

## INTERSTITIAL CYSTITIS/BLADDER PAIN SYNDROME HAS A CAUSAL IMPACT ON HYSTERECTOMY IN MIDDLE AGE FEMALE

### Hypothesis / aims of study

Symptoms of interstitial cystitis/bladder pain syndrome (IC/BPS) are often confused with uterine conditions. Gynecologists may therefore recommend hysterectomy which was inappropriate for these patients. This study investigated whether IC/BPS increases the risk of hysterectomy in a large nationwide retrospective cohort study.

### Study design, materials and methods

From a national insurance database, we identified women diagnosed with IC/BPS between 2002 and 2013. Those with a history of hysterectomy before IC/BPS diagnosis were excluded. All women were stratified into three subgroups (younger, middle, older age) based on the propensity scores of 15 confounding factors, including age and comorbidities (Figure). All were followed until the end of 2013 to detect the event of hysterectomy. The hazard ratio (HR) of hysterectomy in the IC/BPS cohort was compared with the non-IC/BPS cohort among the three subgroups by Cox regression after adjusting for confounding factors.

### Results

In addition to the representative middle age, subgroup 2 had similar rates of comorbidities as the general population (Table 1). The study was both externally and internally valid. The risk of hysterectomy in the IC/BPS cohort (n= 536) was significantly higher than in the non-IC/BPS cohort (n = 103846) in subgroup 2 (HR= 1.701, 95 % CI 1.056–2.740) (Table 2). The mean time to hysterectomy after diagnosis of IC/BPS was 2.97 years (Table 3). Conclusions In this nationwide study, we found that IC/BPS has a causal impact on hysterectomy in the middle-age subgroup in LHID 2010. The possibility of a woman having IC/BPS should be evaluated prior to hysterectomy to avoid inappropriate surgery.

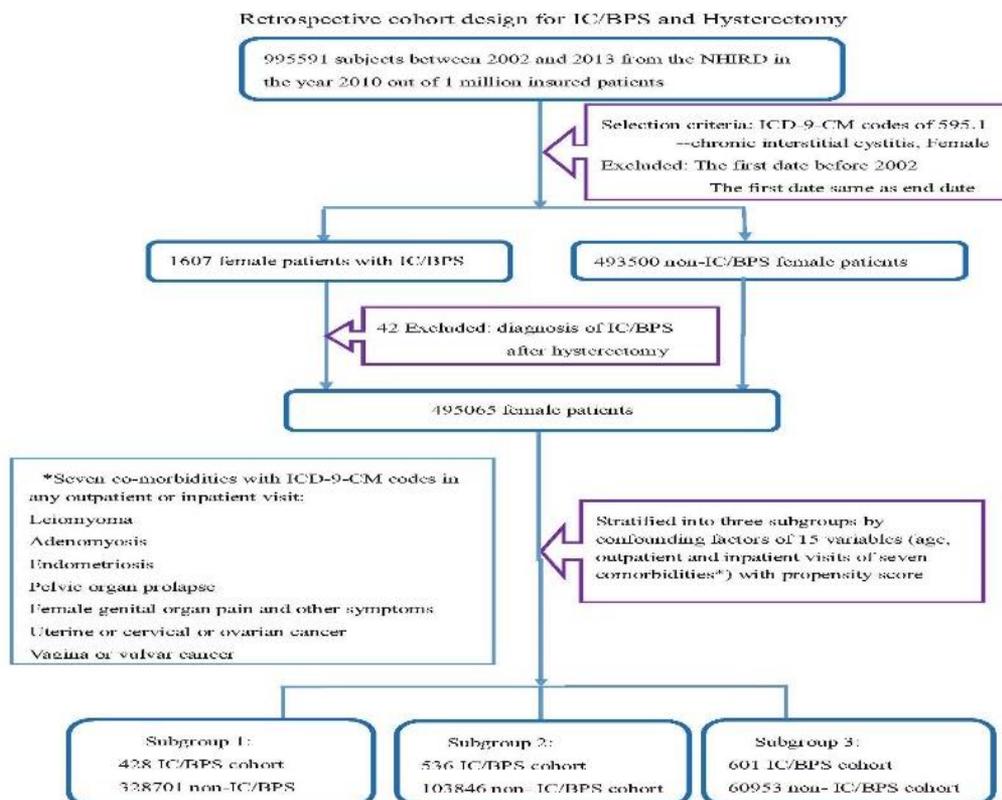
### Interpretation of results

After adjusting for potential confounding factors, IC/BPS in middle-age women has a causal impact on hysterectomy, with duration from diagnosis to surgery 2.97 years on average.

Gynecologists should cautiously evaluate the possibility of IC/BPS prior to hysterectomy to avoid inappropriate surgery. Further studies to assess the underlying reasons for this phenomenon and the risk of hysterectomy before IC/BPS diagnosis are needed.

### Concluding message

IC/BPS has a causal impact on hysterectomy in middle age female; the possibility of IC/BPS should be evaluated prior to hysterectomy to avoid inappropriate surgery.



**Table 1** Distribution of confounding factors among the three subgroups

Variable/group	IC/BPS cohort	Non-IC/BPS cohort
<b>Subgroup 1 (n = 329129)</b>	n = 428	n = 328701
Age, mean ± SD (range)	29.06 ± 7.04 (3–39)	18.78 ± 12.26 (0–55)
Leiomyomata, outpatient	0.51 ± 2.23 (0–27)	0.38 ± 1.99 (0–115)
Inpatient	0.04 ± 0.20 (0–1)	0.01 ± 0.11 (0–3)
Adenomyosis, outpatient	0.08 ± 0.46 (0–6)	0.08 ± 0.84 (0–75)
Inpatient	0.01 ± 0.10 (0–1)	0.00 ± 0.05 (0–2)
Endometriosis, inpatient	0.01 ± 0.12 (0–1)	0.01 ± 0.09 (0–6)
POP, inpatient	0.00 ± 0.00 (0–0)	0.00 ± 0.03 (0–1)
Genital pain, outpatient	0.02 ± 0.21 (0–3)	0.03 ± 0.48 (0–102)
Inpatient	0.00 ± 0.00 (0–0)	0.00 ± 0.00 (0–1)
Pelvic cancer, outpatient	0.00 ± 0.00 (0–0)	0.14 ± 3.40 (0–444)
Inpatient	0.00 ± 0.00 (0–0)	0.01 ± 0.41 (0–94)
Genital cancer, outpatient	0.06 ± 1.07 (0–22)	0.03 ± 1.34 (0–147)
<b>Subgroup 2 (n = 104,382)</b>	n = 536	n = 103846
Age, mean ± SD (range)	46.33 ± 6.43 (18–56)	45.90 ± 5.70 (0–72)
Leiomyomata, outpatient	0.54 ± 2.37 (0–34)	0.53 ± 2.68 (0–186)
Inpatient	0.06 ± 0.24 (0–1)	0.03 ± 0.17 (0–3)
Adenomyosis, outpatient	0.15 ± 0.83 (0–11)	0.15 ± 1.34 (0–87)
Inpatient	0.03 ± 0.17 (0–1)	0.01 ± 0.10 (0–2)
Endometriosis, inpatient	0.01 ± 0.10 (0–1)	0.01 ± 0.11 (0–4)
POP, inpatient	0.00 ± 0.06 (0–1)	0.00 ± 0.06 (0–2)
Genital pain, outpatient	0.01 ± 0.10 (0–1)	0.03 ± 0.57 (0–73)
Inpatient	0.00 ± 0.00 (0–0)	0.00 ± 0.01 (0–1)
Pelvic cancer, outpatient	0.44 ± 6.36 (0–139)	0.22 ± 4.46 (0–365)
Inpatient	0.01 ± 0.11 (0–1)	0.01 ± 0.25 (0–23)
Genital cancer, outpatient	0.10 ± 2.04 (0–47)	0.07 ± 2.29 (0–202)
<b>Subgroup 3 (n = 61554)</b>	n = 601	n = 60953
Age, mean ± SD (range)	63.44 ± 11.22 (25–98)	64.00 ± 9.63 (0–102)
Leiomyomata, outpatient	1.68 ± 4.44 (0–41)	1.03 ± 4.30 (0–252)
Inpatient	0.25 ± 0.48 (0–4)	0.09 ± 0.39 (0–41)
Adenomyosis, outpatient	0.82 ± 3.75 (0–70)	0.38 ± 2.57 (0–110)
Inpatient	0.18 ± 0.41 (0–2)	0.06 ± 0.26 (0–16)
Endometriosis, inpatient	0.03 ± 0.20 (0–2)	0.02 ± 0.17 (0–8)
POP, inpatient	0.04 ± 0.21 (0–2)	0.02 ± 0.14 (0–4)
Genital pain, outpatient	0.06 ± 0.56 (0–10)	0.03 ± 0.60 (0–65)
Inpatient	0.00 ± 0.04 (0–1)	0.00 ± 0.02 (0–3)
Pelvic cancer, outpatient	0.81 ± 7.70 (0–103)	0.49 ± 8.81 (0–640)
Inpatient	0.02 ± 0.24 (0–5)	0.01 ± 0.24 (0–16)
Genital cancer, outpatient	0.46 ± 6.06 (0–104)	0.23 ± 5.78 (0–385)

SD standard deviation, POP pelvic organ prolapse, Outpatient total number of times seeking outpatient medical advice for a confounding variable, Inpatient total number of admissions for a confounding variable, Genital pain female genital organ pain and other symptoms, Pelvic cancer uterine, cervical, or ovarian cancer, Genital cancer vagina or vulvar cancer, IC/BPS interstitial cystitis/bladder pain syndrome,

**Table 2** Hazard ratio (HR) of hysterectomy between cohorts in the three subgroups

Subgroup	HR* (95 % CI)
<b>Subgroup 1 (n = 329,129)</b>	
IC/BPS (yes/no)	2.041 (0.972–4.285)
<b>Subgroup 2 (n = 104,382)</b>	
IC/BPS (yes/no)	1.701 (1.056–2.740)
<b>Subgroup 3 (n = 61,554)</b>	
IC/BPS (yes/no)	0.861 (0.430–1.726)

**Table 3** Duration of follow-up and the time from study start date to hysterectomy among the three subgroups

	No.	Mean (year)	SD	Min	Max
Duration of follow-up					
Subgroup 1	329129	10.57	2.45	0.003	12
Subgroup 2	104382	10.99	2.16	0.003	12
Subgroup 3	61554	11.08	1.95	0.003	12
Total	495065	10.72	2.34	0.003	12
Time from diagnosis of IC/BPS to hysterectomy					
Subgroup 2	17	2.97	3.10	0.005	9.660

IC/BPS interstitial cystitis/bladder pain syndrome, SD standard deviation

**Disclosures**

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