

# Spina Bifida: Complex Decision Points

## Role of Urodynamics and CIC in Infants

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# Disclosures

- Grant/research support: Centers for Disease Control and Prevention

# Prevent CKD: the “known knowns”

- Most born with normal kidneys
- Some at higher risk for renal deterioration
- Risk for renal deterioration is modifiable

# Prevent CKD: the “known knowns”

- Most born with normal kidneys
  - Historical: 90-95% have normal urinary tract when first evaluated
  - Contemporary (UMPIRE):
    - RBUS: 105/188 (SFU 0), 76/188 (SFU 1-2)
    - DMSA: 61/66 no renal defects

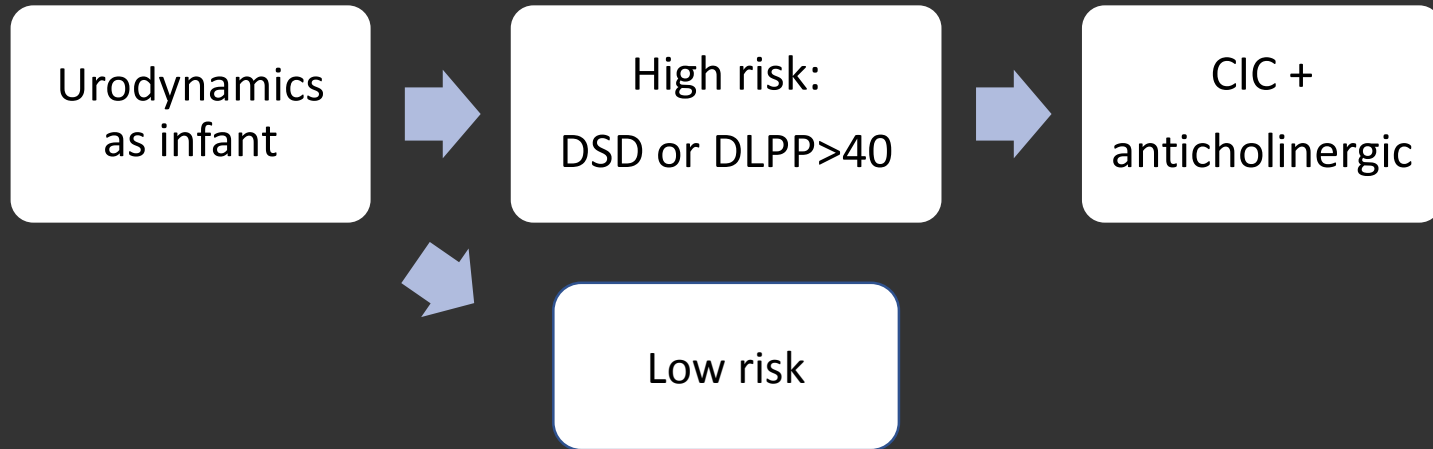
# Prevent CKD: the “known knowns”

- Some at higher risk for renal deterioration
  - DSD
  - DLPP > 40 cm H<sub>2</sub>O

# Prevent CKD: the “known knowns”

- Renal deterioration is modifiable
  - Historical: 695 adults since 1944
    - 56 deaths with known cause → 33% renal
  - Contemporary (2012): 1128 adults
    - Mean age 26y
    - CKD 26%
    - ESRD 1.3%

# Current proactive approach



# Urodynamics for risk stratification, but...



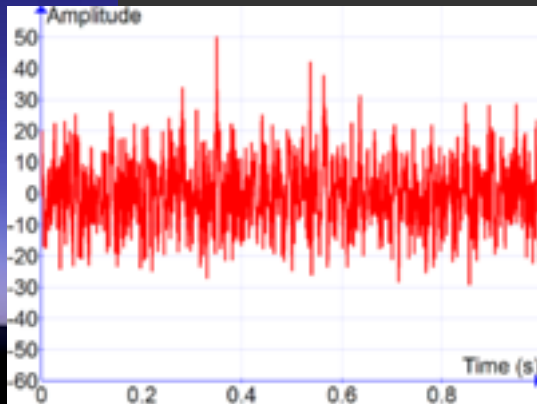
Dr. Noel Tulipan:

- Neurosurgeon pioneer – in utero MMC repair
- “Are the urodynamics bad?”

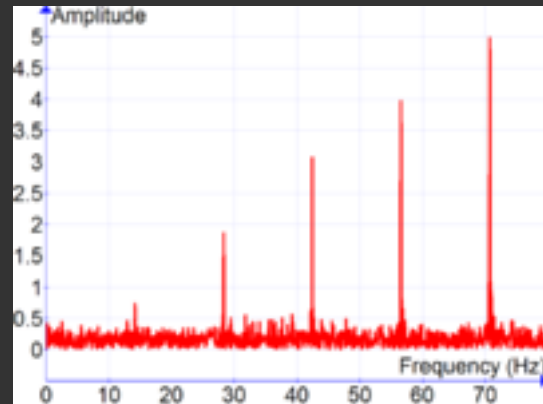


# Urodynamics for risk stratification, but...

Raw signal



Signal processing

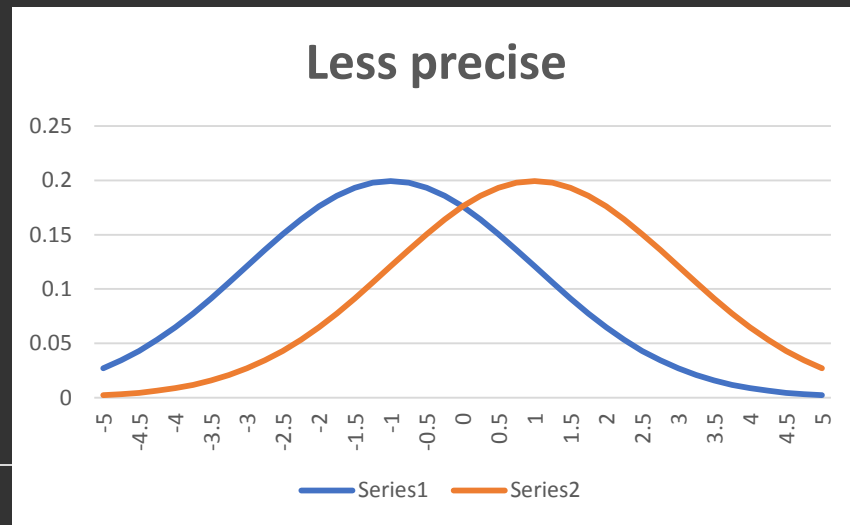
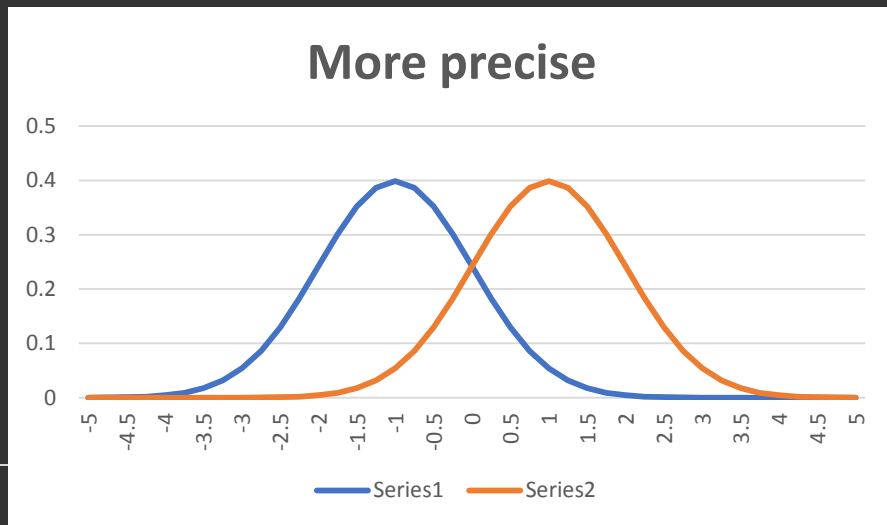


# Urodynamics for risk stratification, but...

- Subjective interpretation of known risk factors: DSD, DLPP and others
- Low interrater reliability

# Consequences of imprecise measurements

- Harder to detect an actual difference



# Differences in bladder function, but not urodynamics!

- Prenatal vs postnatal closure
- MOMS: Difference in voiding status
- Katowice: Better continence, fewer UTIs
- No difference in urodynamics

# Possible conclusions

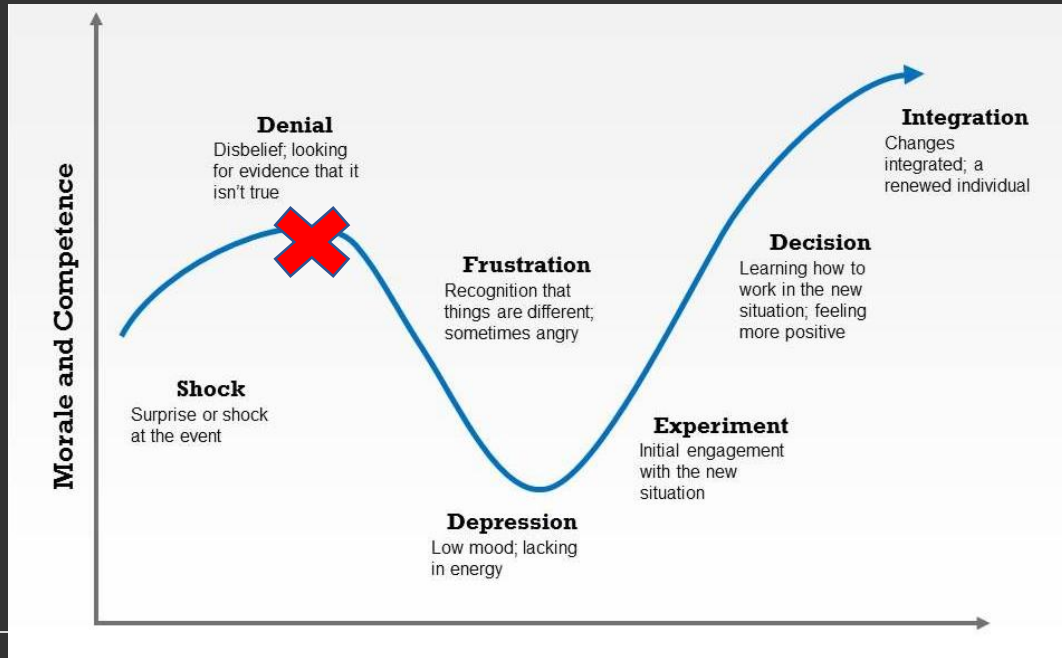
- ~~Urodynamics are useless, OR~~
- Urodynamics could be better

# Process to improve urodynamics

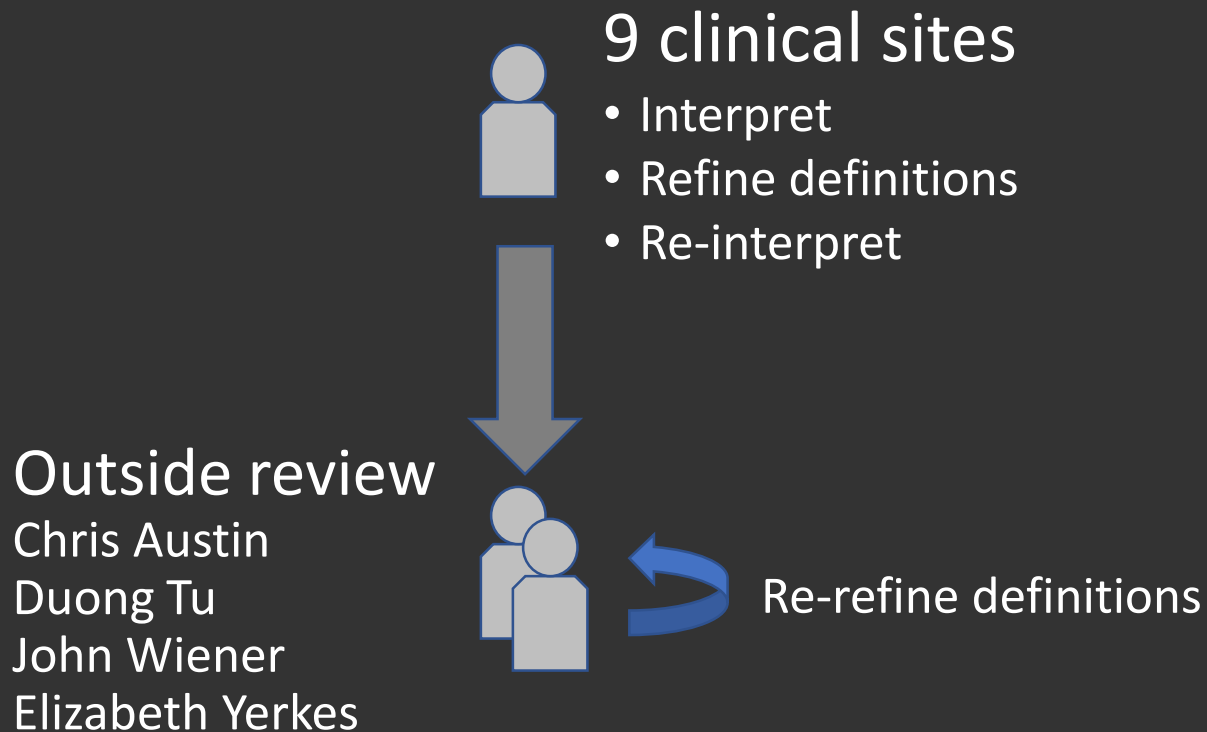
- UMPIRE: Urologic Management to Preserve Initial Renal Function for Young Children with Spina Bifida
- Baseline urodynamics < 4mo
- Initial studies: 5/2015– 9/2017



# Process to improve urodynamics

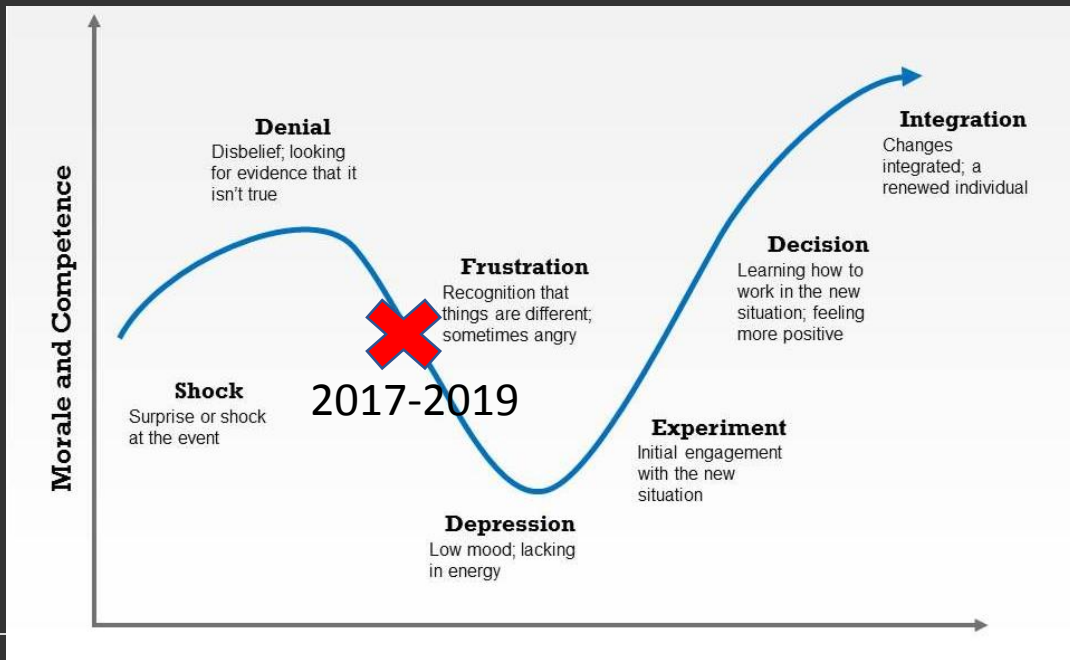


# Process to improve urodynamics

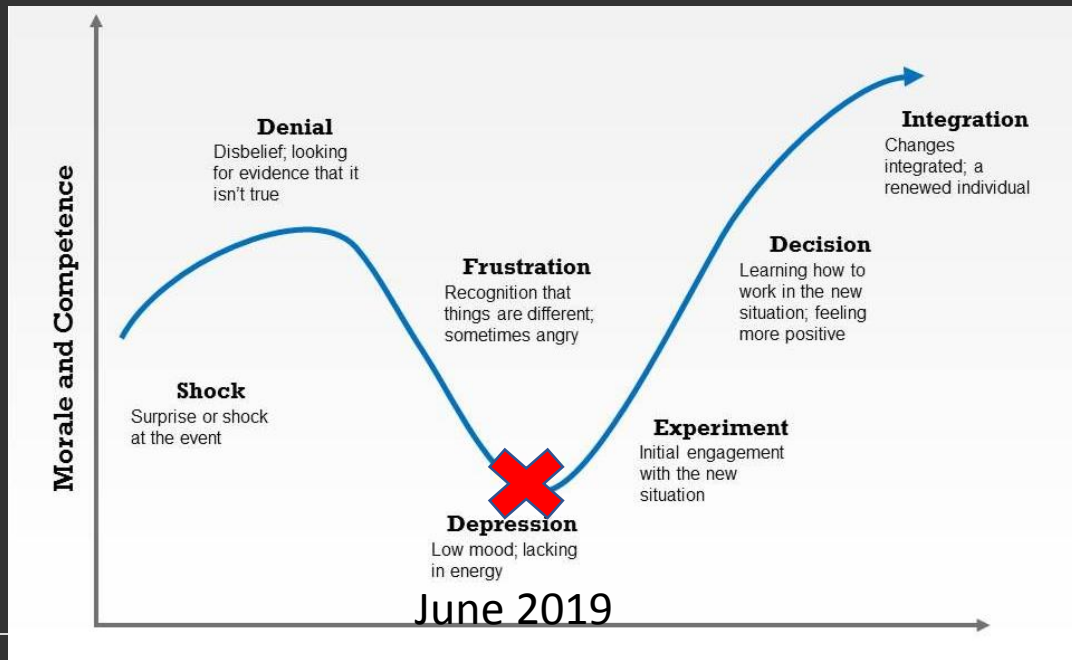




# How to (try to) improve urodynamics



# How to (try to) improve urodynamics



# UMPIRE process to improve urodynamics

- All 3 reviewers agreed on overall bladder classification for only 58%

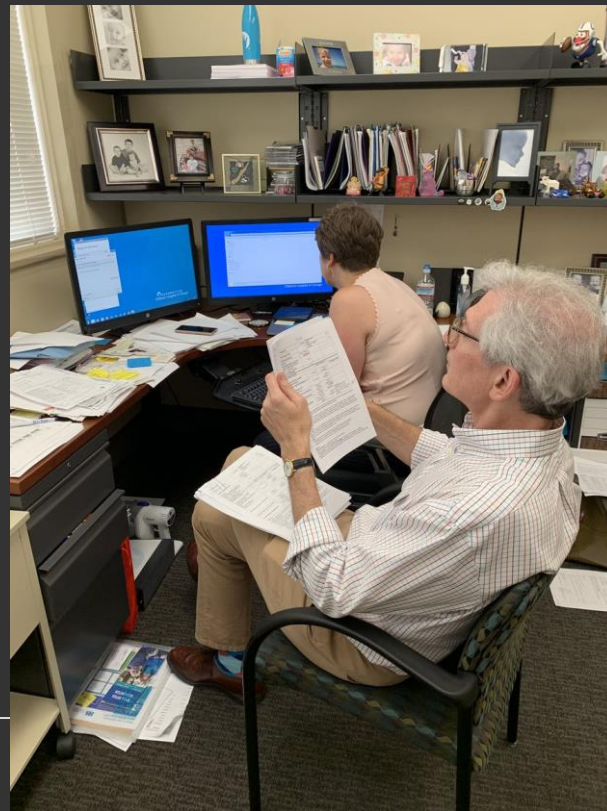
# Process to improve urodynamics



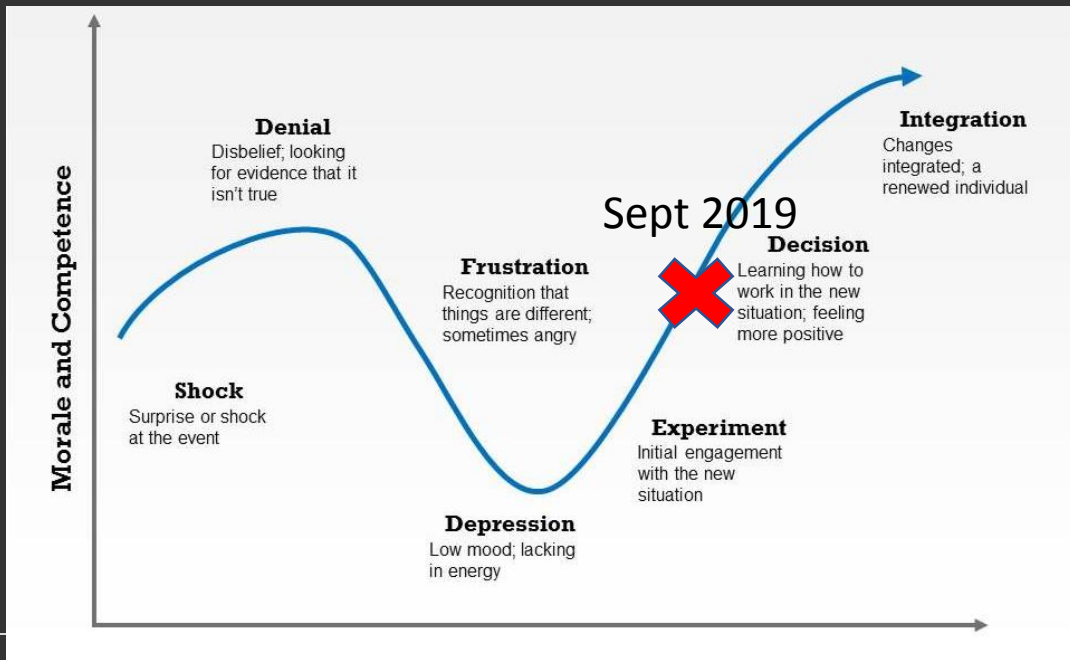
Dr. Earl Cheng:

- “This is bad.”
- Convinced 6 other pediatric urologists to sit in a room for 2 days to review urodynamics

# September 5-6, Chicago



# How to (try to) improve urodynamics



# Lessons learned

- Value of face-to-face communication
- September 5: Agreed on 80/135 (58%)
- September 6: Agreed on 108/158 (68%)

# Lessons learned: problems of technique

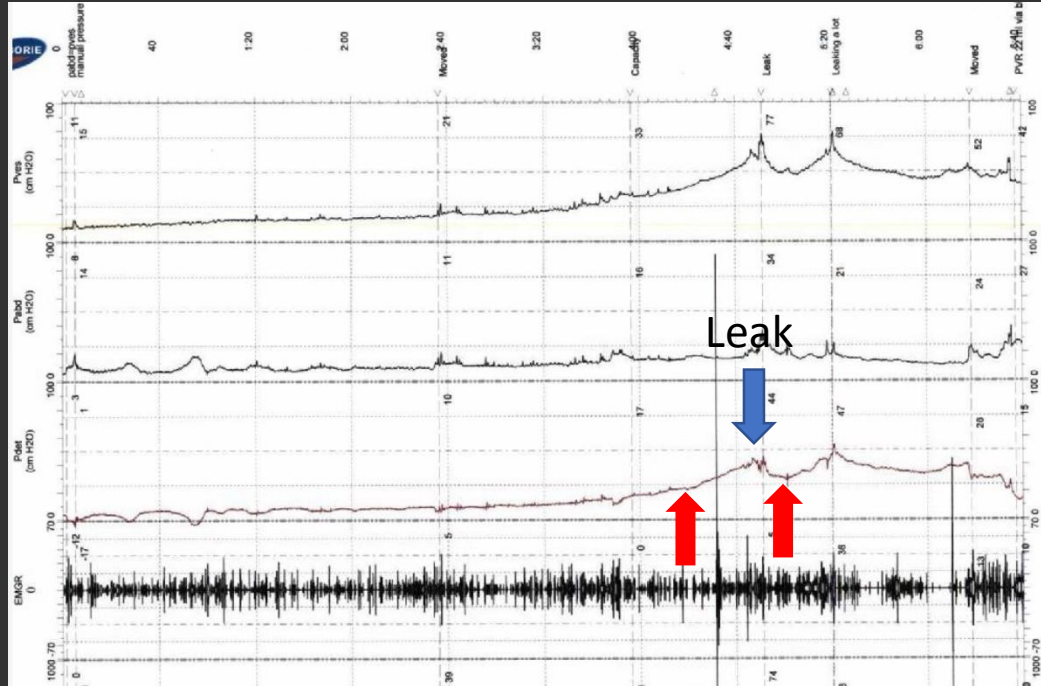
- Fill rate
- Volume: To leak? To capacity? To pressure?
- # Cycles - best or worst cycle?
- Catheter in through void?
- Annotation



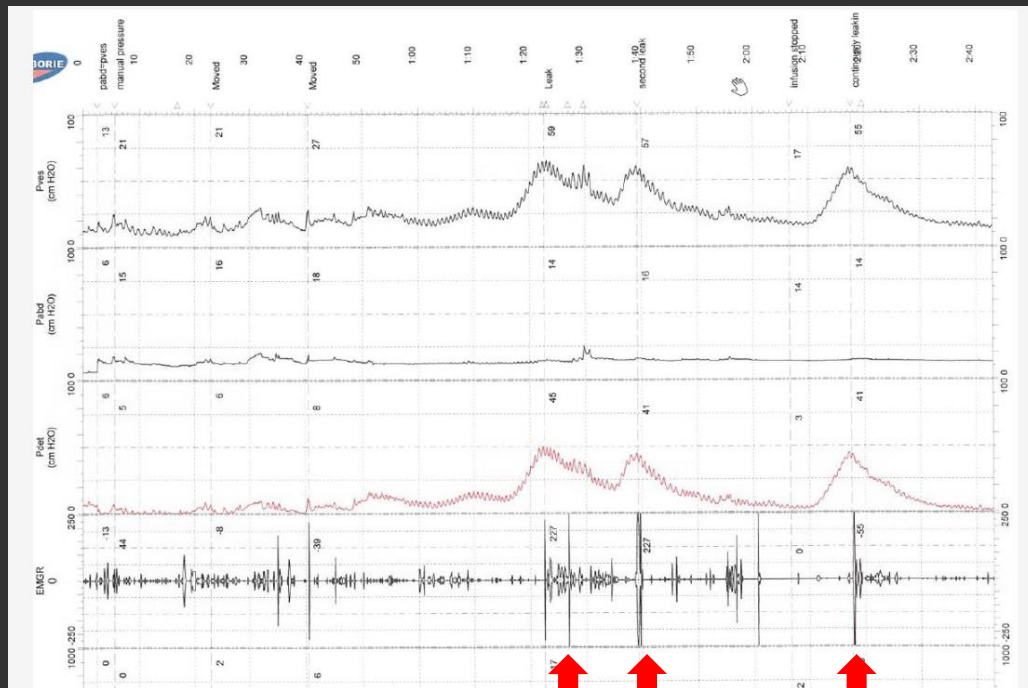
# Lessons learned problems of interpretation

- Definitions not good enough for real world tracings
  - Leak point pressure?
  - DSD?
  - DO?

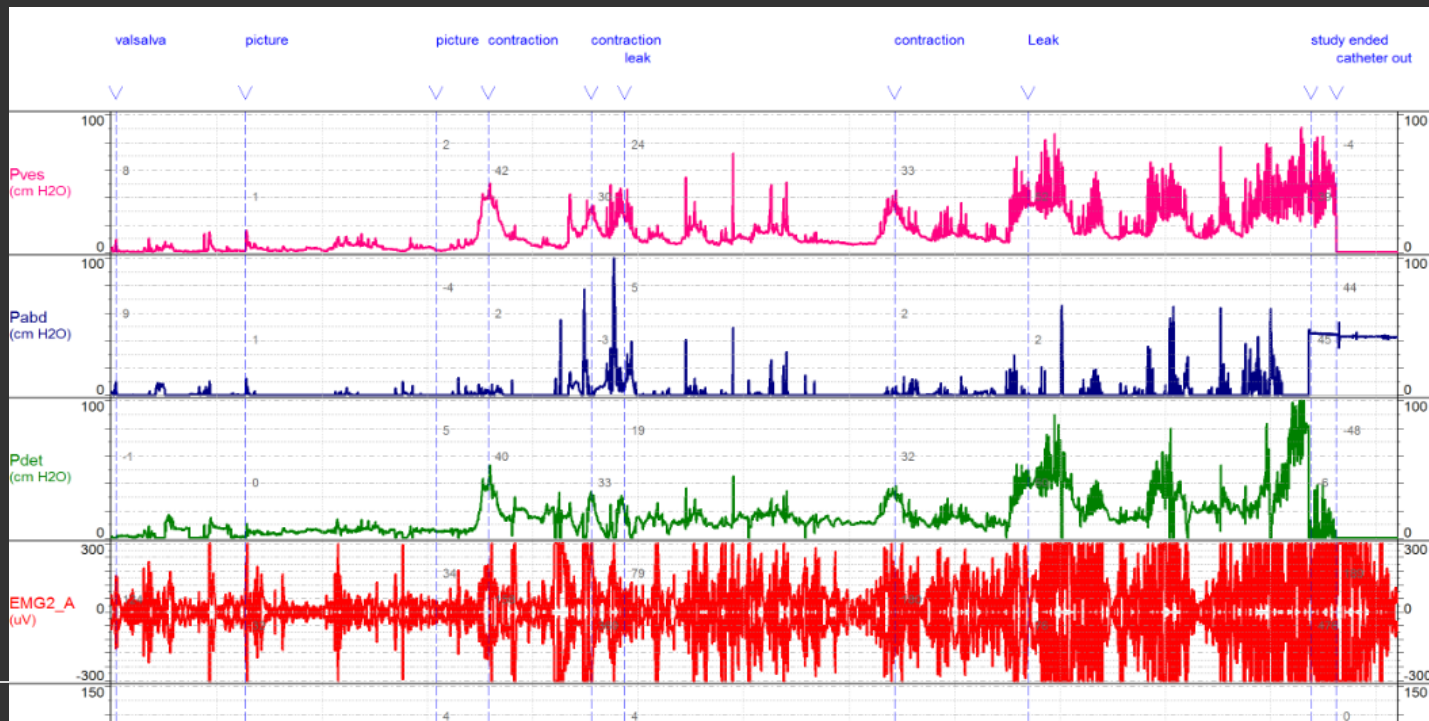
# Where to measure pressure?



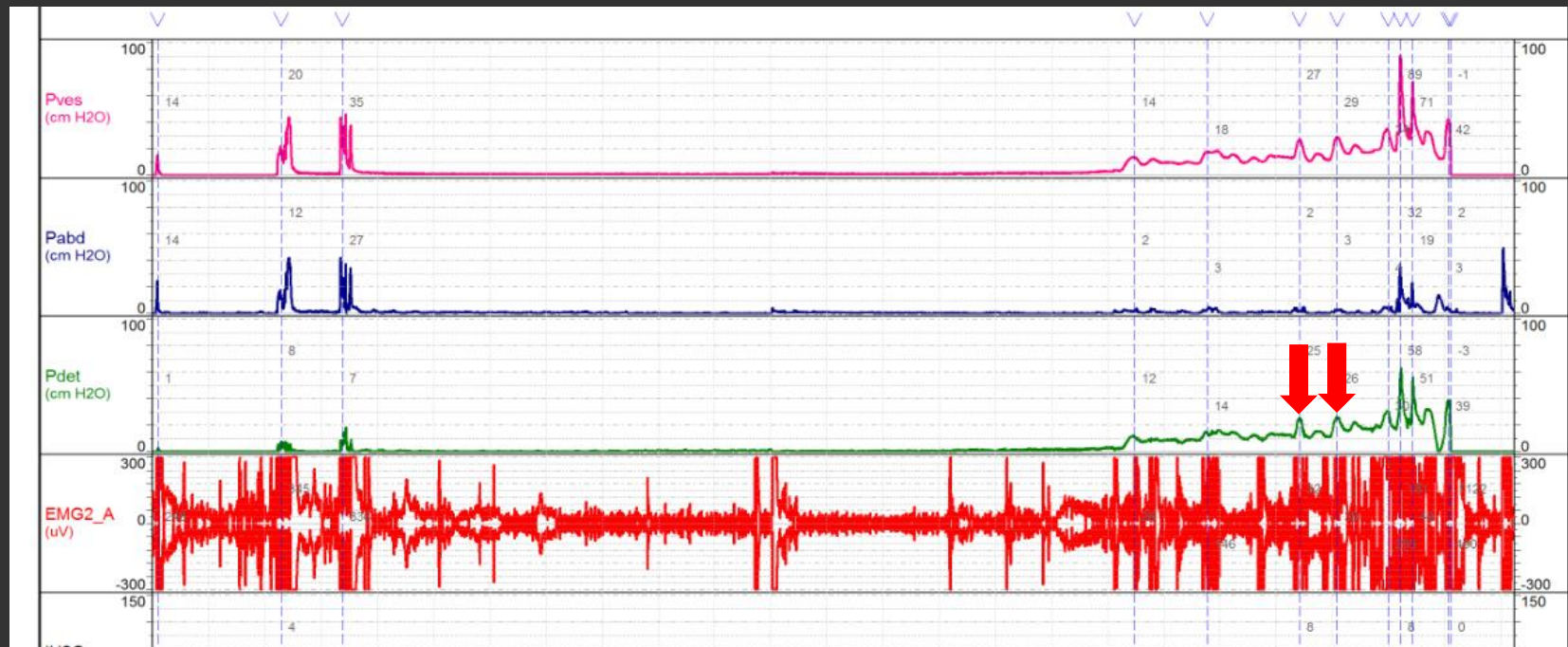
# Is it DSD?



# Is it DSD? Or movement?



# Is it DO?



# Lessons learned - action item

- Well tempered urodynamics for infants/children with spina bifida
  - Standardize technique
  - Standardize interpretation



# So why bother?

- In 20s
  - CKD rate 26%
  - Low ESRD rate
  - What about 30s, 40s?
- USRDS: average onset of ESRD in spina bifida = 41y

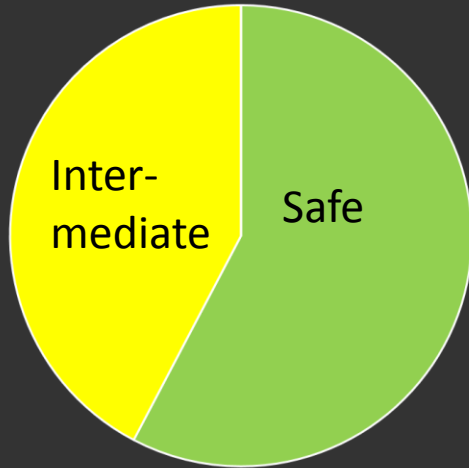
# Who needs CIC as an infant?

- UMPIRE indications for CIC + oxybutynin, OR
  - DLPP or end fill pressure > 40 cm H<sub>2</sub>O, and/or
  - DSD
- CIC + oxybutynin for everyone, OR
- Expand urodynamic indications for early intervention

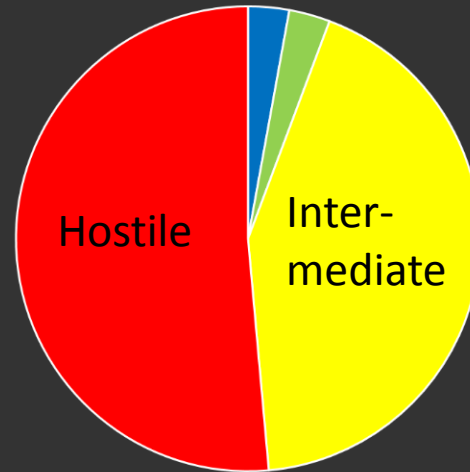


# “Good” and “bad” intermediates

Originally characterized  
as safe



Originally characterized  
as hostile



# Take home points

- Renal deterioration risk is modifiable
- Urodynamics important part of risk stratification
- In research studies, urodynamics only useful if technique and interpretation standardized