



Turkish Continence Society ICS Recognised Urodynamics Certification Course



UROFLOWMETRY

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- 1) How is it done?
- 2) What are the tested parameters?
- 3) Problematic situations, artefacts, and troubleshooting
- 4) Recording and interpretation of results



A non-invasive urodynamic test that records the flow rate of the urinary stream as volume per unit time in milliliters per second (ml/s).

It reports the maximum & average flow rate, the volume voided, flow pattern, and post void residual volume (PVR).



Post-Void Residual Volume – PVR

The remaining intravesical fluid volume determined directly after completion of the voiding.

The technique (eg, ultrasound or catheter) used to measure the volume should be specified.



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Fig. 5: A common type of uroflowmetry container for men and women.



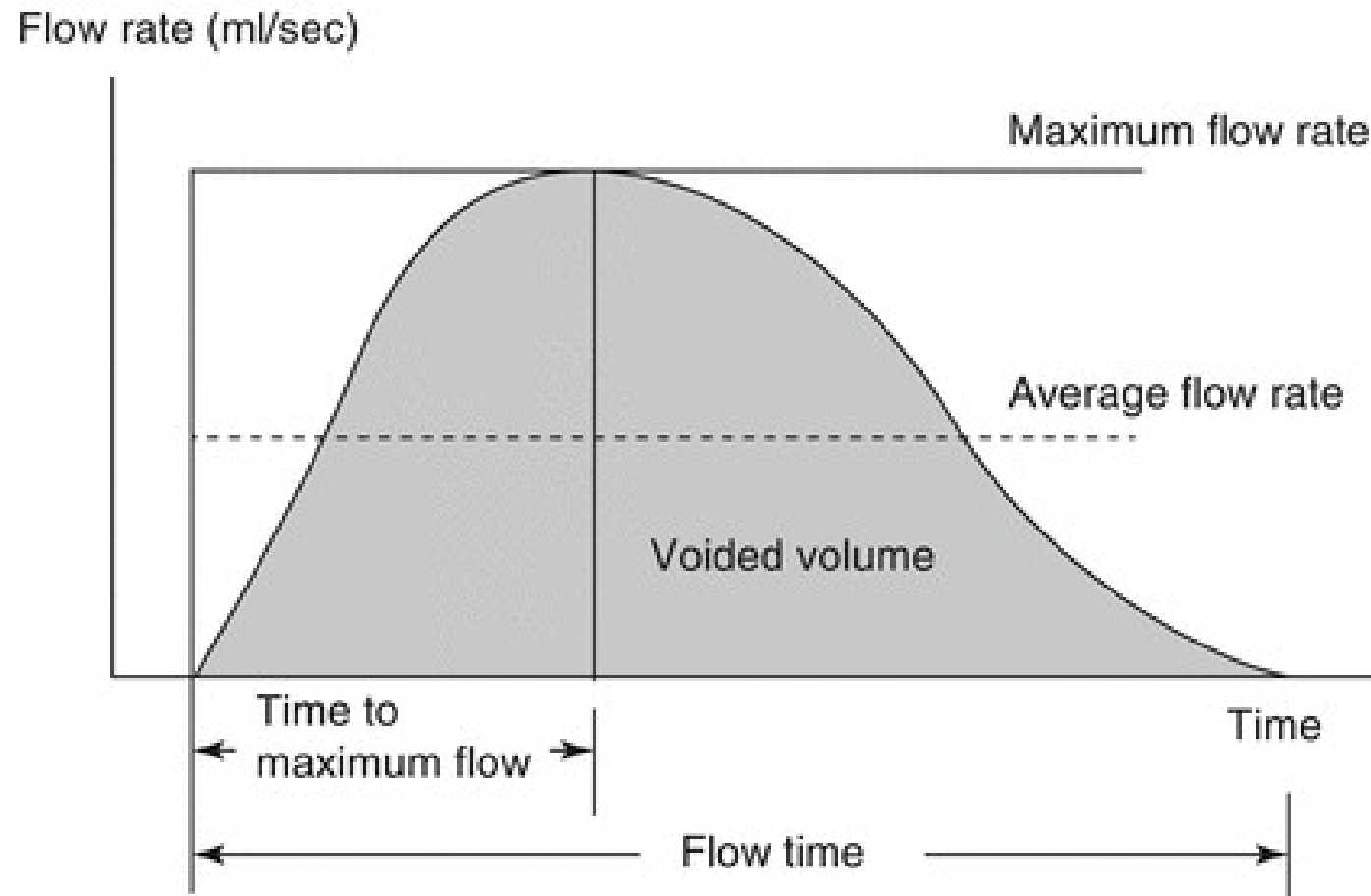
A suitable environment for uroflowmetry:

-The flowmeter can be accessed quickly from the waiting area if the patient experience surgency, achieves privacy (here by having a curtain in addition to a locked doorway), is easy to clean, and has direct access to a sluice room.

-Female uroflowmetry would have a commode seat in addition to the funnel

Gammie A & Drake MJ, NAU 2018

Uroflowmetry: ICS recommended nomenclature



“Normal” Ranges

Gender	Age (years)	Flow rate (ml/s)
Male	<40	>22
	40-60	>18
	>60	>13
Female	<50	>25
	>50	>18



Uroflowmetry is sensitive to patient cooperation and
emotion

Should only be interpreted if the voiding has been
representative regarding both voided volume and the
patient's opinion



Flow rate testing- 1

Before a flow test, the patient should be instructed to keep his stream in the same part of the funnel, not to squeeze his penis, and try to avoid knocking the machine

Patients undergo uroflowmetry in their preferred position and to strive for minimum physical discomfort and anxiety for the patient.

Patients should be asked to pass urine when they feel a “normal” desire to void



Flow rate testing- 2

Check if the voiding is representative, based on the patient's report and also on the association with the patient's FVC or BD volumes.

The position of the patient should be reported.

Consider repetition of the uroflowmetry if the result has not been representative for the patient or if the result indicates abnormality. Voided volume and/or flow rate are unexpectedly low or the PVR is much larger than expected.



Urine flow occurs as a result of the complex interaction between:

1. **Detrusor contraction**
2. **Urethral opening**
3. **Sphincteric relaxation**

TABLE 1 Task list to assist good practice in uroflowmetry

Task No.	Good practice question	If “No,” correction needed
1	Has equipment calibration been checked?	Check calibration
2	Is the patient aware of the reason for the test and what is required of them?	Explain to patient
3	Has the bladder diary been completed and examined?	Discuss with patient to gain estimates
4	Does the patient have a normal desire to void?	Wait until normal desire
5	Is the equipment set at the right height and position?	Adjust to suit patient
6	After the void, has urinalysis been carried out?	Perform urinalysis
7	Is the void known to be a representative normal void?	Repeat flow test after drinking
8	Is the trace clear of artefacts from movement of body, flowmeter or urine stream?	Adjust trace markers if possible, and instruct patient for improved next flow
9	Is Q_{max} marked at a point away from artefacts?	Move Q_{max} marker to smoothed maximum position
10	Are the markers for start and end of void away from artefacts or drops of urine?	Move markers away from artefacts
11	Does the scale of printing make the flow trace clearly visible?	Adjust scale of display/print
12	Has the residual urine volume been measured immediately after voiding?	Measure volume, including comment on any time delay
13	Does the report include: Q_{max} , voided volume, residual volume, Void%, flow and voiding times, flow trace shape description, whether flow is representative?	Complete report
	The report may also include if required: Clinical history summary, urinalysis, bladder diary summary and any lifestyle advice given.	



- **Factors affecting uroflowmetry results:**
 - Age and sex
 - Coincidence
 - Voided volume
 - Urine density
 - The emotional state of the patient
 - Technical (device-related) problems



Consider repeating the uroflowmetry if the result has not been representative for the patient or it indicates abnormality, with reasonable fluid intake and diuresis time before the flow is repeated.



Possible artefacts

Knocking of the flowmeter, passing of feces or disposal of tissues result in high, sudden values of flow rate and/or volume.

Moving the urine stream back and forth across the funnel results in phasic variations around the true flow rate.

“squeeze and release” habit gives gaps in the flow followed by high flow rate spurts. Pelvic floor muscle action or body movement can result in smaller, artefactual variations in flow rate.



Troubleshooting

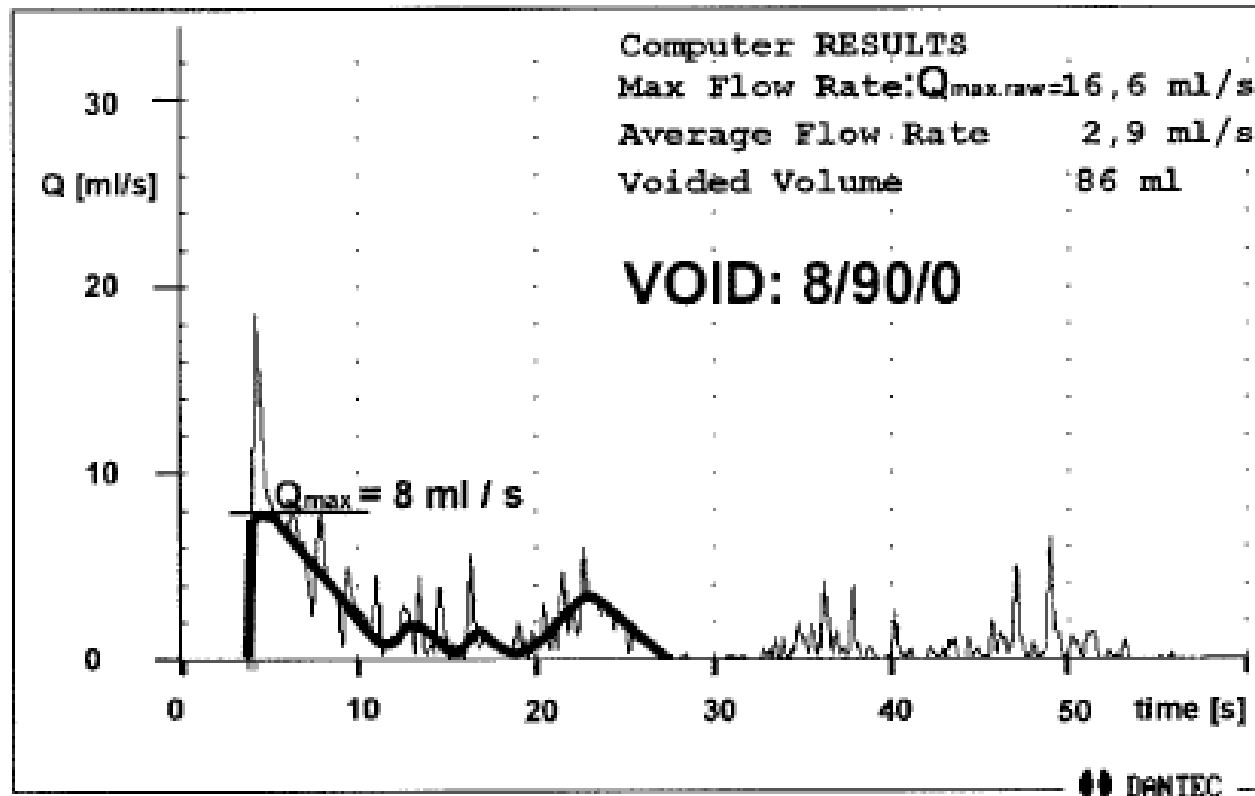
Uroflowmetry machines will automatically, measure the highest peak of flow, rather than smooth out the flow rate to remove these artefacts.

Move the Qmax marker to a nearby point, or smooth the flow signal by eye, in order to establish the clinically representative value.

A moving average using a 2 s window is advised.

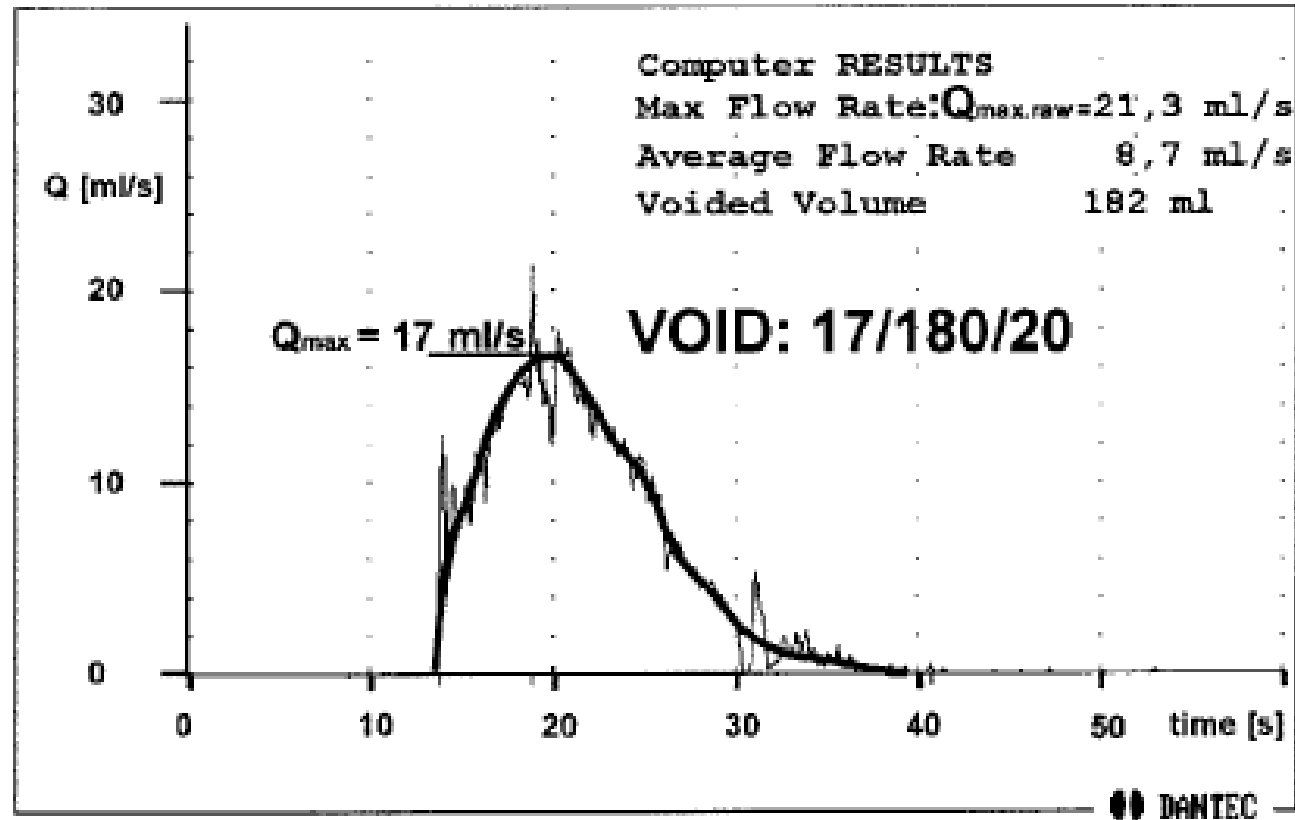
Initial Free Flow

Re-analyse



Initial Free Flow

Re-analyse





Reporting

Q max is rounded to the nearest integer
10.25 ml/s → 10 ml/s

PVR is rounded to the nearest 10 mL
342 ml → 340 ml



Reporting

Reporting in standardized format – ‘VOID’

Qmax / voided volume / PVR

Void 1: 17 / 180 / 20

Void 2: 15 / 290 / -

Indicate the nomogram used;

Nomograms show the likelihood of the Qmax and voided volume recorded resulting from a normal urinary tract.

These nomograms are not diagnostic, but may be a useful screening tool for dysfunction.



Interpretation

Integrate the uroflowmetry results with the history, examinations and Bladder Diary summary.

Urinalysis should also be evaluated and reported with the flow results, since current UTI could alter the patient's flow characteristics.



Voided percentage (Void%)

The numerical description of the voiding efficacy or efficiency which is the proportion of bladder content emptied.

$$\left(\frac{\text{volume voided}}{\text{volume voided} + \text{PVR}} \right) \times 100.$$



Interpretation

The shape or pattern of the flow curve may suggest specific types of abnormality, but reliable and specific information about the cause cannot be derived from a flow curve alone.

The shape of the flow curve can be described as continuous or intermittent, and smooth or fluctuating



Interpretation

Slow flow rate and abnormal pattern in uroflowmetry curve points out voiding dysfunction.

It does not indicate which component(s) (detrusor, urethra, sphincter) is/are responsible.

Invasive urodynamic tests should be performed to better delineate the cause.