



# Perioperative Considerations for Gender-Affirming Surgery

Christian van Rooyen<sup>1</sup> · Nelson J. Aquino<sup>2</sup> · Luis E. Tollinche<sup>3</sup> · Travis L. Reece-Nguyen<sup>4</sup>

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## Abstract

**Purpose of Review** As perioperative patient advocates, anesthesiology providers should be well prepared to deliver compassionate gender-affirming care to their transgender patients. The purpose of this paper is to identify areas where there is a lack of knowledge and to review this standard of care and to highlight high-yield topics that are directly applicable to the perioperative care of transgender patients.

**Recent Findings** A wide range of anatomical, physiological, psychological, and anatomical changes exist within the transgender and gender-diverse community who seek gender-affirming care. Resources such as the World Professional Association for Transgender Health (WPATH) standard of care version 8 and UCSF Guidelines for the Primary and Gender-Affirming Care of Transgender and Gender Nonbinary People are valuable resources to guide your management.

**Summary** The lack of knowledge about gender-affirming care results in discrimination against the transgender and gender-diverse community. There should be a focus on educating anesthesiology providers on gender-affirming care and highlighting possible challenges that these patients might pose in perioperative period.

**Keywords** Gender-affirming surgery · Transgender · Perioperative · Patient-centered care · Gender dysphoria · Diversity and inclusion · Quality · Patient safety

## Introduction

As the national rhetoric surrounding access to gender-affirming care (GAC) continues to grow more contentious, the reality remains that transgender and gender-diverse (TGD) patients require anesthesiology services for all types of surgical care, not just gender-affirming surgeries/procedures. Unfortunately, a frequently cited study from 2016 revealed that 33% of gender-diverse adult respondents had experienced discrimination within the healthcare setting leading 23% of respondents to avoid seeking medical care [1]. The healthcare discrimination faced by TGD individuals is a pervasive problem that has persisted in large part due to a lack of adequate medical training and minimal exposure to educational content that specifically discusses TGD patient care [2].

The anesthesiology workforce is no exception and a few recent studies further highlight the need for increased TGD patient care educational opportunities. A 2020 study found that only 19% of obstetric anesthesiology fellowship program directors reported their curriculum included any discussion of TGD patient care [3]. A survey of pediatric anesthesiologists found that 92% of respondents agreed

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✉ Luis E. Tollinche  
ltollinche@metrohealth.org

Christian van Rooyen  
chrisvr@uw.edu

Nelson J. Aquino  
nelson.aquino@childrens.harvard.edu

Travis L. Reece-Nguyen  
travisreecenguyen@stanford.edu

<sup>1</sup> Department of Anesthesiology and Pain Medicine, UW Medical Center, University of Washington, Pacific Street, Seattle, WA 1959 NE98195, USA

<sup>2</sup> Department of Anesthesiology, Critical Care and Pain Medicine, Gender Affirming Surgical Perioperative Program (GASPP) Team Leadership, Boston Children's Hospital, 300 Longwood Avenue Boston, Boston, MA 02115, USA

<sup>3</sup> Department of Anesthesiology, MetroHealth Medical Center of Case Western Reserve University, 2500 MetroHealth Drive, Cleveland, OH 44109, USA

<sup>4</sup> Department of Anesthesiology, Perioperative, and Pain Medicine, Stanford University, 453 Quarry Road, MC 5663, Stanford, CA 94305, USA

that learning about TGD patient care was relevant and 65% believed their education thus far was inadequate [4]. Although the lack of anesthesiology-specific education is apparent, Blanchard et al. also found that this lack of education coupled with an overall poor understanding of the TGD community led to anesthesiology provider uncertainty and decreased intent to provide gender-affirming care [5]. As perioperative patient advocates, anesthesiology providers should be better prepared to deliver compassionate GAC to their TGD patients. To help increase the anesthesiology workforce knowledge of GAC, this manuscript contains curated, high-yield topics that are directly applicable to the perioperative care of TGD adult and adolescent patients.

## Adult Preoperative Consideration

The TGD community faces discrimination in every step of the healthcare system. A lack of healthcare education, evidence-based literature, and holistic approach all contribute to the traumatizing healthcare experience faced by this unique population [5–10].

Educating healthcare providers on TGD care is vital in providing adequate care. A recent UK survey highlighted this by investigating the confidence of anesthesiologists in the perioperative of transgender patients confirming what was already known. The median score when asked if they had received sufficient prior education on transgender healthcare and their confidence in managing this cohort of patients was 4 out of 10. After a subsequent 2-h webinar covering transgender-specific topics, a repeat survey showed their confidence in managing transgender patients rose to 8 out of 10 [11•].

The anesthesiologist as a perioperative physician should spend appropriate time with the patient and their family member to discuss all their expectations and fears.

## History

In most cases, the initial medical treatment of gender dysphoria involves the use of gender-affirming hormone therapy (GAHT) and/or medications that block the effects of endogenous hormones [12, 13]. At the preanesthesia visit, their hormone regimen should be documented and the provider should be aware of possible risks associated with these medications.

## Hormones

**Estrogen** The primary class of estrogen used for feminizing therapy is 17-beta estradiol, an estrogen steroid hormone, and referred to as estradiol. Estradiol is administered via injection of a conjugated ester, sublingual tablet, transdermal

patch, or an oral or sublingual tablet [14]. Estrogen is known to increase several clotting factors including fibrinogen, factor VIII, von Willebrand factor, factor VII, and factor X [15]. Ethinyl estradiol is a synthetic estrogen used in contraceptive preparations and is associated with an increased thrombotic risk.

According to the WPATH SOC 8, there is no increased perioperative increase risk of VTE in transgender females undergoing surgery, while continuing GAHT when compared with that among patients whose GAHT was discontinued preoperatively [16•]. They advise the continuation of estrogen therapy pre- and post-surgery in transgender women specifically in those who lack additional specific risk factors [17].

**Spirolactone** Spirolactone is a component of feminizing hormone therapy for transgender women [18]. Spirolactone, an antihypertensive and potassium-sparing diuretic, acts as a direct antiandrogen receptor activity and suppresses testosterone synthesis at high doses. Important side effects include hyperkalemia, increased frequency of urination, and a reduction in blood pressure [19].

**Cyproterone Acetate** Cyproterone acetate is a commonly used antiandrogen outside of the USA. Cyproterone acetate has been associated with the development of meningiomas, liver dysfunction hyperprolactinemia adrenal suppression, and, when used in combination with estrogen, increased thromboembolic events [20].

**Testosterone** The use of testosterone, specifically in the cisgender population, in the perioperative period has not been associated with an increase in mortality or morbidity despite its effect on cholesterol, blood pressure, inflammatory markers, and hemoglobin [21]. Currently, the literature does not suggest the discontinuation of testosterone in transgender patients undergoing gender-affirming surgery however further investigation is warranted.

## Medical Conditions

**Human Immunodeficiency Virus** The transgender community faces a higher than the average rate of HIV infection, with infection rates estimated at 14% to as high as among transgender women [22]. Recent surveys have found this figure to be closer to 42% in major US cities [23]. Perioperative risks linked to HIV infection include electrolyte disturbances from chronic diarrhea, cardiac complications such as infective endocarditis, respiratory infections such as *Pneumocystis carinii* pneumonitis (PCP), and nervous system complications toxoplasmosis and HIV-associated dementia [5, 24]. Drug interaction can occur with commonly used antiretroviral medication including non-nucleoside

reverse transcriptase inhibitors and protease inhibitors as they are primarily metabolized in the liver by cytochrome P-450 enzymes [25].

**Diabetes Mellitus** The exact rate of diabetes in TGD individuals remains unknown largely due to studies only asking binary gender questions; however, recent research might indicate that there is an increased prevalence of type 2 diabetes mellitus among TGD individuals compared to their cisgender counterparts [26]. The TGD population also displays a high rate of modifiable factors such as high triglycerides and cholesterol that contribute to diabetes-related complications [27]. Diabetic patients who seek GAC represent a unique group for whom aggressive treatment to normalize glucose control is desirable as gender-affirming surgery often involves microvascular surgical techniques. Optimal glycemic control is associated with decreased infection rates and improved cosmesis as well as better wound healing.

**Psychiatric and Psychological Considerations** A recent study showed that approximately 58% of transgender patients had at least one DSM-5 diagnosis compared with 13.6% of cisgender patients, with suicide remaining as one of the leading causes of death [28, 29]. Psychoactive medications such as selective serotonin reuptake inhibitors, serotonin and noradrenaline reuptake inhibitors, and monoamine oxidase inhibitors have well documented drug interactions relevant to the anesthesiologist. As often seen in conjunction psychiatric disease, transgender patients also face higher rates of illicit drug use including opiates, alcohol, and amphetamines. Acute intoxication or chronic substance abuse can impact the pre-, intra-, and postoperative management of the patient [30].

### Physical Exam

The physical examination of the TGD patient is especially important as they might have had cosmetic feminization and masculinization procedures that can affect the airway anatomy [5]. Careful attention should be paid to the thyroid cartilage and thyromental distance.

**Facial Feminization** Facial feminization procedures in part aim to reduce the gender dysphoria experienced by transgender women. These procedures most commonly involve the mandible and the thyroid cartilage. Mandibular angle reduction and a decrease in chin width and height are performed as part of feminizing the lower face. These procedures can lead to scar formation, decreased mandible range of movement, a shortened thyromental distance, and a crowded oropharynx—all of which can lead to difficult mask ventilation and intubation [31].

Chondrolaryngoplasty involves reducing or shaving the thyroid cartilage prominence in transgender women with prominent thyroid cartilage (Adam's apple) [32]. This procedure can lead to inaccurate thyromental distance estimates as well as lead to difficulty in mask ventilation, endotracheal intubation, and even locating the cricothyroid membrane in a surgical airway emergency due to the scar formation on the anterior portion of the neck.

**Vocal Feminization** Voice feminization surgery is achieved through either decreasing the length and mass of the vocal cord, increasing its tension through scar formation, or elongating the cords. The anesthesiologist should be aware of the relevant procedures and the challenges they might pose to the airway management of the patient. Scar formation by the anterior commissure web approach can lead to a smaller glottic opening; a smaller size endotracheal tube might need to be used in these patients [33]. The cricothyroid approximation aims to alter the pitch of the voice by stretching the vocal cords and increasing tension by removing the cricothyroid membrane; you might experience difficulties in identifying and puncturing the membrane during an emergency surgical airway.

**Facial Masculinization** Facial masculinization surgery includes a surgical technique for augmenting Adam's apple (thyroid cartilage) to give it a more masculine profile and appearance. By augmenting the thyroid cartilage, you might have difficulty in estimating and accurate thyromental distance. The procedure can lead to scar tissue formation leading to difficulties in mask ventilation, intubation, and even puncturing of the cricothyroid membrane during a surgical airway emergency [31].

**Chest Binding** Chest binding, also known as binding, refers to the process of compressing or minimizing your chest tissue to create the appearance of a flatter chest. Binding can involve the use of fabric binders or special binding tape and has been associated with mechanical complications including back pain, rib fractures, overheating, and skin damage. Respiratory complications have also been reported in the form of shortness of breath and abnormal lung function tests such as a high FEV1 (forced expiratory volume), forced vital capacity, lower peak expiratory flow values, and a decrease in expiratory vital capacities [34, 35]. Kim et al. [36] report a transgender young adult wearing a chest binder during an endoscopy procedure under general anesthesia culminating in acute desaturation and airway sequelae requiring interventions [36]. In another case report, a transgender adolescent undergoing general anesthesia for dental rehabilitation emerged in the recovery unit without their chest binding replaced. This unintentional act required an unexpected inpatient psychiatric admission for severe gender distress [37].

**Pregnancy Testing** The American Society of Anesthesiologists Practice Advisory for Perianesthesia Evaluation recommended that pregnancy testing may be offered to female sex patients of childbearing age for whom the result would alter the patient’s medical management. It also states that a patient has the right to decide to have pregnancy screening prior to receiving an anesthetic. The 2021 practice advisory does not comment on transmasculine patients that were assigned female at birth (AFAB) and has subsequently caused confusion and even resulted in lawsuits at several hospitals [38]. Fertility is unpredictably impacted by testosterone therapy, and transgender men with intact ovaries and uteri have conceived and carried pregnancies. Testosterone is not a form of contraception and transgender men may have unintended pregnancies while amenorrhoeic [39].

### Risk Stratification

**Risk Calculators** Risk models and calculators are designed to estimate patients’ perioperative risk, often including binary sex in the scoring systems (as opposed to gender-diverse variations), but do not account for the use of GAHT.

Male sex is usually scored higher when these tools are used which can lead to gross underestimating of the risk faced by transgender women when the female sex is used improperly. Examples of commonly used perioperative risk calculators that incorporate sex but fail to address GAHT include the American College of Surgeons National Surgery Quality Improvement Program (NSQIP) Surgical Risk calculator, STOP-BANG score for obstructive sleep apnea, and the CHADS2-Vasc score for atrial fibrillation stroke risk [40–42]. In order not to underestimate the patient’s risk, it can be advised to select the binary sex with the highest risk for that particular calculation and to interpret the results with caution until further evidence and specific guidelines become available.

**Additional Testing** There are many calculated laboratory parameters and reference ranges that routinely incorporate binary sex (e.g., Cockcroft–Gault formula for creatinine

clearance, Modification of Diet in Renal Disease glomerular filtration rate equation, hematocrit reference ranges). Reference values may not be accurate if based on sex assigned at birth rather than affirmed gender [43]. Providers should be aware that transgender patients on GAHT will likely have changes in lab values that begin to shift toward the reference values of their affirmed gender at ~6 months of therapy [44]. Commonly seen changes include increases in hematocrit, hemoglobin, and creatinine for patients taking testosterone and decreases for those taking estrogen (see Table 1).

### Intraoperative Considerations

**Anatomic Consideration** Catheterization for TGD patients might pose unique difficulties as surgery involving the urethra might alter the anatomy making it a technically difficult procedure. An experienced provider, the use of smaller caliber catheters, or a low threshold to consult urology for assistance should be considered [45].

**Drug Interactions** Because of GAHT, there is a change in total body fat composition in the GAD population [46]. Data on this population is still lacking but this change in fat redistribution can theoretically influence the volume of distribution ( $V_d$ ) of fat-soluble drugs as well as the IBW (ideal body weight) calculation [47]. Estrogen is shown to decrease pseudochoolinesterase activity and prolong muscle paralysis from succinylcholine. It can also increase the free fraction of local anesthetics such as bupivacaine by decreasing albumin and alpha1-acid glycoprotein concentration [48, 49]. Sugammadex can also bind to steroid-structured molecules such as estrogen and thereby decreasing the effectiveness of the hormones in the postoperative period [50, 51].

**Airway** As previously discussed, facial and vocal feminization procedures may lead to altered anatomy in the transgender female population. A thorough past surgical history and detailed physical exam point to vocal cord damage decreased tracheal lumen, or tracheal stenosis—all of which are associated with these procedures. Case reports have described unexpectedly difficult airway management in patients who

**Table 1** Interpreting selected laboratory tests in transgender population using hormone therapy (HT)

Laboratory measure	Transgender men using masculinizing HT		Transgender women using feminizing CSHT	
	Lower limit of normal	Upper limit of normal	Lower limit of normal	Upper limit of normal
Creatinine	Not defined	Male value	Not defined	Male value
Hemoglobin/hematocrit	Male value <sup>a</sup>	Male value	Female value	Male value

<sup>a</sup>If menstruating regularly, consider using a female lower limit of normal. Adapted from UCSF Transgender Care, Department of Family and Community Medicine, University of California San Francisco. Guidelines for the Primary and Gender-Affirming Care of Transgender and Gender Nonbinary People; 2nd edition. Overview of masculinizing hormone therapy. Deutsch MB, ed. June 2016. Available at [transcare.ucsf.edu/guidelines](https://transcare.ucsf.edu/guidelines); with permission [77•]

previously underwent gender-confirming feminization surgery to the face and larynx [31].

Reports of severe tracheal stenosis developing in a transgender male after prolonged intubation with an inappropriately large endotracheal tube have also been reported. Biological sex must be considered when airway management algorithms are applied, and the size of endotracheal tubes is used [52].

## Postoperative Considerations

**Postoperative Pain** Management of postoperative pain relief leads to earlier mobilization, shortened hospital stay, reduced hospital costs, and increased patient satisfaction. The range of contributing factors includes age, psychological factors, such as depression, level of fear and anxiety, and medical factors, such as hormone-induced osteoporosis, previous surgeries, and an impaired immune system [53]. The use of regional anesthesia during GAS can reduce the required dosage of opioids and pain intensity experienced by the TG patient. The literature describes the use of the pectoral nerve block and lumbar epidural as well as sacral erector spinae plane block [54–56].

**Postoperative Nausea and Vomiting** Postoperative nausea and vomiting (PONV) are two of the most common adverse events with an estimated incidence of 30–80% depending on their risk factors [57]. These risks include age, method of anesthesia, type of surgery, smoking history, history of motion sickness, and female sex (possibly related to the effect of estrogen) [58]. Screening tools such as the Apfel score are commonly used to predict the risk of experiencing PONV [59]. These tools however did not take the transgender population and GAHT into account and will therefore need to be interpreted with caution.

## Adolescent Considerations

### Medications

To alleviate gender dysphoria and affirm one's gender identity in adolescence, gender-affirming medical care typically takes the form of puberty suppression and gender-affirming hormone therapy. The administration of reversible gonadotropin-releasing hormone (GnRH) analogs halts the development of Tanner stage 2 (or greater) sex characteristics and offers an extended epoch of exploratory adolescence [60]. In addition, several longitudinal and cross-sectional studies suggest an association of puberty and menstrual suppression treatments with improved mental wellbeing, body image satisfaction, and maturity of critical, age-appropriate transitions

into young adulthood [61–64]. Non-binary youth in Western cultures experience challenges occupying a specific gender role and/or spirit that may not exist in other societies [65, 66]. Without a universal non-binary classification, there are guarded limitations on hormonal treatments based on personal goals and a lack of evidence-based outcome measures [16•]. With limited data on hormonal interactions, medication reconciliation mitigates adverse complications.

## Psychosocial Issues

In a recent study, suicidal ideation remains highest among transgender (49.3%) and gender-expansive youth (41.3%) when compared to binary adolescent gender identities (male, 10.8%; female, 19.2%). They also found that half of TGD youth's suicidal ideation was due to bullying, dating violence, and depression, while ~39% was attributed to substance use [67]. Physical inactivity and tobacco and vape use in transgender persons place them at increased risk for cardiovascular morbidity and thromboembolic events [68]. The foundation of these behaviors stems from minority stress which extends to individual microaggressions and large-scale macroaggressions against transgender adolescents and youth. With fifteen states proposing antigender-affirming healthcare legislation in the USA, more than 58,000 adolescents and young adults will be affected by these overt bills denying equitable access to gender-affirming and primary healthcare [69]. A basic understanding of increased biopsychosocial risk factors for gender-diverse youth supports the identification of red flags for perioperative planning for gender-affirmation procedures.

## Multidisciplinary Approach

For patients eligible for medical and surgical gender-affirming treatments, the most recent WPATH Standards of Care 8 (SOC-8) recommends a comprehensive multidisciplinary team approach for adolescents, youth, and their families [16•]. In addition, an interdisciplinary team supports open communication, advanced care coordination, and better perioperative outcomes [70, 71]. In one pediatric gender surgery center in the USA, an innovative anesthesia specialty team established anesthesia management protocols for gender-affirming surgeries to follow clinical outcomes, advance transgender education, and enhance the transgender perioperative experience [71]. An inpatient, multidisciplinary perioperative team approach has also been shown to significantly improve overall patient satisfaction with communication, hospital environment, and care transition. Working with a committed, gender-focused multidisciplinary team has numerous advantages that promote mutual dignity and respect for this vulnerable population.

## Current Issues

Even though the nation's leading healthcare professional societies agree that gender-affirming care is medically necessary and lifesaving, many politicians have attempted to weaponize and ban TGD adolescents' basic right to access gender-affirming care. In 2022 alone, over 155 state legislative bills have been introduced, many of which seek to limit adolescents' access to care and/or criminalize parental support of TGD youth to do so. The negative emotional impact of antitrans legislation on TGD youth cannot be overstated and it also directly impairs healthcare professionals' ability to provide gender-affirming care through prohibitive state bans and proposed felony charges.

In gender-diverse youth, the common ethical issues revolve around the age of consent, surgical eligibility requirements, fertility preservation, and decision regret [72]. However, the recent attention on gender-affirming medical and surgical care for adolescents on social media has negatively impacted patients, families, and clinicians caring for this growing population. The focus on the treatment age has affected pediatric hospitals, clinicians, and their gender teams through personal attacks and bomb threats for providing life-changing and medically necessary care. As a result of these actions and review of current evidence, the SOC-8 guidelines allow gender-affirming providers to use their clinical judgment for medical treatment initiation along with a comprehensive biopsychosocial assessment for adolescents [16, 74]. Gender-affirming surgery age requirements are based on age-consensus guidelines for an individual country [74]. In the USA, top and bottom surgeries are accessible for patients 18 years or older. Still, there are cases where adolescents who meet the WPATH medical and mental health criteria with parental consent may be eligible for top surgery earlier. With increasing antitransgender legislation and knowledge gaps in peer influence and social contagion, there is an emerging phenomenon described as rapid onset gender dysphoria (ROGD) that is hypothesized utilizing parental observation surveys [75]. ROGD is not acknowledged as a mental health diagnosis by any professional psychological association. In addition, evidence-based studies on adolescents in gender clinics found no statistical association between the ROGD hypothesis among peers and other mental disorders based on validated gender dysphoria surveys [76].

## Conclusion

The importance of providing gender-affirming perioperative care cannot be emphasized enough, yet many anesthesiologists lack the necessary education and experience necessary to provide such care. This lack of knowledge also results in discrimination against the transgender and gender-diverse community within anesthesiology which often leads

to increased burnout and decreased mental health among these providers. Increasing TGD educational efforts across all areas of anesthesiology will improve the perioperative experience for TGD patients and make the specialty more accepting of TGD providers.

## Declarations

**Conflict of Interest** LET is a grant recipient through Merck Investigator Studies Program (MISP) to fund clinical trial at MSKCC (NCT03808077). LET serves a consultancy and advisory role for Merck & Co. Pharmaceutical Company. LET serves a consultancy and advisory role for GE Healthcare. LET receives stipend for his role as examiner with The American Board of Anesthesiology. LET is an expert testimony witness and receives compensation for this role. CV, NA, TR have no relevant financial or non-financial interests to disclose.

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***Gender-Affirming Care of Transgender and Gender Nonbinary People. These guidelines aim to address inequalities by providing primary care providers with the tools and knowledge to meet the healthcare needs of their TGD patients. It is useful to both providers and patients to have access to resources like this and refer to them when facing clinical challenges***

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