

THE 2021 SCIENTIFIC MEETING OF THE SOCIETY OF GYNECOLOGIC SURGEONS

HIGHLIGHTS ISSUE, PART 2



Miles Murphy, MD, MSPH

Co-Medical Director, Institute for Female Pelvic Medicine
and Reconstructive Surgery
Chief, Division of Urogynecology
Abington-Jefferson Health
Associate Professor of Obstetrics and Gynecology
Sidney Kimmel Medical College
of Thomas Jefferson University
Philadelphia, Pennsylvania

Cecile Ferrando, MD, MPH

Associate Professor
Obstetrics and Gynecology
Subspecialty Care for Women's Health
Cleveland Clinic
Cleveland, Ohio

S. Abbas Shobeiri, MD, MBA

Professor of Obstetrics and Gynecology
and Bioengineering
Vice Chair, Gynecology
Inova Fairfax Hospital
Falls Church, Virginia

Andrea Pezzella, MD

Urogynecologist
Medical Director
Southern Urogynecology, LLC
West Columbia, South Carolina

Christine A. Heisler, MD, MS

Assistant Professor
FPMRS Fellowship Program Director
University of Wisconsin School of Medicine
and Public Health
Madison, Wisconsin

Sarah M. Temkin, MD

Washington, DC

Innovative therapies in gynecology: The evidence and your practice

Nonsurgical, nonhormonal novel treatments appear promising for treating such disorders as GSM and SUI, but is the evidence of efficacy and safety sufficient to bear them out?

Miles Murphy, MD, MSPH; Cecile Ferrando, MD, MPH; S. Abbas Shobeiri, MD, MBA; and Andrea Pezzella, MD

As more and more gynecologic therapies move to the outpatient setting, keeping up on the latest data regarding emerging options can be challenging. Furthermore, it can be difficult to justify purchasing expensive equipment for the office when a therapy is not covered by medical insurance plans. However, if a therapy is efficacious and patients are willing to pay out of pocket, clinicians may want to have these options available for their patients.

In an effort to work through these complex issues, a panel of experts was convened at the 47th Annual Scientific Meeting of the Society of Gynecologic Surgeons in Palm Springs, California, on June 29, 2021. This article includes the salient points from that panel discussion.

Fractionated CO2 laser therapy

Fractionated CO2 laser therapy is considered second-line therapy for the treatment of genitourinary syndrome of menopause (GSM). In 2018, the US Food and Drug Administration (FDA) issued a safety warning about the use of CO2 laser therapy and warned patients and clinicians that the FDA had not approved the treatment for vaginal rejuvenation or treatment of vaginal symptoms related to menopause, urinary incontinence, or sexual function. Despite this warning, laser treatments are still performed in many practices.

Dr. Murphy reports serving as a consultant to Boston Scientific. Dr. Ferrando reports receiving royalties from UpToDate, Inc. Dr. Pezzella reports serving as a consultant to Axonics, Coloplast, and Medtronic and as a speaker for Coloplast and Urovent. Dr. Shobeiri reports no financial relationships relevant to this article.

doi: 10.12788/obgm.0126

In 2019, the International Continence Society (ICS) and the International Society for the Study of Vulvovaginal Disease (ISSVD) put out a joint practice consensus statement that essentially did not recommend the routine use of laser treatment for GSM, urinary incontinence, or lichen sclerosus.¹ Conversely, the 2020 American Urogynecologic Society (AUGS) published a clinical consensus statement that spoke to the promising results of laser therapy for the treatment of vulvovaginal atrophy, vaginal dryness, and menopausal dyspareunia, with benefits lasting up to 1 year.² This statement also suggested that the short-term safety profile of the CO2 laser device was favorable.

How CO2 lasers work

Fractionated CO2 laser therapy differs from unfractionated treatment (which often is used in the treatment of condyloma) in that it is not ablative. The laser works by using fractionated beams of light to penetrate the affected tissue to create small wounds in the epithelium and underlying lamina propria, which leads to collagen remodeling and regeneration that then results in the restoration of the superficial epithelium, vaginal rugae, and lubrication.³ Most clinicians perform 3 applications of the laser treatment 6 weeks apart, a recommendation that is based on manufacturer-sponsored studies in menopausal women.

Study results of patient outcomes with laser therapy

GSM. Several retrospective^{4,5} and prospective studies⁶⁻¹⁰ have looked at short- and longer-term outcomes in patients undergoing treatment with

the CO₂ laser. All of these studies showed improvement in patient symptoms related to GSM.

The VeLVET trial, conducted by Paraiso and colleagues, was a randomized trial that compared CO₂ laser treatment with vaginal estrogen in women with GSM.¹¹ While the study was underpowered due to cessation of enrollment once the FDA safety warning was issued, the authors reported that at 6 months, both the fractionated CO₂ laser therapy group and the vaginal estrogen group had similar improvements, with 70% to 80% of participants reporting satisfaction with treatment. The authors concluded that laser therapy is likely to be as efficacious as vaginal estrogen and may be a good option for patients who cannot use vaginal estrogen to treat GSM.¹¹

Lichen sclerosus. Some data exist on the efficacy of laser therapy for the treatment of lichen sclerosus. One recently published randomized trial showed that at 6 months, fractionated CO₂ laser treatment and prior treatment with high potency topical corticosteroids was associated with higher improvement in subjective symptoms and objective measures compared with clobetasol propionate treatment.¹² Another trial, however, revealed that laser treatment was not an effective monotherapy treatment for lichen sclerosus when compared with placebo.¹³ Fewer studies have examined the effect of laser therapy on urinary incontinence.

More prospective data are emerging, evidenced by trials currently registered in ClinicalTrials.gov. While some studies provide evidence that laser therapy may be efficacious in the treatment of vulvovaginal atrophy, additional data are needed to confirm the favorable outcomes observed with laser therapy for the treatment of lichen sclerosus, and a significant amount of data are needed to evaluate the efficacy of laser treatment for urinary incontinence.

Until such evidence is available, fractionated CO₂ vaginal laser therapy will remain a fee-for-service treatment option and will be inaccessible to patients who cannot afford the cost of treatment.

Hydrogel urethral bulking

Urethral bulking agents have been used for 5 decades in the treatment of stress urinary incontinence (SUI) in women. Unlike midurethral slings,

in which many medical device companies use the same implant material (microporous, monofilament polypropylene mesh), the material for bulking agents has varied greatly. A 2017 Cochrane review of urethral bulking listed these agents used for this indication: autologous fat, carbon beads, calcium hydroxylapatite, ethylene vinyl alcohol copolymer, glutaraldehyde cross-linked bovine collagen, hyaluronic acid with dextranomer, porcine dermal implant, polytetrafluoroethylene, and silicone particles.¹⁴ These agents can be injected through a transurethral or periurethral technique. The review failed to find superiority of one material or injection technique over another.

New bulking agent available

In January 2020, the FDA approved the premarket application for a new bulking agent. This new agent is a permanently implanted, nonresorbable hydrogel that consists of cross-linked polyacrylamide (2.5%) and water (97.5%). It is intended to be used with a transurethral bulking system that includes a rotatable sheath and two 23-gauge needles; a total of 1.5 to 2.0 mL of the hydrogel is injected in 3 locations in the proximal urethra per session. Patients may undergo an additional 2 sessions, if needed, at least 4 weeks after the previous session.

Polyacrylamide hydrogel has been used as a bulking agent in cosmetic and ophthalmic surgery for many years, and it was first approved for medical use in Europe in 2001. The initial European data on its use as a urethral bulking agent was published in 2006.¹⁵ The first North American data came in 2014 from a multicenter, randomized trial that compared polyacrylamide hydrogel with collagen gel.¹⁶ This investigation followed 345 women for 12 months and concluded that the safety and efficacy of polyacrylamide hydrogel was not inferior to collagen, with a little over half of both cohorts demonstrating a 50% or greater decrease in incontinence episodes.

Since these initial studies, 3-year¹⁷ and 7-year safety and efficacy data¹⁸ have been reported, with reassuring findings, but both studies experienced significant attrition of the original group of patients. The most commonly reported adverse events associated with the procedure are pain at the injection site (4%–14%) and urinary tract infection (3%–7%); transient urinary retention rates range in incidence from 1.5% to 15%.¹⁹

CONTINUED ON PAGE S54

Short procedure, long-term results

Given that a urethral bulking procedure can be done in less than 10 minutes in the office under local analgesia, this treatment may lend itself to use in more brittle patient populations. One study of women aged 80 or older showed a greater than 50% decrease in the number of daily pads used for up to 2 years after initial injection.²⁰ Another study found the greatest treatment success in women aged 60 years or older with fewer than 2.5 episodes of SUI per day.²¹

Platelet-rich plasma therapy

Platelet-rich plasma (PRP) therapy has been used in multiple disciplines for more than 2 decades as a treatment to regenerate damaged tissue, particularly in sports medicine for treating tendonitis as well as in plastic surgery, gynecology, urology, and ophthalmology, and good outcomes have been demonstrated with no serious adverse effects. PRP is a natural product in which high levels of platelets are concentrated through centrifugation with bioactive growth factors, including platelet-derived growth factor (PDGF), transforming growth factor-beta (TGF- β), vascular endothelial growth factor (VEGF), epidermal growth factor (EGF), fibroblast growth factor (FGF), and insulin growth factor (IGF).²² The activated platelets are then injected autologously back into the patient's tissue. This process releases activated growth factors that accelerate tissue healing by stimulating the number of reparative cells to create collagen production, angiogenesis, and neurogenesis while fighting infection and downregulating the autoimmune system.

Uses for PRP in gynecology

In gynecology, dating back to 2007 PRP was shown to facilitate wound healing, when Fanning and colleagues reported PRP applications in gynecologic operative wounds, such as hysterectomies and urogynecologic procedures, to reduce postoperative pain.²³ In the last decade, there has been a dramatic increasing trend in the application of PRP injections as an alternative therapy in gynecology to improve intimate health. PRP has been used to treat lichen sclerosus, atrophic vaginitis, SUI, and female sexual dysfunction; however, there is a dearth of studies that compare PRP with traditional therapies.

Runels and colleagues described the effects of localized injections of autologous PRP for the treatment of sexual dysfunction early in 2014.²⁴ Those authors pioneered PRP use in women with dyspareunia and other symptoms related to sexual dysfunction. Women were offered PRP injections into the periurethral area of the Skene glands and the clitoris. Sexual satisfaction and pain were improved but results did not reach statistical significance. The results of this pilot study of 11 patients suggested that PRP injections could perhaps be an effective method to treat certain types of female sexual dysfunction, including desire, arousal, lubrication, and orgasm.

In another pilot study, Long and colleagues looked at the effectiveness of local injection of PRP for treating women with SUI.²⁵ In that study, younger patients with mild severity of SUI had promising results, with up to 75% cured or improved. Results in the older group, with 50% cured or improved, did not reach statistical significance. Other small, limited studies have been conducted under the hypothesis that PRP as an "O-shot" may be a promising treatment that is a safe, effective, nonsurgical, and nonhormonal option for women with dyspareunia from lack of lubrication and related sexual dysfunction, such as decreased libido or arousal.²⁶⁻²⁹ A pilot study by Behnia-Willison and colleagues demonstrated clinical improvement in PRP use as an alternative to topical steroids for lichen sclerosus.³⁰ Several other studies also have shown efficacy for the treatment of lichen sclerosus.³¹⁻³⁴

More evidence of efficacy needed

To date, preliminary studies suggest that PRP holds promise for a host of gynecologic conditions. Since PRP is autologous, there are no significant contraindications, and thus far there have been no known serious adverse effects. However, most health insurers still do not cover this therapy, so for now patients must pay out-of-pocket fees for these treatments.

As we continue to investigate therapies in regenerative medicine, the continued efforts of our discipline are required to conduct well-designed prospective, randomized controlled studies. While initial series suggest that PRP is safe, it is unlikely that this therapy will be embraced widely in the paradigm as an alternative treatment option for many

genitourinary symptoms of menopause and vulvar disorders until efficacy is better established.

Radiofrequency therapy

For the past 20 years, radiofrequency (RF) energy has been used through the vagina, urethra, and periurethral tissues for the treatment of genitourinary symptoms, with limited success. More recently, because some patients hesitate to receive mesh implants for treatment of urinary incontinence,³⁵ there has been gravitation to office-based procedures.

In contrast to lasers, which transmit energy through light, RF waves (measured in hertz) transform the kinetic energy of the intracellular atoms, which move and collide, generating thermal energy.^{36,37} RF therapy has been shown to increase the proportion of smooth muscle and connective tissue; stimulate proliferation of the epithelium, neovascularization, and collagen formation in the lamina propria; and improve natural lubrication.^{36,38} In addition, RF is:

- ablative when the heat is capable of generating ablation and/or necrosis of the epidermis and dermis
- microablative when energy fractionation produces microscopic columns of ablative thermal lesions in the epidermis and upper dermis, resulting in microscopic columns of treated tissue interspersed with areas of untreated skin,³⁹ and
- nonablative when trauma occurs only in the dermis by heating without causing ablation of the epidermis.³⁹

The RF devices discussed below are used with settings for microablation in the treatment of SUI and sexual health/vaginal laxity, and with nonablative settings in the treatment of GSM.

RF for the treatment of urinary incontinence

Studies with RF have shown its benefits in urinary symptoms as secondary outcomes, such as improvement of SUI.^{38,40} One theory that favors energy devices as a treatment for SUI is that the treatment strengthens suburethral and pubocervical support, thereby decreasing urethral mobility.⁴¹

In 2016, the Viveve system (Viveve) received FDA 510(k) clearance for “use in general surgical procedures for electrocoagulation and

hemostasis.” A single-site, randomized, nonblinded pilot study compared 1 treatment (group 1) versus 2 treatments (group 2) with the Viveve system for SUI in 35 participants.⁴² At 12 months, only for group 2 did mean scores on the Incontinence Impact Questionnaire Short Form (IIQ-7) and the International Consultation on Incontinence Modular Questionnaire-Urinary Incontinence-Short Form (ICIQ-UI-SF) decrease by the minimum clinically important difference of 16 and 2.52 points, respectively, compared with baseline.

The ThermiVa device (ThermiGen, LLC) received FDA clearance for “use in dermatological and general surgical procedures for electrocoagulation and hemostasis” in 2017. A single-site, prospective, double-blind, randomized controlled pilot trial evaluated the efficacy of this device for the treatment of SUI in 20 participants randomly assigned in a 1:1 fashion to active and sham groups.⁴³ At 12 weeks, mean scores of the Urogenital Distress Inventory (UDI-6) and the ICIQ-UI-SF decreased by the minimal clinically important difference only in the treatment group arm. Additionally, 70% of treatment group participants had a negative stress test at 12 weeks compared with 0% of control group participants.⁴³ In another study of 48 patients who were followed longitudinally for 5 months, a substantial improvement in genital appearance was observed.⁴⁴ Assessment based on validated instruments demonstrated significant improvements in sexual function and SUI.⁴⁴

A microablative RF device (Wavetronic 6000 Touch Device, Megapulse HF FRAXX system; Loktal Medical Electronics) consists of a vaginal probe with 64 microneedles at the tip, each capable of penetrating to a depth of 1 mm. During activation, delivery of RF energy, which results in vaporization of tissue at 100 °C, occurs in a preset sequence of 8 needles at a time, preventing the overheating of intervening tissue between adjacent needles.

Slongo and colleagues conducted a 3-arm randomized clinical trial that included 117 climacteric women with SUI.⁴⁵ In group 1, treatment consisted of 3 monthly sessions of RF; group 2 received 12 weekly sessions of pelvic floor muscle training (PFMT); and group 3 received RF treatment plus PFMT simultaneously. Assessments were conducted at baseline and 30 days after the end of therapy using validated questionnaires and scales for urinary, vaginal, and sexual functions, and

cytology was used to assess vaginal atrophy. The association between RF and PFMT showed significant improvement in the SUI symptoms assessed by questionnaire. The vaginal symptoms and dryness showed more substantial improvement with the RF treatment, and vaginal laxity showed similar improvement in the 3 treatment groups.⁴⁵

RF for the treatment of GSM

For women who are not candidates for localized hormone therapy, as well as others who simply do not wish to use hormones, nonablative RF laser therapy may be an alternative for the management of GSM.

The VIVEVE I trial was one of the largest randomized, sham-controlled trials performed to determine the efficacy of vaginal rejuvenation using surface-cooled RF; 174 women received either RF treatment (90 J/cm²) or sham treatment (1 J/cm²).⁴⁶ Treated participants had a significant improvement in perception of vaginal laxity/looseness and sexual function up to 6 months posttreatment.⁴⁶ Overall, participants were satisfied with the treatment (77.8%–100%) and reported significant improvements in vaginal laxity and symptoms of atrophy. RF was well tolerated with minimal adverse effects, such as procedure-related erythema and edema of treated tissue, and vaginal discharge. One patient discontinued treatment because of procedural pain.^{47,48}

The ThermiVa system also was evaluated for efficacy in the treatment of GSM in a single-site, double-blind randomized controlled pilot study, the methods of which were previously described above.⁴³ GSM symptoms were evaluated at baseline and 12 weeks using the Vaginal Health Index (VHI) and visual analog scale (VAS). At the 12-week follow-up, compared with baseline scores, VHI scores were unchanged in the control group and improved in the treatment group. Additionally, VAS scores for dyspareunia decreased in the treatment group compared with baseline while VAS for dyspareunia in the sham group did not change from baseline to 12 weeks.

RF treatment for sexual health

The efficacy of the Viveve RF system for female sexual dysfunction was evaluated in an international, randomized, controlled, single-blinded study (n = 154) that compared 6-month outcomes of RF

treatment versus sham treatment.⁴⁶ Although there was a statistically significant improvement in patient-reported sexual dysfunction on validated instruments, it is essential to note that the study was powered for the primary outcome of vaginal laxity. In addition, the study was not adequately powered to evaluate safety; however, the adverse events reported were mild, and the most frequently reported adverse event was vaginal discharge.

Microablative monopolar RF treatment for GSM has been evaluated in 2 single-arm clinical trials that included a total of 70 patients.^{39,49} Pre- and posttreatment outcomes were analyzed after delivery of 3 treatment sessions 28 to 40 days apart. Although the only significant improvement in quality of life was in the health domain of the World Health Organization Quality of Life Adapted Questionnaire ($P = .04$), significant improvements in sexual functioning were seen in terms of the desire ($P = .002$), lubrication ($P = .001$), satisfaction ($P = .003$), and pain ($P = .007$) domains of the Female Sexual Function Index (FSFI) questionnaire except for excitation and orgasm.³⁹ Overall, 100% of participants reported being satisfied or very satisfied with treatments, and 13 of 14 women felt “cured” or “much better.”³⁹ After treatment, significant increases in vaginal *Lactobacillus* ($P < .001$), decreases in vaginal pH ($P < .001$), improvements in maturation of vaginal cellularity (decreased parabasal cells, $P < .001$; increased superficial cells, $P < .001$), and increased VHI score ($P < .001$) alone occurred.⁴⁹ No adverse events beyond self-limited vaginal burning and redness were reported.^{39,49} In another study mentioned above, the combination of RF and PFMT in sexual function does not offer benefits superior to those achieved by the therapies alone.⁴⁵

Evidence on RF treatment does not support marketing efforts

Radiofrequency devices have been marketed for a variety of genitourinary problems in women, with limited high-quality, randomized, comparative evidence of efficacy and durability in the literature. It is unfortunate that RF treatment continues to be promoted by practitioners around the world who cite small, short-term studies that lack biostatistical rigor in their reporting of protocols and results. Statements from both AUGS and the International Urogynecological Association have heeded

CONTINUED ON PAGE S58

caution on the use of lasers but they could not even evaluate RF devices due to lack of evidence.^{2,41}

Informed counseling and shared decision making remain the bottom line

By the year 2025, all members of the Baby Boom generation will be aged 60 or older. While in the past there has been a reluctance to discuss women's sexual health, urinary incontinence, and GSM, the need for open discussion and a variety of treatment options for these conditions has never been more critical.

Many patients prefer office-based therapies over hospital-based procedures, and others are leery of synthetic implants. These concerns are leading toward great interest in the types of treatments covered in this article. However, it is paramount that clinicians are aware of the evidence-based data behind these emerging options so that we can openly and accurately counsel our patients.

As we have shown, the quality of the data behind these office-based therapies varies significantly. Until a greater body of research data is available, we must carefully balance our desire to meet patient wishes with solid, informed counseling and shared decision making. ■

References

- Preti M, Viera-Baptista P, Digeus GA, et al. The clinical role of LASER for vulvar and vaginal treatments in gynecology and female urology: an ICS/ISSVD best practice consensus document. *J Lower Genital Tract Dis*. 2019;23:151-160.
- Alshiek J, Garcia B, Minassian V, et al. Vaginal energy-based devices: AUGS clinical consensus statement. *Female Pelvic Med Reconstr Surg*. 2020;26:287-298.
- Streicher LF. Vulvar and vaginal fractional CO2 laser treatments for genitourinary syndrome of menopause: NAMS practice pearl. *Menopause*. 2018;25:571-573.
- Gardner AN, Aschkenazi SO. The short-term efficacy and safety of fractional CO2 laser therapy for vulvovaginal symptoms in menopause, breast cancer, and lichen sclerosis. *Menopause*. 2021;28:511-516.
- Balchander D, Nyirjesy P. Fractionated CO2 laser therapy in recalcitrant lichen sclerosis. *J Lower Genital Tract Disease*. 2020;24:225-228.
- Pieralli A, Fallani MG, Becorpi A, et al. Fractional CO2 laser for vulvovaginal atrophy (VVA) dyspareunia relief in breast cancer survivors. *Arch Gynecol Obstet*. 2016;294:841-846.
- Pieralli A, Bianchi C, Longinotti M, et al. Long-term reliability of fractionated CO2 laser as a treatment of vulvovaginal atrophy (VVA) symptoms. *Arch Gynecol Obstet*. 2017;296:973-978.
- Sokol ER, Karram MM. Use of novel fractional CO2 laser for the treatment of genitourinary syndrome of menopause: 1-year outcomes. *Menopause*. 2017;24:810-814.
- Pagano T, Conforti A, Buonfantino C, et al. Effect of rescue fractional microablative CO2 laser on symptoms and sexual dysfunction in women affected by vulvar lichen sclerosis resistant to long-term use of topic corticosteroid: a prospective longitudinal study. *Menopause*. 2020;27:418-422.
- Sindou-Faurie T, Louis-Vahdat C, Oued Es Cheikh E, et al. Evaluation of the efficacy of fractional CO2 laser in the treatment of vulvar and vaginal menopausal symptoms. *Arch Gynecol Obstet*. 2021;303:955-963.
- Paraiso MFR, Ferrando CA, Sokol ER, et al. A randomized clinical trial comparing vaginal laser therapy to vaginal estrogen therapy in women with genitourinary syndrome of menopause: the VeLVET trial. *Menopause*. 2019;27:50-56.
- Burkett LS, Siddique M, Zeymo A, et al. Clobetasol compared with fractionated carbon dioxide laser for lichen sclerosis: a randomized controlled trial. *Obstet Gynecol*. 2021;137:968-978.
- Mitchell L, Goldstein AT, Heller D, et al. Fractionated carbon dioxide laser for the treatment of vulvar lichen sclerosis: a randomized controlled trial. *Obstet Gynecol*. 2021;136:979-987.
- Kirchin V, Page T, Keegan PE, et al. Urethral injection therapy for urinary incontinence in women. *Cochrane Database Syst Rev*. 2017;7:CD003881.
- Lose G, Mouritsen L, Nielson JB. A new bulking agent (polyacrylamide hydrogel) for treating stress urinary incontinence in women. *BJU Int*. 2006;98:100-104.
- Sokol ER, Karram MM, Dmochowski R. Efficacy and safety of polyacrylamide hydrogel for the treatment of female stress incontinence: a randomized, prospective, multicenter North American study. *J Urol*. 2014;192:843-849.
- Pai A, Al-Singary W. Durability, safety and efficacy of polyacrylamide hydrogel (Bulkamid) in the management of stress and mixed urinary incontinence: three year follow up outcomes. *Cent European J Urol*. 2015;68:428-433.
- Brosche T, Kuhn A, Lobodasch K, et al. Seven-year efficacy and safety outcomes of Bulkamid for the treatment of stress urinary incontinence. *Neurourol Urodyn*. 2021;40:502-508.
- Kasi AD, Pergialiotis V, Perrea DN, et al. Polyacrylamide hydrogel (Bulkamid) for stress urinary incontinence in women: a systematic review of the literature. *Int Urogynecol J*. 2016;27:367-375.
- Vecchioli-Scaldazza CV, Smaali C, Morosetti C, et al. Polyacrylamide hydrogel (Bulkamid) in female patients of 80 or more years with urinary incontinence. *Int Braz J Urol*. 2014;40:37-43.
- Elmelund M, Sokol ER, Darram MM, et al. Patient characteristics that may influence the effect of urethral injection therapy for female stress urinary incontinence. *J Urol*. 2019;202:125-131.
- Sanoulis V, Nikolettos N, Vlahos N. The use of platelet-rich plasma in the gynecological clinical setting: a review. *HJOG*. 2019;18:55-65.
- Fanning J, Murrain L, Flora R, et al. Phase I/II prospective trial of autologous platelet tissue graft in gynecologic surgery. *J Minim Invasive Gynecol*. 2007;14:633-637.
- Runels CE, Melnick H, DeBourbon E, et al. A pilot study of the effect of localized injections of autologous platelet rich plasma (PRP) for the treatment of female sexual dysfunction. *J Womens Health Care*. 2014;3:4.
- Long CY, Lin KL, Shen CR, et al. A pilot study: effectiveness of local injection of autologous platelet-rich plasma in treating women with stress urinary incontinence. *Sci Rep*. 2021;11:1584.
- Matz EJ, Pearlman AM, Terlecki RP. Safety and feasibility of platelet rich fibrin matrix injections for treatment of common urologic conditions. *Investig Clin Urol*. 2018;59:61-65.
- Neto JB. O-Shot: platelets rich plasma in intimate female treatment. *J Womens Health Care*. 2017;6:5.
- Nikolopoulos KI, Pergialiotis V, Perrea D, et al. Restoration of the pubourethral ligament with platelet rich plasma for the treatment of stress urinary incontinence. *Med Hypotheses*. 2016;90:29-31.
- Hersant B, SidAhmed-Mezi M, Belkacemi Y, et al. Efficacy of injecting platelet concentrate combined with hyaluronic acid for the treatment of vulvovaginal atrophy in postmenopausal women with a history of breast cancer: a phase 2 pilot study. *Menopause*. 2018;25:1124-1130.
- Behnia-Willison F, Pour NR, Mohamadi B, et al. Use of platelet-rich plasma for vulvovaginal autoimmune conditions like lichen sclerosis. *Plast Reconstr Surg Glob Open*. 2016;4:e1124.
- Goldstein AT, King M, Runels C, et al. Intradermal injection of autologous platelet-rich plasma for the treatment of vulvar lichen sclerosis. *J Am Acad Dermatol*. 2017;76:158-160.

32. Casabona F, Priano V, Vallerino V, et al. New surgical approach to lichen sclerosus of the vulva: the role of adipose-derived mesenchymal cells and platelet-rich plasma in tissue regeneration. *Plast Reconstr Surg*. 2010;126:210e-211e.
33. Franic D, Iternica Z, Franic-Ivanisevic M. Platelet-rich plasma (PRP) for the treatment of vulvar lichen sclerosus in a premenopausal woman: a case report. *Case Rep Womens Health*. 2018;18: e0062.
34. Posey LK, Runels C. In office surgery and use of platelet rich plasma for the treatment of vulvar lichen sclerosus to alleviate painful sexual intercourse. *J Lower Genital Tract Dis*. 2017;21(4S):S14.
35. Stachowicz AM, Hoover ML, Karram MM. Clinical utility of radiofrequency energy for female genitourinary dysfunction: past, present, and future. *Int Urogynecol J*. 2021;32:1345-1350.
36. Tadir Y, Gaspar A, Lev-Sagie A, et al. Light and energy based therapeutics for genitourinary syndrome of menopause: consensus and controversies. *Lasers Surg Med*. 2017;49:137-159.
37. US Food and Drug Administration. Statement from FDA Commissioner Scott Gottlieb, MD, on efforts to safeguard women's health from deceptive health claims and significant risks related to devices marketed for use in medical procedures for "vaginal rejuvenation." <https://www.fda.gov/news-events/press-announcements/statement-fda-commissioner-scott-gottlieb-md-efforts-safeguard-womens-health-deceptive-health-claims>. Updated August 2, 2018. Accessed August 13, 2021.
38. Vicariotto F, Raichi M. Technological evolution in the radiofrequency treatment of vaginal laxity and menopausal vulvo-vaginal atrophy and other genitourinary symptoms: first experiences with a novel dynamic quadripolar device. *Minerva Ginecol*. 2016;68:225-236.
39. Kamilos MF, Borrelli CL. New therapeutic option in genitourinary syndrome of menopause: pilot study using microablative fractional radiofrequency. *Einstein (Sao Paulo)*. 2017;15:445-551.
40. Caruth JC. Evaluation of the safety and efficacy of a novel radiofrequency device for vaginal treatment. *Surg Technol Int*. 2018;32:145-149.
41. Shobeiri SA, Kerkhof MH, Minassian VA, et al. IUGA committee opinion: laser-based vaginal devices for treatment of stress urinary incontinence, genitourinary syndrome of menopause, and vaginal laxity. *Int Urogynecol J*. 2019;30:371-376.
42. Allan BB, Bell S, Husarek K. Early feasibility study to evaluate the Viveve system for female stress urinary incontinence: interim 6-month report. *J Womens Health (Larchmt)*. 2020;29:383-389.
43. Leibaschoff G, Izasa PG, Cardona JL, et al. Transcutaneous temperature controlled radiofrequency (TTCRF) for the treatment of menopausal vaginal/genitourinary symptoms. *Surg Technol Int*. 2016;29:149-159.
44. Desai SA, Vakil Z, Kroumpouzos G. Transcutaneous temperature-controlled radiofrequency treatment: improvement in female genital appearance, sexual dysfunction, and stress urinary incontinence. *Aesthet Surg J*. 2021;sjab174. doi: 10.1093/asj/sjab174.
45. Slongo H, Lunardi AL, Riccetto CL, et al. Microablative radiofrequency versus pelvic floor muscle training for stress urinary incontinence: a randomized controlled trial. *Int Urogynecol J*. 2021. doi: 10.1007/s00192-021-04758-2.
46. Krychman M, Rowan CG, Allan BB, et al. Effect of single-treatment, surface-cooled radiofrequency therapy on vaginal laxity and female sexual function: the VIVEVE I randomized controlled trial. *J Sex Med*. 2017;14:215-225.
47. Zerbinati N, Serati M, Origoni M, et al. Microscopic and ultrastructural modifications of postmenopausal atrophic vaginal mucosa after fractional carbon dioxide laser treatment. *Lasers Med Sci*. 2015;30: 429-436.
48. Juhasz ML, Korta DZ, Mesinkovska NA. Vaginal rejuvenation: a retrospective review of lasers and radiofrequency devices. *Dermatol Surg*. 2021;47:489-494.
49. Sarmiento AC, Fernandes FS, Marconi C, et al. Impact of microablative fractional radiofrequency on the vaginal health, microbiota, and cellularity of postmenopausal women. *Clinics (Sao Paulo)*. 2020;75:e1750.

Gender equity and gynecologic surgery: Ensuring a culture of diversity and inclusion

Although gender biases remain widespread, even among health care providers, solutions exist to create gender equity within ObGyn. The authors explain how deliberate use of specific steps can help achieve a gender-equitable culture.

Christine A. Heisler, MD, MS, and Sarah M. Temkin, MD

A workplace environment conducive to success includes equal access to resources and opportunities, work-life integration, freedom from gender discrimination and sexual harassment, and supportive leadership. With focused leadership that is accountable for actionable interventions through measurable outcomes, it is possible to create an equitable, safe, and dignified workplace for all ObGyns.

Recently, obstetrics and gynecology has become the only surgical specialty in which a majority of practitioners are women. Since the 1990s, women in ObGyn have composed the majority of trainees, and 2012 marked the first year that more than half of the American College of Obstetricians and Gynecologists (ACOG) Fellows in practice were women.¹

Despite the large proportion of women within the specialty, ongoing gender-based inequities continue. Many of these inequities are rooted in our pervasive societal views of behavioral norms based on biologic or perceived sex, otherwise known as “gender,” roles.² The cultural gender role for men embodies characteristics that are bold, competitive, decisive, analytical; qualities for women include modesty, nurturing, and accommodating in interactions with others. Such male-typed traits and behaviors are termed “agentic” because they involve human agency, whereas female-typed traits and behaviors are termed “communal.”³

Gender biases remain widespread, even among health care providers.⁴ When gender roles are

applied to medical specialties, there is an assumption that women tend toward “communal” specialties, such as pediatrics or family practice, whereas men are better suited for technical or procedural specialties.⁵ ObGyn is an outlier in this schema because its procedural and surgical aspects would characterize the specialty as “agentic,” yet the majority of ObGyn trainees and physicians are women.

Biases related to gender impact many aspects of practice for the ObGyn, including:

- surgical education and training
- the gender wage gap
- interpersonal interactions and sexual harassment
- advancement and promotion.

Surgical education and training

The message that desirable characteristics for leadership and autonomy are aligned with masculinity is enforced early in medical culture, and it supports the ubiquity of deep-seated stereotypes about gender roles in medicine. For example, the language used for letters of recommendation for women applying to residency and fellowship highlight communal language (nurturing, warm), whereas those for men more typically use agentic terms (decisive, strong, future leader).⁶ During ObGyn surgical training, women residents receive more negative evaluations than men from nurses throughout training, and they report spending more effort to nurture these relationships, including changing communication in order to engage assistance from nurses.⁷

The authors report no financial relationships relevant to this article.

doi: 10.12788/obgm.0127

Similarly, women trainees receive harsher and more contradictory feedback from attending physicians.⁸ For example, a woman resident may be criticized for failing to develop independence and execute complete plans for patient care; later, she might be labeled as “rogue” and told that she should engage with and seek input from supervising faculty when independently executing a treatment plan.

Even when attempting to apply feedback in the operating room, women trainees are afforded less surgical autonomy than men trainees.⁹ These factors contribute to lower surgical confidence in women trainees despite their having the same technical skills as men, as measured by the Fundamentals of Laparoscopic Surgery skills exam.¹⁰

The gender wage gap

The mean salary for women ObGyns remains lower than that for men at every academic rank, with the differences ranging from \$54,700 at the assistant professor rank to \$183,200 for the department chair position.¹¹ Notably, the pay discrepancy persists after adjustments are made for common salary-influencing metrics, such as experience, practice construct, and academic productivity.¹² The gender salary gap is further identified for women subspecialists, as women reproductive endocrinology and infertility specialists and gynecologic oncologists earn \$67,000 and \$120,000 less, respectively, than men colleagues.^{13,14}

While the gender wage gap often is attributed to women’s desire to work part time, similar rates of graduating women and men medical students in 2018 ranked schedule flexibility as important, suggesting that work-life balance is related to an individual’s generation rather than gender.¹¹

Parenting status specifically adversely affects women physicians, with an ascribed “motherhood penalty” and “fatherhood bonus” phenomenon: women physicians who became parents lost an additional 6% salary, whereas men physicians saw a salary increase of 4% with parenthood.¹⁵

Most worrisome for the specialty is evidence of declining wages for ObGyns relative to other fields. “Occupational segregation”¹⁶ refers to the pronounced negative effect on earnings as more women enter a given field, which has been described in other professions.¹⁷ Overall, ObGyn salaries are the lowest among surgical specialties¹⁸

and show evidence of decline corresponding to the increasing numbers of women in the field.¹⁶

Interpersonal interactions and sexual harassment

In the workplace, women in ObGyn face more interpersonal relationship friction than men. Practicing women ObGyns report differing treatment by nurses as compared to men,¹⁹ noting that additional time and effort are required to nurture professional relationships. Additionally, nurses and trainees²⁰ evaluate practicing women ObGyns more harshly than they evaluate men. Further, women gynecologic surgeons experience gender bias from patients, as patients endorse a preference to have a woman gynecologist but prefer a man gynecologic surgeon.²¹

In addition to gender bias, the experience of gender harassment, including sexual harassment, is common, as two-thirds of women gynecologists report workplace harassment, 90% of which is attributed to gender.²² This rate is 3 times higher than that for men, with a senior colleague in a position of power within the same organization reported to be the harasser to women in 91% of occurrences.

Advancement and promotion

Within academia, women faculty face specific career-limiting barriers related to gender. Rates of academic promotion and leadership opportunities remain lower for women than for men faculty. Although there has been more women representation in ObGyn over the past 20 years, the number of women serving as department chairs, cancer center directors, editors-in-chief, or on a board of directors remains lower than what would be expected by representation ratios.²³ (Representation ratios were calculated as the proportion of ObGyn department-based leadership roles held by women in 2019 divided by the proportion of women ObGyn residents in 1990; representation ratios <1.0 indicate underrepresentation of women). This lag in attainment of leadership roles is compounded by the difficulties women faculty experience in finding mentorship and sponsorship,²⁴ which are known benefits to career advancement.

Having fewer women hold leadership roles also negatively influences those in training.

CONTINUED ON PAGE SS12

Key points for ensuring a culture of gender equity

- Gender bias in obstetrics and gynecology is pervasive and spans training through practice.
- Culture change requires assessing the current state, identifying system barriers and opportunities, creating a plan, and taking action.
- Interventions to create gender equity exist on an organizational, interactional, and individual level.
- Every intervention to ensure gender equity must have a measurable outcome to track progress.
- Intentional action toward gender equity could include implicit bias awareness (for example, the Implicit Association Test), gender bias habit-breaking intervention workshops, formal mentorship programs (such as the Wisconsin program “Entering mentoring” curriculum¹), women-focused leadership programs (such as Executive Leadership in Academic Medicine [ELAM]²), and Strategies and Tactics for Recruiting to Improve Diversity and Excellence (STRIDE) presentations.

References

1. Handelsman J, Pfund C, Lauffer SM, et al. Entering mentoring: a seminar to train a new generation of scientists. Wisconsin Program for Scientific Teaching. 2005. https://www.hhmi.org/sites/default/files/Educational%20Materials/Lab%20Management/entering_mentoring.pdf. Accessed August 26, 2021.
2. Drexel University College of Medicine. Executive leadership in academic medicine: about ELAM. <https://drexel.edu/medicine/academics/womens-health-and-leadership/elam/about-elam/>. Accessed August 26, 2021.

For example, a survey of emergency medicine and ObGyn residents identified an implicit gender bias that men and women residents favored men for leadership roles.²⁵ This difference, however, was not significant when division chiefs and department chairs were women, which suggests that visibility of women leaders positively influences the stereotype perception of men and women trainees.⁴

Blueprint for change

While the issues surrounding gender bias are widespread, solutions exist to create gender equity within ObGyn. Efforts to change individual behavior and organizational culture should start with an understanding of the current environment.

Multiple studies have promoted the concept of “culture change,”^{26,27} which parallels a standard change process. A critical aspect of change is that individuals and organizations maintain the status quo until something prompts a desire to achieve a different way of being. As data regarding the breadth and impact of gender bias emerge and awareness is raised, there is recognition that the status quo is not achieving the goals of the department or institution. This may occur through the result of loss of physician talent, reduced access for vulnerable patient populations, or lower financial productivity.

Once change is considered, it must deliberately be pursued through a specific process. The first actionable step is to assess the existing state and then identify prior barriers to and current opportunities for success. A validated instrument

that has been applied for this purpose is the Diversity Engagement Survey, a 22-item questionnaire that assesses 8 domains of organizational inclusion on a 5-point Likert scale (see **TABLE**, page SS14).²⁸ This tool not only provides a measure of institutional culture but also obtains characteristics of the respondents so that it additionally assesses how engaged specific groups are within the organization. Once baseline data are obtained, an action plan can be formulated and enacted. This cycle of assessment, system influences, plan, and act should be continued until the desired changes are achieved.

It is critically important to identify objective, measurable outcomes to assure that the interventions are moving the culture toward enhanced gender equity. As the ideal state is achieved, development of practices and enforceable policies help to ensure the longevity of cultural changes. Furthermore, periodic re-evaluation of the existing organizational culture will confirm the maintenance of gender equity objectives.

Solutions toward gender equity

Gender inequity may arise from societal gender roles, but it is incumbent on health care organizations to create an environment free from gender bias and gender harassment. An imperative first step is to identify the occurrence of gender discrimination.

The HITS (Hurt, Insulted, Threatened with harm, or Screamed at) screening tool has been used effectively with surgical residents to identify the prevalence of and most common types of abuse.²⁹ This

CONTINUED FROM PAGE SS12

TABLE Diversity Engagement Survey: A questionnaire to assess an institution's inclusion efforts²⁸

Engagement and inclusion factor	Item	Item description ^a
Common purpose	4	I feel that my work or studies contribute to the mission of the institution
	17	I feel connected to the vision, mission, and values of this institution
Access to opportunity	5	This last year, I have had opportunities at work/school to develop professionally
	9	There is someone at work/school who encourages my development
Equitable reward and recognition	10	I receive recognition and praise for my good work similar to others who do good work at this institution
	16	In my institution, I am confident that my accomplishments are compensated similar to others who have achieved their goals
Cultural competence	7	In this institution, I have opportunities to work successfully in settings with diverse colleagues
	11	I believe my institution manages diversity effectively
	15	In my institution, I receive support for working with diverse groups and working in cross-cultural situations
	20	In this institution, there are opportunities for me to engage in service and community outreach
Trust	1	I trust my institution to be fair to all employees and students
	13	If I raised a concern about discrimination, I am confident my institution would do what is right
	19	I believe that in my institution harassment is not tolerated
Sense of belonging	6	At work/school, my opinions matter
	14	I consider at least one of my co-workers or fellow students to be a trusted friend
	21	I feel that I am an integral part of my department or school
Appreciation of individual attributes	3	I am valued as an individual by my institution
	8	Someone at work/school seems to care about me as an individual
	22	The culture of my institution is accepting of people with different ideas
Respect	2	The leadership of my institution is committed to treating people respectfully
	12	In my institution, I experience respect among individuals and groups with various cultural differences
	18	I believe that my institution reflects a culture of civility

^aResponses are scored on a 5-point Likert scale (5 = strongly agree, 1 = strongly disagree).

instrument could be adapted and administered to ObGyns in practice or in training. These data should inform the need for system-level antisexist training as well as enforcement of zero-tolerance policies.

Organizations have the ability to create a salary-only compensation model for physicians within the same specialty regardless of academic rank or academic productivity, which has been demonstrated to eliminate gender pay disparity.³⁰ Additional measures to achieve gender equity involve antisexist hiring processes³¹ and transparency in metrics for job performance, salary, and promotion.³²

While health care organizations are obliged to construct a gender-equitable culture, efforts can be made on the individual level. Implicit bias is

ascribed to the unconscious attitudes and stereotypes people conclude about groups. The Implicit Association Test (IAT) is a validated instrument that provides the respondent with information about one's own implicit biases. By uncovering gender bias "blind spots," an individual can work to consciously overcome these stereotypes. Extending from the mental reframing required for overturning implicit biases, individuals can learn to identify and intervene in real-world situations. This concept of "being an upstander" denotes stepping in and standing up when an inappropriate situation arises³³ (see "Case example: Being an upstander," on page SS16). The targeted individual may not have the ability or safety to navigate

CONTINUED ON PAGE SS16

Case example: Being an upstander

Dr. Bethany Wain is attending a departmental conference and is talking with another member of her division when Dr. Joselle, her division director, approaches. He is accompanied by the Visiting Professor, an internationally reputable and dynamic man, a content expert in the field of work in which Dr. Wain is interested and has published. Dr. Joselle introduces the Visiting Professor formally, using his title of “doctor.” He then introduces Dr. Wain by her abridged first name, Beth.

As an upstander, the Visiting Professor quickly addresses Dr. Wain by her title and uses the situation as a platform to highlight the need to maintain professional address in the professional environment. He then adds that women, who are usually junior in academic rank, confer more benefit to being addressed formally and receiving visibility and respect for their work in a public forum. In this way, the Visiting Professor amplifies Dr. Wain’s work and status and demonstrates the standard of using professional address for women and men.

through a confrontation, but an upstander might be able to assist the target with empowerment, verbalization of needs, and support.

Lastly, mentorship and sponsorship are critical factors for professional development and career advancement. Bidirectional mentorship identifies benefit for the mentee and the mentor whereby the junior faculty obtain career development and support and the senior faculty may learn

new teaching or communication skills.³⁴

A final word

As recognized advocates for women’s health, we must intentionally move toward a workplace that is equitable, safe, and dignified for all ObGyns. Ensuring gender equity within obstetrics and gynecology is everyone’s responsibility. ■

References

1. Rayburn WF. *The Obstetrician-Gynecologist Workforce in the United States: Facts, Figures, and Implications, 2017*. Washington, DC: American Congress of Obstetricians and Gynecologists; 2017.
2. Carnes M. Commentary: deconstructing gender differences. *Acad Med*. 2010;85:575-577.
3. Eagly AH. The his and hers of prosocial behavior: an examination of the social psychology of gender. *Am Psychol*. 2009;64:644-658.
4. Salles A, Awad M, Goldin L, et al. Estimating implicit and explicit gender bias among health care professionals and surgeons. *JAMA Netw Open*. 2019;2:e196545.
5. Carnes M, Bartels CM, Kaatz A, et al. Why is John more likely to become department chair than Jennifer? *Trans Am Clin Climatol Assoc*. 2015;126:197-214.
6. Hoffman A, Grant W, McCormick, et al. Gendered differences in letters of recommendation for transplant surgery fellowship applicants. *J Surg Edu*. 2019;76:427-432.
7. Galvin SL, Parlier AB, Martino E, et al. Gender bias in nurse evaluations of residents in obstetrics and gynecology. *Obstet Gynecol*. 2015;126(suppl 4):7S-12S.
8. Gerull KM, Loe M, Seiler K, et al. Assessing gender bias in qualitative evaluations of surgical residents. *Am J Surg*. 2019;217:306-313.
9. Meyerson SL, Sternbach JM, Zwischenberger JB, et al. The effect of gender on resident autonomy in the operating room. *J Surg Educ*. 2017;74:e111-e118.
10. Flyckt RL, White EE, Goodman LR, et al. The use of laparoscopy simulation to explore gender differences in resident surgical confidence. *Obstet Gynecol Int*. 2017;2017:1945801.
11. Heisler CA, Mark K, Ton J, et al. Has a critical mass of women resulted in gender equity in gynecologic surgery? *Am J Obstet Gynecol*. 2020;223:665-673.
12. Warner AS, Lehmann LS. Gender wage disparities in medicine: time to close the gap. *J Gen Intern Med*. 2019;34:1334-1336.
13. Gilbert SB, Allshouse A, Skaznik-Wikiel ME. Gender inequality in salaries among reproductive endocrinology and infertility specialists in the United States. *Fertil Steril*. 2019;111:1194-1200.
14. Croft KM, Rauh LA, Orr JW, et al. Compensation differences by gender in gynecologic oncology. Society of Gynecologic Oncology Annual Meeting on Women’s Cancer. 2020. <https://sgo.confex.com/sgo/2020/meetingapp.cgi/Paper/15762>. 2020. Accessed April 1, 2020.
15. Wang SS, Ackerman S. The motherhood penalty: is it alive and well in 2020? *J Am Coll Radiol*. 2020;17:688-689.
16. Pelley E, Carnes M. When a specialty becomes “women’s work”: trends in and implications of specialty gender segregation in medicine. *Acad Med*. 2020;95:1499-1506.
17. Hegewisch A, Hartmann H. Occupational segregation and the gender wage gap: a job half done. Institute for Women’s Policy Research. 2014. <https://iwpr.org/iwpr-issues/employment-and-earnings/occupational-segregation-and-the-gender-wage-gap-a-job-half-done/>. Accessed August 26, 2021.
18. Greenberg CC. Association for Academic Surgery presidential address: sticky floors and glass ceilings. *J Surg Res*. 2017;219:ix-xviii.
19. Dossett LA, Vitous CA, Lindquist K, et al. Women surgeons’ experiences of interprofessional workplace conflict. *JAMA Netw Open*. 2020;3:e2019843.
20. Morgan HK, Purkis JA, Porter AC, et al. Student evaluation of faculty physicians: gender differences in teaching evaluations. *J Womens Health (Larchmt)*. 2016;25:453-456.
21. Childs AJ, Friedman WH, Schwartz MP, et al. Female patients’ sex preferences in selection of gynecologists and surgeons. *South Med J*. 2005;98:405-408.
22. Brown J, Drury L, Raub K, et al. Workplace harassment and discrimination in gynecology: results of the AAGL Member Survey. *J Minim Invasive Gynecol*. 2019;26:838-846.
23. Temkin AM, Rubinsak L, Benoit ME, et al. Take me to your leader: reporting structures and equity in academic gynecologic oncology. *Gynecol Oncol*. 2020;157:759-764.
24. Shakil S, Redberg RF. Gender disparities in sponsorship—how they perpetuate the glass ceiling. *JAMA Intern Med*. 2017;177:582.
25. Hansen M, Schoonover A, Skarica B, et al. Implicit gender bias among US resident physicians. *BMC Med Ed*. 2019;19:396.
26. Estrada M, Burnett M, Campbell AG, et al. Improving underrepresented minority student persistence in STEM. *CBE Life Sci Educ*. 2016;15:es5.
27. Carnes M, Handelsman J, Sheridan J. Diversity in academic medicine: the stages of change model. *J Womens Health (Larchmt)*. 2005;14:471-475.
28. Person SD, Jordan CG, Allison JJ, et al. Measuring diversity and inclusion in academic medicine. The Diversity Engagement Survey. *Acad Med*. 2015;90:1675-1683.
29. Fitzgerald CA, Smith RN, Luo-Owen X, et al. Screening for harassment, abuse, and discrimination among surgery residents: an EAST multicenter trial. *Am Surg*. 2019;85:456-461.
30. Hayes SN, Noseworthy JH, Farrugia G. A structured compensation plan results in equitable physician compensation: a single-center analysis. *Mayo Clin Proc*. 2020;95:35-43.
31. Devine PG, Forscher PS, Cox WT, et al. A gender bias habit-breaking intervention led to increased hiring of female faculty in STEM departments. *J Exp Soc Psychol*. 2017;73:211-215.
32. Morgan AU, Chaiyachati KH, Weissman GE, et al. Eliminating gender-based bias in academic medicine: more than naming the “elephant in the room.” *J Gen Intern Med*. 2018;33:966-968.
33. Mello MM, Jagsi R. Standing up against gender bias and harassment—a matter of professional ethics. *N Engl J Med*. 2020;382:1385-1387.
34. Burgess A, van Diggel C, Mellis C. Mentorship in the health profession: a review. *Clin Teach*. 2018;15:197-202.