

Original Article

Comprehensive nursing intervention reduces the postoperative infection rate and improves the survival rate in patients with radical gastrectomy

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Abstract: Objective: To investigate the effect of comprehensive nursing intervention on reducing the postoperative infection rate and improving the long-term survival rate of patients with radical gastrectomy. Methods: Eighty-four patients treated with laparoscopic gastrectomy in our hospital were prospectively studied and randomly divided into a test group (N=42) and a control group (N=42). The test group received comprehensive nursing intervention during the treatment, while the control group was given routine nursing interventions. The recovery of gastrointestinal function, the postoperative infection, the score of negative emotion two weeks after the surgery, and the postoperative complications were compared. The 3-year survival rate of the patients after hospital discharge was recorded and compared in the follow-up, and the nursing satisfaction was evaluated by questionnaire after nursing. Results: After nursing intervention, the test group showed better gastrointestinal function, higher quality of life, lower SAS and SDS scores, and postoperative infection as well as incidence rate of complications than control group ($P<0.05$); The 3-year survival rate of the test group was clearly higher than the control group ($P<0.001$). Conclusion: Comprehensive nursing intervention in patients with radical gastrectomy can reduce the postoperative infection rate and improve the survival rate, which is deserving of clinical application and promotion.

Keywords: Comprehensive nursing, gastrectomy, infection, long-term survival rate

Introduction

As a common malignant tumor of the digestive system, in recent years gastric cancer has an increasingly high mortality and incidence, possibly due to the changes in life rhythm and eating habits [1, 2]. At present, surgical treatment is the main treatment method for gastric cancer, especially laparoscopic radical gastrectomy, which is a commonly used minimally invasive surgery in clinical practice [3]. Radical gastrectomy can achieve its maximum effect of tumor clearance mainly through the removal of the primary tumor and cleaning of the infiltrated tissue and lymph nodes [4]. Despite great increase in the success rate of radical gastrectomy with the rise of medical technology, patients have poor gastrointestinal function and frequent postoperative infections after radical gastrectomy, which is unfavorable for the post-

operative recovery and the long-term survival rate of patients [5, 6]. The long period of postoperative recovery makes patients susceptible to negative emotions such as despair, anxiety, and depression during the recovery, harmfully impacting the recovery and quality of life of patients [7].

As the medical models and medical technology have stepped into an advanced stage, nursing focusing only on the disease cannot satisfy the needs of patients anymore, pushing the old routine nursing model to transform into the holistic nursing model- with comprehensive nursing interventions [8]. Comprehensive nursing intervention, where the patient's condition is under close attention, with quick solutions, but also the psychological state of patients is carefully watched to improve the patient's emotions, and thus improving the patient's quality of life [9];

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when applied to clinical practice it can achieve good effects in patients with liver cancer [10] and patients with gynecological laparoscopic surgery [11]. One study [12] has shown that the use of reasonable nursing intervention in the perioperative period of patients undergoing radical gastrectomy is beneficial to the postoperative recovery and quality of survival of patients.

In this study, a comprehensive nursing intervention model was performed in patients with radical gastrectomy, and its effect on postoperative infection and the long-term survival rate of patients was explored to provide a more theoretical basis for nursing of patients with radical gastrectomy.

Materials and methods

General information

Eighty-four patients (45 males and 39 females, with a mean age of 52.30 ± 7.2 years) who underwent laparoscopic gastrectomy in Jinan People's Hospital were prospectively studied and randomly divided into the test group and the control group, with 42 patients in each group. A comprehensive nursing intervention was performed on the test group during the treatment, and a routine nursing intervention was performed on the control group. Inclusion criteria: patients who were diagnosed with gastric cancer by pathology and underwent an elective radical gastrectomy. Exclusion criteria: patients with severe hepatorenal dysfunction or other tumors; patients with severe cardiopulmonary insufficiency; patients with surgical contraindications; patients with coagulation dysfunctions; patients with conscious or communicative disorders; patients who did not cooperate with the study. All patients and their families agreed to participate in the experiment and signed an informed consent form. This experiment was already approved by the ethics committee of the Jinan People's Hospital.

Nursing methods

Laparoscopic radical gastrectomy was performed in both groups. The nursing intervention lasted from the patient's admission to the patient's discharge from the hospital. Control group received routine nursing, including close monitoring of vital signs, timely observation and treatment of adverse reactions and infec-

tions, and had the importance of medication after the operation explained to the patients and their families. For the test group, the comprehensive nursing intervention was performed as follows: (1) A reasonable nursing plan was formulated according to the overall assessment about the patient's family, economic, and living situations. (2) The patients and their families were given patient explanation about the surgical details and precautions of the laparoscopic radical surgery, which raised their confidence. On the night before the surgery, food and water were banned from the patients, and patients were required to undergo an intestinal cleanse and given neomycin antibiotics to prevent infection. On the day of surgery, the catheter and stomach tube were indwelled to the patients. (3) After the surgery, the patient's blood pressure, pulse, heart rate, and other vital signs were strictly examined, and the patient's urine and stool were observed. The pain level of the patients was evaluated by observing the facial expression and behavior of the patients to decide the use of analgesic drugs, and the usage and precautions of the analgesic pump which were explained to the patients and their families in detail. For patients who received unsatisfactory effects from the analgesic drugs, a massage or local hot compress were recommended. The gastric tube in the patient was carefully fixed after the surgery with no twists or shedding to ensure the fluency of the negative pressure drainage of the gastric tube, and the aseptic drainage bag was replaced once a day to prevent infection. In terms of diet care, patients were strongly encouraged to fast without water during the first 24 hours after removal of the gastric tube, and a light fluid diet was recommended to start a normal diet on the 5th or 6th day after the surgery according to the recovery of intestinal peristalsis. When the postoperative intestinal function was restored and no adverse reactions such as abdominal distention, nausea and vomiting occurred, a semi-liquid diet was administered, which was gradually transitioned to a normal diet, except for gas-producing foods such as milk and sweet potatoes. After patient discharge, the patients were followed up by telephone, webchat and hospital review every two months.

Outcome measurement

(1) The gastrointestinal functional recovery of the two groups was evaluated in terms of the

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Table 1. General Information Table

	Test group n=42	Control group n=42	X ²	P
Gender			0.048	0.827
Male	23 (54.76)	22 (52.37)		
Female	19 (45.24)	20 (47.62)		
Age (years)			0.048	0.826
≤52	19 (45.24)	18 (42.86)		
>52	23 (57.76)	24 (57.14)		
BMI (kg/m ²)			0.048	0.827
≤22	22 (49.15)	21 (47.46)		
>22	20 (50.85)	21 (52.54)		
Drinking history			0.055	0.815
Yes	28 (52.54)	29 (55.93)		
No	14 (42.37)	13 (44.07)		
Pathological staging			0.223	0.895
I stag	19 (45.20)	18 (20.34)		
II stag	13 (18.64)	15 (15.25)		
III stag	10 (20.34)	9 (22.03)		
Education			0.004	0.950
Below high school	15 (37.29)	16 (38.98)		
High school and above	27 (62.71)	28 (61.02)		

nursing satisfaction of the two groups of patients at the time of discharge was evaluated by questionnaire survey, including three levels of “very satisfied”, “satisfied” and “not satisfied”.

Statistical methods

SPSS 19.0 statistical software (Beijing NDTimes Technology Co., Ltd.) was used for statistical analysis of the data used. The t-test was used to compare the measurement data; the independent t-test was used for comparison between the two groups; the paired t-test was used for comparison of factors before and after the treatment in the same group; the chi-square test was performed to compare the count data. The difference was regarded as statistically significant if $P < 0.05$.

first gas exhaust time and first defecation time, the gastric tube removal time and the time of getting out of bed. (2) An evaluation was made about the postoperative infections during the hospitalization of the two groups, including pulmonary infection and incisional infection. (3) The negative emotional scores, the SAS scores, and the SDS scores [13] of the two groups 2 weeks after the surgery were evaluated. They are two widely-used self-report measures in the area of depression and anxiety. Both are 20 item Likert scales, in which items probe psychological and physiological symptoms and are rated by respondents according to how each applied to them within the past week, using a 4-point scale ranging from 1 (none, or a little of the time) to 4 (most, or all of the time). The lower the scores, the more positive the emotion. (4) The postoperative complications of the two groups during hospitalization were recorded and compared, including the anastomotic fistula and adhesive intestinal obstruction. (5) The quality of life of the two groups at the time of discharging was assessed using the Quality of Life Questionnaire (QLQ-C30) [14]. (6) Follow-up by telephone, webchat and hospital review was performed to record the 3-year survival rate of the two groups and ended when the patient died or was lost to the follow-up. (7) The

Results

Baseline data

The patients in the two groups were comparable since they were not significantly different in terms of gender, age, BMI, and pathological staging ($P > 0.05$) (Table 1).

Comprehensive nursing promotes recovery of gastrointestinal function

The first gas exhaust time (25.89 ± 5.03 hours), the first time of defecation (51.05 ± 8.04 hours), and the removal time of the gastric tube (3.46 ± 0.52 days) of patients in the Test group were all much shorter compared with the first gas exhaust time (38.03 ± 8.21 hours), the first time of defecation (70.38 ± 9.26 hours), and the removal time of the gastric tube (5.21 ± 1.21 days) of patients in the Control group, and the differences were statistically significant ($P < 0.05$) (Table 2).

Comprehensive nursing reduces postoperative infections

In the Test group, only 2 patients developed a pulmonary infection, and no patients developed an incisional infection, with a total infec-

Table 2. Gastrointestinal functional recovery of the two groups of patients

Project	Test group n=42	Control group n=42	t	P
First gas exhaust time (h)	25.89±5.03	38.03±8.21	8.171	<0.001
Defecation for the first time (h)	51.05±8.04	70.38±9.26	10.22	<0.001
Gastric tube removal time (d)	3.46±0.52	5.21±1.21	8.611	<0.001

Table 3. Postoperative infection in the two groups of patients [n,(%)]

Infection situation	Test group n=42	Control group n=42	χ ²	P
Pulmonary infection	2 (4.76)	4 (9.52)	0.718	0.397
Incisional infection	0	5 (11.90)	5.316	<0.050
Total infection rate	2 (4.76)	9 (21.43)	5.126	<0.050

Table 4. Negative emotional score 2 weeks after the operation

Project	Test group n=42	Control group n=42	t	P
SAS	26.33±4.26	41.18±7.26	11.43	<0.001
SDS	25.71±4.52	42.76±7.38	12.77	<0.001

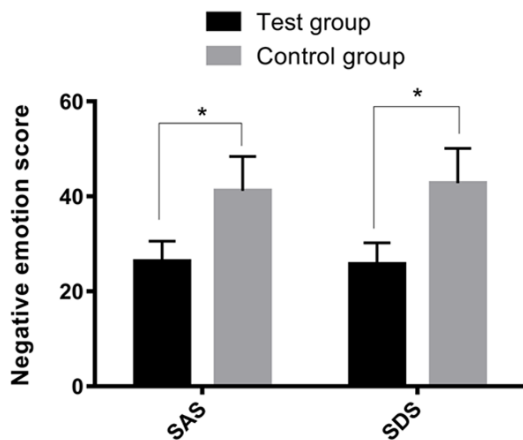


Figure 1. Negative emotional scores of the two groups of patients. The SAS score and SDS score of the Test group were significantly lower than the Control group, and the difference was statistically significant (P < 0.05). Note: * indicates P < 0.05.

tion rate of 4.76%, while in the Control group, 4 patients suffered from pulmonary infection and 5 patients suffered from incisional infection, with an infection rate of 21.43%. The total infection rate of the Test group was statistically significantly lower than that of the Control group (P < 0.05) (Table 3).

Comprehensive nursing improves emotions 2 weeks after the surgery

The SAS score (25.71±4.52) and SDS score (26.33±4.26) of the Test group 2 weeks after

the surgery were significantly lower than the Control group where the SAS score and SDS score were (41.18±7.26) and (42.76±7.38) respectively, and the differences were statistically significant (P < 0.05) (Table 4 and Figure 1).

Comprehensive nursing reduces postoperative complications

In the Test group, only one patient developed an anastomotic fistula and no cases of adhesive intestinal obstruction occurred; in the Control group, there were 4 cases of anastomotic fistula, and 3 cases

of adhesive intestinal obstruction were reported. The total incidence of postoperative complications in the Test group (2.38%) which was significantly lower than that in the Control group (16.67%), with a statistical difference between them (P < 0.05) (Table 5).

Comprehensive nursing improves quality of life

Scores of factors concerning the quality of life in the Test group were significantly higher than that in the Control group: the role, emotional function, physical function, cognitive function and social function scores of the Test group were (82.21±2.34), (81.05±2.42), (80.77±2.51), (80.65±2.62), (80.53±2.33) respectively, while the role, emotional, physical, cognitive, and social function scores of the Control group were (62.75±2.31), (62.54±2.22), (61.73±2.83), (62.19±2.69), (61.38±2.55) respectively, and the differences were statistically significant (P < 0.05) (Table 6).

Comprehensive nursing improves the 3-year survival rate

Eight patients in the test group died within 3 years after the surgery, the 3-year survival rate was 80.95% (34/42), while 16 patients in the control group died within 3 years after the surgery. The 3-year survival rate of the test group 80.95% (34/42) was significantly higher than that of the control group at 61.90% (26/42),

Table 5. Postoperative complications of the two groups of patients [n, (%)]

Complication	Test group n=42	Control group n=42	χ^2	P
Anastomotic fistula	1 (2.38)	4 (9.52)	1.914	0.167
Adhesive intestinal obstruction	0	3 (7.14)	3.111	0.078
Overall incidence rate	1 (2.38)	7 (16.67)	4.974	<0.050

Table 6. Comparison of quality of life scores between the two groups of patients at discharge

	Test group n=42	Control group n=42	t	P
Role function	82.21±2.34	62.75±2.31	38.35	<0.001
Emotional function	81.05±2.42	62.54±2.22	36.53	<0.001
Physical function	80.77±2.51	61.73±2.83	32.62	<0.001
Cognitive function	80.65±2.62	62.19±2.69	31.86	<0.001
Social function	80.53±2.33	61.38±2.55	35.93	<0.001

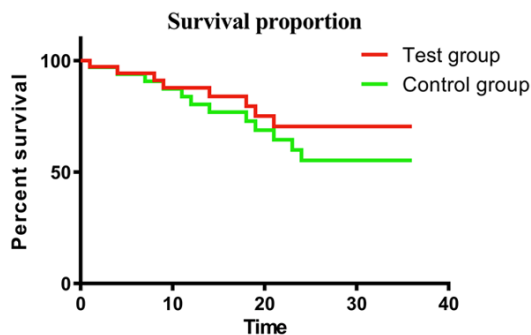


Figure 2. 3-year survival rates of the two groups of patients. The 3-year survival rate of the Test group was significantly higher than that of the Control group.

and the difference was statistically significant ($P<0.05$) (**Figure 2**).

Comprehensive nursing improves nursing satisfaction

The nursing satisfaction of the Test group (97.62%) was significantly higher than that of the Control group (71.43%) ($P<0.05$) (**Table 7**).

Discussion

In recent years, gastric cancer has been growing in incidence with the change in people's living habits and eating habits. Some studies pointed out that factors such as gastric inflammatory disease and *Helicobacter pylori* infection were high-risk factors affecting gastric

cancer [15]. At present, surgical treatment is the main method of treating gastric cancer clinically, especially the radical gastrectomy [16]. With the use of radical gastrectomy in which the tumors, lymph nodes and the surrounding infiltrated tissues in the stomach are resected, as a result the patient's digestive function and body immunity are reduced after the surgery, with easy possibility of complications such as infection [17]. Some studies suggested that the appropriate nursing mode following

the surgery could effectively reduce the postoperative infection rate and improve the quality of life of patients [18]. The comprehensive nursing intervention provides a targeted and comprehensive care for patients based on routine care [19]. Currently, comprehensive nursing intervention has been applied in many diseases and has achieved good results [20]. One study [21] which explored the effect of comprehensive nursing interventions in non-small cell lung cancer discovered that the efficacy and median survival time of patients who underwent comprehensive nursing intervention were significantly better than those who received routine nursing. Another study [22] which explored the effect of the comprehensive nursing intervention in patients with bladder cancer after the surgery found that the quality of life of patients with comprehensive nursing intervention was significantly better than patients with routine nursing, which inspired this study to explore the application of comprehensive nursing intervention in patients with radical gastrectomy after the surgery.

According to investigation of the first gas exhaust time, the first defecation time, and the gastric tube removal time of the two groups of patients, all three were significantly shorter than those of the Control group ($p<0.05$), indicating that the implementation of comprehensive nursing intervention can effectively promote the recovery of gastrointestinal function in patients. The disorder of gastrointestinal

Table 7. Comparison of nursing satisfaction between the two groups of patients

Satisfaction level	Test group n=42	Control group n=42	X ²	P
Very satisfied	38 (90.48)	21(50.00)	-	-
Satisfied	3 (7.14)	9 (21.43)	-	-
Not satisfied	1 (2.38)	12 (28.57)	-	-
Nursing satisfaction rate	41 (97.62)	30 (71.43)	11.01	<0.001

function is mostly caused by the changes of gastrointestinal hormones such as gastrin which can promote gastric emptying and motilin which can enhance colonic movement [23]; which encouraged the assumption in this study that the comprehensive nursing intervention might promote the recovery of intestinal function in patients by improving the secretion of gastrointestinal hormones. Then comparing the postoperative infections between the two groups of patients, we found that the infection rate of the Test group was significantly lower than that of the Control group (P<0.05). This study also revealed that the occurrence of complications, the score of negative emotions and the nursing satisfaction rate of the Test group were all in a significantly better than the Control group (P<0.05). Patients in the Test group received surgery-related knowledge training before the surgery, including knowledge of infections and complications, which was useful to reduce the patient's nervousness and negative emotions, and thus helped to improve the compliance of the treatment and decrease the incidence of infections and complications. The quality of life of the two groups of patients at the time of hospital discharge was also studied and presented a better quality of life score in the Test group than the Control group, with a statistical difference between them (P<0.05). Finally, the 3-year survival rates of the two groups were compared and showed that the 3-year survival rate of the Test group was statistically significantly higher than that of the Control group (P<0.05).

A study [24] that explored the use of comprehensive nursing intervention in patients with hysteromyoma after the surgery discovered the ability of the comprehensive nursing intervention to strengthen the patient's psychological defense mechanism and thereby reduce the incidence of postoperative infection; verifying the results of this study despite its focus on

hysteromyoma instead of the gastric cancer. Currently, a study [25] was reported to investigate the impact of comprehensive nursing intervention on the quality of life of patients with gastric cancer and drew the conclusion that comprehensive nursing intervention could improve patients' negative emotions and their

quality of life, which greatly supported the results of this study. This study that believed in the effects of the comprehensive nursing intervention to improve the survival rate of patients with gastric cancer is consistent with our study.

In summary, the application of comprehensive nursing intervention in patients with radical gastrectomy can effectively reduce the postoperative infection rate, improve the quality of life and the survival rate of patients, which is worthy of clinical promotion. However, due to the small sample size, the survival rate was not adjusted according to the baseline data. The 3-year follow-up time did not record the patient's progression-free survival period, which called for a continuous record of the patient's 5-year survival rate. Besides, the reasons for postoperative infections were not analyzed in this study, which requires further research.

Disclosure of conflict of interest

None.

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References

[1] Fu M, Zou C, Pan L, Liang W, Qian H, Xu W, Jiang P and Zhang X. Long noncoding RNAs in digestive system cancers: functional roles, molecular mechanisms, and clinical implications (Review). *Oncol Rep* 2016; 36: 1207-1218.

[2] Szasz AM, Lanczky A, Nagy A, Forster S, Hark K, Green JE, Boussioutas A, Busuttill R, Szabo A and Gyorffy B. Cross-validation of survival associated biomarkers in gastric cancer using

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- transcriptomic data of 1,065 patients. *Oncotarget* 2016; 7: 49322-49333.
- [3] Liu G, Jian F, Wang X and Chen L. Fast-track surgery protocol in elderly patients undergoing laparoscopic radical gastrectomy for gastric cancer: a randomized controlled trial. *Oncotargets Ther* 2016; 9: 3345-3351.
- [4] Chen QY, Huang CM, Lin JX, Zheng CH, Li P, Xie JW, Wang JB and Lu J. Laparoscopy-assisted versus open D2 radical gastrectomy for advanced gastric cancer without serosal invasion: a case control study. *World J Surg Oncol* 2012; 10: 248.
- [5] Yu M, Shan S, Zhao Y, Wu X, Zhou L and Long D. Prevention and treatment of postoperative complications of the penile elongation. *J Huazhong Univ Sci Technolog Med Sci* 2003; 23: 176-177.
- [6] Fan F, Luo Y, Liu X, Lu Y and Zheng T. Risk factors for postoperative complications in lensectomy-vitreotomy with or without intraocular lens placement in ectopia lentis associated with Marfan syndrome. *Br J Ophthalmol* 2014; 98: 1338-1342.
- [7] Sager C, Burek C, Duran V, Corbetta JP, Weller S, Juan B and Lopez JC. Pharmacotherapy in pediatric neurogenic bladder intravesical botulinum toxin type a. *ISRN Urol* 2012; 2012: 763159.
- [8] Gao JQ, Xie Y, Yang W, Zheng JP and Liu ZJ. Effects of percutaneous renal sympathetic denervation on cardiac function and exercise tolerance in patients with chronic heart failure. *Rev Port Cardiol* 2017; 36: 45-51.
- [9] Li L, Dai JX, Xu L, Huang ZX, Pan Q, Zhang X, Jiang MY and Chen ZH. The effect of a rehabilitation nursing intervention model on improving the comprehensive health status of patients with hand burns. *Burns* 2017; 43: 877-885.
- [10] Luo XF, Zhang M, Zhao DJ, Lei Y, Liu J, Bai C, Zhou Q and Hu XH. [Influences of comprehensive nursing intervention on the caregivers of severely burned children]. *Zhonghua Shao Shang Za Zhi* 2018; 34: 648-652.
- [11] Bao ZL and Zhang J. [Method selection and perioperative management of termination of pregnancy during the first and second trimester of pregnancy with severe cardiovascular disease]. *Zhonghua Fu Chan Ke Za Zhi* 2018; 53: 608-612.
- [12] Lu J, Xu BB, Zheng ZF, Xie JW, Wang JB, Lin JX, Chen QY, Cao LL, Lin M, Tu RH, Huang ZN, Zheng CH, Huang CM and Li P. CRP/prealbumin, a novel inflammatory index for predicting recurrence after radical resection in gastric cancer patients: post hoc analysis of a randomized phase III trial. *Gastric Cancer* 2019; 22: 536-545.
- [13] Zung WW. The measurement of affects: depression and anxiety. In: editors. *Psychological measurements in psychopharmacology*. Karger Publishers; 1974. p. 170-188.
- [14] Haroutounian S, Ratz Y, Ginosar Y, Furmanov K, Saifi F, Meidan R and Davidson E. The effect of medicinal cannabis on pain and quality-of-life outcomes in chronic pain: a prospective open-label study. *Clin J Pain* 2016; 32: 1036-1043.
- [15] Wang F, Guan X, Yang J, He W, Wei Y, Chen H and Li Y. Differential expression and significance of endoplasmic reticulum golgi intermediate compartment 1 in precancerous gastric lesions and gastric cancer. *Am J Med Sci* 2018; 355: 228-234.
- [16] Okabe H, Tsunoda S, Obama K, Tanaka E, Hisamori S, Shinohara H and Sakai Y. Feasibility of laparoscopic radical gastrectomy for gastric cancer of clinical stage ii or higher: early outcomes in a phase ii study (KUGC04). *Ann Surg Oncol* 2016; 23: 516-523.
- [17] He X, Lai S, Su T, Liu Y, Ding Y, Quan S, Si J and Sun L. Survival benefits of gastrectomy in gastric cancer patients with stage IV: a population-based study. *Oncotarget* 2017; 8: 106577-106586.
- [18] Hall LM, Doran D and Pink GH. Nurse staffing models, nursing hours, and patient safety outcomes. *J Nurs Adm* 2004; 34: 41-5.
- [19] He LJ, Zhang HP, Li HJ, Wang J and Chang DD. Effect of serum vitamin D levels on cellular immunity and antiviral effects in chronic hepatitis B patients. *Clin Lab* 2016; 62: 1933-1939.
- [20] Tang WH, Ma LL, Luo KP, Hong K, Zhao LM, Huang Y and Jiang H. [Interns' knowledge on male reproductive health: a comparison between pre- and post-training in the department of urology]. *Zhonghua Nan Ke Xue* 2007; 13: 153-156.
- [21] Na N, Yao J, Cheng C, Huang Z, Hong L, Li H and Qiu J. Meta-analysis of the efficacy of the pretreatment neutrophil-to-lymphocyte ratio as a predictor of prognosis in renal carcinoma patients receiving tyrosine kinase inhibitors. *Oncotarget* 2016; 7: 44039-44046.
- [22] Wang J, Yue P, Huang J, Xie X, Ling Y, Jia L, Xiong Y and Sun F. Nursing intervention on the compliance of hemodialysis patients with end-stage renal disease: a meta-analysis. *Blood Purif* 2018; 45: 102-109.
- [23] Liu Y, Li X, Ma C, Wang P, Liu J, Su H, Zhuo H, Kong X, Xu D and Xu D. Serum anti-PLA2R antibody as a diagnostic biomarker of idiopathic membranous nephropathy: the optimal cut-off value for Chinese patients. *Clin Chim Acta* 2018; 476: 9-14.

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- [24] Dowell AC, Cobby E, Wen K, Devall AJ, During V, Anderson J, James ND, Cheng KK, Zeegers MP, Bryan RT and Taylor GS. Interleukin-17-positive mast cells influence outcomes from BCG for patients with CIS: data from a comprehensive characterisation of the immune microenvironment of urothelial bladder cancer. *PLoS One* 2017; 12: e0184841.
- [25] Wang B, Xu D, Yu X, Ding T, Rao H, Zhan Y, Zheng L and Li L. Association of intra-tumoral infiltrating macrophages and regulatory T cells is an independent prognostic factor in gastric cancer after radical resection. *Ann Surg Oncol* 2011; 18: 2585-2593.