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DEVELOPMENT AND EVALUATION OF E-HEALTH SYSTEM FOR CARING PATIENTS WITH INTERSTITIAL CYSTITIS / BLADDER PAIN SYNDROME (IC/BPS)

Hypothesis / aims of study
Interstitial Cystitis / Bladder Pain Syndrome (IC/BPS) is a chronic disease of uncertain etiology that the pathophysiology of IC/BPS is likely multifactorial and leaded to use multimodal treatment modalities. The controversies surrounding management of the IC/BPS are fuelled by the heterogeneity of urological and non-urological symptoms leading to poor quality of life and the need of multidisciplinary care team. Previous study demonstrated that a Internet information and communication technology (ICT) system to monitoring physiological signs, scheduling and reminding medication, and healthcare education. It was demonstrated to be effective in early identification of adverse events to avoid hospital readmission or to reduce length of stay in hospital. We hypothesized that applying this system to take care of IC/BPS patients can improve urological symptoms and quality of life. So the aim of our study is to apply information and communication technology (ICT) to improve the quality of life for IC/BPS patients.

Study design, materials and methods
This is a prospective case control study. A total of 80 IC/BPS patients were recruited from the urological clinic and randomly assigned to either the study group (N=40) or the control group (N=40). In this study, a web service designed for providing health education and administrating questionnaires were used for health care and health management of IC/BPS patients. The patients receiving ICT intervention were asked to check the health education items weekly. Also application was designed to provide Question/Answer service to handle the cases of emergent outbreaks for IC/BPS patients. When an emergent symptom occurred, the patient was encouraged to send a message by typing the event number to the server through a designated mobile phone number. The template containing the questions (symptoms) and their corresponding answers are stored in the mobile phone. The server responded the question by sending its corresponding answer guiding to the patient how to relieve the symptom at once. The questionnaires, including SF-36 health survey, visual analogue scales (VAS) for the measurement of pain and urgency, and O'Leary-Sant symptom (ICSI) and problem index (ICPI), were administrated to measure the patient perception of health status before (pre-test) and after (post-test) ICT intervention spanning a period of 8 weeks (Figure 1).

Results
Among 80 IC/BPS patients, 7 patients in the study group and 8 in the control group were excluded because they failed to fill the questionnaires in either pre- or post-test. Only the data of 65 patients, 33 in the study group and 32 in the control group, were used for further analysis. Patient demographics including study and control group showed no statistically significant differences in the average age, education, ICSI, ICPI, and VAS for the measurement of pain and urgency. Highly significant improvement of VAS pain and urgency score was observed compare to control group respectively (-1.88 ± 3.14 v -0.03 ± 0.86, -1.85 ± 3.03 v -0.13 ± 0.75, $p < 0.05$) (Table1). Also highly significant improvement of SF-36 quality of life items was observed after ICT intervention except role physical and emotional item compared to control group ($p < 0.05$) (Table2).

Interpretation of results
The E-health system, supporting health education and providing SMS (short message service) for self-management, was demonstrated to be effective in improving urological symptoms, measured by VAS pain score and urgent score and quality of life, measured by SF-36 of IC/BPS patients during the 8 weeks observation period.

Concluding message
The Internet healthcare education is useful to consolidate patients' healthy dietary habits and life styles, as well as to self-manage their outbreak symptoms. The Internet healthcare education is useful to consolidate patients' healthy dietary habits and life styles, as well as to self-manage their outbreak symptoms.
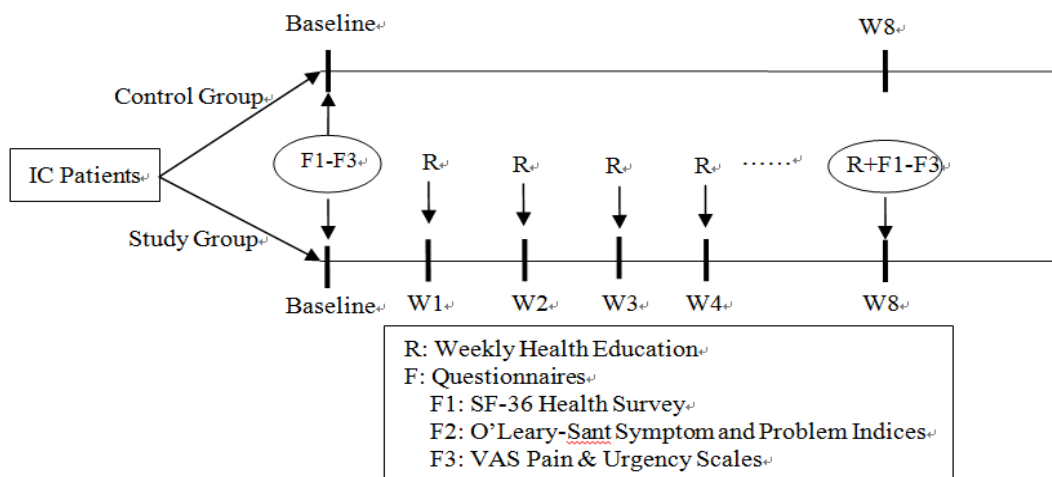
Figure1. Experimental procedure

R: Weekly Health Education
F: Questionnaires
    F1: SF-36 Health Survey
    F2: O'Leary-Sant Symptom and Problem Indices
    F3: VAS Pain & Urgency Scales

Table1. Disease severity of control and study groups before and after ICT intervention

| | Control (N= 32) | | | | Study (N= 33) | | | | | P-valve | |
| | Pre | Post | Testing | | Pre | Post | Testing | | | | |
	Mean ± SD	Mean ± SD	Mean ± SD	t	p	Mean ± SD	Mean ± SD	Mean ± SD	t	p	t	p
Symptom	11.34±4.78	9.19±4.19	-2.16±4.12	-2.96	.01	11.33±4.14	7.76±4.22	-3.58±5.61	-3.66	.00	1.16	.25
Problem	10.47±4.71	5.81±3.80	-4.66±4.86	-5.42	.00	11.55±5.03	9.24±5.43	-2.30±6.13	-2.16	.04	-1.71	.09
Pain	5.16±2.58	5.13±2.42	-0.03±0.86	-0.21	.84	4.91±2.78	3.03±1.90	-1.88±3.14	-3.44	.00	3.21	.00*
Urgency	5.06±2.97	4.94±2.66	-0.13±0.75	-0.94	.35	5.12±2.60	3.27±2.17	-1.85±3.03	-3.50	.00	3.12	.00*

*P <.05

Table2. SF-36 health survey of control and study groups before and after ICT intervention

| | Control (N= 32) | | | | | Study (N= 33) | | | | | P-valve | |
| | Pre | Post | Testing | | | Pre | Post | Testing | | | | |
	Mean ± SD	Mean ± SD	Mean ± SD	t	p	Mean ± SD	Mean ± SD	Mean ± SD	t	p	t	p
Physical function	81.88±18.17	83.91±17.21	2.03±3.33	3.45	.00	72.12±23.19	81.67±19.15	9.55±19.58	2.80	.01	-2.14	.04*
Role physical	63.28±38.62	72.66±30.69	9.38±17.68	3.00	.01	48.48±44.61	74.24±37.23	25.76±48.20	3.07	.00	-1.81	.08
Bodily pain	63.78±26.31	68.53±21.87	4.75±7.69	3.50	.00	52.24±24.05	69.15±17.92	16.91±22.70	4.28	.00	-2.87	.01*
General health	54.38±22.69	57.59±18.64	3.22±7.25	2.51	.02	38.61±23.81	52.48±23.28	13.88±22.28	3.58	.00	-2.58	.01*
Vitality	48.28±13.95	51.41±13.45	3.13±4.88	3.62	.00	42.73±21.25	60.76±20.35	18.03±22.88	4.53	.00	-3.61	.00*
Social function	66.02±18.58	68.75±17.39	2.73±10.40	1.49	.15	62.88±25.67	75.00±17.68	12.12±19.64	3.55	.00	-2.40	.02*
Role emotional	59.38±43.78	75.00±38.80	15.63±26.75	3.30	.00	45.45±47.01	77.78±34.02	32.32±3.69	4.25	.00	-1.85	.07
Mental health	53.38±18.81	55.00±18.32	1.63±4.41	2.08	.05	47.15±19.99	58.18±17.95	11.03±19.55	3.24	.00	-2.66	.01*

*P <.05

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