

Analysis of the Role of Nursing Intervention in Operating Room in the Prevention of Incision Infection in Orthopedic Aseptic Surgery

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Abstract: *Objective:* To explore and analyze the role of nursing in the operating room in the prevention of incision infection in aseptic orthopedic surgery. *Methods:* 68 patients that underwent aseptic orthopedic surgery in our hospital from January 2021 to December 2022. They were divided into a research group ($n = 34$) and a control group ($n = 34$) by the random number table method. The patients in the control group received conventional nursing intervention in the operating room, and the patients in the study group received the optimized and modified nursing intervention in the operating room; then, the related indicators of nursing intervention of the two groups were compared. *Results:* The incidence of incision infection in the study group was lower than that of the control group ($P < 0.05$); the average duration of surgery and length of stay the study group were lower than those in the control group ($P < 0.05$); the stress response indexes of patients in the study group were lower than those in the control group 24 hours after operation ($P < 0.05$); the degree of satisfaction of the patients in the study group to the services provided by the nursing staff was significantly higher than that of the control group ($P < 0.05$). *Conclusion:* High-quality nursing intervention in the operating room for aseptic orthopedic surgery patients can significantly reduce the incidence of incision infection, reduce the stress response caused by surgery, shorten the duration of surgery and length of stay, and improve nursing satisfaction, which makes it worthy of popularization.

Keywords: Nursing intervention in the operating room; Aseptic orthopedic surgery; Incision infection

Online publication: July 27, 2023

1. Introduction

In an aseptic orthopedic surgery, specific instruments are implanted to fix the damaged bone, establish a new joint structure, and restore the motor function of the limbs. This type of surgery is suitable for the treatment of various fractures, and the clinical effect is remarkable^[1]. Aseptic orthopedic surgery is complex and time-consuming, and the incision site is exposed to the air for a long time, which makes it prone to infection. Clinical studies have shown that incision infection in aseptic orthopedic surgery prolongs postoperative recovery time and aggravates stress response, which seriously affects the effect of the surgery and even endangers the life of patients^[2,3]. Therefore, effective nursing interventions are needed in the operating room to prevent incision infection. In this study, 68 patients were selected to study the effect of nursing intervention in the operating room.

2. Materials and methods

2.1. General information

In this study, 68 patients who underwent orthopedic aseptic surgery in our hospital from January 2021 to December 2022 were selected and divided into a research group ($n = 34$) and a control group ($n = 34$) by the random number table method. The research group consisted of 19 males and 15 females, aged 28–66 years old, with an average of 47.55 ± 3.68 years old, including 18 cases of hip replacement surgery and 16 cases of femoral head replacement surgery. The control group consisted of 20 males and 14 females, with aged 30–64 years old, with an average of 47.48 ± 3.62 years old, including 17 cases of hip replacement surgery and 17 cases of femoral head replacement surgery. There was no significant difference between the baseline data of the two groups ($P > 0.05$).

Inclusion criteria: (i) meet the indications for aseptic orthopedic surgery, (ii) has normal cognitive function, (iii) signed an informed consent.

Exclusion criteria: (i) Complicated with infectious diseases, (ii) unstable vital signs, (iii) did not cooperate with the treatment.

2.2. Methods

Patients in the control group received conventional nursing intervention in the operating room. The nurses prepared the instruments and medicines required for the operation in advance, delivered the instruments according to the surgical procedure, assisted the doctors and monitored the changes of the patient's vital signs during surgery, and escorted the patient back to the ward after the surgery.

Patients in the study group received optimized and modified nursing interventions in the operating room. High-risk factors for incision infection were determined based through consulting relevant literature and the nurse's experience, and modified nursing interventions were formulated.

(i) Patient assessment

Before the surgery, the patient's condition was evaluated to understand whether the factors affecting the patient's immune system are controlled and whether the infection focus is effectively treated. The nutritional status of the patient's body was also evaluated, and if the patient has emaciation, anemia, or hypoalbuminemia, the patient was given nutritional support or transfusion of blood products and albumin according to the doctor's instructions. If the patient is complicated with hypotension and electrolyte imbalance, fluid rehydration was given to maintain water and electrolyte balance. Moreover, the surgical site was inspected, and skin preparation was performed properly to avoid damaging the patient's skin tissue during surgery and to shorten the interval between skin preparation and surgery.

(ii) Operation schedule

Complicated surgeries that had an expected duration of 3 hours were prioritized, and those surgeries were performed in the laminar flow operating room. Aseptic surgeries was arranged before non-aseptic surgeries, and the operating room was ventilated for at least 10 minutes between operations. Besides the operating room was also disinfected for 30 minutes after a surgery was completed.

(iii) Sterilization and disinfection of surgical tools

The tools needed for the surgery were prepared in advance and were sterilized using appropriate methods. Surgical tools that are heat-resistant and moisture-resistant were sterilized by pressure steam, while other surgical tools were sterilized by low-temperature plasma.

(iv) Rational use of antibiotics

At 30 min to 1 h before the surgery, antibiotics were injected intravenously by a nurse according to the doctor's instructions, and antibiotics are brought into the operating room from the ward. The patient was monitored carefully during surgery, and if the antibiotics' half-life was shorter than the duration of

surgery or that the intraoperative blood loss exceeded 1500 mL, the patient was injected with more antibiotics in time.

(v) Restriction of the flow of nursing staff

The entrance of the operating room was equipped with foot pads soaked in disinfectant to keep them wet, and they were changed twice a day. Nurses could only enter the operating room after being disinfected. Nurses that were not involved in the operation and nurses with infectious diseases were not allowed to enter the operating room. The patients' coats, packaging of surgical instrument, and other external items were controlled, and the number of surgical visitors were limited. Besides, the nurses entering the operating room were required to put on special masks, hats, and underwear. If multiple operations need to be performed in a row, the underwear needs to be replaced after each surgery. Moreover, the nursing staff must enter the designated operating room, and they were not allowed to walk around frequently. The surgical visitors were to stand more than 50 cm from the doctor.

(vi) Cooperation of the nurses in the operating room

The nurses were required to understand the surgical process and bring in the items needed for the surgery into the operating room in advance, and also configure special types of surgical instruments according to the doctor's working style. During surgery, the nursing staff strictly followed the requirements of the aseptic surgery, established intravenous access for the patient, pre-warmed the fluid in the patient's body, delivered the equipment to the doctor in time, assisted the surgeons accordingly, and monitored the changes in the patient's vital signs. The surgeons were alarmed when abnormalities occurred during the surgery. After the surgery, nurses were to perform surgical drain and incision suture according to the doctor's instruction.

(vii) Postoperative nursing intervention

After the operation, the patients were escorted back to the ward and were handover to the ward nurses. The patient and their family were also informed to protect the incision and drainage tube. The patient was followed up to learn about the healing of their incision, and patient was given a diet and exercise plan.

2.3. Evaluation criteria

The incidence of incision infection in the two groups were recorded, with the following being the criteria for an infection: (i) purulent secretions on the surface of the incision or redness, with swelling and heat pain at the incision site; (ii) the incision was swollen or reopened, and the presence of purulent secretions or pus in the drainage fluid; (iii) positive for incision secretions through bacterial culture.

The duration of surgery and length of stay were recorded. 5 ml of venous blood samples were collected from patients before surgery and 24 hours after surgery, and stress response indicators such as CRP, IL-6, cortisol, and adrenaline were detected by automatic biochemical analyzer and corresponding kits.

The degree of satisfaction of the two groups of patients towards the nursing services were investigated using a self-made questionnaire. The full score of the questionnaire was 100 points, with a score of 80–100 being very satisfied, 60–79 being satisfied, and below 60 being dissatisfied.

2.4. Statistical analysis

SPSS 23.0 was used to analyze the measurement data, which was represented by mean \pm standard deviation (SD); a *t*-test was also performed on the count data, which was expressed as percentages; a χ^2 test was also performed; $P < 0.05$ indicated a statistical difference.

3. Results

3.1. Incidence of incision infection

As shown in **Table 1**, the incidence of incision infection of the study group was significantly lower than that of the control group ($P < 0.05$).

Table 1. Comparison of the incidence of incision infection between the two groups ($n/\%$)

Group	Number of incision infection cases	Incidence of incision infection
Research group ($n = 34$)	1	1 (2.9)
Control group ($n = 34$)	6	6 (17.6)
χ^2		3.981
P		0.046

3.2. Duration of surgery and length of stay

As shown in **Table 2**, the duration of surgery and length of stay of the patients in the study group were shorter than those of the control group ($P < 0.05$).

Table 2. Comparison of operation time and hospitalization time between the two groups (mean \pm SD)

Group	Duration of surgery (min)	Length of stay (d)
Research group ($n = 34$)	144.27 \pm 15.82	10.94 \pm 1.86
Control group ($n = 34$)	192.75 \pm 22.38	15.42 \pm 2.33
t	10.314	8.762
P	0.000	0.000

3.3. Stress response indicators

As shown in **Table 3**, the stress response indexes of patients in the study group were lower than those of the control group 24 hours after operation ($P < 0.05$).

Table 3. Comparison of stress response indicators between the two groups of patients (mean \pm SD)

Group	CRP (mg/L)		IL-6 (ng/L)		Cortisol (nmol/L)		Epinephrine (ng/L)	
	Preoperative period	24 hours after operation	Preoperative period	24 hours after operation	Preoperative period	24 hours after operation	Preoperative period	24 hours after operation
Research group ($n = 34$)	72.11 \pm 4.68	95.33 \pm 2.94	75.64 \pm 4.94	85.11 \pm 4.69	355.48 \pm 26.59	445.72 \pm 28.94	88.19 \pm 3.75	128.57 \pm 4.96
Control group ($n = 34$)	72.08 \pm 4.75	122.35 \pm 5.72	75.58 \pm 4.82	102.75 \pm 6.28	355.52 \pm 26.48	586.25 \pm 31.77	88.26 \pm 3.84	153.07 \pm 7.92
t	0.026	24.498	0.051	13.123	0.006	19.067	0.076	15.287
P	0.979	0.000	0.960	0.000	0.995	0.000	0.940	0.000

3.4. Degree of satisfaction towards the nursing care provided

As shown in **Table 4**, the degree of satisfaction of the patients in the research group towards was higher

than that of the control group ($P < 0.05$).

Table 4. Comparison of degree of satisfaction towards the nursing care provided ($n/\%$)

Group	Very satisfied	Satisfied	Dissatisfied	Rate of satisfaction
Research group ($n = 34$)	25	8	1	33 (97.1)
Control group ($n = 34$)	19	8	7	27 (79.4)
χ^2				5.100
P				0.023

4. Discussion

Aseptic orthopedic surgery is an effective method of treating various bone and joint diseases. The surgery involves the implantation of an internal fixation in the bone lesion area. The surgical process is relatively complicated, the duration of surgery is long, and it is prone to incision infection. Studies have shown that surgical incision infection can lead to prolonged postoperative recovery and can affect the recovery of joint function. Therefore, it is necessary to prevent incision infection through effective nursing interventions in the operating room [4,5].

In conventional nursing in the operating room, nurses do not pay enough attention to the prevention of incision infection and only implement routine surgical nursing, resulting in a high incidence of incision infection. With high-quality nursing intervention in the operating room, the prevention of incision infection is emphasized, and the causes of incision infection, including imperfect preoperative preparation, operating room environment, duration of surgery, receiving surgery, patient's condition are considered. Targeted nursing interventions are formulated based on the factors above, which can effectively prevent incision infection [6]. Compared to general nursing in the operating room, the optimized and modified nursing interventions in the operating room are more standardized and comprehensive, and the patient's condition is considered. Thus, the patient can be provided with a comprehensive incision protection that can effectively prevent incision infection and help improve postoperative recovery [7].

In this study, the rate of incision infection in the research group was lower. The reason is that with high-quality operating room nursing, the patients were evaluated in advance, and high-risk factors of incision infection were eliminated. Besides, suitable antibiotics were given, and the sterilization of the tools was done properly. The flow of personnel was also restricted, and proper measures were taken to protect the site of incision. On the other hand, in conventional nursing interventions, the prevention of incision infection was not emphasized, so there was a higher incidence of incision infection in the control group [8]. The results of this study showed that the duration of surgery, the length of stay, and postoperative stress response indexes of the patients in the study group were all lower than those of the control group. Long surgeries can lead to a more serious stress response in the body and an increased risk of incision infection. During the high-quality nursing intervention in the operating room, the nursing staff optimized and adjusted the surgical nursing process and measures with the goal of preventing incision infection. Through the cooperative efforts of skilled nurses, the duration of surgery can be shortened, thus reducing the stress response. Effective protection of the incision can shorten the length of hospital stay [9]. This study confirmed that the patients in the study group were generally more satisfied with the nursing care provided compared to the control group. Incision infection can lead to prolonged hospital stay and decreased nursing satisfaction. During the high-quality nursing period, nursing interventions started from the preoperative to the postoperative period, and the nursing operation was professionally standardized. Therefore, the patients were more satisfied with nursing interventions [10].

5. Conclusion

In short, high-quality operating room nursing intervention for orthopedic aseptic surgery patients can significantly reduce the incidence of incision infection, reduce the stress response caused by surgery, shorten the duration of surgery and length of stay, and improve the satisfaction of patients towards the nursing care. However, the number of samples of aseptic orthopedic surgery patients included in the study is small, and the measures of nursing intervention in the operating room for patients with aseptic orthopedic surgery still need to be studied.

Disclosure statement

The author declares no conflict of interest.

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