

Use of Sound Waves through Smartphone in Monitoring Urinary Flow Patterns amongst residents in Rural Northern Ontario- A Digital Health Strategy?



Emmanuel Abara MD ^{1,2} Sebastian Diebel MD ² Ndidi Abara MD ³
¹Richmond Hill Urology Practice



²Northern Ontario School of Medicine(NOSM) University, Sudbury/Thunder Bay, Ontario Canada
³Yuma Regional Medical Centre, University of Arizona,USA

NO CONFLICT OF INTEREST

ABSTRACT

Introduction Monitoring urinary flow patterns of our patients remain a paramount function of the urologist. Over the years, there have been many devices and techniques available in health care facilities and some are home-based. Recent interest in audio-based uroflowmetry applications make telemedicine and smartphone technologies potential drivers for self-empowerment, improved access, home based care and digital health. Between 15 June 2021 and February 18, 2022 we evaluated the use of a publicly available e-uflow App among residents of rural Northern Ontario to determine if the participants are able to download the App, generate data and send to the urologist for review and treatment decisions.

Methods A prospective 'mixed' study with inclusion criteria: adults > 18 years; owns smartphone, internet access; referred with a urological condition. Excluded were: no smart phone ownership, urinary retention, non-consenting. Informed consent was in English/French. Following a telemedicine assessment, a unique ID # was generated to enable participant download the App, use it on 4 consecutive days for all urination activities and send data (IPSS, Uroflow tracings) to the urologist. Follow up telemedicine visit/virtual care to review data and treatment options. Feedback by online survey followed. Data collection and analysis was by Excel spread sheet and descriptive statistics. Study was approved by the Laurentian University Ethics Review Board. Ontario Health (OTN) provided platform for virtual video visits.

Results Out of the 40 participants, 28 (70%) were men and 12 (30%) were women aged between 22 and 75, average 64 years.36/40 (90%), completed the trial. Urological conditions include BPH, prostate cancer, voiding dysfunction, OAB, hematuria, Stones, kidney cancer, bladder cancer. Most participants continued to use the App and send data after 4 days. The highest 60 average 12.9. All the volunteers found the App easy to use and generate data. It was easy, provided convenient, multiple urination data points at 'homes' comfort for individualized care. Few had some technical issues that were resolved. There were no comparative studies with the conventional uro-flowmeters.

Conclusion Sound waves through the smartphone App, used in individuals, appear to be simple, convenient, generating a large amount of e-urination data potential for monitoring, therapeutic and surveillance purposes. A digital health strategy is here. Further multi-centre trials and comparative studies with the conventional devices are recommended.

METHODS AND MATERIAL

INCLUSION CRITERIA

- Adult (men and women) > 18 yr.
- Own a Smartphone
- Has Internet Access
- Standard Toilet at Home
- Referred with a Urological condition

EXCLUSION CRITERIA

- No Smartphone ownership
- Urinary Retention/Indwelling catheter
- Non-consenting

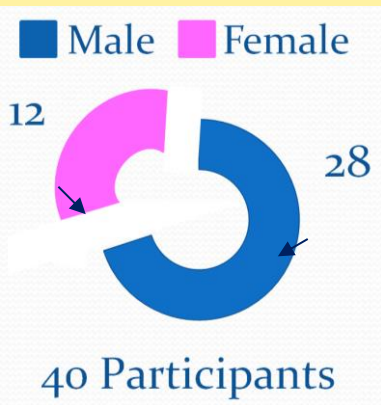
DESIGN

- Prospective
- Qualitative
- Quantitative
- Descriptive

- Referral from Primary Care/New and Existing patients
- Triage, scheduled for encounter Virtual or Face to face
- Encounter with urologist-for Assessment, Use of e-Uroflow App discussed
- Following Participant(s)' Consent a unique ID # is generated
- Use the unique ID number to download the App; use it on 4 consecutive days for all urination activities and send data to the Urologist
- Follow up e-Visit (OTN), Virtual/Telephone occur.
- Feedback by online Survey followed
- Participant may withdraw consent



RESULTS

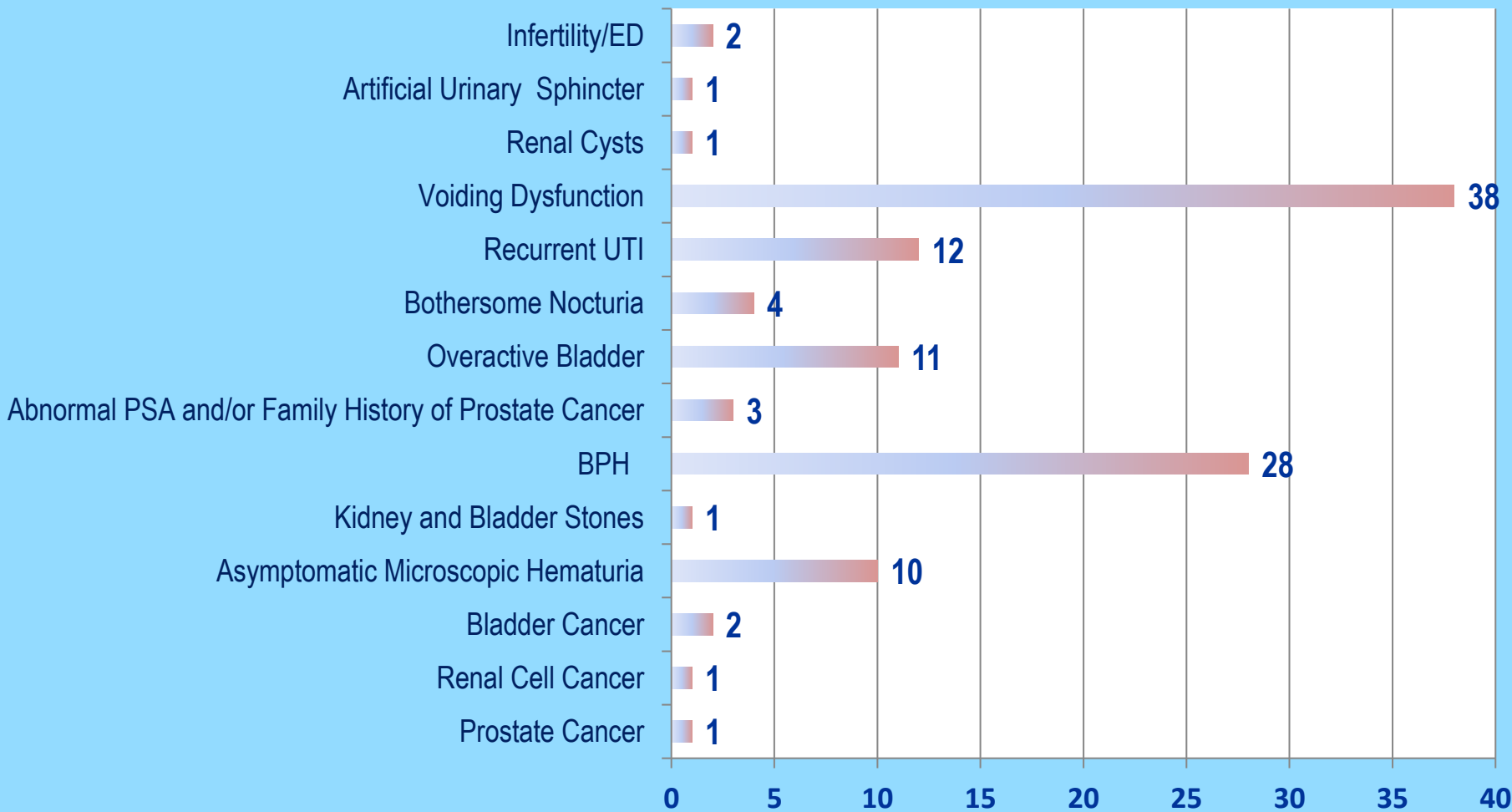


Age group

22 to 75
with an average of 64 years old



DIAGNOSES



BENEFITS

- Found the App easy to use and generate data
- It was easy, provided convenience, and comfort at 'nature's' call
- Multiple self-directed, urination data in the home;
- Appropriate 'physical distancing' and provided useful information for patient
- Management in selected cases during the COVID-19 pandemic
- Potential for improved access, cost savings; participants empowerment in self care
- Reduced anxiety associated with in hospital-office-facilities uroflowmetry
- Individualized data generated for specific individual-no generalization

LIMITATIONS

At present state

- Data individualized; conclusions not generalizable
- Surrounding noise, type of toilet bowl (porcelain, metal) may have influence on the output
- Distance of smart phone microphone from the toilet bowl or container;
- Software in present state, not able to generate voided volume, maximum, average flow rates, etc.
- But this may change
- No comparative study with the conventional method was done as this study was predominantly during the various waves of the pandemic

CONCLUSION

Sound waves through the Smartphone App used in individuals appear to be simple and convenient

It can generate large amount of e-urination data potential for monitoring, therapeutic and surveillance purposes

This provides a possible digital health strategy and calls for multicentre trials and comparative studies

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Thanks to our Office staff, Ontario Health (OTN) Staff and our participants

INTRODUCTION

- Monitoring of Uroflow patterns of our patients - an important function of the urologist
- Many devices and several techniques in use in health institutions and office practice
- Interest in audio-based Uroflowmetry, make Telemedicine/Virtual Care and Smartphone technologies
- Potential Drivers for self-empowerment, improved access, home-based care and digital health

AIM

- Evaluate the use of a publicly available e-uflow App in a Smartphone in rural Northern Ontario
- Determine if participants are able to download the App, generate data and send to the Urologist for review and treatment decisions.

STUDY PERIOD

June 15, 2021 to February 18, 2022

Laurentian University Ethics Review Board Approval (6020953)