



Research Article

Application and Effect of High-quality Nursing Combined with Enteral Nutrition Support in Patients with Acute Pancreatitis

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Abstract

Objective: This study was designed to determine the effect of high-quality nursing (HQN) combined with enteral nutrition support (ENS) in patients with acute pancreatitis (AP).

Methods: The hematuria amylase recovery time were observed and recorded in the two groups. The contents of nutritional and biochemical indicators (total serum protein, TP; prealbumin, PA; albumin, ALB) were detected before and after nursing intervention in the two groups, and the ratios of CD4+T lymphocytes, CD4+/CD8+T lymphocytes and white blood cell counting (WBC) were monitored. Before and after nursing intervention, the levels of inflammatory factors interleukin-6 (IL-6), interleukin-10 (IL-10), tumor necrosis factor- α (TNF- α) and C-reactive protein (CRP) were tested, and the scores of acute physiology and chronic health evaluation II (APACHE II) and computed tomography (CT) were evaluated. Self-rating anxiety scale (SAS) and self-rating depression scale (SDS) were employed for the evaluation of the anxiety and depression status of patients before and after nursing intervention, Short-Form 36-item Health Survey (SF-36) for the assessment of the quality of life (QOL) and the self-made (hospital) nursing satisfaction questionnaire for the determination of the nursing satisfaction of patients in the two series after nursing intervention.

Results: In comparison with CG, the hospitalization time, hospitalization cost, and the hematuria amylase recovery time were statistically less in RG ($P<0.05$). Compared with CG, the levels of nutritional and biochemical indicators TP, AP, ALB were statistically higher in RG ($P<0.05$), the ratios of CD4+T lymphocytes and CD4+/CD8+T lymphocytes were statistically higher ($P<0.05$), and the WBC level was statistically lower after nursing intervention ($P<0.05$). In comparison with CG, the IL-6, TNF- α and CRP levels were statistically lower and the IL-10 level was statistically higher in RG after nursing intervention ($P<0.05$). RG presented statistically lower APACHE II and CT scores, evidently decreased SAS and SDS scores, and significantly higher QOL scores and nursing satisfaction than CG after nursing intervention ($P<0.05$).

Conclusion: HQN intervention is markedly effective in the treatment of AP patients with ENS. It can statistically shorten the length of hospital stay, lower the economic pressure, and reduce the hematuria amylase recovery time and the incidence of complications. Also, it can enhance the nutritional health level and immune function of patients, reduce the inflammatory reaction, alleviate patients' adverse emotions of anxiety and depression, and meliorate their QOL and prognosis.

Keywords: high-quality nursing, enteral nutrition support, acute pancreatitis, application effect

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1 INTRODUCTION

As a common multiple disease in Department of Gastroenterology, acute pancreatitis (AP) is an acute abdominal disease with critical onset, multiple complications and high mortality^[1]. AP is mainly induced by the activation of pancreatin in the pancreas, which leads to the inflammation of the pancreas and its surrounding tissues such as self digestion, edema, bleeding and even necrosis^[2]. The main clinical manifestations of AP include fever, nausea, vomiting, and acute epigastric pain^[3]. Its etiology is currently unclear, but cholelithiasis, heavy drinking and overeating are common causes of the disease^[4]. Depending on the severity, AP is clinically divided into mild and severe types^[5]. Literally, severe acute pancreatitis (SAP) is a serious type of acute pancreatitis.

Following SAP, hypermetabolism, internal environment disorder, immune dysfunction and malnutrition can occur rapidly, and SAP is often complicated with septic shock, cardiopulmonary insufficiency and other systemic complications, with poor prognosis^[6]. While improving the body's immune function and anti-infection ability, effective nutritional support can restore and maintain the body's viscera function^[7]. Therefore, nutritional support is an indispensable component of SAP comprehensive treatment program^[8]. Recent relevant studies suggest that enteral nutrition more agrees with the physiological metabolic process of the body, and is regarded as the preferred nutritional support method for patients with normal intestinal function due to its advantages such as promoting intestinal mucosal cell proliferation, maintaining intestinal mucosal barrier function, improving immune function, and significantly reducing adverse reactions^[9]. In the process of enteral nutrition support (ENS) treatment for SAP patients, safe and effective nursing measures are of great significance for guaranteeing treatment efficacy, reducing complications and improving the treatment rate^[10].

High-quality nursing (HQN) is a new nursing model that is patient-centered^[11], which can improve the overall quality of nursing service by deepening the connotation of self-specialty, improving self-comprehensive quality and professional skills of the nursing staff^[12]. Its purpose

is to timely and effectively solve the patients' physiological and psychological problems, enhance their confidence in conquering the disease, and improve the compliance of patients to actively cooperate with treatment and nursing, thereby improving the clinical treatment effect^[13]. Previous studies have reported that HQN intervention in the perioperative period of obstetrics and gynecology can significantly improve postpartum depression and reduce the occurrence of postpartum adverse events^[14]. In the study of Gullick et al.^[15], it was found that HQN intervention for ICU patients can bolster treatment success rate and improve the prognosis of patients. However, at present, there are few studies on the application of HQN combined with ENS in patients with AP.

Therefore, through the implementation of HQN model for AP patients treated by ENS, this study explored the application effect of this nursing model in the treatment of AP patients, aiming to provide a feasible nursing intervention plan for this patient population.

2 MATERIALS AND METHODS

2.1 General Information

From January 2018 to June 2019, 98 consecutive patients with AP treated in our hospital were selected and assigned into two groups according to different nursing intervention modes. During ENS treatment, 46 cases in the control group (CG) were treated with routine nursing, while 52 cases in research group (RG) were treated with HQN. There were 28 males and 18 females in CG, aged from 30 to 60 years old, with an average of (51.82±5.43) years; while RG consisted of 32 males and 20 females, with the age range of 31-58 and an average age of (52.65±5.78) years.

2.2 Inclusion and Exclusion Criteria

2.2.1 Inclusion Criteria

- (1) Patients all met the diagnostic criteria of AP^[16];
- (2) Patients with acute physiology and chronic health evaluation II (APACHE II) ≥ 8 points^[17];
- (3) Patients with the first onset of the disease;
- (4) Patients had no contraindications of enteral nutrition and were given ENS treatment;
- (5) The Ethics Committee of our hospital approved this

study without reserves. All patients and their families were informed and signed the fully informed consent.

2.2.2 Exclusion Criteria

- (1) Patients with complete gastrointestinal obstruction or active gastrointestinal bleeding;
- (2) Patients who were allergic to enteral nutrients;
- (3) Patients with severe visceral lesions such as heart, liver, lung and kidney;
- (4) Patients with infectious or immune system diseases;
- (5) Patients with end-stage chronic diseases or malignant tumors;
- (6) Patients with cognitive impairment, speech and hearing impairment;
- (7) Patients with mental illness or family history of mental illness.

2.3 Treatment Methods

After admission, patients in both groups were given symptomatic treatment, such as anti-infection, gastrointestinal decompression, inhibition of pancreatic secretion, correction of electrolyte disturbance, spasmolysis and pain relief. Apart from that, both groups were given ENS treatment, the specific contents of which were as follows: Within 24h after admission, a nose-jejenum nutrition tube was placed through one side of the nasal cavity of the patient under the guidance of gastroscope, and the jejunal nutrition tube was properly fixed to prevent falling off. On day 1, 500mL 5% glucose was dripped from the tube at 30-50ml/h. On day 2, 500mL total nutritional mixture (TNA) was administered through the intestine at a rate of 40-50ml/h, and appropriate fiber or liquid diet was given according to the patient's physical condition. On day 3, 1000mL TNA was given at the rate of 60-80ml/h, and the concentration and amount of the nutrient solution were adjusted according to the patient's hospitalization time and tolerance. Normal diet was not given until the symptoms of the patient disappeared and the APACHE II was normal.

2.4 Nursing Methods

Patients in CG were given routine nursing intervention. The main methods were to give ENS as prescribed by the doctor, regulate the infusion speed with the nutrition pump, flush the tube with boiling water after infusion, patrol the infusion process, detect and observe the physical signs of patients, and take regular nursing measures such as medication and life nursing.

The patients in RG implemented the HQN model on the basis of CG, and the specific methods were as follows:

- (1) Health knowledge education: Targeted health knowledge education was conducted for patients and their families according to their educational level, informing them of the pathogenesis, risk factors, matters needing attention and treatment methods of the disease, and explaining the reasons, necessities, methods and possible complications

of ENS treatment, so as to make patients and their families know that ENS treatment can change patients' lifestyle, strengthen their disease awareness, and enhance their confidence and compliance in treatment;

- (2) Psychological nursing: First of all, the nursing staff actively communicated with the patients when they admitted to hospital, timely grasped their psychological activities, and took targeted measures (such as playing music and videos, conducting psychological lectures, etc.) to alleviate and eliminate a series of anxiety and tension caused by their lack of understanding of the disease and treatment. Secondly, health guidance was carried out to the family members of patients to improve their awareness regarding prevention of complications, so as to reduce the incidence of complications as much as possible. Finally, during the hospitalization of patients, the nursing staff visited the ward once an hour, actively communicated with the patients, and used positive language to motivate and encourage the patients, with optimistic attitude. In addition, regular exchange sessions were organized, where successful patients were there to convey positive and optimistic ideas of treatment, so as to improve patients' confidence in treatment, eliminate bad emotions and reduce psychological pressure.

- (3) Nutrition nursing: According to the effect of ENS treatment, patients can resume eating properly after the gradual recovery of intestinal function. The patients were advised to eat smaller and frequent meals with food rich in protein and vitamin while easy to digest, and avoid edible oil or sweet greasy food, so as to reduce the pressure on the digestive system. At the same time, the appropriate exercise was guided according to patients' physical condition.

- (4) Condition monitoring and nursing: The nursing staff strengthened the monitoring of nutritional status and biochemical indicators of patients, and gradually reduced the dose of enteral nutrition therapy according to the recovery of patients, in order to resume oral feeding as soon as possible.

- (5) Canal Nursing: The nursing staff regularly checked whether the nasointestinal canal was fixed and secured to ensure that the nasointestinal canal was unobstructed, asked whether the patient had any discomfort, and adjusted the drip rate of enteral nutrition according to the patient's recovery and tolerance to enteral nutrition.

- (6) Complication nursing: During intubation, the nursing staff strictly followed aseptic operation to reduce adverse reactions such as intestinal tract, and adjusted nutrient solution according to the changes of the patient's blood glucose. In addition, the nursing staff observed whether the patient had breathing difficulties and, if so, took immediate measures to prevent suffocation. If a patient had an adverse reaction after medication, the nurse stopped the drug immediately and reported it to the attending physician for appropriate treatment.

2.5 Outcome Measures

- (1) The hospitalization time, hospitalization cost and the

incidence of complications were observed in the two series.

(2) The hematuria amylase recovery time was recorded in the two groups.

(3) Nutritional and biochemical indexes: The contents of total serum protein (TP), prealbumin (PA) and albumin (ALB) in the two groups before and after nursing intervention were analyzed and measured by an automatic biochemical analyzer.

(4) Immune function indexes: Before and after nursing intervention, whole blood automatic analyzer was used for white blood cell counting (WBC), and EPICS-XL flow cytometry (Beckman Coulter company) was applied to detect and calculate the ratios of CD4+T lymphocytes and CD4+/CD8+T lymphocytes.

(5) Inflammatory factors: Fasting venous blood (5mL) was drawn from all the patients before and after nursing intervention, and centrifuged at 2000r/min at room temperature for 10min to collect the upper serum. Then strictly following the instructions of human IL-6 ELISA, human IL-10 ELISA, human TNF- α ELISA, and human CRP ELISA (Shanghai Jingkang Biological Engineering Co., Ltd., Shanghai, China (Ca. Nos.: JK-(a)-0023, JK-(a)-0032, JK-(a)-1446, JK-(a)-1623), the levels of interleukin-6 (IL-6), interleukin-10 (IL-10), tumor necrosis factor- α (TNF- α) and C-reactive protein (CRP) were measured by enzyme-linked immunosorbent assay (ELISA).

(6) APACHE II and computed tomography (CT) scores: Covering three dimensions of acute physiology, age and chronic health status, APACHE II has a total score of 71 points. The score was in reverse proportion to the severity of the patient's condition. The CT score was graded by Balthazar grading system^[18]. There are 5 grades (A-E) in total, corresponding to 0-4 points. The score was also in reverse proportion to the severity of the patient's condition.

(7) The anxiety and the depression of patients were assessed using Self-rating anxiety scale (SAS) and self-rating depression scale (SDS). On a 100-point scale, 50-70points indicated mild anxiety, 71-90 points indicated moderate anxiety, and >90points indicated severe anxiety. The score was positively correlated with the anxiety of patients. With a total score of 100points, the score and corresponding depression evaluation was as follows: 50-70points for mild depression, 71-90points for moderate depression, >90points for severe depression. The score was positively correlated with the depression of patients.

(8) Short-Form 36-item Health Survey (SF-36)^[19], developed by the American Institute of Medical Research, was used to evaluate the quality of life (QOL) of patients after nursing intervention. The scale includes eight dimensions: general health (GH), physiological functioning (PF), bodily pain (BP), vitality (VT), social functioning (SF), role-emotional (RE) and mental health (MH), each scores 0-100 points. The higher the score, the better the QOL.

(9) The nursing satisfaction questionnaire made by our hospital was used to score the patients' satisfaction with

the nursing work, with a total of 20 questions. The patients were scored according to the nursing content of our hospital, with 5points for each question. The total score <70 was classified as dissatisfied, 70-89 as satisfied, and ≥ 90 as very satisfied. Satisfaction = (very satisfied + satisfied) cases/ total number of cases $\times 100\%$.

2.6 Statistical Methods

Statistical analyses and image rendering of the data were performed by SPSS20.0 (IBM Corp, Armonk, NY, USA) and GraphPad Prism 7 respectively. The counting data are recorded as [n(%)] and compared by the Chi-square test between groups. When the theoretical frequency in the Chi-square test was less than 5, the continuity correction chi-square test was applied. The measurement data were recorded in the form of mean \pm standard deviation ($\bar{x} \pm SD$). Independent sample t-test was used for the inter-group comparison of measurement data and paired t-test for intra-group comparison. The level of significance was set as $P < 0.05$.

3 RESULTS

3.1 General Information

No significant difference was identified in general clinical baseline data such as gender, age, body mass index (BMI), marital status, residence, ethnicity, educational background, smoking history, drinking history, diabetes history, hypertension history, and cause of onset between RG and CG ($P > 0.05$) (Table 1).

3.2 Comparison of the Incidence of Complications

The incidence of complications in RG (9.61%) was remarkably lower than that in CG (39.13%) ($P < 0.05$) (Table 2).

3.3 Comparison of Hospitalization Time and Hospitalization Cost

The hospitalization time and the hospitalization cost in RG were statistically less than those in CG ($P < 0.05$) (Table 3).

3.4 Comparison of Hematuria Amylase Recovery Time

The hematuria amylase recovery time in RG was statistically less than that in CG after nursing intervention ($P < 0.05$) (Table 4).

3.5 Comparison of Nutritional and Biochemical Indexes

Serum TP, PA and ALB levels did not differ statistically between RG and CG before nursing intervention ($P > 0.05$). While the TP, PA, and ALB levels increased notably in both groups after nursing intervention, and the increase was more significant in RG ($P < 0.05$) (Figure 1).

3.6 Comparison of Immune Function Indexes

No significant difference was observed in CD4+T lymphocyte ratio, CD4+/CD8+T lymphocyte ratio and

Table 1. Comparison of General Information Between the Two Groups ([n(%)], x ± sd)

Classification	Research Group (n=52)	Control Group (n=46)	t/χ ²	P
Gender			0.005	0.946
Male	32(61.54)	28(60.87)		
Female	20(38.46)	18(39.13)		
Age (years old)	52.65±5.78	51.82±5.43	0.730	0.467
BMI (kg/m ²)	24.53±3.21	24.86±3.45	0.490	0.625
Marital status			0.055	0.814
Married	42(80.77)	38(82.61)		
Single	10(19.23)	8(17.39)		
Residence			0.020	0.888
Urban	23(44.23)	21(45.65)		
Rural	29(55.77)	25(54.35)		
Ethnicity			0.005	0.944
Han	41(78.85)	36(78.26)		
Ethnic minorities	11(21.15)	10(21.74)		
Educational background			0.233	0.629
≥High school	24(46.15)	19(41.30)		
<High school	28(53.85)	27(58.70)		
Smoking history			0.166	0.683
Yes	33(63.46)	31(67.39)		
No	19(36.54)	15(32.61)		
Drinking history			0.038	0.845
Yes	36(69.23)	31(67.39)		
No	16(30.77)	15(32.61)		
History of diabetes			0.274	0.601
Yes	10(19.23)	7(15.22)		
No	42(80.77)	39(84.78)		
History of hypertension			0.078	0.779
Yes	9(17.31)	7(15.22)		
No	43(82.69)	39(84.78)		
Cause of onset			0.375	0.829
Biliary	32(61.54)	31(67.39)		
Alcoholic	13(25.00)	10(21.74)		
Overeating	7(13.46)	5(10.87)		

Table 2. Comparison of the Incidence of Complications Between the Two Groups

Groups	n	Aspiration Pneumonia	Plugging	Accidental Extubation	Diarrhea	Abnormal Glucose Metabolism	Total Incidence
Research group	52	1(1.92)	2(3.85)	0(0.00)	1(1.92)	1(1.92)	5(9.61)
Control group	46	5(10.87)	4(8.70)	3(6.52)	4(8.70)	2(4.34)	18(39.13)
χ ²	-	-	-	-	-	-	11.840
P	-	-	-	-	-	-	0.006

WBC between the two groups before nursing intervention ($P>0.05$). After nursing intervention, the ratios of CD4+T lymphocytes and CD4+/CD8+T lymphocytes elevated greatly in both groups ($P<0.05$), and the increase was more significant in RG ($P<0.05$). The post-nursing WBC level declined noticeably in both groups ($P<0.05$), and the

deduction was more significant in RG ($P<0.05$) (Figure 2).

3.7 Comparison of Inflammatory Factors

Before nursing intervention, there were no significant differences in IL-6, IL-10, TNF-α and CRP levels between the two groups. After nursing intervention, the IL-6, TNF-α

Table 3. Comparison of Hospitalization Time and Hospitalization Cost Between the Two Groups (x ± sd)

Groups	n	Hospitalization Time (d)	Hospitalization Cost (CNY)
Research group	52	20.34±5.58	9636.42±2005.27
Control group	46	28.91±6.24	14189.63±2518.31
t	-	7.178	9.952
P	-	<0.001	<0.001

Table 4. Comparison of Hematuria Amylase Recovery Time Between the Two Groups (d, x ± sd)

Groups	n	Blood Amylase Recovery Time	Urine Amylase Recovery Time
Research group	52	5.25±2.87	9.36±1.65
Control group	46	7.43±3.51	12.82±2.58
t	-	3.380	7.999
P	-	0.001	<0.001

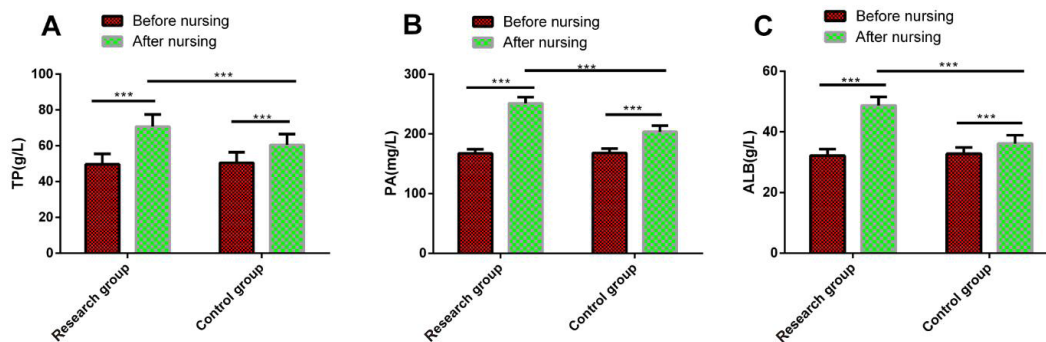


Figure 1. Comparison of nutritional and biochemical indexes between the two groups before and after nursing intervention. Before nursing intervention, there were no significant differences in the levels of TP (A), PA (B) and ALB (C) between the two groups. While the post-nursing TP, PA, and ALB levels increased notably in both groups, and their levels in research group was significantly higher than those in control group. Note: *** indicates $P<0.001$.

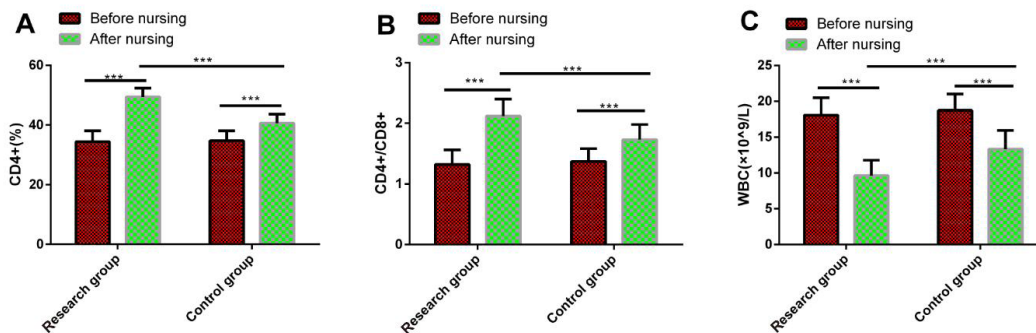


Figure 2. Comparison of immune function indexes between the two groups before and after nursing intervention. Before nursing intervention, there were no significant differences in CD4+T lymphocyte ratio (A), CD4+/CD8+T lymphocyte ratio (B) and WBC (C) between the two groups. After nursing intervention, the ratios of CD4+T lymphocytes and CD4+/CD8+T lymphocytes elevated greatly in both groups ($P<0.05$), and the ratios in research group was significantly higher than those in control group. The post-nursing WBC level declined noticeably in both groups, and the decrease was more significant in research group ($P<0.05$). Note: *** $P<0.001$.

and CRP levels reduced evidently in the two groups, and their levels in RG were remarkably lower than those in CG ($P<0.05$). The IL-10 level elevated statistically in both groups after nursing intervention ($P<0.05$), and the level in RG was statistically higher than that in CG ($P<0.05$) (Figure 3).

3.8 Comparison of APACHE II and CT Scores

The scores of APACHE II and CT did not identify any

marked differences between RG and CG before nursing intervention ($P>0.05$). After nursing intervention, the scores of APACHE II and CT declined statistically in the two groups ($P<0.05$), and the reduction was more significant in RG ($P<0.05$) (Figure 4).

3.9 Comparison of SAS and SDS Scores

The SAS and SDS scores were not statistically difference

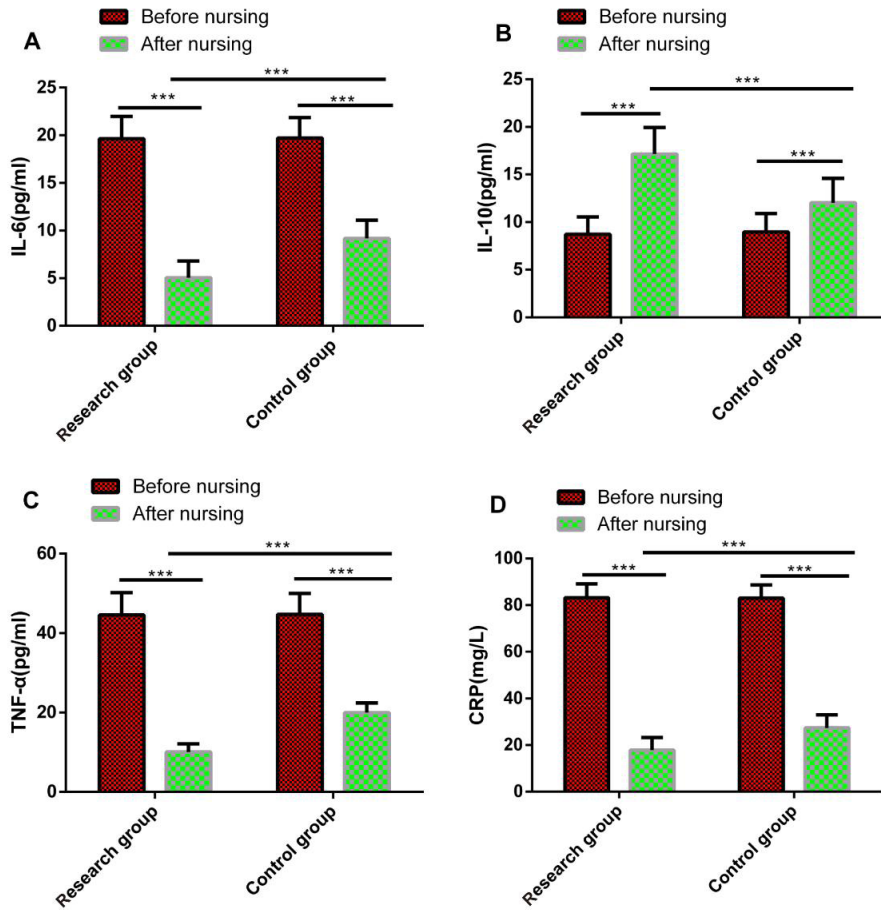


Figure 3. Comparison of inflammatory factors between the two groups before and after nursing intervention. Before nursing intervention, there were no significant differences in IL-6 (A), IL-10 (B), TNF-α (C) and CRP (D) levels between the two groups. After nursing intervention, the IL-6, TNF-α and CRP levels reduced evidently in the two groups, and their levels in research group were remarkably lower than those in control group. The IL-10 level elevated statistically in both groups after nursing intervention, and the level in research group was significantly higher than that in control group. Note: *** $P < 0.001$.

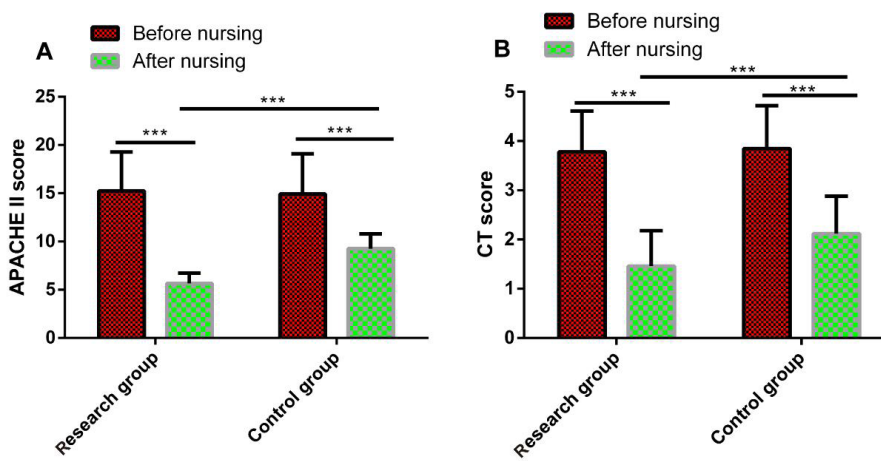


Figure 4. Comparison of APACHE II (A) and CT (B) scores between the two groups before and after nursing intervention. The scores of APACHE II and CT did not identify any marked differences between the two groups before nursing intervention ($P > 0.05$). While the scores of APACHE II and CT decreased notably in the two groups after nursing intervention, and the scores in research group were significantly lower than those in control group. Note: *** $P < 0.001$.

between RG and CG before nursing intervention ($P>0.05$). After nursing intervention, the scores of SAS and SDS reduced remarkably in the two groups ($P<0.05$), but the deduction was more significant in RG ($P<0.05$). (Figure 5)

3.10 Comparison of Post-nursing QOL Scores

After nursing intervention, the QOL scores of patients in RG were statistically higher than those in CG ($P<0.05$) (Table 5).

3.11 Comparison of Nursing Satisfaction

The nursing satisfaction in RG (94.23%) was statistically higher than 71.74% in CG after nursing intervention ($P<0.05$) (Table 6).

4 DISCUSSION

Severe AP (SAP) is a dangerous acute abdominal disease that can induce the impairment of multiple organ functions of the whole body, which progresses rapidly. During disease development, severe stress reaction and high metabolic reaction often occur, and the internal environment of the body is severely disordered, leading to malnutrition^[20]. In recent years, with the changes in people's lifestyle and dietary structure, obesity and high-fat diet are becoming more and more pervasive, and accordingly, the incidence of SAP is on the rise year by year^[21]. Studies have shown that due to the long course of SAP, adequate nutritional support in the early stage can rebuild the patient's immune function, reduce the body's stress response, and facilitate the recovery of patients^[22]. Along with the development of evidence-based medicine, more and more studies believe that ENS therapy is the preferred treatment for SAP^[23]. However, during ENS, some improper operations often occur, coupled with adverse events such as bad mood and complications in patients, which seriously affect the clinical treatment effect^[24]. Therefore, in addition to effective treatment, scientific and reasonable nursing intervention is also an important link to improve the effectiveness and safety of treatment. In this study, we adopted HQN intervention for AP patients receiving ENS treatment to explore its application effect.

HQN is a comprehensive nursing intervention integrating patients' condition, psychological state, surrounding environment, physical factors and social relations, which goes beyond the single mode of conventional nursing^[25]. The study of Andritsch et al.^[26] showed that the adoption of HQN model in cancer patients can significantly shorten the length of hospital stay, reduce the medical expenses and the occurrence of adverse events during the nursing process, improve patients' prognosis and their QOL. Our research exhibited that compared with CG, the hospitalization time and cost were statistically less in RG, with a statistically lower incidence of complications, indicating that HQN can reduce the length of hospitalization, lower economic pressure, and decrease the incidence of complications. This

may be related to the improvement of nursing skills of nursing staff in the HQN model, which effectively reduces the occurrence of adverse emotions in patients. Hematuria amylase is a serum index commonly used in the diagnosis of AP, which increases rapidly during the acute attack of SAP, and its recovery time is often used to evaluate the therapeutic effect^[27]. This study found that the hematuria amylase recovery time in RG was statistically less than that in CG, indicating that HQN can better improve the treatment effect. TP, PA and ALB are all indicators reflecting the changes of nutritional status in patients with SAP. In the early stage of SAP, due to the hypermetabolic state of the body, the three nutritional indicators are all lower than the normal level and gradually increase after treatment^[28]. In the study of Ketwaroo et al.^[29], it was found that the nutritional level of SAP patients who received HQN intervention recovered more quickly. Similar to the results of Ketwaroo et al.^[29], our study identified that the TP, PA and ALB levels in RG were statistically higher than those in CG after nursing intervention, indicating that HQN can better improve the malnutrition status of patients. This may be related to the fact that HQN can better meliorate the intestinal mucosal barrier function of patients.

Following SAP, the body is in a state of stress, the resistance is decreased, and the immune function is suppressed, which makes the body vulnerable to infection and invasion of pathogens, igniting the release of a large number of inflammatory mediators such as IL-6, IL-10, TNF- α , and CRP^[30]. Ratios of CD4+T lymphocytes and CD4+/CD8+T lymphocytes are indicators reflecting the immune function of the body, which decrease when the body is in the state of infection, trauma and stress^[31]. The increase of WBC level indicates that there is infection in the body, and the levels of IL-6, IL-10, TNF- α and CRP also indicate the severity of the disease and infection dynamics^[32]. Gao et al.^[33] reported that HQN intervention combined with ENS in patients with AP can decrease the release of inflammatory factors, restore the immune function of patients, and reduce the incidence of complications. The results of this study revealed that after nursing intervention, the ratios of CD4+T lymphocytes and CD4+/CD8+T lymphocytes in RG elevated notably and were markedly higher than CG, WBC decreased and was statistically lower than that in CG; IL-6, TNF- α and CRP decreased and were statistically lower than those in CG, and IL-10 increased and was statistically higher than that in CG; all suggest that HQN can significantly improve the immune function of SAP patients, reduce the degree of systemic inflammatory reaction and speed up rehabilitation.

APACHE II score is an index for evaluating the severity of AP, and CT grading is an imaging index for evaluating the degree and range of pancreatic necrosis^[34]. According to Majdoub et al.^[35] HQN combined with ENS in the treatment of SAP was superior to routine nursing in alleviating the

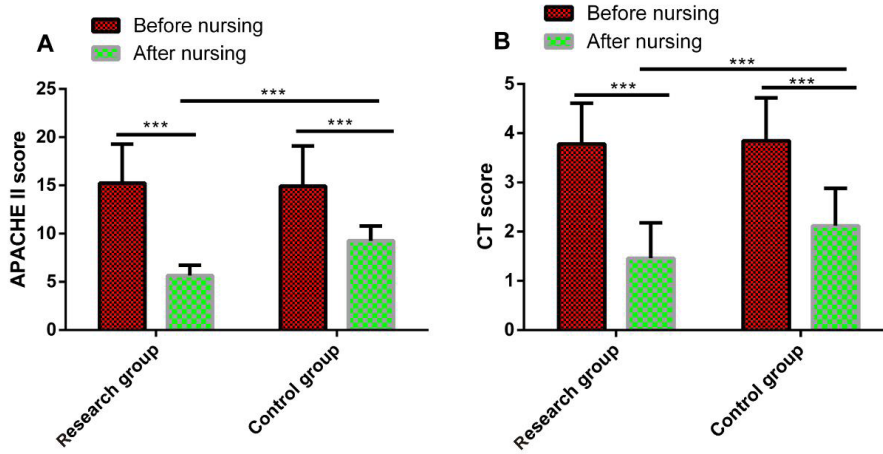


Figure 5. Comparison of SAS (A) and SDS (B) scores between the two groups. Before nursing intervention, there were no significant differences in SAS and SDS scores between the two groups. While the scores of SAS and SDS decreased notably in the two groups after nursing intervention, and the scores in research group were significantly lower than those in control group. Note: *** indicates $P < 0.001$.

Table 5. Comparison of QOL Scores Between the Two Groups After Nursing Intervention ($x \pm SD$)

QOL scores	Research Group (n=52)	Control Group (n=46)	T	P
GH	78.45±5.13	65.15±3.55	14.730	<0.001
RP	73.08±5.35	61.05±4.04	12.430	<0.001
RP	76.06±6.10	62.70±4.25	12.420	<0.001
BP	79.02±7.61	61.25±6.46	12.380	<0.001
VT	79.25±8.11	65.74±7.46	8.544	<0.001
SF	77.33±7.42	65.16±6.48	8.595	<0.001
RE	75.24±6.97	64.15±5.25	8.804	<0.001
MH	78.02±5.64	65.89±5.38	10.860	<0.001

Table 6. Comparison of Nursing Satisfaction Between the Two Groups After Nursing Intervention [n(%)]

Classification	Research Group (n=52)	Control Group (n=46)	χ^2	P
Very satisfied	31(59.62)	14(30.44)	-	-
Satisfied	18(34.62)	19(41.30)	-	-
Dissatisfied	3(5.77)	13(28.26)	-	-
Nursing satisfaction	49(94.23)	33(71.74)	9.038	0.002

severity of the disease and promoting the recovery of pancreas. The results of this study found that after nursing intervention, the scores of APACHE II and CT of RG were reduced, and were statistically lower than CG, indicating that HQN can promote the recovery of the disease, which is similar to the results of Majdoub A and other studies. In the study of Janda et al.^[36], it was found that the application of HQN intervention in the treatment of inpatients with pancreatic cancer could significantly relieve anxiety, depression and other negative emotions, and improve the QOL and prognosis of patients. This study found that RG presented markedly lower SAS and SDS scores, and statistically higher QOL scores than CG, indicating that HQN was superior to routine nursing in alleviating patients' psychological problems and improving their QOL, which was similar to the results of Janda M. Finally,

we compared the satisfaction of the two groups of patients after nursing. According to statistics, the satisfaction of RG intervened by HQN was significantly higher than that of CG, which also indicated that patients were more willing to accept HQN intervention.

Although this study confirmed that HQN can bring better benefits to patients with AP, there is still some room for improvement. For example, we can further evaluate the treatment compliance of patients with AP. In addition, the exploration of the risk factors affecting the poor prognosis is also warranted, which will help nursing staff pay special attention to the risk factors affecting the prognosis, so as to improve the treatment efficacy. In the future, we will gradually conduct supplementary studies from the above perspectives.

5 CONCLUSION

To sum up, HQN intervention is high-performing in the treatment of patients with AP. On the one hand, it can reduce the length of hospital stay of patients, lower their economic pressure and the occurrence of complications, and improve their nutritional status and intestinal mucosal barrier function. On the other hand, it can decrease inflammatory reaction, bolster immune function, alleviate patients' bad mood, and meliorate their nursing satisfaction, QOL and prognosis.

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Not applicable.

Conflicts of Interest

The authors declared no conflict of interest.

Author Contribution

Yang W and Liang J designed this study and wrote the article; Yang W and Ren S collected the data and performed the statistical analysis; Liang J revised the papers for important intellectual content; all authors approved the final version.

Abbreviation List

AP, acute pancreatitis
APACHE II, acute physiology and chronic health evaluation II
CRP, C-reactive protein
CT, computed tomography
ENS, enteral nutrition support
HQN, high-quality nursing
IL-6, interleukin-6
QOL, quality of life
SAS, Self-rating anxiety scale
SDS, self-rating depression scale
TNF- α , tumor necrosis factor- α
WBC, white blood cell

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