Anaesthesia 2024, 79, 1102–1116 doi:10.1111/anae.16378

Guidelines

Peri-operative care of transgender and gender-diverse individuals: guidance for clinicians and departments

Stuart Edwardson[1] **Luke Flower,**[2,3] **Erik Fawcett,**[4] **Rebecca Medlock,**[5] **Ada S. Cheung,**[6,7] **Kamilla Kamaruddin,**[8] **Victoria L. McCormack**[9] and **Seema Agarwal**[10,11]

1 Department of Anaesthesia and Intensive Care Medicine, Royal Infirmary of Edinburgh, Edinburgh, UK
2 Victor Phillip Dahdaleh Heart and Lung Research Institute, Department of Medicine, University of Cambridge, Cambridge, UK
3 Department of Intensive Care Medicine, London School of Intensive Care Medicine, London, UK
4 Department of Anaesthesia, Queen Elizabeth Hospital, Woolwich, UK
5 Department of Anaesthetics and Critical Care Hospital, Great Western Hospital, Great Western Hospitals NHS Foundation Trust, Swindon, UK
6 Trans Health Research Group, Department of Medicine, University of Melbourne, Melbourne, Australia
7 Department of Endocrinology, Austin Health, Heidelberg, Melbourne, Australia
8 Transgender Health Care and Clinical Lead East of England Gender Service, Cambridge, UK
9 Department of Anaesthesia and Critical Care Medicine, Manchester Royal Infirmary, Manchester Foundation Trust, Manchester, UK
10 Department of Anaesthesia and Critical Care Medicine, Wythenshawe Hospital, Manchester Foundation Trust, Manchester, UK
11 Manchester University, Manchester, UK

Summary

Introduction The objective of this document is to guide best practice to ensure the safety and dignity of transgender and gender-diverse people in the peri-operative period. While transgender and gender-diverse people may have specific health needs in relation to gender dysphoria, their health requirements go beyond their gender identity. Most doctors will provide care to someone who is transgender or gender-diverse at some stage in their career. It is therefore important that all anaesthetists are educated on specific considerations when caring for these patients.

Methods A working party was assembled consisting of individuals with experience in direct clinical care of the relevant patient group, those who have expertise in endocrinology and gender-affirming hormones, educators on the topic of transgender and gender-diverse healthcare, and authors of both cisgender and transgender identities. After discussion among the working party, targeted searches of literature were undertaken.

Results The authors initially came up with a list of over 25 recommendations which was subsequently revised to a list of 15 recommendations after further review by the working party. These included airway assessment and management; management of hormonal therapy; relevant issues in obstetric anaesthesia; and hospital infrastructure and processes.

Conclusions This document provides the first guidance produced to advise on best practice to ensure the safety and dignity of trans and gender-diverse individuals in the peri-operative period.

Correspondence to: Stuart Edwardson
Email: stuart.edwardson@nhs.scot
Accepted: 12 June 2024

Keywords: anaesthesia; guidelines; peri-operative; transgender
Twitter/X: @scotgasdoc; @LukeFlower1; @erikjfawcett; @BecsMedlock; @DrAdaCheungAU; @drkamillak; @vlmvictoria; @seemamosca

Recommendations

1 The patient's preferred name and pronouns should be confirmed and used at all times. This is an important way of showing respect and decreasing the risk of gender dysphoria.
2 There should be a process in place whereby a patient can privately and safely disclose both their sex at birth and gender as part of pre-operative assessment. Digital pre-assessment questionnaires can provide this in an elective setting.
3 All forms of social, medical and surgical gender affirmation should be identified at pre-operative assessment, and sensitive explanations given to the patient for the purposes of enquiring. Anaesthetists should be aware that many aspects of gender-affirming care may not be present on a patient's health record (including gender-affirming surgical procedures).
4 A pre-operative pregnancy test should be offered to all patients who have a uterus and ovarian tissue between the ages of 12 and 55 years, regardless of the use of contraception.
5 All specific peri-operative considerations for transgender and gender-diverse patients, including name and pronouns, should be communicated with the team at the surgical brief. Transgender status need only be shared with the patient's consent and if it is deemed important for the safety of their care. It should be given the same level of confidentiality as any other sensitive personal information.
6 Anaesthetists should be cognisant of the inaccuracy of an airway assessment in a patient who has undergone gender-affirming cosmetic procedures of the face and neck.
7 Patients who have undergone cricothyroid approximation may no longer have a cricothyroid membrane. Standard emergency front-of-neck airway may therefore not be possible. This should be considered when formulating an airway plan.
8 Patients who have undergone any surgical vocal pitch-raising procedures should not have their airway instrumented for at least 8–12 weeks postoperatively unless absolutely necessary.
9 Chest binders should ideally be removed, with the patient's consent, before anaesthetic intervention.
10 Hormone therapy should be continued throughout the peri-operative period unless there are specific contraindications. Patients should be counselled on the risks and benefits of this with the aim of making a shared decision.
11 Current total intravenous anaesthesia pharmacokinetic models are not validated for transgender and gender-diverse patients on established hormone therapy. Processed electroencephalogram monitoring should be used at all times.
12 Transgender and gender-diverse patients should be cared for in an environment that respects their gender identity. In some circumstances, this may involve providing a single room.
13 Organisations should have clear guidance for the care of patients who are transgender and gender-diverse. This should include specific educational materials to increase awareness of issues impacting their access to high-quality care.
14 All areas of peri-operative and perinatal practice should embrace gender-inclusive language to honour all identities.
15 Pregnant patients who are transgender or gender diverse should be seen in an anaesthetic clinic in the antenatal period to inform and support decision-making and plan care before presenting in labour.

What other guidelines are available on this topic?

This document is the first publication of its kind looking specifically at peri-operative considerations for transgender and gender-diverse patients aimed at the anaesthetic profession. Other documents of relevance include the Society of Radiographers' *Inclusive Pregnancy Status Guidelines for Ionising Radiation* [1] and the Royal College of General Practitioners' policy document entitled *Transgender Care* [2]. The General Medical Council's lesbian, gay, bi and trans (LGBT) patient guide sets out the standards of knowledge and ethics that doctors should apply to their care of this patient group [3]. However, there is no formal consensus document that covers the scope of this guideline.

Why were these guidelines developed?

It has been highlighted frequently by both transgender healthcare charities [4] and government bodies [5] that transgender and gender-diverse individuals face significant health inequity and that healthcare professional knowledge and practice specific to their care must improve. There are several specific considerations that must be taken into account to provide safe and dignified peri-operative care for transgender and gender-diverse patients which have not yet been documented as part of a guideline for anaesthetists.

How does this statement differ from existing guidelines?

There is currently no existing guidance covering the scope and focus of this document. The aforementioned guidance documents deal with specific circumstances including pregnancy testing in the context of ionising radiation; referral for gender identity; referral to endocrinology clinics; and the long-term management of hormone therapy in the community. This document covers the specific clinical care required for this cohort of patients when attending for either elective or emergency surgery or anaesthetic care.

Introduction

The number of people openly identifying as transgender and/or gender diverse has increased significantly over the past decade, most likely as a result of emerging clarity and comfort with open expression. Census estimates from 2021 identified 262,000 people living in the UK identifying with a gender that does not correspond with that assigned at birth [6]. It is worth noting that this is a lower estimate than others, most likely due to hesitation of people to disclose. The 2017 *Trans Report* highlighted a disparity in access to healthcare for trans people, with a startling 41% feeling their specific healthcare needs were not understood by healthcare professionals [4]. In 2016, the House of Commons Women's and Equality Committee noted a significant concern about the lack of awareness of these issues by doctors in its *Transgender Equality* report [5].

Around 50% of transgender and gender-diverse people are currently undergoing some form of medical treatment for gender affirmation (whether this is hormonal therapy, surgical affirmation or both), and a further 25% are not currently accessing gender-affirming medical interventions but wish to [4]. Many aspects of these interventions provide specific and important considerations for the anaesthetist in the peri-operative period.

Transgender and gender-diverse people comprise a significant and varied minority with specific healthcare needs that are often both poorly misunderstood and met. It is our collective responsibility for this inequity to be addressed. Transgender and gender-diverse people, in addition to some specific needs, experience the same health problems as everyone else and will therefore present to all services whether specialist or not. This guideline sets out a structured explanation of current evidence and practicalities to be considered for any anaesthetist looking after a transgender and gender-diverse patient in any scenario or area of the hospital.

Definitions and terminology

Terminology is important to demonstrate understanding of gender diversity [7]. Table 1 explains some important definitions used throughout this document. Use of a patient's preferred pronouns is a simple and effective way to be more inclusive and normalise gender expression. Common pronouns are she/her for a trans woman, he/him for a trans man and they/them for non-binary people. Some individuals use a mix of pronouns (e.g. he/they).

Trans and transgender are terms used commonly to refer to gender-diverse people. For example, a transgender man is a man who was assigned female at birth, and a transgender woman is a woman who was assigned male at birth. A non-binary person may identify across a range of gender identities, but not specifically as male or female. An intersex person naturally exhibits biological sex characteristics which are not typically considered male or female. They may also undergo a process of gender affirmation similar to transgender people. There are many terms to describe this process, and the preference is for the term `gender affirmation´ as opposed to `gender reassignment´.

The term `gender dysphoria´ describes a sense of discomfort and distress that a person may have because of the incongruence between their biological sex and their gender identity [8]. Many transgender and gender-diverse people experience gender dysphoria and distress from gender incongruence. Using the correct language when referring to trans people is a powerful tool for healthcare professionals to demonstrate inclusivity and provide better healthcare to transgender and gender-diverse people.

Methods

This working party was assembled by selecting individuals with experience of direct clinical care of the relevant patient group, those who have expertise in endocrinology and

Table 1 Gender glossary.

Sex	The assignment and characteristics that define people as male, female, intersex or another sex based on a combination of anatomy, hormones and chromosomes.
Gender	The socially constructed characteristics involved in how a person identifies.
Gender identity	One's own internal sense of self and gender of being male, female, neither of these, both or another gender(s).
Transgender	An umbrella term used to describe people whose gender identity differs from their sex assigned at birth. For the purposes of this document it includes anyone on specific gender-affirming medications or who has had gender-affirming surgery, or socially presents as a gender which is not their sex as birth.
Cisgender	A term to describe people whose gender identity is the same as their sex assigned at birth.
Trans woman/trans female	A term used to describe someone who is assigned male at birth but identifies and lives as a woman.
Trans male/trans man	A term used to describe someone who is assigned female at birth but identifies and lives as a man.
Gender diverse	A term used to describe people with gender identities and/or expressions that are different from social and cultural expectations attributed to their sex assigned at birth. This may include, among many other culturally diverse identities, people who identify as nonbinary, gender expansive, gender nonconforming and others who do not identify as cisgender.
Non-binary	Non-binary people have a gender which is not exclusively a man or a woman (i.e. not binary). Non-binary is also used as an umbrella term for a range of gender terms that are not man or woman, such as transmasculine; transfeminine; agender; genderfluid; genderqueer; or many other terms.
Intersex	Intersex is a general term used to refer to individuals born with, or who develop naturally in puberty, biological sex characteristics which are not typically male or female. That is, a person with an intersex condition is born with sex chromosomes, external genitalia or an internal reproductive system that is not considered typical for a male or female.
Sexuality/sexual orientation	A person's sexual attraction to another person based on the person's gender preferences, or lack of preference.

gender-affirming hormones, educators on the topic of transgender and gender-diverse healthcare, and authors of both cisgender and transgender identities.

Peri-operative transgender care is a poorly researched area, thereby precluding a comprehensive systematic review. The evidence presented in this guidance was explored through targeted searches after discussion among the working party members. Responsibility for each section was assigned according to each author's expertise and was subsequently reviewed and edited by another of the authors before review by the rest of the working party. Areas where there is a lack of evidence or no consensus are stated as such. The authors initially came up with a list of over 25 recommendations which was subsequently revised to a list of 15 recommendations after a further review by the working party.

Clinical considerations for anaesthesia

Airway

Transgender and gender-diverse people may undergo a variety of procedures involving airway structures to either alter their physical appearance or vocal pitch [9–13]. In these patients, there are several considerations to remain cognisant of during the peri-operative period. A thorough surgical history is thus vital to ascertain the presence of any gender-affirming surgery that may affect airway management.

Where possible, discussion with gender-affirming surgeons should be sought to ascertain the safest method for airway instrumentation if a patient has undergone any of these alterations. Important procedures to be aware of and their potential effects are described below.

Vocal pitch-altering procedures

There remains a paucity of evidence around specific peri-operative management of patients who have undergone vocal pitch-altering procedures. Thus pragmatic, expert-driven recommendations should be followed where possible. Table 2 describes some examples of vocal pitch-altering procedures patients may undergo and their relevance to the peri-operative setting [11, 14–17].

Advice given to patients undergoing vocal pitch raising procedures recommends avoidance of elective surgery for 8–12 weeks postoperatively where possible. If surgery is unavoidable during this period, then we advise that the following approaches should be attempted (in order of preference): local anaesthetic or spinal anaesthesia and/or sedation (and complete avoidance of general anaesthesia); supraglottic airway device (if general anaesthesia is necessary); and (if tracheal intubation is necessary), use of

Table 2 Gender-affirming, vocal pitch-altering procedures and their associated anaesthetic considerations.

Surgery	Description of procedure	Anaesthetic considerations
Endoscopic glottoplasty/anterior web formation (vocal feminisation procedure) (Fig. 1)	The anterior third of the vocal cords are sutured together	May decrease glottic aperture size by up to 33%. This may alter the size of tracheal tube required
Open feminisation laryngoplasty (voice feminisation procedure)	The anterior third of the thyroid and vocal cords are removed and the anterior section of the cords are sutured	May decrease glottic aperture size by up to 33%. This may alter the size of tracheal tube required
Anterior commissure advancement (voice feminisation procedure)	The thyroid cartilage is incised at the level of the anterior commissure and an implant is inserted. This increases vocal cord length and tension	May result in appearance of a second laryngeal prominence
Laser-assisted voice adjustment (voice feminisation procedure)	This technique involves vaporisation of portions of the vocal folds, leading to a decrease in vocal cord mass and an increase in their stiffness due to scarring	Potential difficulty passing a tracheal tube through the vocal cords due to stiffness and scarring
Cricothyroid approximation (voice feminisation procedure) (Fig. 2)	The cricoid cartilage is moved anterior-inferiorly and the thyroid cartilage is moved posterior-superiorly leading to an increase in vocal cord tension	Can lead to complete loss of the cricothyroid membrane thus making a cricothyroidotomy impossible. An alternative `cannot intubate, cannot oxygenate´ plan should be discussed
Thyroplasty type 3 (vocal masculinisation procedure)	A rectangular segment is removed from the thyroid ala bilaterally and the anterior commissure of the glottis is moved dorsally	Movement of glottic anterior commissure dorsally and thus potential difficulties passing a tracheal tube

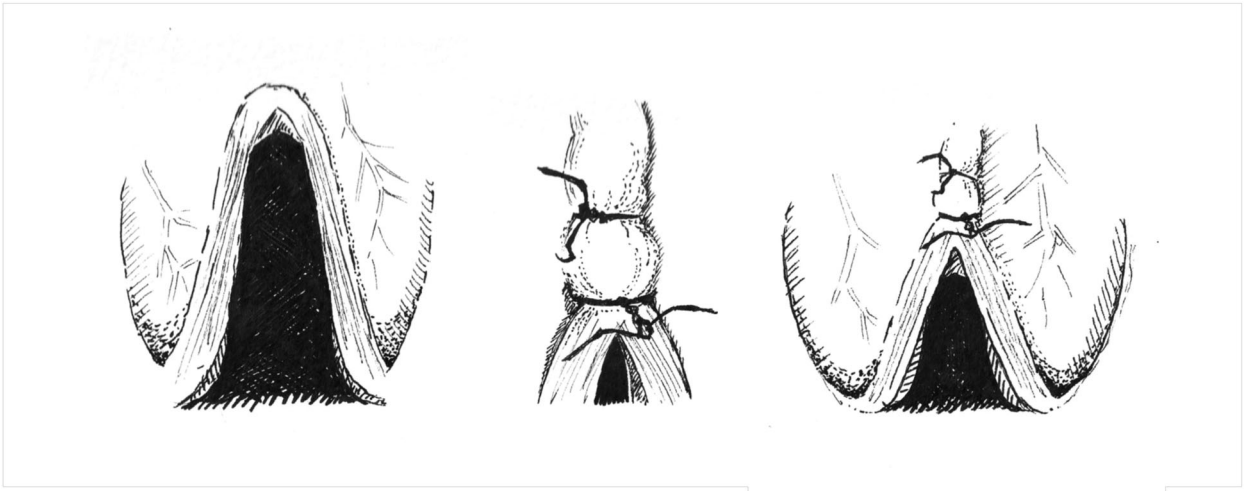

Figure 1 Endoscopic glottoplasty in a transgender female. Original image created by Dr Matthew Heron.

microlaryngeal tracheal tube, e.g. internal diameter 5.0–6.0 mm.

Patients that have undergone vocal pitch-raising procedures, except for cricothyroid approximation, will have a reduction in the size of their glottic aperture (Fig. 1) This should be considered if tracheal intubation is required after the initial 8–12-week postoperative period, using the smallest suitable tracheal tube.

It is important to note that if a patient has undergone a cricothyroid approximation (Table 2, Fig. 2), there can be complete loss of the cricothyroid membrane. This would mean that emergency front-of-neck airway would not be possible [14]. Percutaneous access between the second and third tracheal rings may be an option, but such an airway plan must be decided on before surgery.

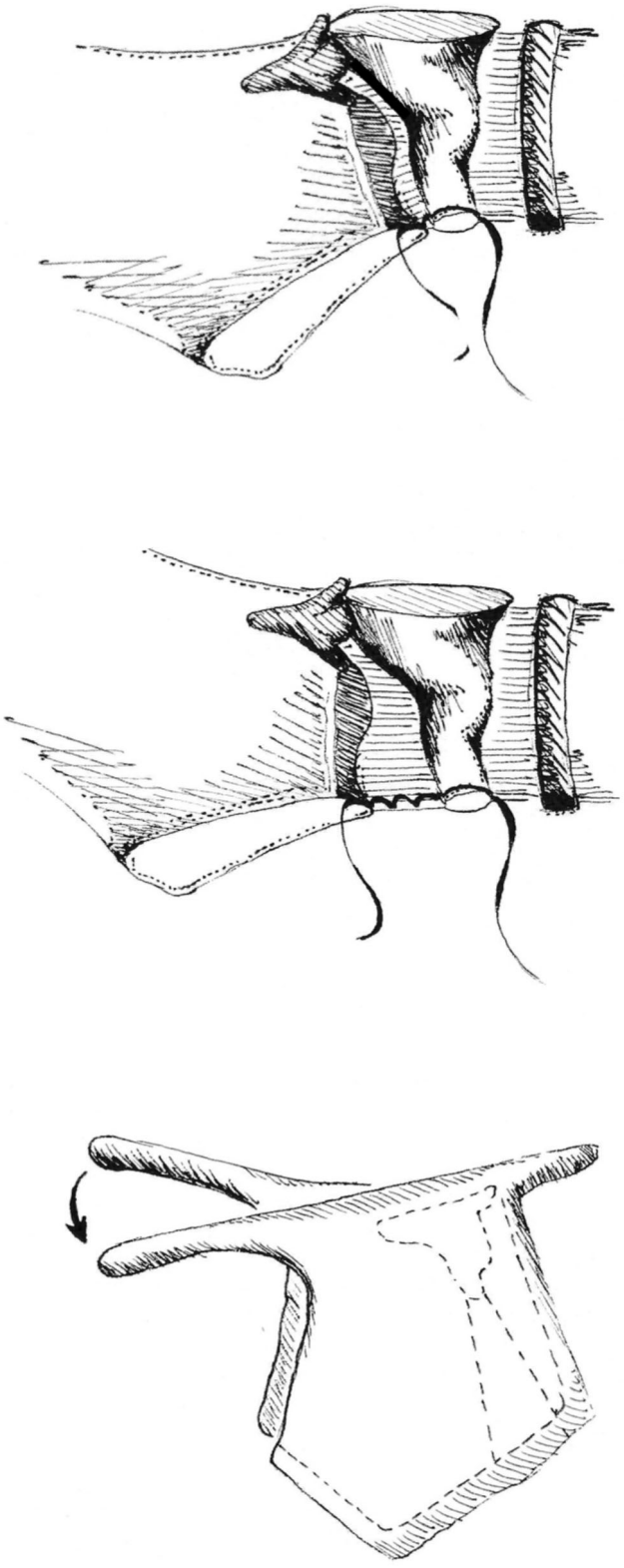

Figure 2 Cricothyroid approximation. These stages show the procedure eventually leading to either a significantly reduced or absent cricothyroid membrane. Original image created by Dr Matthew Heron.

Cosmetic procedures

There are several cosmetic procedures that transgender and gender-diverse patients may undergo to better align their appearance with their gender identity. Procedures relevant to anaesthetists include: mandible reduction (this may lead to oropharynx crowding); chin augmentation (this alters the reliability of visual assessment of the thyromental distance); rhinoplasty (this may influence nasal instrumentation); and chondroplasty/tracheal shave (this reduces the size of the laryngeal prominence and may make assessing thyromental distance or identification of front-of-neck structures more challenging).

It is also important to note that patients may achieve significant changes to their vocal pitch through vocal training techniques and speech and language therapy alone. This makes undertaking an accurate pre-operative assessment even more important.

Respiratory system

Transgender men or non-binary patients may wear a chest binder. This is a technique which involves tightly wrapped tape or a compressive garment applied to the chest wall to flatten breast tissue and give the appearance of a masculine or non-binary chest. This process can cause a restrictive lung defect and thus binders should ideally be removed before anaesthetising a patient [18]. This is of particular relevance if a patient is to be ventilated in the prone position. A clear discussion should take place with the patient about why chest binders should be removed in the peri-operative period. Agreement should be made about when the binder will be removed and allowance made for it to be put back on again postoperatively, as soon as is safe and feasible. Considerations should be made to find ways to minimise dysphoria. This may include allowing patients to wear oversized clothing or a blanket over their hospital gown before arriving in the operating theatre or on transfer to the ward.

Peri-operative hormone medication management

Gender-affirming hormone therapy is an important part of affirmation for many (but not all) transgender and gender-diverse people. By aligning physical characteristics that are more in line with an individual's gender identity, gender-affirming hormone therapy has been shown to improve dysphoria, quality of life and psychological functioning [19–22]. The type, dose and duration of gender-affirming hormone therapy is tailored to individual needs. While many trans people will desire masculinisation or feminisation, some transgender and gender-diverse individuals may desire partial changes using low doses of gender-affirming hormone therapy to induce a more androgynous appearance [23].

Puberty blockers

Gonadotropin-releasing hormone analogues are most often used in trans adolescents in early puberty (typically Tanner stage 2), as a temporary measure to suppress testosterone and oestradiol. Some adults will also regularly take puberty blockers in addition to other hormonal therapy. Treatment halts the development of irreversible secondary sexual characteristics such as breast development, body hair growth and changes in the voice and genitals [24]. Gonadotropin-releasing hormone analogues are reversible and allow the child and their family to take time to consider their gender identity and make a decision about masculinising or feminising gender-affirming hormone therapy [7]. They have been shown to reduce suicidality and improve psychological function [25, 26]. Adverse effects include reduced height velocity and potentially reduced peak bone mass accrual [26, 27]; height appears to accelerate subsequently when gender-affirming hormone therapy is commenced [28, 29].

Masculinising hormone therapy

Masculinising hormone therapy, or testosterone therapy, is used to help trans men and non-binary individuals who were assigned female at birth to develop a more masculine appearance and voice [7]. Standard doses of testosterone therapy are given to achieve serum testosterone concentrations in the typical cisgender male reference range [7, 19, 30]. Haemoglobin will increase to the male reference range within 3 months [31]. Physically, masculinising gender-affirming hormone therapy induces thicker vocal cords to produce a deeper voice pitch; body and facial hair growth; menstrual suppression; increased libido; clitoral growth; and an increase in muscle mass and reduction in fat mass [7, 19, 30]. Non-binary individuals who desire low-dose testosterone therapy may achieve gradual effects [7, 23]. Changes such as lowered voice pitch and hair changes are irreversible even if testosterone therapy is ceased [7, 30].

Adverse effects of testosterone therapy include polycythaemia; reduced high density lipoprotein cholesterol (HDL-c); androgenic alopecia; acne; gynaecological effects such as pelvic pain and genital dryness; and potentially increased risk of myocardial infarction [32–36]. Immune function appears to mirror that

Table 3 Cardiovascular risk when taking hormone therapy.

	Risk compared with cis men	Risk compared with cis women
Transgender women taking feminising hormone therapy		
Venous thromboembolism	Increased	Increased
Myocardial infarction	No difference	Increased
Stroke	Increased	Increased
Transgender men taking masculinising hormone therapy		
Venous thromboembolism	No difference	No difference
Myocardial infarction	No difference	Increased
Stroke	No difference	No difference

of the affirmed gender [37] and there does not appear to be an increased risk of any malignancies [38]. As such, long-term monitoring by a healthcare provider is important to monitor clinical effects, testosterone concentrations, monitor for polycythaemia and mitigate cardiovascular risk factors.

Feminising hormone therapy

Feminising hormone therapy is used to help trans women and non-binary individuals who were assigned male at birth develop a more feminine appearance. The therapy involves oestradiol therapy and anti-androgen medications (in those who have not had orchidectomy) [7, 19, 30]. Anti-androgens may include spironolactone; cyproterone acetate; bicalutamide; finasteride; or gonadotropin-releasing hormone analogues. Depending on the mechanism of action, peripheral androgen receptor antagonists such as spironolactone or bicalutamide may not necessarily lower testosterone concentrations [39, 40]. Optimal oestradiol doses or concentrations required to induce feminisation are unclear, but most individuals achieve oestradiol and testosterone concentrations in the cisgender female reference range [41].

Feminising hormone therapy induces change in body composition with increases in fat mass and reduction in muscle mass; breast growth; softening of the skin; decreased body and facial hair; decreased libido; reduced erectile function; and decreased testicular size [7, 30]. Some physical characteristics induced by prior male puberty do not change with feminising gender-affirming hormone therapy, such as lowered voice pitch; laryngeal prominence of the thyroid cartilage; and bone structure [7]. Adverse effects include an increased risk of venous thromboembolism; weight gain; compromised bone structure; infertility; and cardiovascular disease relative to cisgender women and men [32, 42–44].

Peri-operative gender-affirming hormone therapy

There are minimal data to guide the peri-operative use of gender-affirming hormone therapy. Testosterone therapy will generally be continued. Thrombosis risk is the main concern with any type of oestradiol therapy. Previous reviews have not found any evidence to support or refute routine discontinuation of oestradiol therapy before surgery (which may carry negative psychological consequences) [45–47], even for vaginoplasty [48]. The physical and mental health benefits of oestradiol therapy may outweigh the risk of thrombosis [49]. In addition to thromboprophylaxis strategies, the decision to continue or temporarily cease oestradiol therapy requires an individualised discussion of the benefits and risks of therapy.

Cardiovascular risk

Population-based studies have investigated cardiovascular risk in transgender and gender-diverse people using long-term gender-affirming hormone therapy. Nota et al. published one of the largest cohort studies regarding this risk, showing elevated cardiovascular risk in trans women [32]; the findings are summarised in Table 3. Elevated risk of ischaemic stroke and myocardial infarction in trans women relative to cisgender women has also been seen in other studies [42, 50, 51]. Trans women also have consistent increased risk of venous thromboembolism compared with cisgender men and women [32, 42]. This increased risk persists despite oestradiol dosing and preparations being altered over time. The risk remains elevated compared with the general population, and cis women using either oral contraceptive therapy or hormone replacement therapy [52]. Data for trans men remain conflicting with some studies suggesting no elevated risk [42, 50] and others suggesting elevated risk of myocardial infarction [32, 51].

Evidence on peri-operative cardiovascular risk factors when taking hormonal therapies remains inconclusive.

Table 4 Gender-affirming medications and relevant peri-operative considerations.

Gender-affirming medication	Relevance
Hormone therapies	
Testosterone	• Increased risk of obstructive sleep apnoea • Increased risk of hypertension • Increased risk of high body weight • Erythrocytosis and theoretical increased blood viscosity
Oestrogen	• Bound by sugammadex, reducing serum concentration. Effect unclear • If topical oestradiol patch, ensure no localised heat (from patient warming device) or pyrexia, which will increase transdermal uptake • Long-term reduction in serum albumin. Increased free drug of any highly protein-bound medications such as bupivacaine • Possible increased risk of postoperative nausea and vomiting • Potentially reduced plasma cholinesterases, resulting in prolonged block from suxamethonium
Anti-androgens	
Spironolactone	• Acute kidney injury • Hyperkalaemia • Hypovolaemia • Deranged liver function • Thrombocytopaenia
Bicalutamide	• Displaces warfarin from binding site, thereby increasing its anticoagulant activity • Prolonged QT interval • Risk of interstitial lung disease with long-term use • Metabolised by cytochrome P450 and reduces action of CYP3A4. Marked increase of serum midazolam concentration
Cyproterone acetate	• Anaemia • Can cause fulminant hepatic failure • Adrenal suppression

Patients should be counselled on the potential risks of continuation of hormonal therapy in the peri-operative period, taking note that discontinuation is likely to result in significant exacerbation of dysphoria, potential depression and/or anxiety.

Transfusion of blood products

This is an area of significant importance, and yet much complexity. This risk may not necessarily be immediately clear to the anaesthetist. Unfortunately, there is no current guidance from NHS Blood and Transplant regarding this topic.

The delineation between sex and gender is of vital importance when correctly sampling for and administering appropriate blood products. The blood transfusion service will identify your patient as the sex documented on their sample form and treat them only as such. This risks administration of potentially harmful blood products in transgender patients. In circumstances where you know that your patient is transgender, this must be reported to your hospital's blood transfusion service with the patient's consent, and in line with the legislation of the Gender Recognition Act (2004).

Unfortunately, in many circumstances, the medical team may not know of their patient's transgender status. Many previous medical notes (including blood transfusion history) may not be available to you, and the patient themselves may feel uncomfortable volunteering this information. Many patients may have had a change of name which also may or may not be consistent with their current medical records.

Local health boards should have a policy regarding blood sampling and transfusion of blood products in transgender patients, and these should be strictly observed.

Pharmacological considerations for the anaesthetist

Table 4 lists some of the major peri-operative considerations for common medications taken by transgender and gender-diverse people.

Pharmacokinetic models

It remains unclear how gender-affirming hormone therapy affects renal clearance and ideal body weight. The body composition of a transgender patient will start to show signs of change to their affirmed gender after 3 months of established hormone therapy. After 6 months, it may be

acceptable to calculate a patient's creatinine clearance and ideal body weight based on their affirmed gender [14], noting that there may still be a degree of inaccuracy. This is also relevant for calculations of appropriate lung-protective ventilation volumes, and some antibiotic dosing regimens.

Total intravenous anaesthesia (TIVA)

There are currently no validated models of TIVA for use in transgender patients taking hormonal therapies. When considering the target-controlled infusion algorithms used for TIVA, it should be acknowledged that body composition and volume of distribution may change significantly after a period of established hormone therapy [14]. Careful titration to clinical effect and the use of processed electroencephalogram monitoring is recommended.

Peri-operative scoring systems

It should be noted that many peri-operative scoring systems use sex as a component. An example would include the STOP-BANG assessment for obstructive sleep apnoea. Several factors (such as fat redistribution from hormone therapy) could play into inaccuracies of the final score in a transgender population. It is unclear how sex and gender influence the final scores in these systems when applied to a transgender population.

The patient's peri-operative journey

Undergoing a surgical procedure can be a vulnerable time for any patient, but potentially even more so for transgender and gender-diverse individuals. As previously stated, transgender and gender-diverse patients have low confidence that healthcare workers understand their specific needs and are fearful of encountering prejudice and discrimination [4]. For this reason, it is important to create an open and inclusive environment with educated staff, where transgender and gender-diverse patients feel they can be free to discuss their past medical history and gender identity. There is a significant chance that a transgender and gender-diverse patient's medical records may not accurately document their gender-affirming medical history, as this is often obtained from private healthcare sources or sought in other countries. This makes voluntary disclosure in a safe environment even more important.

One potential solution to reduce non-disclosure of transgender and gender-diverse status is its routine incorporation into non-gendered peri-operative screening questionnaires. This should be a two-step question: the first asking about sex recorded at birth; and the second question asking about gender identity (see online Supporting Information Appendix S1 for examples). If relevant, this can then lead on to a subset of suggested questions which will be of relevance to transgender and gender-diverse patients. The pre-operative anaesthetic clinical assessment should also involve clarification of a patient's preferred name, pronouns, current hormone therapy and previous gender-affirming surgical procedures. It is important to ask these questions sensitively and in a private environment. Providing a clear and thoughtful explanation for the relevance of each question asked will help to increase the patient's confidence in your care and reduce feelings of discrimination. Once this information is received, it should be recorded in the patient's medical notes in a way that future healthcare staff have access to it in order to avoid necessity for repeated potentially uncomfortable conversations. Information about an individual's gender identity should only be shared with those for whom it is relevant.

If a patient is identified as being transgender or gender diverse through a routine pre-operative screening questionnaire, there are several specific areas to explore as part of the anaesthetic assessment (Fig. 3). Examples of good practice and ways to phrase these questions are shown in online Supporting Information Appendix S1.

Disclosing a patient's transgender status to another party should only be done with the patient's consent and if deemed medically necessary. Upon initial consultation with your patient, it would be pertinent to ask if they are happy for this to be documented in their notes and shared with other medical personnel if and when deemed necessary for their safety.

Pregnancy testing

All patients who have any potential to be pregnant should be offered pregnancy testing before arriving to the operating theatre. It may be challenging to identify which patients should be offered this test, and we advise inclusion of pregnancy status and offering of pregnancy test to a larger non-gendered pre-operative questionnaire to reduce non-disclosure and ensure safety. It is important to note that masculinising hormone therapy does not provide adequate contraception, therefore some transgender or gender-diverse patients remain at risk of pregnancy. In these circumstances, an open and non-gendered question on a checklist such as `Is there any chance you could be pregnant?´ can provide the most inclusive and least distressing form of enquiry.

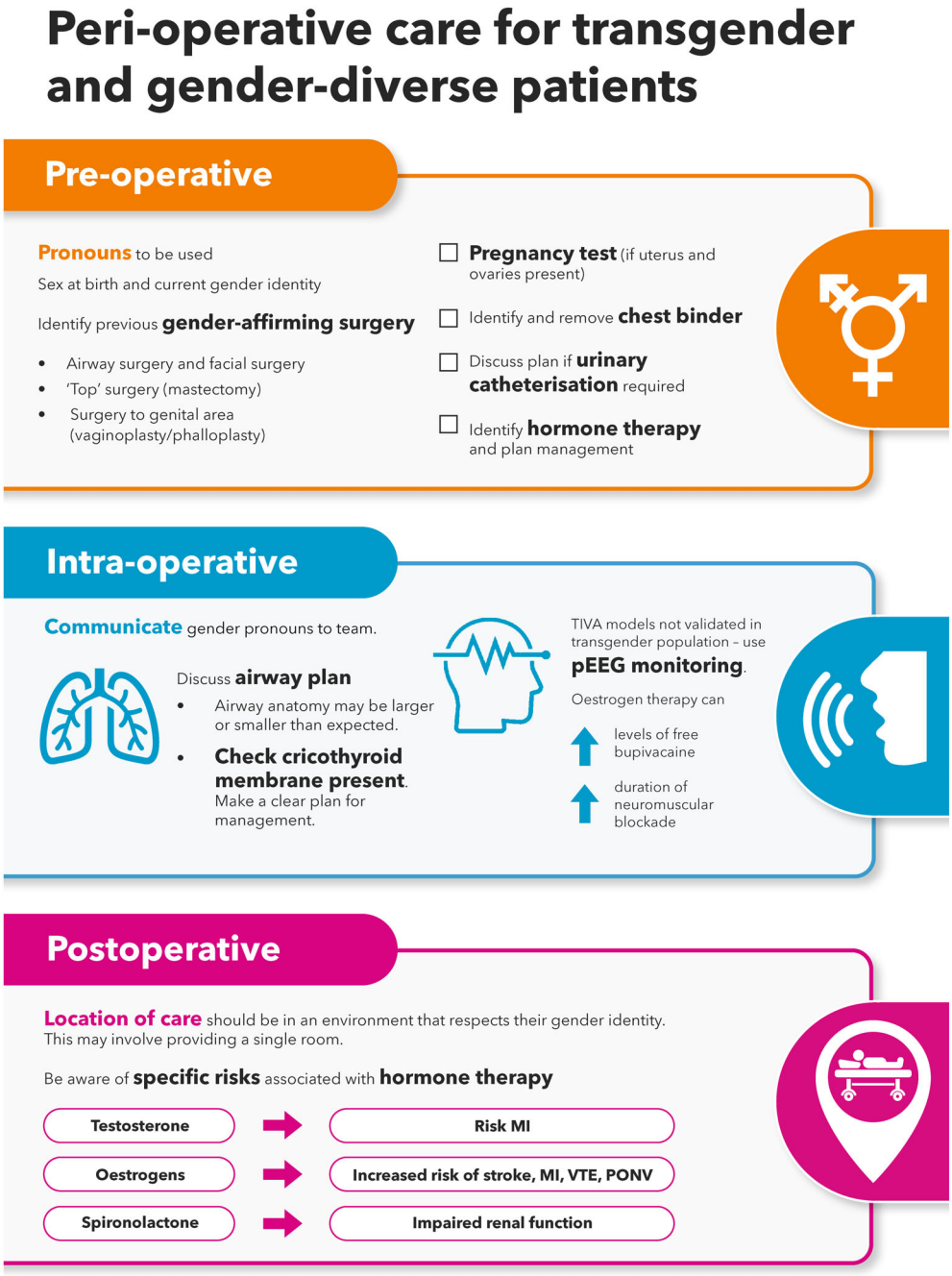

Figure 3 The peri-operative pathway. A summary of some of the major considerations when planning safe care for transgender and gender-diverse patients. Original image courtesy of the Association of Anaesthetists.

Pregnancy testing is one area that may worsen feelings of gender dysphoria. For best practice, questions surrounding this should involve factual language. We recommend avoiding terms such as `male´ and `female´ and instead asking about presence or absence of reproductive organs. For some patients, consent to a pregnancy test may be particularly distressing and they may refuse to do so. In these circumstances, there should be a clear explanation about the risks of not confirming pregnancy status and verbal consent to go ahead with the planned procedure.

Healthcare systems change and staff education

In 2018, NHS England reported that healthcare organisations must put systems in place to bring about sustained change which helps to improve healthcare

inequities for transgender and gender-diverse individuals [53]. This includes individual hospital and departmental policies outlining guidance and standards of care for transgender and gender-diverse patients, as well as increased staff training. Feedback from transgender and gender-diverse patients has repeatedly identified that this is an area where clinicians require further training [4, 54]. Hospitals should provide trans-specific resources, evidence-based guidelines and educational materials to increase awareness and understanding of issues impacting access to high-quality care. With increasing education and awareness should come increasing confidence and comfort for the specific considerations and processes involved in safe care. Some elements of this proactive inclusion may involve departmental posters, staff pronoun badges and the availability of gender inclusive services (e.g. gender inclusive midwives).

A pathway should be in place for clinical governance to review themes and trends of discrimination, victimisation or aggression against transgender and gender-diverse individuals, remembering that this may include trans staff members.

Clear systems should be in place so that medical records reflect sex assigned at birth and current gender identity. A `body organ checklist´ has been proposed as a solution to aid identification of relevant medical information without imposing gender identity or triggering gender dysphoria [55]. As for any other elements of a patient's medical information, their trans or gender-diverse status should be kept confidential and only shared when necessary to provide safe care, and with the patient's consent. This emphasis on confidentiality is enshrined within UK criminal law, according to the Gender Recognition Act (2004).

Obstetric anaesthesia

Transgender and gender-diverse pregnancy is increasing in incidence yet remains an area where stark health inequalities occur. The increasing number of people identifying as trans or gender diverse and recommendations to provide fertility preservation before starting hormone treatment are part of this rise. Unintended pregnancy is high risk in these patients as hormone treatment in the context of functioning natal reproductive organs is not adequate contraception, but this information is not widely known. Relatively few undergo hysterectomy; for example, a survey from the USA found only 8% of trans male and non-binary respondents had undergone this procedure [56].

Transgender and gender-diverse patients are more likely to experience prejudice and discrimination within healthcare settings which creates barriers to accessing clinical care [57, 58]. A UK survey in 2020 reported that 30% of pregnant transgender and gender-diverse patients did not access either NHS or private perinatal care compared with 2% of all pregnancies across the UK. For the black, Asian and minority ethnic subgroup this percentage increased to 46%. For those who did seek care, 30% reported being treated without respect or dignity [57].

It is common for this group of patients to feel uncomfortable disclosing their gender status in healthcare settings due to fear of discrimination. Healthcare practitioners should be cognisant that a male-presenting patient does have a potential to suffer unexpected issues such as incomplete miscarriage, ectopic pregnancy and retained placenta [59]. In addition, transgender men who are pregnant have reported trying to avoid healthcare discrimination by deciding to present as cis-gendered women to perinatal services [57, 60]. This approach not only leads to inaccurate team knowledge of past medical history and risk profile but significantly exacerbates the patient's sense of gender dysphoria and reduces chances of engaging with healthcare in the future.

Pregnancy and birth can be a particularly stressful time and carry significant risk of exacerbating gender dysphoria, anxiety and depression. Inclusive teams and environments should be developed and fostered to allow transgender and gender-diverse people to feel comfortable enough to reveal their status. Gender-inclusive language can be used throughout the patient's care pathway, including in anaesthetic clinic letters, information leaflets and protocols. As for all other peri-operative settings, the patients chosen name and pronouns should be clear to the entire multidisciplinary team before patient arrival. Care should be taken with language pertaining to pregnancy. Individuals may have different degrees of dysphoria around gendered language and anatomical names and the language and terms with which they are comfortable should be confirmed [60, 61].

There is evidence that perinatal patients in a non-supportive setting have refused pain medication in labour to allow them to remain vigilant for informed decision-making [61]. Anaesthetists should be supportive of these concerns and consider providing epidural analgesia with the added information that this will not affect consciousness and should preserve the ability to provide informed consent. Epidural analgesia may also help prevent exacerbation of gender dysphoria by reducing sensation from regular vaginal examinations during labour.

It is recommended that all transgender and gender-diverse patients booking for antenatal care are referred for an anaesthetic assessment to inform and support decision-making and plan care before birth. Care should be led by a senior anaesthetist and obstetrician.

Transgender men and non-binary patients who have received testosterone therapy may have an increase in cardiovascular and atherosclerotic risk, and haematocrit in keeping with the natal male population [42, 50]. This should be considered when clinically assessing these patients. At this time, there are no data on whether these physiological changes increase the incidence of hypertension, pre-eclampsia or venous thromboembolism in pregnancy.

Neurodiversity and mental health

Transgender and gender-diverse people have an increased rate of autism compared with cis-gender individuals [62]. They also show increased rates of psychiatric disorders including anxiety; depression; bipolar disorder; obsessive compulsive disorder; attention deficit hyperactivity disorder; and schizophrenia [62]. These conditions all have specific peri-operative relevance to anaesthetists and thus their higher prevalence should be considered when approaching their care.

Fertility

Patients starting gender-affirming treatment are given guidance on seeking fertility-preserving therapy. Patients may present for fertility treatment after starting therapy. Transgender men and non-binary patients may require anaesthetic-led sedation for egg retrieval. Before this, gender-affirming hormones ceased to increase yield [63]. This can result in partial reversal of physical changes or cessation in the process of gender-affirming physical changes that can worsen dysphoria [64]. Emotional and psychological effects of high-dose hormone treatment can compound both pre-existing mental health issues and gender dysphoria. This is likely to be a particularly sensitive time for the patient.

Conclusion

This document provides the first guidance produced to advise on best practice to ensure the safety and dignity of transgender and gender-diverse individuals in the peri-operative period. Healthcare staff should remain educated and updated on the significant disparities in healthcare outcomes these patients face, alongside the specific anatomical, physiological and social factors to be considered to provide safe and dignified care.

Acknowledgements

We would like to thank representatives from TransActual and Spectra for providing targeted consultation and invaluable advice to make this document as inclusive and impactful as possible. We would also like to thank Dr J. Hartland for their expertise and guidance in constructing this document. Many thanks to Dr M. Heron for illustrating original anatomical images for the airway figures. SE is Chair of the Association of Anaesthetists' Trainee Committee and a member of the Editorial Board of *Anaesthesia*. AC has received products (oestradiol and progesterone) for investigator-initiated trials from Besins Healthcare. Besins Healthcare has not provided any monetary support nor had any input into the design and analysis of research studies or the writing of any manuscripts. AC is supported by an Australian Government National Health and Medical Research Council Investigator Grant. VM is Honorary Secretary Elect of the Association of Anaesthetists. SA is an Editor of *Anaesthesia*. No other competing interests declared. Sharing of statistical code and data is not relevant to this document.

References

1. Society of Radiographers. Inclusive pregnancy status guidelines for ionising radiation: Diagnostic and therapeutic exposures. 2021. https://www.sor.org/getmedia/1d256f96-40cb-4eeb-b120-90fe27daf7e9/Inclusive-Pregnancy-Status-Guidelines-for-Ionising-Radiation_LLv2 (accessed 19/05/2023).
2. Royal College of General Practitioners. Transgender care. 2019. https://www.rcgp.org.uk/representing-you/policy-areas/transgender-care (accessed 03/03/2023).
3. General Medical Council. Your rights as lesbian, gay, bi and trans patients. 2021. https://www.gmc-uk.org/ethical-guidance/patient-guides-and-materials/lgbt-patient-guide (accessed 04/10/2023).
4. Stonewall. LGBT in Britain—trans report. 2017. https://www.stonewall.org.uk/lgbt-britain-trans-report (accessed 05/07/2022).
5. House of Commons Women and Equalities Committee. Transgender equality. First report of session 2015–16. 2016. https://publications.parliament.uk/pa/cm201516/cmselect/cmwomeq/390/390.pdf (accessed 04/03/2023).
6. Office for National Statistics. First census estimates on gender identity and sexual orientation. 2021. https://www.ons.gov.uk/news/news/firstcensusestimatesongenderidentityandsexualorientation (accessed 24/03/2023).
7. Coleman E, Bouman W, Brown G, et al. Standards of care for the health of transgender and gender diverse people, version 8. *Int J Transgender Health* 2022; **23**: S1–S259. https://doi.org/10.1080/26895269.2022.2100644.
8. NHS. Gender dysphoria. https://www.nhs.uk/conditions/gender-dysphoria (accessed 13/10/2023).
9. Bultynck C, Cosyns M, T'Sjoen G, van Borsel J, Bonte K. Thyroplasty type III to lower the vocal pitch in trans men. *Otolaryngol Head Neck Surg* 2021; **164**: 157–9. https://doi.org/10.1177/0194599820937675.
10. Kocak I, Dogan M, Tadihan E, Alkan Cakir Z, Bengisu S, Akpinar M. Window anterior commissure relaxation laryngoplasty in the management of high-pitched voice disorders. *Arch*

Otolaryngol Head Neck Surg 2008; **134**: 1263–9. https://doi.org/10.1001/archotol.134.12.1263.
11. Kim HT. Vocal feminization for transgender women: current strategies and patient perspectives. *Int J Gen Med* 2020; **13**: 43–52. https://doi.org/10.2147/IJGM.S205102.
12. Flower L, Kamarrudin K, Lennie Y, Edwardson S. The perioperative management of transgender patients: a knowledge gap we can no longer ignore. *Br J Hosp Med* 2022; **83**: 1–6. https://doi.org/10.12968/hmed.2022.0338.
13. Flower L, Cheung A, Connal S, Humphreys A, Kamaruddin K, Lennie Y, Edwardson S. Management of transgender patients in critical care. *J Intensive Care Soc* 2022; **24**: 320–7. https://doi.org/10.1177/17511437221145102.
14. Lennie Y, Leareng K, Evered L. Perioperative considerations for transgender women undergoing routine surgery: a narrative review. *Br J Anaesth* 2020; **124**: 702–11. https://doi.org/10.1016/j.bja.2020.01.024.
15. Webb H, Free N, Oates J, Paddle P. The use of vocal fold injection augmentation in a transmasculine patient unsatisfied with voice following testosterone therapy and voice training. *J Voice* 2022; **36**: 588.e1–588.e6. https://doi.org/10.1016/j.jvoice.2020.08.011.
16. Orloff LA, Mann AP, Damrose JF, Goldman SN. Laser-assisted voice adjustment (LAVA) in transsexuals. *Laryngoscope* 2006; **116**: 655–60. https://doi.org/10.1097/01.mlg.0000205198.65797.59.
17. Difficult Airway Society. Guidelines. https://das.uk.com/guidelines (accessed 04/10/2023).
18. Peitzmeier S, Gardner I, Weinand J, Corbet A, Acevedo K. Health impact of chest binding among transgender adults: a community-engaged, cross-sectional study. *Cult Health Sex* 2017; **19**: 64–75. https://doi.org/10.1080/13691058.2016.1191675.
19. Cheung AS, Wynne K, Erasmus J, Murray S, Zajac JD. Position statement on the hormonal management of adult transgender and gender diverse individuals. *Med J Aust* 2019; **211**: 127–33. https://doi.org/10.5694/mja2.50259.
20. Nolan BJ, Zwickl S, Locke P, Zajac JD, Cheung AS. Early access to testosterone therapy in transgender and gender-diverse adults seeking masculinization: a randomized clinical trial. *JAMA Netw Open* 2023; **6**: e2331919. https://doi.org/10.1001/jamanetworkopen.2023.31919.
21. van Leerdam TR, Zajac JD, Cheung AS. The effect of gender-affirming hormones on gender dysphoria, quality of life, and psychological functioning in transgender individuals: a systematic review. *Transgender Health* 2023; **8**: 6–21. https://doi.org/10.1089/trgh.2020.0094.
22. Foster Skewis L, Bretherton I, Leemaqz SY, Zajac JD, Cheung AS. Short-term effects of gender-affirming hormone therapy on dysphoria and quality of life in transgender individuals: a prospective controlled study. *Front Endocrinol* 2021; **12**: 717766. https://doi.org/10.3389/fendo.2021.717766.
23. Cheung AS, Leemaqz SY, Wong JWP, et al. Non-binary and binary gender identity in Australian trans and gender diverse individuals. *Arch Sex Behav* 2020; **49**: 2673–81. https://doi.org/10.1007/s10508-020-01689-9.
24. Schagen SE, Cohen-Kettenis PT, Delemarre-van de Waal HA, et al. Efficacy and safety of gonadotropin-releasing hormone agonist treatment to suppress puberty in gender dysphoric adolescents. *J Sex Med* 2016; **13**: 1125–32. https://doi.org/10.1016/j.jsxm.2016.05.004.
25. Turban JL, King D, Carswell JM, Keuroghlian AS. Pubertal suppression for transgender youth and risk of suicidal ideation. *Pediatrics* 2020; **145**: e20191725. https://doi.org/10.1542/peds.2019-1725.
26. Rew L, Young CC, Monge M, Bogucka R. Review: puberty blockers for transgender and gender diverse youth-a critical review of the literature. *Child Adolesc Mental Health* 2021; **26**: 3–14. https://doi.org/10.1111/camh.12437.
27. Vlot MC, Wiepjes CM, de Jongh RT, T'Sjoen G, Heijboer AC, den Heijer M. Gender-affirming hormone treatment decreases bone turnover in transwomen and older transmen. *J Bone Miner Res* 2019; **34**: 1862–72. https://doi.org/10.1002/jbmr.3762.
28. Willemsen LA, Boogers LS, Wiepjes CM, Klink DT, van Trotsenburg ASP, den Heijer M, Hannema SE. Just as tall on testosterone; a neutral to positive effect on adult height of GnRHa and testosterone in trans boys. *J Clin Endocrinol Metab* 2023; **108**: 414–21. https://doi.org/10.1210/clinem/dgac571.
29. Boogers LS, Wiepjes CM, Klink DT, Hellinga I, van Trotsenburg ASP, den Heijer M, Hannema SE. Transgender girls grow tall: adult height is unaffected by GnRH analogue and estradiol treatment. *J Clin Endocrinol Metab* 2022; **107**: e3805–15. https://doi.org/10.1210/clinem/dgac349.
30. Hembree WC, Cohen-Kettenis PT, Gooren L, et al. Endocrine treatment of gender-dysphoric/gender-incongruent persons: an Endocrine Society clinical practice guideline. *J Clin Endocrinol Metab* 2017; **102**: 3869–903. https://doi.org/10.1210/jc.2017-01658.
31. Defreyne J, Vantomme B, Van Caenegem E, et al. Prospective evaluation of hematocrit in gender-affirming hormone treatment: results from European network for the investigation of gender incongruence. *Andrology* 2018; **6**: 446–54. https://doi.org/10.1111/andr.12485.
32. Nota NM, Wiepjes CM, de Blok CJM, Gooren LJG, Kreukels BPC, den Heijer M. Occurrence of acute cardiovascular events in transgender individuals receiving hormone therapy. *Circulation* 2019; **139**: 1461–2. https://doi.org/10.1161/CIRCULATIONAHA.118.038584.
33. Nolan BJ, Leemaqz SY, Ooi O, et al. Prevalence of polycythaemia with different formulations of testosterone therapy in transmasculine individuals. *Intern Med J* 2021; **51**: 873–8. https://doi.org/10.1111/imj.14839.
34. Tang GT, Zwickl S, Sinclair R, Zajac JD, Cheung AS. The effect of gender-affirming hormone therapy on hair growth: a systematic review of the literature. *Clin Exp Dermatol* 2023; **48**: 1117–27. https://doi.org/10.1093/ced/llad203.
35. Zwickl S, Burchill L, Wong AFQ, et al. Pelvic pain in transgender people using testosterone therapy. *LGBT Health* 2023; **10**: 179–90. https://doi.org/10.1089/lgbt.2022.0187.
36. Cocchetti C, Castellini G, Maggi M, et al. Effects of hormonal treatment on dermatological outcome in transgender people: a multicentric prospective study (ENIGI). *J Endocrinol Investig* 2023; **46**: 779–86. https://doi.org/10.1007/s40618-022-01944-x.
37. Shepherd R, Bretherton I, Pang K, et al. Gender-affirming hormone therapy induces specific DNA methylation changes in blood. *Clin Epigenetics* 2022; **14**: 24. https://doi.org/10.1186/s13148-022-01236-4.
38. McFarlane T, Zajac JD, Cheung AS. Gender-affirming hormone therapy and the risk of sex hormone-dependent tumours in transgender individuals—a systematic review. *Clin Endocrinol* 2018; **89**: 700–11. https://doi.org/10.1111/cen.13835.
39. Angus L, Leemaqz S, Ooi O, et al. Cyproterone acetate or spironolactone in lowering testosterone concentrations for transgender individuals receiving oestradiol therapy. *Endocr Connect* 2019; **8**: 935–40. https://doi.org/10.1530/EC-19-0272.
40. Angus LM, Nolan BJ, Zajac JD, Cheung AS. A systematic review of anti-androgens and feminisation in transgender women. *Clin Endocrinol* 2021; **94**: 743–52. https://doi.org/10.1111/cen.14329.
41. Nolan BJ, Cheung AS. Relationship between serum estradiol concentrations and clinical outcomes in transgender individuals undergoing feminizing hormone therapy: a

narrative review. *Transgender Health* 2021; **6**: 125–31. https://doi.org/10.1089/trgh.2020.0077.
42. Getahun D, Nash R, Flanders WD, et al. Cross-sex hormones and acute cardiovascular events in transgender persons: a cohort study. *Ann Intern Med* 2018; **169**: 205–13. https://doi.org/10.7326/M17-2785.
43. Bretherton I, Ghasem-Zadeh A, Leemaqz SY, et al. Bone microarchitecture in transgender adults: a cross-sectional study. *J Bone Miner Res* 2022; **37**: 643–8. https://doi.org/10.1002/jbmr.4497.
44. Wiepjes CM, de Blok CJ, Staphorsius AS, et al. Fracture risk in trans women and trans men using long-term gender-affirming hormonal treatment: a Nationwide cohort study. *J Bone Miner Res* 2020; **35**: 64–70. https://doi.org/10.1002/jbmr.3862.
45. Boskey ER, Taghinia AH, Ganor O. Association of surgical risk with exogenous hormone use in transgender patients: a systematic review. *JAMA Surg* 2019; **154**: 159–69. https://doi.org/10.1001/jamasurg.2018.4598.
46. Haveles CS, Wang MM, Arjun A, Zaila KE, Lee JC. Effect of cross-sex hormone therapy on venous thromboembolism risk in male-to-female gender-affirming surgery. *Ann Plast Surg* 2021; **86**: 109–14. https://doi.org/10.1097/SAP.0000000000002300.
47. Nolan BJ, Cheung AS. Estradiol therapy in the perioperative period: implications for transgender people undergoing feminizing hormone therapy. *Yale J Biol Med* 2020; **93**: 539–48.
48. Kozato A, Fox GWC, Yong PC, et al. No venous thromboembolism increase among transgender female patients remaining on estrogen for gender-affirming surgery. *J Clin Endocrinol Metab* 2021; **106**: e1586–90. https://doi.org/10.1210/clinem/dgaa966.
49. Arrington-Sanders R, Connell NT, Coon D, et al. Assessing and addressing the risk of venous thromboembolism across the Spectrum of gender affirming care: a review. *Endocr Pract* 2022; **29**: 272–8. https://doi.org/10.1016/j.eprac.2022.12.008.
50. Caceres BA, Jackman K, Edmondson DA, Bockting W. Assessing gender identity differences in cardiovascular disease in US adults: an analysis of data from the 2014–2017 BRFSS. *J Behav Med* 2020; **43**: 329–38. https://doi.org/10.1007/s10865-019-00102-8.
51. Alzahrani T, Nguyen T, Ryan A, et al. Cardiovascular disease risk factors and myocardial infarction in the transgender population. *Circ Cardiovasc Qual Outcomes* 2019; **12**: e005597. https://doi.org/10.1161/CIRCOUTCOMES.119.005597.
52. Asscheman H, T'Sjoen G, Lemaire A, et al. Venous thromboembolism as a complication of cross-sex hormone treatment of male-to-female transsexual subjects: a review. *Andrologia* 2014; **46**: 791–5. https://doi.org/10.1111/and.12150.
53. NHS England. Sustainable improvement team: The change model guide. 2018. https://www.england.nhs.uk/wp-content/uploads/2018/04/change-model-guide-v5.pdf (accessed 04/10/2023).
54. Berner AM, Connolly D, Pinnell I, et al. Attitudes of transgender men and non-binary people to cervical screening: a cross-sectional mixed-methods study in the UK. *Br J Gen Pract* 2021; **71**: 614–25. https://doi.org/10.3399/BJGP.2020.0905.
55. Kamaruddin K. We must improve cancer screening for trans and nonbinary people. 2019. https://www.pulsetoday.co.uk/views/uncategorised/we-must-improve-cancer-screening-for-trans-and-non-binary-people (accessed 04/10/2023).
56. James SE, Herman JL, Rankin S, Keisling M, Mottet L, Anafi M. *The report of the 2015 transgender survey*. Washington, DC: National Center for Transgender Equality, 2016 https://transequality.org/sites/default/files/docs/usts/USTS-Full-Report-Dec17.pdf (accessed 04/10/2023).
57. LGBT Foundation. Improving trans and non binary experiences of maternity services report. 2020. https://lgbt.foundation/news/revealed-improving-trans-and-non-binary-experiences-of-maternity-services-items-report/475 (accessed 04/10/2023).
58. Light AD, Obedin-Maliver J, Sevelius JM, Kerns JL. Transgender men who experienced pregnancy after female-to-male gender transitioning. *Obstet Gynecol* 2014; **124**: 1120–7. https://doi.org/10.1097/AOG.0000000000000540.
59. Stroumsa D, Roberts EFS, Kinnear H, Harris LH. The power and limits of classification—a 32-year-old man with abdominal pain. *N Engl J Med* 2019; **380**: 1885–8. https://doi.org/10.1056/NEJMp1811491.
60. Hoffkling A, Obedin-Maliver J, Sevelius J. From erasure to opportunity: a qualitative study of the experiences of transgender men around pregnancy and recommendations for providers. *BMC Pregnancy Childb* 2017; **17**: 332. https://doi.org/10.1186/s12884-017-1491-5.
61. Care Quality Commission. Adult trans care pathway: What CQC expects from maternity and gynaecology services. 2022. https://www.cqc.org.uk/guidance-providers/healthcare/adult-trans-care-pathway-what-cqc-expects-maternity-gynaecology-0 (accessed 04/10/2023).
62. Warrier V, Greenberg DM, Weir E, et al. Elevated rates of autism, other neurodevelopmental and psychiatric diagnoses, and autistic traits in transgender and gender-diverse individuals. *Nat Commun* 2020; **11**: 3959. https://doi.org/10.1038/s41467-020-17794-1.
63. Cheng PJ, Pastuszak AW, Myers JB, Goodwin IA, Hotaling JM. Fertility concerns of the transgender patient. *Transl Androl Urol* 2019; **8**: 209–18. https://doi.org/10.21037/tau.2019.05.09.
64. Moravek MB, Kinnear HM, George J, Batchelor J, Shikanov A, Padmanabhan V, Randolph JF. Impact of exogenous testosterone on reproduction in transgender men. *Endocrinology* 2020; **161**: bqaa014. https://doi.org/10.1210/endocr/bqaa014.

Supporting Information

Additional supporting information may be found online via the journal website.

Appendix S1. Examples of suggested questions and explanations as part of pre-operative assessment screening questionnaire for those who have already identified as transgender and gender diverse.