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ORIGINAL RESEARCH

The application of information-motivation-behavior skill model in patients with moderate to severe ovarian hyperstimulation syndrome

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Abstract

Ovarian Hyperstimulation Syndrome (OHSS) is a common complication of infertile patients underwent super ovulation treatment with assisted reproductive technology, which often occurs after the use of gonadotropin or in the first trimester. In this study, we investigated the effectiveness of the information-motivation-behavior skill model in patients with moderate to severe OHSS. After different nursing intervention, the score results showed that after 4 weeks of intervention, the two groups of patients' self-efficacy scores, total scores and quality of life scores were higher than before intervention, and the intervention group was higher than the normal control ($p < 0.05$). Self-rating anxiety scale (SAS) and self-rating depression scale (SDS) scores of 2 groups were lower than before intervention, and the score of the intervention group was lower than the normal control ($p < 0.05$). In conclusion, the information-motivation-behavioral (IMB) skills model can significantly improve the cognitive level and the quality of life of patients with moderate and severe OHSS.

Keywords

Information-motivation-behavior skill model; Ovarian hyperstimulation syndrome; Anxiety; Depression; The quality of life

1. Introduction

Ovarian Hyperstimulation Syndrome (OHSS) is a common complication of infertility patients receiving super ovulation treatment with assisted reproductive technology, with an overall incidence of 23.3% [1]. The incidence of moderate OHSS during in vitro fertilization (IVF) induced ovulation cycle was 2%–6%, and the incidence of severe OHSS was 0.1%–0.2% [2]. Patients with moderate and severe OHSS may develop symptoms such as blood concentration, pleural fluid, ascites, electrolyte disturbances, oliguria, abnormal liver and kidney function, and thrombosis, which may be life-threatening in severe cases [3]. In addition, patients are worried about the influence on pregnancy or the influence on the fetus and life safety after pregnancy, so infertility patients complicated with OHSS are prone to pessimism, anxiety and fear [4]. However, studies [5] have shown that most patients with OHSS lack sufficient knowledge of OHSS and fail to take relevant nursing measures according to doctors' and nurses' orders, resulting in poor compliance and serious impact on the treatment effect. Therefore, appropriate psychological guidance plays an important role in the treatment and rehabilitation of patients. It is important to systematically manage patients with moderate and severe OHSS. The information-motivation-behavioral skills (IMB) model is characterized by integrating of various theories

and models of high-risk behavior change [6]. It is believed that the change of high-risk behavior is based on the three determinants of information, motivation and behavioral skills, and has achieved good results in patients with diabetes [7] and AIDS [8]. This study aimed to develop the corresponding nursing intervention plan based on the IMB model by providing patients with favorable information to change the patient's mentality, thereby mobilizing their enthusiasm to participate in medication and self-care, hoping to improve the psychological state of patients, improve the quality of life.

2. Materials and Methods

2.1 Data Sources

A total of 90 patients with moderate to severe OHSS who receive *in vitro* fertilization and embryo transfer in Fujian Maternity and Child Health Hospital were selected as the study subjects, and they were divided into the normal control and the intervention group with 45 patients in each group according to the random number table method. Women in normal control were (30.47 ± 5.11) years old on average, and body mass index (BMI) was (20.89 ± 1.39) kg/m^2. The duration of infertility was (4.16 ± 1.58) years. Causes of infertility were listed as following: oviduct factors in 12 cases, endometriosis in 12 cases, polycystic ovary syndrome in 11 cases, and unknown

causes in 10 cases. Severity of disease included 27 cases of moderate and 18 cases of severe. The average age of women in the intervention group was (30.22 ± 4.57) years, and the body mass index (BMI) was (21.22 ± 1.43) kg/m^2. The duration of infertility was (4.22 ± 1.74) years. Causes of infertility included: fallopian tube factors in 10 cases, endometriosis in 12 cases, polycystic ovary syndrome in 12 cases, and unknown causes in 11 cases. Severity of disease included moderate in 30 cases and severe in 15 cases. There was no significant difference in age, BMI, infertility time and other general information between the two groups (all $p >$ 0.05), which were comparable.

2.2 Inclusion and exclusion criteria

Inclusion criteria: the diagnostic criteria for moderate and severe OHSS were met [9], and the cognitive function was normal. All the patients who participated in the study were informed of the study and signed the informed consent. The age of patients included in this study was mainly between 25–40 years old, and the age of all patients was >18 years old and <45 years old. All patients were not infertility caused by uterine abnormalities, congenital and systemic factors, and these patients who received embryo transfer were eventually pregnant after IVF. Exclusion criteria: combined with prenatal depression, anxiety and other mood disorders; Combined with schizophrenia and other mental disorders; Complicated with pneumonia and other systemic infectious diseases; Complicated with malignant neoplastic disease; Patients requiring intensive care unit (ICU) treatment, multiple organ failure, thrombosis, and severe pregnancy termination without remission after multiple treatments; People who don't use the WeChat app in their smartphones; Lose contact and give up.

2.3 Intervention methods

In 90 patients, the conventional gonadotropin releasing hormone agonist/follicle stimulating hormone/chorionic gonadotropin (GnRHa/FSH/HCG) long and short regimens were used for hyperovulation. The eggs were collected 36 h after injection of HCG, and embryo transfer was performed 2–3 days after operation.

The normal control followed the nursing points of moderate and severe ovarian hyperstimulation syndrome include: reasonable rest, high protein diet, recording the amount of body fluids in and out for 24 hours, regular measurement of body weight and abdominal circumference, dilatancy, anticoagulation, and prevention of thrombosis. The patient's blood pressure, temperature, pulse, respiration and other changes were closely observed. The patients should eat little meals, high protein, easy to digest, high fiber content, and light and low salt semi-liquid food. Strenuous exercise and pressure on the pelvic and abdominal cavity are prohibited. At the same time, examination of the pelvic and abdominal cavity is prohibited to avoid ovarian rupture or ovarian torsion. Patients with pleural effusion or ascites need assistance to adjust their posture to the semi-decubitus or decubitus position in order to improve their dyspnea. The bed needs to be kept clean and dry, and nursing person should guide the patients to take the right recumbent position, and move slowly when turning up, frequently turn over during bed rest. Patients need to be given proper massage to prevent blood clots forming, told the daily activity in patients with attention at the same time, and given comfort, told the appointment time.

The intervention group was given IMB mode guidance for 4 weeks on the basis of the normal control, which means nursing intervention was carried out from three aspects of information, motivation and behavioral skills. The first two weeks of intervention were information and motivation intervention, and the second two weeks were behavioral skills intervention (Table 1). Establishment of IMB intervention team: the team was composed of a multidisciplinary team, including 1 physician with psychological background, 2 nursing supervisors, 1 attending physician and 2 nursing graduate students. The psychologist is responsible for evaluating the intervention plan and training team members to ensure the effect of the intervention. The nurse in charge is responsible for the synchronous implementation of the intervention program. The attending physician is responsible for the adjustment of the patient's treatment plan and risk control, and the graduate student is responsible for the coordination and communication and the evaluation of indicators.

2.4 Observation Indicators

Evaluation was performed before intervention and 4 weeks after intervention. The evaluation included: (1) Self-efficacy: Self-efficacy scale [10] was used for evaluation, which mainly included 4 dimensions of patients' daily life, health behavior, medication situation and medical compliance behavior. The highest score of each dimension was 10 points. The total score of self-efficacy was equal to the sum of the scores of all dimensions, and the higher the score, the higher the self-efficacy. (2) Anxiety and depression states: Self-rating Anxiety Scale (SAS) and Self-rating Depression Scale (SDS) were used to evaluate the psychological states of patients in the two groups [11], among which SAS score 50–59 was classified as mild anxiety, 60–69 as moderate anxiety, and ≥ 70 as severe anxiety. SDS depression score <53 indicates normal, 53–62 indicates mild depression, 63–72 indicates moderate depression, and >72 indicates major depression. The lower the score, the better the mental state. (3) Quality of life: Quality of life Scale Summary table (QOL-BREF) [12] was used to evaluate the quality of life of patients in the two groups. The scale included 24 items in physiological field, psychological field, social relationship field and environmental field, and each item was scored according to the scale of 1–5. The higher the score, the better the quality of life of patients. The changes of self-efficacy, anxiety, depression (SAS, SDS) and quality of life (QOL-BREF) in two groups were observed before intervention and 4 weeks after intervention.

2.5 Statistical analysis

Using SPSS software (version 25.0, SPSS, Inc., Chicago, IL, USA), measurement data of normal distribution were expressed as mean ± standard deviation ($\bar{x} \pm s$), and comparison between groups was performed by t test. The test level $\alpha =$ 0.05, and $p < 0.05$ was considered statistically significant.

T A B L E 1. Treatment procedure.

Items	Day	Interventions
Information intervention; Motivational intervention	1	In a "one-to-one" way, the "Guide to ovarian hyperstimulation syndrome" was distributed to guide the correct understanding of patients with Ovarian Hyperstimulation Syndrome (OHSS) disease, with the patient and family to establish trust and in-depth interviews.
	3	To understand the main reason for the patients with psychological problems and record, as well as collect the nursing problems.
	5	Based on individual nursing problems, personalized health education manual is developed through conversation, and health education is carried out in the form of demonstration until patients can grasp the correct information.
		Considering patients' anxiety caused by disease, nursing staff can play cheerful and soothing music to create a relaxed atmosphere.
		Summarize successful treatment cases in the past and invite them to introduce their own experience and experience by phone or WeChat video, thereby enhancing patients' confidence in overcoming the disease, and encouraging patients to cooperate with treatment with positive beliefs and behaviors.
		Medical staff and patients establish a relationship of mutual trust, timely communication with patients, listen to patients patiently and carefully, and encourage patients to establish positive confidence to reduce the psychological burden of patients.
	7	Review the previous health education, discuss the after-school problems with the patients, and understand whether they have mastered the correct information through discussion with the patients. According to the causes of patients' psychological problems, set up a health education plan to promote patients to clarify daily maintenance and nursing measures in a "one-to-one" way, reduce their fear of various complications, and further obtain the deep trust of patients and their families.
	9	According to the content of health education already carried out, a question-and-answer game was played to further deepen the patients' understanding of OHSS disease health education, and the relevant knowledge content was reviewed as a whole.
		Five successful treatment cases can be invited to introduce their experiences and experiences through telephone or WeChat video, so as to further enhance patients' confidence in overcoming diseases and encourage patients to cooperate with treatment with positive beliefs and behaviors.
	11	A questionnaire survey was conducted to explain in detail the knowledge that the patient did not master until the patient fully mastered it.
	13	Play cheerful and soothing music to create a relaxed atmosphere.
		Summarize the past successful treatment cases and invite another 4 people to introduce their experiences and experiences through telephone or WeChat video, so as to enhance patients' confidence in overcoming diseases and encourage patients to cooperate with treatment with positive beliefs and behavior.
Behavioral intervention	15–28	Nurse to help the patient comfortable postures, lay down, close eyes, eliminate distractions and concentrate, according to the nurse's command in the order of "three lines", gradually relax all parts of the body, 1 line (sides): from the head start, order on both sides of the neck, on both sides of the shoulder, upper arm, elbow joint, forearm, wrist, hand to the tip of the finger. The second line (front): from the face, the order is the front of the neck, chest and abdomen, front of the thigh, front of the calf, instep to toes. The third line (back): from the back of the head, the back of the neck, back, waist, back of the thigh, popliteal fossa, back of the calf to the heel. When the nurse said to a certain part, asked the patient to focus their thoughts here, take a deep breath, read the word "loose" in the heart, and then pay attention to the next part consciously. After the end of a line, leave the mind at the stop point for a moment (the stop point is the middle finger, the thumb of the foot and the center of the foot respectively). Repeat 2 cycles, each cycle takes about 5 min.

The treatment procedure including two parts: information intervention, motivational intervention (1–14 days) and Behavioral intervention (15–28 days).

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T A B L E 2. Comparison of self-efficacy scores between the two groups (scores, $\bar{x} \pm s$).

group	number of cases	daily life	health behavior	medicine behavior	behavior of following doctor's instruction	total points
before the intervention						
normal control	45	6.87 ± 1.84	6.56 ± 1.39	6.58 ± 1.45	6.60 ± 1.44	26.60 ± 2.97
intervention group	45	6.42 ± 2.15	6.53 ± 1.85	7.02 ± 1.56	6.18 ± 1.19	26.16 ± 3.78
t value		1.054	0.064	−1.399	1.517	0.620
p value		0.295	0.949	0.165	0.133	0.537
after the intervention						
normal control	45	7.29 ± 1.33	6.96 ± 1.41	7.00 ± 1.37	7.33 ± 1.11	28.58 ± 2.68
intervention group	45	8.13 ± 1.47	8.09 ± 1.54	8.04 ± 1.55	8.09 ± 1.26	32.36 ± 2.81
t value		−2.861	−3.644	−3.390	−3.024	−6.527
p value		0.005	0.000	0.001	0.003	0.000

T A B L E 3. Comparison of SAS and SDS scores between the two groups (scores, $\bar{x} \pm s$).

group	number of cases	SAS score	SDS score
before the intervention			
normal control	45	45.51 ± 2.68	45.67 ± 2.49
intervention group	45	45.56 ± 2.59	46.36 ± 2.37
t value		−0.080	−1.346
p value		0.936	0.182
after the intervention			
normal control	45	34.76 ± 3.11	36.80 ± 3.02
intervention group	45	29.53 ± 3.63	31.22 ± 3.58
t value		7.335	7.990
p value		0.000	0.000

SAS, Self-rating Anxiety Scale; SDS, Self-rating Depression Scale.

T A B L E 4. Comparison of QOL-BREF scores between the two groups (scores, $\bar{x} \pm s$).

group	number of cases	physical field	psychological field	social relations	environmental area
before the intervention					
normal control	45	63.56 ± 4.49	65.89 ± 4.35	63.64 ± 5.74	63.33 ± 4.78
intervention group	45	64.20 ± 4.19	64.49 ± 5.11	63.42 ± 4.62	62.96 ± 4.32
t value		−0.704	1.400	0.202	0.394
p value		0.483	0.165	0.840	0.695
after the intervention					
normal control	45	71.40 ± 3.744	71.16 ± 5.65	70.64 ± 6.40	70.44 ± 5.32
intervention group	45	74.13 ± 3.98	75.82 ± 5.30	73.58 ± 5.69	74.31 ± 4.94
t value		−3.355	−4.040	−2.298	−3.573
p value		0.001	0.000	0.024	0.001

3. Results

3.1 Comparison of self-efficacy scores between the two groups

Before intervention, there was no significant difference in self-efficacy score between the two groups (all $p > 0.05$). As shown in Table 2, after 4 weeks of intervention, the scores of both groups were increased, and the self-efficacy and scores of all dimensions in the intervention group were significantly higher than those in the normal control, with statistical significance (all $p < 0.05$).

3.2 Comparison of SAS and SDS scores between two groups

As shown in Table 3, before intervention, there was no significant difference in SAS and SDS scores between 2 groups (all $p > 0.05$). After 4 weeks of intervention, the scores of both groups were decreased, and the scores of SAS and SDS in the intervention group were significantly lower than those in the normal control, with statistical significance (all $p < 0.05$).

3.3 Comparison of QOL-BREF scores between 2 groups

There was no statistical significance in QOL-BREF score between two groups before intervention (all $p > 0.05$). After 4 weeks of intervention, the scores of both groups were increased, and the QOL-BREF scores and scores of all dimensions in the intervention group were significantly higher than those in the normal control, with statistical significance (all $p < 0.05$). These results were shown in Table 4.

4. Discussion

OHSS is an iatrogenic complication induced by in vitro fertilization and embryo transfer (IVF-ET)-related controlled superovulation [13, 14], which brings mental burden and physical discomfort to infertility patients, and may even threaten patients' lives without timely intervention. Some scholars believe [5] that correct and effective systematic nursing intervention is conducive to the timely rehabilitation of moderate and severe OHSS patients. IMB skills model is a theory proposed by Fisher *et al.* [5], that emphasizes the combined effect of information, motivation and behavioral skills to promote individual behavior change, and has achieved good results in the prevention of high-risk behaviors of AIDS [6], self-management of diabetes patients [7] and peritoneal dialysis patients [15].

In this study, the self-efficacy of patients in the two groups was evaluated. The results showed that the self-efficacy scores of all dimensions and total scores in the intervention group were higher than those in the normal control ($p < 0.01$). On the one hand, the model of IMB skills introduces the concept of "self-efficacy" from social cognitive theory, builds confidence through motivational intervention, promotes patients to change their own behavior, and plays a positive role in changing the prognosis. On the other hand, the IMB skill model can provide disease-related information for OHSS patients, improve their cognition of OHSS, and understand that their active cooperation with treatment has a very positive effect on the development of OHSS, improve patients' treatment compliance and confidence, shorten the course of disease, and improve clinical efficacy.

In terms of adverse psychological emotions, IMB model can reduce anxiety and depression in moderate and severe OHSS patients. The results of this study showed that the scores of SAS and SDS in the intervention group were lower than those in the normal control ($p < 0.05$). The IMB skill model can guide medical staff to understand the existing nursing problems of OHSS patients and their families, set up health education programs according to these problems, and promote patients to clarify daily maintenance and nursing measures in a "one-to-one" way, thereby reducing the fear of various complications. In addition, medical staff can analyze the reasons for patients' bad psychological emotions, effectively communicate with patients, and patiently listen to and calm patients' depression and anxiety. In addition, silent therapy is not only a physical relaxation training method, but also a unique form of thought [16, 17]. Studies have confirmed that silent therapy stimulates the secretion of pineal hormone in the upper thalamus, exert the sympathetic inhibition effect, reduce the oxygen consumption of the body, and reduce blood pressure and heart rate, thereby relaxing the body [18, 19]. Silent therapy can help patients with OHSS to maintain physical and mental relaxation, remove excessive attention to the disease, further eliminate mental fatigue, and reduce anxiety level.

The IMB skill model can effectively improve the quality of life of patients with moderate and severe OHSS. The results of this study showed that the quality of life of patients in the two groups was significantly higher after intervention than before intervention, and the intervention group was higher than the normal control ($p < 0.05$). The reason may be that IMB model can improve patients' disease cognition through personalized nursing guidance, and promote patients' confidence in treatment according to interviews and motivational intervention, and establish a firm will to change their bad behavior habits, thus alleviating all kinds of bad psychological states, shortening the course of disease, and improving self-efficacy and the quality of life. However, there are still limitations in this study. The number of samples in this study is limited. In the future, we will expand the cases to complete the investigation of nursing measures of OHSS patients, and hope of improving the psychological state of patients and the improvement of life quality.

5. Conclusion

In conclusion, the IMB skill model can significantly improve the cognitive level of patients with moderate and severe OHSS, promote their adherence behavior, improve self-efficacy, reduce depression, anxiety and other negative emotions, and improve the quality of life of patients.

AUTHOR CONTRIBUTIONS

QL and CY—designed the study, supervised the data collection, analyzed the data, interpreted the data, prepare the manuscript for publication and reviewed the draft of

the manuscript. All authors have read and approved the manuscript.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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