Original Article
The application of evidence-based nursing and its effect on reducing surgical incision infections and improving patient satisfaction with nursing

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Abstract: Objective: Evidence-based nursing in the operating room was successfully applied, and its effect on postoperative infections and patient satisfaction was investigated. Methods: 84 patients were randomly divided into an observation group (OG) (n = 42) and a control group (CG) (n = 42). The patients in the OG were given evidence-based nursing in the perioperative period. The patients in the CG received routine nursing. The infection rate, psychological negative sentiment (SAS and SDS) at 1 week after surgery, the length of the hospital stay, VAS scores at 48 h after surgery, the incidences of postoperative complications, quality of life, and patient satisfaction one month after surgery were evaluated. Results: The surgical wound infection rate, SAS and SDS scores, VAS scores, hospital stays and the incidence of postoperative complications in the OG were lower than they were in the CG (P<0.05). The quality of life and nursing satisfaction in the OG were higher than those in the CG (P<0.050). Conclusions: Perioperative evidence-based nursing can significantly reduce the surgical wound infection rate and improve patients' negative emotions.

Keywords: Operating room, evidence-based nursing, surgical wound infection rate, nursing satisfaction

Introduction

As a place for surgery and rescue, the operating room is also a high-risk place where patients have incision infections [1]. Once the surgical incision infection occurs, the surgical efficacy is seriously affected. In addition, multiple organ failure and systemic infection can easily occur [2, 3]. Therefore, the prevention of incision infection in the operating room has also become an important direction for hospitals to control incision infections [4]. Scientific and reasonable layouts and strict disinfection and sterilization of the operating room, and enough equipment are necessary for infection prevention [5].

However, which nursing model is more suitable for the operating room is always a controversial focus clinically. The selection of a suitable surgical nursing model is of important clinical significance [6] due to the fact that clinical care staff and other health care workers are the frontline defense for applying daily infection control practices to prevent infections and the transmission of organisms to other patients. Clinical care nurses directly prevent infections by performing, monitoring, and assuring compliance with aseptic work practices. They provide knowledgeable collaborative oversight on environmental decontamination to prevent the transmission of microorganisms from patient to patient. They also serve as the primary resource to identify and refer ill visitors or staff [7]. Nurses can reduce the risk of infection by diminishing the entry of endogenous or exogenous organisms via invasive medical devices [8].

Evidence-based nursing was proposed by Canadian scholars in the 1990s. In recent years, evidence-based nursing has received more and more attention with the development of evidence-based medicine [9]. In the concept of evidence-based nursing, the nursing plan is made in combination with the actual situations,

the literature, and other scientific and systematic methods. The best nursing resources and the most professional nurses are combined. The most suitable nursing protocol is developed according to the clinical experience and the actual needs of patients [10, 11]. Evidence-based nursing has become more and more widely used clinically. For example, a study [12] showed that evidence-based nursing in spinal instrument surgery can effectively reduce the infection rate of the surgical site. Another study [13] found that evidence-based nursing can remarkably improve the efficacy of surgery and the prognosis of patients with heart failure.

However, the study of the application of evidence-based nursing in the operating room is not well recognized due to the lack of study. The following study was intended to contribute to the further understanding of the application of evidence-based nursing in the operating room and its effect on the surgical wound infection rate and patients' nursing satisfaction.

Materials and methods

General information

84 patients in our hospital were selected as the subjects, including 51 males and 33 females. The patients were aged 40.61±6.57 years old on average. 14 patients underwent a urologic surgical procedure. 23 patients received orthopedic surgery. 26 patients underwent general surgery. 16 patients were given gynecology and obstetrics surgery. 5 patients received other surgeries. All the patients were randomly categorized into an observation group (OG) (n = 42) and a control group (CG) (n = 42). The patients in the OG were given evidence-based nursing in the perioperative period. The patients in the SG were given routine nursing.

The inclusion criteria were as follows: Patients aged 20-65 undergoing elective surgery with general anesthesia were included. All the patients had a surgical incision >2 cm.

The exclusion criteria were: Patients with surgical contraindications; patients with infectious diseases; patients with severe hepatic and renal dysfunction; patients with a severe coagulation disorder or patients with cognitive and communication disorders; patients with diabetes and severe immunodeficiency; patients with a wound infection before surgery; and patients with surgical incisions less than 2 cm, were all excluded.

All the patients and their family members agreed to the study protocol. The informed consent forms were signed. The study was approved by the Ethics Committee.

Nursing methods

The patients in the CG were given routine nursing, including preoperative routine precautions. The nurses cooperated with the doctors to ensure proper nursing. The postoperative incision was kept dry and clean. Routine diet instructions and rehabilitation guidance were provided for the patients.

The patients in the OG received evidence-based nursing on the basis of routine nursing. The details were as follows: (1) First, the evidence-based nursing team was established. The nurses were strictly screened. All nurses were given strict professional training and assessment. The most experienced nurse was selected as the team leader. After the establishment of the evidence-based nursing team, the problems existing in the operating room nursing were first put forward. Then, evidence retrieval was performed by searching the relevant literature. The specific situations of the patients were comprehensively assessed from the aspects of psychology, physiology, family conditions, social values, etc. Finally, a scientific and reasonable nursing plan was made according to the literature, the specific situations, and the problems. (2) Preoperative nursing: The patients were given a warm and cordial reception. Thus, the patient's treatment compliance was improved. The patients can face the surgery with a relaxed and positive attitude. (3) Intraoperative nursing: The temperature and humidity was adjusted to minimize the infection risks of the incisions [14]. The patients were helped to select the most suitable and comfortable surgical position according to the patients' specific situations. The doctors and other medical staff members were supervised to perform a strict, sterile operation during the surgery. The intraoperative vital signs were closely monitored. The patient's conditions and feelings during surgery were constantly monitored. The patients seriously cooperated with

the doctor to complete the surgery. If abnormal vital signs occurred, communication was made with the doctor in time. The measures were completed in a timely manner. (4) Postoperative nursing: After surgery, the patients were kept in the proper positions. All record lists in the operating room were carefully filled out. The medial devices were arranged and sent to the disinfecting department. The intervention ended when the patient left the operating room.

Outcome measures

(1) The surgical wound infection rates were recorded and compared between the two groups at one week after surgery. The patient had a purulent discharge from the incision, accompanied by an increase in body temperature. Their infection was confirmed by a pathological examination. (2) The psychological negative sentiment before surgery and 1 week after surgery was evaluated with a self-rating anxiety scale (SAS) and a self-rating depression scale (SDS) [15]. The length of the hospital stay was compared. (3) The pain degree 48 h after surgery was evaluated with the VAS score [16]. (4) The postoperative complications were recorded and compared. The postoperative complications included fever, wound bleeding, urinary retention, and deep venous thrombosis (5) QLQ-C30 [17] was used to evaluate the quality of life 1 month after nursing. The role function, physical function, emotional function, cognitive function, and social function were included in the scale, 30 items in total. The higher the score was, the higher the quality of life was. (6) The patients' nursing satisfaction on perioperative nursing was evaluated in the form of a questionnaire on the third day after surgery and was graded as very satisfied, satisfied, or not satisfied. Nursing satisfaction = (Number of patients very satisfied + number of patient satisfied)/total number of patients × 100%.

Statistical methods

The experimental data in the study were statistically analyzed with SPSS 18.0 (Beijing NDTimes Science and Technology Co., Ltd.). For intragroup before-after comparisons, pairwise t tests were used; for the between-group comparisons, independent t tests were used chi-squared tests were used for the comparisons of the enumeration data. $P < 0.05$ implied a significant difference.

Results

Comparison of the general information

There was no difference in terms of gender, age, BMI, history of smoking, history of blood transfusion, negative emotional score, ASA classification, duration of surgery, liver function, surgical type, or type of anesthesia between the two groups (**Table 1**, P>0.05).

Comparison of the surgical wound infection rates

One case of postoperative incision infection occurred in the OG. The incidence was 2.38%. 7 cases of postoperative incision infections occurred in the CG. The incidence in the CG was 16.67%, and it was higher than the rate in the OG (P<0.05) (**Figure 1**).

Comparison of psychological negative sentiment 1 week after surgery

The SAS and SDS scores in the OG were (22.34±3.21) and (22.78±3.19) points respectively, which were lower than the scores in the CG (P<0.05) (**Table 2**).

Comparison of postoperative VAS scores and hospital stays

The VAS scores and hospital stays in the OG were (1.24±0.14) points and (7.71±1.35) d. They were lower than the (4.35±0.22) points and (11.23±2.05) d in the CG respectively (P<0.05) (**Figure 2**).

Comparison of the postoperative complications

Fever, wound bleeding, and urinary retention occurred in 2 patients, 1 patient, and 0 patients in the OG. The total incidence of adverse reactions was 7.14%. 3 cases of fever, 4 cases of wound bleeding, and 4 cases of urinary retention occurred in the CG. The total incidence was 26.19%, and this was higher than the incidence in the OG (P<0.05) (**Table 3**).

Comparison of the quality of life 1 month after surgery

The scores of role function, emotional function, physical function, cognitive function, and social function in the OG were respectively (80.31± 2.22), (80.12±2.39), (81.15±2.72), (80.54± 3.03) and (80.33±2.91). They were accordingly

Table 1. General information table

Project	Test group n = 42	Control group n = 42	X^2/t	P
Gender			0.050	0.823
Male	26 (61.90)	25 (59.52)		
Female	16 (38.10)	17 (40.48)		
Age (years)			0.048	0.827
≤40	22 (52.38)	23 (54.76)		
>40	20 (47.62)	19 (45.24)		
BMI (kg/m^2)			0.048	0.826
≤23	23 (54.76)	24 (57.14)		
>23	19 (45.24)	18 (42.86)		
History of drinking			0.053	0.819
Yes	15 (35.71)	14 (33.33)		
No	27 (64.29)	28 (66.67)		
Type of surgery			0.933	0.920
Urological surgery	6 (14.29)	8 (19.05)		
Orthopedic surgery	12 (28.57)	11 (26.19)		
General surgery	14 (33.33)	12 (28.57)		
Obstetrics and gynecology	7 (16.67)	9 (21.43)		
Others	3 (7.14)	2 (4.76)		
Blood transfusion history			0.068	0.794
Yes	10 (23.81)	9 (21.43)		
No	32 (76.19)	33 (78.57)		
ASA classification				
I	26 (34.90)	27 (64.29)		
II	9 (21.43)	9 (21.43)		
III	7 (16.67)	6 (14.29)		
Duration of surgery (min)	126.45±20.16	125.98±19.96	0.107	0.915
General anesthesia method			0.049	0.825
Venous anesthesia	25 (59.52)	24 (57.14)		
Suction anesthesia	17 (40.48)	18 (42.86)		
Negative sentiment score				
SAS	55.61±4.34	54.87±4.42	0.774	0.441
SDS	54.25±3.64	55.01±3.72	0.946	0.347
Liver function Index				
Serum total protein g/L	67.36±2.85	68.02±2.67	1.095	0.277
Glutamic pyruvic transaminase μmol/L	26.22±4.29	26.15±4.24	0.075	0.940
Total bilirubin μmol/L	11.58±2.44	11.64±2.62	0.109	0.914

higher than the (65.34±2.12), (65.81±2.37), (65.51±3.04), (65.42±2.64), and (66.02±2.85) scores in the CG (P<0.05) (**Table 4**).

Comparison of nursing satisfaction

36 patients, 5 patients and 1 patient in the OG were respectively very satisfied, satisfied, and not satisfied. The numbers of patients who were very satisfied, satisfied, and not satisfied in the CG were respectively 19, 10, and 13. The nursing satisfaction in the OG was 97.62% and

this was higher than the 69.05% in the CG (P<0.05).

Discussion

The operating room is the main place for the treatment of patients. The nursing work in the operating room is generally characterized by large personnel mobility and a long nursing time. Any carelessness is likely to lead to intra-operative infection and negatively affect the therapeutic effect [18, 19].
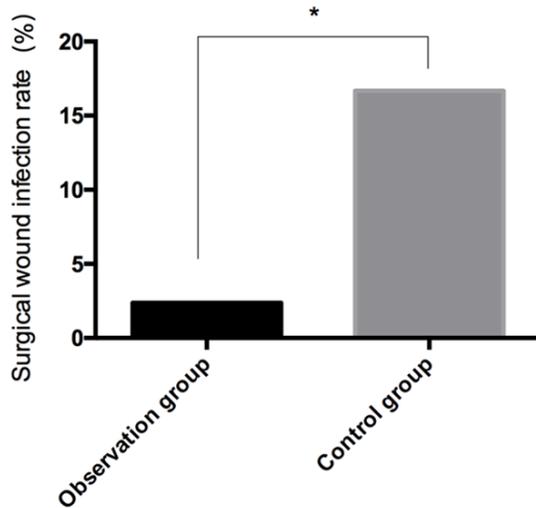
Figure 1. Comparison of the surgical wound infection rate. The postoperative surgical wound infection rate in the observation group (OG) was lower than it was in the control group (CG) (P<0.05). Note: *implied P<0.05.
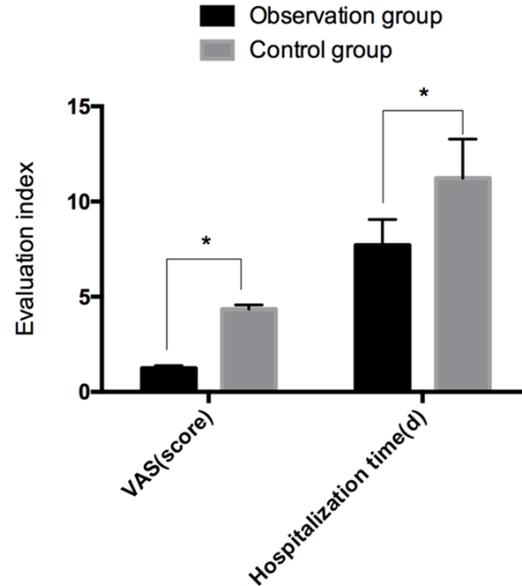

Figure 2. Comparison of the postoperative VAS score and hospital stay. The VAS score and hospital stay 48 h after surgery in the CG were higher than they were in the SG (P<0.05). Note: *indicated P<0.05.

Table 2. Comparison of the SAS and SDS scores at 1 week after surgery in both groups

Project	Test group n = 42	Control group n = 42	t	P
SAS	22.34±3.21	37.31±4.32	18.03	<0.001
SDS	22.78±3.19	36.99±4.27	17.28	<0.001

During the nursing, there are some differences in the cooperation of nursing and treatment due to the differences among the patients. Therefore, many difficulties occur [20]. However, the selection of the nursing model in the operating room has always been an important topic in clinical practice. Evidence-based nursing combines the actual situations of the patients with the best evidence. It is scientific, rational, and rigorous. The nursing problems in actual situations are taken as the starting point. The nursing plan is developed by consulting the relevant literature and considering the specific situations of the patients [21, 22].

The application of evidence-based nursing in the operating room was investigated in this study. The results showed that the surgical wound infection rate in the OG was lower than it was in the CG. A 3-year prospective study [23] showed that evidence-based nursing in the operating room can effectively reduce the infection rate. This conclusion is consistent with the one in this study. This is mainly due to the improvement of surgical cleanliness

[24]. In this study, special attention has also been paid to the sterile operation of surgery. Further studies [24] also found that evidence-based nursing can effectively reduce the post-operative infection of cesarean section.

The results showed that the negative sentiment score, the VAS pain score, and the hospital stay in OG were much lower than the corresponding scores in the CG. Moreover, the quality of life was higher than it was in the CG (P<0.05). A previous study [25] showed that evidence-based nursing has a significant effect on the improvement of the quality of life. Another study [26] showed that evidence-based nursing combined with routine nursing can remarkably improve the treatment compliance and quality of life of elderly patients with peptic ulcers. A previous study [27] found that evidence-based nursing can effectively improve the depressive state of patients with depression. All the above-mentioned results confirm the partial results in this study.

Finally, the results showed that the nursing satisfaction in the OG was higher than it was in the CG. A study [28] showed that the implementation of evidence-based nursing can effectively improve the nursing satisfaction of patients with acute coronary syndrome in the hospital. Another study [29] showed that the

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

Project	Test group n = 42	Control group n = 42	X^2	P
Heat	2 (4.76)	3 (7.14)	0.213	0.645
Wound bleeding	1 (2.38)	4 (9.52)	1.914	0.167
Urinary retention	0	4 (9.52)	4.200	0.040
Lower extremity deep venous thrombosis	1 (2.38)	3 (7.14)	1.050	0.306
Total incidence	4 (9.52)	14 (33.33)	7.071	0.008

Table 4. Comparison of quality of life between the two groups of patients after 1 month of nursing

Project	Test group n = 42	Control group n = 42	t	P
Role function	80.31±2.22	65.34±2.12	31.61	<0.001
Emotional function	80.12±2.39	65.81±2.37	27.55	<0.001
Physical function	81.15±2.72	65.51±3.04	24.85	<0.001
Cognitive function	80.54±3.03	65.42±2.64	24.38	<0.001
Social function	80.33±2.91	66.02±2.85	22.77	<0.001

perioperative application of evidence-based nursing in patients with peritoneal neuroblastoma can significantly improve the nursing satisfaction of patients. It also indicated that evidence-based nursing can increase the degree of treatment participation of the patients and their family members. Furthermore, the clinical results can be improved. The conclusions in the study are confirmed by the studies above.

In summary, evidence-based nursing in the operating room can remarkably reduce the surgical wound infection rate. Meanwhile, the negative sentiment is improved. The postoperative pain is alleviated. The hospital stay is shortened. The quality of life is improved. Moreover, the patients have higher nursing satisfaction. It is worthy of being popularized clinically. However, there are some deficiencies in this study. For example, the nursing factors affecting the incision infection were not further analyzed. Only the evidence-based nursing was simply compared with the routine nursing. The most suitable nursing model in the operating room was not investigated. Therefore, evidence-based nursing will be compared with other nursing models in a future study. Thus, more theoretical data are provided for the application of evidence-based nursing in the operating room.

Disclosure of conflict of interest

None.

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