

ESTIMATION OF BLADDER VOLUME IN NORMAL VOLUNTEERS.

Hypothesis / aims of study

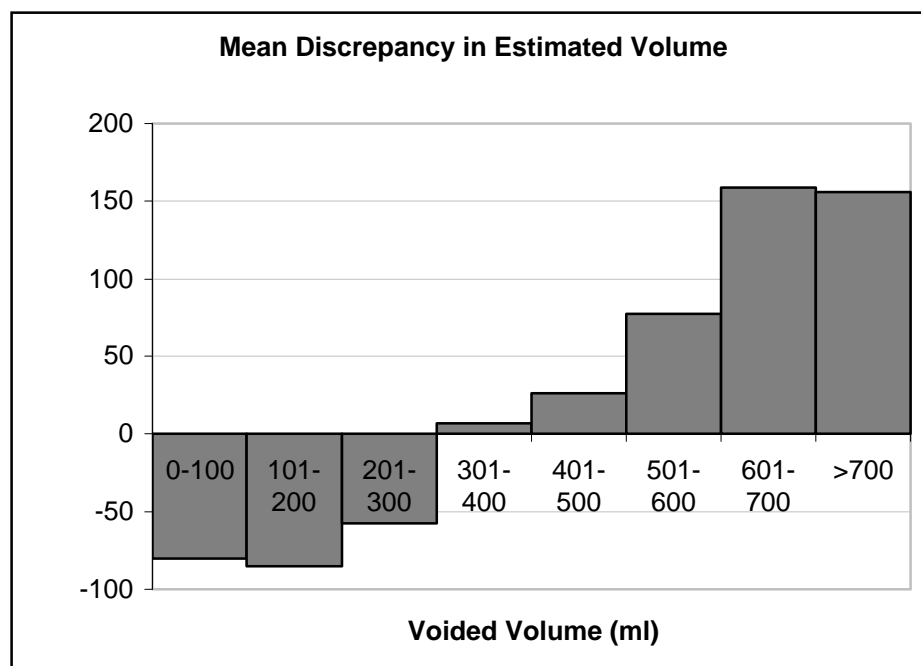
Many different scales have been described for recording bladder sensation, either during completion of bladder diaries, or during cystometry¹. These scales may fail to distinguish normal desire to void, from pathological urinary urgency, in part because the sensation of urgency is highly subjective, and depends on environmental context, such as the availability of a toilet. This problem is compounded by the difficulty of differentiating "urge" and "urgency" in other languages. The consistent objective features of urinary urgency are the associated reduction in the voided volume, and the reduction in the intervoid interval. One possible objective measure of urgency might therefore be the discrepancy between the estimated and actual voided volume. This study aimed to establish the reliability of estimation of bladder volume in normal volunteers.

Study design, materials and methods

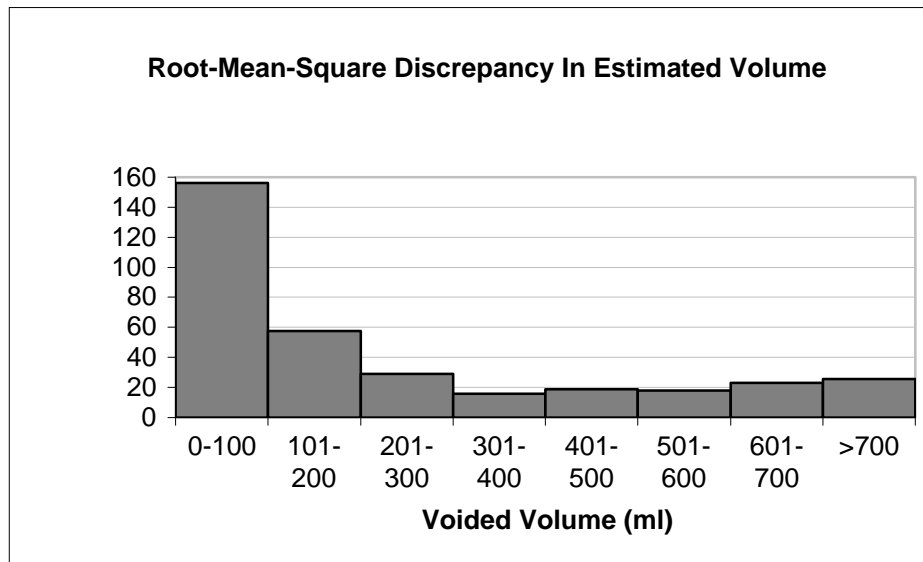
8 male and 8 female healthcare professionals (age 27-56) screening negative for lower urinary tract symptoms were recruited. Immediately prior to voiding, participants were asked to estimate their bladder volume to the nearest 10ml, and then measure the actual voided volume. Measurements were performed both in home and work contexts, without interruption to normal voiding patterns. Measurements were not necessarily from consecutive voids.

Results

A total of 232 pairs of estimated and actual voided volumes were recorded. Mean voided volume was 362ml (range 30-900ml, sd 162ml). Mean estimated bladder volume was 365ml (range 80-900, sd 134ml), a non-significant difference ($p=0.63$, paired t test). Estimated and actual volumes were highly correlated ($r=0.733$). Female participants had a higher mean voided volume (375ml, sd 170ml) than male participants (351ml, sd 152ml), although again this was not a statistically significant difference ($p=0.27$, t test). At voids below 300ml participants tended to over-estimate the volume, with the converse being true for voids above 400ml.



Expressed as a percentage of voided volume, estimation was poor below 200ml. However from 200ml upwards mean discrepancies were consistently <30% of voided volume. There was a slight trend towards decreasing accuracy with increasing volume.



Interpretation of results

As implied by the concept of “first sensation of filling” recorded during cystometry, estimation of bladder volume was very inaccurate at low volumes. Above 200ml, normal volunteers were able to consistently estimate the volume, with a small reduction in accuracy at high volumes. The ease with which these estimations were made devalues the use of voided volumes as an “objective” outcome measure in anti-muscarinic drug trials. All volunteers had at least some prior experience of measuring bladder volumes, which may have contributed to their accuracy. Patients with overactive bladder have abnormal perception of bladder fullness², and further investigation is needed to establish if this involves a component of abnormal conscious estimation of volume, or whether it is merely secondary to abnormal sensation. Further work is also needed to assess whether urgency episodes are associated with over-estimation of bladder volume.

Concluding message

Volunteers tend to over-estimate their bladder volumes when they void at low volumes, and under-estimate when they void at high volumes. In the most common range of voided volumes, volunteers are accurately able to estimate bladder volume.

References

1. BJU Int 2005;95(3):335–340.
2. BJOG 1991;98(12):1287-9.

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HUMAN SUBJECTS: This study did not need ethical approval because Questionnaire study only, with no intervention. All data was collected by subjects themselves and was anonymised. but followed the Declaration of Helsinki Informed consent was obtained from the patients.