

Integration of newer technologies in the understanding of sexuality and management of sexual dysfunction

Shivam Priyadarshi¹, Darpan Kaur, Nikita Dound

Executive Summary:

This guideline addresses contemporary technology adapted approaches for male and female sexual dysfunction. Technology should augment and not replace clinical judgment. Robotics, artificial intelligence, image guidance, intraoperative navigation, augmented reality, 3D modelling, neuromodulation and regenerative technologies should be adapted when they demonstrate an appropriate balance of clinical benefit, safety, reproducibility, cost effectiveness and patient acceptability.

Technology-mediated sexual behaviours, including pornography use, cybersex, virtual sex, social media and dating-app-mediated sexual interactions, and the use of sexual wellness devices, are increasingly relevant to sexual health practice. These behaviours may be associated with sexual wellbeing, relationship dynamics, distress, compulsive patterns, digital harms, and selected sexual dysfunctions, but should not be assumed to be inherently pathological.

Clinicians should adopt a confidential, non-judgmental, rights-based, and biopsychosocial approach while assessing these behaviours. Problematic or compulsive patterns should be identified based on impaired control, clinically significant distress, functional impairment, risk, or harm, rather than frequency of behaviour alone. In individuals with sexual dysfunction, technology-mediated behaviours should be explored as possible contributing or maintaining factors without presuming direct causality.

Sexual wellness devices such as lubricants, dilators, vibratory devices, vacuum devices, positioning aids, and pelvic tools may be considered as adjuncts to standard counselling, psychosexual therapy, pelvic rehabilitation, or medical management in selected individuals. Their use should be guided by clinical indication, informed consent, hygiene, safety, cultural acceptability, affordability, and avoidance of commercial bias.

In the Indian context, special attention is required to privacy, confidentiality, stigma, gender norms, marital and family pressures, LGBTQIA+ affirmative care, digital safety, misinformation, cyber abuse, non-consensual image sharing, sextortion, and regulatory gaps. Where direct Indian evidence is limited, recommendations should be applied cautiously using available Indian evidence, international literature, ethical principles, and expert consensus, and refined through IPS expert-panel review.

1. Professor and head, Department of Urology, S M S Medical College and hospital, Jaipur

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INTRODUCTION

Technology, Psychiatry, Mental Health and Sexual Dysfunction has an interesting interface. Technology has relevant applications across diagnosis, prognosis, pharmacotherapy and psychotherapy in Sexual Dysfunction. The objective of this draft is to provide clinicians guidance for integrating newer technologies into the understanding of sexuality and the management of sexual dysfunction, with attention to safety, equity, and evidence-based use. It will cover male and female sexual dysfunction, epidemiology and neuroscience advances, digital health (apps, telemedicine, digital therapeutics), Artificial Intelligence (AI) and predictive tools, robotics and devices, internet/social media influences, sex accessories, special populations, and ethical/legal/regulatory considerations. Digital sexual ecosystems, including pornography platforms, cybersex, social media, virtual sexual interactions, Virtual Reality (VR)-based sexual experiences, sexual health apps, telehealth platforms, teleconsultation and sex-tech/sexual wellness devices, are increasingly relevant to clinical sexual health practice. This section will provide a focused clinical and policy framework for understanding how technology-mediated sexual behaviors and sex-tech may influence sexual health, sexual functioning, help-seeking, risk behavior, assessment, counselling, referral, ethics, and policy. Despite the widespread incorporation of sex accessories in sexual well-being, biopsychosocial and medical contexts, scientific data from India are lacking. This section is intended to complement, not replace, the core guideline chapters on male and female sexual dysfunctions. Disorder-specific diagnosis and pharmacological, surgical, and procedural management of sexual dysfunctions will be addressed in the respective clinical chapters.

Review of Data: Epidemiology

An estimated 325 million people suffer from sexual dysfunction. Despite the alarming prevalence it is under-reported, under-recognized and under-treated. Approximately 31% males suffer from sexual dysfunction in their lifetime (1).

[Anderson D, Laforge J, Ross MM, Vanlangendonck R, Hasoon J, Viswanath O, Kaye AD, Urits I. Male Sexual Dysfunction. Health Psychol Res. 2022 Aug 20;10\(3\):37533. doi: 10.52965/001c.37533. PMID: 35999971; PMCID: PMC9392840](#)

Male sexual dysfunction includes erectile dysfunction (ED), Ejaculatory disorders, orgasmic dysfunction and desire issues. The prevalence of ED in young men is 30%. 52% of men between 40 to 70 yrs suffer from some degree of ED (2)

[Hatzipouridis K. Epidemiology of male sexual dysfunction. Am J Mens Health. 2007 Jun;1\(2\):103-25. doi: 10.1177/1557988306298006. PMID: 19482788.](#)

The prevalence of ED in young men is 30% (3).

[Nguyen HMT, Gabrielson AT, Hellstrom WJG. Erectile Dysfunction in Young Men-A Review of the Prevalence and Risk Factors. Sex Med Rev. 2017 Oct;5\(4\):508-520. doi: 10.1016/j.sxmr.2017.05.004. Epub 2017 Jun 20. PMID: 28642047.](#)

Risk factors could be psychogenic including anxiety, depression and relationship problems and organic including vasculogenic, neurological, endocrinal, iatrogenic or structural disorders.

[DeLay KJ, Haney N, Hellstrom WJ. Modifying Risk Factors in the Management of Erectile Dysfunction: A Review. World J Mens Health. 2016 Aug;34\(2\):89-100. doi: 10.5534/wjmh.2016.34.2.89. Epub 2016 Aug 23. PMID: 27574592; PMCID: PMC4999494](#)

Premature Ejaculation (PE) is classified as Lifelong, Acquired, variable and subjective. (15)

[Saitz TR, Serefoglu EC. The epidemiology of premature ejaculation. Transl Androl Urol. 2016 Aug;5\(4\):409-15. doi: 10.21037/tau.2016.05.11. PMID: 27652213; PMCID: PMC5001986](#)

The complaint of lifelong PE was seen at rates of 2.3% and 3.2%, while the rates of acquired PE were 3.9% and 4.5%, variable PE were 8.5% and 11.4% and subjective PE were 5.1% and 6.4% in the Turkish and Chinese studies. (16,17)

[Serefoglu EC, Yaman O, Cayan S, et al. Prevalence of the complaint of ejaculating prematurely and the four premature ejaculation syndromes: results from the Turkish Society of Andrology Sexual Health Survey. J Sex Med 2011;8:540-8.](#)

[10.1111/j.1743-6109.10.1111/j.1743-6109, Gao J, Zhang X, Su P, et al. Prevalence and factors associated with the complaint of premature ejaculation and the four premature ejaculation syndromes: a large observational study in China. J Sex Med 2013;10:1874-81. 10.1111/jsm.12180](#)

Indian Study: Sexual dysfunction was prevalent n=14 (46.66%) of female subjects, Sexual problems related to drive were most common and reported in 42.86% of patients, Sexual problems related to arousal were present in 21.43% and 21.43% also reported problems related to orgasm. Sexual problems related to pain were present in 14.28% of patients. Fifty four percent of patients had medical problems such as diabetes, hypertension, cardiac problems, thyroid dysfunction, etc. It was also found that stressors were present in 63.33 percent of patients with interpersonal stressors as most common in 44.39% of patients. Overall, the most common psychiatric disorder was Mood disorder. (39)

[Patel N, Kaur D, & Ghildiyal R \(2017\). Sexual Dysfunction in Female Patients with Psychiatric Disorders: Women's Mental Health and Sexuality. International Journal of Indian Psychology, Vol. 5, \(1\)](#)

Social media and sexual dysfunction :

The results showed that social media addiction had direct and indirect (via intimacy and perceived social support) effects on sexual function and sexual distress.

[\(Alimoradi Z, Lin CY, Imani V, Griffiths MD, Pakpour AH. Social media addiction and sexual dysfunction among Iranian women: The mediating role of intimacy and social support. J Behav Addict. 2019 Jun 1;8\(2\):318-325.\)](#)

Addictive-like use of Social networking sites (SNS) and smartphones might be a risk factor for sexual difficulties. [Fuzeiro V, Martins C, Gonçalves C, Santos AR, Costa RM. Sexual Function and Problematic Use of Smartphones and Social Networking Sites. J Sex Med. 2022 Aug;19\(8\):1303-1308.](#)

Internet addiction: Problematic internet use is characterized by excessive or poorly controlled preoccupations, urges or behaviours regarding computer use and internet access that lead to impairment or distress. [Shaw M, Black DW. Internet addiction: definition, assessment, epidemiology and clinical management. CNS Drugs. 2008;22\(5\):353-65. doi: 10.2165/00023210-200822050-00001. PMID: 18399706.](#)

The UDAYA survey (2015–2016) in Uttar Pradesh and Bihar included 3,885 boys and 7,766 girls aged 15–19 years. About 47% of the boys and 6% of the girls reported exposure to pornography ([Srivastava et al., 2023](#)). Adolescents who owned a personal mobile phone were more likely to be exposed (1.69 times overall and 2.27 times among girls), and among boys, frequent media exposure was associated with significantly higher odds of exposure (Srivastava et al., 2023). The authors recommend prioritising life skills programmes and comprehensive sexuality education ([Srivastava et al., 2023](#)).

Most of the evidence comes from cross-sectional studies and case reports, so causal relationships cannot be established ([Dwulit & Rzymiski, 2019](#)). There is little evidence that pornography use is associated with delayed ejaculation, and little or no evidence of a causal link with erectile dysfunction ([Dwulit & Rzymiski, 2019](#)). Findings on sexual desire are contradictory and may differ between women and men. In women, more frequent pornography use has been associated with greater sexual desire toward their partner ([Dwulit & Rzymiski, 2019](#)). The strongest evidence is for an association with lower sexual satisfaction, particularly in men. However, prospective studies are inconsistent, and one longitudinal study found the relationship ran both ways ([Dwulit & Rzymiski, 2019](#)). Shared pornography viewing in couples has been associated with higher sexual satisfaction ([Dwulit & Rzymiski, 2019](#)).

An Indian mixed-methods study of 100 LGBTQIA+ adults found that cyberbullying was mainly verbal, sexual or directed at a person's identity. The most common forms were LGBTQ-phobic messages (52.9%) and sexually harassing messages (40.2%) ([Maji & Abhiram, 2023](#)). More frequent cyberbullying and more severe sexual cyberbullying were associated with poorer mental health. Participants also reported depression, anxiety, sleep disturbance and self-injury ([Maji & Abhiram, 2023](#)). Acceptance on social media was linked to better mental health, but it did not lessen the effect of cyberbullying ([Maji & Abhiram, 2023](#)).

Sex Accessories:

A nationwide online survey by P. Mhatre, A.Agrawal et al (KEM college mumbai, GMC Nagpur), which included 2071 adults between the age of 18-44yrs was conducted to estimate the use of sex accessories, explored user experiences, and analysed how use related to demographic factors and general sexual satisfaction (Mhatre et al., 2025). 98.5% of the adults reported awareness of sex accessories, with 40.56% reportedly using it either during solo and partnered sexual activity. Adults aged 24-44yrs were twice as likely to use it compared to 18-24yrs olds. Cis-Women ,non-cisgendered individuals and others identifying as queers showed significantly higher usage.Vibrators were the most commonly used device, for both solo (24.4%) and partnered sex (16.3%). In the open-ended responses (n = 188), positive experiences outnumbered negative ones. Around 58 participants said sex toys helped them better understand and experience orgasm, heightened arousal, and enhanced pleasure. In addition, 46 participants reported greater sexual autonomy and confidence, and 27 reported better partnered sexual experiences. Negative experiences were fewer and included insecurity or feelings of inferiority (n = 4), physical adverse effects such as discomfort, pain and abrasion (n = 6), and difficulty reaching orgasm without a toy (n = 4). The main concerns were social taboo and fear of judgment, lack of privacy, and limited access and awareness. The authors note the sample may not be representative of the Indian

population. Non-probability sampling was used, 61% of respondents were aged 18 to 24, and 35.7% were from Maharashtra (Mhatre et al., 2025). [Mhatre P, Agrawal A, Agrawal P, Narayan G, Kataria P, Rathod P, Wadhva S. Exploring sex toy use among 18-45-year-old Indian adults: insights from a nationwide online survey. Lancet Reg Health Southeast Asia. 2024 Nov 11;32:100508. doi: 10.1016/j.lansea.2024.100508. PMID: 39583949; PMCID: PMC11585771.\(38; Appendix\).](#)

A prospective pilot at a US urogynaecology clinic enrolled 79 cisgender women with sexual dysfunction, pelvic floor disorders and/or genitourinary syndrome of menopause, of whom 53 completed the study (Dubinskaya et al., 2024). Participants applied a bullet vibrator to the external genitalia for 5 to 10 minutes, two to three times a week, for 3 months. The Female Sexual Function Index total score improved ($p = 0.002$), pain with sexual activity fell from 48.1% to 15.1% ($p < 0.0001$), and bothersome prolapse symptoms, lichen sclerosus appearance and vaginal atrophy severity also improved. The rate of subjective depression fell significantly ($p = 0.011$) and health-related quality of life improved ($p = 0.006$), but anxiety did not change significantly ($p = 0.096$); participants continued regular medications and confounders were not controlled. The study had no control group or randomisation, and most participants were white (74.7%) (Dubinskaya et al., 2024)

A cross-sectional internet based survey conducted in US (Herbenick et al., 2009), with participation by 2,056 women aged 18-60 years showed that vibrator use was significantly related to several domains of sexual function (desire, arousal, lubrication, orgasm, pain, overall function) with recent vibrator users scoring higher on most sexual function domains, indicating more positive sexual function. Most women (71.5%) reported no adverse genital symptoms associated with vibrator use. [Herbenick D, Reece M, Sanders S, Dodge B, Ghassemi A, Fortenberry JD. Prevalence and characteristics of vibrator use by women in the United States: results from a nationally representative study. J Sex Med. 2009 Jul;6\(7\):1857-66. doi: 10.1111/j.1743-6109.2009.01318.x. Epub 2009 May 7. PMID: 19453881.](#)

Clinical assessment :

Sexual dysfunction should be managed as a biopsychosocial disorder and surgery should be considered only when non responsive to medical management or in conjunction with nonsurgical treatment. (4). [Lowy M, Ramanathan V. Erectile dysfunction: causes, assessment and management options. Aust Prescr. 2022 Oct;45\(5\):159-161. doi: 10.18773/austprescr.2022.051. Epub 2022 Oct 4. PMID: 36382171; PMCID: PMC9584785.](#)

Patients should undergo assessment of sexual history and goals, relationship/partner factors, psychological/social/psychosexual factors, cardiovascular/metabolic risk, hormonal abnormalities where clinically indicated, drug induced, pelvic-floor dysfunction ,Genitourinary pathology, previous pelvic/retroperitoneal /prostate surgery, neurological disease, cancer treatment-related sexual dysfunction.

Integration of Technology should augment and not replace clinical judgment. Robotics, artificial intelligence, image guidance, intraoperative navigation, augmented reality, 3-D modelling, advanced ultrasound, neuro-modulation and regenerative technologies should be incorporated only when they demonstrate an appropriate balance of: clinical benefit + safety + reproducibility + cost-effectiveness + patient acceptability.(5). [Alwaal A, Breyer BN, Lue TF. Premature ejaculation: current concepts and treatment options. Transl Androl Urol. 2015.](#)

Evaluation of **Female Sexual Dysfunction** should include:(21) concerns like sexual desire, arousal ,lubrication, orgasm, dyspareunia, genito-pelvic pain, pelvic-floor function, vulvovaginal examination, hormonal/menopausal status, psychological and relationship factors, previous obstetric trauma, pelvic surgery, neurological disorders. [Krakowsky Y, Grober ED. A practical guide to female sexual dysfunction: An evidence-based review for physicians in Canada. Can Urol Assoc J. 2018 Jun;12\(6\):211-216. doi: 10.5489/cuaj.4907. Epub 2018 Feb 23. PMID: 29485038; PMCID: PMC5994984.](#)

Algorithms: The International Consultation on Sexual Medicine proposes an updated algorithm for diagnostic evaluation of sexual dysfunction in men and women, with specific recommendations for sexual history taking and diagnostic evaluation. Standardized scales, checklists, and validated questionnaires are additional adjuncts that should be used routinely in sexual problem evaluation. (6)[Hatzichristou D, Kirana PS, Banner L, Althof SE, Lonnee-Hoffmann RA, Dennerstein L, Rosen RC. Diagnosing Sexual Dysfunction in Men and Women: Sexual History Taking and the Role of Symptom Scales and Questionnaires. J Sex Med. 2016 Aug;13\(8\):1166-82.](#)

Psychosexual assessment should be integrated when anxiety, performance concerns, relationship issues, or previous psychological trauma contribute to symptoms.

● Advanced Diagnostic Evaluation

Specialised investigations

(Not required routinely; to be considered in selected situations)

- Young men with suspected traumatic or vascular ED
- Suspected arterial insufficiency
- Penile deformity
- Complex endocrine abnormalities
- Consideration of reconstructive vascular procedures

Available investigations include:

- Nocturnal penile tumescence and rigidity testing
- Intracavernosal injection testing
- Penile duplex Doppler ultrasound
- Cavernosometry/cavernosography
- Penile angiography in selected cases

Psychosexual assessment should be integrated when anxiety, performance concerns, relationship issues, or previous psychological trauma contribute to symptoms.

214 **Image created using Claude AI** [Miller TA. Diagnostic evaluation of erectile dysfunction. Am Fam Physician. 2000 Jan](#)
215 [1;61\(1\):95-104, 109-10. PMID: 10643952.](#)
216 [\(Dubinskaya et al., 2024\)](#) used the Female Sexual Function Index but as it mainly targets partnered penetrative
217 intercourse, a validated measure for solo sexual activity is needed.

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Management

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It includes sex education , counselling , sex therapy and pharmacotherapy which are covered in other clinical practice

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guidelines in this issue.

Newer digital technology and AI use in MSD

• **Digital therapeutics and apps:** structured app-based interventions for erectile dysfunction (ED) have shown clinically meaningful improvements in IIEF scores and quality-of-life in randomized trials and can be considered as adjunctive first-line or parallel therapy, particularly when access to in-person multidisciplinary care is limited.

• **Telemedicine and remote follow-up:** teleconsultation can be used for history-taking, medication management, adherence counseling, and guided pelvic/perineal physiotherapy programs when in-person visits are impractical, with appropriate privacy safeguards.

• **Device and robotics integration:** penile prostheses remain the standard for refractory organic ED; novel programmable/robotic-assist systems and smart implants are emerging but require further clinical validation and regulatory review before routine recommendation .

Mobile interventions: A brief, easily disseminated mobile intervention showed poor adherence, but had limited estimates of efficacy for secondary outcomes; perceived stress, learning stress management skills, and sexual functioning (women only). (8) [Pensak NA, Carr AL, Jones J, Mikulich-Gilbertson SK, Kutner JS, Kilbourn K, Sannes TS, Brewer BB, Kolva E, Joshi T, Laudenslager ML. A pilot study of mobilized intervention to help caregivers of oncology patients manage distress. *Psychooncology*. 2021 Apr;30\(4\):520-528.](#)

Internet based interventions: Most interventions offered Web-based therapeutic content within a more or less preprogrammed structure. Most of these also offered prescheduled and/or participant-initiated contact with a sexual health care professional.(30) [van Lankveld J. Internet-Based Interventions for Women's Sexual Dysfunction. *Curr Sex Health Rep*. 2016;8:136-143.](#)

Machine learning: AI, machine and deep learning models can accurately predict changes in core muscles during FSD. The neglected core muscles play a significant role in FSD, highlighting the need for comprehensive rehabilitation programs that address these muscles. (34) [Abdel Hady DA, Abd El-Hafeez T. Revolutionizing core muscle analysis in female sexual dysfunction based on machine learning. *Sci Rep*. 2024 Feb 27;14\(1\):4795.](#)

Metaverse: Participants identified several perceived benefits of metaverse-based intervention, including avoiding the perceived embarrassment of going to a clinic and accessing patients (a) with diverse physical or mental functionality, (b) living in remote areas and/or (c) balancing different family/work obligations or duties.(37) [Vila A, Romero-Moreno R, Nogales-Gonzalez C, Ritchey AJ, Ardoy-Cuadros J. Sexual Interventions in the Metaverse: Attitudes Towards Novel Therapeutic Approaches, a Qualitative Study. *Health Expect*. 2024 Oct;27\(5\):e70004.](#)

Virtual Reality: Virtual reality (VR) offers innovative treatment options for both mental and sexual disorders, such as female orgasmic disorder and erectile disorder. (38) [Lafortune D, Lapointe VA, Dubé S, Bonneau J. Virtual reality exposure therapy for sexual aversion: a proof-of-concept study on acceptability, adequacy, and clinical effects. *J Sex Med*. 2025 Jan 3;22\(1\):124-131.](#)

Sex Accessories:

Second-Line Therapies For men who do not respond adequately to oral therapy: **Vacuum Erection Devices** is non-invasive and can be used alone or combined with medication.

Vacuum erection device (VED) as one of the approved therapies for erectile dysfunction (ED) is widely used. VED is an effective adjunct for improving the intercourse success rate and patient satisfaction in refractory ED, a condition often unresponsive to PDE5 inhibitors. Future large randomized controlled trials with standardized objective measurements and longer follow-up durations are warranted. [Zhang F, Luo Z, Xue Q. Efficacy of vacuum erectile device in refractory erectile dysfunction: a systematic review and meta-analysis. International Journal of Impotence Research. 2026;38\(2\):76–85. doi:https://doi.org/10.1038/s41443-025-01102-w](#)

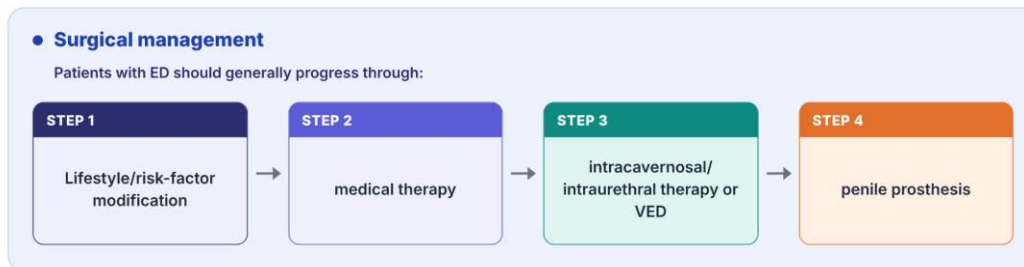
External aids for sexual recovery include external penile prosthesis, penile sleeves and penile support devices. **(13)** [Marcotte AS, Kaufman EM, Campbell JT, Reynolds TA, Garcia JR, Gesselman AN. Sextech use as a potential mental health reprieve: The role of anxiety, depression, and loneliness in seeking sex online. Int J Environ Res Public Health. 2021;18\(17\):8924. doi:10.3390/ijerph18178924.](#)

Multisensory integration can help with sexual arousal for men who use such devices allowing them to achieve orgasm despite intractable ED. Strap on dildo can help in penetrative sex . Penile rings can help to maintain erection by venous occlusion . Sex robot (Sergi Santos designed a love machine called Samantha)comes with sensors in the face , hands , breast and genitals . Sex dolls have developed which can replicate human sexual response. [Döring N, Mohseni MR, Walter R. Design, Use, and Effects of Sex Dolls and Sex Robots: Scoping Review. J Med Internet Res. 2020 Jul 30;22\(7\):e18551. doi: 10.2196/18551. PMID: 32729841; PMCID: PMC7426804.](#)

Surgical interventions:

Surgical management Patients with ED should generally progress through:

Lifestyle/risk-factor modification → medical therapy → intracavernosal/ intraurethral therapy or VED → penile prosthesis .



Penile prosthesis surgery: newer advances

The three-piece inflatable penile prosthesis (IPP) remains the principal definitive surgical option for medically refractory ED. The newer technological advances include

- Improved cylinder materials
- Smaller-profile reservoirs and pumps
- Antimicrobial coatings
- Hydrophilic coatings
- Improved locking/unlocking mechanisms
- Reservoir configuration options
- Enhanced tubing and connection systems
- Improved pump ergonomics
- MRI-compatible devices
- More physiological inflation/deflation profiles

Patients should receive structured counselling regarding expectations, complications, mechanical

failure, infection and revision surgery. (6). [Çakır ÖO, Lee WG, Ralph P, Meqson M, Ralph DJ. Advances in](#)

[Penile Prosthesis Surgery: A Clinical Update. Turk J Urol. 2022 Nov;48\(6\):393-397. doi: 10.5152/tud.2020.20442. PMID: 33112736; PMCID: PMC12482481.](#)

5. Artificial intelligence in ED surgery may potentially assist with:

- Preoperative patient selection
- Prediction of prosthesis complications
- Infection-risk stratification
- Device selection
- Corporal length prediction
- Identification of anatomical risk factors
- Image-based recognition of corporal fibrosis
- Postoperative outcome prediction
- Patient-specific rehabilitation pathways.(7) [Teoman AS, Serefoglu EC. Artificial Intelligence-Based Clinical Decision-Making in Erectile Dysfunction: a Narrative Review. Curr Urol Rep. 2024 Dec 11;26\(1\):22. doi: 10.1007/s11934-024-01251-3. PMID: 39663266.](#)

6. Regenerative and restorative therapies for ED include

- Low-intensity shockwave therapy
- Platelet-rich plasma
- Autologous cell therapy
- Stem-cell approaches
- Exosome-based therapies
- Tissue engineering
- Gene therapy
- Neuro-regenerative approaches.

These technologies are scientifically important but considered investigational in clinical trials or research protocols.(8,9,10,11) [Wang B, Gao W, Zheng MY, Lin G, Lue TF. Recent advances in stem cell therapy for erectile dysfunction: A narrative review. Expert Opin Biol Ther. 2023;23\(6\):565-573. doi:10.1080/14712598.2023.2203811.](#) (8)

[Drury R, Natale C, Hellstrom WJG. Reviewing the evidence for shockwave- and cell-based regenerative therapies in the treatment of erectile dysfunction. Ther Adv Urol. 2021;13:17562872211002059. doi:10.1177/17562872211002059.](#) (9)

[Fode M. Regenerative therapies for male sexual dysfunction: A review article. Dan Med J. 2025;72\(12\). doi:10.61409/A04250307.](#) (10)

[Sarnoski SS, Machado F, Almeida LMD, Andreolli A, Choji CH, Rahal AK, et al. The next generation of erectile dysfunction treatments: Clinical verdict on cell therapy, PRP, and Li-ESWT. J Sex Med. 2026;23\(Suppl 4\):qdaq118.504. doi:10.1093/jsxmed/qdaq118.504](#) (11)

8. Erectile dysfunction after radical prostatectomy. (12) [Emanu JC, Avildsen IK, Nelson CJ. Erectile dysfunction after radical prostatectomy: prevalence, medical treatments, and psychosocial interventions. Curr Opin Support Palliat Care. 2016 Mar;10\(1\):102-7. doi: 10.1097/SPC.000000000000195. PMID: 26808052; PMCID: PMC5005072.](#)

It includes

- Preoperative sexual-function assessment
- MRI-based anatomical planning where indicated
- Nerve-sparing surgical planning
- Intraoperative nerve identification
- Neurovascular bundle preservation
- Digital postoperative rehabilitation monitoring
- PDE5 inhibitor-based rehabilitation where clinically appropriate
- Early VED/ICI strategies
- Penile prosthesis for refractory ED

Premature Ejaculation(PE):

The current management of PE recommends pharmacological and behavioral strategies and Surgery should not be considered routine treatment for PE. Surgical/technology-based interventions proposed for PE (18). [Shechter A, Gruenwald I. New technologies developed for treatment of premature ejaculation. Int J Impot Res. 2024 Nov;36\(7\):700-705. doi: 10.1038/s41443-024-00875-w. Epub 2024 Mar 27. PMID: 38538813; PMCID: PMC11554564.](#)

A. Dorsal penile neurectomy .

Potential complications include • Permanent sensory alteration • Numbness • Neuropathic pain • Erectile/sexual dysfunction • Unpredictable effect on ejaculation • Patient dissatisfaction.

Current guidance recommends against dorsal neurectomy pending better safety evidence.

B. Glans augmentation include injection of • Hyaluronic acid • Other injectable fillers • Autologous materials to reduce glans sensitivity. However due to uncertain Objective long-term benefits , it should be performed by appropriately trained clinicians with informed consent regarding the limited long-term evidence. (19,20).

[Ambusaidi H, Alshuaibi M, Zuqail AS, Beley S. The role of surgical therapy in the management of premature ejaculation: a narrative review. Transl Androl Urol. 2023 Oct 31;12\(10\):1589-1597. doi: 10.21037/tau-23-240. Epub 2023 Oct 24. PMID: 37969778; PMCID: PMC10643386.](#) (19)

Deger, M.D., Gül, M. & Serefoglu, E.C. Surgical treatment of premature ejaculation: a narrative review. *Int J Impot Res* 36, 474–479 (2024). <https://doi.org/10.1038/s41443-023-00771-9> (20)

C. Neuro-modulation for PE • Sacral neuro-modulation • Peripheral nerve stimulation • Pudendal neuro-modulation • Transcutaneous electrical stimulation • Transdermal wearable device • Closed-loop neuromodulatory systems.

D. Cryoneurolysis and Radiofrequency ablation of dorsal penile nerve

E. Frenuloplasty

F. Botulinum toxin injection in bulbospongiosus muscles

These technologies may eventually provide a neurophysiological approach to ejaculatory control but currently there is insufficient evidence to recommend routine implantation of neuromodulatory devices specifically for PE

G. Digital technology for PE

Potential applications include • Smartphone-based IELT recording • Patient-reported outcome monitoring • Digital behavioural therapy • Psychosexual interventions • Biofeedback • Pelvic-floor EMG biofeedback • AI-assisted phenotyping • Treatment-response prediction.

Female Sexual Dysfunction

Evaluation of **Female Sexual Dysfunction** should include:(21) concerns like sexual desire, arousal, lubrication, orgasm, dyspareunia, genito-pelvic pain, pelvic-floor function, vulvovaginal examination, hormonal/menopausal status, psychological and relationship factors, previous obstetric trauma, pelvic surgery, neurological disorders. [Krakowsky Y, Grober ED. A practical guide to female sexual dysfunction: An evidence-based review for physicians in Canada. *Can Urol Assoc J*. 2018 Jun;12\(6\):211-216. doi: 10.5489/cuaj.4907. Epub 2018 Feb 23. PMID: 29485038; PMCID: PMC5994984.](#)

Surgical treatment may become relevant when sexual dysfunction is secondary to: • Pelvic organ prolapse • Vaginal stenosis • Significant scarring • Obstetric trauma • Fistula • Pelvic-floor anatomical abnormalities • Selected post-oncological anatomical defects.(22)

[Tunuguntla HS, Gousse AE. Female sexual dysfunction following vaginal surgery: a review. *J Urol*. 2006 Feb;175\(2\):439-46. doi: 10.1016/S0022-5347\(05\)00168-0. PMID: 16406967.](#)

A. **Female pelvic reconstructive surgery** is considered when a structural pelvic-floor disorder is contributing to sexual dysfunction and it aims to 1. Restore anatomy 2. Preserve vaginal length and calibre 3. Minimise postoperative pain 4. Preserve neural and vascular structures 5. Avoid

excessive vaginal narrowing 6. Address coexisting pelvic-floor dysfunction.(23) [Campaner AB, Valadares ALR, Vale FBC, de Oliveira LM, Schreiner L, Lara LAS, Costa-Paiva L, Sartori MGF, Speck NMG, Bella ZIKJD. Energies and new technologies in pelvic and pelvic floor dysfunctions. Rev Bras Ginecol Obstet. 2025 Jul 31;47:e-FPS6. doi: 10.61622/rbgo/2025FPS6. PMID: 41982307; PMCID: PMC13075998.](#)

B. Technology integration • 3-D pelvic imaging • Dynamic pelvic MRI • 3-D ultrasound • Robotic surgery • Laparoscopic reconstruction • Image-guided surgery • Digital pelvic-floor assessment • AI-based anatomical modelling. • Robotic assisted surgery

C. Labioplasty and clitoral hood should not be recommended solely to improve sexual pleasure or libido in otherwise anatomically normal patients. When performed for a clearly documented clinical indication, appropriate specialist assessment and informed consent are essential.

D. Clitoral surgery Because the clitoris is a highly innervated sexual organ, surgery carries a potential risk of: • Altered sensation • Neuropathic pain • Reduced orgasmic function • Scarring • Sexual dysfunction. It should be restricted to clearly defined clinical indications and performed by experts only.

E. Vaginal surgery which utilises various energy-based technologies including • CO₂ laser • Er:YAG laser • Radiofrequency • Other energy-based devices. These are often marketed for: • Vaginal dryness • Dyspareunia • GSM • Sexual dysfunction • “Vaginal rejuvenation.”

F. Vulvar Vestibulectomy , Vestibuoplasty

G. Vacuum device for clitoral congestion and erection

H. Pelvic-floor technology includes • Surface EMG • Intravaginal biofeedback • Pressure-based biofeedback • Digital pelvic-floor training • Wearable sensors • Real-time ultrasound biofeedback • AI-guided pelvic-floor rehabilitation. Potential uses include Hypertonic pelvic floor leading to dyspareunia, Hypotonic pelvic floor resulting in reduced sexual function / pelvic-floor symptoms, Postpartum dysfunction rehabilitation and Pelvic pain neuromuscular retraining

I. Neuromodulation for female sexual dysfunction includes • Sacral neuromodulation • Tibialnerve stimulation • Pudendal stimulation • Transcutaneous electrical nerve stimulation • Spinal neuromodulation. These technologies are better established for urinary and pelvic-floor disorders than for primary female sexual dysfunction.

J. Artificial intelligence in female sexual medicine

Diagnosis • Phenotyping of FSD • Identification of overlapping disorders • Pelvic-floor dysfunction classification Treatment • Personalised treatment pathways • Digital psychosexual interventions • Predicting response to therapy Surgery • 3-D anatomical reconstruction • Preoperative planning • Identification of neurovascular structures • Robotic navigation • Postoperative outcome prediction.

h. Virtual reality and digital sexual-health interventions include: • Virtual reality-based exposure therapy • Body-image interventions • Sexual pain rehabilitation • Couple-based interventions • Mindfulness/relaxation • Digital cognitive behavioral therapy.

These may have a role as adjuncts, particularly in patients with psychosexual or pelvic-pain components

Regenerative medicine in female sexual dysfunction include use of (24) *Saltzman RG, G Campbell K, J Ripps S, Golan R, Cabreja-Castillo MA, Garzon AM, Rahman F, Caceres LV, Tovar JA, Khan A, Hare JM, Ramasamy R. The impact of cell-based therapy on female sexual dysfunction: a systematic review and meta-analysis. Sex Med Rev. 2023 Sep 27;11(4):333-341. doi: 10.1093/sxmrev/qead023. PMID:37279578*

• Platelet-rich plasma • Autologous stem cells • Stromal vascular fraction • Exosomes • Tissue engineering • Angiogenic therapies • Nerve-regeneration strategies.

However, currently it should be regarded as investigational.

Temperature controlled radio frequency technology: Temperature-controlled radiofrequency technology has a certain therapeutic effect on FSD and Pelvic floor surface electromyography and sexual function test can be used as an objective indicator for PFD in FSD patients. (1) [Wang N, Li H. Therapeutic effect of the temperature-controlled radio frequency technology in female sexual dysfunction. Ginekol Pol. 2023 Aug 29.](#)

Sacral Neuromodulation

Recently, sacral neuromodulation (SNM) has emerged as a minimally invasive, safe, and effective neuromodulatory intervention, representing a significant advance in the management of refractory PFDs and it modulates the sacral nerve reflex pathways through an implanted electrode and it is specifically indicated for conditions including overactive bladder, non-obstructive urinary retention, and fecal incontinence, with potential therapeutic benefits extending to chronic pelvic pain, sexual dysfunction, and neurogenic bladder. (2) [Fu J, Li Z, Pu J, Liu Y, Mao Q, Li C, Li L, Gai X. Advancing women's health: innovative applications of sacral neuromodulation in pelvic floor dysfunctions. Arch Gynecol Obstet. 2025 Nov;312\(5\):1489-1501.](#)

Conclusion/Future Direction

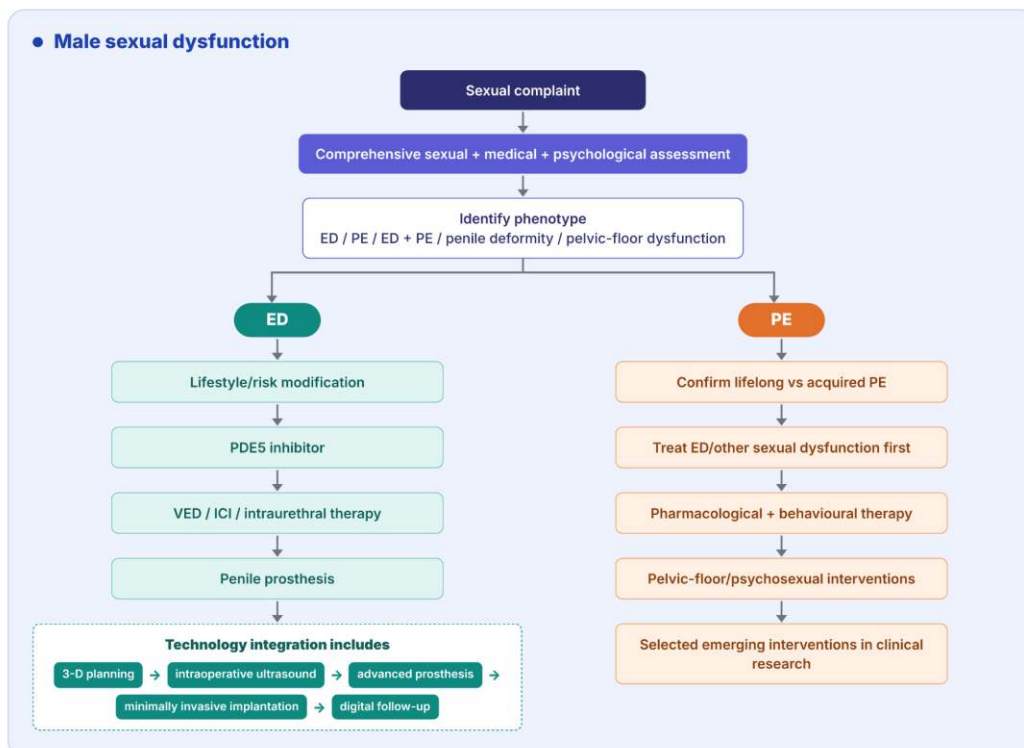
Core clinical approach continues to be standard diagnostic workup while incorporating tech enabled screening and remote monitoring as adjuncts to care.

Digital therapeutics and app based interventions have shown clinically meaningful improvements in randomized trials and can be considered as adjuncts when access to in person multidisciplinary care is limited. Telemedicine and remote follow up can be used with appropriate privacy safeguards. Penile prosthesis remains the standard for refractory ED. Novel programmable/ robotic assisted systems and smart implants are emerging but require further clinical validation. Regenerative stem cell therapy, Platelet rich plasma, Low intensity shock wave therapy and neuro-modulation are still considered investigational and require clinical validation and regulatory review before routine recommendation. Indian and culturally grounded research is needed on technology-mediated sexual behaviors and how they relate to sexual health. Research is also needed on digital sexual health interventions such as

telehealth and mobile-based psychosexual care, and on the clinical use, safety, acceptability and outcomes of sex accessories, app-enabled devices, tele-dildonics and sex robots. Priority groups are adolescents, sexual and gender minority persons, rural populations, persons with disabilities and people with limited access to care. Culturally sensitive assessment tools need to be developed and validated, and longitudinal studies and randomized controlled trials should evaluate digital, virtual reality-based and sex technology-assisted interventions for sexual dysfunction. All such research should protect privacy, follow ethical safeguards, be inclusive, and reflect clinical needs and Indian sociocultural realities.

Proposed treatment algorithm(25) [Nicol A, Chung E. Male sexual dysfunction: Clinical diagnosis and management strategies for common sexual problems. Aust J Gen Pract. 2023;52\(1-2\):41-45. doi:10.31128/JGP-09-22-6559](#)

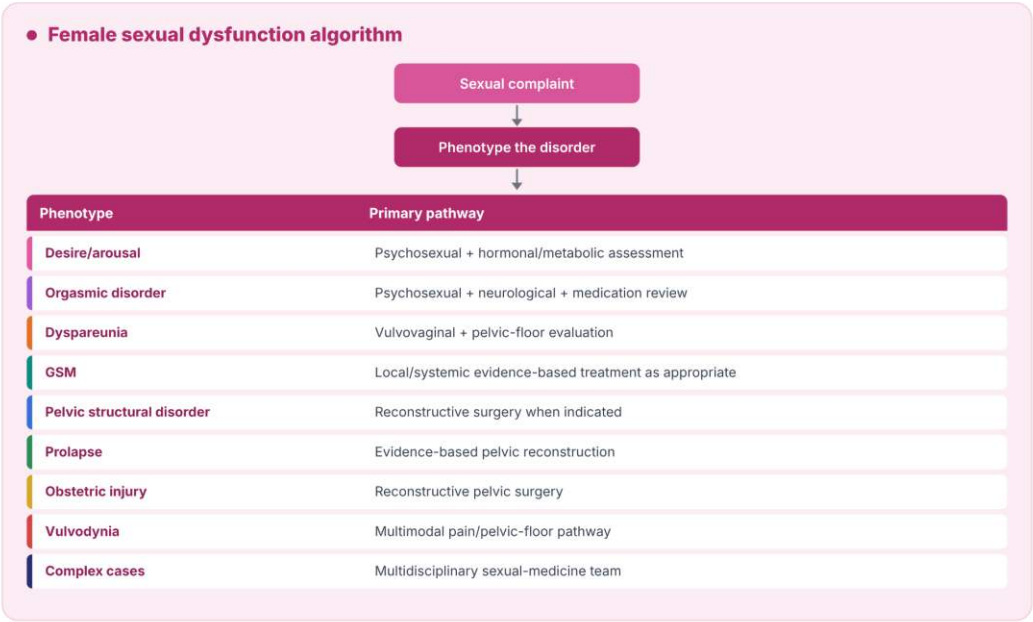
Proposed treatment algorithm



Image

Generated using Claude AI.

Proposed treatment algorithm



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Created Using Claude AI



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