

DEVELOPMENT OF A SCORING SYSTEM FOR THE QUALITY OF URODYNAMIC TRACES

Hypothesis / aims of study

Quality urodynamic traces are essential for delivering good urodynamic diagnoses. Despite the ICS guidelines (1), there is no objective method for assessing urodynamic trace quality. Quality assurance in clinical trials uses independent scrutiny of all traces or of random samples. Both these methods are inherently subjective. Recently, an assessment was made of adherence to ICS standards in publications, which highlighted the lack of quality in practice (2). It would therefore be helpful to be able to objectively quantify the quality of urodynamic traces in order to assist audit of practice. This study aims to develop a scoring system for the quality of a urodynamic trace by grading the relative importance of features acknowledged to be good practice.

Study design, materials and methods

A table of all features in the ICS guidelines on Good Urodynamic Practices (GUP) (1) relating to quality, and other features regarded as important, (totalling 49 features) was sent to members of the ICS registered as 'Urodynamicist' and members of a national Urodynamic Standards Working Group. They were asked to grade features with respect to importance for patient management and diagnosis, categorising them as either 'Essential' (E), 'Desirable' (D) or 'Not Important' (N). The features were then ranked in order of 'Essential' grades, and scores assigned to the implied relative importance of groups of features, in order to develop the content validity of the assessment method.

Results

12 replies were received. The results are listed in Table 1 in descending order of percentage of 'Essential' (E) grades. Other suggested features were noted for future incorporation.

Urodynamic Feature	E	D	N	% of total graded 'E'
Was the intra-abdominal pressure p_{abd} graph shown?	12	0	0	100%
Was the intravesical pressure p_{ves} graph shown?	12	0	0	100%
Was the detrusor pressure p_{det} graph shown?	12	0	0	100%
Was p_{det} labelled as such?	12	0	0	100%
Was the intravesical filled volume shown (graphically or numerically)?	12	0	0	100%
Were the p_{ves} and the p_{abd} zeroed to atmosphere (Both greater than 0 cmH ₂ O after zeroing and after connection to patient)?	11	1	0	92%
Was the p_{ves} axis maximum value printed on the vertical axis?	11	1	0	92%
Was fill volume axis max value printed (if vol displayed graphically)?	11	1	0	92%
Was the time scale printed on the horizontal axis?	10	1	0	91%
Was a cough test carried out at the very start of the test?	10	0	1	91%
If there was tube leakage (steady pressure descent) was it corrected?	8	1	0	89%
Was p_{abd} labelled as such?	10	2	0	83%
Was p_{ves} labelled as such?	10	2	0	83%
Was the p_{det} axis maximum value printed on the vertical axis?	10	2	0	83%
Was the urine flow rate graph shown?	10	2	0	83%
Was the urine flow rate graph labelled as such?	10	2	0	83%
Was the urine flow axis maximum value printed on the vertical axis?	10	2	0	83%
Was the voided volume shown (graphically or numerically)?	10	2	0	83%
Was the p_{abd} axis maximum value printed on the vertical axis?	10	2	0	83%
Was the patient reported sensation (perception) of filling indicated?	10	1	1	83%
If urine leakage was present, was it clearly marked as such?	10	1	1	83%
Was voided vol axis max value printed (if vol displayed graphically)?	9	3	0	75%
Was the p_{det} vertical axis size as recommended (≤ 200 cmH ₂ O)?	9	3	0	75%
Was the patient position recorded on the trace?	9	2	1	75%
Was resting p_{det} in the physiological range (-5 to +15 cmH ₂ O)?	9	3	0	75%
Was use of the $p_{ves} = p_{abd}$ function avoided?	8	4	0	67%
If poor compliance was seen, was the pump stopped for a short time?	8	4	0	67%
If detrusor overactivity was present, was it clearly marked as such?	8	2	2	67%
Was 'permission to void' indicated?	8	4	0	67%
Was the p_{ves} vertical axis size as recommended (≤ 200 cmH ₂ O)?	8	3	1	67%
Was the smaller cough test peaks (or patient movements) $\geq 70\%$ of larger, or corrected if not?	8	4	0	67%
Did the p_{ves} catheter remain in the bladder during voiding?	7	4	0	64%
Did the p_{abd} catheter remain in the abdomen during voiding?	7	4	0	64%
Were the resting p_{ves} and p_{abd} pressures in the physiological range (e.g. 5 - 20 cmH ₂ O when supine)?	7	5	0	58%

Were cough tests done (visible on the printout) at least every minute?	7	3	2	58%
If patient position change was seen, was the sensor level adjusted?	7	5	0	58%
Was a cough test done before and after final void?	7	4	1	58%
Was time scale size as recommended (≤ 1 min/cm fill; ≤ 2 s/mm void)?	6	4	1	55%
Was the voided volume vertical axis size as recommended, if volume displayed graphically (≤ 1000 ml)?	6	5	1	50%
Was the urine flow vertical axis size as recommended (≤ 50 ml/sec)?	6	5	1	50%
During void, was any drop in p_{abd} from pre-void value clearly marked?	5	4	2	45%
Was the fill volume vertical axis size as recommended, if volume displayed graphically (≤ 1000 ml)?	5	6	1	42%
Was the p_{abd} vertical axis size as recommended (≤ 200 cmH ₂ O)?	5	6	1	42%
Was the scale of any EMG signal clearly displayed?	4	3	3	40%
Was printing definition as recommended (better than 1 line / 0.1mm)?	4	7	0	36%
Were the traces not overlapping (and therefore difficult to analyze)?	4	7	0	36%
Was any after contraction present clearly visible?	2	4	6	17%
Was the order of printing from top to bottom p_{abd} , p_{ves} , p_{det} ?	2	6	4	17%
Were live signals visible throughout the test (or after any correction) on p_{abd} and p_{ves} , but not visible on p_{det} ?	1	10	1	8%

Table 1. Responses to survey on relative importance of urodynamic features

Interpretation of results

In Table 2, we have assigned scores to the absence of features in the order listed above. In a manner similar to that used to assess risk in the mortgage industry, these scores are subtracted from a starting value of 100, in order to give a percentage value relating to the quality of a trace. In this manner the absence of poor quality features does not affect the quality score.

% of 'E' grading	Rationale	Recommended deduction for absence of feature
100	Without these features, not an acceptable urodynamics trace	50
≥ 80	Most require this for good diagnosis and management	25
≥ 67	More than two thirds consider these essential	10
≥ 50	A majority consider these essential	5
< 50	These are more desirable than essential	2

Table 2. Proposed scores for deduction when quality feature is absent

Concluding message

We propose a method for objectively assessing the quality of a urodynamic trace. The system is ready for wider consultation and testing on real urodynamic data, with the aim of producing a final draft for validation, including sensitivity to change.

References

- Schäfer et al., Neurourol. Urodyn. 2002; 21:261-274
- Rosier et al., Neurourol. Urodyn. 2010; 29:869-870

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Is this a clinical trial?

No

What were the subjects in the study?

NONE