REVIEW

Understanding erectile dysfunction: A review of causes, diagnosis, and treatment options

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ABSTRACT

Erectile dysfunction (ED) is a common condition that can stem from a myriad of causes, each influenced by physiological, psychological, and lifestyle factors. Understanding the multifaceted causes of ED is crucial for developing effective treatment strategies. As research continues to evolve in the field of sexual health, new insights and innovative findings are emerging that shed light on the underlying causes of erectile dysfunction. This paper explores the most recent and groundbreaking information related to the causes of ED, offering a comprehensive understanding of this multifaceted condition. The factors contributing to erectile dysfunction can be broadly categorized into physical, psychological, and lifestyle components. For nurses recognizing the intricate interplay of these elements is essential not only for effective patient assessment but also for tailored interventions and holistic care. Understanding the complexities surrounding erectile dysfunction directly informs nursing practice. It empowers nurses to implement evidence-based strategies, advocate for comprehensive assessments, and promote awareness of holistic approaches to health and well-being in patients. This holistic understanding ultimately contributes to the advancement of sexual health care and improves the quality of life for individuals experiencing ED.

Key Words: Physical, Psychological, Lifestyle factors, Risk factors, Diagnosis, Treatment, Nursing implications

1. INTRODUCTION

A review of the causes, risk factors and treatments for erectile dysfunction (ED) is warranted due to its high prevalence, multifactorial nature, profound impact on quality of life, and the emergence of new treatment options. By enhancing understanding, fostering awareness, and guiding clinical practice and research, such a review can contribute significantly to the effective management of erectile dysfunction and improve the health and quality of affected individuals. The implications for nursing are significant. By guiding clinical practice with up-to-date information on ED, nurses can implement evidence-based interventions that improve patient outcomes. Additionally, continued education and research into the causes and treatments of ED enable nurses to monitor the effectiveness of various therapies, adapt care plans as needed, and contribute to a holistic approach that addresses both physical and psychological aspects of the condition. Ultimately, such a review can significantly enhance the management of erectile dysfunction, leading to improved health and quality of life for affected individuals.

2. PHYSICAL CAUSES

One of the predominant physical causes of erectile dysfunction is cardiovascular disease. Conditions that interfere with blood flow, such as atherosclerosis, can severely restrict blood circulation to the penis, directly affecting a man's

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ability to achieve an erection. Atherosclerosis involves the buildup of plaque in the arteries, which can impede circulation not only to the heart and brain but also to the penile tissues, creating significant issues for sexual function. Research indicates that cardiovascular health plays a crucial role in erectile function; recent studies suggest that nearly 40% of men with ED have some form of cardiovascular disease, emphasizing the link between these two conditions.[1]

Another significant physical factor is diabetes, which is increasingly recognized as a major contributor to erectile dysfunction. High blood sugar levels can damage nerves and blood vessels over time, complicating the ability to achieve and maintain an erection. The risk of developing ED is notably higher in men with diabetes due to the vascular and neurological complications that accompany the disease. A study published in 2021 found that approximately 47% of men with diabetes experience erectile dysfunction, underscoring the condition's prevalence within this population.[2]

Hormonal imbalances, particularly low testosterone levels, can also play a critical role in erectile dysfunction. A man's sexual desire and ability to achieve and sustain an erection can diminish when testosterone levels are inadequate. These hormonal changes can occur due to various factors, including aging, specific medical conditions, and hormonal disorders. Recent data reveal that testosterone deficiency affects around 40% of men aged 45 and older, highlighting a potential area for therapeutic intervention.[3]

Neurological disorders are another category of physical causes linked to erectile dysfunction. Conditions such as Parkinson's disease, multiple sclerosis, and spinal cord injuries can interfere with the nerve signals necessary for achieving an erection. These disorders disrupt the communication between the nervous system and the reproductive system, leading to problems with sexual function. Notably, recent findings suggest that men with spinal cord injuries have an ED prevalence rate as high as 75%, showcasing the significant impact of neurological factors on erectile health.[4]

Additionally, various chronic illnesses, including kidney disease and liver disease, can contribute to erectile dysfunction by affecting overall health and hormonal balance. Chronic kidney disease is particularly relevant, as it can lead to hormonal imbalances and vascular changes that negatively impact sexual function. Recent studies have indicated that men with chronic kidney disease experience rates of erectile dysfunction exceeding 50%.[5]

Certain medications can also lead to erectile dysfunction as a side effect. Common culprits include antidepressants and antihypertensive drugs. For example, selective serotonin reuptake inhibitors (SSRIs), frequently prescribed for depression, have been linked to sexual side effects, including erectile dysfunction in a significant subset of patients. Research from 2022 highlights that approximately 30% of men taking SSRIs report some degree of sexual dysfunction, emphasizing the need for careful medication management.[6]

Research into lifestyle choices has also unveiled important risk factors associated with erectile dysfunction. Obesity continues to be a major contributor; a significant study in 2023 found that men with a body mass index (BMI) of 30 or higher face a 60% higher risk of developing ED compared to those of normal weight.[7] The physiological mechanisms behind this association involve hormonal changes and vascular complications. Consequently, weight loss programs emphasizing healthy eating and regular exercise are being promoted not just for overall health but as pivotal interventions to improve sexual health.

Smoking presents another clear risk factor. Recent statistics indicate that smokers are 50% more likely to experience erectile dysfunction than non-smokers.[8] The harmful effects of tobacco on vascular health are well-documented, leading to impaired blood flow, which is critical for achieving and maintaining an erection. Community health campaigns now focus on smoking cessation as a dual approach to improve both general and sexual health, ensuring men understand the benefits of quitting smoking on erectile function.

Alcohol consumption is also a contributing lifestyle factor; studies show that excessive drinking significantly increases the risk of erectile dysfunction. A review published in 2023 revealed that heavy alcohol use affects testosterone levels and impairs erectile function in various ways.[9] Given these findings, public health initiatives are increasingly emphasizing moderation and providing support for those struggling with alcohol dependence.

3. Psychological causes

While physical factors are crucial, psychological causes of erectile dysfunction are being reexamined considering recent findings. Emerging data indicate that psychological factors, such as stress and anxiety, can trigger or exacerbate ED, creating a cycle that is difficult to break. A comprehensive review from the Archives of Sexual Behavior in late 2022 revealed that approximately 40% of men with ED reported significant levels of anxiety and depression, highlighting the mental health aspect of sexual function.[10] This relationship underscores the need for integrated treatment approaches that address both mental and physical health.

Additionally, there is increasing recognition of the effects of relationship dynamics on erectile dysfunction. Recent studies have shown that lack of communication and unre-

solved conflicts between partners can significantly affect a man's ability to perform sexually. Research presented at the American Urological Association's 2023 annual meeting demonstrated that men who reported relationship dissatisfaction were twice as likely to experience ED.[11] This finding suggests that addressing relational issues may be as pivotal as treating physiological problems, advocating for couples therapy and counseling as valuable components of comprehensive treatment strategies.

Understanding the causes of erectile dysfunction is integral to nursing practice because it enhances patient assessment, informs tailored treatment plans, facilitates patient education, fosters communication, and promotes interdisciplinary collaboration. By recognizing the multifaceted nature of ED, nurses can provide comprehensive and empathetic care, ultimately improving health outcomes and quality of life for individuals affected by this condition.

4. Assessment and innovative diagnosis

One of the cornerstones of an effective diagnosis for erectile dysfunction is a thorough medical history. Recent research emphasizes the importance of understanding a patient's comprehensive health background, including chronic diseases, medications, and lifestyle factors. Healthcare providers are encouraged to adopt a proactive approach when gathering this information, as many men are reluctant to discuss sexual health issues due to stigma or embarrassment. Innovative patient questionnaires have been developed to facilitate these conversations. These tools not only focus on sexual health but also encompass broader health concerns, giving clinicians valuable insights into potential underlying causes of ED. A recent study found that utilizing structured questionnaires can significantly improve the accuracy of diagnoses, as they help identify psychological and emotional factors that may contribute to erectile dysfunction.[10] By enabling open dialogue, these tools help destigmatize discussions around sexual health, leading to better patient engagement and more accurate assessments.

In addition to a thorough medical history, a focused physical examination is crucial for diagnosing erectile dysfunction. Recent guidelines emphasize the importance of assessing cardiovascular health since vascular issues are often a precursor to ED. This includes measuring blood pressure, evaluating heart health, and inspecting the genital area for any abnormalities.

Innovative techniques are being incorporated into physical exams as well. For instance, new imaging technologies, such as high-resolution ultrasound, allow healthcare providers to evaluate blood flow dynamics in penile arteries more accurately. A study published in 2023 highlighted that these advanced imaging techniques can provide detailed insights into vascular function that traditional methods miss, enabling more precise diagnoses and tailored treatment plans.[12] This approach is particularly valuable for men who might have underlying cardiovascular conditions contributing to their erectile dysfunction.

Laboratory tests play a pivotal role in diagnosing erectile dysfunction by identifying underlying health conditions. While routine blood tests assessing hormonal levels, blood sugar, and lipids have become standard practice, recent advances are highlighting the potential of emerging biomarkers. For example, researchers are investigating the role of inflammatory markers, such as C-reactive protein (CRP), in predicting erectile dysfunction. A recent meta-analysis revealed that elevated CRP levels are significantly associated with impaired erectile function, suggesting that these biomarkers could provide additional insights into a patient's risk profile.[9] As research continues to evolve, the integration of these biomarkers into routine clinical practice may allow healthcare providers to identify men at risk for erectile dysfunction earlier and with greater accuracy.

In more complex cases, specialized tests may be necessary to diagnose erectile dysfunction effectively. Recent advancements in diagnostic technologies have enriched the options available to healthcare providers. For instance, penile Doppler ultrasound is becoming increasingly popular in clinical settings as a non-invasive method for assessing blood flow and vascular function in the penis. Innovative techniques in Doppler ultrasound allow for real-time evaluation of blood flow during erections, providing crucial data that can help distinguish between different types of erectile dysfunction—whether they are primarily psychological or vascular in nature. A study published in 2023 revealed that utilizing Doppler ultrasound improved the diagnosis accuracy of vascular ED by over 30% compared to traditional assessment methods.[13] This advancement empowers clinicians to devise more tailored treatment strategies based on precise diagnostic results.

Furthermore, nocturnal penile tumescence (NPT) testing remains a significant tool for diagnosing erectile dysfunction, particularly in differentiating between psychological and physiological causes. Recent innovations in this area involve wearable devices that can track nocturnal erections and provide detailed reports to both patients and clinicians. These devices have become increasingly sophisticated, with some capable of monitoring data through smartphone applications, making it easier for patients to share their results during

consultations.[14]

The rise of telehealth has also transformed the diagnostic landscape for erectile dysfunction. Recent advancements in remote consultation technologies allow healthcare providers to conduct thorough assessments through virtual appointments. This development has proven particularly advantageous for men who may feel uncomfortable discussing sexual health issues in person. Telehealth consultations often utilize digital questionnaires and mobile health apps that allow patients to report symptoms and track their sexual health over time. A study highlighted how telehealth has increased access to care, noting a 40% increase in men seeking help for erectile dysfunction during the past year.[11] This accessibility can lead to earlier diagnoses and intervention, ultimately improving patient outcomes.

Understanding the diagnosing and testing for the causes of erectile dysfunction is fundamental to nursing practice. It enhances patient assessment, ensures appropriate testing, facilitates early detection of underlying health issues, and supports patient education and engagement. The implications for nursing are significant, as they involve providing compassionate, evidence-based care while promoting a more comprehensive approach to sexual health and well-being. By being well-versed in these areas, nurses can significantly impact patient outcomes and improve the overall quality of care provided to individuals experiencing ED.

5. EMERGING THERAPIES

Traditionally, phosphodiesterase type 5 (PDE5) inhibitors, such as Viagra (sildenafil), Cialis (tadalafil), and Levitra (vardenafil), are the first-line treatments for erectile dysfunction. These medications help increase blood flow to the penis, enhancing the ability to achieve and maintain an erection. However, recent studies have explored alternative medications and combinations that may yield better results for various patient populations. One exciting development is the exploration of new formulations of existing medications. For instance, researchers have been investigating a once-daily use version of tadalafil, which could provide spontaneous sexual activity without the need for timing doses.[15] This innovation aims to address the inconvenience often reported by patients who feel pressured to take medication right before sexual activity. Moreover, the potential of combining PDE5 inhibitors with other therapies is gaining traction. One study showed that incorporating low-dose testosterone therapy alongside PDE5 inhibitors significantly enhanced treatment outcomes for men with both erectile dysfunction and low testosterone levels.[16] This dual approach not only improves erectile function but also addresses libido, creating a more holistic treatment strategy.

Hormonal treatments for erectile dysfunction are becoming increasingly sophisticated, particularly for men diagnosed with testosterone deficiency. Recent developments have seen the advent of new delivery methods for testosterone replacement therapy, including gels, patches, and injectable forms that allow for sustained hormone levels.[17] A study published in 2022 demonstrated that men using testosterone gels reported significant improvements in sexual desire and erectile function, reaffirming the importance of hormone regulation in the treatment of ED.[10]

Emerging data also suggest a potential link between hormonal fluctuations and erectile dysfunction in younger men. This correlation has encouraged healthcare providers to consider more proactive screening for testosterone levels, even in patients under 40, opening new avenues for early intervention.[18]

In addition to pharmacological treatments, device-based therapies offer non-invasive options for men experiencing erectile dysfunction. Vacuum erection devices (VEDs)have long been utilized, but recent innovations have enhanced their usability and effectiveness. Newer models feature improved suction mechanisms and more comfortable constriction rings, making them more user-friendly. Research indicates that more than 70% of men using VEDs report successful erections sufficient for sexual intercourse.[19] Penile implants have also undergone significant technological advancements. The newest generation of inflatable penile implants now features more streamlined designs that provide a more natural feel and improved patient satisfaction. A recent study found that satisfaction rates among patients receiving these implants have risen to over 90%, highlighting the importance of this surgical option for men who do not respond to other treatments.[20]

Another innovative approach gaining popularity is low-intensity shockwave therapy. This non-invasive treatment uses sound waves to stimulate blood flow and encourage tissue regeneration in the penis. Recent clinical trials have shown promising results, revealing that a series of shockwave treatments can lead to lasting improvements in erectile function for some men, even after treatment has concluded.[21] This has generated considerable interest, particularly among men looking for alternatives to medication or surgery. Moreover, the field of regenerative medicine is also exploring cutting-edge techniques such as stem cell therapy and platelet-rich plasma (PRP) injections. Early studies suggest that these treatments may promote new blood vessel growth and improve erectile function. While still in the research phase, initial results indicate that patients receiving PRP injections into the penis experienced significant im-

provements in erectile function and overall satisfaction.[22] As these therapies undergo further clinical trials, they hold promise as potential treatments for erectile dysfunction.

Recognizing the psychological components of erectile dysfunction has led to an increased emphasis on therapy and counseling as integral parts of treatment. Cognitive-behavioral therapy (CBT) has been shown to effectively address performance anxiety and emotional distress related to ED, resulting in improved sexual function. Recent studies indicate that integrating therapy with pharmacological approaches can yield better outcomes than medication alone.[23] Additionally, lifestyle modifications are crucial for the treatment of erectile dysfunction. Health care providers are increasingly recommending exercise programs, dietary changes, and smoking cessation as part of a comprehensive ED treatment plan. Recent guidelines emphasize that these lifestyle changes can significantly reduce the risk of ED and enhance the effectiveness of medical treatments.[18]

The landscape of erectile dysfunction treatment is evolving rapidly, driven by innovative research and new therapeutic approaches. From advancements in medication and hormonal therapies to device-based solutions and regenerative medicine, there are now more options than ever for men facing this challenging condition. By combining medical interventions with psychological support and lifestyle modifications, healthcare providers can offer a holistic approach that addresses the diverse needs of patients. As research continues to uncover new strategies, the future looks promising for improving sexual health and overall quality of life for men experiencing erectile dysfunction. Understanding the trends and emerging treatments for erectile dysfunction is critical for nursing practice. This knowledge enhances patient care by facilitating informed decision-making, personalized treatment approaches, and improved patient education. Additionally, nurses play a key role in advocating for patients, supporting lifestyle changes, and collaborating within interdisciplinary teams. By staying updated on advancements in ED management, nurses can significantly impact the quality of care and overall health outcomes for individuals experiencing this common condition.

6. Conclusions

Erectile dysfunction involves various causes and risk factors, making it a multifaceted condition. Understanding these elements is vital for effective diagnosis and treatment. With appropriate medical intervention, lifestyle changes, and psychological support, many men can successfully manage ED and improve their sexual health and overall quality of life. Seeking help from a healthcare professional is essential for those experiencing symptoms of erectile dysfunction, as early intervention can lead to better outcomes. Understanding the complexities surrounding erectile dysfunction directly informs nursing practice. It empowers nurses to implement evidence-based strategies, advocate for comprehensive assessments, and promote awareness of holistic approaches to health and well-being in patients.

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REFERENCES

[1] Hoppe H, Diehm N. Percutaneous treatment of venous erectile dysfunction. Frontiers in Cardiovascular Medicine. 2020; 7: 626943. PMid: 33604356. https://doi.org/10.3389/fcvm.2020.626943

[2] Agochukwu-Mmonu N, Pop-Busui R, Wessells H, et al. Autonomic neuropathy and urologic complications in diabetes. Autonomic Neuroscience. 2020; 229: 102736. PMid: 33197694. https://doi.org/10.1016/j.autneu.2020.102736

[3] Patel DP, Pastuszak AW, Hotaling JM. Genetics and erectile dysfunction: Leveraging early foundations for new discoveries. International Journal of Impotence Research. 2022; 34: 252-259. PMid: 33173200. https://doi.org/10.1038/s41443-020-00372-w

[4] Yamagishi M, Ogushi Y, Niikura A, et al. Erectile dysfunction in young patients and elderly patients by sexual encounter profile: A comparative study. International Journal of Urology. 2022; 29(6): 566-570. PMid: 35231950. https://doi.org/10.1111/iju.14850

[5] Zou Z, Lin H, Zhang Y, et al. The role of nocturnal penile tumescence and rigidity (nptr) monitoring in the diagnosis of psychogenic erectile dysfunction: A review. Sex. Med. Rev. 2019; 7(3): 442-454. PMid: 30612976. https://doi.org/10.1016/j.sxmr.2018.10.005

[6] Motwani S, Hukumchand A, Karia S, et al. Sexual Dysfunction with Antidepressants: A Clinical Review. Indian Journal of Private Psychiatry. 2023; 17(2): 78-82. https://doi.org/10.5005/jp-journals-10067-0143

[7] Mazzilli F. Erectile Dysfunction: Causes Diagnosis and Treatment: An Update. Journal of Plastic, Reconstructive & Aesthetic Surgery. 2022; 72(4): 532-538. PMid: 32805230. https://doi.org/10.1016/j.amjmed.2020.07.015

[8] Faselis C, Katsimardou A, Imprialos K, et al. Microvascular complications of type 2 diabetes mellitus. Current Vascular Pharmacology. 2020; 18(2): 117-124. PMid: 31057114. https://doi.org/10.2174/1570161117666190502103733

[9] Isidori AM, Giammusso B, Corona G. Diagnostic and Therapeutic Workup of Erectile Dysfunction: Results from a Delphi Consensus of Andrology Experts. Sexual Medicine. 2019; 7: 292-302. PMid: 31196744. https://doi.org/10.1016/j.esxm.2019.04.001

[10] Mazzilli F. Sexual Dysfunction with Antidepressants: A Clinical Review. Journal of Clinical Medicine. 2020; 11(21): 6429. PMid: 36362656. https://doi.org/10.3390/jcm11216429

[11] Hicks CW, Wang D, Windham BG, et al. Association of peripheral neuropathy with erectile dysfunction in US men. American Journal of Medicine. 2021; 134(2): 282-3. PMid: 32805230. https://doi.org/10.1016/j.amjmed.2020.07.015

[12] Bovijn J, Jackson L, Censin J, et al. GWAS Identifies Risk Locus for Erectile Dysfunction and Implicates Hypothalamic Neurobiology and Diabetes in Etiology. American Journal of Human Genetics. 2019; 104: 157-163. PMid: 30583798. https://doi.org/10.1016/j.ajhg.2018.11.004

[13] Dake Zhu P, Quan M, Wang C, et al. Erectile Dysfunction and Oxidative Stress: A Narrative Review. International Journal of Molecular Sciences. 2025; 26(7): 3073. PMid: 40243750. https://doi.org/10.3390/ijms26073073

[14] Baturu M, Solakhan M, Kazaz T, et al. Frequently asked questions on erectile dysfunction: evaluating artificial intelligence answers with expert mentorship. International Journal of Impotence Research. 2025; 37(4): 310-314. PMid: 38714784. https://doi.org/10.1038/s41443-024-00898-3

[15] Agochukwu-Mmonu N, Malaeb BS, Hotaling JM, et al. Risk factors for orgasmic and concomitant erectile dysfunction in men with type 1 diabetes: A cross-sectional study. International Journal of Impotence Research. 2021; 33(1): 59-66. PMid: 32157243. https://doi.org/10.1038/s41443-020-0242-8

[16] Jiang N, Wu C, Zhou X, et al. Cavernous Nerve Injury Resulted Erectile Dysfunction and Regeneration. Journal of Immunology Research. 2021; 12(2021): 1-10. PMid: 34970630. https://doi.org/10.1155/2021/5353785

[17] Cloete L. Diabetes mellitus: An overview of the types, symptoms, complications and management. Nursing Standard. 2022; 37(1): 61-66. PMid: 34708622. https://doi.org/10.7748/ns.2021.e11709

[18] Xiong Y, Zhang Y, Zhang F, et al. Applications of artificial intelligence in the diagnosis and prediction of erectile dysfunction: A narrative review. Int J Impot Res. 2023; 35: 95-102. PMid: 35027721. https://doi.org/10.1038/s41443-022-00528-w

[19] Chung C. A Review of Current and Emerging Therapeutic Options for Erectile Dysfunction. Medical Science. 2019; 7: 91. PMid: 31470689. https://doi.org/10.3390/medsci7090091

[20] Katz JE, Clavijo RI, Rizk P, et al. The Basic Physics of Waves, Soundwaves, and Shockwaves for Erectile Dysfunction. Sexual Medicine Reviews. 2020; 8: 100-105. PMid: 31735700. https://doi.org/10.1016/j.sxmr.2019.09.004

[21] Kun P, Deng P, Hao X, et al. Advances in physical diagnosis and treatment of male erectile dysfunction. Frontiers in Physiology. 2023; 13: 1096741. PMid: 36699684. https://doi.org/10.3389/fphys.2022.1096741

[22] Retzler K. Erectile Dysfunction: A Review of Comprehensive Treatment Options for Optimal Outcome. Journal of Restorative Medicine. 2019; e20190104.

[23] Calzo JP, Justin SB, Charlton BM, et al. Erectile dysfunction in a sample of sexually active young adult men from a U.S. Cohort: Demographic, metabolic and mental health correlates. Journal of Urology. 2021; 205(2): 539-544. PMid: 32935616. https://doi.org/10.1097/JU.0000000000001367