CADTH Reference List

Penile Doppler Ultrasound for Erectile Dysfunction

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Summary of Abstracts

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Key Messages

- We did not find any studies on the diagnostic test accuracy of point-of-care penile doppler ultrasound for patients suspected of having erectile dysfunction.
- We did not find any studies on the clinical utility of point-of-care penile doppler ultrasounds for patients suspected of having erectile dysfunction.
- We did not find any studies on the cost-effectiveness of point-of-care penile doppler ultrasounds for patients suspected of having erectile dysfunction.
- We found 1 evidence-based guideline regarding the use of penile doppler ultrasound as a test for erectile dysfunction.
- We found 4 evidence-based guidelines regarding the diagnosis of erectile dysfunction.

Research Questions

1. What is the diagnostic test accuracy of point-of-care penile doppler ultrasound for patients suspected of having erectile dysfunction?
2. What is the clinical utility of point-of-care penile doppler ultrasounds for patients suspected of having erectile dysfunction?
3. What is the cost-effectiveness of point-of-care penile doppler ultrasounds for patients suspected of having erectile dysfunction?
4. What are the evidence-based guidelines regarding the use of penile doppler ultrasound as a test for erectile dysfunction?
5. What are the evidence-based guidelines regarding the diagnosis of erectile dysfunction?

Methods

Literature Search Methods

An information specialist conducted a literature search on key resources including MEDLINE, the Cochrane Database of Systematic Reviews, the International HTA Database, the websites of Canadian and major international health technology agencies, as well as a focused internet search. The search approach was customized to retrieve a limited set of results, balancing comprehensiveness with relevancy. The search strategy comprised both controlled vocabulary, such as the National Library of Medicine's MeSH (Medical Subject Headings), and keywords. Search concepts were developed based on the elements of the research questions and selection criteria. The main search concepts were penile doppler ultrasound and erectile dysfunction. No filters were applied to limit the retrieval by study type for questions 1 to 4. CADTH-developed search filters were applied to limit retrieval to guidelines for question 5. The search was completed on May 3, 2023, and limited to English-language documents published since January 1, 2018. Internet links were provided, where available.

Selection Criteria and Summary Methods

One reviewer screened literature search results (titles and abstracts) and selected publications according to the inclusion criteria presented in Table 1. Full texts of study publications were not reviewed. The Overall Summary of Findings was based on information available in the abstracts of selected publications. Open access full-text versions of evidence-based guidelines were reviewed when available, and relevant recommendations were summarized.

Table 1: Selection Criteria

Criteria	Description
Target condition and population	People with suspected erectile dysfunction
Index test or intervention	Q1 to Q3: Point-of-care penile doppler ultrasound performed by nonradiologists Q4: Penile doppler ultrasound Q5: Any method or approach for the diagnosis of erectile dysfunction
Reference standard	Q1: Vascular ultrasound of the penis performed in a medical imaging facility or by a radiologist Q2 to Q5: Not applicable
Comparator	Q1, Q4, and Q5: Not applicable Q2 and Q3: Standard of care (e.g., patient history, vascular ultrasound in a medical imaging facility)
Outcomes	Q1: Diagnostic test accuracy (e.g., sensitivity, specificity, positive predictive value, negative predictive value) Q2: Clinical utility (e.g., time to diagnosis, patient management, quality of life, time to treatment, direct patient benefits and harms) Q3: Cost-effectiveness (e.g., cost per quality-adjusted life-year gained, incremental cost-effectiveness ratio) Q4: Recommendations regarding the use penile doppler ultrasound (e.g., best practices, contraindications, appropriate patient populations and clinical settings) Q5: Recommendations regarding best practices for diagnosing erectile dysfunction (e.g., which tests or assessment tools to use)
Study designs	Health technology assessments, systematic reviews, randomized controlled trials, nonrandomized studies, economic evaluations, evidence-based guidelines

Results

No relevant health technology assessments, systematic reviews, randomized controlled trials, or nonrandomized studies were identified about the diagnostic test accuracy of point-of-care penile doppler ultrasounds (PDUs) for patients suspected of having erectile dysfunction (ED). No relevant literature was identified about the clinical utility of point-of-care PDUs for patients suspected of having ED. Additionally, no economic evaluations were identified about the cost-effectiveness of point-of-care PDUs for patients suspected of having ED. One evidence-based guideline was identified about the use of PDU as a test for ED.[1] Four evidence-based guidelines were identified about the diagnosis of ED.[1-4]

Additional references of potential interest that did not meet the inclusion criteria are provided in Appendix 1.

Overall Summary of Findings

Four evidence-based guidelines were identified.[1-4] One guideline recommends performing penile colour doppler ultrasound in all men with ED.[1] Three guidelines[1-3] recommend a variety of diagnostic tools for ED, including cardiological assessment,[1] instrumental evaluation,[1] metabolic and hormonal evaluation,[1,2] physical examination,[1,2] self-reported questionnaires[1-3] and structured interviews.[1,3] One guideline recommends performing specialized diagnostic tests under certain circumstances only.[2] In addition, multiple evaluation methods focusing on psychosocial aspects of ED are recommended, including psychiatric,[1] psychological,[1,3] and psycho-sexological[1,3] assessments and partner involvement.[3] One guideline also recommends creating a safe, open, and inclusive environment for patients suspected of having ED.[3] Finally, 1 guideline recommends against the "exclusion diagnosis".[1] A detailed summary of guideline recommendations can be found in Table 2.

Table 2: Summary of Recommendations in Included Guidelines

Summary of recommendations	Quality or level of evidence and/or strength of recommendations
Corona et al. (2023)[1]	
"Recommendation 33. We recommend against the "exclusion diagnosis," as it is not evidence based, of erectile dysfunction." (p. 13)	NA
"Recommendation 35. We suggest using validated questionnaires and structured interviews to support medical and sexological history during erectile dysfunction assessment and/or follow up." (p. 14)	**Strength of recommendation:** Weak **Quality of evidence:** Low
"Recommendation 36. We recommend a focused genitalurinary and physical examination including penis, testis, and prostate evaluation, at least at the patient's first visit, in addition to the mandatory general physical examination." (p. 14)	**Strength of recommendation:** Strong **Quality of evidence:** High
"Recommendation 37. We recommend routine laboratory tests including fasting glucose, glycated hemoglobin and triglycerides and total and HDL cholesterol, in all patients affected by erectile dysfunction." (p. 15)	**Strength of recommendation:** Strong **Quality of evidence:** High
"Recommendation 38. We recommend routine hormonal parameters including luteinizing hormone, follicle-stimulating hormone, total testosterone, sex hormone binding globulin, and albumin (for calculated free testosterone determination) in all patients affected by ED." (p. 15)	**Strength of recommendation:** Strong **Quality of evidence:** High
"Recommendation 39. We suggest considering prolactin and thyroid stimulating hormone evaluation in the presence of other sexual comorbidities such as reduced sexual desire or ejaculatory dysfunctions." (p. 15)	**Strength of recommendation:** Weak **Quality of evidence:** Low
"Recommendation 40. We suggest performing penile color Doppler ultrasound, at least in flaccid condition, in all men with erectile dysfunction." (p. 15)	**Strength of recommendation:** Weak **Quality of evidence:** Moderate
"Recommendation 41. We suggest performing Nocturnal Penile Tumescence and Rigidity (NPTR) test or other instrumental examinations only in selected patients." (p. 15)	**Strength of recommendation:** Weak **Quality of evidence:** Low

Summary of recommendations	Quality or level of evidence and/or strength of recommendations
"Recommendation 42. We suggest that coronary artery calcium score (if permitted by local expertise and availability) could be considered as a further diagnostic test in men with calculated risks around decision thresholds (low-to-intermediate CVD risk profile), in order to relocate them to different risk groups." (p. 16)	**Strength of recommendation:** Weak **Quality of evidence:** Low
"Recommendation 43. We suggest educational, psychological, psycho-sexological, and marital assessment in all patients with ED." (p. 16)	NA
"Recommendation 44. We recommend investigating anxiety and depressive symptoms, through standardized self-reported assessment, in men with erectile dysfunction, due to high incidences of these disorders." (p. 17)	**Strength of recommendation:** Strong **Quality of evidence:** High
"Recommendation 45. We suggest using as screening tools "General Anxiety Disorder-7" and "Patient Health Questionnaire-9", for anxiety and depression, respectively." (p. 17)	**Strength of recommendation:** Weak **Quality of evidence:** Moderate
Chung et al. (2022)[2]	
"A comprehensive clinical history and tailored physical examination are required in all cases." (p. 3)	**Strength of recommendation:** Weak **Level of evidence:** OCEBM Level 3
"Clinically validated questionnaires to evaluate ED can be used to assess sexual function domains and response to therapies to assess sexual function domains and response to therapies." (p. 3)	**Strength of recommendation:** Weak **Level of evidence:** OCEBM Level 3
"Routine blood testings for ED include fasting glucose and/or glycated haemoglobin, lipid profile and fasting testosterone glycated haemoglobin, lipid profile and fasting testosterone levels." (p. 3)	**Strength of recommendation:** Strong **Level of evidence:** OCEBM Level 3
"Specialised diagnostic tests are required under certain circumstances only, and proper patient counselling should be undertaken before organising these tests." (p. 3)	**Strength of recommendation:** Weak **Level of evidence:** OCEBM Level 4
Dewitte et al. (2021)[3]	
"Statement 2: The diagnostic process of ED should take into account diversity in terms of onset, context, age, and sexual orientation." (p. 4)	**Quality of evidence:** Grade C **Level of evidence:** 2011 OCEBM Level 2
"Statement 3: Questionnaires and structured interviews can support the diagnostic process but must not be considered a replacement of history taking." (p. 4)	NA
"Statement 4: Clinicians are recommended to proactively ask about sexuality, ED, and treatment options by creating a safe and open environment." (p. 5)	NA
"Statement 5: The assessment of ED requires a medical and psychosexual evaluation as approached from a multidisciplinary perspective." (p. 5)	**Quality of evidence:** Grade 3 **Level of evidence:** 2011 OCEBM Level 3
"Statement 6: When possible, the partner needs to be involved in the assessment of ED." (p. 5)	**Quality of evidence:** Grade B **Level of evidence:** 2011 OCEBM Level 1
"Statement 7: The evaluation of ED should include an assessment of distress." (p. 5)	**Quality of evidence:** Grade 2 **Level of evidence:** 2011 OCEBM Level 3

Summary of recommendations	Quality or level of evidence and/or strength of recommendations
Salonia et al. (2021)[4]	
The guideline from the European Association of Urology provides evidence-based recommendations regarding the diagnostic evaluation of ED (specific recommendations not reported in the abstract).	NA

CVD = cardiovascular diseases; ED = erectile dysfunction; HDL = high-density lipoprotein; NA = not applicable; OCEBM = Oxford Centre for Evidence-Based Medicine.

References

Health Technology Assessments

No literature identified.

Systematic Reviews

No literature identified.

Randomized Controlled Trials

No literature identified.

Non-Randomized Studies

No literature identified.

Economic Evaluations

No literature identified.

Guidelines and Recommendations

1. Corona G, Cucinotta D, Di Lorenzo G, et al. The Italian Society of Andrology and Sexual Medicine (SIAMS), along with ten other Italian Scientific Societies, guidelines on the diagnosis and management of erectile dysfunction. *J Endocrinol Invest*. 2023 Jan 25;46:1241. PubMed: PM36698034' PubMed
   Refer to: Recommendation #33, #35-45 (page 13 to 17)
2. Chung E, Lowy M, Gillman M, Love C, Katz D, Neilsen G. Urological Society of Australia and New Zealand (USANZ) and Australasian Chapter of Sexual Health Medicine (AChSHM) for the Royal Australasian College of Physicians (RACP) clinical guidelines on the management of erectile dysfunction. *Med J Aust*. 2022 09 19;217(6):318-324. PubMed
   Refer to: Diagnostic penile vascular imaging studies (page 3), Summary recommendations (page 3), Algorithm for the management of erectile dysfunction (page 4)
3. Dewitte M, Bettocchi C, Carvalho J, et al. A Psychosocial approach to erectile dysfunction: position statements from the European Society of Sexual Medicine (ESSM). Sex. 2021 Dec;9(6):100434. PubMed
   Refer to: Statements #2 to #7 (page 4 to 5)
4. Salonia A, Bettocchi C, Boeri L, et al. European Association of Urology guidelines on sexual and reproductive health-2021 update: male sexual dysfunction. *Eur Urol*. 2021 09;80(3):333-357. PubMed

Appendix 1: References of Potential Interest

Non-Randomized Studies

Mixed Intervention — A Two-Step Procedure

Santi D, Spaggiari G, Simoni M, Granata ARM. Accurate and time-saving, two-step intracavernosal injection procedure to diagnose psychological erectile dysfunction. *Andrology*. 2022 07;10(5):852-862. PubMed

Unclear Intervention — Point-of-Care Not Specified

Totaro A, Gandi C, Campetella M, et al. Value of transrectal color Doppler ultrasound of the common penile arteries in the diagnosis of arteriogenic erectile dysfunction: A pilot study. *Urologia*. 2023 Mar 18:3915603231162388. PubMed

Zucchi A, Pezzoni F, Pastore AL, et al. Prospective cross-sectional evaluation of penile helicine circulation by power doppler during dynamic ultrasound in veno-occlusive erectile dysfunction. *Urology*. 2022 11;169:110-114. PubMed

Sussman H, Labastie MN, Hauet P, Allaire E, Lombion S, Virag R. Ultrasonography after pharmacological stimulation of erection for the diagnosis and therapeutic follow-up of erectile dysfunction due to cavernovenous leakage. *J Med Vasc*. 2020 Feb;45(1):3-12. PubMed

Wang J, Wang J, Liu Q, et al. Time-effect of penile color duplex Doppler ultrasound for diagnosing vascular erectile dysfunction. *Med Ultrason*. 2020 03 01;22(1):37-42. PubMed

Guidelines and Recommendations

Expert Consensus

Isidori AM, Giammusso B, Corona G, Verze P. Diagnostic and therapeutic workup of erectile dysfunction: results from a Delphi Consensus of Andrology Experts. *Sex*. 2019 Sep;7(3):292-302. PubMed
Refer to: Statement 1 (page 3)

Review Articles

Elgendi K, Zulia N, Beilan J. A Review on penile doppler and ultrasonography for erectile dysfunction. *Curr Urol Rep*. 2023 Feb;24(2):69-74. PubMed

Safaei M, Maasoumi R, Mahdavi SA, Ghadirian L, Gelehkolaee KS. Reaching consensus: a scoping review on erectile disorder guidelines. *J Med Life*. 2022 Sep;15(9):1074-1080. PubMed

Aversa A, Crafa A, Greco EA, Chiefari E, Brunetti A, La Vignera S. The penile duplex ultrasound: how and when to perform it? *Andrology.* 2021;9(5):1457-1466. https://onlinelibrary.wiley.com/doi/10.1111/andr.13029 Accessed 2023 May 10. PubMed

Ma M, Yu B, Qin F, Yuan J. Current approaches to the diagnosis of vascular erectile dysfunction. *Transl*. 2020 Apr;9(2):709-721. PubMed

Varela CG, Yeguas LAM, Rodriguez IC, Vila MDD. Penile Doppler Ultrasound for Erectile Dysfunction: Technique and Interpretation. *AJR American Journal of Roentgenology*. 2020 05;214(5):1112-1121. PubMed