

REDUCTION OF INTRA-SUBJECT VARIABILITY BY OBTAINING MULTIPLE FLOW MEASUREMENTS IN PATIENTS WITH LOWER URINARY TRACT SYMPTOMS (LUTS)

Hypothesis / aims of study

Uroflowmetry is a well-established test in the assessment of men with lower urinary tract symptoms (LUTS). However, its diagnostic accuracy is limited, partly due to the natural variability of uroflowmetry which can be attributed to several factors such as time of day, bladder volume and behavioural factors.

This inherently limits the reliability of an individual measurement, such as that usually performed in the clinic. Multiple measurements of flow in a more natural and relaxed environment such as the home and over a longer period of time could potentially provide a more representative characterisation of an individual's voiding function and allow more detailed information to be collected.

We have developed a flowmeter suitable for home use. It is simple, compact, low cost and battery-powered. The full uroflowmetry trace is obtained and it can measure all voids performed in the space of 2 weeks. It has no operator controls, reducing patient interaction to a minimum, with the only obligation being that the patient must clean the flowmeter after use. We devised a study to investigate the feasibility of collecting with our device multiple flows of patients with LUTS and to demonstrate the typical variation in flow and volume which make individual measurements unrepresentative.

Study design, materials and methods

Each patient was given verbal and written instructions for use of the flowmeter. We asked the patients to use the flowmeter as many times as possible for one week. On return, the data was downloaded to a computer. For each void, we made a manual record of Qmax and voided volume (VVoid) and calculated descriptive statistics Qmax and VVoid for each patient.

Results

To date, multiple home flow measurements have been obtained in 6 men with LUTS.

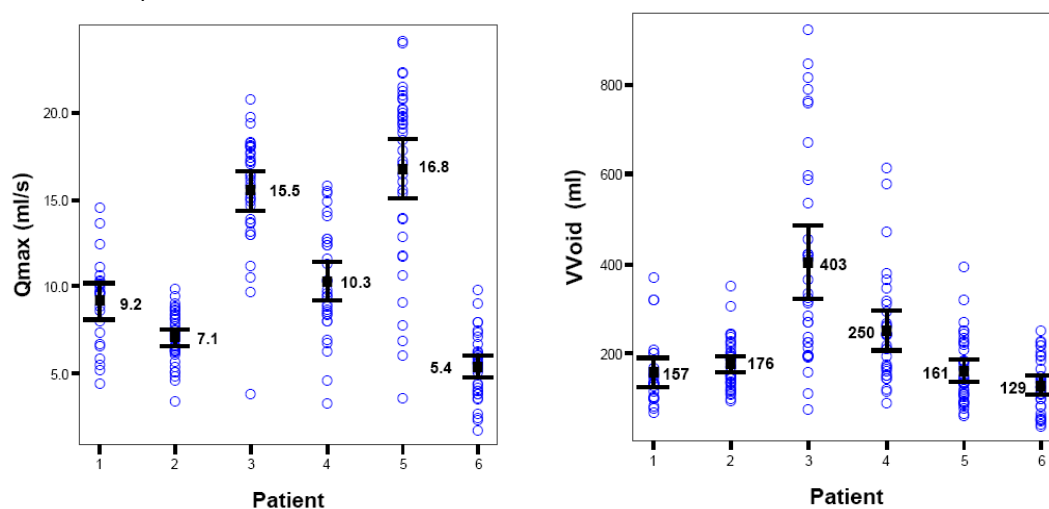


Figure 1: Qmax and VVoid for all the flows of each patient over 7 days. Means and error bars, representing the 95% confidence intervals of the mean, are shown.

Interpretation of results

Convenience of home measurements:

Flow clinics can be inconvenient and time-consuming for patients and generate some degree of "performance" anxiety. Performing home flow measurements with a suitable device such as the one described may be a solution to these problems, especially if these can take the place of the already well-established practice of voiding diaries. The patients in our study performed one week of flow measurements (29 to 39 flows per patient). They found the flowmeter convenient to use and confirmed they would be happy to repeat the week of measurements if required.

Increased accuracy through multiple measurements:

It is well known that increasing the number of measurements increases the accuracy with which a mean value can be determined. This is especially important in physiological measurements where natural variability exists. The standard deviations of Qmax for each patient (1.4 to 5.3 ml/s) in the present study were similar to the natural variability of flow rate reported for patient populations in other studies (for example 2.9 ml/s in [1]). However, the mean Qmax obtained for each patient has error bars which are well within this variability (Fig.1). Obtaining a reliable estimate of Qmax is important in investigating treatment response from medical therapy which typically improves Qmax by a relatively modest 16-26% [2]. This only represents an increase of 2 ml/s for a Qmax of 10 ml/s, making the difference due to treatment in an individual patient difficult to detect. Multiple flow measurements could potentially allow such small differences to be observed on an individual patient's mean Qmax.

More detailed information about voiding habits:

For clinical flow measurements, it is recommended that the patient voids a volume of greater than 150 ml. However, as can be seen from Fig.1, many voids occur with lower voided volumes. It seems that the information from these voids remains valuable and

asking the patient to void with an over-full bladder may not be representative of that patient's voiding habits. As the aim of urodynamics is to reproduce symptoms, obtaining a more complete picture of a patient's voiding habits may contain more information than a single clinic flow.

Concluding message

The home flowmeter has been shown to be a suitable option for obtaining more accurate measurements of uroflow in individuals. The importance of the additional information acquired will require further investigation. A readily available low cost flowmeter such as ours could be potentially useful for studying patient variability, watchful waiting or in the assessment of treatment outcome.

References

[1] J Urol (1998) 160; 1689-94.

[2] Urol (2004) 64; 1081-8.

<i>Specify source of funding or grant</i>	None
<i>Is this a clinical trial?</i>	No
<i>What were the subjects in the study?</i>	HUMAN
<i>Was this study approved by an ethics committee?</i>	Yes
<i>Specify Name of Ethics Committee</i>	Newcastle and North Tyneside 1 Research Ethics Committee
<i>Was the Declaration of Helsinki followed?</i>	Yes
<i>Was informed consent obtained from the patients?</i>	Yes