



Current Concepts in Gender-Affirming Surgery Postgraduate Training

Alexander N. Khouri¹  Caleb Haley² Mark MacEachern³ Shane D. Morrison¹

¹Section of Plastic and Reconstructive Surgery, Department of Surgery, University of Michigan, Ann Arbor, MI, United States

²Medical School, University of Michigan, Ann Arbor, MI, United States

³University of Michigan Taubman Health Sciences Library, Ann Arbor, MI, United States

Address for correspondence Shane D. Morrison, MD, University of Michigan, 2130 Taubman Center, 1500 E. Medical Center Drive, Ann Arbor, MI 48109-0340, United States (e-mail: shanedm@med.umich.edu).

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Abstract

Background Recent advocacy efforts and expanded insurance coverage has increased health care utilization among transgender patients. Therefore, it is pivotal that surgical residents are properly trained to care for transgender patients in both clinical and surgical settings. Yet, no formal curriculum or training requirements exist for surgical residents. The aim of this systematic review is to understand the surgical trainee's postgraduate education and training with respect to transgender health and gender-affirming surgeries (GAS).

Methods A Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA)-compliant literature search was performed on December 04, 2020 in PubMed, Elsevier Embase, and Wiley Cochrane Central Register of Controlled Trials. The retrieved hits were screened and reviewed by two independent reviewers.

Results Our literature search identified 186 unique publications, of which 14 surveys and one interventional study from various surgical specialties including plastic surgery, urology, otolaryngology, oral and maxillofacial surgery (OMS), dermatology, and obstetrics and gynecology (OBGYN) were included in this study. The majority of residents and program directors in surgical specialties believe education related to transgender health is important, and the current exposure in surgical training does not sufficiently prepare surgical residents to care for this marginalized population.

Conclusion Current postgraduate surgical training in gender-affirming surgery is nonuniform across surgical specialty, geographical region, and individual program. Incorporating training modules and hands-on experiences into surgical trainee education will better prepare residents for the numerous clinical and surgical interactions with transgender patients. Further research is required to better understand how to best incorporate these experiences into existing surgical curriculums.

Keywords

- ▶ surgical education
- ▶ transgender persons
- ▶ gender-affirming surgery
- ▶ residency

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Introduction

It is estimated that approximately 25 million people worldwide identify as transgender.^{1,2} The term transgender describes those whose gender identity differs from their sex assigned at birth and/or does not confirm to the conventional gender binary, including gender nonbinary, gender nonconforming, gender queer, and gender diverse.³ Transgender patients have previously experienced significant levels of discrimination within health care settings.⁴⁻⁶ However, recent advocacy efforts and expanded insurance coverage has decreased stigma and improved access to health care for this patient population. As transgender health care utilization continues to increase, so too will the requested number of gender-affirming surgeries (GAS).⁷ Therefore, it is pivotal that surgical residents are properly trained to care for transgender patients in both clinical and surgical settings.

As per the World Professional Association for Transgender Health (WPATH), treatment of gender dysphoria involves psychiatric, medical, and surgical interventions. Multiple studies have already assessed the current undergraduate medical education related to transgender health.⁸ A well-cited 2011 study by Obedin-Maliver et al discovered that the median time devoted to lesbian, gay, bisexual, and transgender (LGBT) content in undergraduate medical education was only 5 hours across 4 years of school.⁹ This was further supported by Dubin et al, who performed a systematic review of the current literature related to medical student and resident transgender health awareness and found that education in these curriculums was often limited to one-time attitude and awareness-based interventions.¹⁰ These studies established the limited transgender health exposure in medical school curriculums. Recently, there has been an increase in literature describing transgender-specific education for surgical training programs. However, no literature has summarized our current understanding of the postgraduate training in surgical residency related to transgender health.

Multiple surgical specialties have already begun participating in GAS, including plastic surgery, urology, otolaryngology, oral and maxillofacial surgery (OMS), and obstetrics and gynecology (OBGYN). Yet, no formal curriculum or training requirements exist for surgical residents preparing to care for transgender patients. The aim of this systematic review is to better understand the surgical trainee's education and training with respect to transgender health and GAS.

Methods

Literature Search

This systematic review adhered to the standards of the Cochrane Handbook of Systematic Reviews of Interventions and was written in the format provided by the Preferred Reporting Items of Systematic Reviews and Meta-Analyses (PRISMA) statement.¹¹⁻¹³ (► **Fig. 1**). On December 04, 2020, we performed a comprehensive and reproducible electronic search for studies regarding GAS postgraduate training in PubMed, Elsevier Embase, and Wiley Cochrane Central Reg-

ister of Controlled Trials. See ► **Appendix 1** for the comprehensive search strategies.

Eligibility Screening

The retrieved hits were screened and reviewed by two independent reviewers, based on the title and abstract and using predefined inclusion and exclusion criteria. A third reviewer was asked to adjudicate in the case where consensus could not be reached among initial reviewers. An additional assessment was performed, based on the full-text versions of all selected records and those with insufficient information in the title and abstract. Studies were included if they addressed transgender health education related to a surgical or procedural specialty. Reasons for exclusion included irrelevant outcomes, inability to acquire full text, abstract only publications, secondary sources (reviews, commentaries, letters to the editor), and publications without English translation.

Results

The electronic search yielded a total of 186 unique hits. Screening of the title and abstract led to the inclusion of 33 studies for secondary evaluation. Screening of the citations, references, and related articles of the 33 reviewed manuscripts yielded two additional papers. Fifteen original studies were ultimately included in the systematic review. Fourteen of these were survey-based studies among various surgical specialties such as plastic surgery, urology, otolaryngology, OMS, dermatology, and OBGYN. One manuscript included in this review implemented a training module consisting of both didactic and cadaveric dissection. Notable primary outcomes included trainee exposure with respect to transgender care, program director and resident perceptions and attitudes of transgender care, and currently established transgender health curriculums. Secondary outcomes included geographical region, comfortability caring for this patient population, and beliefs regarding gender-affirming surgical fellowships. All of the publications were from North America.

Current Training for Surgical Residents in Transgender Health

Initial surveys among American plastic surgery and urology residents revealed that surgical trainee exposure to GAS is highly variable (► **Table 1**). Morrison et al surveyed 322 plastic surgery residents and fellows from 21 training programs and found that approximately 65% had received education or had direct patient exposure to transgender patients during residency.¹⁴ Dy et al found that among 289 urology residents, 54% of respondents received education about or were directly exposed to transgender patients. Urology residents were more likely to have direct patient interaction as opposed to formal lectures.¹⁵ Exposure varied geographically in both cohorts. Despite the inconsistencies in training, respondents in both surveys agreed that exposure to transgender education is important.^{16,17}

A secondary survey performed by Morrison et al found that among 154 American plastic surgery and urology

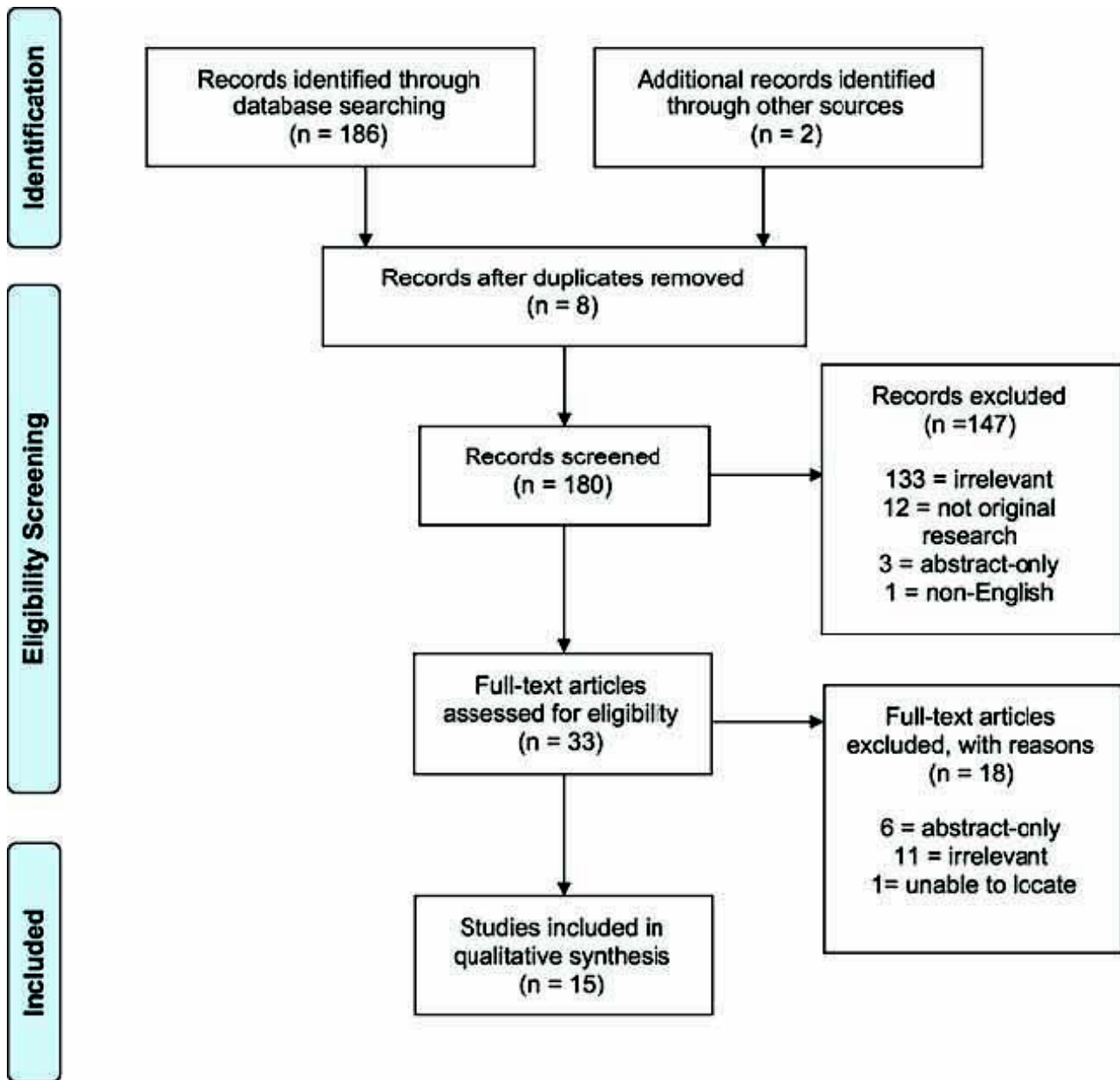


Fig. 1 Study selection process. Flow diagram depicting the number of manuscripts identified, retrieved, screened, and included in the final systematic review.

programs, as reported by program directors, the median dedicated time to transgender health was 1 didactic hour and 2 clinical hours annually.¹⁸ As most surgical training programs range from 5 to 7 years, this amounts to no more than 21 hours of transgender health exposure.¹⁹ The reported median allotted time also does not capture that 18% of plastic surgery and 42% of urology programs had no didactic education, and a third of plastic surgery and urology programs had no clinical exposure.¹⁸ All three initial surveys indicated that a positive program director attitude toward transgender education correlated with more trainee exposure and formal education.^{14,15,18} These results built upon the preliminary surveys claims that a surgical trainee's transgender education was nonuniform and varied, based on factors such as

geography and overall program attitude toward transgender care.

A 3-year follow-up survey of 43 American plastic surgery program directors asserted that consistent education across residency programs may be improving.²⁰ Magoon et al found that a large majority of programs now devote educational time to transgender health and are planning on increasing these efforts in the coming years.²⁰ Programs now spend 3.5 hours annually on GAS curriculum, an increase of 1 hour per year from prior surveys and an indication that programs are committed to their plans to increase transgender health related education.^{18,21} Although only 26% of programs report dedicated clinical experience with transgender patients, and the majority of that exposure exclusively dealt with

Table 1 Relevant survey studies on transgender-related surgical training

| Authors | Year | Specialty | Survey population | Survey Response rate | Results |
|----------------------------------|------|------------------------------------|---|----------------------|--|
| Chang et al ²⁹ | 2018 | OBGYN | Female pelvic medicine and reconstructive surgery fellows | 78% (n = 76) | 84% reported no inpatient experience and 74% had no outpatient experience with transgender patients. At institutions where FTM GAS was performed, 88% felt comfortable providing a FTM hysterectomy with salpingo-oophorectomy, compared to 33% at institutions where FTM surgery was not performed ($p < 0.001$). Most fellowships had no didactics related to transgender health care. Fellows with at least 1 hour of didactic training were significantly more likely to report that they would be comfortable managing surgical complications from FTM GAS (74%) compared to those who had not (47%) ($p = 0.047$). |
| Grimstad et al ³⁰ | 2016 | OBGYN | OBGYN program directors | 39% (n = 86) | 46% reported having transgender patients seen by trainees in clinic and 8% stated their clinic saw more than 10 patients per year. Most common educational activities used were lectures (63%) and reading materials (52%). The most desired educational activities were direct patient exposure (67%), online modules (58%), and reading materials (43%). 96% felt that providing transgender education in their program would be beneficial for resident education. |
| Mehta et al ²⁸ | 2018 | OBGYN | ACOG fellows | 53% (n = 228) | 43% with previous training in LGB-TGNC health. Respondents were more likely to receive training if they self-identified as LGB-TGNC or had close contact with an LGB-TGNC person. Previous training made providers more comfortable with performing gender affirming oophorectomy on younger patients and more likely to discuss gender identity and ask about pronouns. 60% desired more training in LGB-TGNC health and those with prior training were more likely to request further training. Lack of medical expertise was the major reason for lack of comfort with TGNC patients (61%). |
| Qin et al ³¹ | 2020 | OBGYN | OBGYN residents | 13% (n = 126) | On average, residents responded being "somewhat" comfortable taking care of TGNC patients, "somewhat" competent taking care of TGNC patients, and "somewhat not" satisfied with their curricular/didactic exposure to TGNC education. 78% of residents strongly agreed that training in TGNC topics were important. |
| ^a Unger ²⁷ | 2015 | OBGYN | OBGYN faculty | 40% (n = 141) | 80% reported they did not receive transgender health care education as not part of their residency training. More recently trained providers were not more likely to learn about transgender health care than more distantly trained providers. |
| Vinekar et al ³³ | 2019 | OBGYN | OBGYN program directors | 61% (n = 61) | 51% of programs offer transgender healthcare education (11% with well-developed curricula) and 80% of the programs that do not have a current curricula plan to establish one in the next year. Of the programs that offered trans health education, 97% provided formal didactic sessions, 64% offered health screening, 45% offered hormone therapy training, 16% taught surgical techniques, and 26% provided medical care for surgical complications of GAS. |
| Ludwig et al ²⁶ | 2019 | OMS | OMS residents | 7% (n = 87) | 31% reported exposure to transgender patients during residency in a variety of clinical settings: 21% during surgery, 18% to psychiatric components, and 17% to the medical components of transgender health care. On average, residents felt like gender affirmation surgery training was important. 38% stated fellowship training in GAS should be offered. |
| Massenburg et al ²⁵ | 2018 | Otolaryngology | Otolaryngology residents | 69% (n = 285) | 30% with transgender didactic education or direct patient care, mostly facial or pitch alteration surgery. 63% supported including GAS in existing fellowship training and 31% thought it should be its own fellowship. On average, respondents believed GAS training was somewhat important. |
| Magoon et al ²⁰ | 2020 | Plastic and reconstructive surgery | Plastic and reconstructive surgery program directors | 54% (n = 43) | 86% of programs incorporate GAS didactics into their curriculum and 79% would like to spend more dedicated time on the topic. Residents had much more exposure to top surgery (91%), compared to bottom surgery (28%) and facial surgery (56%). 67% of respondents believed that trainees are prepared to address transgender-related concerns. There was a mixed response on |

Table 1 (Continued)

| Authors | Year | Specialty | Survey population | Survey Response rate | Results |
|---|------|---|---|----------------------|---|
| Morrison et al ¹⁴ | 2016 | Plastic and reconstructive surgery | Plastic and reconstructive surgery residents | 80% (n = 322) | the importance for gender affirmation surgery fellowship training, however most felt it is "important" or "very important". 65% reported exposure to transgender education or patient care during residency, with the most exposure in Midwest and Northeast regions. 63% reported exposure to transgender didactic education and 51% with exposure to direct patient care. The most common procedures residents were exposed to were gender affirmation top and bottom surgery (78% and 60%, respectively). Majority felt gender affirmation surgery training is important, and 72% thought GAS fellowship opportunities were necessary. |
| Morrison et al ^{13,4} | 2017 | Plastic and reconstructive surgery, urology | Plastic and reconstructive surgery, urology program directors | 70% (n = 145) | Median of 1 didactic hour and 2 clinical hours yearly related to transgender care. 56% stated that transgender education is important in resident training. 56% of PD's felt that transgender-specific education is important in resident training. |
| ^a Coutin et al ²² | 2018 | Urology | Urology residents | 82% (n = 14) | None of the respondents felt competent managing transgender-related urologic care and none agreed that their current transgender education was adequate. 43% of urology residents reported 0 hours of lectures/training in trans health care and 51% reported having 1 to 5 encounters with transgender patients during their training. Only 64% of urology residents felt comfortable seeing a transmale and transfemale patient for general health problems. Only half of the urology residents agreed that transgender health care encompassed in the specialty and 29% were interested in incorporating transgender health care into their future practice. |
| Dy et al ¹⁸ | 2017 | Urology | Urology residents | 72% (n = 289) | 54% had exposure to transgender care, most commonly through direct patient care rather than lectures. Female residents, those from the West and North Central regions, and those with prior education in transgender healthcare were more likely to report transgender education as important. Similarly, 77% of residents indicated that gender affirmation training is important, and that training should be offered in fellowship. |
| Buhalog et al ²⁴ | 2020 | Various | Program directors | 9% (n = 38) | 47% of the respondents (22 dermatology, 9 plastic surgery, 6 otolaryngology, 1 oculoplastics) perform MIGAPs. Of these, 56% provide formal education for their trainees in these procedures. |

Abbreviations: ACOG, American College of Obstetricians and Gynecologists; FTM, female to male; GAS, gender-affirmation surgery; LGB+TGNC, lesbian, gay, bisexual, transgender, and gender-nonconforming; MIGAPs, minimally invasive gender-affirming procedures; OBGYN, obstetrics and gynecology; PD, program director.

*Only included results pertaining to surgical residency training.

chest/breast surgery, 67% of program directors felt that their residents were prepared to address transgender-related concerns. As opposed to initial surveys, continuing medical education (CME) hours per year dedicated to the topic did not vary by region. Widespread transgender health education among surgical residents may continue to improve as GAS becomes more commonly accepted and practiced.

Despite the improvement in recent plastic surgery studies, a survey of multiple specialties from Canada, including urology, found that none of the 14 urology residency respondents felt competent managing trans-related urologic care, and none of them agreed that their current education was adequate.²² Similar to previous studies, 43% of respondents had no curricular exposure to transgender health care.^{18,22} Half of the urology residents agreed that transgender health care was included as a part of their specialty and only 29% planned on incorporating it into their future practice.^{20,22} Despite being significantly underpowered, it highlights the need for further transgender health care training in current urological residencies in order to reflect the resident-endorsed desire for increased GAS training.¹⁵

Other surgical specialties involved in the multidisciplinary approach to GAS and transgender health include otolaryngology, OMS, and dermatology. Otolaryngology and OMS residents are uniquely qualified to perform the facial and pitch alteration surgeries desired by transgender patients, and dermatologists commonly perform minimally invasive gender-affirming procedures (MIGAPs) such as soft-tissue augmentation, laser hair removal, and neuromodulator injections.^{23,24} However, residency exposure to transgender care is mixed among these surgical specialties. Massenberg et al found that 30% of American ENT residents had exposure to transgender health, most commonly with facial and pitch surgeries such as cricothyroid approximation or endoscopic vocal cord shortening.²⁵ Exposure was similar in American OMS residencies, as identified in a national survey performed by Ludwig et al.²⁶ A survey of 38 program directors, which included not only dermatologists but also otolaryngologists, oculoplastic surgeons, and plastic surgeons, found that 47% of programs offer training in MIGAP procedures.²⁴ These are only preliminary studies in their respective specialties and may not capture the true residency experience and attitudes, as these studies were limited by low-response rates. Further studies will be required to fully understand the experiences and perceptions of surgical trainees in these specialties.

Training was even more limited amongst OBGYN providers and fellows. Unger found that among 141 American OBGYN providers, only 20% received any training regarding transgender patient care during residency and only a third felt comfortable providing care to these patients.²⁷ Mehta et al had similar results, identifying only 25% of American providers who received education in lesbian, gay, bisexual, transgender and gender-nonconforming (LGB-TGNC) health during residency and fellowship.²⁸ Those with previous training were more likely to self-identify or have a close contact identifying as LGB-TGNC, and training did not correlate with provider comfort caring for transgender patients,

suggesting that prior training may have inadequately prepared the providers.^{27,28} This is significant as OBGYN providers play a crucial role in the long-term medical and surgical care of these patients. Among female pelvic medicine and reconstructive surgeons, a hybrid between OBGYN and urology surgical specialties, Chang et al found that most fellows had no experience with transgender patients (26% with outpatient exposure, 16% with inpatient exposure) and 70% of fellows had no transgender health didactics during fellowship.²⁹ Only 33% of fellows at institutions where GAS was not performed felt comfortable performing gender-affirming hysterectomy with salpingo-oophorectomy, as opposed to the 88% of fellows at institution where GAS was performed.²⁹

Despite the lack of exposure, Grimstad et al found that 82% of American OBGYN residency program directors felt that transgender health objectives were important and 96% favored the addition of a transgender component in their curriculum.³⁰ This was reiterated by Mehta et al who found that 60% of providers desired further training in LGB-TGNC health.²⁸ Similar to other surgical specialties, OBGYN residents feel only "somewhat" prepared to care for this marginalized population, despite strongly agreeing that education in transgender care is important, and highlighting the need for a more developed formal curricula.³¹ This request for increased education is supported by The American College of Obstetricians and Gynecologists, who echoed the need for transgender education in response to a landmark study that detailed disparities affecting this community.³² Yet, current curricula lack sufficient transgender education. A follow-up survey performed by Vinekar et al found that 31 out of 61 responding American residency programs currently offered transgender health education and 24 programs planned to introduce educational didactics in the preceding year.³³ However, only 20 programs offered clinical training for transgender patients and only five introduced surgical techniques for GAS. Current research may not fully elucidate a true understanding of the current transgender education for OBGYN, as response rates were overall much lower among OBGYN providers, program directors, and residents when compared to other specialties.

Discussion

Training in transgender health for surgical residents is neither standardized nor uniform and the current exposure during residency does not sufficiently prepare all residents to care for this marginalized population.^{15,18,26,30,31,33} The Accreditation Council for Graduate Medical Education (ACGME) at this time has no case log requirements or mandated education related to transgender health and GAS.³⁴ As a result, a surgical trainee's experience varies significantly across surgical specialty, geographical region, and individual program. Specialties such as otolaryngology, OMS, and OBGYN report less exposure when compared to plastic surgery and urology (► Fig. 2).¹⁴⁻³⁵ Residents from different specialties reported significantly different comfort levels when caring for transgender patients.^{22,28,31} Recently,

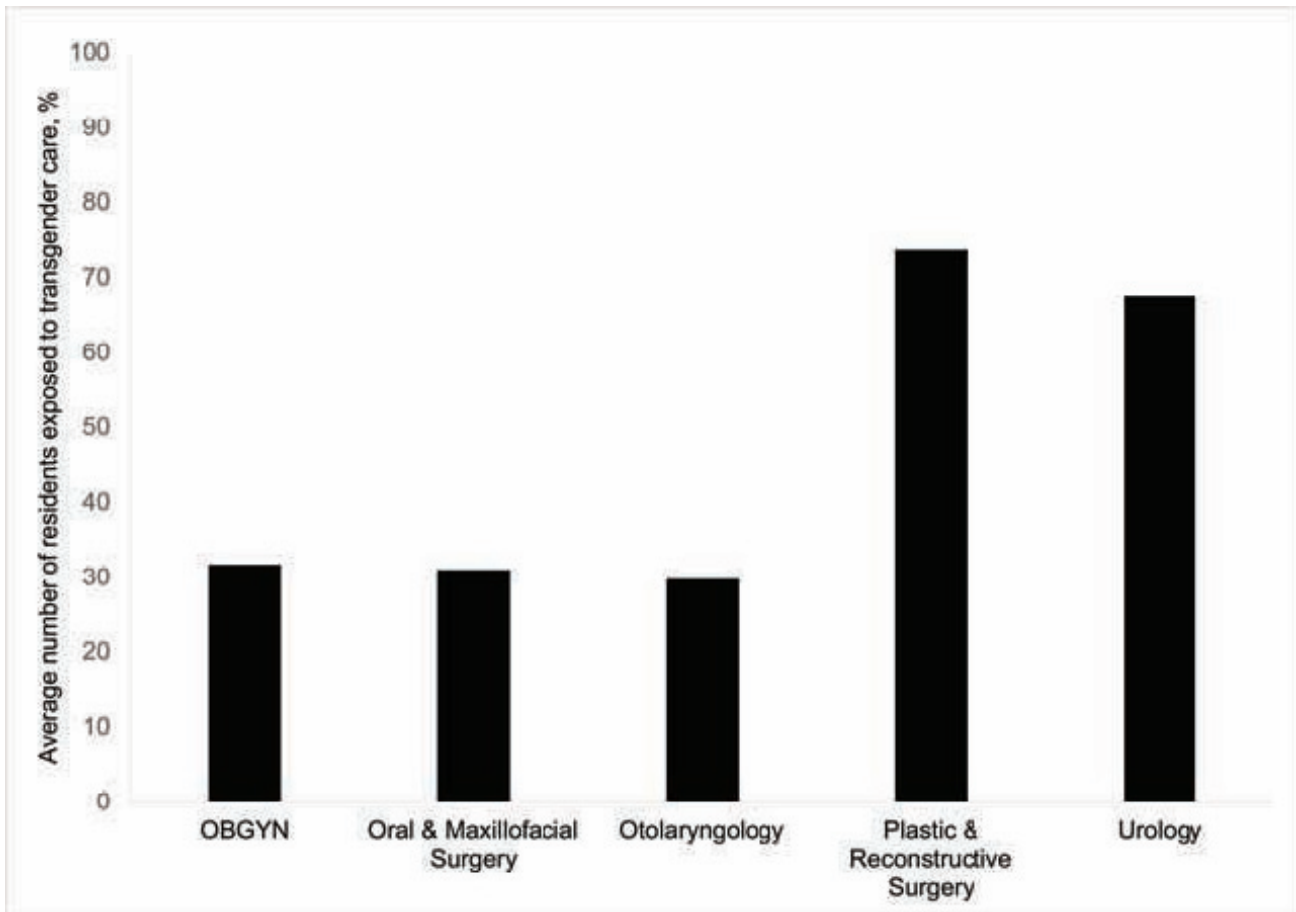


Fig. 2 Resident exposure to transgender health across surgical specialties. Average percent of resident exposure to transgender health and gender-affirming surgery (GAS), based on specialty. This figure included results from six obstetrics and gynecology (OBGYN) studies, one oral and maxillofacial surgery (OMS) study, one otolaryngology study, three plastic and reconstructive surgery studies, and three urology studies.

an emphasis has been placed on the multidisciplinary and holistic approach to transgender health.³⁵ It is therefore imperative that surgical residents in all specialties that perform GAS receive adequate education and exposure related to transgender care. Standardizing training with competency-based guidelines will prepare surgical residents uniformly to care for transgender patients undergoing GAS.

The majority of residents and program directors in surgical specialties encourage transgender health education during residency.^{15,18,26,30,31,33} However, not all surgical residents felt that transgender health was an important component of a residency curriculum.^{14,18,25,26,36} Multiple studies have demonstrated that residents and providers with prior education in transgender health were more likely to desire further training.^{15,28} As programs commit to implementing and expanding transgender education in upcoming curriculums, we anticipate the relative emphasis on transgender health in surgical education will propagate and become considered a foundational component of surgical training.^{14,18,20,26,33,36} Through standardization of training and increased support for transgender health education, programs will be better suited to adequately train residents in GAS.

While transgender health education during surgical residency continues to evolve, there has been a simultaneous

increase in GAS fellowship opportunities and a demand for fellowship-trained surgeons.^{19,37,38} Despite program directors disagreeing on the need for fellowship training in GAS, multiple studies have shown that most residents in plastic surgery, urology, otolaryngology, and OMS support fellowship training.^{14,15,20,21,25,26} Fellowship opportunities will further prepare trainees to master the technically challenging GAS, and better care for these patients in a variety of clinical settings. Additional training is also supported by patients, as it has been shown to alleviate stress in patients undergoing these life-changing surgeries.³⁹

Limitations and the Development of New Transgender-Health Curricula

Our current understanding of surgical training related to transgender care is primarily derived from survey-based studies. These are often limited by generalizability and incomplete participation and are frequently susceptible to selection and response bias. These studies are also restricted to North America and do not provide insight into training elsewhere in the world. GAS are commonly performed in Africa, Asia, Europe, and South America. Further studies will be required to better understand the robustness of surgical

Table 2 Relevant interventional studies on transgender-related surgical training

| Authors | Year | Specialty | Intervention | Outcomes |
|---------|------|------------------------------------|---|--|
| Pfaff | 2020 | Plastic and reconstructive surgery | Facial feminization course for medical students and residents with 1 hour didactic followed by cadaver dissection | All 16 (11 residents, 5 medical students) participants completed pre- and postcourse assessments. Pre- and posttest scores demonstrated improved understanding of the procedure (67.1 ± 22.4 percent vs. 84.4 ± 11.7 percent; $p = 0.011$). |

training in transgender health globally. However, the surveys included in this study together identify an overall understanding of the current surgical trainee experience in North America. Ultimately, existing research will lay foundation for interventional studies such as the development of training modules to be implemented in surgical curriculums.

One such training experience has been demonstrated by Pfaff et al, who executed a structured facial feminization course that included a 1-hour lecture and cadaveric dissection for 11 plastic surgery residents and five medical students (→ **Table 2**).⁴⁰ Pre- and postcourse self-assessments confirmed an improved understanding of facial feminization in transgender females. Several barriers to establishing similar training modules have been cited, such as lack of faculty expertise, formal curriculum, and resources.³³ There is no consensus regarding which formats of educational interventions are best suited to teach transgender health.⁴¹ However, initial curriculums may be best achieved through easily accessed online training modules. Online material may offer programs an affordable, high-quality, standardized educational resource in transgender health.⁴² Live surgery training courses for gender-affirming procedures have been produced annually via WPATH. A set of guiding principles to drive the development of new curricula has been previously explored by Schechter et al. This includes recommendations for surgical trainees to perform at least 25 top and bottom surgeries over a 2-year period.³⁶ However, technical skills alone will not sufficiently prepare residents. An effective surgical training in transgender health will require a multidisciplinary, holistic approach that includes core lectures, clinical and technical training, CME, and research.^{35,36,43} This well-rounded experience will prepare residents for competency-based interactions with transgender patients which will translate to a multitude of care settings.⁴⁴ Eventually, this comprehensive education may be adapted by the ACGME or other global medical education councils. Formal training will also standardize trainee exposure and education, limiting program and geographical variation and better preparing trainees for the recent increase in new GAS fellowships.¹⁹

Summary

Current postgraduate surgical training in GAS is nonuniform across surgical specialty, geographical region, and individual

program and does not sufficiently prepare all surgical residents to care for this marginalized population. Incorporating training modules and hands-on experiences into surgical trainee education as well as working toward the development of a formal GAS curriculum will better prepare residents for the numerous clinical and surgical interactions with transgender patients and standardize exposure. Development of fellowships in GAS will allow those seeking further education to explore these opportunities. Further research is required to better understand how to best incorporate these experiences into existing surgical curriculums.

Financial Disclosures

The authors have no financial interest to declare.

Conflict of Interest

None.

References

- 1 Meerwijk EL, Sevelius JM. Transgender population size in the united states: a meta-regression of population-based probability samples. *Am J Public Health* 2017;107(02):e1–e8
- 2 Winter S, Diamond M, Green J, et al. Transgender people: health at the margins of society. *Lancet* 2016;388(10042):390–400
- 3 Coleman E, Bockting W, Botzer M, et al. Standards of care for the health of transsexual, transgender, and gender-nonconforming people, version 7. *Int J Transgenderism* 2011;13(04):165–232
- 4 James SE, Herman JL, Rankin S, Keisling M, Mottet L, Anafi M. The Report of the 2015 U.S. Transgender Survey. Washington, DC: National Center for Transgender Equality; 2016
- 5 Reisner SL, Hughto JM, Dunham EE, et al. Legal protections in public accommodations settings: a critical public health issue for transgender and gender-nonconforming people. *Milbank Q* 2015; 93(03):484–515
- 6 Poteat T, German D, Kerrigan D. Managing uncertainty: a grounded theory of stigma in transgender health care encounters. *Soc Sci Med* 2013;84:22–29
- 7 Lane M, Ives GC, Sluiter EC, et al. Trends in gender-affirming surgery in insured patients in the United States. *Plast Reconstr Surg Glob Open* 2018;6(04):e1738
- 8 The World Professional Association for Transgender Health. Standards of Care for the Health of Transsexual, Transgender, and Gender Nonconforming People. Vol. 7. ed. Accessed January 11, 2021 at: <https://www.wpath.org/publications/soc>
- 9 Obedin-Maliver J, Goldsmith ES, Stewart L, et al. Lesbian, gay, bisexual, and transgender-related content in undergraduate medical education. *JAMA* 2011;306(09):971–977

- 10 Dubin SN, Nolan IT, Streed CG Jr, Greene RE, Radix AE, Morrison SD. Transgender health care: improving medical students' and residents' training and awareness. *Adv Med Educ Pract* 2018; 9:377–391
- 11 Higgins JPT, Thomas J, Chandler J, et al. *Cochrane Handbook for Systematic Reviews of Interventions* version 6.1 (updated September 2020). Cochrane, 2020 Accessed April 12, 2021 at: www.training.cochrane.org/handbook
- 12 Moher D, Shamseer L, Clarke M, et al; PRISMA-P Group. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Syst Rev* 2015;4(01):1
- 13 Page MJ, Shamseer L, Tricco AC. Registration of systematic reviews in PROSPERO: 30,000 records and counting. *Syst Rev* 2018;7(01):32
- 14 Morrison SD, Chong HJ, Dy GW, et al; Transgender Educational Study Group. Educational exposure to transgender patient care in plastic surgery training. *Plast Reconstr Surg* 2016;138(04):944–953
- 15 Dy GW, Osburn NC, Morrison SD, Grant DW, Merguerian PATransgender Education Study Group. Exposure to and attitudes regarding transgender education among urology residents. *J Sex Med* 2016;13(10):1466–1472
- 16 Morrison SD, Smith JR, Mandell SP. Are surgical residents prepared to care for transgender patients? *JAMA Surg* 2018;153(01):92–93
- 17 Smith JR, Morrison SD, Gottlieb LJ. Are surgical residents prepared for fellowship training in gender-confirming surgery? *J Sex Med* 2017;14(08):1066–1067
- 18 Morrison SD, Dy GW, Chong HJ, et al. Transgender-related education in plastic surgery and urology residency programs. *J Grad Med Educ* 2017;9(02):178–183
- 19 Salgado CJ, Nugent A, Kuhn J. Is there value to seeing a transgender fellowship-trained surgeon? *Plast Reconstr Surg* 2018;141(06):978e–979e
- 20 Magoon KL, LaQuaglia R, Yang R, Taylor JA, Nguyen PD. The current state of gender-affirming surgery training in plastic surgery residency programs as reported by residency program directors. *Plast Reconstr Surg* 2020;145(02):567–574
- 21 Morrison SD, Smith J, Massenburg BB, Chong HJ. Evolving Conceptions in Gender-Affirming Post-Graduate Training. *Plast Reconstr Surg* 2020;146(05):694e–695e
- 22 Coutin A, Wright S, Li C, Fung R. Missed opportunities: are residents prepared to care for transgender patients? A study of family medicine, psychiatry, endocrinology, and urology residents. *Can Med Educ J* 2018;9(03):e41–e55
- 23 Chaiet SR, Yoshikawa N, Sturm A, Flanary V, Ishman S, Streed CG Jr. The otolaryngologist's role in providing gender-affirming care: an opportunity for improved education and training. *Otolaryngol Head Neck Surg* 2018;158(06):974–976
- 24 Buhalog B, Peebles JK, Mansh M, et al. Trainee exposure and education for minimally invasive gender-affirming procedures. *Dermatol Clin* 2020;38(02):277–283
- 25 Massenburg BB, Morrison SD, Rashidi V, et al; Transgender Educational Study Group. Educational exposure to transgender patient care in otolaryngology training. *J Craniofac Surg* 2018;29(05):1252–1257
- 26 Ludwig DC, Dodson TB, Morrison SD. U.S. oral and maxillofacial residents' experience with transgender people and perceptions of gender-affirmation education: a national survey. *J Dent Educ* 2019;83(01):103–111
- 27 Unger CA. Care of the transgender patient: a survey of gynecologists' current knowledge and practice. *J Womens Health (Larchmt)* 2015;24(02):114–118
- 28 Mehta PK, Easter SR, Potter J, Castleberry N, Schulkin J, Robinson JN. Lesbian, gay, bisexual, and transgender health: obstetrician-gynecologists' training, attitudes, knowledge, and practice. *J Womens Health (Larchmt)* 2018;27(12):1459–1465
- 29 Chang OH, Haviland MJ, Von Barga E, Gomez-Carrion Y, Hacker MR, Li J. Female pelvic medicine and reconstructive surgery fellows' exposure to transgender health care. *Am J Obstet Gynecol* 2018;219(06):625–626
- 30 Grimstad FW, Satterwhite CL, Wieneke CL. Assessing residency program approaches to the transgender health CREOG objective. *Transgend Health* 2016;1(01):69–74
- 31 Qin LA, Estevez SL, Radcliffe E, Shan WW, Rabin JM, Rosenthal DW. Are obstetrics and gynecology residents equipped to care for transgender and gender nonconforming patients? A national survey study. *Transgend Health* 2020 (e-pub ahead of print). Doi: doi.org/10.1089/trgh.2020.0063
- 32 Committee on Health Care for Underserved Women. Committee opinion no. 512: health care for transgender individuals. *Obstet Gynecol* 2011;118(06):1454–1458
- 33 Vinekar K, Rush SK, Chiang S, Schiff MA. Educating obstetrics and gynecology residents on transgender patients: a survey of program directors. *Obstet Gynecol* 2019;133(04):691–699
- 34 Morrison SD, Wilson SC, Smith JR. Are we adequately preparing our trainees to care for transgender patients? *J Grad Med Educ* 2017;9(02):258
- 35 Schechter LS. Response to letter to the editor: "gender confirmation surgery: guiding principles". *J Sex Med* 2017;14(08):1067
- 36 Schechter LS, D'Arpa S, Cohen MN, Kocjancic E, Claes KEY, Monstrey S. Gender confirmation surgery: guiding principles. *J Sex Med* 2017;14(06):852–856
- 37 Nguyen PD, Freet DJ. Reply: the current state of gender-affirming surgery training in plastic surgery residency programs as reported by residency program directors. *Plast Reconstr Surg* 2020;146(05):695e–696e
- 38 Lau BD, Levine A, Haider AH. Are surgical residents prepared to care for transgender patients? *JAMA Surg* 2018;153(01):93–94
- 39 Smith JR, Washington AZ III, Morrison SD, Gottlieb LJ. Assessing patient satisfaction among transgender individuals seeking medical services. *Ann Plast Surg* 2018;81(06):725–729
- 40 Pfaff MJ, Malapati SH, Su L, Yuan N, Farias-Eisner G, Lee JC. A structured facial feminization fresh tissue surgical simulation laboratory improves trainee confidence and knowledge. *Plast Reconstr Surg* 2020;145(05):1016e–1017e
- 41 Nolan IT, Blasdel G, Dubin SN, Goetz LG, Greene RE, Morrison SD. Current state of transgender medical education in the United States and Canada: update to a scoping review. *J Med Educ Curric Dev* 2020;7:2382120520934813
- 42 Balbona J, Patel T. The hidden curriculum: strategies for preparing residents for practice. *Curr Urol Rep* 2020;21(10):39
- 43 Schechter LS, Cohen M. Gender confirmation surgery: a new frontier in plastic surgery education. *Plast Reconstr Surg* 2016;138(04):784e–785e
- 44 Shields R, Lau B, Haider AH. Emergency general surgery needs for lesbian, gay, bisexual, and transgender patients: are we prepared? *JAMA Surg* 2017;152(07):617–618

Appendix 1

PubMed (103 results on December 4, 2020)

Sex Reassignment Surgery/education[mh] OR transgender persons/education[mh] OR ((sex reassignment surgery[mh] OR transgender persons[mh] OR transsexualism[mh] OR gender affirming[tiab] OR transgender*[tiab] OR transexual*[tiab]) AND (medical education[ti] OR education, medical[mj] OR (fellow*[ti] OR otolaryngol*[ti] OR procedure*[ti] OR residen*[ti] OR surg*[ti] OR trainee*[ti] OR urolog*[ti])) AND (educat*[ti] OR student*[ti] OR teach*[ti] OR train*[ti]))))

Elsevier Embase (88 results on December 4, 2020)

('sex reassignment'/exp OR 'transgender'/exp OR 'gender affirming':ti,ab OR transgender*:ti,ab OR transexual*:ti,ab) AND ('education'/exp/mj OR 'medical education'/exp OR educat*:ti OR student*:ti OR teach*:ti OR train*:ti) AND (operati*:ti,ab OR otolaryngolog*:ti,ab OR procedure*:ti,ab OR surgeon*:ti,ab OR surger*:ti,ab OR surgic*:ti,ab OR urolog*:ti,ab)

Wiley Cochrane Central Register of Controlled Trials (10 results on December 4, 2020)

([mh "sex reassignment surgery"] or [mh "transgender persons"] or [mh transsexualism] or (gender near/2 affirm*):ti,ab or transgender*:ti,ab or transsexual*:ti,ab) and ([mh "education, medical"] or educat*:ti or student*:ti or teach*:ti or train*:ti)