



REVIEW

Dermatologic Care of Hair in Transgender Patients: A Systematic Review of Literature

Catherine C. Motosko · Antonella Tosti

Received: May 12, 2021 / Accepted: June 25, 2021 / Published online: July 7, 2021
© The Author(s) 2021

ABSTRACT

Transgender patients on masculinizing and feminizing hormonal therapy undergo myriad physical and psychologic changes. Dermatologists are uniquely qualified to guide patients in the gender-affirming process, especially as it relates to hair. Given the paucity of literature guiding dermatologists in this process, a systematic review was performed to better understand the physiologic changes of hair in patients on masculinizing and feminizing hormonal therapy as well as the variety of treatment options that exist to help transgender patients to attain their desired hair growth pattern. This review reports findings and treatment options supported by the performed literature review as well as treatment recommendations based on the authors' own experiences treating this unique patient population.

Keywords: Hair; Transgender; Hormones; Growth

C. C. Motosko · A. Tosti (✉)
Dr. Phillip Frost Department of Dermatology and Cutaneous Surgery, University of Miami School of Medicine, Miami, FL, USA
e-mail: atosti@med.miami.edu

Key Summary Points

Why carry out this study?

There is a paucity of literature on caring for hair in transgender individuals

This study summarizes current literature to provide dermatologists with current evidence regarding hair changes in transgender patients on hormonal therapy and the various treatments that can utilized to improve their hair

What was learned from this study?

Transgender men and women undergo numerous hair changes, both desired and undesired

Dermatologists can utilize numerous tools in their armamentarium that can help patients to improve their hair growth and help remove unwanted hair

INTRODUCTION

Characterized by distinct colors, textures, and styles, hair is intrinsically linked to personality and identity. For transgender and gender non-conforming patients, the appearance of hair is

critical to refining society's perception in their affirmed gender; this, in turn, affords them a greater sense of confidence and safety.

The transgender population includes those with an array of identities in which the gender identity and/or expression differs from the sex the person was assigned at birth. Other patients may identify as non-binary or genderqueer, describing a gender identity and/or expression that falls outside the typical binary categories of male and female [1]. For the purposes of this article, the term transgender women refers to those assigned male at birth but who identify on the female end of the gender spectrum; transgender men refers to those assigned female at birth but who identify on the male end of the spectrum.

Gender dysphoria—the distress that arises from the incongruity between the gender that was assigned to an individual at birth and the gender with which the individual identifies and expresses—has various treatment options, which depend on the individual patient's goals. Hormonal therapy, gender-affirming procedures, and surgery can improve the alignment of patients' physical characteristics with the gender that they choose to express.

Despite the myriad therapeutic options available to transgender patients, individual interventions may fall short of achieving the desired effect on their hair, especially regarding masculinizing or feminizing hormonal therapy. Hormonal therapy alters hair growth; however, supplemental treatments are frequently required to achieve the hair growth patterns that patients desire.

As altering patterns of hair growth continue to play an integral part in the affirmation of gender in patients with gender dysphoria, the relevance of dermatologic techniques must be emphasized. These interventions can be incorporated into masculinizing and feminizing therapy and may be increasingly important as the barriers to healthcare faced by transgender patients are recognized and addressed [2]. Therefore, this systematic review of current literature serves to characterize hair sequelae in response to the gender-affirming process and guide dermatologists in caring for the hair of their transgender patients. Given the relative

paucity of literature on the topic, information derived from the systematic review was supplemented with the authors' own experience and recommendations.

METHODS

The report was written in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statements [3]. In April 2021, a comprehensive search of EMBASE, MEDLINE, Cochrane Central Register of Controlled Trials, and Cochrane Database of Systematic Reviews from each database's inception through April 21, 2021, was carried out. Search terms included “transgender” and “hair.” Titles and abstracts were reviewed, and if deemed eligible, full-text articles were assessed. Articles were eligible for inclusion if they included data relating to hair changes or treatment in transgender individuals. Exclusion criteria included abstracts and review articles. No date or language restrictions were applied. The titles and abstracts of all articles were initially screened for potential inclusion. The full text was assessed if the title and abstract did not include enough information for exclusion and inclusion criteria to be applied. The full text of the remaining articles was then evaluated for inclusion.

This article is based on previously conducted studies and does not contain any new studies with human participants or animals performed by any of the authors.

RESULTS

The database search identified 246 studies (149 from EMBASE, 78 from MEDLINE, 9 from Cochrane Central Register of Controlled Trials, and 0 from Cochrane Database of Systematic Reviews) (Fig. 1). Sixty-one duplicates were removed. Titles and abstracts of the remaining 185 articles were reviewed, resulting in the exclusion of 107 studies (47 abstracts and 60 review articles). The remaining 78 articles were reviewed in their entirety, resulting in the exclusion of an additional 42 studies that did

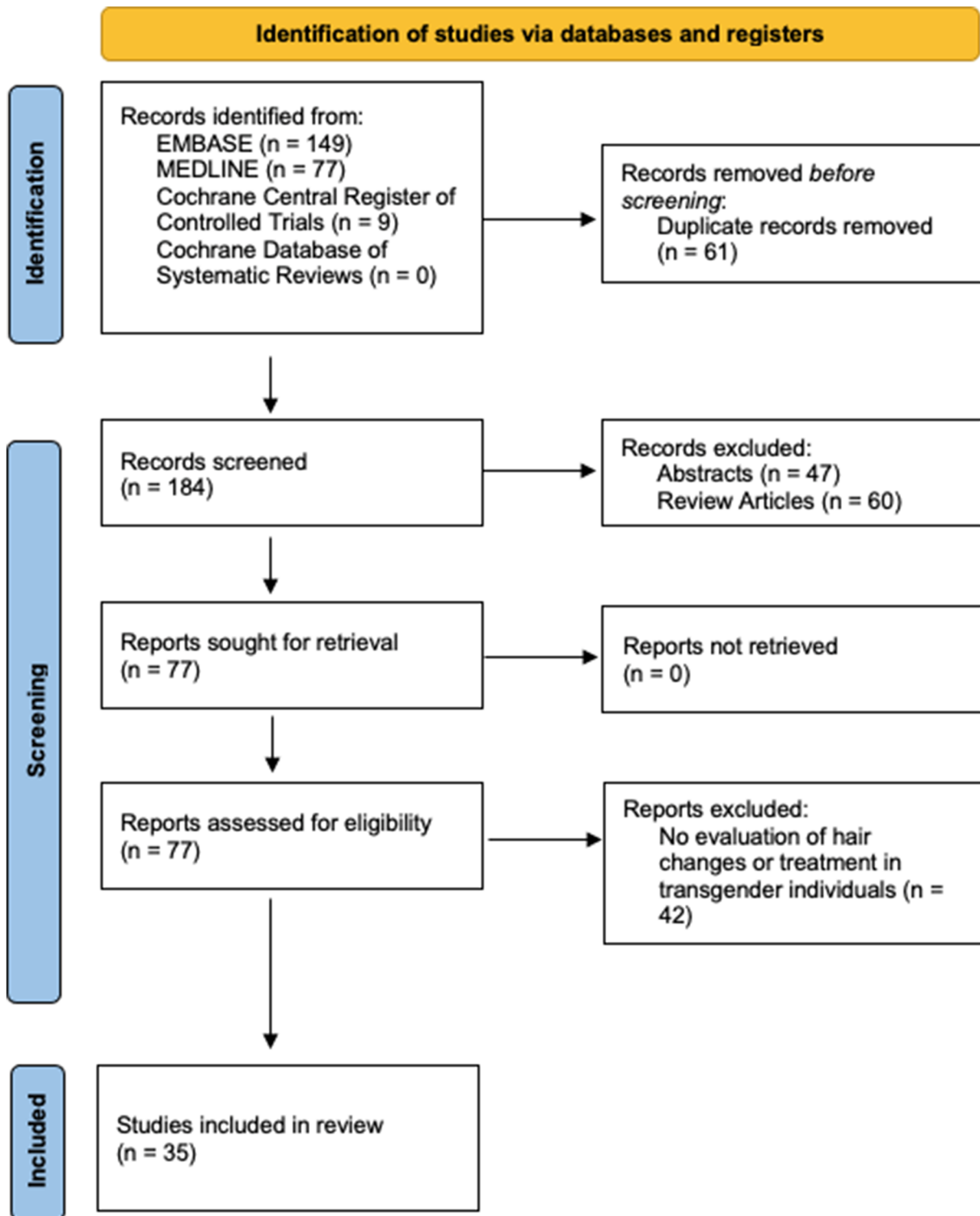


Fig. 1 Search methodology and results

not evaluate hair changes or treatment in transgender individuals. Thirty-five studies met the inclusion criteria [2, 4–37]. Broadly, 14 evaluated hair changes of patients on masculinizing and feminizing hormonal therapy [7, 9, 17–19, 21, 22, 26, 31–36], 4 articles related to insurance coverage of gender-affirming procedures [2, 12, 15, 20], 6 assessed patient's quality of life and/or mental wellbeing [16, 23–25, 28, 29], 6 articles discussed hair treatments [6, 11, 13, 14, 27, 37], 3 assessed patient demand for minimally invasive gender-affirming procedures [8, 10, 30], and 2 assessed patient/physician understanding of gender-affirming procedures [4, 5]. Table 1 summarizes the study findings.

DISCUSSION

Effects of Hormonal Therapy on Hair

The individual's goals of masculinizing and feminizing hormonal therapy vary widely. Some patients strive for maximal expression of feminine or masculine features; others seek a more androgynous presentation through minimizing preexisting masculine or feminine features. Most physical changes occur within 2 years of initiating hormone therapy, but the degree of changes and the time over which they occur is highly variable, depending on the dose, route, and type of medications used. Currently, there is no evidence to suggest that any method of treatment is more effective than another in producing desired physical changes; therefore, current guidelines suggest treatment be made in accordance with each patient's specific goals and medical risk profile [38].

Feminizing Hormonal Therapy

A combination of estrogens and antiandrogens such as spironolactone and cyproterone are used to emphasize feminine features and minimize masculine features. Typically, estrogen has a greater effect on body hair than facial hair, though facial hair is reported to decrease in 28% [18] of adults and 71.4% of adolescents. Over

the first year of feminizing hormonal therapy, the Ferrimen and Gallway (F&G) scores evaluating body hair growth decrease, even though patients typically continue to score above 7—the score considered indicative of hirsutism [36]. Hair diameter shows marked decrease during the initial 4 months of therapy before stabilizing [36]. Neither growth rate, nor density, nor diameter falls to the values typical of *cis*-gendered females with hormonal therapy alone [36].

When initiating feminizing hormonal therapy, transgender women with preexisting androgenic alopecia may experience varying degrees of hair regrowth. However, hormonal therapy alone has only been rarely reported to induce significant regrowth. Aduvula et al. [34] reported a case of a transgender woman with a history of androgenic alopecia, who had almost full regrowth of scalp hair after 6 months of starting estradiol 30 mg/60 ml twice daily and aldactone 100 mg daily. Stevenson et al. [31] report a transgender woman on estradiol 5 mg daily and spironolactone 150 mg daily who experienced both scalp hair regrowth as well as thickening of preexisting hair after 6 months of treatment. Other studies have reported little effect of feminizing hormonal therapy on scalp hair loss [17].

Masculinizing Hormonal Therapy

Masculinizing hormone therapy commonly relies on testosterone to inhibit estrogen and exert robust masculinizing effects. Testosterone has a significant effect on both facial hair growth and body hair growth, which has been reported in 53–100% and 34–100% of patients, respectively [9, 21, 35]. Increased facial hair growth can be noted within 1–6 months [7]. Within 1 year of initiating testosterone therapy, F&G scores increase by 6–21 points [22, 33, 36]. Upwards of 80% of patients treated with testosterone therapy achieve a score > 8, typically within the first 4 months [5]. Despite this, even after years of therapy, patients are unlikely to reach F&G scores typical of *cis*-gendered males, which Motosko et al. reported to be 10.5 (median; IQR, 7.25–12) [22, 33, 36]. Long-term

Table 1 Summary of study findings

| References | Summary of hair related findings |
|--|--|
| <i>Studies reporting demand for treatments</i> | |
| Downing et al. [10] | Dermatologists provided hair removal services at a higher rate to transgender women who had not received gender-affirming surgery compared with those who had received gender-affirming surgery |
| Ginsberg et al. [30] | Among people who reported having gender-affirming facial procedures done, the most common procedure was laser hair removal. Almost all transgender men experienced changes in facial hair |
| Vilenchik et al. [8] | 89% ($n = 43$) received laser hair removal to the face/neck; 11% ($n = 5$) received laser hair removal to the genital/groin area before gender-affirming surgery. Patients completed an average of 7 treatments, most of which was performed with the long-pulsed alexandrite (755 nm) laser. Average reduction of hair growth was 66%. 77% of patients rated their outcome as ‘much better’ or ‘very much better’ |
| <i>Education</i> | |
| Buhalog et al. [5] | Among participating programs, only dermatology programs offered trainees experience in laser hair removal in transgender patients. Dermatology also offered training in neuromodulation and soft tissue augmentation |
| Sabra et al. [4] | The most commonly reported gap in knowledge among transgender patients included: “laser hair reduction requires maintenance treatment,” “laser hair reduction can only reduce hair with pigmentate,” and “it is possible to perform laser hair removal on all skin tones” |
| <i>Studies documenting hair changes</i> | |
| Adenuga et al. [34] | A 38-year-old transgender woman experienced full hair regrowth over a completely alopecic scalp after initiating feminizing hormonal therapy |
| Giltay et al. [36] | Hair growth and sebum production decreased after FHT; facial hair continued. MHT increased hair growth rate and sebum production |
| Imhof et al. [19] | MHT was associated with increased risk of androgenic alopecia, which was diagnosed an average of 12.8 years after initiating therapy |
| Jain et al. [18] | 28% ($n = 11$) reported decreased facial hair after FHT |
| Kirisawa et al. [9] | After 2 years on MHT, facial hair growth was observed in 53% ($n = 45$) and body hair growth in 38% ($n = 32$) |
| Marks et al. [17] | MHT significantly worsened self-reported Hamilton-Norwood and Sinclair scores. FHT had no significant effect |
| Motosko et al. [22] | Transgender men on MHT had significantly higher Ferriman-Gallwey scores (median, 5; $n = 90$) than cisgender women and transgender men not on MHT; scores did not reach those of cisgender men (median, 10.5; $n = 30$) |
| Mueller et al. [35] | MHT induced body hair growth and beard hair growth, necessitating shaving in 68.9% ($n = 31$) of patients |
| Nakamura et al. [7] | After 1 month of MHT, increased facial hair was noted in 22% of patients taking testosterone 250 mg every 2 weeks, 13% taking 250 mg every 3 weeks, and 12% taking 125 mg every 2 weeks |

Table 1 continued

| References | Summary of hair related findings |
|--|---|
| Stevenson et al. [31] | A 33-year-old transgender woman experienced scalp hair regrowth and thickening of existing hair after starting feminizing hormonal therapy |
| Stoffers et al. [21] | Hair on extremities increased in all subjects after 1 year on MHT. Facial hair was present in all subjects by 15 months. 79% had some abdominal/chest hair, but not all had abdominal hair by 2 years |
| Tack et al. [26] | 56% ($n = 15$) of adolescents reported decrease facial shaving frequency while on cyproterone acetate monotherapy; 71% ($n = 15$) reported decreased shaving need on cyproterone acetate and 17 β -estradiol combination therapy |
| Wierckx et al. [33] | MHT increased facial hair, body hair, and prevalence of androgenetic alopecia. The effects of FHT could not be evaluated as nearly all patients underwent laser epilation |
| Wierckx et al. [32] | MHT increased facial and body hair growth to a median Ferriman-Gallwey score of 12 after 1 year. 5% ($n = 1$) developed androgenetic alopecia within the first year on MHT |
| <i>Studies reporting hair treatments</i> | |
| Capitán et al. [27] | Authors describe 65 transgender women who underwent forehead reconstruction and simultaneous hair transplantation |
| Cho et al. [6] | Authors describe a transgender woman who underwent frontal bone reshaping, brow lift, and frontolateral hairline lowering |
| Garcia-Rodriguez et al. [14] | Authors describe 29 transgender women who underwent hairline advancement |
| Marks et al. [13] | 85% of transgender woman had hair for which they desired hair removal. There was no significant difference in excess hair among those taking MHT and those not on MHT. The face was the most commonly reported site of excess hair |
| Moreno-Arrones [37] | In 10 transgender men treated with oral finasteride 1 mg daily, all improved one grade on the Norwood-Hamilton scale after an average of 5.5 months |
| Pigot et al. [11] | Preoperative laser hair removal decreases hair growth in the neourethra |
| <i>Studies reporting insurance coverage of hair treatments</i> | |
| Almazan et al. [12] | 50% of insurance policies covered hair removal in states prohibiting gender exclusions and 30.8% covered hair removal in states without prohibitions |
| Ngaage et al. [15] | 16% ($n = 10$) of insurers provided some form of coverage for hair restoration or removal procedures. Hair transplantation and facial hair removal were equally covered |
| Pelozza et al. [20] | 40% ($n = 36$) of insurance carriers covered preoperative hair removal; 12% ($n = 11$) covered facial hair removal when medical necessity criteria were met |
| Thoreson et al. [2] | 26% ($n = 45$) of health insurances covered hair removal preoperatively for genital surgery; 5% ($n = 8$) provided hair removal without explicit restrictions. Private insurances had higher odds of hair removal coverage over Medicaid policies |
| <i>Studies reporting quality of life</i> | |

Table 1 continued

| References | Summary of hair related findings |
|--------------------------|---|
| Bradford et al. [23] | Hair removal among transgender women was associated with decreased distress and increased subjective well-being |
| Butler et al. [24] | Transgender women who completed hair removal treatments had less social anxiety than those who not |
| Fisher et al. [28] | Among transgender women, higher Ferriman-Gallwey scores were significantly associated with higher levels of gender dysphoria; among transgender men, higher Ferriman-Gallwey scores were associated with lower levels of gender dysphoria |
| Ristori et al. [16] | Sexual distress was positively correlated with Ferriman-Gallwey score in transgender women and negatively correlated in transgender men |
| Testa et al. [25] | Patients who completed hair removal procedures experienced more body satisfaction than those who were planning to complete the procedure |
| van de Grift et al. [29] | Transgender men and women reported that they were greatly dissatisfied with hair growth |

MHT masculinizing hormonal therapy, *FHT* feminizing hormonal therapy

treatment with testosterone results in scores ranging from 6 to 34 (median, 24), a finding independent of duration or type of testosterone therapy [32]. Over the first year after initiating testosterone therapy, hair growth rate, density, and diameter all increase progressively, but only hair diameter has been observed to reach values similar to *cis*-gendered males [36].

Masculinizing hormone therapy is associated with an increased risk of androgenic alopecia, which is often an undesirable side effect [17, 19]. This has been seen in up to 45% of patients [17, 19]. The risk of developing androgenic alopecia is likely dependent on patient age and genetic predisposition and less likely related to the duration or type of testosterone therapy [32]; it has been seen within 1–44 years of initiating testosterone therapy [19]. Treatment with 5- α -reductase inhibitors might prevent or reverse this side effect. Finasteride and dutasteride, 5- α -reductase inhibitors, may be uniquely valuable in treating hair loss in this population, as they decrease dihydrotestosterone—the primary androgen involved in the pathogenesis of androgenetic alopecia—without decreasing testosterone levels [39].

DERMATOLOGIC INTERVENTIONS

One study by van de Grift et al. [29] showed that transgender men and women are greatly dissatisfied with their hair. Dermatologists are likely the most qualified to treat these patients and ultimately relieve some of the burden of gender dysphoria [5]. Numerous studies have shown a significant correlation with the amount and density of hair growth with more symptoms of gender dysphoria in transgender woman and less in transgender men [16, 23–25, 28, 29]. However, obtaining these procedures can be financially difficult, as only 16–40% insurances provide some degree of coverage for these procedures, most of which only permit coverage preoperatively for gender-affirming surgery [2, 12, 15, 20]. For those that wish to undergo these procedures, patients should be fully educated on treatment expectations, as many are unaware that procedures such as laser hair removal require multiple treatments [4]. Table 2 summarizes treatment recommendations.

Table 2 Summary of treatment recommendations

| | Patients on masculinizing therapy | Patients on feminizing therapy |
|---------------------------------------|-----------------------------------|--------------------------------|
| Treatments to facilitate hair growth | Finasteride and dutasteride | Topical minoxidil 5% |
| | Topical minoxidil 5% | Oral minoxidil (0.25 mg) |
| | Oral minoxidil (1.25–5 mg) | Hair transplantation |
| | Hair transplantation | Hairline lowering surgery |
| Treatments to facilitate hair removal | Photoepilation | Photoepilation |
| | Electrolysis | Electrolysis |
| | Shaving | Shaving |
| | Depilatory creams | Depilatory creams |
| | Tweezing, waxing, threading | Tweezing, waxing, threading |
| | Eflornithine 12.9% cream | Eflornithine 12.9% cream |

Hair Growth

Anti-androgenic treatments of androgenic alopecia such as spironolactone, flutamide, bicalutamide, and cyproterone acetate should be prescribed with caution in transgender men on masculinizing therapy. Finasteride and dutasteride, 5- α -reductase inhibitors, may provide additional benefit. One study treated transgender men with androgenetic alopecia with oral finasteride 1 mg daily, and all patients improved one grade on the NH scale after an average of 5.5 months [37].

Other treatment options that are not anti-androgenic may have high clinical utility in this patient population. Topical 5% minoxidil does not interact with patients' hormonal therapy and can be effectively utilized for improving hair density in the scalp and beard. Oral minoxidil is also an excellent option in these patients as it increases both scalp and body hair. Although there are no specific studies on oral minoxidil in this population, doses ranging from 1.25 to 5 mg can be considered [40]. From our personal experience on use of oral minoxidil, we recommend to start with 1.25 mg at night to be increased to 2.5 mg after 3 months if well tolerated.

Patients on feminizing hormonal therapy may also benefit from topical and oral

minoxidil. However, doses should be much lower because of the risk of hypertrichosis. This possible side effect should be discussed in detail in this population as risks might exceed benefit. Frequency of hypertrichosis is dose dependent, with a reported prevalence < 10% with doses of 0.25 mg daily [40]. Therefore, we recommend treatment with 0.25 mg at night and follow-up every 3 months.

Hair transplantation techniques have been employed to masculinize and feminize patients' hairlines, eyebrows, beards, chests, and pubic areas. Hair transplantation may be performed in concert with other facial feminization surgeries such as frontal bone reshaping, brow lifting, or hairline lowering [6, 14, 27].

Lastly, patients should be counseled on various nonmedical approaches to achieve ideal hair coverage. Areas of hair thinning may be camouflaged using tinted powders, fiber sprays, and creams or by careful hair coloring, styling, and tattooing. Wigs, hair pieces, and hair extensions can offer additional methods of coverage for areas of hair thinning.

Hair Removal

Hair removal may be desired for numerous reasons, and dermatologists should be aware of

the various treatment options to help guide the patient in choosing the best treatment option. Photoepilation therapies such as laser or intense pulsed non-coherent light reduce and thin hair, promising semi-permanent results. Electrolysis has a higher rate of permanent hair reduction, but results tend to be variable and operator dependent. It requires treatment of individual hairs, requiring a substantial amount of time. Hair may be temporarily removed by using over-the-counter methods, such as shaving, depilatory creams, mechanical removal via tweezers, wax, and threading. Eflornithine 12.9% cream can slow facial growth, but its use is limited by costs and continuous twice daily application that is required for the effect to be sustained. All methods of epilation are unlikely to be affected by hormonal therapy; however, there is a theoretical risk of hyperpigmentation in patients taking estrogen that may be relevant with abrasive hair removal techniques [41].

The face is reported to be the highest priority among many transgender women regarding all gender-affirming procedures, higher than the chest or genitals [30]. The face is the most commonly reported site of excess hair in transgender women [13]. One study in the UK found 89% of transgender woman receiving laser hair removal had the procedure performed on the face and neck; 11% received treatment to the genital and groin area before gender-affirming surgery [8]. Another study found laser hair removal to be the most common facial procedure among transgender women [30]. Dermatologists most often perform laser hair removal services on transgender women who have not received gender-affirming surgery [10]. Nonetheless, dermatologists should be aware of the general process of gender-affirming bottom surgery as their role may greatly contribute to the process.

In patients undergoing vaginoplasty or phalloplasty, the skin harvested to construct the neovaginal cavity or neourethra respectively may require preoperative epilation. Consulting the treating surgeon is required to determine which areas will be harvested. Typically, the penile shaft or scrotum is used to line the vaginal cavity, and the radial forearm or anterolateral thigh is used to construct the

neourethra. Removal of hair from skin grafted to construct the neophallus can be delayed until after surgery, but areas harvested for the neovagina and neourethra likely require hair removal prior to surgery to prevent postoperative intravaginal or intraurethral hair growth [11]. Postoperative hair within the vagina can be removed via manual plucking with forceps or use of depilatory creams. Whether electrolysis or laser hair removal is performed, surgery should be delayed until 3 months after the last hair removal treatment to ensure hair is permanently removed.

CONCLUSION

Increased hair growth with masculinizing therapy and decreased hair growth with feminizing therapy is well described. The best treatments for these patients and the role dermatologists can play in the gender-affirming process are still being established. Understanding the unique medical needs of the transgender population is increasingly important, especially as improved societal acceptance allows transgender men and women to live more easily in accordance with their affirmed gender identity and expression. Guidelines on caring for transgender patients can help dermatologists to fill in gaps in their knowledge [38]. Despite the existence of guidelines, dermatologists should be open in admitting inexperience with this patient population; respectful inquiry on medications and procedures with which physicians are unfamiliar is generally appreciated.

To be inclusive of the range of gender identities, intake forms should include write-in options on the patient's chosen name, gender, and pronouns to incorporate the range of gender identities. Physicians and staff should incorporate the patient's pronouns in every aspect of the practice, from phone calls to physician notes. Creating an inclusive environment for all gender identities is essential to improving transgender populations' access to medical care and sets the foundation for an open physician-patient relationship.

ACKNOWLEDGEMENTS

Funding. No Rapid Service Fee was received by the journal for the publication of this article.

Authorship. All named authors meet the International Committee of Medical Journal Editors (ICMJE) criteria for authorship for this article, take responsibility for the integrity of the work as a whole, and have given their approval for this version to be published.

Authors' Contributions. Catherine Motosko contributed to the concept/design, systematic review process, and writing of this manuscript. Antonella Tosti contributed to the concept/design and writing of this manuscript.

Disclosures. Catherine Motosko and Antonella Tosti have nothing to disclose.

Data Availability. Data sharing is not applicable to this article as no datasets were generated or analyzed during the current study.

Compliance with Ethics Guideline. This article is based on previously conducted studies and does not contain any new studies with human participants or animals performed by any of the authors.

Open Access. This article is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License, which permits any non-commercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence,

visit <http://creativecommons.org/licenses/by-nc/4.0/>.

REFERENCES

1. Poudrier G, Nolan IT, Cook TE, et al. Assessing quality of life and patient-reported satisfaction with masculinizing top surgery: a mixed-methods descriptive survey study. *Plast Reconstr Surg.* 2019;143(1):272–9.
2. Thoreson N, Marks DH, Peebles JK, King DS, Dommasch E. health insurance coverage of permanent hair removal in transgender and gender-minority patients. *JAMA Dermatol.* 2020;156(5):561–5.
3. Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ.* 2021;372:n71.
4. Sabra JJ, Fang CX, Kundu RV. A knowledge-based assessment of dermatological care for transgender women. *Transgend Health.* 2018;3(1):71–3.
5. Buhalog B, Peebles JK, Mansh M, et al. Trainee exposure and education for minimally invasive gender-affirming procedures. *Dermatol Clin.* 2020;38(2):277–83.
6. Cho SW, Jin HR. Feminization of the forehead in a transgender: frontal sinus reshaping combined with brow lift and hairline lowering. *Aesthetic Plast Surg.* 2012;36(5):1207–10.
7. Nakamura A, Watanabe M, Sugimoto M, et al. Dose-response analysis of testosterone replacement therapy in patients with female to male gender identity disorder. *Endocr J.* 2013;60(3):275–81.
8. Vilenchik V, Thomas K, Baker L, Hitchens E, Keith D. Laser therapy is a safe and effective treatment for unwanted hair in adults undergoing male to female sex reassignment. *Clin Exp Dermatol.* 2021;46(3):541–3.
9. Kirisawa T, Ichihara K, Sakai Y, Morooka D, Iyoki T, Masumori N. Physical and psychological effects of gender-affirming hormonal treatment using intramuscular testosterone enanthate in Japanese transgender men. *Sex Med.* 2021;9(2):100306.
10. Downing JM, Yee K, Dy G. Hair removal for patients undergoing feminizing surgeries in oregon's Medicaid program. *JAMA Dermatol.* 2021;157(3):346–8.
11. Pigot GLS, Belboukhaddaoui S, Bouman MB, et al. Effectiveness of preoperative depilation of the urethral donor site for phalloplasty: neourethral hair

- growth and its effects on voiding. *Eur Urol Focus*. 2020;6(4):770–5.
12. Almazan AN, Benson TA, Boskey ER, Ganor O. Associations between transgender exclusion prohibitions and insurance coverage of gender-affirming surgery. *LGBT Health*. 2020;7(5):254–63.
 13. Marks DH, Hagigeorges D, Manatis-Lornell AJ, Dommasch E, Senna MM. Excess hair, hair removal methods, and barriers to care in gender minority patients: A survey study. *J Cosmet Dermatol*. 2020;19(6):1494–8.
 14. Garcia-Rodriguez L, Thain LM, Spiegel JH. Scalp advancement for transgender women: Closing the gap. *Laryngoscope*. 2020;130(6):1431–5.
 15. Ngaage LM, McGlone KL, Xue S, et al. Gender surgery beyond chest and genitals: current insurance landscape. *Aesth Surg J*. 2020;40(4):NP202–10.
 16. Ristori J, Cocchetti C, Castellini G, et al. Hormonal treatment effect on sexual distress in transgender persons: 2-year follow-up data. *J Sex Med*. 2020;17(1):142–51.
 17. Marks DH, Hagigeorges D, Manatis-Lornell AJ, Dommasch E, Senna MM. Hair loss among transgender and gender-nonbinary patients: a cross-sectional study. *Br J Dermatol*. 2019;181(5):1082–3.
 18. Jain J, Kwan D, Forcier M. Medroxyprogesterone acetate in gender-affirming therapy for transwomen: results from a retrospective study. *J Clin Endocrinol Metab*. 2019;104(11):5148–56.
 19. Imhof R, Miest R, Davidge-Pitts C, Nippoldt T, Tollefson M. Dermatological disorders in transgender patients. *J Amer Acad Dermatol*. 2019;81(4):AB44.
 20. Pelozo K, Kahn B, Yeung H. Insurance coverage for hair removal therapies for the care of transgender patients. *J Amer Acad Dermatol*. 2019;81(4):AB83.
 21. Stoffers IE, de Vries MC, Hannema SE. Physical changes, laboratory parameters, and bone mineral density during testosterone treatment in adolescents with gender dysphoria. *J Sex Med*. 2019;16(9):1459–68.
 22. Motosko CC, Zakhem GA, Pomeranz MK, et al. Effect of testosterone on chests and abdomens of transgender men. *J Am Acad Dermatol*. 2019;81(2):634–6.
 23. Bradford NJ, Rider NG, Spencer KG. Hair removal and psychological well-being in transfeminine adults: associations with gender dysphoria and gender euphoria. *J Dermatol Treat*. 2019. <https://doi.org/10.1080/09546634.2019.1687823>.
 24. Butler RM, Horenstein A, Gitlin M, et al. Social anxiety among transgender and gender nonconforming individuals: The role of gender-affirming medical interventions. *J Abnorm Psychol*. 2019;128(1):25–31.
 25. Testa RJ, Rider GN, Haug NA, Balsam KF. Gender confirming medical interventions and eating disorder symptoms among transgender individuals. *Health Psychol*. 2017;36(10):927–36.
 26. Tack LJW, Heyse R, Craen M, et al. Consecutive cyproterone acetate and estradiol treatment in late-pubertal transgender female adolescents. *J Sex Med*. 2017;14(5):747–57.
 27. Capitán L, Simon D, Meyer T, et al. Facial feminization surgery: simultaneous hair transplant during forehead reconstruction. *Plast Reconstr Surg*. 2017;139(3):573–84.
 28. Fisher AD, Castellini G, Ristori J, et al. Cross-sex hormone treatment and psychobiological changes in transsexual persons: Two-year follow-up data. *J Clin Endocrinol Metab*. 2016;101(11):4260–9.
 29. van de Grift TC, Cohen-Kettenis PT, Elaut E, et al. A network analysis of body satisfaction of people with gender dysphoria. *Body Image*. 2016;17:184–90.
 30. Ginsberg BA, Calderon M, Seminara NM, Day D. A potential role for the dermatologist in the physical transformation of transgender people: A survey of attitudes and practices within the transgender community. *J Am Acad Dermatol*. 2016;74(2):303–8.
 31. Stevenson MO, Wixon N, Safer JD. Scalp hair regrowth in hormone-treated transgender woman. *Transgender Health*. 2016;1(1):202–4.
 32. Wierckx K, Van de Peer F, Verhaeghe E, et al. Short- and long-term clinical skin effects of testosterone treatment in trans men. *J Sex Med*. 2014;11(1):222–9.
 33. Wierckx K, Van Caenegem E, Schreiner T, et al. Cross-sex hormone therapy in trans persons is safe and effective at short-time follow-up: Results from the European network for the investigation of gender incongruence. *J Sex Med*. 2014;11(8):1999–2011.
 34. Adenuga P, Summers P, Bergfeld W. Hair regrowth in a male patient with extensive androgenetic alopecia on estrogen therapy. *J Am Acad Dermatol*. 2012;67(3):e121–3.
 35. Mueller A, Haeberle L, Zollver H, et al. Effects of intramuscular testosterone undecanoate on body composition and bone mineral density in female-to-male transsexuals. *J Sex Med*. 2010;7(9):3190–8.

-
36. Giltay EJ, Gooren LJ. Effects of sex steroid deprivation/administration on hair growth and skin sebum production in transsexual males and females. *J Clin Endocrinol Metab.* 2000;85(8):2913–21.
 37. Moreno-Arrones OM, Becerra A, Vano-Galvan S. Therapeutic experience with oral finasteride for androgenetic alopecia in female-to-male transgender patients. *Clin Exp Dermatol.* 2017;42(7):743–8.
 38. Health WPAfT. Standards of Care for the Health of Transsexual, Transgender, and Gender Nonconforming People (7th Version). In: 2012.
 39. Pallotti F, Senofonte G, Pelloni M, et al. Androgenetic alopecia: effects of oral finasteride on hormone profile, reproduction and sexual function. *Endocrine.* 2020;68(3):688–94.
 40. Randolph M, Tosti A. Oral minoxidil treatment for hair loss: A review of efficacy and safety. *J Am Acad Dermatol.* 2021;84(3):737–46.
 41. Motosko CC, Bieber AK, Pomeranz MK, Stein JA, Martires KJ. Physiologic changes of pregnancy: A review of the literature. *Int J Womens Dermatol.* 2017;3(4):219–24.