Artificial Intelligence in Urodynamics: A Systematic Review of Diagnostic, Analytical, and Predictive Applications in Lower Urinary Tract Dysfunction

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Background

•Urodynamics = gold standard for diagnosing lower urinary tract dysfunction (LUTD).

•Interpretation is subjective, time-consuming, and error-prone.

•AI offers potential for automated analysis, improved accuracy, and predictive modeling.

Objective

•Systematically review applications of AI in urodynamics and LUTD diagnosis.

Methods

•Systematic review (2009–2025).

•Databases: PubMed, Scopus, Embase.

•Inclusion: studies using AI in urodynamic diagnosis/analysis/prediction.

•19 studies included (N ≈ 2,500 patients).

•Outcomes: diagnostic accuracy, analytical performance, predictive modeling.

Results

•**Detrusor Overactivity (DO):** AI achieved diagnostic accuracy up to ~85–90%.

•**Detrusor Underactivity (DU):** ML models predicted DU with good sensitivity/specificity.

•**Bladder Outlet Obstruction (BOO):** AI outperformed traditional nomograms in

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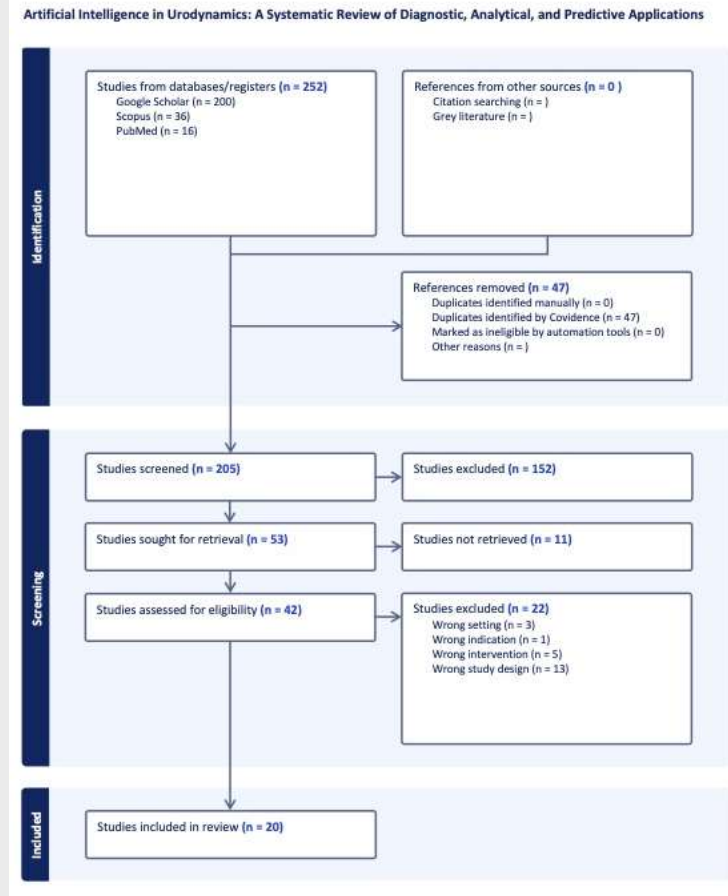
Conclusion / Take-Home

•AI shows strong potential in urodynamics for **automation, diagnostic support, and prediction.**

•Early results are promising, but studies are **small, heterogeneous, and lack external validation.**

•Future work: **larger, standardized, multi-center datasets** to confirm clinical utility.