

## Original Article

# Effect of comprehensive nursing intervention on serum inflammatory factors and quality of life in patients with pelvic inflammatory disease

Hailing Sun<sup>1</sup>, Hongdi Lin<sup>2</sup>, Haifei Ye<sup>2</sup>

<sup>1</sup>Party and Government Office, Zhoushan Women and Children Hospital, Zhoushan 316000, Zhejiang Province, China; <sup>2</sup>Department of Gynecology, Zhoushan Women and Children Hospital, Zhoushan 316000, Zhejiang Province, China

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**Abstract:** Objective: To explore the improvement of quality of life of patients with pelvic inflammatory disease by comprehensive nursing intervention. Methods: Altogether 118 patients with pelvic inflammatory disease admitted to our hospital from February 2018 to December 2019 were obtained and grouped into the control group (CG) and the experimental group (EG). The CG was given routine nursing and the EG was given comprehensive nursing intervention. The clinical efficacy, changes of serum inflammatory factors, negative emotion scores, treatment compliance and quality of life of the two groups were compared. The satisfaction of nursing care of patients in two groups was counted. Results: The total effective rate of treatment in the EG was evidently higher than that in the CG. Before nursing, there was no significant difference in serum inflammatory factors, SDS and SAS scores and quality of life scores between the two groups ( $P < 0.05$ ). After nursing intervention, the levels of serum inflammatory factors, SDS and SAS scores and quality of life scores in the EG were evidently better than those in the CG, and their satisfaction with nursing was evidently higher than that in the CG (all  $P < 0.05$ ). Conclusion: Comprehensive nursing intervention can effectively improve the quality of life of patients with pelvic inflammatory disease, and as such it is worth popularizing.

**Keywords:** Comprehensive nursing, pelvic inflammation, therapeutic efficacy, quality of life, satisfaction

## Introduction

Pelvic inflammatory disease refers to infectious diseases caused by infection of various pathogenic microorganisms in the female genital tract and its surrounding tissues, which is a common gynecological disease [1] and can be divided into acute [2] and chronic [3]. Untreated pelvic inflammatory disease may cause chronic pelvic pain, infertility, ectopic pregnancy and abdominal infection, posing a serious threat to work efficiency and quality of life for women. It mainly includes endometritis [4], salpingitis [5], tubal ovarian abscess [6], and pelvic peritonitis [7]. Its diagnosis markers are lower abdominal or pelvic pain, cervical movement, uterine or adnexal tenderness with genital tract inflammation [8]. As the symptoms and signs of pelvic inflammatory disease are usually not obvious, many women may develop genital tract infec-

tions which are seen clinically. If they are not treated well for a long time, it will lead to reproductive dysfunction, including infertility, ectopic pregnancy and chronic pelvic inflammatory disease [9]. In the course of treatment, long-term medication will cause patients to have a negative psychology, and even suffer from infertility due to tubal blockage, resulting in hard to deal with emotions, such as depression, anxiety and other negative emotions, thus affecting the quality of life [10]. Therefore, in the treatment of gynecological pelvic inflammatory disease, it is very important to improve the treatment effect with effective comprehensive nursing intervention.

In recent years, the number of patients with chronic pelvic inflammatory disease in China has gradually increased, and the causes and forms of the disease have also shown a diversi-

fied development trend, which has greatly affected the lives and work of patients and their families [11]. As we all know, chronic pelvic inflammatory disease is caused by bacterial infection of female internal genitalia. Although the cure success rate is high, if patients do not pay attention to it, or do not prevent in all aspects in subsequent life and work, it is very easy to relapse [12]. Therefore, in daily life, patients need to maintain good personal hygiene and develop scientific and reasonable living habits, so as to reduce the prevalence rate and recurrence rate. As a new nursing mode, comprehensive nursing is more scientific than other nursing modes [13]. The implementation of comprehensive nursing is to adhere to the principle of being “people-oriented” by paying attention to patients’ feelings, meeting patient’ psychological needs, and making patients feel respected and valued in the course of treatment, so as to relieve patients’ negative emotions, enhance patients’ confidence and cooperation in healing, and achieve better treatment effects [14]. Therefore, this study intended to observe the effect of comprehensive nursing intervention on improving the quality of life of patients with pelvic inflammatory disease.

### Materials and methods

#### *Research participants*

Altogether 118 patients with gynecological pelvic inflammatory disease in Zhoushan Women and Children Hospital from February 2018 to December 2019 were obtained and randomly divided into the control group (CG) and the experimental group (EG). The CG (n=50) had an average age of ( $32.37 \pm 5.86$ ) years and an average course of disease of ( $2.95 \pm 1.08$ ) years. The EG (n=68) had an average age of ( $33.16 \pm 5.92$ ) years and an average course of disease of ( $3.04 \pm 1.13$ ) years. Inclusive criteria: before admission, all patients showed irregular menstruation, waist and abdomen pain, pelvic pain, poor resistance and other cold symptoms; patients were diagnosed with chronic pelvic inflammatory disease after routine gynecological examination and laboratory examination. Exclusive criteria: patients with other major physical diseases, secondary or primary dementia, history of mental illness, or women during lactation or pregnancy were excluded. There was no significant difference in age and course of disease between the two groups ( $P > 0.05$ ).

All patients agreed to participate in this study, and the study was approved by the Medical Ethics Committee.

#### *Methods*

Both groups of patients were treated with anti-infection and symptomatic treatment. Levofloxacin injection (Manufacturer: Sichuan Kelun Pharmaceutical Co., Ltd.; registered number of approval: SFDA Approval No. H20083233; Specification: 100 mL: 0.5 g) and Metronidazole sodium chloride injection (Manufacturer: Wuhan Fuxing Biological Pharmaceutical Co., Ltd.; registered number of approval: SFDA Approval No. H20043319; Specification: 100 mL: 0.5 g) were used for intravenous drip treatment, twice a day, with 14 days for a course of treatment.

Patients in the CG were given routine nursing. During nursing, aseptic operations were strictly carried out, and patients were informed of medication precautions and related knowledge of pelvic inflammatory disease prevention, such as eating more fresh fruits and vegetables, paying attention to hygiene during menstruation and puerperium, and birth control.

The EG received comprehensive nursing intervention on the basis of routine nursing, and the main measures were as follows: (1) Admission guidance: The related knowledge of chronic pelvic inflammatory disease after admission, treatment methods and related precautions were explained to patients to improve patients’ awareness of the disease. (2) Dietary guidance: Patients were instructed to avoid cold or spicy food, take a light diet, and increase the intake of high-protein and high-vitamin foods to improve the body’s resistance. (3) Exercise guidance: The appropriate exercise mode was chosen according to the specific conditions of patients, with aerobic exercise such as swimming and jogging as the best, which can obviously promote the blood circulation and metabolism of patients and improve the function of patients’ immune system. (4) Daily life guidance: Patients were instructed to keep healthy daily life habits, change personal clothes frequently, and keep the perineum clean and dry. The leucorrhea was observed, and patients needed to see a doctor in time if necessary. (5) Psychological nursing: As the disease is in the private parts of the body, some

**Table 1.** Comparison of clinical efficacy between two groups

	Cured	Markedly effective	Effective	Ineffective	Total effective rate
CG (n=50)	10 (20.0)	18 (36.0)	12 (24.0)	10 (20.0)	40 (80.0)
EG (n=68)	18 (26.5)	30 (44.1)	15 (22.1)	5 (7.3)	63 (92.7)
$\chi^2/t$					4.1531
P					0.0415

patients are reluctant to talk about such topics and have a lack of communication. Nurses can communicate with patients in real time, reduce their psychological burdens and promote doctor-patient communication, so as to popularize disease knowledge for patients, improve professional and standardized clinical guidance, and strengthen the education of patients' families. With the cooperation of their families, patients' negative emotions can be alleviated.

#### *Effect evaluation and outcome measures*

Clinical efficacy: (1) cured: the clinical symptoms, signs and laboratory examination of the patient returned to normal, and gynecological ultrasound imaging examination showed that pelvic inflammation had been completely absorbed. (2) Markedly effective: the clinical symptoms, signs and laboratory examination of the patient returned to normal, and gynecological ultrasound imaging examination showed that pelvic inflammation was partially absorbed. (3) Effective: the clinical symptoms, signs and laboratory examination results of the patients were obviously improved, and gynecological ultrasound imaging examination showed that pelvic inflammatory disease partially returned to normal. (4) Ineffective: the clinical symptoms and signs of the patients did not show obvious improvement, and gynecological ultrasound imaging showed no obvious change in pelvic inflammation.

Inflammatory factor level: All patients were fasting venous blood before and after treatment and centrifuged at 3000 r/min for 30 min, and the serum was taken. The expression levels of TNF- $\alpha$ , IL-1 $\beta$ , TGF- $\beta$ 1 and IL-8 in serum were detected by ELISA [Shanghai Enzyme-Linked Biotechnology Co., Ltd., item number: TNF- $\alpha$  (ml077385), IL-1 $\beta$  (ml058059), TGF- $\beta$ 1 (ml022-522-2), IL-8 (ml028580)].

Negative emotion score: Self-rating Anxiety Scale (SAS) and Self-rating Depression Scale (SDS) were used to evaluate the emotional state (including anxiety and depression) before and after treatment. A higher score indicated more serious degree of anxiety and depression.

Treatment compliance: The treatment compliance of two groups of patients was compared from four aspects: adhering to standardized treatment, paying attention to menstrual hygiene, regular lifestyle and timely reexamination.

Quality of life score: The Nottingham Healthy Profile (NHP) was used to evaluate the patients' quality of life. The questionnaire included essence, pain, emotion, sleep, social life and physical activity. The total score of each item was 100 points. The higher score indicated worse quality of life.

Nursing satisfaction: the nursing satisfaction of both groups of patients was investigated by questionnaire. The evaluation criteria included satisfied, generally satisfied and dissatisfied, and nursing satisfaction = (satisfied+generally satisfied)/total cases \* 100%.

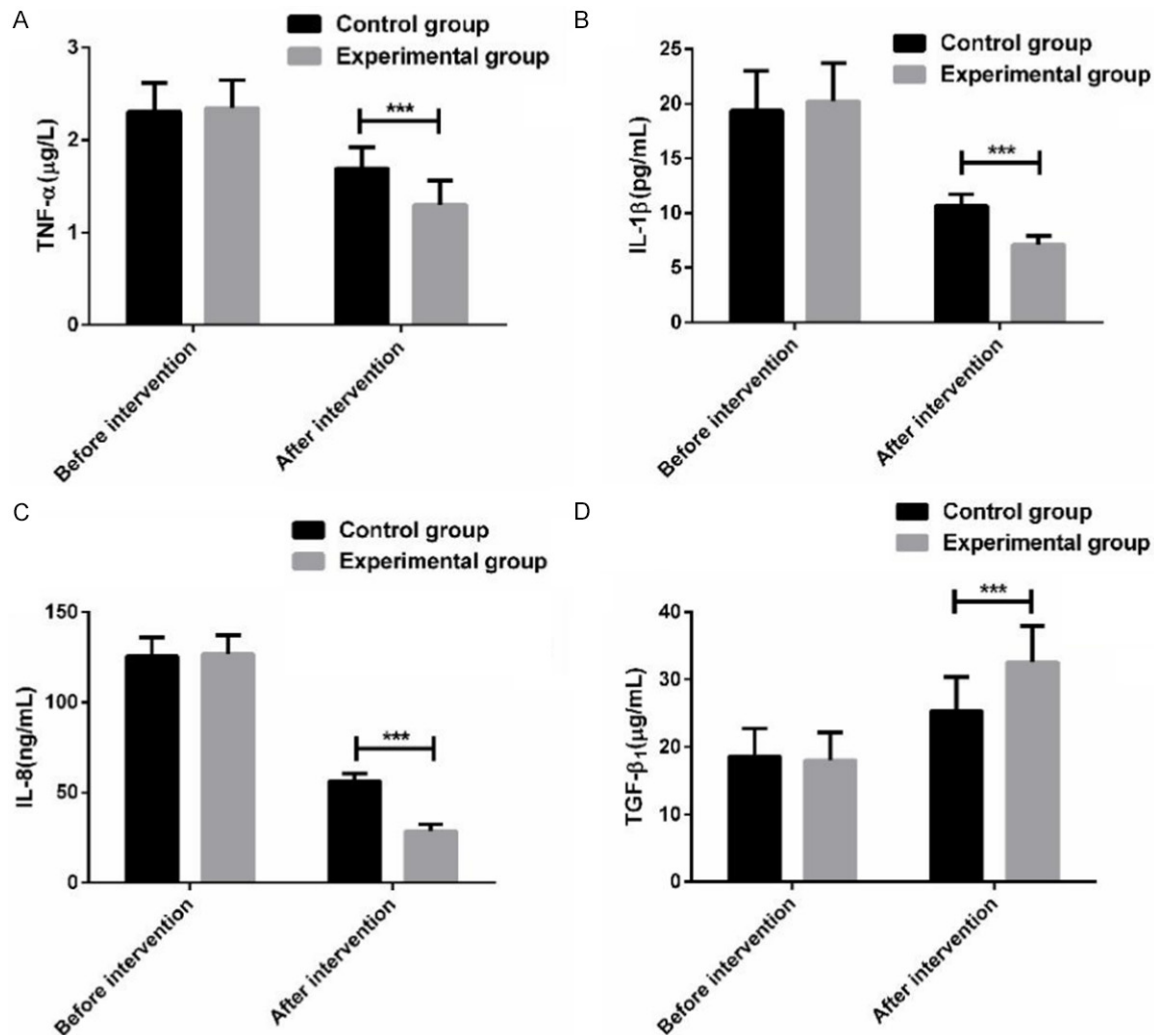
#### *Statistical analysis*

SPSS 22.0 was used to analyze the research data. The counting data and measurement data were represented as n (%) and (Mean  $\pm$  SD), and compared by  $\chi^2$  and t tests.  $P < 0.05$  indicated statistically significant differences.

## **Results**

### *Clinical efficacy of both groups of patients*

After nursing intervention, the total effective rate of clinical treatment in the EG was evidently higher than that in the CG ( $P < 0.05$ ), as shown in **Table 1**.



**Figure 1.** Levels of serum inflammatory factors in two groups. A: TNF-α level; B: IL-1β level; C: IL-8 level; D: TGF-β1 level; \*\*\* indicates  $P < 0.001$ .

#### Levels of inflammatory factors in both groups

Before nursing intervention, there was no significant difference in serum inflammatory factors between the two groups ( $P < 0.05$ ). After nursing intervention, the levels of TNF-α, IL-1β, IL-8 decreased and the level of TGF-β1 increased in both groups, and the change degree in the EG was evidently greater than that in the CG ( $P < 0.001$ ) (Figure 1).

#### SDS and SAS scores of patients in both groups

Before nursing intervention, there was no significant difference in SDS and SAS scores between the two groups, and all patients were had depression and anxiety. After nursing intervention, SDS and SAS scores of patients in

both groups decreased, but the improvement degree of patients in the EG was evidently higher than that in the CG ( $P < 0.05$ ), as shown in Table 2.

#### Treatment compliance of both groups of patients

The compliance of patients in the EG with standardized treatment, attention to menstrual hygiene, regular lifestyle and timely reexamination was higher than that in the CG ( $P < 0.05$ ), as shown in Table 3.

#### Quality of life scores of patients in both groups

Through the statistics of NHP scores, the results showed that there was no significant dif-

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**Table 2.** Comparison of SDS and SAS scores between the two groups

	SDS score		SAS score	
	Before intervention	After intervention	Before intervention	After intervention
CG (n=50)	56.42±8.62	48.74±7.23	51.82±9.03	47.26±7.85
EG (n=68)	56.81±8.56	41.26±6.82	52.05±9.10	42.03±7.33
$\chi^2/t$	0.2438	5.7391	0.1361	3.7164
P	0.8078	<0.0001	0.8920	0.0003

**Table 3.** Comparison of treatment compliance between two groups of patients

	Adhere to standardized treatment	Pay attention to menstrual hygiene	Regular lifestyle	Timely reexamination
CG (n=50)	34 (68.0)	36 (72.0)	32 (64.0)	33 (66.0)
EG (n=68)	62 (91.2)	60 (88.2)	61 (89.7)	63 (92.7)
$\chi^2/t$	10.2010	5.0071	11.4010	13.4910
P	0.0014	0.0252	0.0007	0.0002

**Table 4.** Quality of life scores of patients in two groups

		Pain	Emotion	Energy	Sleep	Physical activity	Social life
Before intervention	CG (n=50)	52.13±4.16	21.35±1.52	46.82±4.26	25.21±1.92	32.65±3.12	20.56±1.82
	EG (n=68)	52.56±4.08	21.48±1.38	47.11±4.15	25.51±1.88	32.84±3.10	21.02±1.59
$\chi^2/t$		0.5611	0.4843	0.3709	0.8489	0.3281	1.4602
P		0.5758	0.6291	0.7114	0.3977	0.7434	0.1469
After intervention	CG (n=50)	32.35±3.02	18.92±1.52	28.26±2.35	19.82±1.74	20.68±1.81	16.03±1.36
	EG (n=68)	26.12±2.82	14.25±1.22	21.45±2.03	14.26±1.46	14.71±1.66	12.35±1.03
$\chi^2/t$		11.5071	18.5022	16.8383	18.8378	18.5778	16.7304
P		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

**Table 5.** Nursing satisfaction

	Satisfied	Generally satisfied	Dissatisfied	Total satisfaction
CG (n=50)	20 (40.0)	21 (42.0)	9 (18.0)	41 (82.0)
EG (n=68)	43 (63.2)	22 (32.4)	3 (4.4)	65 (95.6)
$\chi^2/t$				5.8241
P				0.0158

ference in NHP scores between the two groups before intervention. After intervention, the scores of NHP in the EG were lower than those in the CG ( $P<0.05$ ), as shown in **Table 4**.

### Nursing satisfaction

After nursing intervention, the satisfaction of patients in the EG was evidently higher than that in the CG ( $P<0.05$ ), as shown in **Table 5**.

### Discussion

Women with chronic pelvic inflammatory disease will not only be impacted in their quality of

life and work level because of the pain and discomfort caused by the disease, but it will also have a great adverse impact on treatment effects because of the psychological pressure caused by the disease. In addition, the disease rate is secondary after acute pelvic inflammatory disease, and the healing may be delayed because of incomplete treatment. Some patients with poor physical fitness [15] have low resistance to pathogenic bacteria, which are chronic at the onset, stubborn, difficult to cure and easily recurrent [16]. Therefore, when treating patients with chronic pelvic inflammatory disease, medical staff should combine appro-



priate nursing intervention and help patients with pelvic inflammatory disease to recover gradually with the help of comprehensive nursing modes.

Comprehensive nursing intervention is a comprehensive nursing mode, which is a comprehensive and highly targeted high-quality medical nursing measure based on the patient's psychology and conditions, so that patients can enjoy comprehensive nursing services and further improve the treatment effects [17]. During the treatment, the medical staff should listen patiently to the comments expressed by the patients, eliminate their ideological concerns, discuss and analyze the disease with the patients, tell the patients' families about the causes and development trends of the disease, and guide their families to understand and care for the patients, so as to better help the patients establish correct living habits, mediate the patients' emotions and enhance their confidence in healing, so as to persist in treatment and help them recover as soon as possible [14]. The results of this study showed that the total effective rate of patients receiving comprehensive nursing intervention was evidently higher than that of patients receiving routine nursing intervention. Moreover, the scores of SDS and SAS of patients receiving comprehensive nursing intervention after treatment were evidently lower than those of the routine nursing intervention group, and the treatment compliance was also improved, which is similar to the results of comprehensive nursing intervention. Comprehensive nursing is more scientific due to its analysis of each patient's illness degree, psychological state and living habits, and due to its targeted guiding plan, which makes the nursing plan more humane [18]. After using the comprehensive nursing mode to care for patients for a period of time, the treatment effect of patients was improved, the tension and anxiety of patients were gradually relieved, the cooperation and recognition of family members were obtained, and the treatment and care of diseases with "do both things simultaneously" were completed. In this way, it can not only improve the quality of life of patients, but also enhance their satisfaction with nursing work [19]. The results of this study also showed that the quality of life of patients receiving comprehensive nursing intervention was evidently better than that of patients receiving routine nursing intervention,

and the patients' satisfaction with nursing was also improved. Pelvic inflammation is mainly caused by pathogenic microorganism infection, including *Neisseria gonorrhoeae*, *Chlamydia trachomatis*, aerobic bacteria and anaerobic bacteria [20]. The levels of inflammatory factors (TNF- $\alpha$  [21], IL-1 $\beta$  [22], IL-8 [23]) in the serum of patients with pelvic inflammatory disease were increased. Inflammatory mediators are important immunoregulatory proteins. Studies have shown that [24] inflammatory mediators (TNF- $\alpha$ , IL-1 $\beta$  and IL-6) play the role of proximal mediators in the pathogenesis of chronic pelvic inflammatory disease. TNF- $\alpha$  is synthesized by macrophages and monocytes, and it plays an important role in apoptosis. Alexander et al. [25] found that the levels of TNF- $\alpha$  and IL-1 $\beta$  in plasma of chronic pelvic inflammatory disease increased. TGF- $\beta$ 1, an inflammatory cytokine, can inhibit the progress of inflammation by down-regulating excessive immune responses, and also inhibits the apoptosis of T cells and B cells and the expression of various inflammatory mediators [26]. Therefore, its level in patients with pelvic inflammatory disease decreased. After antibiotic treatment, each index level will be gradually optimized. Similar to the results of this study, all patients were treated with antibiotics, but the index of patients with comprehensive nursing intervention improved evidently. Therefore, comprehensive nursing intervention played a promoting role in the treatment of pelvic inflammatory disease. The deficiency of this study is that the observation period of patients is short, and the sample size is not large enough, which needs to be further expanded by increasing the sample size and prolong the observation time.

To sum up, comprehensive nursing intervention for patients with chronic pelvic inflammatory disease can promote the improvement of serum inflammatory factors after treatment, eliminate the negative emotions of patients and improve the quality of life after treatment, which has good clinical value.

### Disclosure of conflict of interest

None.

**Address correspondence to:** Hailing Sun, Party and Government Office, Zhoushan Women and Children Hospital, 238th Renminbei Road, Dinghai District, Zhoushan 316000, Zhejiang Province,

China. Tel: +86-13666580295; E-mail: sunhailing2020@163.com

## References

- [1] Brunham RC, Gottlieb SL and Paavonen J. Pelvic inflammatory disease. *N Engl J Med* 2015; 372: 2039-2048.
- [2] McKee DL, Hu Z and Stahlman S. Incidence and sequelae of acute pelvic inflammatory disease among active component females, U.S. Armed Forces, 1996-2016. *MSMR* 2018; 25: 2-8.
- [3] Cheng Y, Yuan Y, Jin Y, Xu N and Guo T. Acupuncture for chronic pelvic inflammatory disease: a systematic review protocol. *Medicine (Baltimore)* 2018; 97: e0225.
- [4] Wiringa AE, Ness RB, Darville T, Beigi RH and Haggerty CL. *Trichomonas vaginalis*, endometritis and sequelae among women with clinically suspected pelvic inflammatory disease. *Sex Transm Infect* 2020; 96: 436-438.
- [5] Price MJ, Ades AE, Welton NJ, Simms I and Horner PJ. Pelvic inflammatory disease and salpingitis: incidence of primary and repeat episodes in England. *Epidemiol Infect* 2017; 145: 208-215.
- [6] Chappell CA and Wiesenfeld HC. Pathogenesis, diagnosis, and management of severe pelvic inflammatory disease and tuboovarian abscess. *Clin Obstet Gynecol* 2012; 55: 893-903.
- [7] Sasaki T, Okamura K, Yonemoto Y, Okura C and Takagishi K. Pelvic peritonitis during biologic therapy for rheumatoid arthritis: a case report and review of the literature. *Springerplus* 2014; 3: 567.
- [8] Bugg CW, Taira T and Zaurova M. Pelvic inflammatory disease: diagnosis and treatment in the emergency department [digest]. *Emerg Med Pract* 2016; 18: S1-S2.
- [9] Chayachinda C and Rekhawasin T. Reproductive outcomes of patients being hospitalised with pelvic inflammatory disease. *J Obstet Gynaecol* 2017; 37: 228-232.
- [10] Speer LM, Mushkbar S and Erbele T. Chronic pelvic pain in women. *Am Fam Physician* 2016; 93: 380-387.
- [11] Huang CC, Huang CC, Lin SY, Chang CY, Lin WC, Chung CH, Lin FH, Tsao CH, Lo CM and Chien WC. Association of pelvic inflammatory disease (PID) with ectopic pregnancy and preterm labor in Taiwan: a nationwide population-based retrospective cohort study. *PLoS One* 2019; 14: e0219351.
- [12] Safrai M, Rottenstreich A, Shushan A, Gilad R, Benshushan A and Levin G. Risk factors for recurrent Pelvic Inflammatory Disease. *Eur J Obstet Gynecol Reprod Biol* 2020; 244: 40-44.
- [13] Armstrong J and Mitchell E. Comprehensive nursing assessment in the care of older people. *Nurs Older People* 2008; 20: 36-40.
- [14] Coombs T, Curtis J and Crookes P. What is a comprehensive mental health nursing assessment? A review of the literature. *Int J Ment Health Nurs* 2011; 20: 364-370.
- [15] Bugg CW and Taira T. Pelvic inflammatory disease: diagnosis and treatment in the emergency department. *Emerg Med Pract* 2016; 18: 1-24.
- [16] O'Connell CM and Ferone ME. Chlamydia trachomatis Genital Infections. *Microb Cell* 2016; 3: 390-403.
- [17] Trent M, Perin J, Gaydos CA, Anders J, Chung SE, Tabacco Saeed L, Rowell J, Huettner S, Rothman R and Butz A. Efficacy of a technology-enhanced community health nursing intervention vs standard of care for female adolescents and young adults with pelvic inflammatory disease: a randomized clinical trial. *JAMA Netw Open* 2019; 2: e198652.
- [18] Beltran Salazar OA. The meaning of humanized nursing care for those participating in it: Importance of efforts of nurses and healthcare institutions. *Invest Educ Enferm* 2016; 34: 18-28.
- [19] Floris L, Irion O, Bonnet J, Politis Mercier MP and de Labrusse C. Comprehensive maternity support and shared care in Switzerland: comparison of levels of satisfaction. *Women Birth* 2018; 31: 124-133.
- [20] Curry A, Williams T and Penny ML. Pelvic inflammatory disease: diagnosis, management, and prevention. *Am Fam Physician* 2019; 100: 357-364.
- [21] Nakao K, Kishi H, Imai F, Suwa H, Hirakawa T and Minegishi T. TNF-alpha suppressed FSH-induced LH receptor expression through transcriptional regulation in rat granulosa cells. *Endocrinology* 2015; 156: 3192-3202.
- [22] Feng XL, Jiang S, Chen J, Liu X, Zhang Y and Chen L. Effect of Fuyanshu Capsules combined with antibiotics on inflammatory factors in patients with pelvic inflammatory disease. *Zhongguo Zhong Yao Za Zhi* 2019; 44: 2637-2643.
- [23] Huang TR, Li W and Peng B. Correlation of inflammatory mediators in prostatic secretion with chronic prostatitis and chronic pelvic pain syndrome. *Andrologia* 2018; 50.
- [24] Peng X, Guo H, Chen J, Wang J and Huang J. The effect of pifenidone on rat chronic prostatitis/chronic pelvic pain syndrome and its mechanisms. *Prostate* 2020; 80: 917-925.
- [25] Alexander RB, Ponniah S, Hasday J and Hebel JR. Elevated levels of proinflammatory cytokines in the semen of patients with chronic prostatitis/chronic pelvic pain syndrome. *Urology* 1998; 52: 744-749.
- [26] McCarron MJ and Marie JC. TGF-beta prevents T follicular helper cell accumulation and B cell autoreactivity. *J Clin Invest* 2014; 124: 4375-4386.