SonoCurve uses the sound of urination to provide comparable results to conventional uroflowmetry in men with symptomatic LUTS

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www.ics-eus.org/2025/abstract/553

Introduction

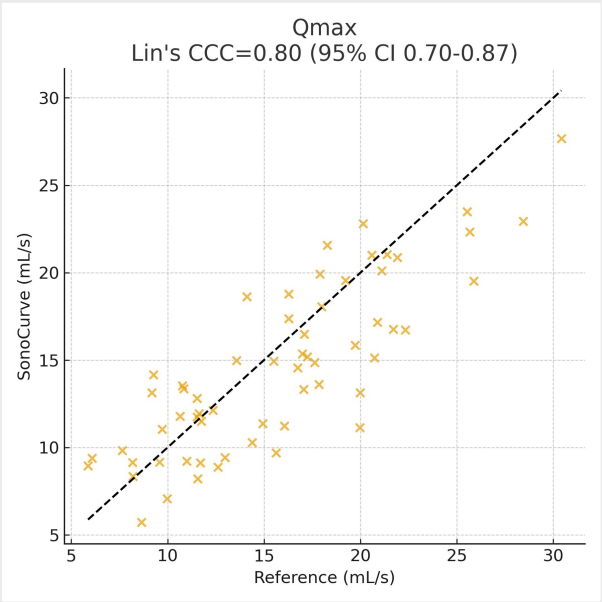
Uroflowmetry is recommended in international guidelines for male LUTS.
Conventional uroflowmetry is costly, prone to faults, and gives only a single, often unrepresentative, reading.
SonoCurve is a machine-learning algorithm that derives flow parameters and curves from urinary sound.
This study validates SonoCurve against standard uroflowmetry in symptomatic men, following earlier preclinical and volunteer testing.

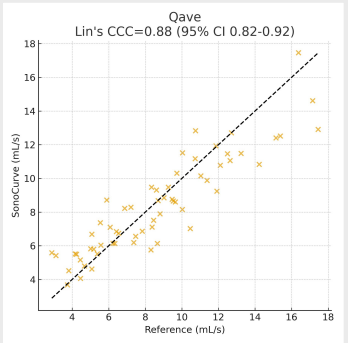
Methods

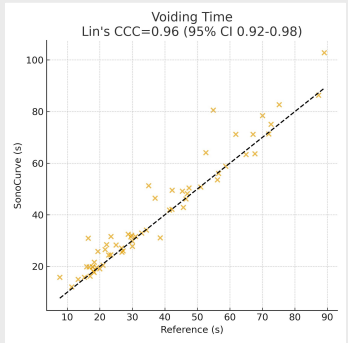
Institutional approval and trial registration obtained (JMC, ITU India). Prospective, within-person comparison in men from a LUTS clinic (Mar–May 2024). Voids measured using gravimetric uroflowmetry (Status Medical Equipments).
Exclusions: inability to void, catheter in situ, neurogenic bladder.
Metrics recorded: Qmax, Qavg, voided volume, voiding time.
Simultaneous smartphone audio recordings (Android).
25 recordings excluded due to background noise interference.
Primary endpoint: difference in Qmax, non-inferiority margin 2 mL/s. Outputs compared using Lin's concordance correlation (Python 3.12).

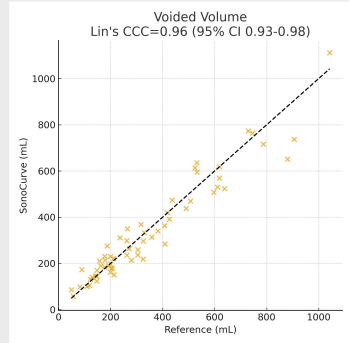
Results:

61 paired measurements analysed
Primary endpoint:
Mean Qmax difference: –1.22 mL/s (SD 3.10) 95% CI: –1.99 to –0.45 mL/s
Met Qmax non-inferiority margin (–2.0 mL/s), p = 0.028.
Agreement (Lin's CCC):
Qmax 0.81, Qavg 0.84, Voiding Volume 0.98, Voiding Time 0.94
Bland–Altman:
small biases, clinically acceptable limits of agreement
Flow curve similarity:
Pointwise RMSE (0.1s): mean 2.87 ± 1.23 mL/s
DTW-RMSE: mean 0.90 ± 0.52 mL/s









Conclusion

SonoCurve demonstrated non-inferior accuracy to standard uroflowmetry for Qmax, with strong agreement across uroflowmetry parameters and excellent curve alignment. These findings support its potential as a reliable, patient-friendly alternative to clinic-based uroflowmetry, enabling wider access and home-based monitoring.
Further work: UK validation and usability trial with clinic and at home testing