resident autonomy in cases.^{4,13} Specific aesthetic procedures that residents consistently find challenging are facial and minimally invasive procedures. Facial surgeries are considered by residents to be the most difficult among aesthetic procedures, even as breadth of experience and methods of training have progressed over the years.^{4,7,8} This focal deficit is likely due, at least in part, to a more complicated operating process and the highly sensitive and visible nature of facial outcomes.^{33,34} In addition, the ACGME-mandated minimum number of nonsurgical cases, namely botulinum toxin injections and dermal fillers, have been difficult to reach for many residents.³⁰ Although these procedures should be performed with less time commitment and training than with more complex surgeries, residents are suffering from a lack of confidence and a suboptimal level of patient demand, which makes gaining experience difficult.^{2,8}

SIMULATION IN AESTHETIC TRAINING

Simulation is another avenue for training plastic surgery residents, with the advantage of a controlled environment and without the common barriers to intraoperative teaching, such as time, attending surgeon teaching approach, and trainee learning style.^{31,32} In addition, studies have shown that simulation-based training produces more significant increases in both knowledge and skill when compared with more traditional educational methods, including self-directed reading and the use of digital images.^{33,34} Simulation training includes use of cadavers, animal models, and prosthetic devices. Simulation training has been used in other subspecialties of plastic surgery, most notably with animal models for microsurgical vessel anastomosis training and human cadaver models for poplar flap reconstruction courses.

Likewise, there are many opportunities for simulation-based training in aesthetic surgery. For example, a study by Zammit et al³⁵ showed that residents feel the

Table 2. Summary of Key Studies on Resident-run Clinics

Topics	Important Studies	Journal	Year Published
Safety and complication rates	Pyle et al ²⁰	<i>Annals of Plastic Surgery</i>	2010
	Qureshi et al ²³	<i>Aesthetic Surgery Journal</i>	2016
	Brandel et al ²¹	<i>Annals of Plastic Surgery</i>	2017
	Koulaxouzidis et al ²²	<i>Annals of Plastic Surgery</i>	2014
Satisfaction rates	Freiberg et al ²⁸	<i>Annals of Plastic Surgery</i>	1989
	Freiberg et al ²⁸	<i>Plastic and Reconstructive Surgery</i>	1997
	Pu et al ²⁵	<i>Aesthetic Surgery Journal</i>	1999
	Iorio et al ²⁹	<i>Aesthetic Plastic Surgery</i>	2012
	Brandel et al ²¹	<i>Annals of Plastic Surgery</i>	2017
	Koulaxouzidis et al ²²	<i>Annals of Plastic Surgery</i>	2014
Limiting factors	Luce ²⁶	<i>Plastic and Reconstructive Surgery</i>	2012
	Rohrich ²⁷	<i>Plastic and Reconstructive Surgery</i>	2012
	Hultman et al ²⁴	<i>Plastic and Reconstructive Surgery—Global Open</i>	2015

least confident performing rhinoplasty procedures and desire increased availability of simulators to practice and improve their skills. Another study showed that simulation training resulted in improved surgical performance of Botox administration when compared with video training.³⁶ Furthermore, Laufer et al showed that a simulator for Botox injection can provide real-time feedback to residents to improve performance and increase confidence during Botox injections.³⁷ Cadaveric pig heads have been used to practice aesthetic facial procedures, such as Botox injections, chemical peels, and even spreader graft placement using porcine septal cartilage.³⁸ Similarly, human cadavers have also proved effective models for learning facial anatomy and rhinoplasty technique training.³⁹ Several prosthetic models have been developed, including a reusable synthetic breast augmentation model with anatomic landmarks and a sub-muscular plane by Kazan et al.⁴⁰ Simulation-based training continues to be studied for its application and effectiveness within plastic surgery but is often limited by time and energy constraints to incorporate these models, in addition to the high costs.^{31,41}

NOVEL TRAINING MODALITIES AND FUTURE CONSIDERATIONS

Novel and unique approaches, such as the incorporation of digital resources and standardized patients, have also been used to improve resident aesthetic training, especially at institutions with insufficient patient volume or funding. For example, one plastic surgery program recently published a study conveying the benefits of technology-based education to supplement their resident training. The addition of weekly educational and surgical training video modules improved how residents acquired new knowledge, learned anatomic and surgical principles, and refined existing surgical technique, facilitated by ease of access to technology at their institution.² However, large-scale incorporation of digital resources into curricula requires financial backing, which may not always be possible to attain to the degree necessary to maximize learning potential.

Another avenue for improving resident confidence in aesthetic surgery is the use of standardized patients to teach preoperative evaluation. Rinker et al¹⁷ noted that residents at their institution found the use of standardized patients to be worthwhile in practicing patient selection and effective communication strategies, thus contributing to a trainee's confidence. Such a method is routinely used in medical schools; so residents already have a certain level of familiarity with this process, enabling them to learn the nuances of patient interactions specific to an aesthetic practice in a low-stakes environment and with the additional benefit of patient feedback.

CONCLUSIONS

Aesthetic surgery is a key aspect of comprehensive plastic surgery education. With increasing ACGME aesthetic case requirements and the growing incorporation of resident-run aesthetic clinics, residents report higher levels of satisfaction and comfort performing cosmetic

operations. However, satisfaction and comfort do not necessarily translate to increased skill or competence. Studies have shown that resident-run clinics are safe and produce high-quality results, but individual assessment of aesthetic abilities remains difficult to achieve and even more challenging to study.

Overall, the changes that residency programs have made have generated a positive trend in resident perception of their personal ability across most aesthetic procedures, though gaps in education still exist. These gaps remain under examination, and many residency programs continue to develop their own methodologies to improve resident training in aesthetic surgery.

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