

## Flows and Urodynamics in Men

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Private Practice



### References

- Good urodynamic practice
  - Schäfer, Abrams et al Neurorol and Urodyn 21: 261-274 2002
- The Standardisation of Terminology of Lower Urinary Tract Function
  - Abrams, Cardozo et al Neurorol and Urodyn 21: 167-178 2002

## Why do flows

- Objective and quantitative information
  - Aids in diagnosis
- 1<sup>st</sup> line screening in LUTD
  - Men
  - Women
  - Children
- Simple
- Cheap
- Non-invasive



## Why have a flow clinic

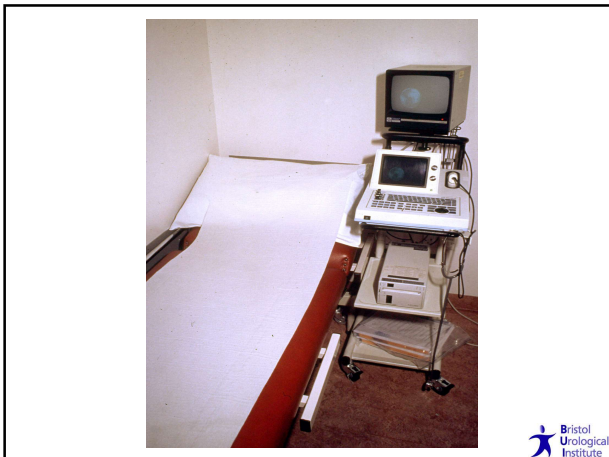
- Difficult to perform flows in a busy O/P clinic
- Need more privacy
- Patients need an adequately full bladder
- Need a sterile sample for MSU
  - two voids
  - ‘dipstick’ the urine in the flow meter
    - Hashim & Abrams, BJU Int, 2006
- Need at least 2 voids to produce good representation of normal voiding pattern
  - Reynard J et al



## Flow's Room

- Couch
  - USS/Bladder scanner
  - Flow meter and transducer
  - Sluicing sink and urine testing sticks
  - Ladies micturition chair
  - Computer, desk, paperwork (Bluetooth)
  - Drinks provision
  - Waiting Area
- NB. Need to ensure patient privacy





## Patient preparation

The patients are sent

- an appointment letter
- a frequency/volume chart
- a Flow Studies information sheet
- a hospital map



North Bristol NHS Trust

Your doctor has requested that you have a test called "flows". You should allow 2 to 3 hours for the test. It will be helpful if you can arrive with a comfortably full bladder.

**What the test involves**

On arrival at the clinic, the flows nurse will meet you and fully explain the test to you. You will be asked to drink some water to fill your bladder. The flows nurse will discuss how much with you.

**Flow Studies**

**Information for patients, relatives and carers**

After drinking some water, you will need to wait until your bladder feels full. We will then ask you to pass water in privacy into a specially adapted toilet that will measure how quickly you pass water. Once you have been to the toilet you will have an ultrasound scan of your bladder to see how empty it is. (The scan is performed by placing some warm jelly on the skin over your bladder area and moving an ultrasound probe over the skin).

This process will be repeated two or three times, which is why this test takes a long time.

**After the test**

A report will be sent to your Consultant and GP. If your GP has referred you to a Consultant, you will have a further appointment to see the Consultant in the outpatient clinic.

For more information please contact:

Urodynamic Unit  
Southmead Hospital  
BRISTOL  
BS10 5NB

Tel: (0117) 959 5181

## What happens in the flow clinic

- Patients welcomed and given a session explanation
- Patients given fluid if inadequately hydrated
- Session lasts 2-3 hrs/pt
- Aim to produce 2 flows; 3 if the first 2 are different
- All new patients have urinalysis performed
- MSUs, bloods and x-rays are done as necessary
- All reports go with the patient's notes
- Flows details are photocopied
- All details put onto the hospital database
- Results discussed and follow up arranged



## Useful tips

- Ensure privacy
- Void when they feel a normal desire to void
- Ask if voiding was representative
- Always look at the trace
- Exclude artefacts (by manual smoothing)
- Compare to FVC
- Do a PVR



### Factors affecting flow

- Age
- Sex
- Voided volume
- Position
  - prone>standing>sitting>supine>lateral
- Nerves: Bashful voiders!!!
- Different nomograms used
  - Siroky in men < 50; women
  - Bristol in men > 50



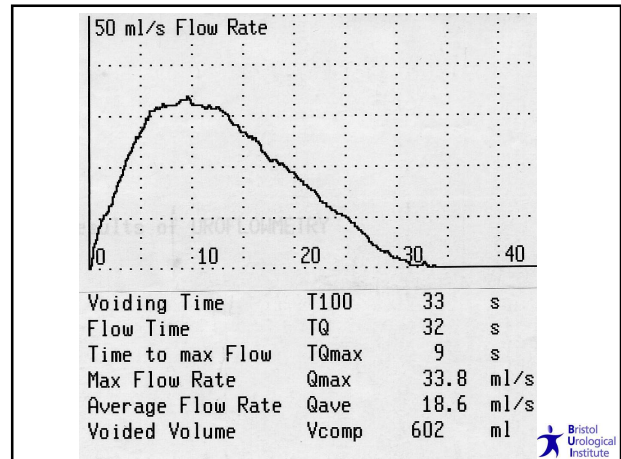
### Normal Flow

- Normal voiding occurs when
  - bladder outlet relaxes (is passive)
  - detrusor contracts (is active)
- An easily distensible bladder outlet with a normal detrusor contraction results in a smooth arc-shaped flow rate curve with high amplitude
- Bell shaped curve
- Qmax within 3-10sec
- Minimum volume required: 150-200mls
- Maximum volume required: 400-500mls



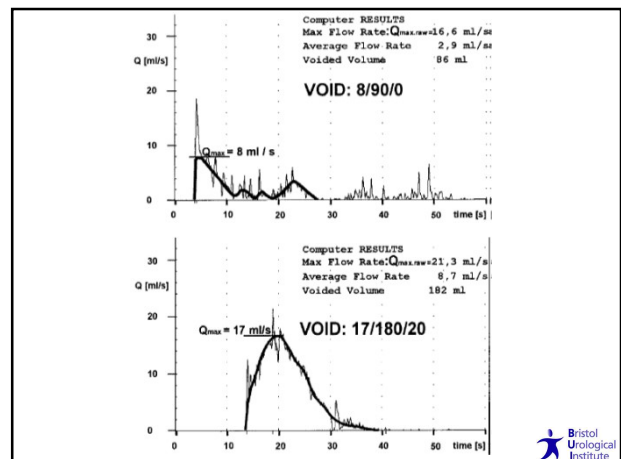
### Minimum acceptable flow rates @ 200mls

Age (yrs)	Male (ml/s)	Female (ml/s)
14-45	18	21
46-65	12	15
66-80	9	10



### Uroflow recommendations

- Standardize graphical scaling to facilitate
  - recording of urine flow rate
  - pattern recognition of flowcurves
  - 1mm = 1s on the x-axis and 1ml/s and 10 ml voided volume on the y-axis
- Flow rate values should be 'smoothed' either electronically or manually but should be reported
- A sliding average over 2 s should be used to remove positive and negative spike artifacts
  - the line should be smoothed by eye into a continuous curve so that in each period of 2 s there are no rapid changes



### Common flow rates

- A decreased detrusor power and/or a constant increased urethral pressure will result in a lower flow rate and a smooth flat flow curve
- A constrictive obstruction (e.g. urethral stricture) with reduced lumen size results in a plateau-like flow curve
- A compressive obstruction with increased urethral opening pressure (e.g. BPO) shows a flattened asymmetric flow curve with a slowly declining end part



### Abnormal flows in men

Possible diagnoses:

- Bladder outflow obstruction
- Stricture
- Detrusor underactivity
- Detrusor overactivity
- Poor sustained/fluctuating detrusor contraction
- Straining
- Cruising
- Squeezing

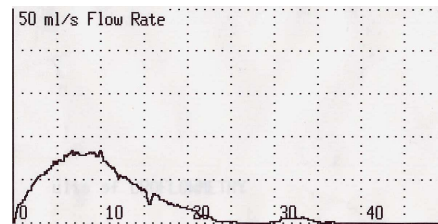


### Predictive ability of flow rate

Flow rate (ml/s)	% Obstructed
<10	89%
10-15	71%
>15	48%



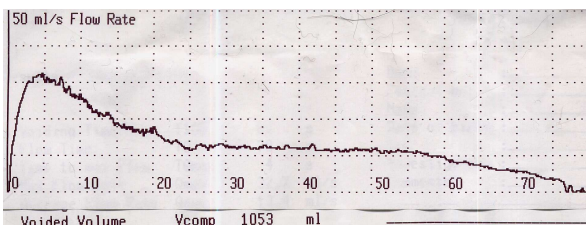
### Normal



Voiding Time	T100	35	s
Flow Time	TQ	28	s
Time to max Flow	TQmax	7	s
Max Flow Rate	Qmax	16.9	ml/s
Average Flow Rate	Qave	7.8	ml/s
Voided Volume	Vcomp	217	ml



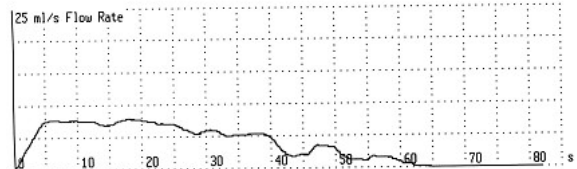
### Normal



Voided Volume Vcomp 1053 ml



### BOO



Results of UROFLOWMETRY

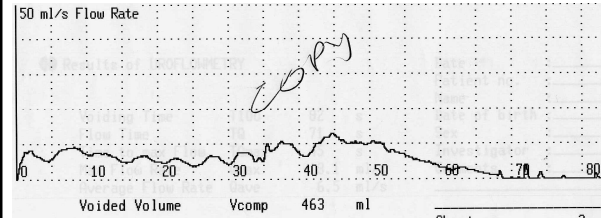
Voiding Time	T100	62	s
Flow Time	TQ	62	s
Time to max Flow	TQmax	18	s
Max Flow Rate	Qmax	7.9	ml/s
Average Flow Rate	Qave	4.8	ml/s
Voided Volume	Vcomp	300	ml



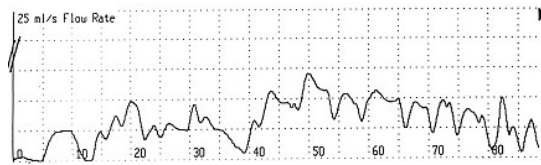
### Stricture



### Detrusor Underactivity



### Straining

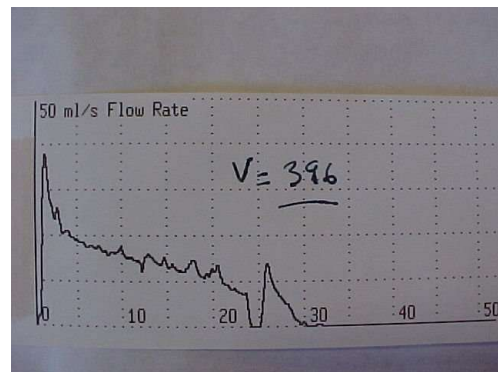


Results of UROFLOWMETRY

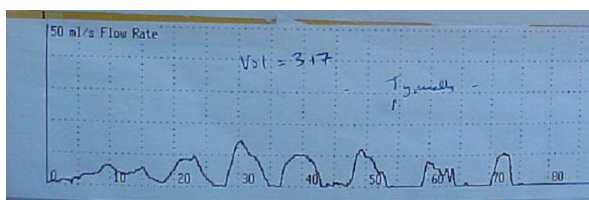
Voiding Time	T100	100	s
Flow Time	TQ	95	s
Time to max Flow	TQmax	50	s
Max Flow Rate	Qmax	14.1	ml/s
Average Flow Rate	Qave	6.1	ml/s
Voided Volume	Vcomp	580	ml



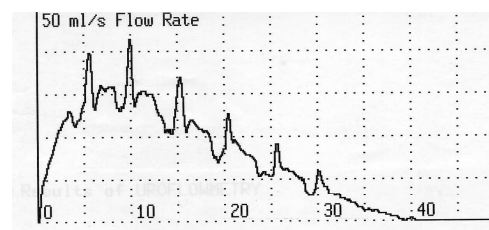
### Detrusor Overactivity



### Fluctuating Detrusor Contraction



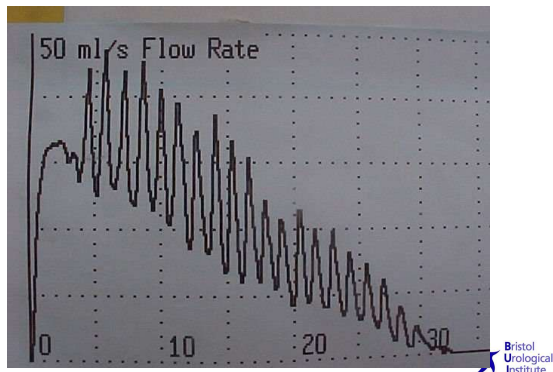
### Cruising



Voiding Time	T100	40	s
Flow Time	TQ	39	s
Time to max Flow	TQmax	10	s
Max Flow Rate	Qmax	42.7	ml/s
Average Flow Rate	Qave	17.1	ml/s
Voided Volume	Vcomp	669	ml

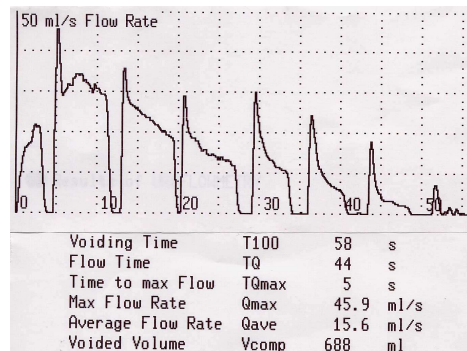


### Cruising



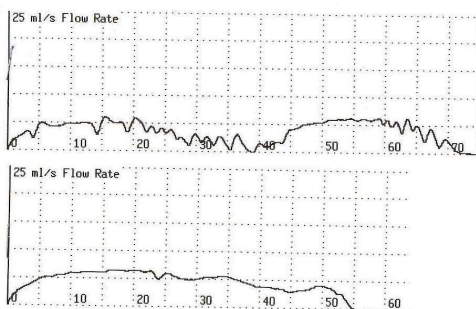
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### Squeezing



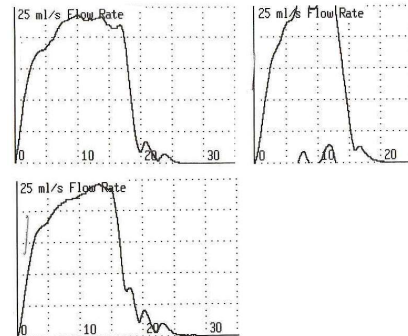
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### Pre optical urethrotomy



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### Post-optical urethrotomy



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### Flow report

- Maximum flow rate (Qmax)
  - to the nearest whole number
- Voided Volume (VV)
  - to the nearest 10mls
- Post void residual (PVR)
  - to the nearest 10mls
- Format: VOID = Qmax/VV/PVR
- If data are not available, then a hyphen should be used, e.g. if VV is missing VOID: 10/-/90.

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### When to proceed to UDS

- Equivocal and/or uninterpretable flow rates
- Incontinence
- Diabetic & Neurological patients
- Children & Young men
- Underactivity (large residual)
- Persistent symptoms
- Post-operative LUTD
- When things don't add up

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## Aims of UDS

- to reproduce the patient's symptoms
- to define bladder and urethral function
- to provide a precise diagnosis
- to define the most significant abnormality
- to allow selection of most appropriate treatment
- to predict post operative problems
- to assess the results of treatment



## What will UDS tell you

- Detrusor function: Stable or DO
- Incontinence: USI or UUI
- Compliance: safe bladder or not
- BOOI: Obstructed or not
  - Will patient benefit from an operation
- BCI: Acontractile/underactive or normal
  - Will patient require ISC



## UDS @ Bristol

- 3 UDS suites; all latex free
- Different machines
- 2 sessions; 5 days a week
  - 3 UDS in morning
  - 2 UDS in afternoon
- Men, women, neurological
- Standard, Video, Ambulatory and Non-invasive
- Anorectal and Whitaker tests also performed
- Urologists, Gynaecologists, Coloproctologists
  - Assisted by nurses or technicians



## Bladder Voiding Function

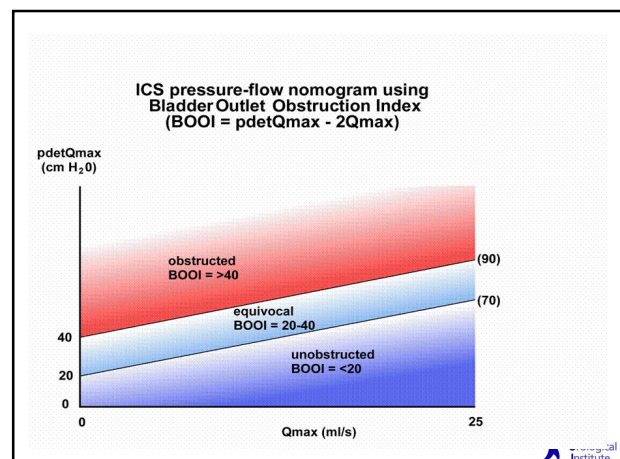
- Three simple indices
  - BOOI (bladder outlet obstruction index)
  - BCI (bladder contractility index)
  - BVE (bladder voiding efficiency)



## Bladder Outlet Obstruction Index (BOOI) (previously Abrams - Griffiths number)

$$\text{BOOI} = \text{pdetQmax} - 2\text{Qmax}$$

- BOOI >40 Obstructed
- BOOI 20 - 40 Slightly Obstructed (Equivocal)
- BOOI <20 Unobstructed



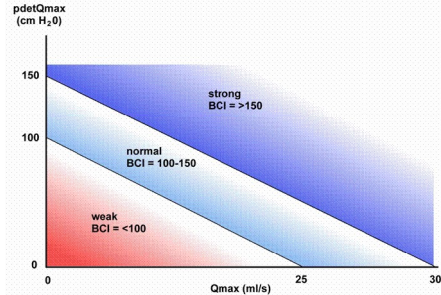
### Bladder Contractility Index (BCI)

$BCI = p_{det}Q_{max} + 5 Q_{max}$

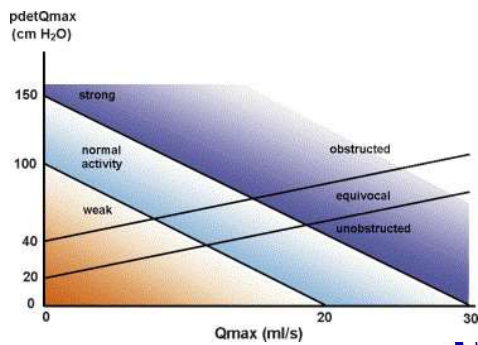
- BCI >150 Strong Contractility
- BCI 100-150 Normal Contractility
- BCI <100 Weak Contractility
- Note: Schäfer (1995) described DECO (unpublished abstract)



Bladder contractility nomogram (after Schafer) using the bladder contractility index (BCI = p<sub>det</sub>+5Q<sub>max</sub>)



Composite obstruction (BOOI) and contractility (BCI) nomogram. BOOI = bladder outlet obstruction index; BCI = bladder contractility index.



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Hashim Hashim et al Eur Urol 2014; 66: 1179

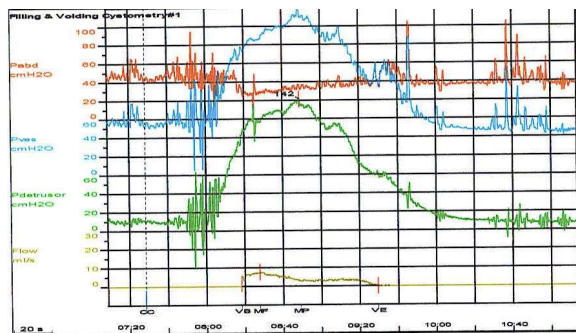


### Bladder Voiding Efficiency (BVE)

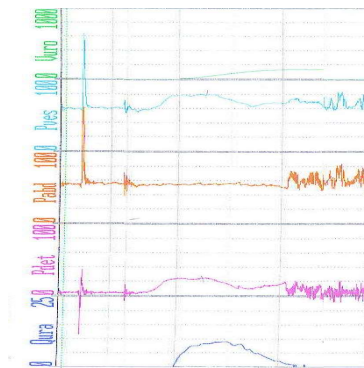
- $BVE = \frac{\text{voided volume}}{\text{total bladder capacity}} \times 100\%$
- BVE is a measure of bladder emptying



### Bladder outflow obstruction

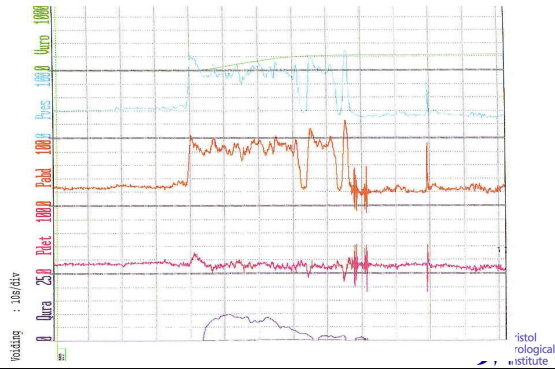


### Detrusor Underactivity

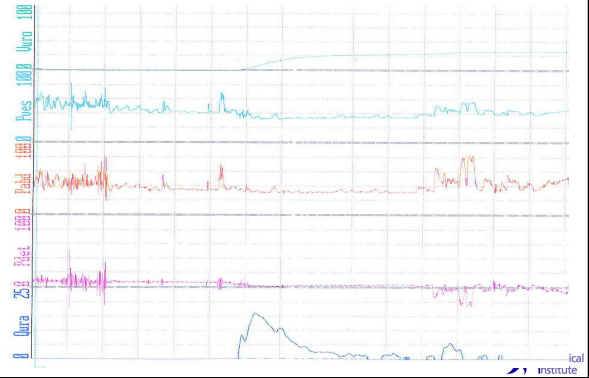




### Voiding by straining, no Pdet



### Post RRP



Thank you