



# What drinking water tells us about bladder sensitivity in Chronic Pelvic Pain



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## Introduction

Chronic Pelvic Pain (CPP) affects up to 26.6% of women worldwide. Endometriosis and Bladder Pain Syndrome are two conditions in which there is a high prevalence of CPP. Translational Research in Pelvic Pain (TRiPP) is a research study with collaboration across sites in the UK, Europe and USA focussing on these conditions. Our hypothesis is that some of the mechanisms generating and maintaining pain in these conditions are overlapping. Visceral hypersensitivity is likely to be an important mechanism in CPP, but has until recently, been difficult to study in part due to invasive testing methods. New paradigms devised by Tu and colleagues[1,2] have enabled bladder sensitivity to be investigated non-invasively.

## This study aims to:

- use this paradigm to assess bladder sensitivity in women with CPP and healthy controls to determine how sensitivity profiles differ amongst CPP groups as well as compared to pain-free controls.

## Methods

Participants were recruited from the TRiPP cohort, which has 5 groups: endometriosis-associated pain (EAP); endometriosis-associated pain with comorbid bladder pain (EABP); bladder pain syndrome (BPS); pelvic pain without bladder pain or diagnosis of endometriosis (PP) and healthy controls (CON).

### The bladder paradigm:

- drink 20 US fluid ounces of water in 5mins
- pain and urgency ratings every 15 minutes
- first sensation, first urge and maximum tolerance timed
- additional 10 fluid ounces given at 45 and 60 minutes if maximum tolerance not reached
- volume voided

All participants gave informed consent. Ethics reference 19/YH/0030. Recruitment and data collection occurred at three sites with trained researchers: University of Oxford, UK; Boston Children's Hospital, USA; and IBMC, Portugal. All participants were women aged 18-50 who were not currently pregnant or lactating. Participants complete detailed questionnaires including the O'Leary-Sant Interstitial Cystitis Symptom and Problem Index (ICSI and ICPI). Participants underwent psychophysical testing including the above bladder paradigm. All data was double-entered into databases and analysed with SPSS version 27. Normality tests were performed and appropriate non-parametric tests used (Kruskal-Wallis and Mann-Whitney U tests for group comparisons, and Spearman's correlation).

## References

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- Hellman KM, Datta A, Steiner ND, Kane Morlock JN, Garrison EF, Clauw DJ, Tu FF. Identification of experimental bladder sensitivity among dysmenorrhea sufferers. Am J Obstet Gynecol. 2018 Jul;219(1):84.e1-84.e8. doi: 10.1016/j.ajog.2018.04.030. Epub 2018 Apr 25. PMID: 29704486; PMCID: PMC6054462.

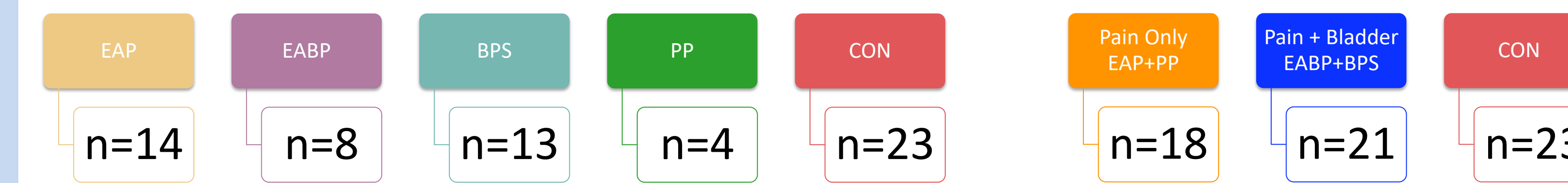
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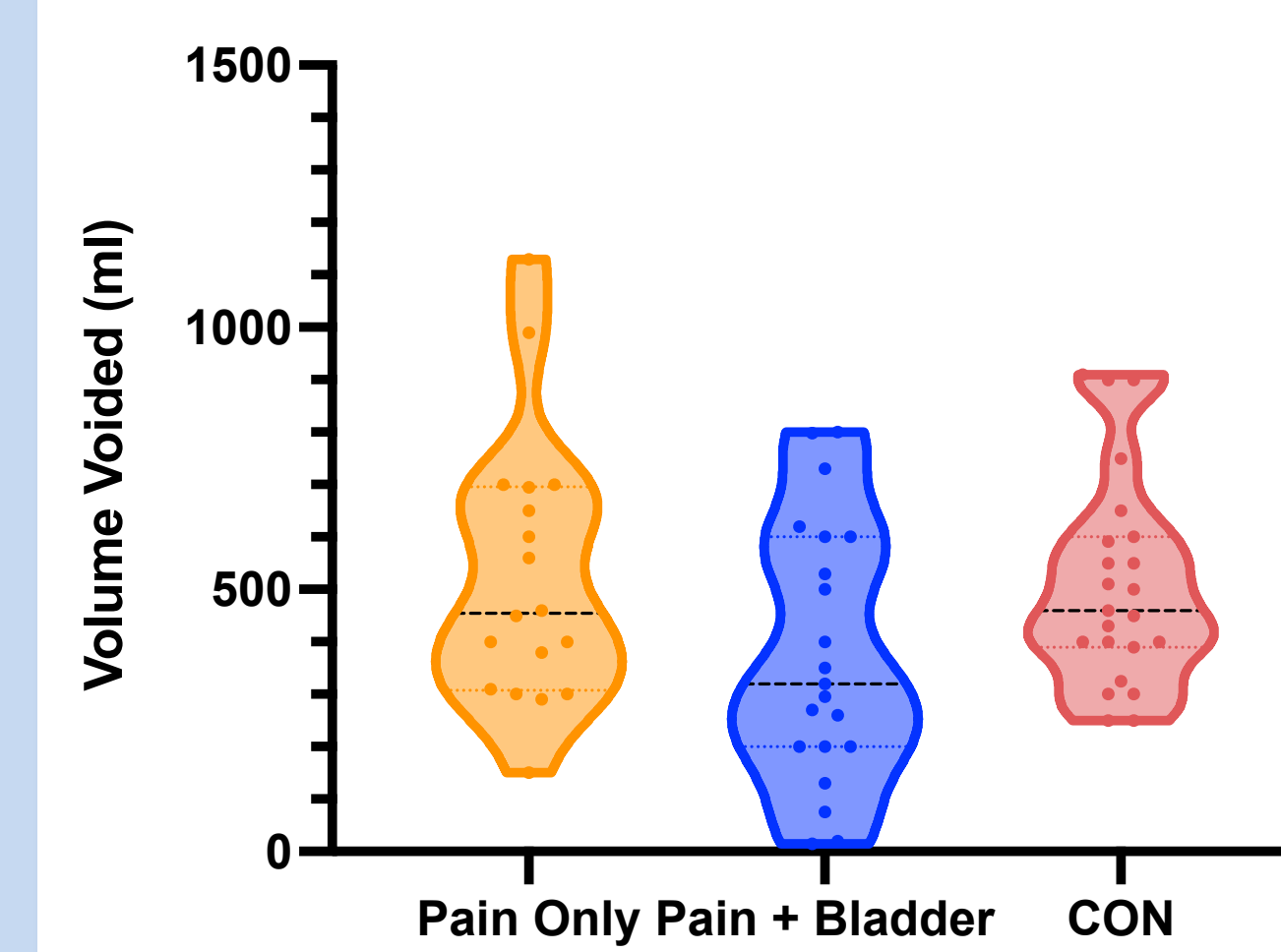
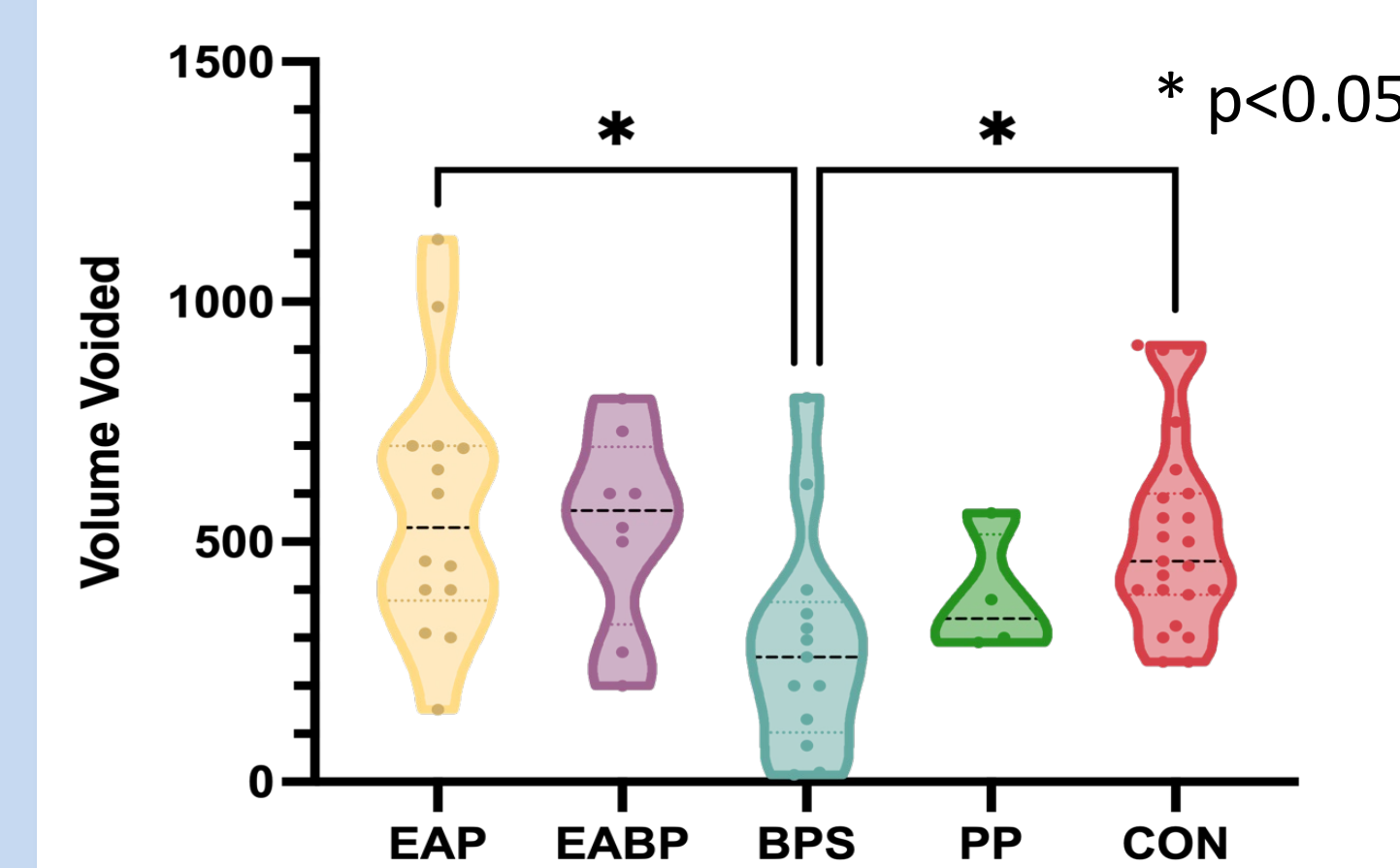
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## Results



### Volume voided



**First sensation (FS):** when riding in a car, the driver stops to use the restroom and you would go as well

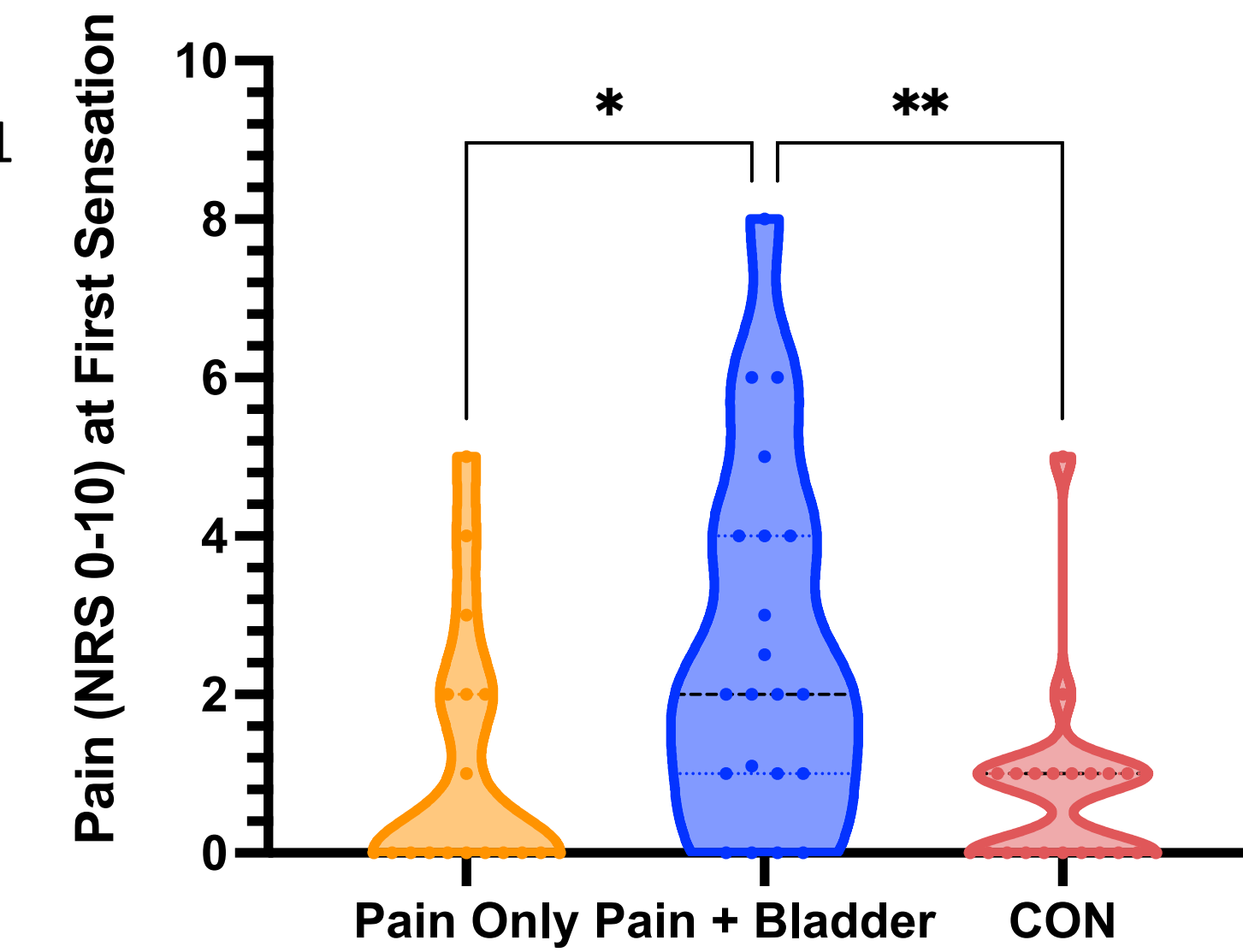
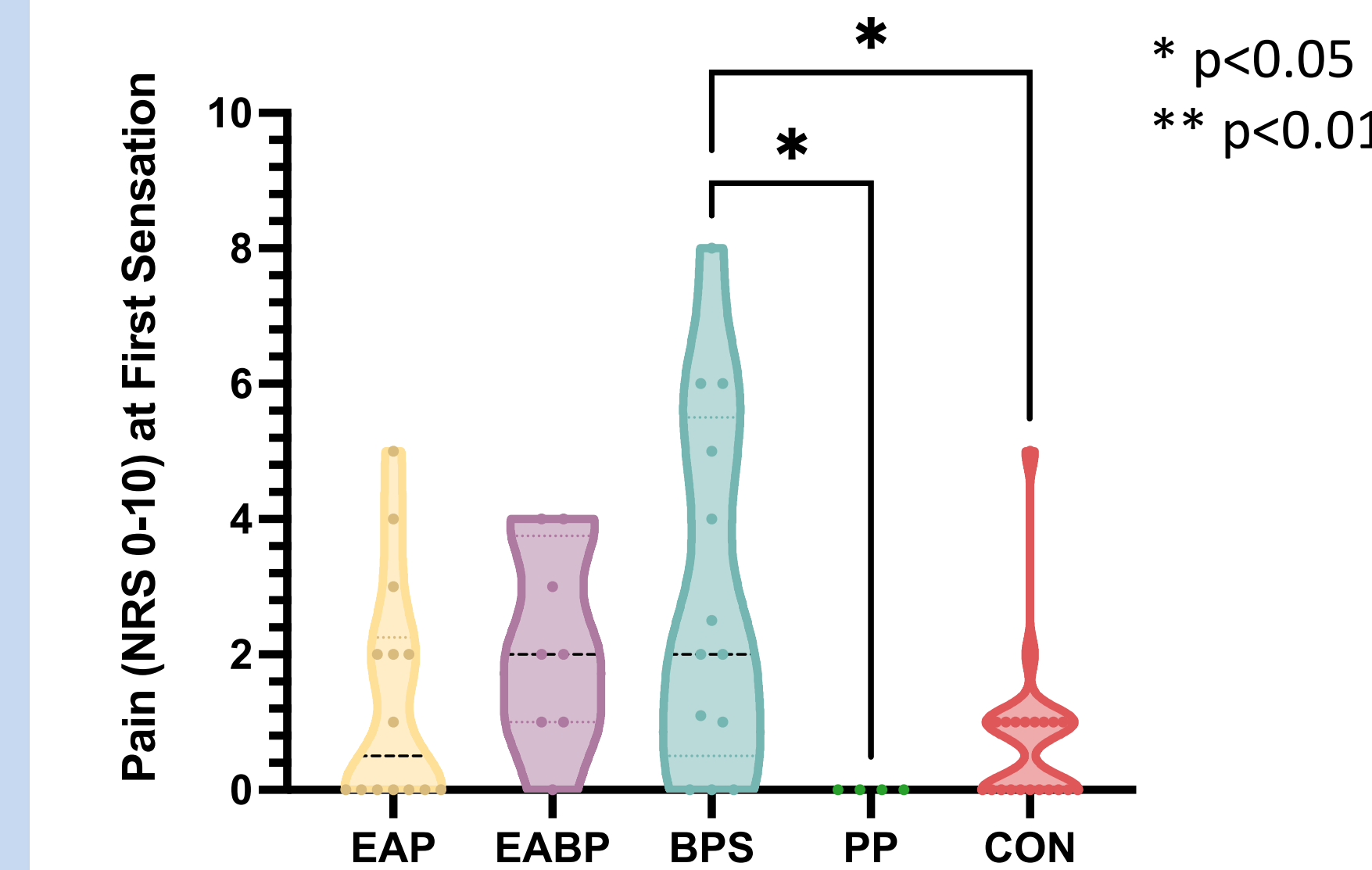
**First urge (FU):** when riding in a car you would initiate the request to find a rest stop

**Maximum tolerance (MT):** when riding in a car you would urinate on the side of the road in bumper-to-bumper traffic

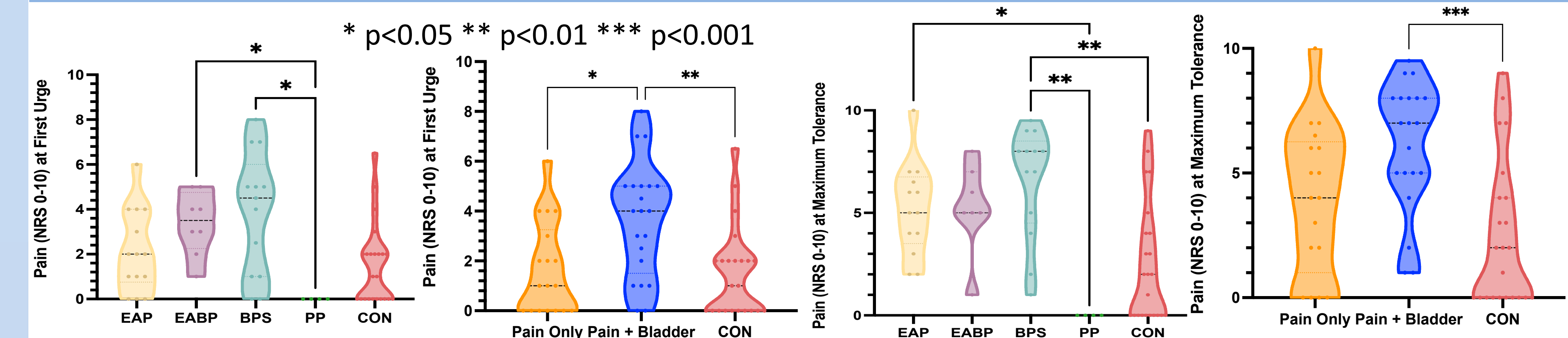
### Time to each sensation

There were no significant differences between the groups in time to each sensation, both for five groups and three groups.

### Pain ratings at First Sensation



### Pain ratings at First Urge & Maximum Tolerance



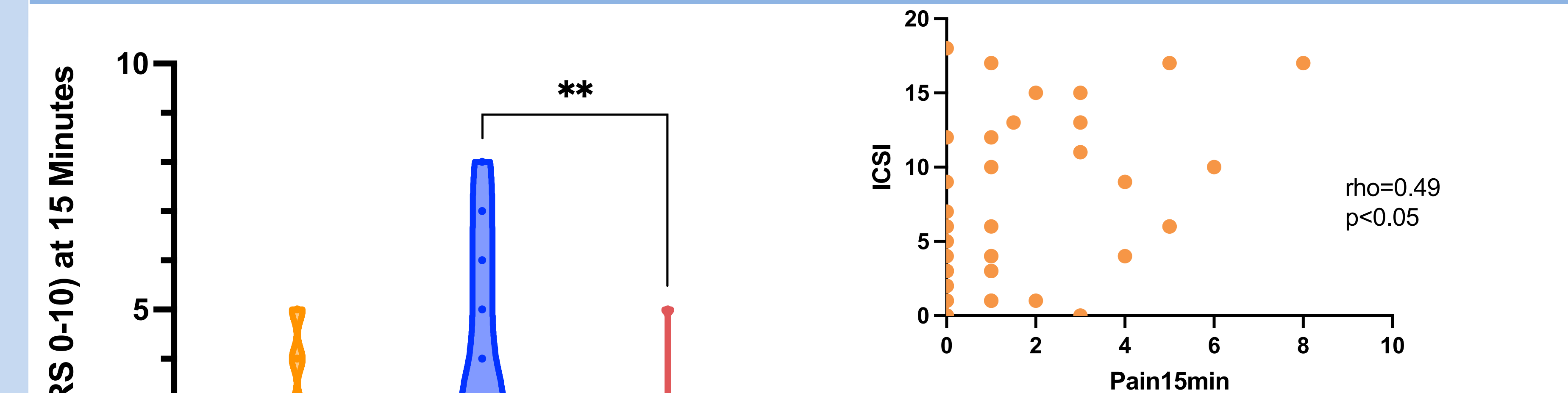
### How do these pain ratings relate to questionnaire measures?

- These pain ratings are correlated with ICSI and ICPI scores.
- There is also a correlation between ICSI and volume voided (ml) ( $\rho = -0.292$ ,  $p = 0.032$ ).
- There is no correlation between time to each sensation and ICSI or ICPI.

Correlation matrix illustrating pain ratings at each sensation and ICSI and ICPI scores. All correlations  $p < 0.05$

	PainFS	PainFU	PainMT	ICSI	ICPI
PainFS	1.00	0.80	0.62	0.42	0.36
PainFU	0.80	1.00	0.84	0.44	0.41
PainMT	0.62	0.84	1.00	0.37	0.42
ICSI	0.42	0.44	0.37	1.00	0.90
ICPI	0.36	0.41	0.42	0.90	1.00

### What does the first 15 minutes tell us?



When looking at pain ratings after only 15 minutes of the paradigm a significant difference was found between the 'pain + bladder symptoms group' and the CON group ( $Z = -2.9$ ,  $p = 0.004$ ). There was a significant correlation between the ICSI and ICPI and the pain score at 15 minutes ( $\rho = 0.49$  and  $\rho = 0.43$  respectively,  $p < 0.05$ ).

## Conclusions

- BPS group seem to be different to others in volume voided.
- When looking at pain ratings those with pain + bladder seem to be different to others.
- This suggests that there may be different mechanisms giving rise to voiding behaviour and pain.
- The bladder sensitivity measurements correlate with ICSI/ICPI scores, further supporting the use of these questionnaires in clinical practice.
- The first 15 minutes of the paradigm appears to distinguish between groups and therefore could be used as a shortened paradigm in research or even clinical practice.

## Relevance for patient care

The presence of bladder sensitivity is often not explored in women with endometriosis. Our data suggests that those with comorbid symptoms may have different mechanisms which should be further explored. Our work shows that a 15 minute paradigm may help in identifying patients with bladder sensitivity who may therefore benefit from treatment strategies targeting this.

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