Am J Transl Res 2021;13(4):3214-3221
www.ajtr.org /ISSN:1943-8141/AJTR0125597

Original Article

Application of Omaha system-based continuing care in patients with retained double J tube after urinary calculus surgery

Jing Liu, Chunlan Chen, Tangjuan Xu, Lixiao Wang, Yuanyuan Liu

Department of Urology Surgery, The First College of Clinical Medical Science, China Three Gorges University, Yichang, Hubei Province, China

Received November 4, 2020; Accepted December 7, 2020; Epub April 15, 2021; Published April 30, 2021

Abstract: Objective: To explore the effect of Omaha system-based continuing care in patients with retained double J tube after urinary calculus surgery. Methods: A total of 124 patients hospitalized with retained double J ureteral stent after urinary calculus surgery were selected as the research subjects. According to the random number table method, they were divided into observation group (n=62) and control group (n=62). The control group was given regular continuing care, while the observation group was given the Omaha system-based continuing care. Awareness of knowledge regarding retained double J tube, anxiety, depression, sleep quality, quality of life, incidence of complications, and patient satisfaction were compared between the two groups. Results: Compared with the control group, patients in observation group did better in the knowledge awareness concerning the purpose of retained double J ureteral stent, daily water consumption, exercise, urination, and extubation time; the observation group was also significantly higher in Self-Rating Anxiety Scale (SAS) scores and lower in Self-Rating Depression Scale (SDS) scores and PSQI scores (all P<0.05). The quality of life (QOL) scores in all aspects of patients in observation group were significantly higher than those of the control group (P<0.05). The incidence of infection, bleeding, fever, back pain, displacement, bladder irritation or other complications in the observation group was significantly lower than that of the control group. Satisfaction rate of patients in the observation group with out-of-hospital continuing care was significantly higher than that of patients in the control group (all P<0.05). Conclusion: The Omaha system-based continuing care has a better nursing effect on patients with retained double J tube after urinary calculus surgery. It can improve patients' compliance with treatment, relieve their anxiety and depression, improve their quality of life, reduce overall complications incidence rate and ultimately improve patients' satisfaction with clinical care.

Keywords: Omaha system, continuing care, double J ureteral stent

Introduction

Urinary calculus include calculus in the kidney, ureter, bladder and urethra. Among them, ureteral calculus is the most common one [1]. The causes are complex and unclear, which are closely related to the patient's physical condition, living habits, environment, and genetic factors [2, 3]. With the improvement of residents' living standards and changes in diet, the incidence of urinary calculus has shown an upward trend [4, 5]. At present, the incidence of urinary calculus is from 2% to 10% worldwide, of which the incidence in the United States is 8.8%, and it has increased by 63% in the past 10 years [6, 7]. The double J tube, or ureteral stent, also known as DJ tube, with both ends bent like the letter "J", is widely used in urinary calculus surgery, kidney transplantation, ileal replacement of the bladder surgery, and bypass surgery for ureteral obstruction. It can promote the patient's unobstructed drainage, residual calculus and blood clot discharge [8]. Studies have shown that the retained time of double J tube for urinary calculus takes about 1-3 months clinically, which may cause bladder irritation, urine reflux, waist soreness, hematuria or other complications. Specially, when patients lack professional nursing services and guidance after discharge from hospital, it will increase the incidence of complications and seriously affect the quality of life of them [9].

Therefore, reducing the incidence of complications in patients with retained tube discharged from hospital is a key issue in clinical nursing research. Continuing care refers to a series of nursing measures that continue to provide nursing services to patients after they are discharged from hospital [10]. The Omaha system refers to a new type of nursing practice system developed by the Visiting Nurses Association of Omaha with community nursing practice as the main content. It is composed of a problem classification system, an intervention system, and an evaluation system. According to the Omaha system, a comprehensive targeted care plan would be formulated based on patients' psychological condition, family and social background, education level, etc. [11]. At present, there are few reports on the application of Omaha system-based continuing care in patients with retained double J tube after urinary calculus surgery. This study mainly explores the effect of Omaha system-based continuing care in patients with retained double J tube after urinary calculus surgery, and focuses on analyzing the influence of the specific nursing intervention mode on patients' knowledge awareness, anxiety, depression, sleep quality, quality of life, overall incidence of complications and clinical satisfaction, with a hope to provide theoretical guidance for clinical care.

Materials and methods

General information

A total of 124 patients with retained double J tube after urinary calculus surgery in The First College of Clinical Medical Science, China Three Gorges University from April 2, 2019 to August 4, 2020 were selected for this prospective study, and were randomized into observation group (n=62) and control group (n=62). This study was approved by the Medical Ethics Committee of The First College of Clinical Medical Science, China Three Gorges University.

Inclusion criteria were as follows: patients with retained double J tube for 1 month after urinary calculus surgery; patients with age >18 years old; patients with normal cognitive function; patients who agreed to participate in this study and signed informed consent.

Exclusion criteria were as follows: patients complicated with major organ dysfunction, systemic infectious diseases or urinary system infections; patients with a history of mental illness or cognitive impairment; patients having complications after calculus removal; patients with malignant tumors; patients with bladder tuberculosis, cystitis, prostatic hyperplasia, urinary dysfunction or other urinary system diseases; patients who withdrew from the study or were lost to follow up.

Methods

During hospitalization, the same care method was implemented on patients in both groups, including retained double J tube knowledge education, diet guidance, condition monitoring, functional exercise guidance, etc. While after being discharged from hospital, patients in both groups were treated with different continuing care according to the design.

Patients in control group received regular continuing care: (1) Discharge guidance: Patients were given discharge guidance before discharge, including post-discharge precautions, possible complications and treatment. Patients were told to drink more water, reduce exercise, avoid strenuous exercise and never hold back urine. (2) Telephone follow-up: Telephone follow-up was conducted once a week. We inquired patients about their current situation, helped them analyze the problems and provided guidance for them.

Patients in observation group received the Omaha system-based continuing care. (1) A nursing evaluation table: We invited 10 urology experts to participate in the development of the table, including the following four domains: environmental domain, psychological domain, physiological domain and health-related behaviors domain. (2) Nursing intervention: ① Environmental care: We educated patients about storage and placement of everyday items, washing method, and instructed patients to clean up domestic garbage in time, change sheets and quilts, clean rooms thoroughly and scientifically every week, and put life supplies at the right place. ② Psychological care: We provided some services and guided patients to scientifically and rationally use the surrounding medical resources and services, such as providing effective service places and consulting methods for each patient; instructed patients to add the WeChat number and telephone number of the medical service institutions. When

they were confronted with traffic inconvenience or limited mobility, other contact information could be available for them to consult related problems. Before leaving the hospital, patients were taught to make full use of various communication tools and medical equipment to know relevant information and obtain medical services in time. We cared about patients' psychological condition, gave related counseling and organized patient activities to strengthen their social relations and enrich their life. ③ Physiological care: We taught patients about pain assessment method and coping methods with different pain levels, and prepared analgesics for them; educated them about various physical sign monitoring methods to accurately grasp their own conditions; instructed them to assess the digestion-hydration status according to complexion, sweating, nausea or vomiting and other symptoms. Oral liquids were prepared to replenish them in time so as to relieve water and electrolyte disorders. We instructed patients to monitor their own defecation and urination, eat more fruits and vegetables, drink more water and avoid constipation as possible. We taught them to understand the risk of infection from urination and hematuria observation, ask for medical help in time, and take anti-infective drugs if necessary. ④ Health-related behaviors care: We instructed patients to ensure adequate rest and sleep, and effectively use music and relaxation therapy to help those with sleeping problems. We told patients to avoid strenuous exercises, and recommended to do low-density aerobic exercises every day such as walking. We evaluated patients' behaviors and provided supervision and guidance. We also evaluated patients' medication standardization and compliance, and promoted rectification. Telephone follow-up was carried out once a week and family visits once a month to track down the family care and provide nursing intervention guidance. (3) Effect evaluation: The effect of nursing intervention was evaluated every week, and the intervention plan was adjusted if necessary.

Outcome measures

After implementing the Omaha system-based continuing care, the intervention effects were compared between the two groups 3 months after discharge: (1) The knowledge awareness rate of the retained double J tube between the patients of the two groups was compared by a double J tube knowledge questionnaire (the validity of the scale was 0.822, and the Cronbach's α coefficient was 0.819). The questionnaire included the purpose of retained double J tubes, daily water intake, exercise, urination and extubation time knowledge. (2) The anxiety status of the patients in the two groups was assessed by the Self-Rating Anxiety Scale (SAS) [12]. SAS score ≥50 points indicates existing anxiety symptoms, and it goes more serious as the score increases. (3) The depression status of the patients in the two groups was evaluated by the Self-Rating Depression Scale (SDS) with mild depression ranges from 53 to 62 points, moderate depression 63-72 points, and severe depression over 72 points [13]. The depression becomes more serious as the score increases. (4) The sleep quality of the patients in the two groups was evaluated by the Pittsburgh Sleep Quality Index (PSQI). Also, the higher score refers to the worse sleep quality [14]. (5) The quality of life of the patients in the two groups was compared through MOS SF-36. It includes 8 items (physical functioning, role physical, bodily pain, general health perceptions, vitality, social functioning, and role emotional). The full score of each item is 100 points and the higher score indicates the higher quality of life in the relevant dimension [15]. (6) The incidence of complications of the patients in the two groups was compared, such as infection, bleeding, fever, back pain, displacement, bladder irritation and other complications. If multiple complications occur in the same patient, all complications were counted in the total incidence, that is, total incidence = number of complications/total number of cases × 100%. (7) The patients were asked to fill out the satisfaction survey scale on Omaha system-based continuing care (the scale validity is 0.861 and Cronbach's α coefficient is 0.880) to evaluate nursing satisfaction, which was divided into satisfied (90-100 points), basically satisfied (60-89 points) and dissatisfied (<60 points). The satisfaction rate equals the number of cases satisfied + basically satisfied/total number of cases × 100%.

Statistical analysis

SPSS 20.0 was used for statistical analysis. Count data was analyzed by χ^2 test and expressed as n/%. The measurement data con-

Table 1. Comparison of general information between the two groups ($\bar{x}$ ± sd)

Index	Observation group (n=62)	Control group (n=62)	χ^2/t	P
Age (years)	43.4±9.1	44.6±10.8	0.669	0.505
Discourse of disease (years)	4.6±2.1	4.7±3.3	0.201	0.841
Gender			0.130	0.718
Male (n)	35	33		
Female (n)	27	29		
Types of calculus			0.322	0.570
Kidney calculus (n)	6	8		
Ureterolithiasis (n)	56	54		
Complications				
Hypertension (n)	9	10	0.062	0.803
Coronary heart disease (n)	8	10	0.260	0.610
Diabetes (n)	6	5	0.099	0.752
Operation time (min)	32.60±8.12	34.73±8.71	1.340	0.165

forming to normal distribution were expressed as mean ± standard deviation ($\bar{x}$ ± sd). The comparison between groups was conducted by independent t test. The composition of rank data between groups was compared by the rank sum test. The difference was statistically significant with P<0.05.

Results

Comparison of general information between the two groups

There was no statistically significant difference between the two groups of patients in age, gender, type of calculus, complications, or operation time (P>0.05). Therefore, they were comparable. See **Table 1**.

Comparison of knowledge awareness of retained double J tube between the two groups

Compared with patients in the control group, those in the observation group had higher awareness rates of the purpose of retained double J tube, daily water intake, exercise, urination and extubation time. The difference was statistically significant (all P<0.01). See **Table 2**.

Comparison of anxiety between the two groups

The SAS score of the observation group was lower than that of the control group (48.25±5.43 vs. 53.15±5.17), and the difference was statistically significant (t=5.146, P<0.001), as shown in **Figure 1**.

Comparison of depression between the two groups

The SDS score of the observation group was lower than that of the control group (47.97 ± 5.56 vs. 53.90 ± 5.98), and the difference was statistically significant (t=5.718, P<0.001), as shown in **Figure 2**.

Comparison of sleep quality between the two groups

The PSQI score of the observation group was lower than that of the control group (10.26 ± 2.28 vs. 13.36 ± 3.29), and the difference was statistically significant (t=6.098, P<0.001). See **Figure 3**.

Comparison of quality of life between the two groups

Compared with the control group, the scores regarding all aspects of the quality of life of patients in the observation group were higher than those in the control group, and the difference was statistically significant (all P<0.001). See **Table 3**.

Comparison of postoperative complications between the two groups

In the observation group, there were 2 cases of infection, 1 case of bleeding, 0 case of fever, 3 cases of back pain, 0 case of displacement, 4 cases of bladder irritation, and the total complication incidence was 16.13%. The control group had 4 cases of infection, 4 cases of bleeding, 1 case of fever, 6 cases of back pain, 1 case of displacement, 6 cases of bladder irritation and the total complication incidence was 35.48%. The total complication rate of the observation group was significantly lower than that of the control group (P<0.05). See **Table 4**.

Comparison of nursing satisfaction between the two groups

In the observation group, 33 patients were satisfied with the nursing care during hospitalization, 26 patients were basically satisfied, and 3 patients were dissatisfied, with satisfaction rate of 95.16%. In the control group, 26 patients

Table 2. Comparison of knowledge awareness of retained double J tube between the two groups (n, %)

Awareness of retained double J tube knowledge	Observation group (n=62)	Control group (n=62)	χ^2	P
Purpose of indwelling double J tube	60 (96.77)	47 (75.81)	11.520	<0.001
Daily water intake	58 (93.55)	44 (70.97)	10.830	0.001
Urination	57 (91.94)	39 (62.90)	14.946	<0.001
Exercise	55 (88.71)	44 (70.97)	11.256	0.001
Extubation time	60 (96.77)	48 (77.42)	10.333	0.001

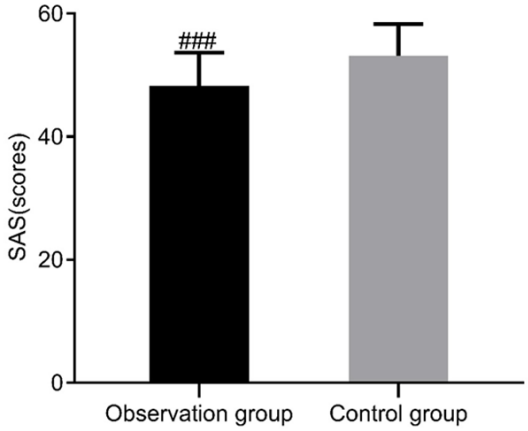

Figure 1. Comparison of SAS scores between the two groups. Compared with the control group, ###P<0.001. SAS: Self-Rating Anxiety Scale.

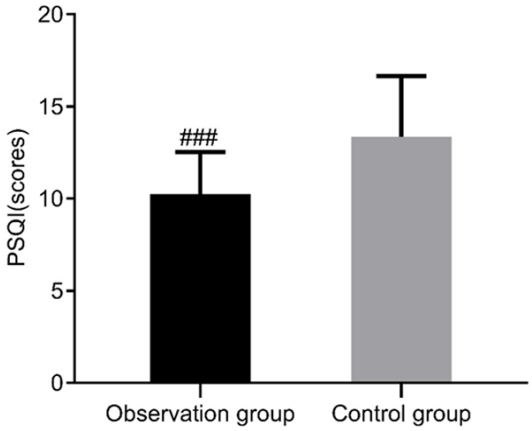

Figure 3. Comparison of PSQI scores between the two groups. Compared with the control group, ###P<0.001. PSQI: Pittsburgh Sleep Quality Index.

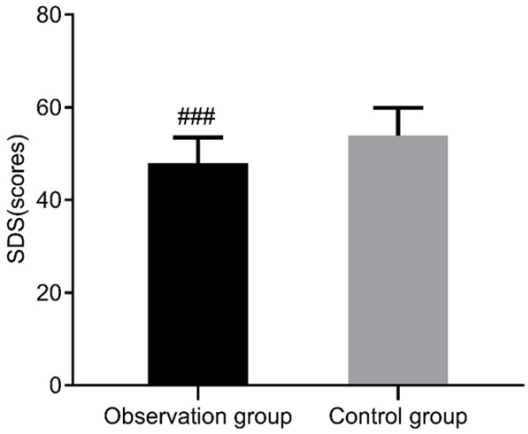

Figure 2. Comparison of SDS scores between the two groups. Compared with the control group, ###P<0.001. SDS: Self-Rating Depression Scale.

were satisfied with the nursing care during the hospitalization period, 26 were basically satisfied and 10 patients were dissatisfied, with satisfaction rate of 83.87%. The satisfaction rate in the observation group with continuing care was significantly higher than that in the control group (P<0.05). See **Table 5**.

Discussion

Since its establishment in 1975, the Omaha system has been used worldwide in family security systems, health departments, school health institutions, and social diagnosis and treatment institutions. It is widely used in medical care for enterostomy, liver cancer, hypertensive cerebral hemorrhage, chronic obstructive pulmonary disease and other clinical nursing [16-19]. It has achieved good practical results.

In this study, the observation group adopted the Omaha system-based continuing care and compared it with the regular continuing care in the control group. We found that the knowledge awareness rate of the retained double J tube after surgery was higher than that of the control group. It proves that the Omaha system-based continuing care is beneficial to improve the patient's grasp of disease knowledge and help improve patient compliance.

Table 3. Comparison of quality of life between the two groups (score; $\bar{x} \pm sd$)

Index of quality of life	Observation group (n=62)	Control group (n=62)	t	P
Physical function	80.19±19.29	64.87±19.18	4.435	<0.001
Role physical	80.63±20.25	66.05±18.06	4.231	<0.001
Bodily pain	78.30±11.24	66.84±10.28	5.924	<0.001
General health perceptions	75.82±11.19	63.59±11.30	6.055	<0.001
Vitality	76.50±17.18	63.46±12.04	4.900	<0.001
Social function	88.50±22.18	71.46±22.04	4.429	<0.001
Role emotional	89.50±19.98	70.46±19.04	5.423	<0.001
Mental health	78.50±18.18	64.46±16.04	4.577	<0.001

Table 4. Comparison of postoperative complications between the two groups (n, %)

Groups	Observation group (n=62)	Control group (n=62)	χ^2	P
Infection	2 (3.23)	4 (6.45)		
Hematuria	1 (1.61)	4 (6.45)		
Fever	0 (0.00)	1 (1.61)		
Waist pain	3 (4.84)	6 (9.68)		
Displacement	0 (0.00)	1 (1.61)		
Bladder irritation	4 (6.45)	6 (9.68)		
Complication incidence	10 (16.13)	22 (35.48)	6.065	0.014

Indwelling double J tube after lithotripsy operation can effectively support the ureter, maintain smooth drainage, reduce pelvic pressure of the renal and relieve renal colic. Compared with traditional drainage devices, it is more convenient for patients to do daily activities. However, the retained double J tube will stimulate the ureteral mucosa and trigone of bladder, bring discomfort to patients and increase the incidence of complications, which may cause negative emotions of patients. Zhao et al. took 36 patients who had radical prostatectomy as the subjects [20]. In their research, patients in the control group was given regular care, while patients in the observation group was given the Omaha system-based continuing care. The research concluded that the Omaha system-based continuing care can relieve patients' anxiety and depression. In our study, patients in the observation group adopted the Omaha system-based continuing care. After comparison with the control group, we found that the patients' SAS and SDS scores were lower than those of the control group, indicating that the Omaha system-based continuing care could reduce the anxiety and depression of patients after discharge, which is consistent with the results of the above-mentioned research. The gist behind the favorable result may lay on the social psychology of patients being included and emphasized in the Omaha-based continuing care model. Paying more attention to the patient's psychological condition, and providing professional counseling based on the patient's psychological problems can effectively reduce the anxiety and depression of the patients and help them in maintaining a good mood and having more confidence in the prognosis of the disease, thus forming a virtuous circle.

Postoperative complications and pain will affect the sleep quality and quality of life of patients. Xu et al. took 116 elderly patients with gastric cancer as the research subjects [21]. The control group was given regular care, while the observation group was given a continuing care based on the Omaha system. The study found that the Omaha system-based continuing care can improve patients' quality of life. In our study, the observation group also adopted the Omaha system-based continuing care and we compared it with the control group. We found that the patients' sleep quality score and the incidence of complications were lower than those of the control group, and the scores regarding all aspects of the quality of life were higher than those of the control group. Our study results are consistent with those of the above-mentioned research, indicating that the Omaha-based continuing care can reduce complications after discharge and improve patients' sleep quality and quality of life. The reason may be that after the implementation of the Omaha

Table 5. Comparison of nursing satisfaction between the two groups (n, %)

Groups	Satisfied	Basically satisfied	Dissatisfied	Satisfaction rate
Observation group (n=62)	33 (53.23)	26 (41.94)	3 (4.84)	59 (95.16)
Control group (n=62)	26 (41.94)	26 (41.94)	10 (16.13)	52 (83.87)
χ^2				4.210
P				0.040

system-based continuing care, the patient has gained professional knowledge and nursing instructions of retained double J tube, which can improve the patient's nursing ability and reduce the incidence of complications, thus improving the patients' sleep quality and quality of life.

Finally, this study also investigated the satisfaction rate of patients in both groups. The results showed that the satisfaction rate of the observation group was significantly higher than that of the control group. It may be attributed to the Omaha system-based continuing care since it provided patients with the double J tube knowledge, reduced their complications incidence and negative emotions, and improved the clinical prognosis of patients. Because of the positive nursing effect, we gained trust of patients, and finally their satisfaction with our nursing work.

However, this study did not explore the influence of the Omaha system-based continuing care on the negative emotions of its core family members. Researches including a large sample of patients and long-term care effect should be carried out in the future to confirm the feasibility and importance of the implementation of the Omaha system-based continuing care in patients with retained double J tube after urinary calculus surgery.

To sum up, the Omaha system-based continuing care is better for patients with retained double J tubes after urinary calculus surgery. It can improve patients' compliance and significantly reduce complication incidence. It can also relieve patients' anxiety and depression, improve the quality of life of patients, thus improving their satisfaction with nursing. Therefore, it is worthy of clinical application and promotion.

Disclosure of conflict of interest

None.

Address correspondence to: Jing Liu, Department of Urology Surgery, The First College of Clinical Medical Science, China Three Gorges University, No.183 Yiling Avenue, Wujiagang District, Yichang 443003, Hubei Province, China. Tel: +86-0717-6486336; E-mail: liujingsx1f@163.com

References

[1] Chen WC, Wu SY, Liao PC, Chou TY, Chen HY, Chiang JH, Su YC, Man KM, Tsai MY and Chen YH. Treatment of urolithiasis with medicinal plant salvia miltiorrhiza: a nationwide cohort study. Evid Based Compl Alternat Med 2018; 2018: 8403648.

[2] Zumstein V, Betschart P, Abt D, Schmid HP, Panje CM and Putora PM. Surgical management of urolithiasis - a systematic analysis of available guidelines. BMC Urol 2018; 18: 25.

[3] Pradere B, Peyronnet B, Khene ZE, Freton L and Bensalah K. Perioperative outcomes of flexible ureterorenoscopy for urolithiasis using the sheathless technique: a comparative study. Eur Urol Suppl 2019; 18: e2024-e2025.

[4] Liu Y, Chen Y, Liao B, Luo D, Wang K, Li H and Zeng G. Epidemiology of urolithiasis in Asia. Asian J Urol 2018; 5: 205-214.

[5] Jung JS, Han CH and Bae S. Study on the prevalence and incidence of urolithiasis in korea over the last 10 years: an analysis of national health insurance data. Invest Clin Urol 2018; 59: 383-391.

[6] Zhong DW, Xiao F, Liao BL and Lu TT. Epidemiological investigation and analysis of stone composition of urinary calculi incidence in western Fujian. Chin Fore Med Treat 2018; 37: 28-30.

[7] Sik TB, Ulanbek B, Yong CS and Wook JC. Eleven-year cumulative incidence and estimated lifetime prevalence of urolithiasis in Korea: a national health insurance service-national sample cohort based study. J Korean Med Sci 2018; 33: e13.

[8] Beysens M and Tailly TO. Ureteral stents in urolithiasis. Asian J Urol 2018; 5: 274-286.

[9] Lin KJ, Chen PC, Fan YH and Huang WJS. Preventing forgotten double j ureteral stents in a high-volume-service medical center - an auto-registration monitoring system. J Chin Med Assoc 2020; 83: 1.

[10] Liu HY. Evaluation of the application effect of continuous nursing in patients with indwelling double J tube after ureteral calculi. Chin J Health Care Nutr 2019; 29: 175.
[11] Yang L and Liang XF. The application effect of continuous nursing based on the theory of Omaha system in urostomy patients. Chin J Prac Nurs 2018; 34: 912-916.
[12] Dunstan DA, Scott N and Todd AK. Screening for anxiety and depression: reassessing the utility of the Zung scales. BMC Psychiatry 2017; 17: 329.
[13] Sepehry AA. Zung self-rating depression scale. Edited by Sepehry AA. New York: Springer; 2011.
[14] Curcio G, Tempesta D, Scarlata S, Marzano C, Moroni F, Rossini PM, Ferrara M and De Gennaro L. Validity of the Italian version of the Pittsburgh Sleep Quality Index (PSQI). Neurol Sci 2013; 34: 511-519.
[15] Vitorino DFdM, Martins FLM, Souza ADC, Galdino D and Prado GFD. Utilizao do SF-36 em ensaios clínicos envolvendo pacientes fibromiálgicos: determinao de critérios mínimos de melhora clínica. Revista Neurociências 2019; 12: 147-151.
[16] Chen F, Deng J, Guo SS, Tao L, Zhou D and Yu L. The effect of case management based on Omaha system in patients with enterostomy. J Nurs Manage 2019; 19: 854-857.
[17] Wang HL, Cao Y, Chen L and Xu CY. The impact of continued care based on the Omaha system on the quality of life of discharged patients with liver cancer. Chin J Social Med 2020; 37: 104-108.
[18] Feng QL, Yao M, Zhang XP, Peng XX and Xu LS. Application of Omaha system-based continuation care in postoperative rehabilitation of patients with hypertensive intracerebral hemorrhage. Chin J Mod Nurs 2017; 23: 95-98.
[19] Zou XY, Han H, Shen LJ and Sang J. The effect of Omaha system-based nursing model on the nutritional status of patients with low-weight chronic obstructive pulmonary disease. Chin J Integr Tradit West Med Emerg Treat 2019; 26: 79-82.
[20] Zhao LP, Wei JL, Lu XX, Chen ZL and Xu XX. The application effect analysis of Omaha system in continuous nursing of patients undergoing radical prostatectomy. J Guangxi Med Univ 2019; 36: 152-155.
[21] Xu LP. The impact of Omaha system-based continuation care on the quality of life and self-efficacy of gastric cancer patients after surgery. Lab Med Clin 2020; 17: 118-121.