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Interstitial cystitis/bladder pain syndrome (IC/BPS) and fibromyalgia (FM) are two non-cancer chronic pain diseases with autonomic dysfunction. They also are one of the comorbidities for each other. They both take long time to get definite diagnosis because of no biomarkers or clear criteria (average: IC/BPS 7 years and FM 5 years). In this study, we compared public health insurance reimbursement between IC/BPS and FM in outpatient perspective to evaluate whether IC/BPS had more reimbursement than FM.

**Study design, materials and methods**

Through data mining in 2002-2013 Longitudinal Health Insurance Database of Taiwan, we identified IC/BPS and FM patients. In this study, we designed 2 models (unmatched and matched) to compare outpatient reimbursement for IC/BPS and FM. (**model 1**: comparisons between two cohorts without matching; **model 2**: first excluding patients with comorbidities [chronic diseases modified from RxRisk model and  $N \leq 15$ ], and then IC/BPS to FM matched under 1:1 ratio based on index date, sex, age, income, and the rest comorbidities) (Figure 1). The confounders, including age, sex, income, hospital levels and the rate of comorbidities would be adjusted in multiple linear regressions if there were significant differences. Data of expense were compared with Chi-square, ANOVA and multiple linear regressions.

**Results**

IC/BPS outpatient expenses were significantly higher than FM in both models. The yearly total pharmacy, total non-pharmacy, total claim, and per-visit pharmacy, per-visit non-pharmacy claim and per-visit total claim, all showed significantly different (Table 2 and table 5). In model 1, significantly higher proportion of female and lower income level in IC/BPS cohort were noted. In addition, the proportions of comorbidities in both cohorts were significantly different in depression, glaucoma, hypertension, psychotic disease and tuberculosis (Table 1). After regression analysis, IC/BPS had significantly higher outpatient reimbursement than FM in both model 1 and model 2, including yearly pharmacy, yearly non-pharmacy, yearly total claim, per-visit pharmacy, per-visit non-pharmacy and per-visit total claim (Table 3 and table 6).

**Interpretation of results**

The result of model 1 and 2 revealed the same tendency which can confirm the reimbursement outcome in the cohort study. It was identified that outpatient reimbursement was significantly higher in IC/BPS than FM from results of both model 1 and 2. The larger proportion of female patients and the lower income in IC/BPS population observed in model 1 are compatible with clinical scenario. The proportions of comorbidities were significantly higher in IC/BP except hypertension. It might indicate IC/BPS cohort had more complicated health condition. Our study result of lower male prevalence in IC/BPS, contrast to the higher male prevalence of hypertension in other epidemiology study, that may explain the lower comorbidity in our study. Though IC/BPS patients were in lower income status, the reimbursement was higher than FM might be due to the easy accessibility and very low co-payments (\$ 3-7) in Taiwan. Obvious bladder discomfort and consequent pharmacy and nonpharmacy treatment, such as urodynamic or cystoscopic surgery that FM didn't require, that might explain the higher medical cost in IC/BPS group. In Taiwan, Elmiron® and Cystistat® were approved for management of IC/BPS, it would make the reimbursement even higher.

**Concluding message**

IC/BPS has significantly different gender and income distribution. The outpatient reimbursement for IC/BPS was significantly higher than FM in both pharmacy and non-pharmacy expenditure. Due to IC/BPS patients experiencing more complex health condition, more pharmacy and non-pharmacy treatment were needed. Because of the chronicity of IC/BPS, the expenditure will increase as time goes on. Paying more attention to the disease research and providing more efficient treatment are encouraged.

**References**

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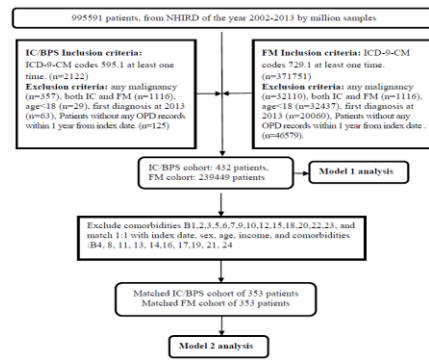


Figure 1- Flow chart

Table 1- Comparison of confounders in IC/BPS and FM cohorts (unmatched).

Variable	IC/BPS (n = 432)	FM (n = 239449)	p
Age, mean (SD), year	43.8 (16.35)	43.0 (15.52)	0.299
Female, n (%)	326 (75.5%)	133521 (55.8%)	0.000
Income, mean (SD), \$	973.6 (698.17)	1128.2 (777.77)	0.000
Hospital level, n (%)			
1. Medical center	47 (10.9%)	17968 (7.5%)	0.055
2. Regional hospital	39 (9.0%)	22037 (9.2%)	
3. Local hospital	45 (10.4%)	23456 (9.8%)	
4. Clinic	301 (69.7%)	175988 (73.5%)	
Comorbidities <sup>†</sup> , n <sup>‡</sup> (%)			
B7 Depression	13(3.0%)	4225(1.8%)	0.046
B12 Glaucoma	9(2.1%)	2050(0.9%)	0.013
B17 Hypertension	32(7.4%)	24010(10.0%)	0.042
B21 Psychotic illness	33(7.6%)	11975(5.0%)	0.008
B24 Tuberculosis	35(8.1%)	14270(6.0%)	0.038
Range: minimum-maximum			
<sup>†</sup> Comorbidity rate with statistically significant values			
<sup>‡</sup> Patients with the comorbidity			

Table 2- Comparison of outpatient reimbursement for IC/BPS and FM cohorts

(unmatched), without adjusting for confounders.

Variable	IC/BPS (432)		FM (239449)		P
	Mean (SD)	Range	Mean (SD)	Range	
Pharmacy claim	32.6 (99.06)	0-1297.1	10.3 (68.96)	0-8977.1	0.000
Non-pharmacy claim	109.7 (338.10)	3.0-3122.8	42.7 (108.58)	0-10653.4	0.000
Total claim	142.3 (370.32)	3.0-3175.3	53.1 (136.72)	0-10715.7	0.000
pharmacy claim per-visit	8.7 (13.93)	0-144.1	3.4 (8.86)	0-1743.9	0.000
non-pharmacy claim per-visit	28.0 (43.73)	3.0-337.2	17.5 (19.43)	0-4156.9	0.000
Total claim per visit	36.7 (45.05)	3.0-338.3	20.8 (21.63)	0-4517.4	0.000
Total visits	2.9 (4.08)	1-41	2.2 (2.84)	1-92	0.000
range: minimum-maximum.					

Table 3- Regression analysis of the comparison of outpatient reimbursement for IC/BPS

and FM cohorts (unmatched) \*

Variable	Regression coefficient	(95% confidence interval)
Pharmacy claim	22.0 <sup>†</sup>	(15.5 to 28.5)
Non-pharmacy claim	66.4 <sup>†</sup>	(56.1 to 76.8)
Total cost	88.4 <sup>†</sup>	(75.5 to 101.4)
Pharmacy claim per visit	5.3 <sup>†</sup>	(4.5 to 6.2)
Non-pharmacy claim per visit	10.6 <sup>†</sup>	(8.8 to 12.4)
Total cost per visit	15.9 <sup>†</sup>	(13.9 to 18.0)
Total visits	0.68 <sup>†</sup>	(0.41 to 0.9)

\* adjusting for the confounders sex, income, comorbidities B7, B12, B17, B21, B24  
<sup>†</sup> p < 0.05

Table 4- Comparisons of confounders in IC/BPS and FM cohorts (matched).

Variable	IC/BPS (n = 353)	FM (n = 353)	p
Age, mean (SD), year	42.01 (15.22)	42.02 (15.24)	0.993
Female, n (%)	264 (74.8%)	264 (74.8%)	1.000
Income, mean (SD), \$	1033.2 (638.0)	1073.6 (618.1)	0.393
Hospital level, n (%)			
1. Medical center	33 (9.3%)	17 (4.8%)	0.128
2. Regional hospital	33 (9.3%)	38 (10.8%)	
3. Local hospital	33 (9.3%)	34 (9.6%)	
4. Clinic	254 (72.0%)	264 (74.8%)	
Range: minimum-maximum			

Table 5- Comparison of outpatient reimbursement for IC/BPS and FM cohorts

(matched)

Variable	IC/BPS (353)		FM (353)		P
	Mean (SD)	Range	Mean (SD)	Range	
Pharmacy claim	32.7 (103.88)	0-1297.1	9.1 (30.23)	0-414.5	0.000
Non-pharmacy claim	119.3 (369.32)	3.0-3122.8	47.3 (146.24)	2.2-2389.9	0.001
Total claim	152.0 (401.04)	3.0-3175.3	56.3 (155.94)	3.8-2403.1	0.000
Pharmacy claim per-visit	8.5 (14.40)	0-144.1	3.6 (8.54)	0-130.2	0.000
Non-pharmacy claim per-visit	28.7 (45.21)	3.0-337.2	15.6 (12.04)	2.2-125.8	0.000
Total claim per-visit	37.3 (46.62)	3.0-338.3	19.2 (14.54)	3.0-132.4	0.000
Total visits	3.0 (4.3)	1-41	2.2 (2.6)	1-19	0.005
range: minimum-maximum.					

Table 6- Regression analysis of the comparison of outpatient reimbursement for

IC/BPS and FM cohorts (matched) \*

Variable	Regression coefficient	(95% confidence interval)
Pharmacy claim	23.6 <sup>†</sup>	(12.3 to 35.0)
Non-pharmacy claim	72.0 <sup>†</sup>	(30.5 to 113.6)
Total cost	95.7 <sup>†</sup>	(50.7 to 140.7)
Pharmacy claim per visit	5.0 <sup>†</sup>	(3.2 to 6.7)
Non-pharmacy claim per visit	13.1 <sup>†</sup>	(8.2 to 18.0)
Total cost per visit	18.1 <sup>†</sup>	(13.0 to 23.2)
Total visits	0.76 <sup>†</sup>	(0.23 to 1.28)

\* no confounders after matching two cohorts  
<sup>†</sup> p < 0.05