Hormone, Medical Management and Pre-Surgery Preparation

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Key words:

Gender-affirming hormone therapy (GAHT); Gender-affirming bilateral orchiectomy; Fertility preservation; Hormone-induced infertility; Cryopreservation; Cancer screening; Cancer risk; Biopsychosocial model.

Key Points:

- *Gender-affirming hormone therapy decreases gender dysphoria and is often a prerequisite for genital gender-affirming surgery*
- *Bilateral orchiectomy has several key medical benefits for the transitioning patient and does not adversely affect future gender-affirming vaginoplasty surgery*
- *Trans-masculine and trans-feminine patients have fertility preservation options and these should be discussed prior to treatments that affect fertility*
- *Cancer screening is an important part of primary medical care for transgender patients*
- *What stage of gender transition a patient is in at any given time can adversely affect whether the patient receives appropriate and timely cancer screening throughout their life*

1. Medical treatment: gender affirming hormone therapy

Gender-affirming hormone therapy (GAHT) is therapeutic during gender transition in two important ways. First and foremost, for most transgender individuals estrogen or testosterone helps to decrease gender dysphoria and dysphoria-related anxiety.[1,2,3] Second, GAHT helps promote desired secondary sex characteristics (for transmasculine patients , deepening of voice, male-pattern facial and body hair growth; for transfeminine patients, breast growth and feminizing skin changes) and helps to reduce some (not all) undesired secondary sex-characteristics (e.g. for transfeminine patients, ongoing facial hair growth, erection frequency and rigidity with arousal). These effects are variable.

Before commencing GAHT patients should be counseled about the likely effect of decreased fertility and should be offered sperm or oocyte-banking.[4] Patients should be counselled on possible effects on libido (transfeminine patients have reported decreased libido with feminizing GAHT: transmasculine patients more often report an increase in libido with testosterone therapy).[5]

GAHT is typically managed by a primary care provider or an endocrinologist with specialized training in GAHT. Dosage is adjusted primarily to reduce and control gender dysphoria and not necessarily to maximize desired physical effects, which can require unsafely-high dosages (especially for transfeminine individuals).[1,2]

1.1 Feminizing hormone therapy

Estrogens are often administered in combination with an anti-androgen (e.g. Spironolactone) or a 5-alpha

reductase inhibitor such as Finasteride or Dutasteride, which results in a more pronounced feminizing effects. Gender-transition related effects: Estrogens may soften the skin, redistribute body fat to a more feminine pattern, and decrease facial hair growth).[2,6]

Therapeutic target: A commonly used therapeutic target for transfeminine patients is to decrease testosterone to range of (30-100ng/dl) without supratherapeutic levels of estradiol (<200 pg/ml) by administering estrogen.[2,6]

Formulations and side-effects (**Table 1**): Various estrogen formulations and delivery methods exist, including oral, injectable, sublingual, and transdermal preparations. Estrogen hormone therapy and can cause cardiovascular and hepatic adverse effects, and, venous thromboembolism (VTE). Many formulations available vary in their degree of hepatic and cardiovascular adverse effects. [2,6] Sublingual and transdermal formulations, which avoid “first-pass” metabolism by the liver, are associated with lower (but not zero) hepatotoxicity. [7] Use of anti-androgens medications with known diuretic properties can result patients reporting irritative voiding symptoms like frequency and urgency.[8] A positive side-effect for feminizing hormone therapy on the urinary tract for transfeminine individuals is that it appears to reduce age-related prostate hypertrophy.[9]

Monitoring considerations: Laboratory analyses (CBC, CMP, total Testosterone, Estadiol and sex-hormone binding globulin) are checked quarterly during the first year of treatment, and then every 6 months, and eventually every 1 year thereafter. [2,6] For patients at risk for Osteoporosis, a Bone Mineral Density (BMD) screening should be performed commencing hormone therapy.[7] Screening for Osteoporosis can otherwise start at age 60, or earlier if sex hormone levels during routine lab tests remain consistently low.

In general, to minimize adverse health effects the lowest effective dosage is recommended. Patients should be counseled about the added VTE and cardiovascular risks from smoking or self-administering higher estrogen dosages. [7] Some patients obtain feminizing hormones outside of the supervision of a healthcare provider (e.g. internet, other patients), and so should be asked about non-prescribed hormone medications they may be taking.

Hormone therapy effects of bilateral orchiectomy

Bilateral orchiectomy should always be offered to patients on feminizing hormone therapy (together with discussion of the attendant risks and benefits), as orchiectomy affords several important benefits:[5]

1. Orchiectomy allows patients to immediately discontinue anti-androgens and 5-a reductase inhibitors, which can be associated with bothersome side effects (urinary frequency and sexual dysfunction, respectively);
2. Orchiectomy typically affords an ~50-75% decrease in estrogen dosage,[1] which is associated with lower cardio-vascular disease risk
3. Orchiectomy significantly reduces systemic testosterone levels, and by doing so reduces the masculinizing effects of endogenous testosterone production;
4. Orchiectomy makes “tucking” (the practice of pulling the tip of the penis as far posteriorly as possible to minimize its visibility, including through clothing) much easier and less uncomfortable.

If performed correctly, bilateral orchiectomy poses no adverse consequences to future vaginoplasty, even when future surgery that will utilize scrotal skin to line the vaginal canal.

To maintain scrotal tissue for potential future vaginoplasty, we recommend performing via a single 2-2.5 cm. midline incision through the superior aspect of the scrotum (just below the peno-scrotal junction).[1,10] (**Figure 1**)

Figure 1

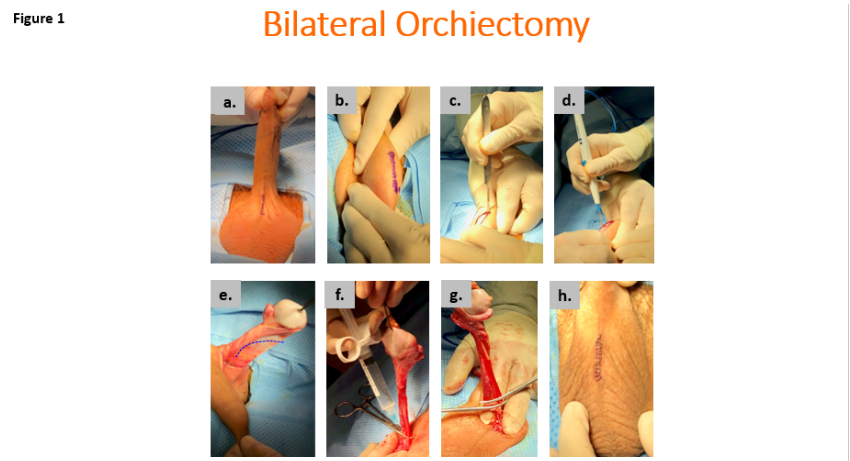


Figure 1. Outpatient bilateral orchiectomy as a stand-alone procedure

A. The patient is positioned supine. The penis is stretched gently, perpendicular to the long axis of the body, to identify the peno-scrotal junction. The penoscrotal junction is shaved and a 2-2.5 cm planned incision is marked at midline immediately posterior to the peno-scrotal junction. B. The testicle from one or the other side is pushed into the inked incision line continuously as 15-blade scalpel incises the skin (C). After the skin is incised, with the testicle still being squeezed into the incision, Bovie electrocautery is applied in a feathery long swipe, to cut through all tissue layers between the skin and the surface of the testicle (D). E. The testicle is delivered through the skin incision, and placed to gentle traction. The adipose tissue pedicle on the ventral aspect of the cord is preserved by electrocautery dissection (blue hatched line). F. A Peon clamp is applied across the cord ~2 cm distal to the external inguinal ring and analgesic (5% Marcaine) is injected proximal to the clamp. G. Two 1-0 Vicryl suture ligatures are placed proximal to the clamp. A second Peon is placed immediately distal to the first, and the cord is transected with a scalpel. This process is repeated such that both testicles and spermatic cords are removed in the same way through the same incision. H. We place only two interrupted figure-of-eight sutures (5-0 Vicryl) to reapproximate deeper tissues, and then a running-locking 5-0 Vicryl suture to close the skin

1.2 Masculinizing hormone therapy

Gender transition related effects: GAHT typically includes only testosterone. Testosterone typically has pronounced visible masculinizing effects. These are more visibly pronounced than, for example, the feminizing effects of feminizing hormone therapy. While results vary across patients, a deepened voice, male-pattern scalp hair-loss, body hair, and adipose tissue distribution, subtle male facial features, and

irreversible clitoral hypertrophy are all common changes transmasculine patients can see. It may also result in increased or decreased uterine bleeding. Approximately 2 years of therapy with testosterone are often required to achieve maximal visible change.[2,6,10]

Therapeutic target: A commonly used therapeutic target for transmasculine individuals is to maintain serum testosterone levels within a range physiological for cisgender men (300-1000 ng/dl).

Formulations and side-effects (**Table 1**)[1,2,6]: Testosterone can be injected intramuscularly, administered via transdermal patch or gel, or as dissolvable pellets placed into gluteal subdermal adipose tissue. While testosterone is not associated with the cardiovascular and hepatic adverse effects associated with estrogens, it can result in polycythemia, for which patients should be monitored. Testosterone does not appear to affect urinary function.

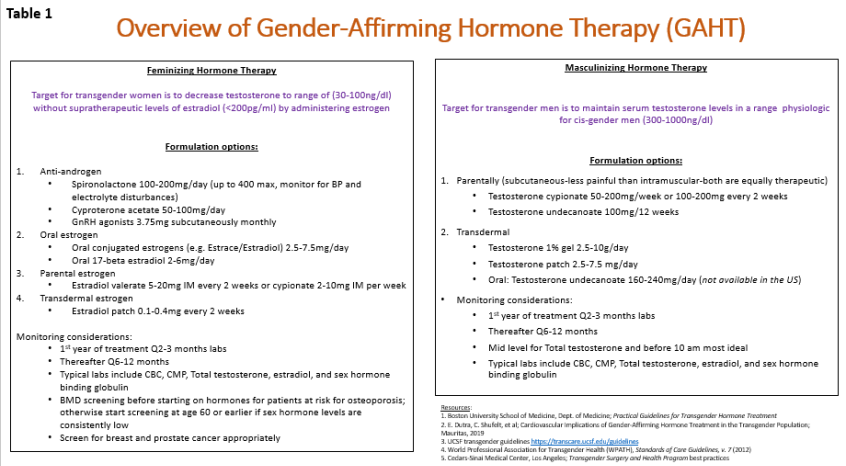


Table 1

Overview of Gender-Affirming Hormone Therapy (GAHT)

Feminizing Hormone Therapy

Target for transgender women is to decrease testosterone to range of (30-100ng/dl) without supratherapeutic levels of estradiol (<200pg/ml) by administering estrogen

Formulation options:

1. Anti-androgen
   - Spironolactone 100-200mg/day (up to 400 max, monitor for BP and electrolyte disturbances)
   - Cyproterone acetate 50-100mg/day
   - GnRH agonists 3.75mg subcutaneously monthly
2. Oral estrogen
   - Oral conjugated estrogens (e.g. Estrace/Estradiol) 2.5-7.5mg/day
   - Oral 17-beta estradiol 2-6mg/day
3. Parental estrogen
   - Estradiol valerate 5-20mg IM every 2 weeks or cypionate 2-10mg IM per week
4. Transdermal estrogen
   - Estradiol patch 0.1-0.4mg every 2 weeks

Monitoring considerations:
- 1st year of treatment Q2-3 months labs
- Thereafter Q6-12 months
- Typical labs include CBC, CMP, Total testosterone, estradiol, and sex hormone binding globulin
- BMD screening before starting on hormones for patients at risk for osteoporosis; otherwise start screening at age 60 or earlier if sex hormone levels are consistently low
- Screen for breast and prostate cancer appropriately

Masculinizing Hormone Therapy

Target for transgender men is to maintain serum testosterone levels in a range physiologic for cis-gender men (300-1000ng/dl)

Formulation options:

1. Parentally (subcutaneous-less painful than intramuscular-both are equally therapeutic)
   - Testosterone cypionate 50-200mg/week or 100-200mg every 2 weeks
   - Testosterone undecanoate 100mg/12 weeks
2. Transdermal
   - Testosterone 1% gel 2.5-10g/day
   - Testosterone patch 2.5-7.5 mg/day
   - Oral: Testosterone undecanoate 160-240mg/day (*not available in the US*)

- Monitoring considerations:
  - 1st year of treatment Q2-3 months labs
  - Thereafter Q6-12 months
  - Mid level for Total testosterone and before 10 am most ideal
  - Typical labs include CBC, CMP, Total testosterone, estradiol, and sex hormone binding globulin

Resources:
1. Boston University School of Medicine, Dept. of Medicine; *Practical Guidelines for Transgender Hormone Treatment*
2. E. Dutra, C. Shufelt, et al; Cardiovascular implications of Gender-Affirming Hormone Treatment in the Transgender Population; Mauritas, 2019
3. UCSF transgender guidelines https://transcare.ucsf.edu/guidelines
4. World Professional Association for Transgender Health (WPATH); *Standards of Care Guidelines, v. 7* (2012)
5. Cedars-Sinai Medical Center, Los Angeles; *Transgender Surgery and Health Program* best practices

Table 1: Overview of Gender Affirming Hormone Therapy (GAHT)

2. Fertility preservation challenges and options for transgender and gender diverse people

Gender-affirming medical and surgical treatments affect the reproductive potential of transgender individuals. A patient's fertility preservation (FP) options depend on where they are in their transition. For all transgender individuals, fertility options can currently be categorized into three different groups: 1. Options available *before* initiation of gender-affirming hormone therapy (TT), 2. Options available *after* initiation of GAHT, and 3. Experimental options, which can be done concurrently with genital gender-affirming surgery.[4]

While the FP options for pre-pubertal and early adolescent patients are experimental at this time, and there is no published data concerning viability of a patient's native gametes following long-term GAHT use, they should get the same consideration as adults. In addition to counseling about their fertility preservation options, patients should be advised prospectively about the requirements, process details, total costs associated with achieving pregnancy, and inherent risks associated with using preserved genetic material including risk of failure, and maternal and fetal health risks.

Transfeminine individuals who started their transition after going through their natal pubescence, can provide a semen sample to be used with assistive reproductive techniques before or after initiation of GAHT. It has been shown that semen sample quality is better if the patient is not on GAHT.[11,12,13,14] However, cessation of GAHT is not necessary for the successful oocyte fertilization, embryologic development, and delivery of a healthy newborn. Pregnancy requirements and cost will depend on the reproductive capabilities of the patient's

partner. Experimental techniques, which are not currently clinically available, involve testicular cryopreservation followed by in vitro initiation of spermatogenesis to produce the sperm to be used in assistive reproductive techniques. These techniques would avoid the need for any interruptions in GAHT.

These options are presented in **Table 2**.

Table 2: Fertility preservation options for transfeminine patients

Patient population	Method	Patient requirements	Pregnancy requirements	Cost
Post pubertal transfeminine patients BEFORE or AFTER initiation of GAH	Sperm Cryopresevation	Established technique. Masturbatory or surgical retrieval options GAH should be stopped prior to specimen retrieval but is not necessary	**Partner without functioning ovaries and uterus**: needs donor oocyte and surrogate **Partner with functioning ovaries and uterus**: IUI or IVF/ICSI	Sperm banking - $2500 + $150-$400 annual fee IUI - $500-$2500 + consultation fee IVF - $12000-$14000 per attempt ICSI and embryo implantation - $18,000 Egg donation and Surrogacy ~$40,000 IVM - cost unknown
Pre and post pubertal transfeminine patients at any point in their transition	Testicular Tissue Cryopreservation	Experimental not clinically available no need to stop GAH Can be done concurrently with gender affirmation surgery	**Partner without functioning ovaries and uterus**: IVM then donor oocyte and surrogate **Partner with functioning ovaries and uterus** : IVM then IUI or IVF/ICSI	

See Reference 5

Trans men can naturally conceive and carry a fetus to term, or can purse any assisted reproductive techniques available for cis women before and after starting hormone therapy.[15,16] There are no studies that describe the recovery of menstruation after long term GAHT, or, how prepubertal suppression and concurrent GAHT affect fertility. Cryopreservation of both oocytes and embryos is a clinically established FP method in cisgender women but has several additional considerations for transgender men. In addition to needing to stop GAHT for an undetermined amount of time, trans men considering assisted reproductive technology (ART) must also be made aware that they will need to undergo the following during preparation for and completion of pregnancy: routine transvaginal ultrasound examinations, ovarian stimulation with exogenous administration of female hormones, and an invasive transvaginal procedure to harvest the oocyte and to assess embryo or uterine health. Some or all of these procedures can be very distressing to transmasculine individuals. [16,17] These options are presented in **Table 3**.

Table 3: Fertility preservation options for transmasculine patients

Patient population	Method	Patient requirements	Pregnancy requirements	Cost
Post-pubertal transmasculine patients before and after initiation of GAHT	Embryo Cryopreservation	Established practice. Need to stop GAHT and undergo controlled ovarian stimulation with transvaginal oocyte retrieval. Need donor sperm at time of harvest.	**Partner with viable sperm**: can use partner's sperm for fertilization. Need surrogate to carry embryo to term **Partner without viable sperm**: sperm donor for fertilization, transplantion of embryo into partner's uterus	Egg freezing: $8000-$12000 + $500 annual fee IVF and embryo transfer: $12000-$14000 Surrogacy fees: ~$30,000
Post-pubertal transmasculine patients before and after initiation of GAH	Oocyte Cryopreservation	Established practice. Need to stop GAHT and undergo controlled ovarian stimulation with transvaginal oocyte retrieval.	**Partner with viable sperm**: use partner's sperm for fertilization. Need surrogate to carry embryo to term. **Partner without viable sperm**:	Egg freezing: $8000-$12000 + $500 annual fee IVF and embryo transfer: $12000-$14000 Surrogacy fees: ~$30,000

			sperm donor for fertilization, transplation of embryo into partner's uterus	
Pre- and post-pubertal transmasculine individuals at any point in their transition	Ovarian Tissue Cryopresevation	Experimental, not clinically available. No need to stop GAHT. Can be done concurrently with gender-affirmation surgery.	**Partner with viable sperm**: IVM, use partner's sperm for fertilization. Need surrogate to carry embryo to term **Partner without viable sperm**: IVM, sperm donor for fertilization, transplation of embryo into partner's uterus	Egg freezing: $8000-$12000 + $500 annual fee IVF and embryo transfer: $12000-$14000 Surrogacy fees: ~$30,000 IVM: cost unknown
See Reference 5				

Transgender individuals have the option for fertility preservation at any point in their transition, including tissue preservation at time of orchiectomy or oophorectomy. Banking of gametes does not guarantee access to or success of future IVF treatments; success depends on the technique used and the quality of the specimen from both parties. Medically assisted reproduction is considered to be safe but is not without maternal and fetal health risks. [18,19,20] The increased use of ART in transgender patients raises the need for adaptive healthcare strategies *before fertilization, during pregnancy, and after birth*.

3. Cancer screening and medical care

Widespread cancer screening among the public at large has resulted in decreased cancer mortality over the past fifty years. Screening has resulted in a 13% reduction in mortality from colorectal cancer and a 14% cancer specific mortality in lung cancer.[21,22] Mortality rates of breast and cervical cancer have both decreased following widespread adoption of screening mammograms and pap smears.[23,24] PSA screening does reduce prostate cancer mortality but is also associated with false-positive test results and overtreatment.[25,26] The American Cancer Society (ACS), the US Preventative Services Task Force (USPSTF) and numerous professional organizations (ACS, AMA, AUA, ACOG) have clear recommendations for the early detection of cancer in average-risk and high-risk cisgender patients.

These guidelines become less straight forward when applied to the transgender community. Currently, the World Profession Association of Transgender Health (WPATH) has no guidelines on cancer screening- though the soon to be released Standards of Care (target release 2021) will address at least some cancer screening related issues for transgender people.

It is important to consider that transgender patients' cancer screening needs will vary by *what stage of their transition* they are in. This is because different interventions related to gender transition will affect cancer risk differently. For example, initiation of gender-affirming hormone therapy (GAHT), non-genital gender affirming surgery (GAS), genital GAS, and surgical removal of some or all of their reproductive organs will each affect the risk of different cancers, differently. The current WPATH Standards of care version 7 states "In the absence of large-scale prospective studies, providers are unlikely to have enough evidence to determine the appropriate type and frequency of screening…Patients may find cancer screening gender affirming, or both physically and emotionally painful". [1] Large databases in the United States, like the Surveillance, Epidemiology and End Result (SEER) and the National Cancer Database (NCDB), do not capture non-binary genders, thus it is difficult to postulate if the cancer risk of transgender individuals is different from the general population. A UK study found gay and bisexual men had increased odds of a cancer diagnosis compared to heterosexual males; although main driver of this difference was the higher rates of viral-related cancers: Kaposi's sarcoma, anal cancer, and penile cancer. [27] Studies in the US have attempted to look at cancer rates in areas with a high population of LGBT individuals to extrapolate any associated cancer risk,[28,29] but the results of these studies often varied significantly and no firm conclusions could be drawn from them. The differences in cancer rates seen in the LGBT community is often attributed to high risk behaviors: smoking, alcohol and drug use, obesity, and significantly higher HIV rates.[30,31,32] The CDC reported that in 2013 1.9% of HIV tests done by transgender individuals were positive, compared to 0.9% for cisgender males and 0.2% for cisgender females.[33] The estimated prevalence of HIV among transgender women of reproductive age (15-49) is 21.7% (95% confidence interval 18.4-25.1), which is 34 times higher than cisgender adults in the same age range.[34]

Transgender patients often face discrimination and are stigmatized in ways that decrease healthcare screening encounters. Transgender individuals have reported difficulties when interfacing with the US healthcare system: 19% have reported refusal of care, 28% reported harassment, and 50% were turned off of

the healthcare system due to a lack of gender-nonconforming providers. [35,36,37] Clinicians also may fail to provide the appropriate screening and counseling based on the patient's anatomy. This includes PSA checks and prostate exams for anyone that still has a prostate and Pap smears for patients that still have a cervix, [38] regardless of what gender they identify with.

Additionally, many transgender patients only seek medical care as a part of gender affirmation and may avoid primary health care concerns. In those patients that do seek routine healthcare checkups they are reluctant to bring up gender incongruous organs. Hence, transgender patients may be more reliant on their health care providers to initiate cancer screening discussions than cisgender patients.

Sterling *et al*[4] performed a systematic search of PubMed, Google Scholar, and Medline, to query the literature for guidelines data related to cancer screening among transgender people, and, where evidence-based data was lacking, draw from cisgender patient screening guidelines to suggest best-practice screening approaches for transgender patients. These data are presented in **Table 4** and **Table 5**.

If we accept that *what stage of gender transition* an individual is in can affect their risk for different cancers in different ways (e.g. internal hormone milieu, whether someone is pre- or post-gender surgery, whether one has or has had removal of their reproductive organs), then, it is easier to see how an individual's stage of transition also affects what medical care they receive. For example, a patient's appearance in a care provider's office as a "man" or a "woman" heavily influences what specialists they are referred to, what exams are (and are not) ordered for them, what questions a doctor is more (or less) likely to ask, and, possibly, what quality of medical care they receive. The inconguence between the gender suggested by a person's outward appearance and the sex of their genes may facilitate cancer or other illnesses being detected later in their course and at more advanced stages. [39]

A proposed model for transgender care

In their work, Sterling et al propose a new model for transgender healthcare, which is rooted in the Biopsychosocial Model first proposed by George L. Engel and Jon Romano in 1977. Engel and Romano's model focuses on the development of illness from the complex interactions across and within biological, psychological and social systems (**Figure 2**).[40,41] Engel emphasized that the biomedical approach is flawed because the body is not the only contributor to illness, or wellness.[41,42] Instead, an individual's own psychological (mood, personality, behavior, etc.) and social (cultural, familial, socioeconomic, etc.) domains also significantly impact underlying biological (genetic, biochemical, etc.) factors, to determine how illness and health are caused and treated. [40] Engel also emphasized the need for two-way dialogue between the patient and doctor in order to find the most effective treatments.[41]

The proposed model for healthcare of the transgender and gender non-conforming individuals accounts for the complex interplay between the individual's gender transition, biological and social systems. (**Figure 3**)

In the context of cancer screening, this model reminds us that cancer risk at any given time is influenced by the multiple levels of organization that Engel describes in the biopsychosocial model,[43] and, other factors. (**Figure 4**) For example, the age at which an individual commenced transition with use of GAHT, and what stages of transition they have completed (**Figure 4**, column a.), influence factors in column b., which are predictors of cancer screening needs and cancer risk (column c.)

When we consider transgender health from the perspective of the model shown in **Figure 2**, three key points become clear: First, that gender transition constitutes different changes for different people (i.e. it is highly individual); Second, patients can be in different states of transition across different domains at any given time; and Third, an individual's present state of gender transition *independently* influences- and is influenced by, each of the concentric levels of organization within the biological, psychological and social continua.

Table 4 Cancer Screening among transwomen

	Cancer Site	Population	Recommendation
Transwomen	Colon	All patients over 50	Annual guaiac-based fecal occult blood test colonoscopy every 10 years
	Lung	Patients 55-75 w/ 30 pack year history	dDscuss routine screening with physician
	Breast	Transwomen who have started gender affirming hormone therapy (GAH)	Follow cis-female guidelines -age 40-44 patients should have the option to undergone mammogram screening, - age 45-55 patients should undergo annual mammogram, - after age 55 patients should have the option for biennial mammograms as long as they are in good health
	Prostate	All patients with a prostate	Follow cis-male guidelines [1ng/ml should be the upper limit of normal in patients on GAH] -age 40-50 patients with family history or other high risk feature should undergo annual PSA screening, - age 50-75 patients should undergo annual PSA check, - after age 75 patients screening is an option if life expectancy >10 years
	Testicles	All patients with testicles	Annual physical examination for testicular masses
	Vagina	All patients with a neovagina	Annual post operative physical exam (speculum and digital exam), cytology testing every 3 years starting at 21
	Anus	Patients over 21 with multiple lifetime sexual partners	Annual anal pap smear
	**HPV vaccination is recommended for all transgender individuals through age 26		

Sterling, J. et al; Cancer screening in the transgender population: a review of current guidelines, best practices and a proposed care model; Translational Andrology and Urology; (Accepted for Publication August 2020)

Table 4: Cancer screening among transfeminine individuals

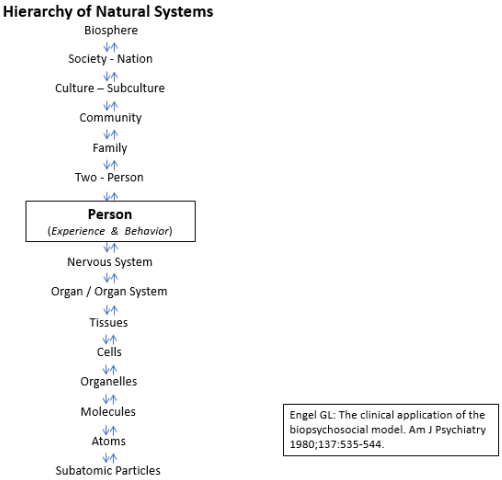
Table 5 Cancer Screening among transmen

	Cancer Site	Population	Recommendation
Transmen	Colon	All patients over 50	Annual guaiac-based fecal occult blood test colonoscopy every 10 years
	Lung	Patients 55-75 w/ 30 pack year history	Discuss routine screening with physician
	Breast	Patients after bilateral mastectomy	Currently no recommendations for this population
		Patients prior to bilateral mastectomy OR after breast reduction	Follow cis-female guidelines -age 40-44 patients should have the option to undergo mammogram screening; -age 45-55 patients should undergo annual mammogram; -after age 55 patients should have the option for biennial mammograms as long as they are in good health
	Cervix	All patients that still have a cervix over 21	Annual pap smear
	Ovary	All patients that still have ovaries	No recommended screening. Prophylactic oopherectomy **NOT** recommended
	Uterus	All patients that still have a uterus	Screening and prophylactic hysterectomy are **NOT** recommended Patients with a uterus should report any abnormal vaginal bleeding or discharge to a physician Patients should undergo endometrial evaluation as a part of pre-operative testing for genital gender affirmation surgery
	Prostate	N/A	
	Anus	Men who have sex with men	No set guidelines but this is an area of active research with the ANCHOR trial Patients should discuss screening options (anal pap smear and anoscopy) with their physician
	**HPV vaccination is recommended for all transgender individuals through age 26		

Sterling, J. et al; Cancer screening in the transgender population: a review of current guidelines, best practices and a proposed care model; Translational Andrology and Urology; (Accepted for Publication August 2020)

Table 5: Cancer screening among transmasculine individuals

Figure 2



Engel GL: The clinical application of the biopsychosocial model. Am J Psychiatry 1980;137:535-544.

Figure 2: Hierarchy of Natural Systems; From Engel GL: *The clinical application of the biopsychosocial model. Am J Psychiatry*1980;137:535-544

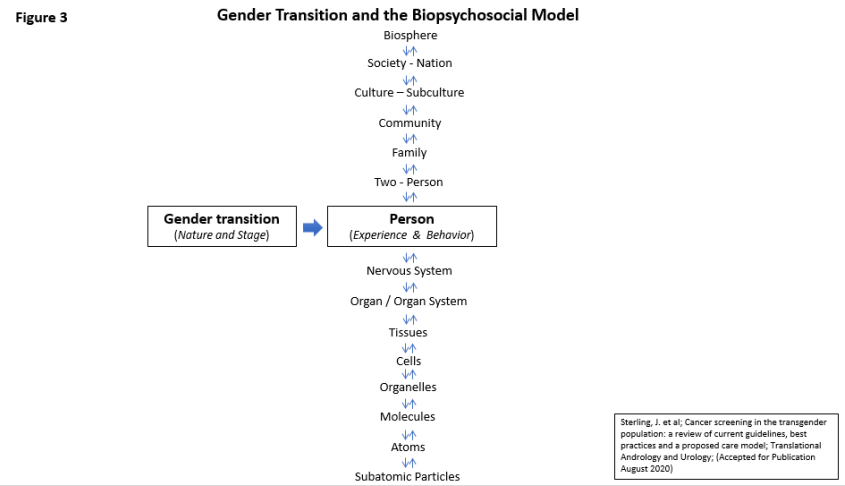


Figure 3: Gender Transition and the Biopsychosocial Model

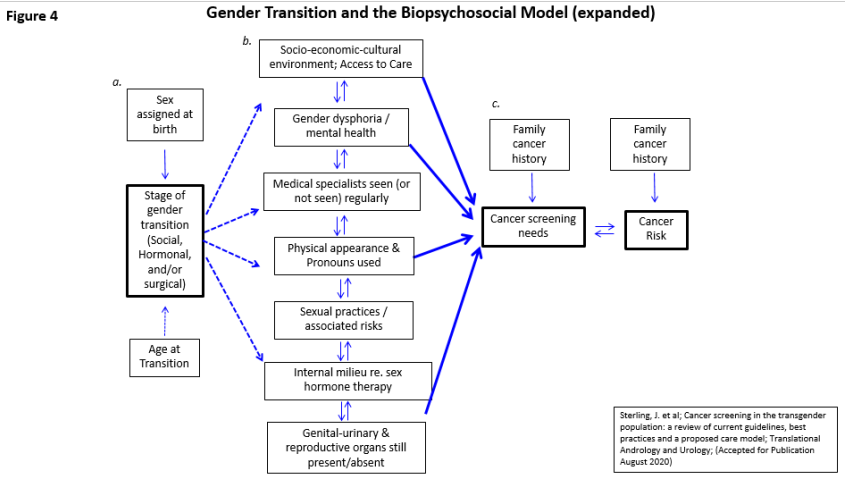


Figure 4: Gender Transition and the Biopsychosocial Model (expanded)

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