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Review Article

Effect of cluster nursing management combined with early enteral nutrition support on serological indexes and gastrointestinal recovery of patients with severe acute pancreatitis

Yu Li[1], Bing Li[2]

[1]*Infection Management Section, Heilongjiang Provincial Hospital Nangang Hospital District Hospital, Haerbin, Heilongjiang Province, China;* [2]*Liushun Community Health Service Center, Heilongjiang Provincial Hospital, Haerbin, Heilongjiang Province, China*

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Abstract: Objective: This study aimed to investigate the effect of cluster nursing management combined with early enteral nutrition support on serological indexes and gastrointestinal tract recovery of patients with severe acute pancreatitis. Methods: Altogether 158 patients with severe acute pancreatitis admitted to our hospital were selected and divided into group A (87 cases) and group B (71 cases). Group A received routine nursing mode combined with early enteral nutrition support, while group B received combined cluster nursing based on the intervention mode of group A. Clinical indicators, serological indicators, pain, incidence of complications, self-care ability, and nursing satisfaction of the two groups of patients were observed. Self-rating anxiety scale (SAS) and self-rating depression scale (SDS) were used to evaluate the anxiety and depression status of the two groups of patients before and after nursing intervention. Results: The clinical manifestations of gastrointestinal function in group B were better than those in group A ($P<0.05$). Serological indexes for monitoring nutritional status and inflammatory reaction in group B were significantly higher than those in group A ($P<0.05$). After nursing, the pain response of group B patients was significantly lighter than that of group A ($P<0.05$). The number of complications in group B was less than that in group A ($P<0.05$). Anxiety and depression in both groups were improved after nursing, and anxiety and depression in group B were significantly better than those in group A after nursing adjustment ($P<0.05$). The scores of self-care and nursing satisfaction in group B were significantly higher than those in group A ($P<0.05$). Conclusion: Cluster nursing management combined with early enteral nutrition support has an application effect on patients with severe acute pancreatitis. It can improve the recovery of gastrointestinal function, enhance nutrition and reduce the level of inflammatory indicators.

Keywords: Cluster nursing, early enteral nutrition support, severe acute pancreatitis, serological indicators, gastrointestinal tract function

Introduction

Acute pancreatitis is an inflammatory abdomen illness in which multiple factors stimulate the activation of pancreatic enzymes in the pancreas, thus resulting in edema, hemorrhage or necrosis of pancreatic tissues [1]. The main accompanying features are abdominal pain, vomiting and increased pancreatic enzymes in blood. Symptoms and pathological changes are directly related, which affect the severity of the disease and can be divided into edema, hemorrhage, and necrosis [2]. Severe acute pancreatitis accounts for a significant proportion among acute pancreatitis. Due to pathological changes such as increased white blood cell number, left shift of neutrophils, secondary infection, peritonitis, and shock, the main characteristics of the patients are peripancreatic or pancreatic necrosis infection and organ failure [3-5]. The commonly used clinical treatment for acute pancreatitis is surgical treatment. However, as an invasive operation, it will reduce the body's resistance and increase the probability of abdominal internal environment disorder and pancreatic tissue damage. Under the stimula-

tion of external factors, the risk of infection is extremely easy to rise [6, 7]. Therefore, some effective and necessary conservative treatment measures are also critical.

The body of patients with severe pancreatitis is in a state of high catabolism for a long time, and the imbalance of metabolic level causes severe malnutrition of patients. Early enteral nutrition support intervention can protect and maintain the pancreatic and intestinal mucosal structure and intestinal functional integrity of patients, and help to improve the disease condition and prognosis [8, 9]. At the same time of implementing early enteral nutrition, diarrhea, plugging and disorders of glucose metabolism have become difficult problems in treatment [10]. Finding appropriate and scientific nursing interventions can play an important role in reducing complications of patients. Cluster nursing is a new type of all-round and active nursing intervention mode. After judging clinical diseases by evidence-based basic experience, treatment and nursing programs are formulated to assist medical personnel in improving the quality of nursing services and optimizing the overall development of diseases [11, 12]. The purpose of this study was to apply the common nursing mode of nutritional support and cluster nursing mode to patients with severe pancreatitis, and to evaluate the recovery of patients by observing various serological and gastrointestinal conditions.

Data and methods

General information

With the approval of the Medical Ethics Committee of our hospital and consent of patients, 158 patients with severe acute pancreatitis admitted to our hospital were selected and divided into group A (87 cases) and group B (71 cases). Group A patients received routine nursing mode combined with early enteral nutrition support, while group B received combined cluster nursing based on the intervention mode of group A. There were 62 males and 25 females in group A, with the average age of 41.34±3.14 years. There were 54 males and 17 females in group B with the average age of 41.36±3.18 years.

Inclusion criteria: (1) the diagnosis conformed to the criteria of the Guidelines for the Diagnosis and Treatment of Acute Pancreatitis [13]; (2) patients with persistent and severe sudden upper abdominal pain; (3) patients and their families knew the purpose and value of the study and signed an informed consent form.

Exclusion criteria: (1) patients with diseases of liver, pancreas, appendix and other lesions; (2) patients with malignant tumors; (3) patients who received other nursing types before accepting this experimental operation; (4) patients with mental disorders.

Nursing methods

All patients were given routine treatment and nursing intervention, including anti-infection, acid suppression, and fasting.

Routine care: The routine nursing operation methods of group A were as follows: (1) Psychological aspects: after admitting to hospital, the patients read the patient's condition examination report, sort out matters needing attention, and the nursing staff have a gentle attitude to tell the patients about the treatment process and matters. Through telling the past successful treatment cases, it establishes the correct mentality of the patients to face the treatment and nursing bravely and improves the trust degree to the medical staff, so as to encourage them to actively respond and cooperate with the treatment and nursing measures. The changes of patients' physical and mental health were observed to provide psychological counseling and comfort to patients, appease negative emotions, enable patients to face up to the influence of their psychological emotions on their illness. And at the same time, quiet, sanitary and tidy ward conditions were provided. (2) Conventional parenteral nutrition: patients were given sufficient calories and nitrogen through peripheral blood vessels, subclavian vein or internal jugular vein catheterization, which were also rich in metabolism-related vitamins, electrolytes, and trace elements. The insulin dosage was adjusted according to the condition of the patient by taking hypertonic sugar and fat milk. (3) Routine dietary intervention: patients' daily diet was rationally planned, and the proportion of meat and vegetable was distributed strictly according to the method of small amount, low-fat, and low-sugar. It is important to avoid overeating and have more meals a day but less food at each. (4)

Early enteral nutrition nursing: the enteral nutrition preparation with amino acid or mixed short peptide chain hydrolyzed protein as nitrogen source was perfused, the initial dosage was 500 ml per day, the dripping rate was controlled at 25 ml/h. The dosage was adjusted to 200 ml/day and the dripping rate to 100 ml/h after the patient established tolerance, and the residual nutrient solution in the stomach was pumped back at intervals of 4 h during the perfusion.

Cluster nursing management combined with early enteral nutrition support intervention: Group B received cluster nursing combined with early enteral nutrition support, the details are as follows: (1) Formation of cluster group: the main department directors and nurses are composed of relevant staff members who have extensive nursing experience and regularly participate in the training and assessment of patients with acute severe pancreatitis to design specific nursing plans and master possible adverse reactions and emergency measures of patients. (2) Gastrointestinal decompression nursing: gastrointestinal decompression was carried out for patients with obvious abdominal distention and poor bowel movements caused by respiratory disorders and shock to reduce secretion of gastric acid and pancreatic juice, and to alleviate the disorder of bacterial flora in gastrointestinal tract excreta retention. The main operation was as follows: the patients were given gastric tube indwelling operation, and the negative pressure drainage device was replaced every day. The operation process was gentle and careful, and the nature and quantity ratio of the drainage were observed. During the gastrointestinal decompression process, the patients' oral care was performed, and the mouth was cleaned in time to keep the respiratory tract unobstructed. (3) Vital sign monitoring: the patient's blood pressure, electrocardiogram and oxygen intake were closely monitored, and urgent and malignant changes were immediately reported to the doctor for assistance. The urine volume and fluid resuscitation of patients were observed to ensure that sufficient albumin and plasma were supplemented and infused to patients with decreased albumin level at all times, so as to avoid the occurrence of renal failure, hyperglycemia and other conditions. Moreover, the patient's body temperature was monitored and necessary physical or drug cooling was carried out according to the doctor's advice. (4) Selection and operation of enteral nutrition nasointestinal tube: the nasointestinal tube was made of polyurethane spiral material with strong toughness and not easy to be broken. Its position was properly fixed, the unobstructed state was regularly checked, and the nasointestinal tube was effectively disinfected and fully washed after use.

Observation index

(1) The clinical indexes of gastrointestinal function between the two groups were compared; (2) The nutritional level serological indexes and inflammatory reaction serological indexes of the two groups of patients were compared; (3) Pain situation: VAS score was adopted, with a maximum score of 10, and the score was positively related to the pain value [14]; (4) The incidence of complications between the two groups of nursing objects was compared; (5) SDS scale was used to evaluate the depression degree of patients, SAS scale to evaluate the anxiety degree of patients, and the best cut-off value was 50. The score more than 50 indicates that anxiety or depression exists, and the high score was closely related to the obvious adverse psychological reaction [15]; (6) Self-care ability: through the evaluation of patients' regular reexamination, compliance behavior, living habits, self-monitoring and health responsibilities, the scores in all aspects ranged from 0 to 20, and the high total score was closely related to the strong self-care ability [16]; (7) The satisfaction degree of the two groups of patients with nursing during hospitalization was evaluated by the self-made questionnaire of our hospital. The items included nursing technology, nursing attitude, nursing timeliness and health education, with a total score of 100 and an average score of 25. The score was positively correlated with the satisfaction degree.

Statistical methods

The data were entered into SPSS 20.0 for processing. The counting data were tested by χ^2 and expressed in the form of number of cases and percentage. The measuring data were analyzed by t test and expressed as mean ± standard deviation. The experimental images were visualized by Graphpad Prism8. A *P* value of

Table 1. Comparison of general data of two groups of nursing objects

Group	Group A n=87	Group B n=71	t/X^2	P
Gender (cases)			0.460	0.498
Male	62 (71.26)	54 (76.06)		
Female	25 (28.74)	17 (23.94)		
Average age (years)	41.34	41.36	0.040	0.969
BMI (kg/m^2)	21.32	21.29	0.060	0.952
Weight (kg)	67.24	67.03	0.168	0.867
Hypertension (cases)			0.031	0.860
Yes	21 (24.14)	18 (25.35)		
No	66 (75.86)	53 (74.65)		
Coronary heart disease (cases)			0.001	0.978
Yes	17 (19.54)	14 (19.72)		
No	70 (80.46)	57 (80.28)		
Diabetes mellitus			0.079	0.779
Yes	18 (20.69)	16 (22.54)		
No	69 (79.31)	55 (77.46)		
Gallstones (cases)			0.012	0.914
Yes	19 (21.84)	15 (21.13)		
No	68 (78.16)	56 (78.87)		
Hyperlipidemia (mainly triglyceride) (>11.3 mmol/L)			0.076	0.783
Yes	24 (27.59)	21 (29.58)		
No	63 (72.41)	50 (70.42)		
Drinking history (cases)			0.026	0.872
Yes	32 (36.78)	27 (38.03)		
No	55 (63.22)	44 (61.97)		
Overeating (cases)			0.009	0.924
Yes	13 (14.94)	11 (15.49)		
No	74 (85.06)	60 (84.51)		

Table 2. Comparison of clinical indexes of gastrointestinal function between two groups of nursing subjects

Group	Group A n=87	Group B n=71	t	P
Recovery time of bowel sound (days)	9.83	8.23	4.371	<0.001
Length of stay (days)	13.93	12.42	5.123	<0.001
Anal exhaust time (days)	7.34	6.84	3.207	0.002
Independent defecation time (days)	11.83	9.423	10.010	<0.001

0.05 is considered to be statistically significant.

Results

General data comparison

The basic data of the two groups are similar in terms of sex, age and weight, and there is no significant difference in past medical history, pathogenic factors and causes (P>0.05). See **Table 1** for details.

Comparison of clinical indicators of gastrointestinal function between the two groups of nursing objects

The clinical manifestations of gastrointestinal function in group B were better than those in group A (P<0.05). See **Table 2** for details.

Comparison of serological indexes between the two groups of nursing objects

The serological indexes for monitoring nutritional status in group B were significantly higher than those in group A, and the serological indexes for monitoring inflammatory reaction in

Table 3. Comparison of serological indexes between two groups of nursing objects

Group	Group A n=87	Group B n=71	t	P
Total protein (g/L)	51.34	64.53	9.350	<0.001
Serum albumin (g/L)	29.27	34.53	6.844	<0.001
Serum preprotein (mg/L)	212.42	252.45	5.728	<0.001
Hemoglobin (g/L)	112.43	134.24	6.915	<0.001
Serum procalcitonin (ng/mL)	2.42	1.72	10.400	<0.001
Average platelet volume (fL)	13.72	11.42	18.550	<0.001

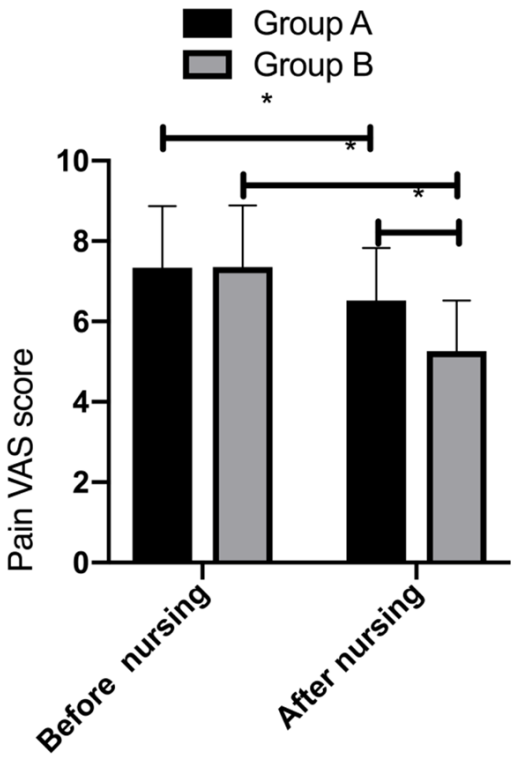

Figure 1. Comparison of pain between two groups of nursing objects. The VAS score of pain response in both groups after nursing was lighter than that before nursing, and the VAS score of pain response in group B was significantly lighter than that in group A after nursing. Note: * indicates that P<0.05.

group A were significantly higher than those in group B (P<0.05). See **Table 3** for details.

Comparison of pain between two groups of nursing objects

There was no obvious difference between the two groups in the pain situation before nursing. The pain response of the two groups after nursing was lighter than that before nursing, and the pain response of group B patients after nursing was significantly lighter than that of group A (P<0.05). See **Figure 1** for details.

Comparison of incidence rate of complications between two groups of nursing objects

The number of complications in group B was less than that in group A (P<0.05). See **Table 4** for details.

Comparison of SAS and SDS scores between the two groups before and after nursing

There was no significant difference in adverse psychological and emotional reactions between the two groups before nursing (P>0.05). The anxiety and depression in the two groups improved after nursing, and the anxiety and depression in group B were significantly better than those in group A after nursing adjustment (P<0.05). See **Figure 2** for details.

Comparison of self-care ability between two groups of nursing objects

The scores of self-care in group B were significantly higher than those in group A (P<0.05). See **Figure 3** for details.

Comparison of nursing satisfaction between two groups of nursing objects

The scores of nursing technology, attitude, timeliness, and health education in group B were higher than group A (P<0.05). See **Figure 4** for details.

Discussion

Pancreas, as the basic organ of human digestive system, plays an important role in food transportation and digestion. When the normal function is damaged due to independent influencing factors such as alcoholism and biliary tract diseases, pathological changes often occur. The pathogenesis can be classified into acute and chronic according to the duration of the disease course [17, 18]. Acute pancreatitis patients release a large amount of vasoactive substances such as histamine and 5-hydroxytryptamine by transferring activated trypsin into blood circulation. When vascular tension

Table 4. Comparison of incidence rates of complications between two groups of nursing objects [n (%)]

Group	Group A n=87	Group B n=71	X^2	P
Aspiration pneumonia	6 (6.90)	1 (1.41)	-	-
Accidental extubation	3 (3.45)	1 (1.41)	-	-
Diarrhea	5 (5.75)	2 (2.82)	-	-
Plugging	4 (4.60)	1 (1.41)	-	-
Total complication rate	18 (20.69)	5 (7.04)	5.854	0.016

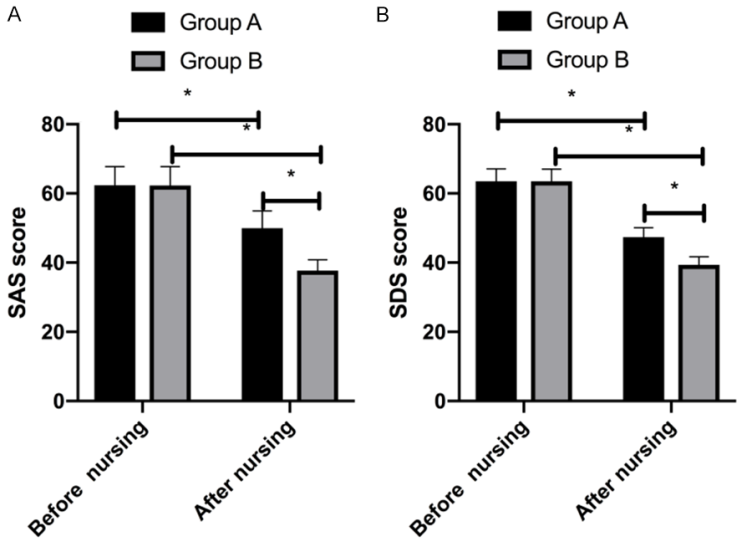

Figure 2. Comparison of SAS and SDS scores before and after nursing between the two groups of nursing objects. A. The anxiety in both groups improved after nursing, and the anxiety in group B was significantly better than that in group A after nursing adjustment. B. The depression in both groups improved after nursing, and the depression in group B was significantly better than that in group A after nursing adjustment. Note: * indicates that P<0.05.

changes, pancreatic tissue damage and chain reactions such as inflammatory transformation occur. If the disease condition is not controlled in a short period of time, it progresses to systemic inflammatory response syndrome, which seriously damages organ functions such as liver and kidney [19, 20]. With the changes of lifestyle and conditions, the recurrence of pancreatitis has become a common and critical and severe disease with dangerous condition and high possibility of death. Controlling the occurrence of recurrence and complications can effectively regulate the patient's condition [21]. Non-surgical conservative treatment for severe acute pancreatitis in modern medicine includes inhibition of gastric juice and pancreatic secretion, anti-infection, nutritional support, and improvement of microcirculation. However, the inducement and pathogenesis of severe acute pancreatitis are not clear. Choosing a reasonable nursing method has become a hot topic at present and is an urgent intervention measure. In this paper, the symptoms of patients with severe acute pancreatitis after nursing are monitored through the two combined nursing and nutrition intervention measures, and the disease states of patients different from other nursing forms are analyzed.

First of all, the reaction indexes of the basic conditions of acute pancreatitis were detected. Monitoring of gastrointestinal function showed that the clinical improvement of gastrointestinal function indexes in group B was better than that in group A. Gastrointestinal function is blocked during the onset of acute pancreatitis. If it is not relieved quickly, it will easily lead to ectopic intestinal flora and accelerate the release of endotoxin substances, thus stimulating the inflammatory system to cause another "damage" to various organs [23]. Cluster nursing can protect gastrointestinal mucosal barrier function and regulate intestinal epithelial cell repair, improve intestinal mucosal blood perfusion efficiency and strengthen the body defense mechanism by implementing evidence-based effective nursing measures to intervene patients and reduce abdominal pressure [24]. Through the above documents, it was proved that cluster nursing combined with enteral nutrition therapy intervention is better than conventional nursing combined with enteral nutrition in improving gastrointestinal function, and it is more suitable for gastrointestinal part of severe acute pancreatitis. Studies on serological indicators showed that the serological indicators for monitoring nutritional status and inflammatory response in group B were significantly higher than those in group A. Literature showed that

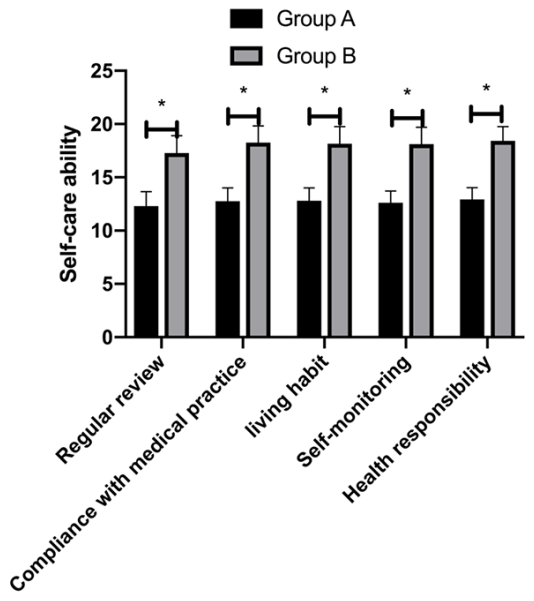

Figure 3. Comparison of self-care ability between two groups of nursing objects. Group B was significantly higher than group A in terms of regular review, compliance, living habits, self-monitoring and health responsibility scores. Note: * indicates that P<0.05.

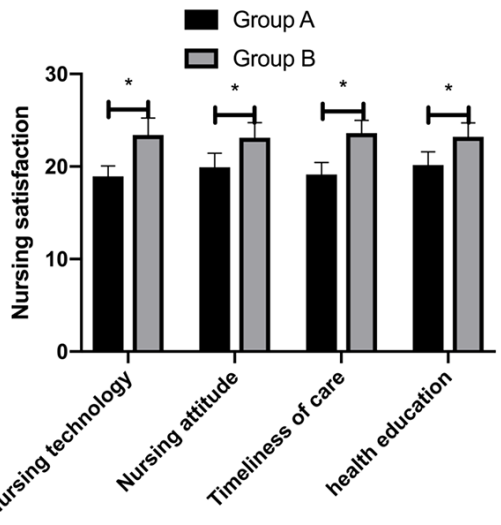

Figure 4. Comparison of nursing satisfaction between two groups of nursing objects. The scores of nursing technology, attitude, timeliness, and health education in group B were higher than group A. Note: * indicates that P<0.05.

[25, 26], through liquid resuscitation, blood purification and other nursing operations in cluster nursing, electrolyte and acid-base status of patients were corrected, blood oxygen saturation was improved, nutrition support combined treatment was facilitated, pancreatic function recovery was promoted, pancreatic secretion was inhibited to a certain extent, and redundant cytokines and inflammatory media in body fluids were removed. This showed that cluster nursing increased the intensity of inhibiting inflammatory reaction and nutrition allocation, which confirmed our experimental data. By observing the occurrence of complications between the two groups, it was found that the number of complications in group B was less than that in group A. Some studies confirmed [27] that cluster nursing has been proved through targeted research and applied to clinical treatment, which has improved the symptoms of plugging and aspiration pneumonia in the later stage of enteral nutrition support. This was consistent with our research results. Observation of the pain state of the two groups showed that the pain reaction in group B after nursing was lighter than that in group A. In cluster nursing, the nursing staff accurately evaluated the pain change factors of patients, and conducted psychological pain guidance intervention, which improved the ability of patients to relieve pain, helped patients master various analgesic methods, and reduced pain and the possibility of adverse reactions caused by taking painkillers [28]. The study on the changes of psychological emotions in the two groups showed that group B was obviously better than group A after nursing and adjusting the psychological unhealthy emotions. Through the discussion of pain management methods between medical staff and patients, cluster nursing can reduce anxiety and depression caused by pain, provide stable family support for patients, and enhance patients' confidence and determination during treatment [29]. This study also found that self-care ability and nursing satisfaction in group B were better than group A. Less related research speculated that it may be related to the improvement of the effect of intensive care on the overall regulation of patients' psychological and pain state, so as to strengthen patients' self-care and reduce the psychological defense line of treatment.

To sum up, the combination of the two intervention modes in this study has an application effect on patients with severe acute pancreatitis, that is, it can improve the recovery of gastrointestinal function, enhance nutrition and reduce the level of inflammatory indicators. However, there are still unsolved problems in

this study. For example, only the complications caused by enteral nutrition support are recorded and counted, and the improvement of adverse reactions caused by other treatments of acute pancreatitis is not included. We will further explore the study by extending the study time in the future.

Disclosure of conflict of interest

None.

Address correspondence to: Bing Li, Liushun Community Health Service Center, Heilongjiang Provincial Hospital, 82 Zhongshan Road, Xiangfang District, Haerbin 150036, Heilongjiang Province, China. Tel: +86-13936683862; E-mail: ulib6235@163.com

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