General Aspects Of Urodynamic Assessment Of Children

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Urodynamic studies (UDS)
What study? And In Whom?

- Non Invasive UDS
  - Uroflowmetry
  - without EMG
  - with EMG
- In who?
  - lower urinary tract dysfunction (LUTD)
    - Neurologically normal children
    - With neurological abnormalities
    - With or without anatomical abnormalities
- Invasive Urodynamics

- Obstructive uroflowmetry (repeated)
- Ultrasound anomalies
- Recurrent UTI
- Insufficient response to treatment
- Scientific research

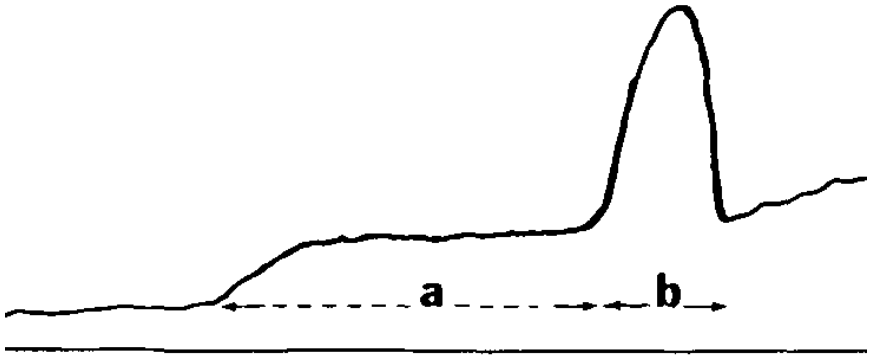
Invasive Urodynamics

- ALLOWS FOR THE ASSESSTMENT OF:
  - VISCOELASTIC COMPONENT OF THE BLADDER
    - What is the bladder baseline compliance
  - DETRUSOR ACTIVITY AND FUNCTION
    - Is the detrusor contracting
    - Are there uninhibited contractions
  - PELVIC FLOOR ELECTRICAL ACTIVITY
    - can be used to assess sphincter activity
    - Can be used to assess if there is voluntary or reflexive tightening of the sphincter
  - ABDOMINAL PRESSURE
    - Measure abdominal straining
    - Allow to confirm if a bladder contraction is real
    - Can be indicative of upper motor neuron disease
  - BLADDER NECK FUNCTION
    - Evaluate continence mechanism
  - SYNERGY OF VOIDING
    - Allows for diagnosis of dyssynergia

Compliance

- *CHANGE IN VOLUME FOR A CHANGE IN PRESSURE (DV/DPdet).*
  - *When abundant detrusor overactivity is present, it may be difficult to determine compliance.*
  - *To standardize the measurement, the most linear part of the V/P relationship should be isolated used for calculating compliance..*
- *VARIABILITY IN COMPLIANCE DEPENDS ON SEVERAL FACTORS:*
  - *rate of filling,*
  - *which part of the curve is used for compliance calculation,*
  - *shape (configuration) of the bladder,*
  - *thickness,*
  - *Mechanical and electrical properties of the bladder wall (Tone)*
  - *contractility,*
  - *relaxability of the detrusor,*
  - *degree of bladder outlet resistance*

Bladder Compliance, Activity in



etrusor smooth muscle activity is able to cause to
combination of both.

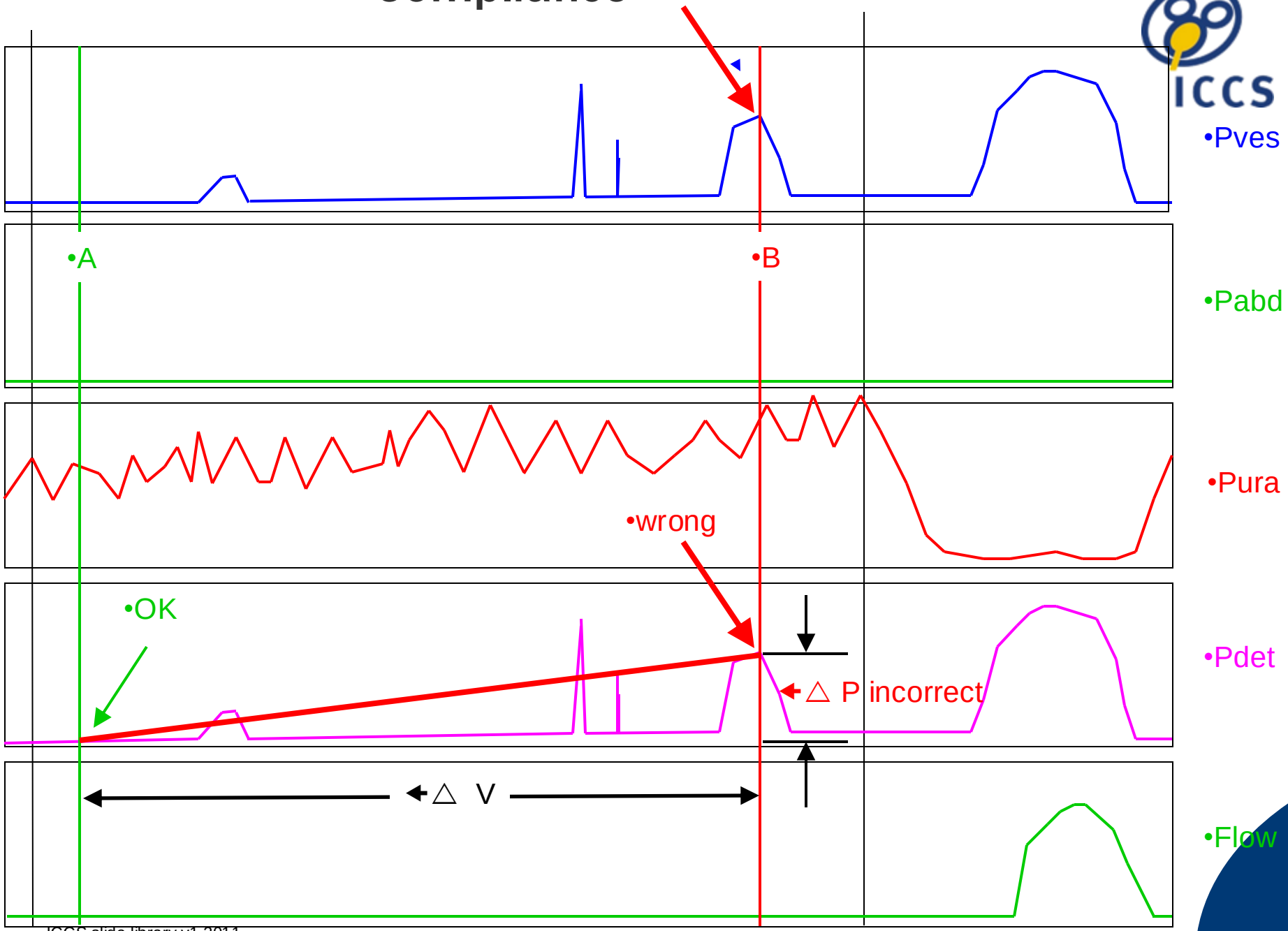
Psuedostatic behavior

- In order for pressure curves to be comparable they must consider Psuedostatic behavior

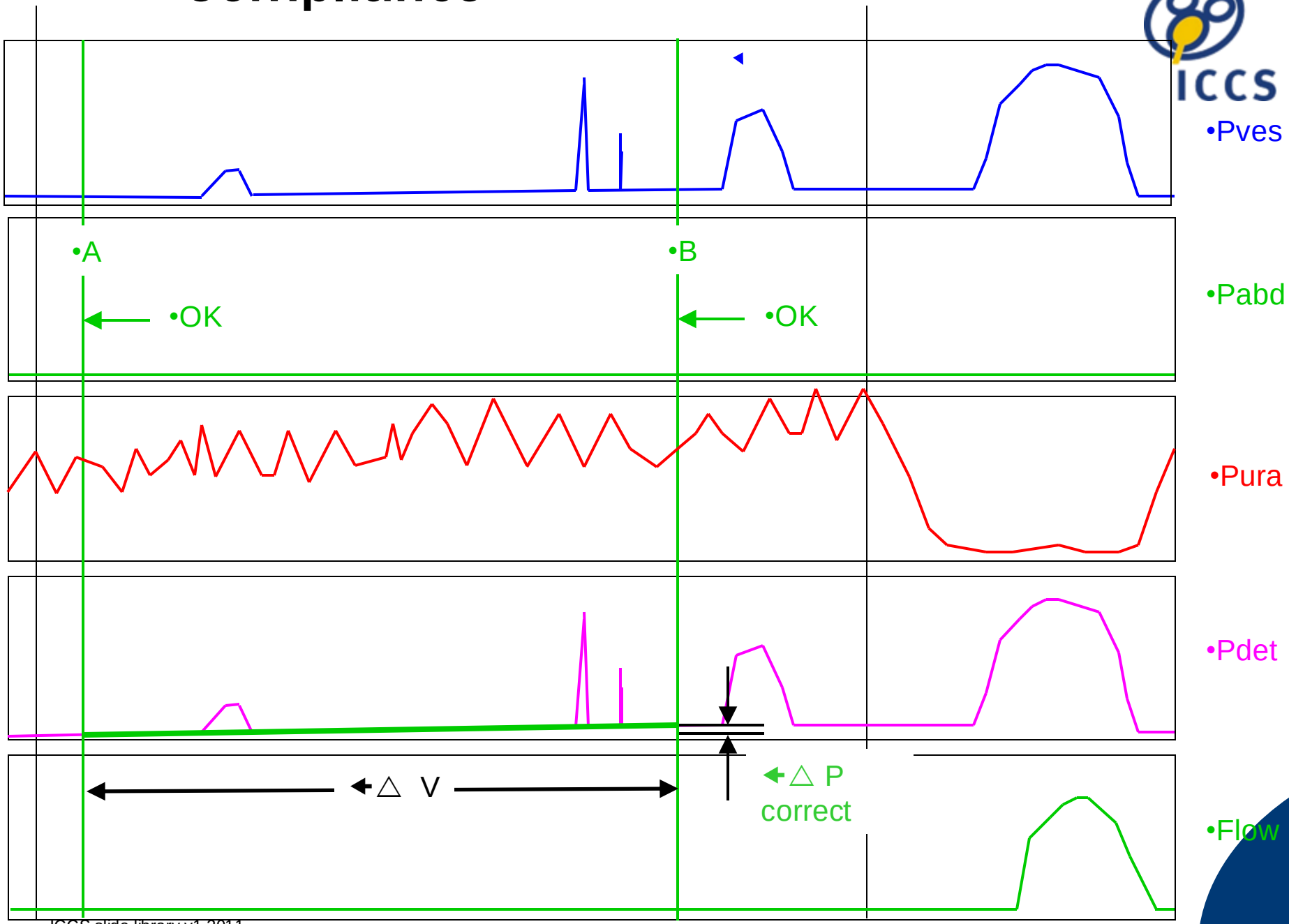
- Psuedostatic behavior means that the influence of time dependent phenomena on the pressure curve is insignificant

- Strain on the bladder should be identical
- It is impossible to achieve identical relative changes in length of bladder wall/unit of time in all bladders.
- Normally bladder fill at 1 cc/min
- Lab studies show that up to 5 cc/min exhibits pseudo static behavior. (Coolsaet 1977)
- In real life cytometry slow fill up to 20 cc/min can give reasonably comparable results
- At rates faster an accommodation test should be performed

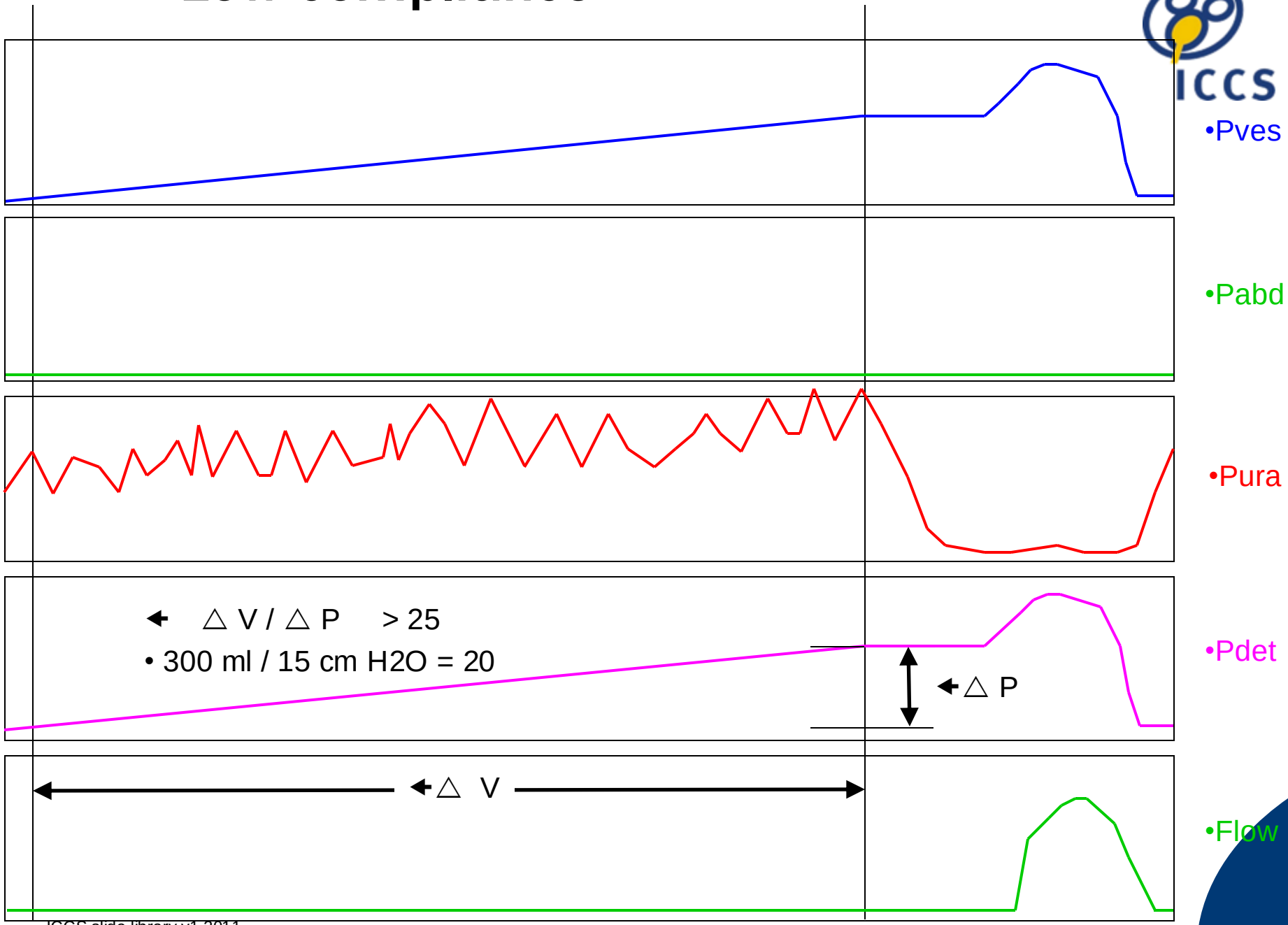
Compliance



• Compliance



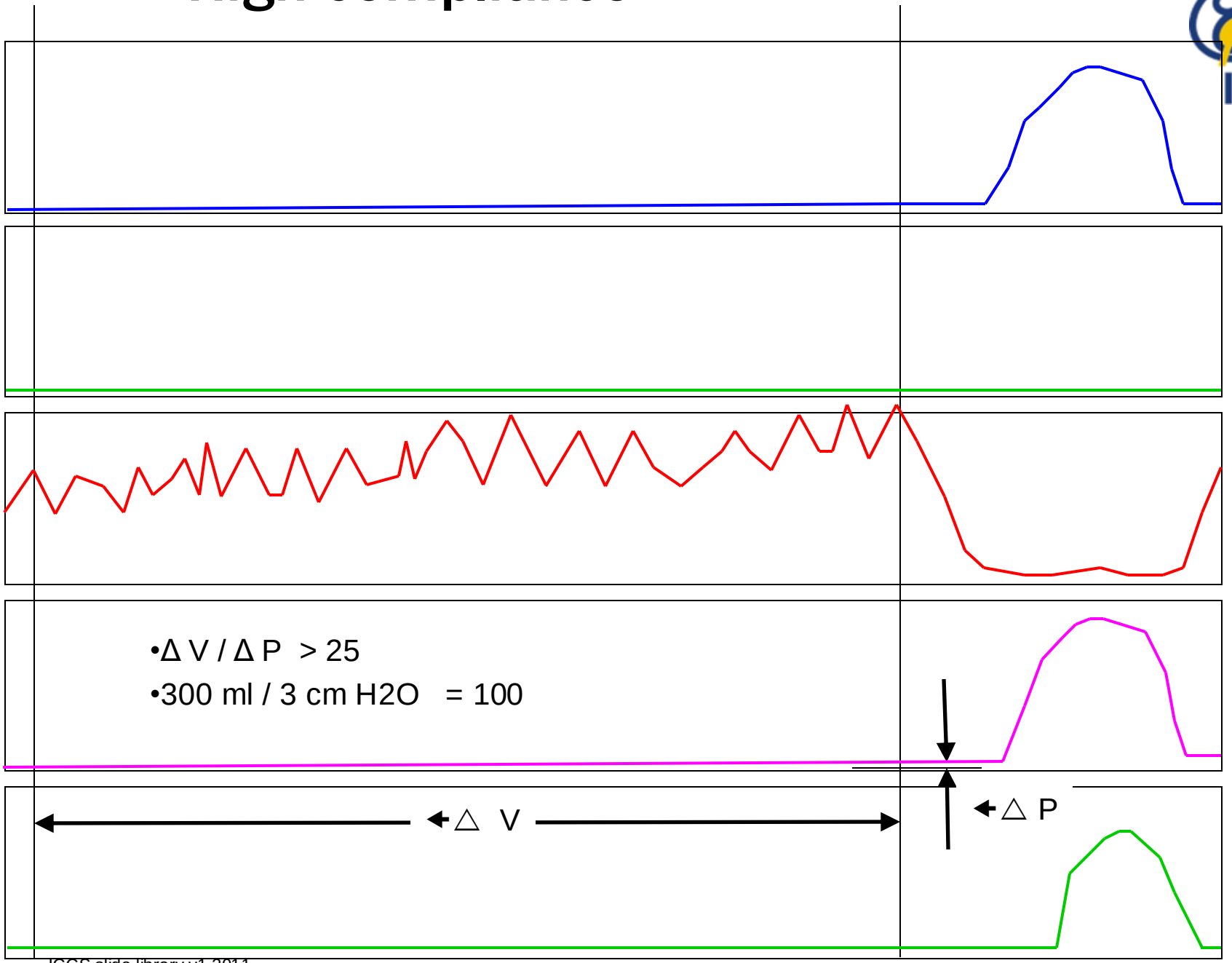
• Low compliance



• High compliance

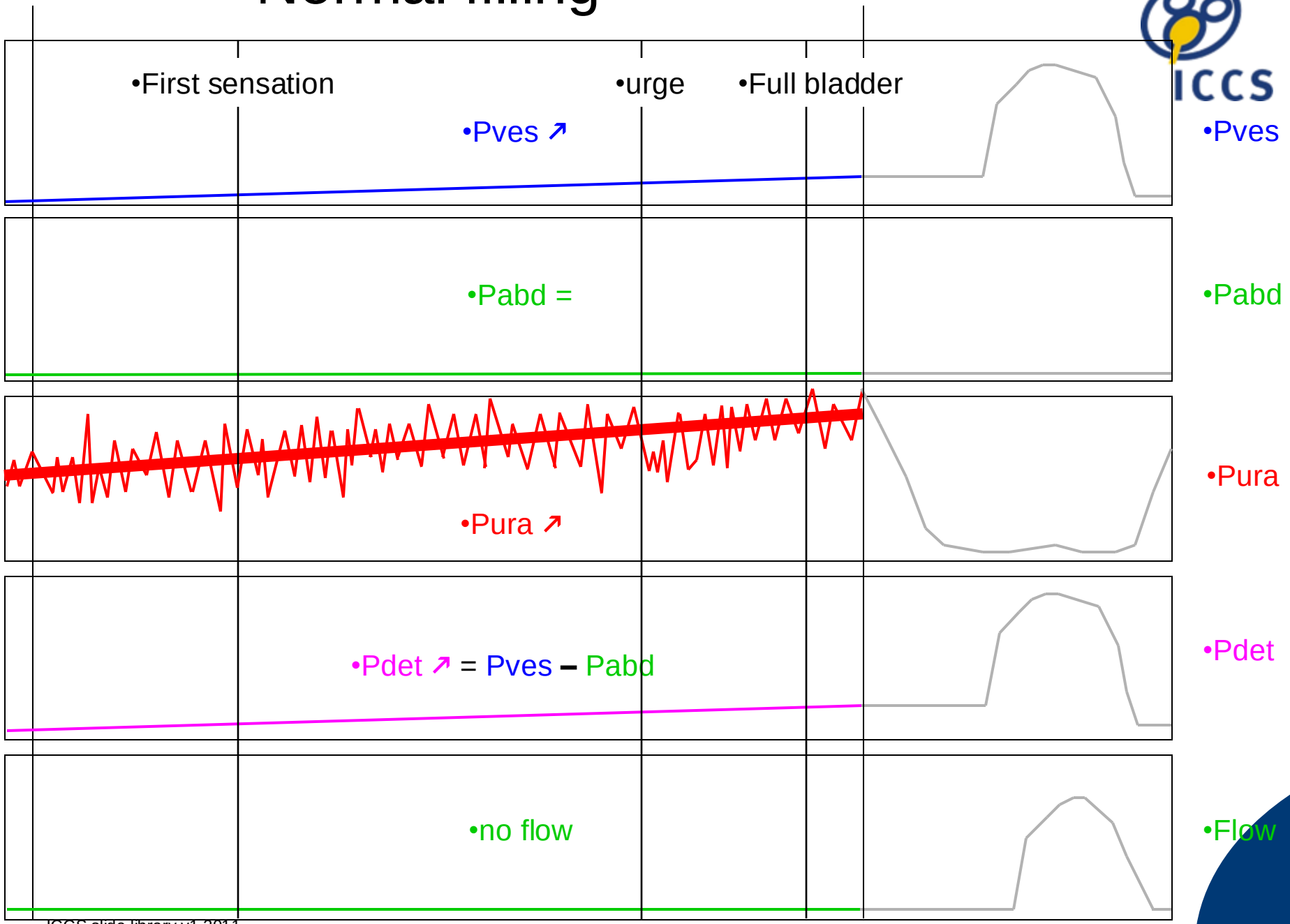
•start

•stop



DETRUSOR ACTIVITY AND FUNCTION

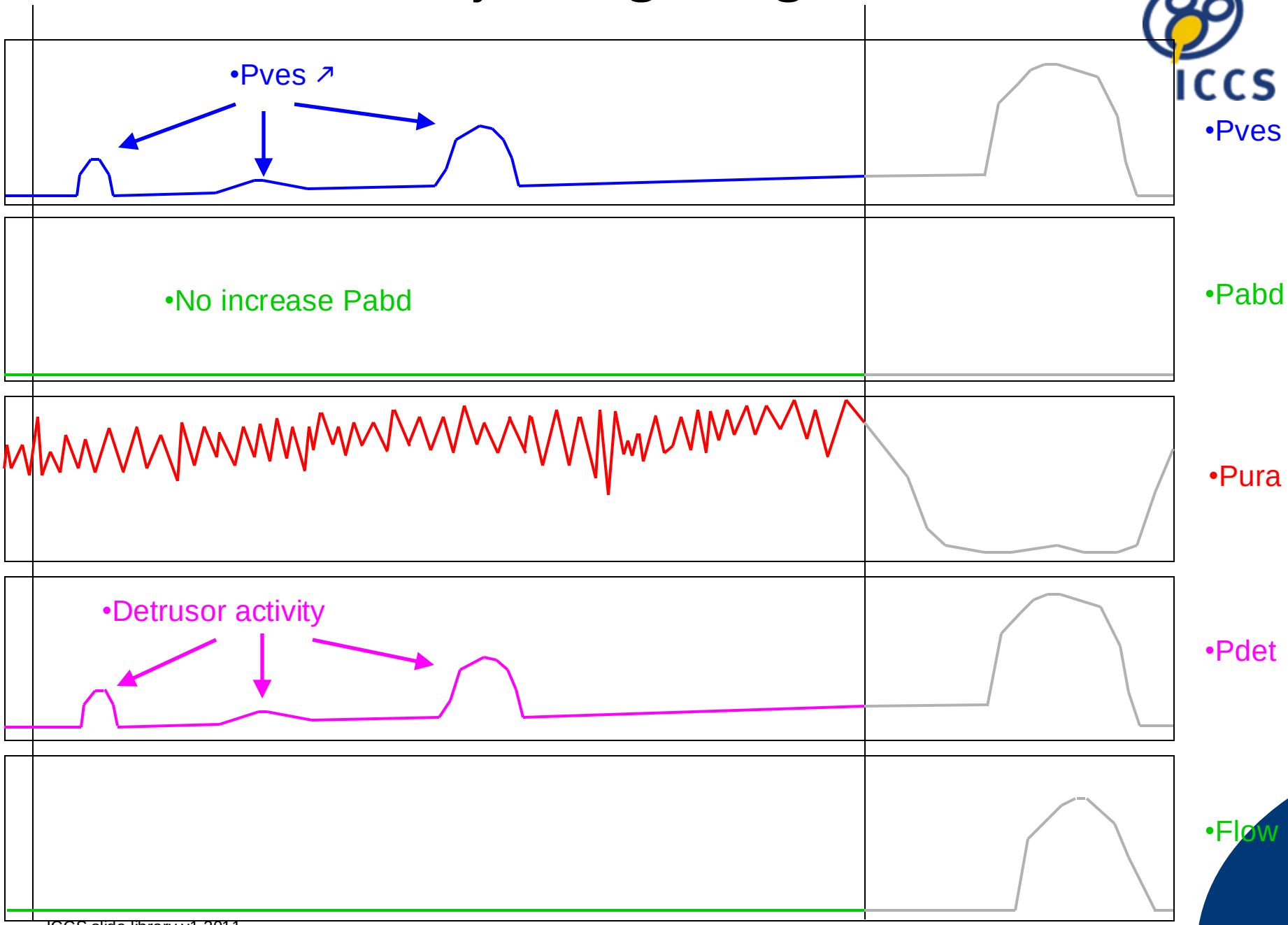
•Normal filling



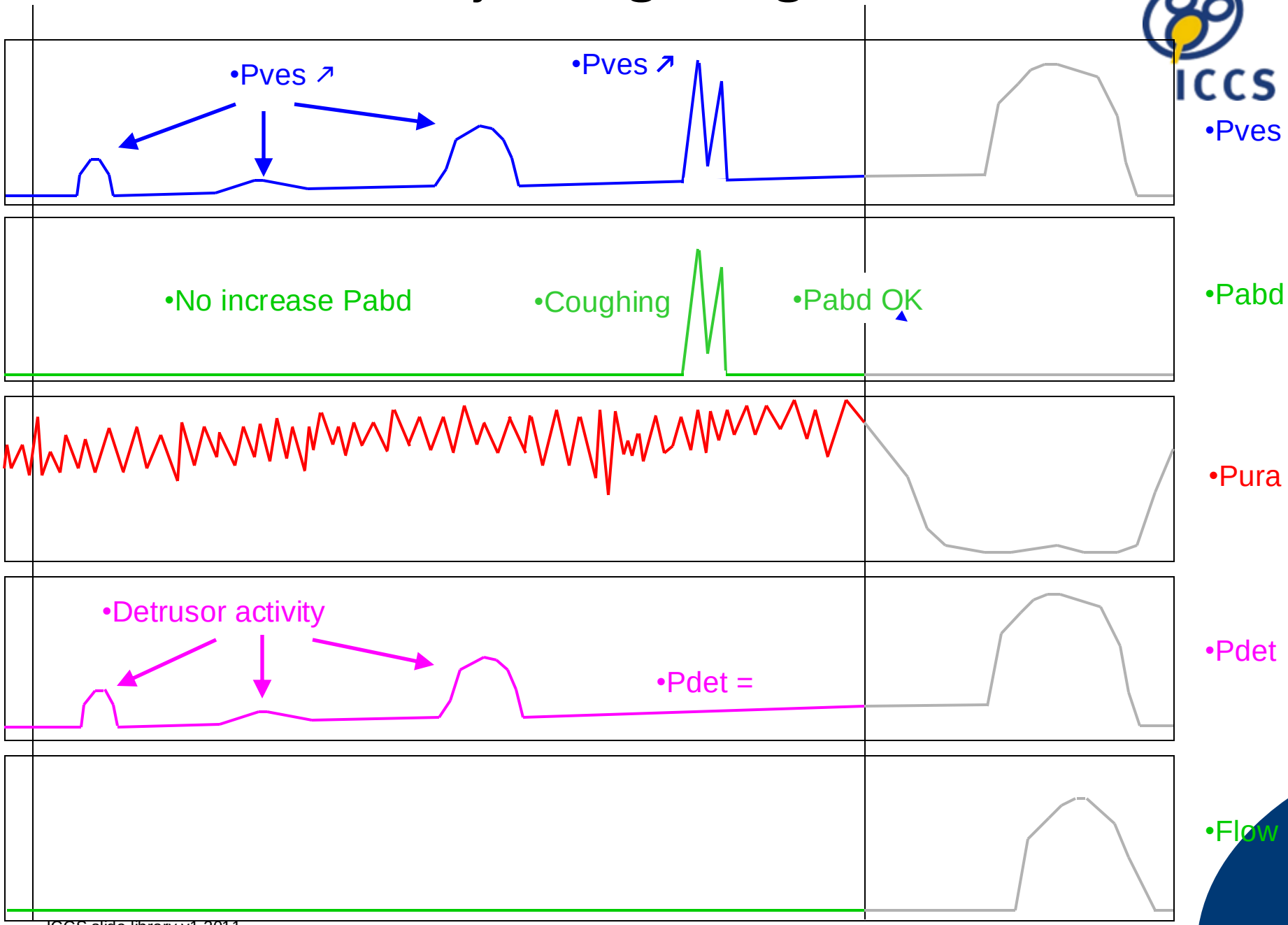
• Detrusor Activity During Filling

•start

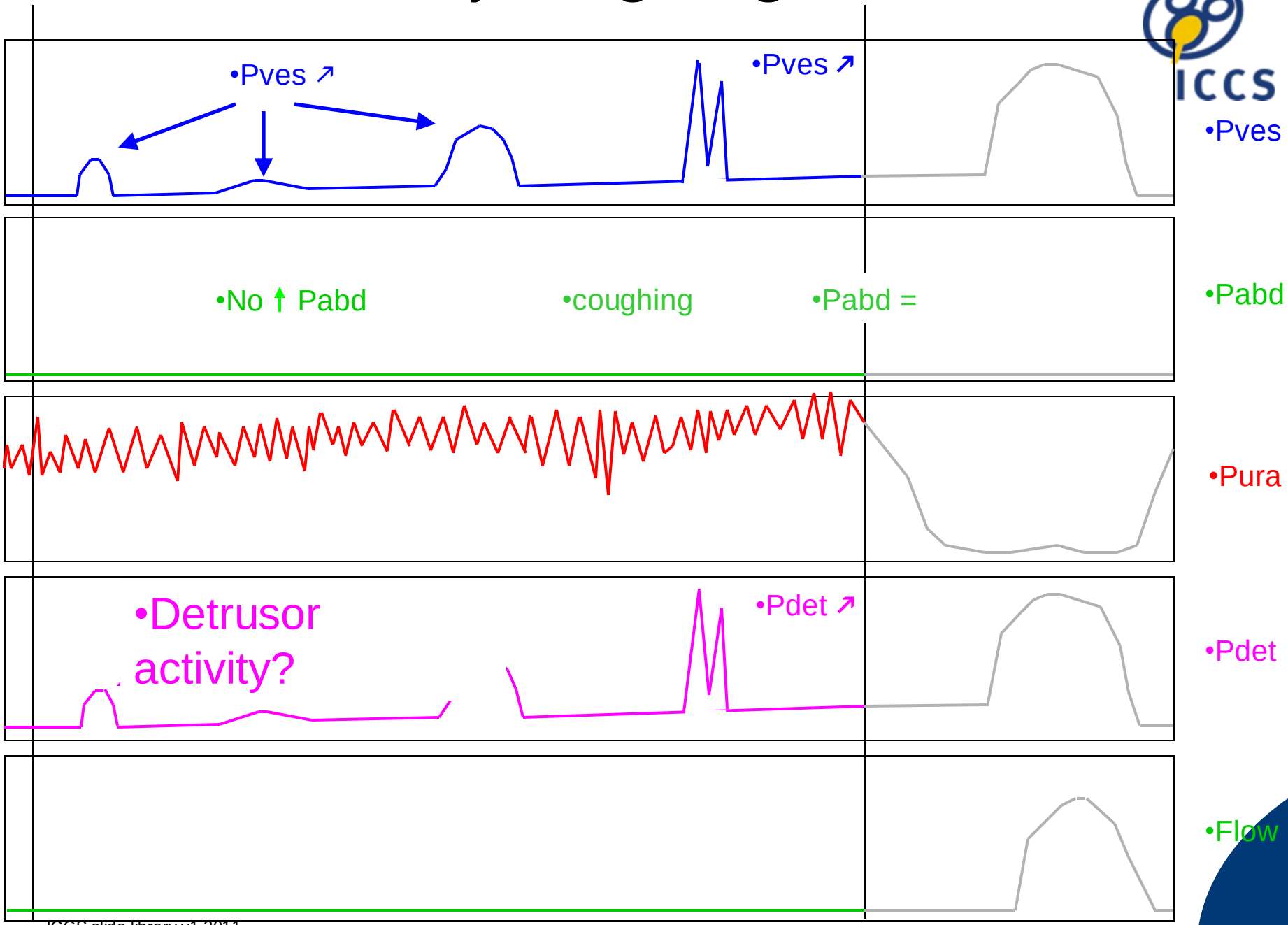
•stop



•start • Detrusor Activity During Filling? •stop



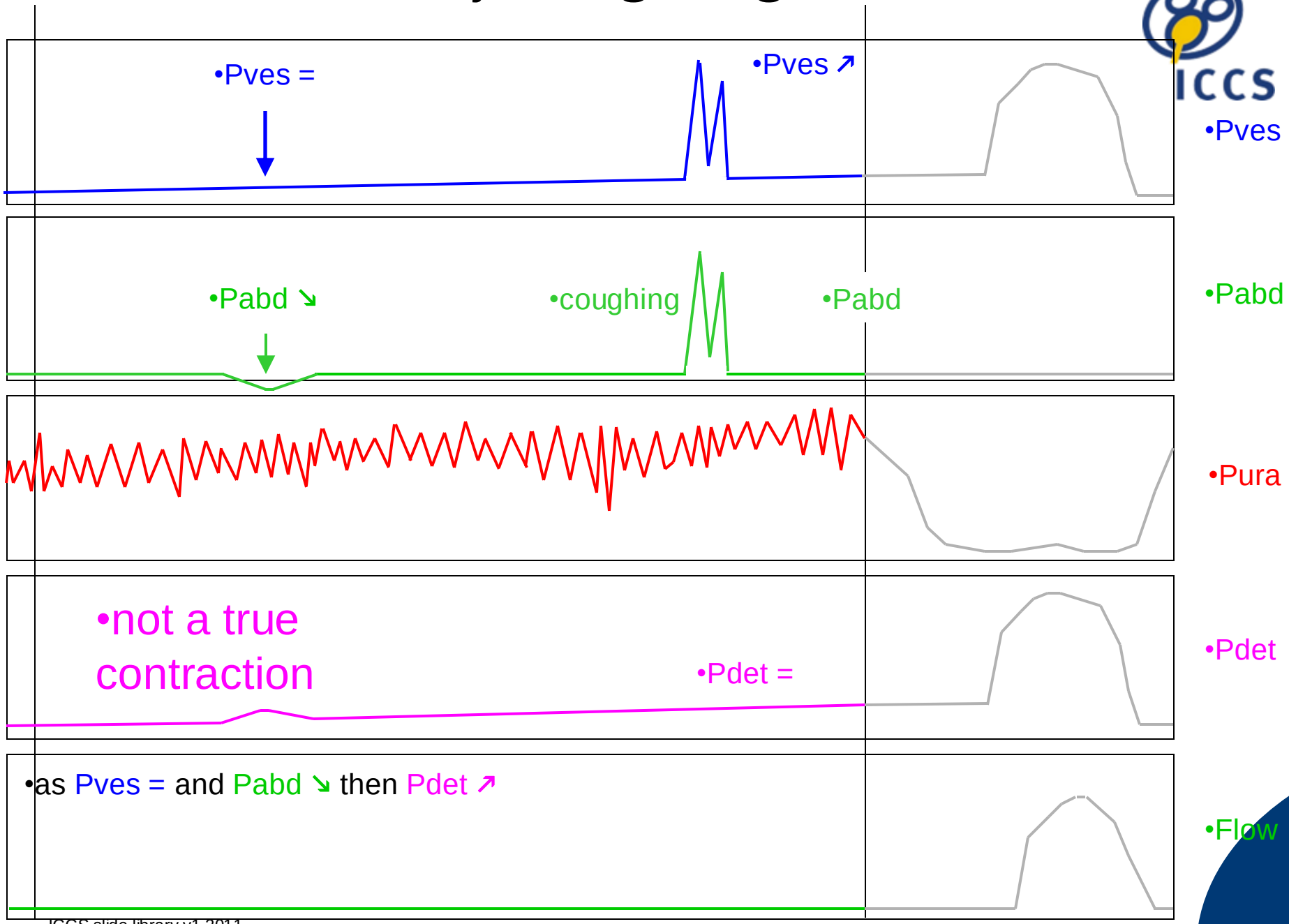
•start • Detrusor activity during filling? •stop



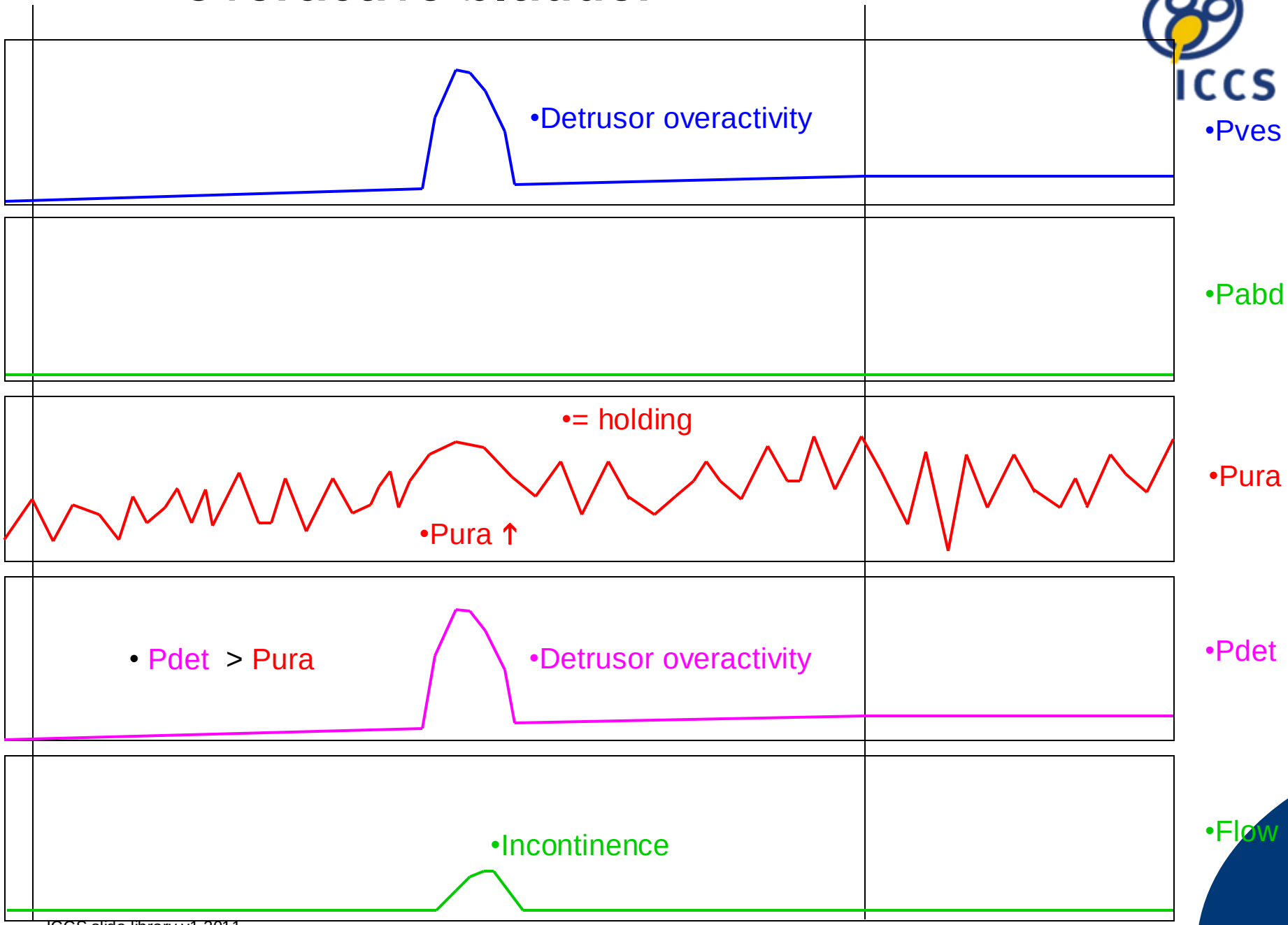
• Detrusor activity during filling?

•start

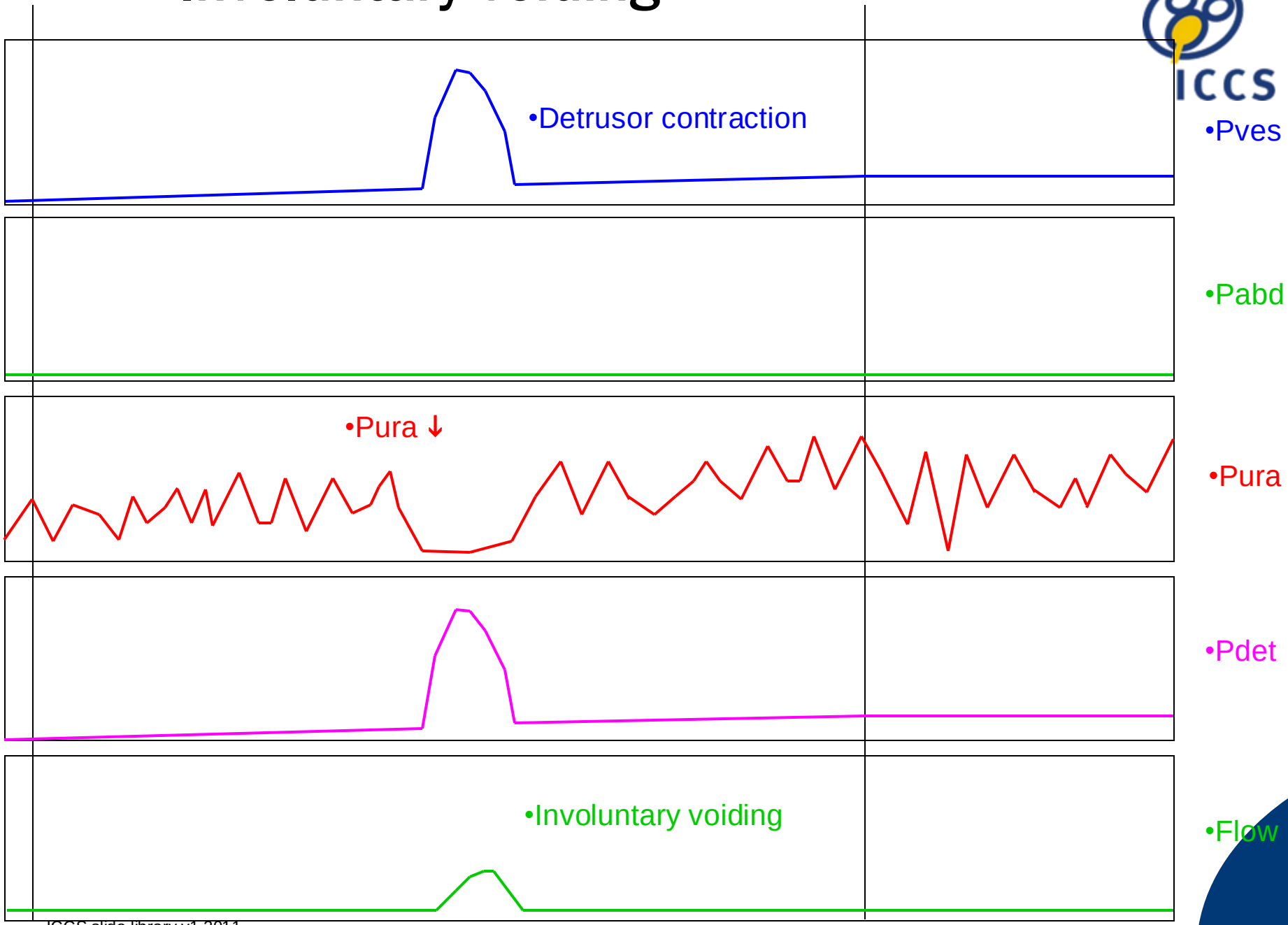
•stop



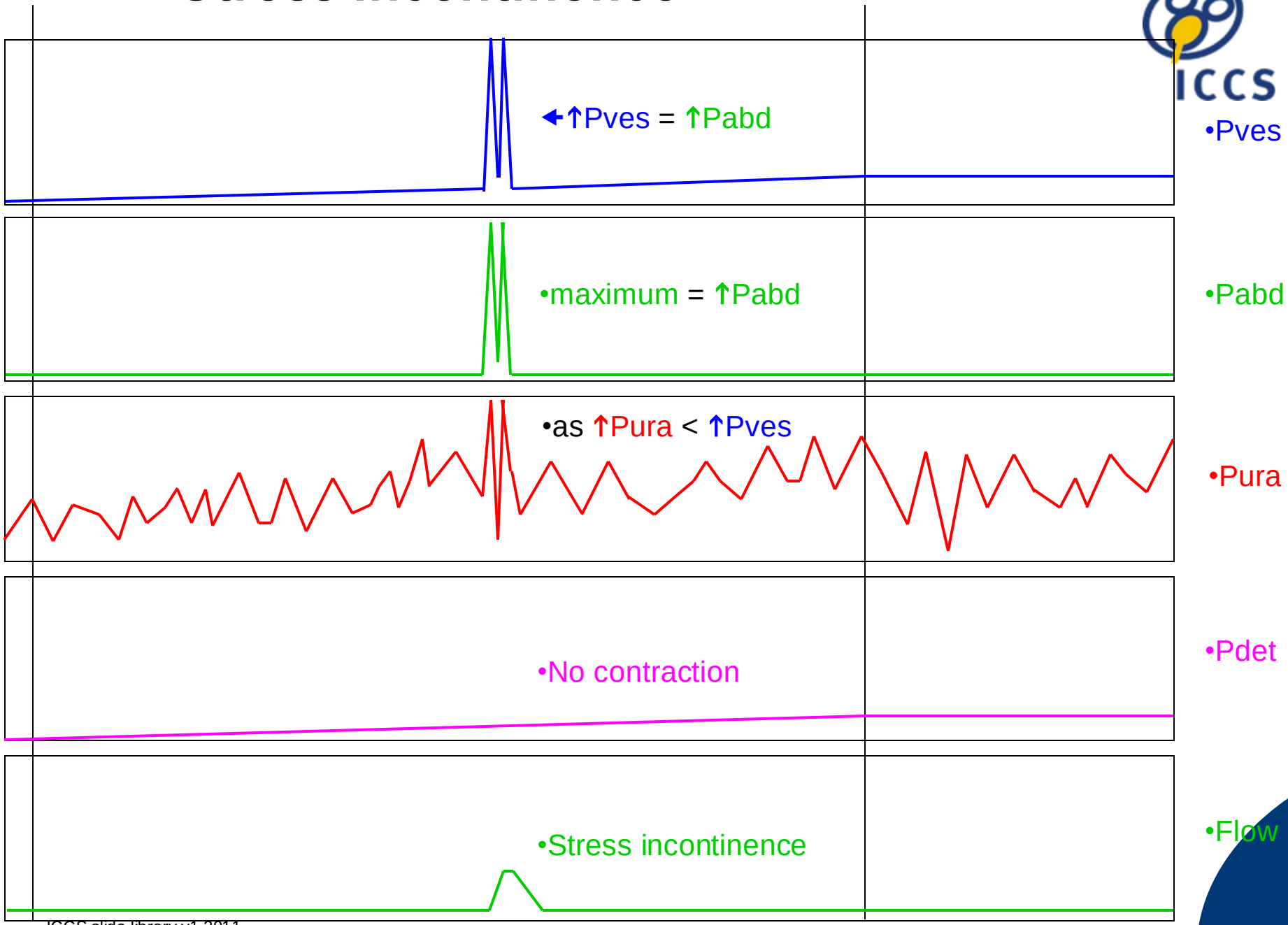
• Overactive bladder



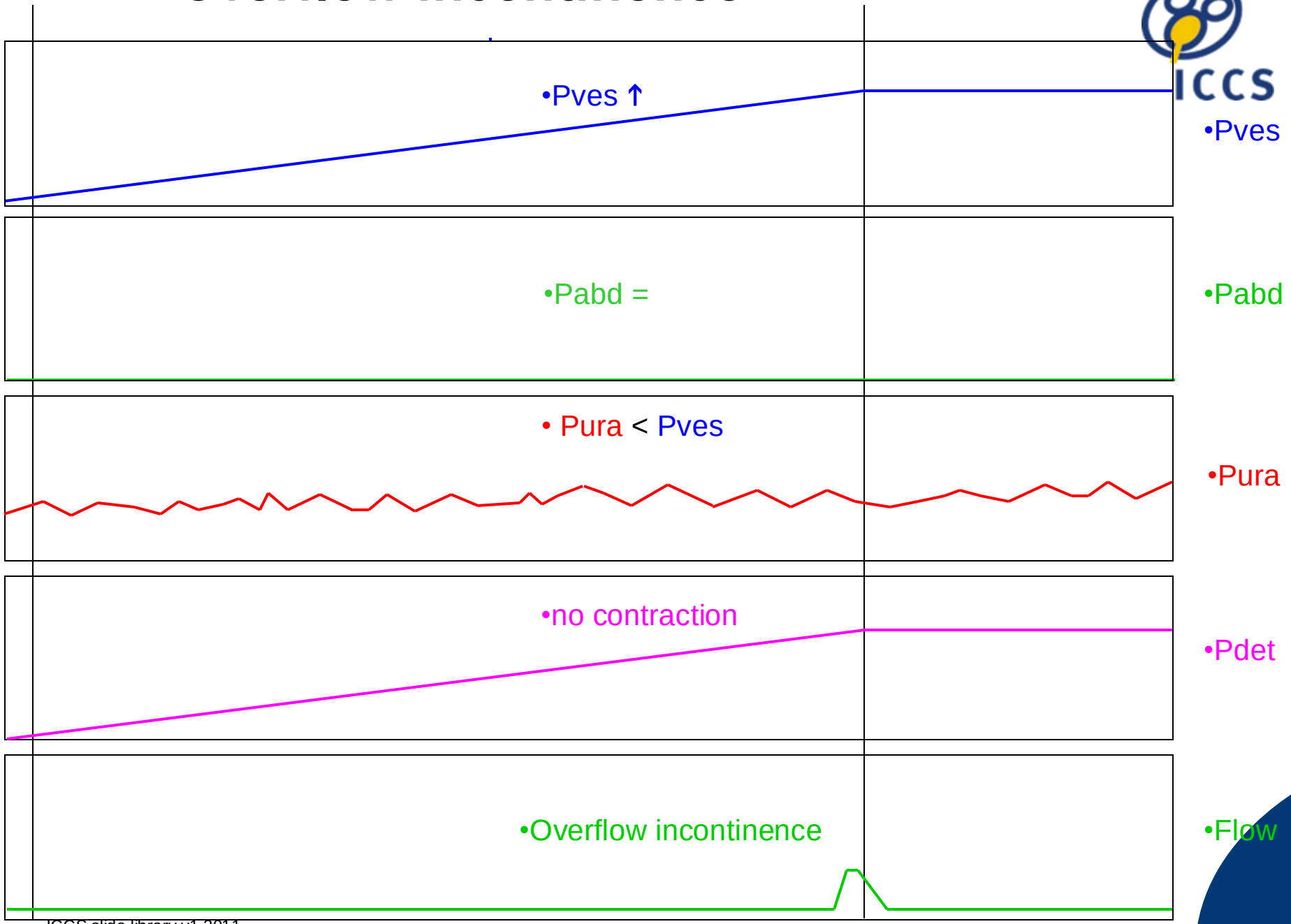
• Involuntary voiding



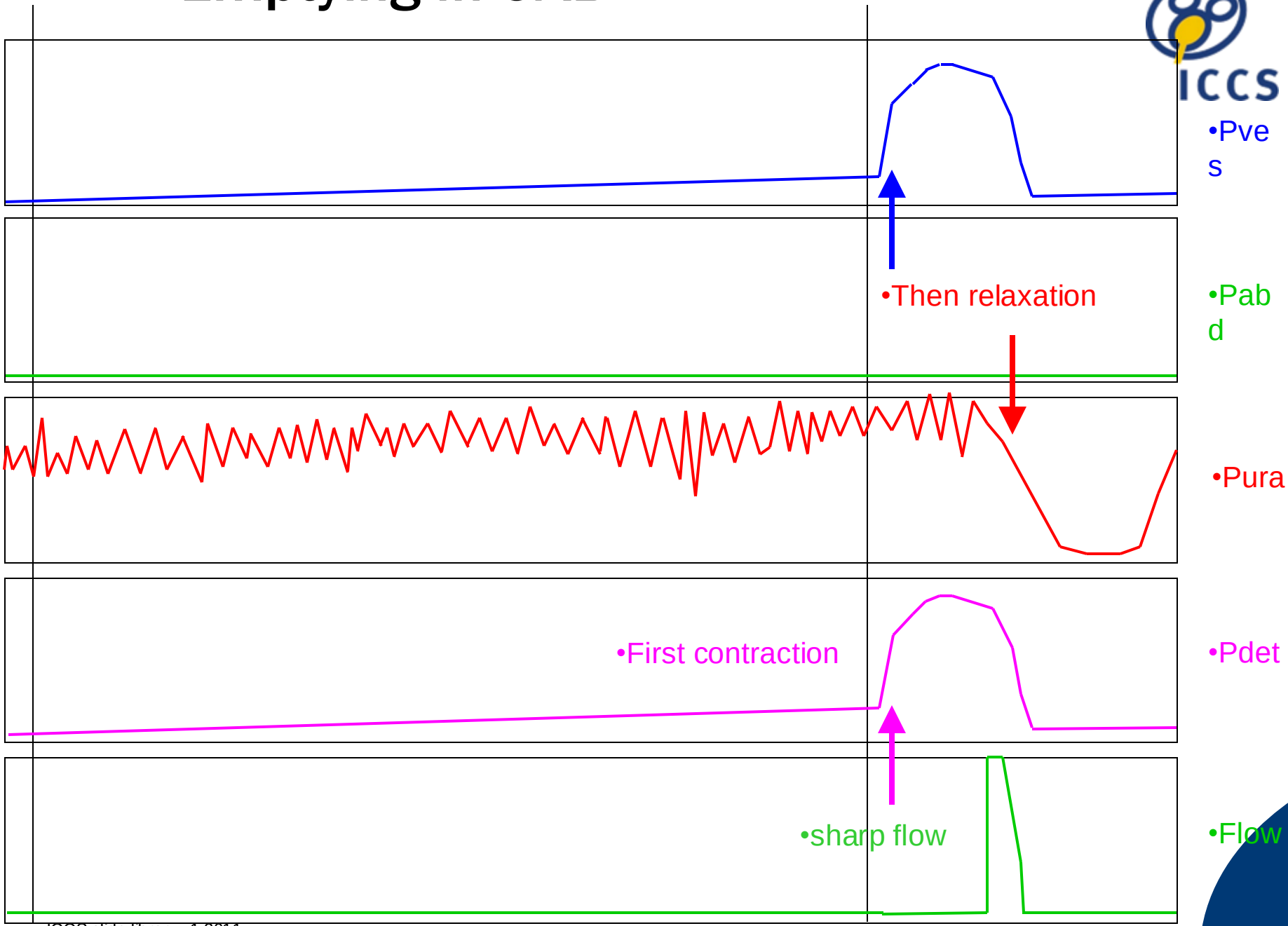
• Stress incontinence



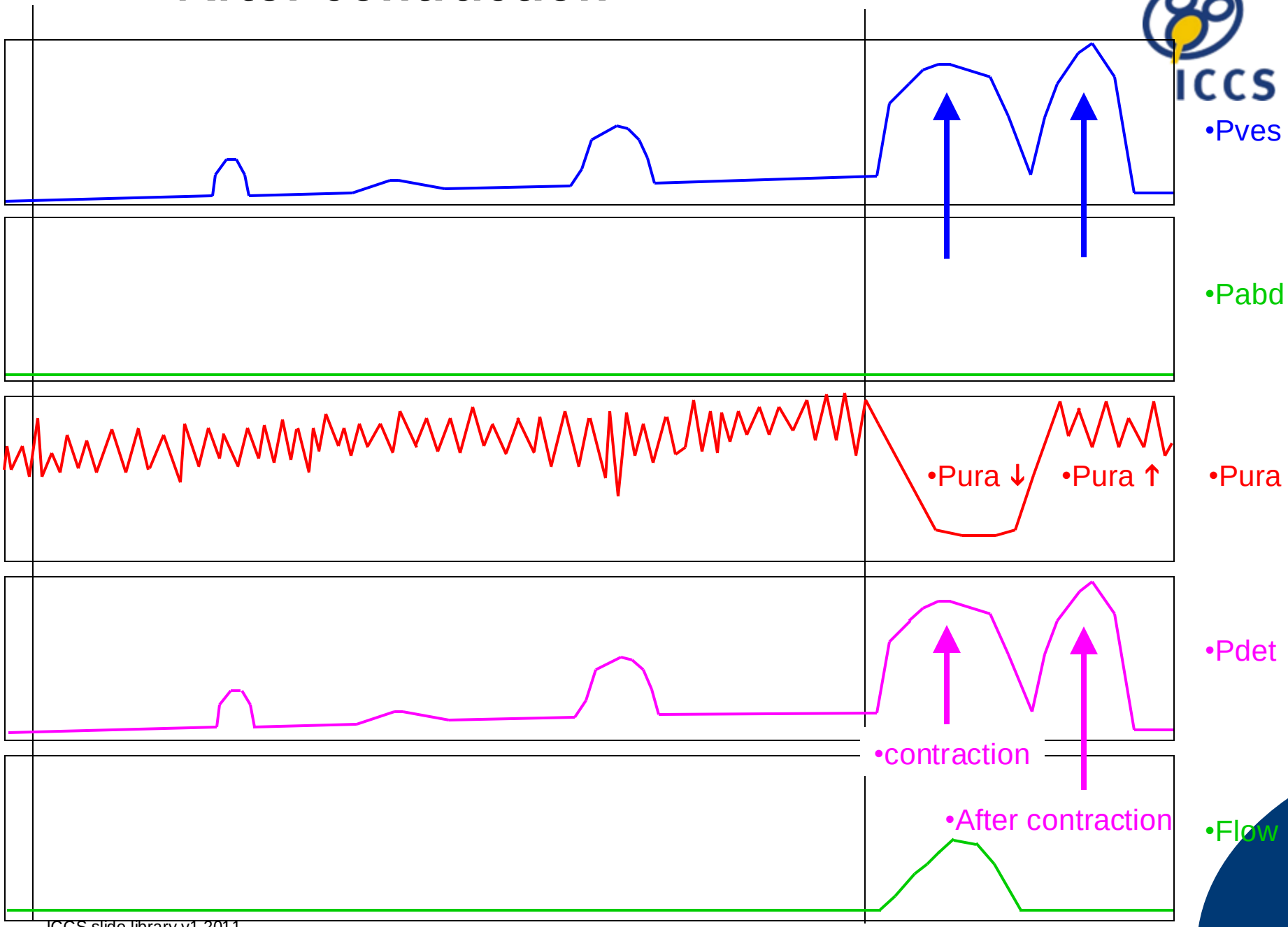
• Overflow incontinence



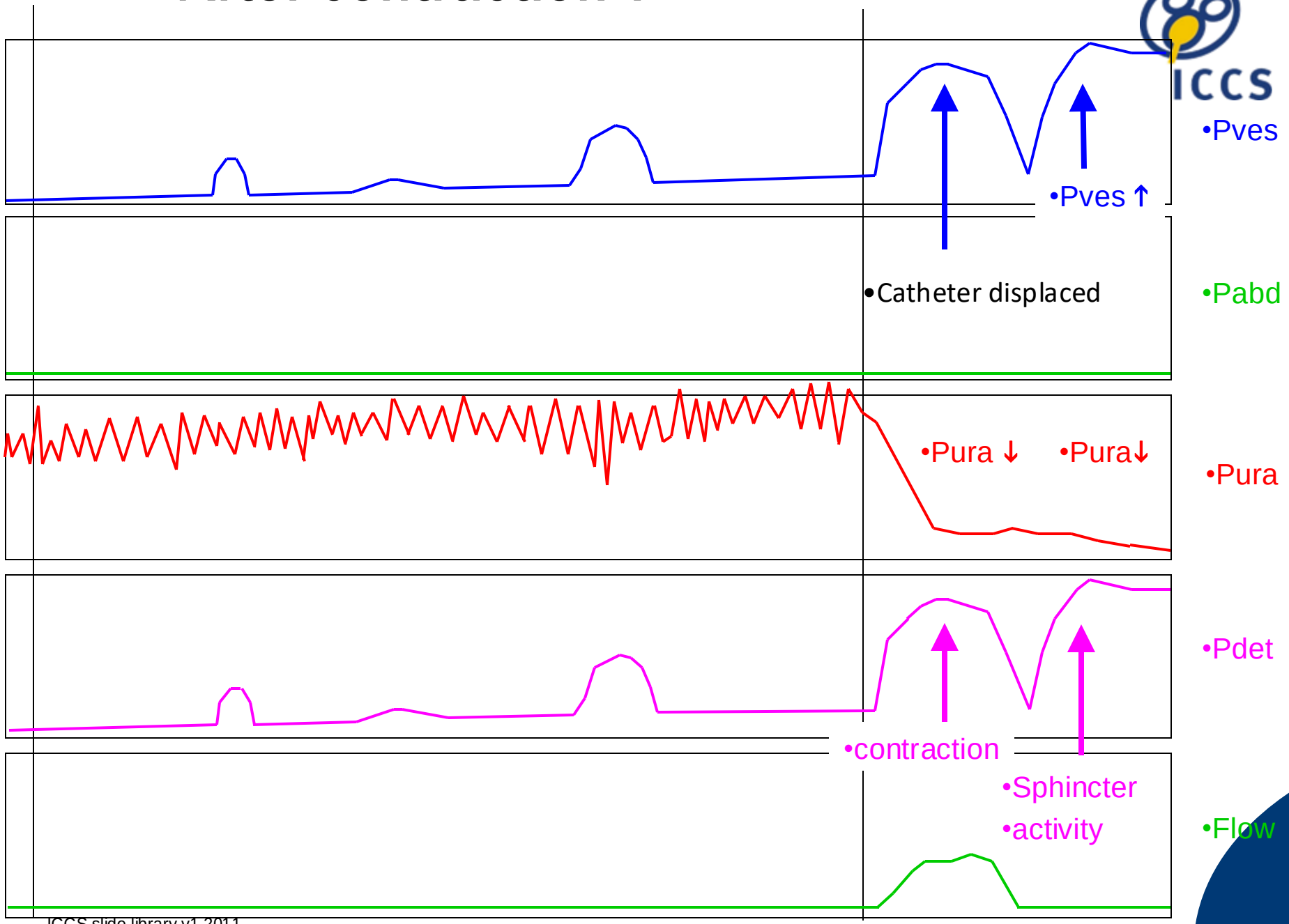
• Emptying in OAB



• After contraction



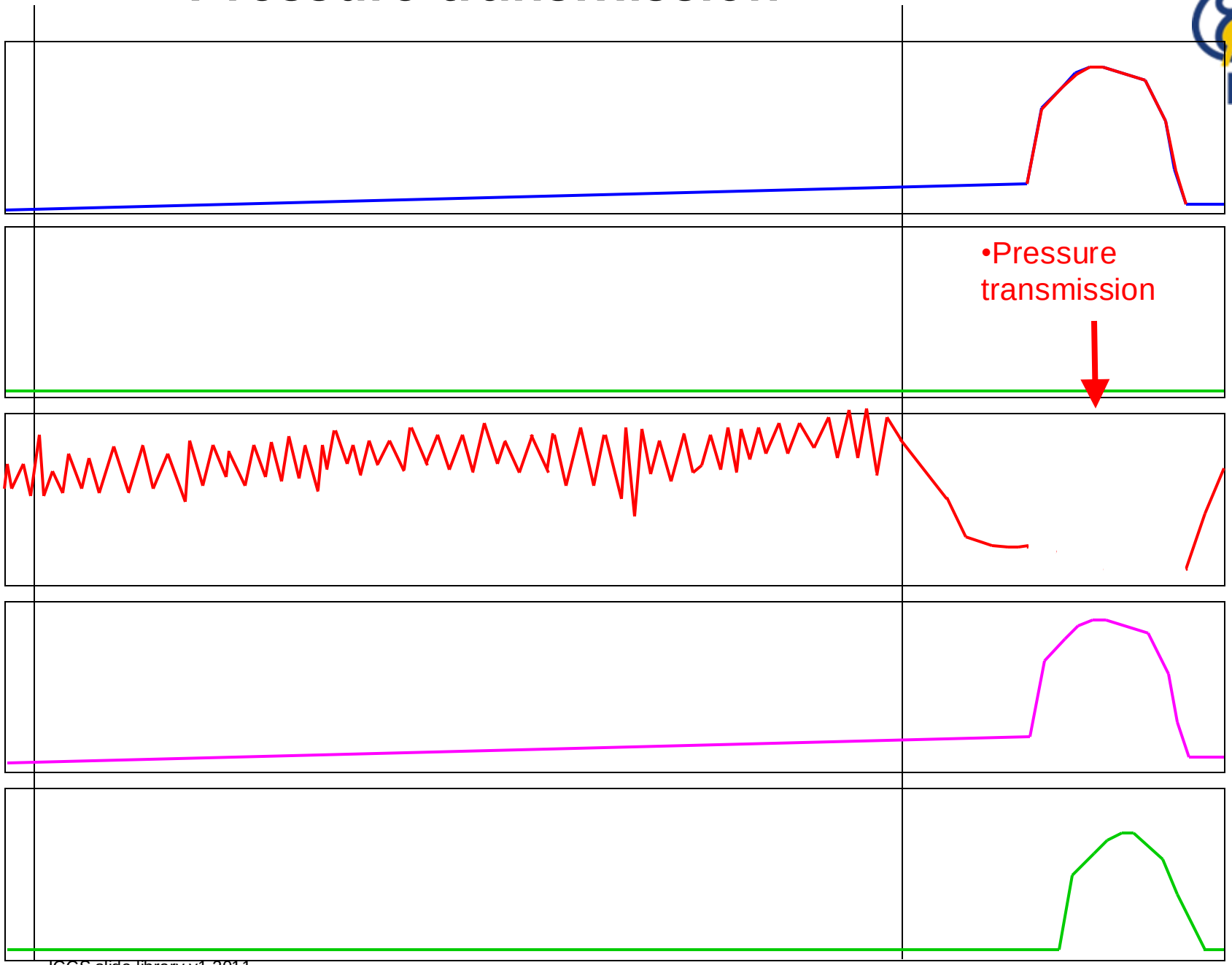
• After contraction ?



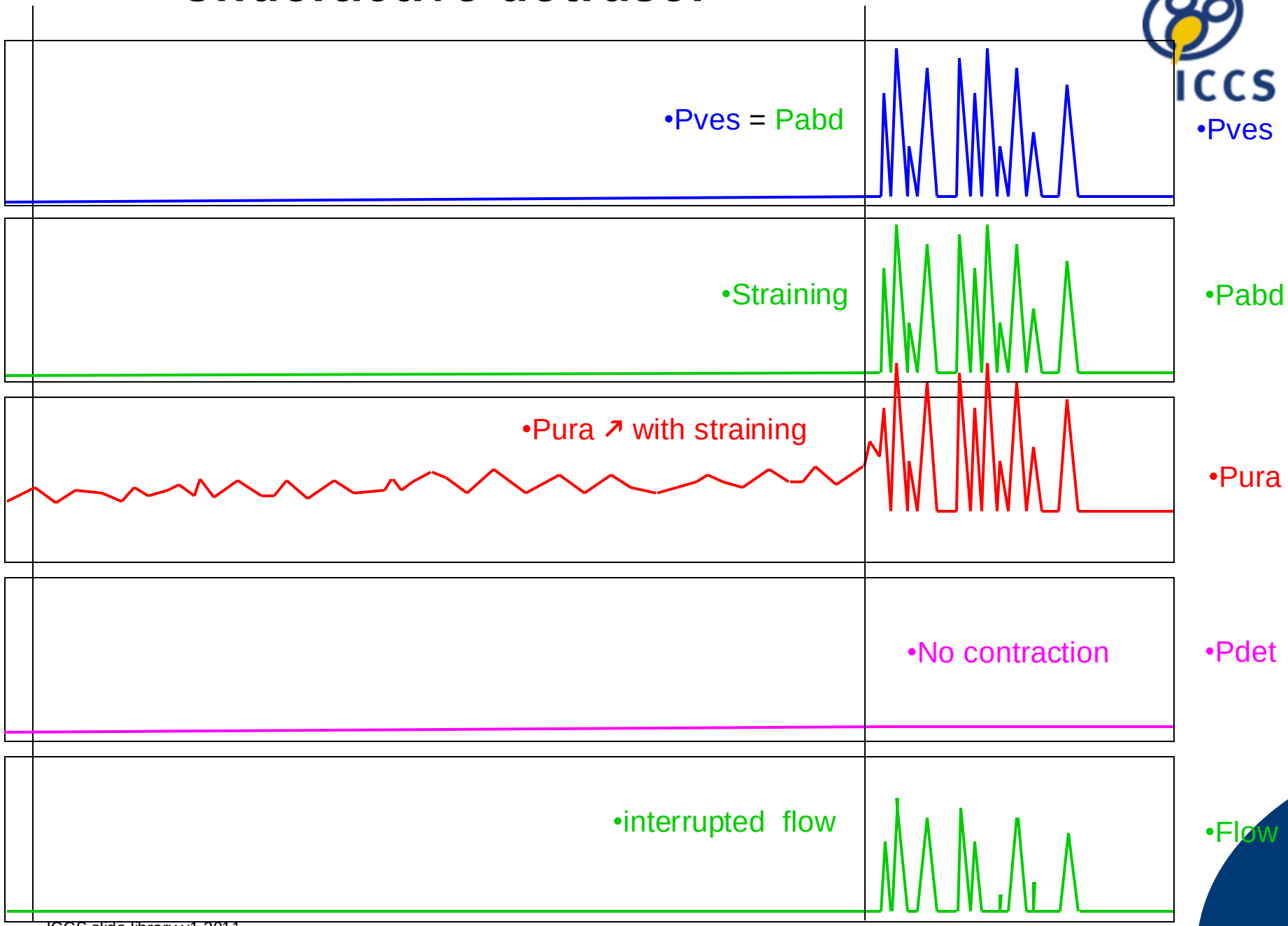
• Pressure transmission

•start

•stop



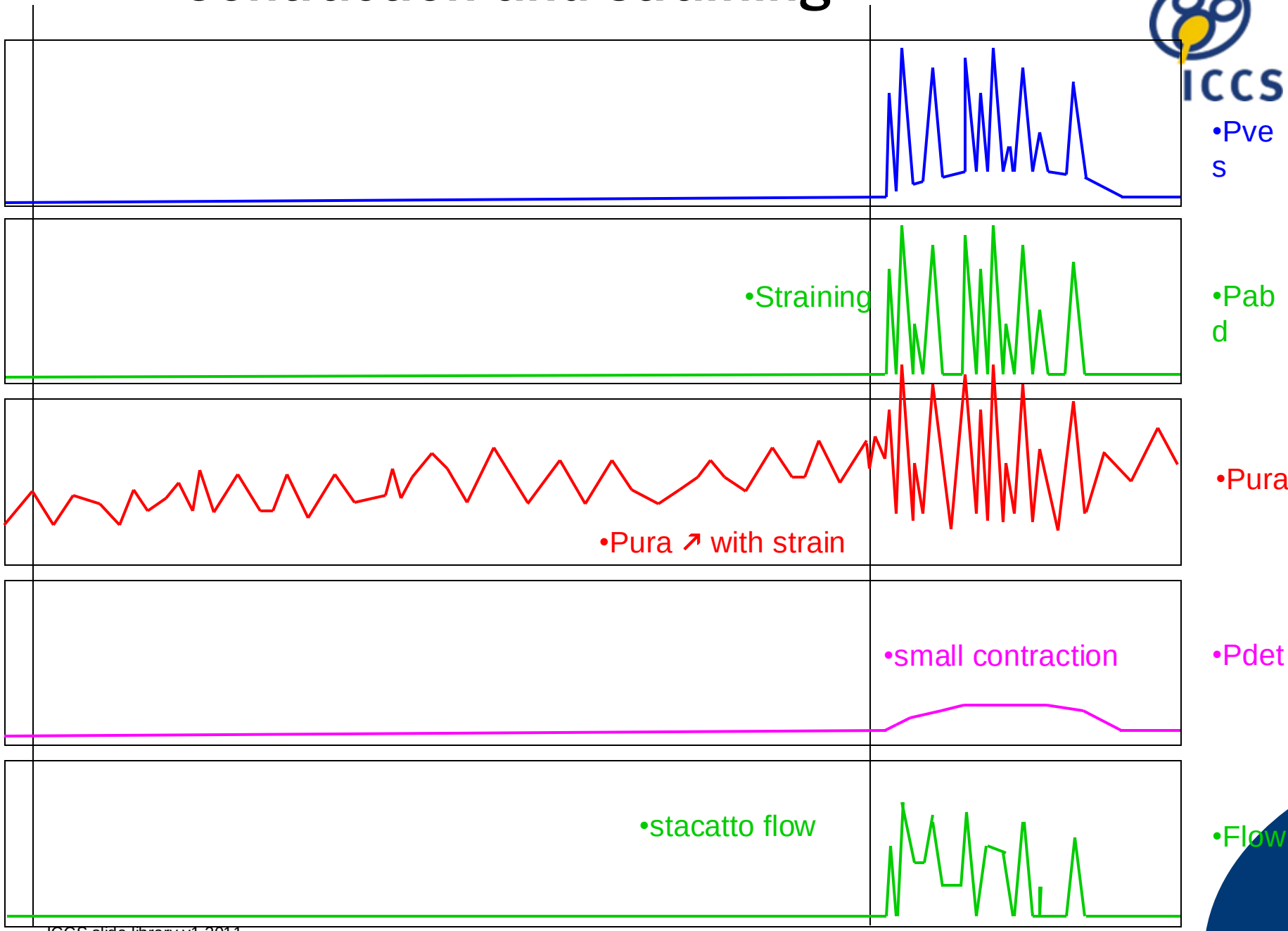
• Underactive detrusor



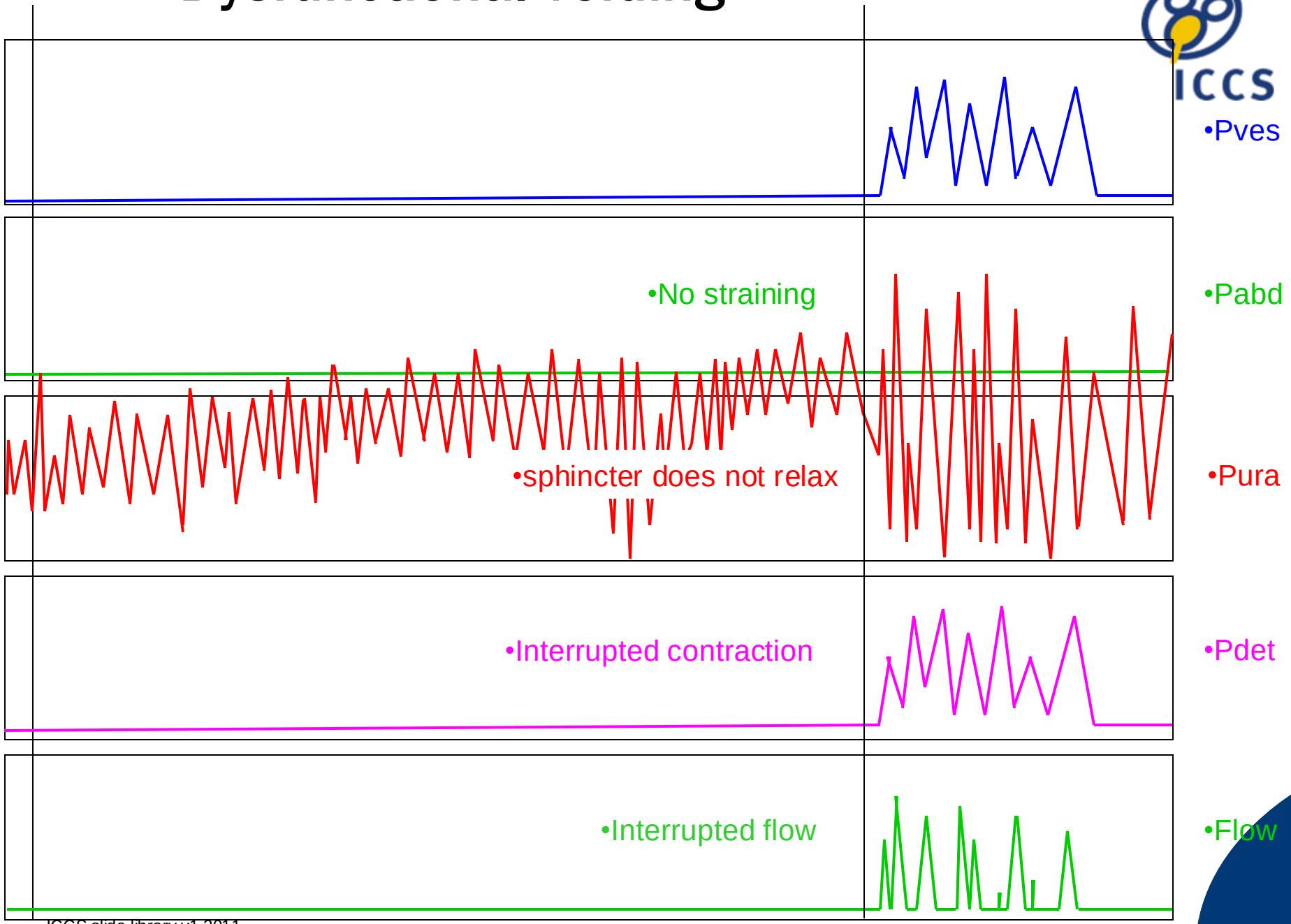
• Contraction and straining

•start

•stop



• Dysfunctional voiding



- Study period Jan 1995 till Dec 1998
- Non-invasive screening in 3500 children
- One thousand selected for Video-urodynamics
- Non-invasive screening
  - history, clinical examination, urinalysis, voiding diary, uroflowmetry, ultrasound, bladder capacity training

Other conclusions

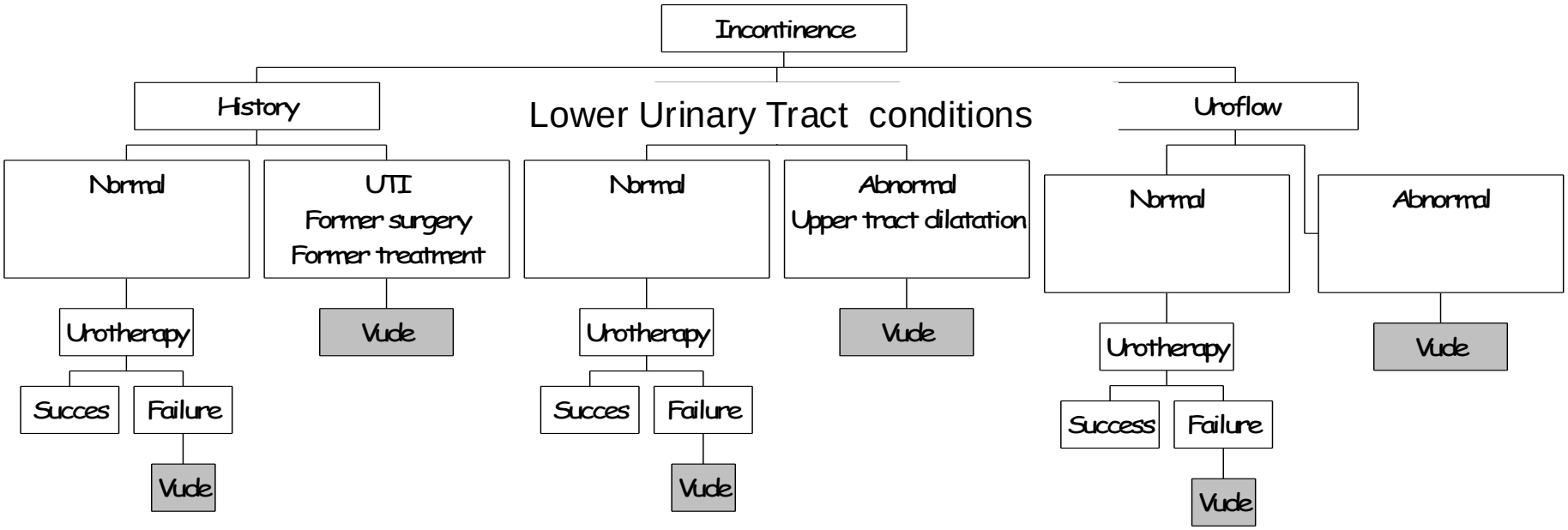
- Most patients had OAB and did not need urodynamics
- Most dysfunctional voiding could be detected on uroflow
- Most anatomical problems could be suspected based on uroflowmetry and ultrasound

New selection criteria

- Obstructive uroflowmetry (repeated)
- Ultrasound anomalies
- Recurrent UTI
- Insufficient response to treatment
- Scientific research

Flow chart: when VUDE?

(video urodynamic examination)



Standardization Documents as References

- Abrams P, Cardozo L, Fall M, Griffiths D, Rosier P, Ulmsten U, et al. The standardisation of terminology of lower urinary tract function: report from the Standardisation Sub-committee of the International Continence Society.

  neurourology and urodynamics. 2002;21(2):167-78.
- Stuart B. Bauer, Rien J.M. Nijman, Beth A. Drzewiecki,* Ulla Sillen, and Piet Hoebeke International Children's Continence Society Standardization Report on Urodynamic Studies of the Lower Urinary Tract in Children, *Neurourology and Urodynamics 34:640–647 (2015)*
- *Paul F. Austin,* Stuart B. Bauer, Wendy Bower, Janet Chase, Israel Franco, Piet Hoebeke, Søren Rittig, Johan Vande Walle, Alexander von Gontard, Anne Wright, Stephen S. Yang and Tryggve Neveus The Standardization of Terminology of Lower Urinary Tract Function in Children and Adolescents: Update Report from the Standardization Committee of the International Children's Continence Society* Neurourol Urodyn. 2016 Apr;35(4):471-81. doi: 10.1002/nau.22751. Epub 2015 Mar 14.PMID: 25772695

Flow chart: when VUDE?

(video urodynamic examination)