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Original Article

Effect of care bundles on postoperative pain, negative emotions, and self-care ability of patients with acute dacryocystitis

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Abstract: Aim: This study aimed to investigate the effect of care bundles on the postoperative pain, negative emotions, and self-care ability of patients with acute dacryocystitis. Methods: We recruited 103 patients with acute dacryocystitis undergoing surgery in our hospital from July 2018 to October 2019 in this study. Among them, 55 patients received care bundles (the research group, RG) and the other 48 received conventional care (the control group, CG). The two groups were compared in response rate, Self-Rating Anxiety Scale (SAS), Self-Rating Depression Scale (SDS), and Exercise of Self-Care Agency Scale (ESCA) before and after nursing interventions, as well as postoperative Visual Analogue Scale (VAS), MOS 36-item short-form health survey (SF-36), and patient satisfaction rate. Results: After the care, the RG had a markedly higher response rate than the CG. No significant differences were found in SAS and SDS scores between the two groups before nursing care, and lower scores were found in the RG after the care. There was no significant difference in VAS scores before nursing care, and the RG showed higher scores than the CG after the care. There was no significant difference in self-care skills, self-care responsibility, self-concept, health knowledge, and self-care ability between the two groups before nursing care, but they all increased after the care. Markedly higher scores of SF-36 and a higher patient satisfaction rate were observed in the RG after the care. Conclusion: Care bundles can enhance the self-care ability of patients with acute dacryocystitis after surgery, reduce pain intensity, relieve negative emotions, improve quality of life, and increase patient satisfaction with nursing care.

Keywords: Care bundles, acute dacryocystitis, negative emotions, self-care ability

Introduction

Acute dacryocystitis, a common ocular infectious disease occurring in the lacrimal system, it is induced by edema, stenosis and even obstruction of the lacrimal canaliculus, fluid retention in the lacrimal sac, and increased pressure in the cyst cavity, which lead to cellulitis and skin abscess to form a dacryocystic fistula [1-3]. Clinical symptoms of acute dacryocystitis mainly include pus in the inner canthus, redness in the lacrimal sac, local tenderness, or increased body temperature and swollen preauricular lymph nodes on the same side of the affected eye [4, 5]. Streptococcus pneumoniae, Streptococcus hemolyticus, Staphylococcus aureus, and Haemophilus influenza are common pathogens of acute dacryocystitis [6], which, if not treated effectively and timely, may easily induce orbital cellulitis, and even life-threatening abscesses, sepsis, and septicemia in patients with low immunity and poor infection control [7, 8]. Acute dacryocystitis is usually treated with systemic antibacterial drugs, followed by external-dacryocystorhinostomy (External-DCR) when the inflammation has completely subsided [9]. External-DCR can effectively relieve symptoms like epiphora and pus, but it has disadvantages of severe trauma, heavy bleeding, slow postoperative pain relief, and scar formation in the lacrimal sac area [10, 11]. Advancements of medical technology have encouraged the wide application of nasal endoscopy dacryocystorhinostomy, making it the predominant surgical method for the treatment of acute dacryocystitis [12]. In addition to effective surgical treatment, perioperative care is also a necessary measure to improve the

treatment effect and postoperative recovery [13].

In recent years, the continuous popularization of evidence-based medicine in clinical practice has revealed the increasing importance of "evidence-based practice guidelines" in modern medical care [14, 15]. Care bundles refer to a set of nursing interventions in which every element has been verified by clinical practice, which, when used together, can be more effective than any single intervention to reduce the incidence of complications and improve patient outcomes and prognoses [16, 17]. Previous studies have found that care bundles can achieve favorable results in improving the treatment outcomes and quality of life of patients with malignant tumors, craniocerebral injuries, and those admitted to the intensive care units (ICU) [18-21]. However, there are few studies on care bundle application to surgically treated acute dacryocystitis.

In this study, we assigned patients with acute dacryocystitis undergoing surgery to receive care bundles or conventional nursing and investigated the effect of this nursing model on postoperative pain, negative emotions, and self-care ability of patients.

Materials and methods

Basic information

We randomly assigned 103 patients with acute dacryocystitis who were admitted to The First Affiliated Hospital of Chongqing from July 2018 to October 2019 to receive care bundles (55 cases, the research group, RG) or conventional care (48 cases, the control group, CG). The RG was comprised of 18 males and 37 females, aged from 24 to 65 years, with an average age of (52.31 ± 3.85) years. The CG was comprised of 16 males and 32 females, aged from 22 to 63 years, with an average age of (52.86 ± 4.05) years.

Inclusion and exclusion criteria

Inclusion criteria: (1) Patients meeting the diagnostic criteria for acute dacryocystitis [22]; (2) Patients with one eye affected by acute dacryocystitis; (3) Patients with a history of chronic dacryocystitis; (4) Patients with no contraindications to surgery; (5) Patients with complete clinical data; (6) Patients who and whose families signed the written informed consent. This study has obtained ethical approval from the ethics committee of our hospital.

Exclusion criteria: (1) Patients suffering from severe hypertension or cardiovascular disease; (2) Patients with severe liver or kidney dysfunction; (3) Patients suffering from severe coagulation abnormalities or blood system diseases; (4) Patients with a history of eye or nasal surgery; (5) Patients with impaired cognitive, verbal, or hearing functions; (6) Patients with mental illness or a family history of mental illness; (7) Patients who withdrew from the study.

Nursing methods

Patients in the CG received conventional care. Nursing staff introduced routine health knowledge, monitored postoperative conditions and vital signs of patients, instructed about medication and basic life care, guided patients for preventions of postoperative infections and other complications, and designed healthy diet plans.

Patients from the RG received care bundles.

(1) A nursing team was built for care bundles: Team members searched through computers, the Internet, and relevant literature to evaluate the clinical practicability, authenticity, and patient needs of evidence-based nursing interventions, and then designed reasonable perioperative care measures for patients with surgically treated acute dacryocystitis.

(2) Professional skill improvement of nursing staff: Nurses were regularly trained to improve their mastery of core nursing skills, and awareness of aseptic operation. Also, nurses analyzed their deficiencies actively to improve their professional competence, enrich their nursing knowledge, and standardize the nursing process.

(3) Comprehensive health education: After admission, nurses took the initiative to distribute disease-related health knowledge manuals to patients and their families, and regularly organized instruction to teach the contents of the manuals. Any questions raised by patients and their families were patiently answered to ensure their better understanding of acute dacryocystitis and higher self-care ability.

(4) Comprehensive psychological care: Nurses implemented comprehensive psychological care to ease the negative emotions of each patient. Patients were given information about the advantages of nasal endoscopy dacryocystorhinostomy in a way that met their cultural and social backgrounds. The explanation by nurses was positive and optimistic to encourage and motivate patients. Nurses introduced convincing and successful cases of similar operations to patients to inspire their treatment initiative and optimism. Also, nurses shared pictures of typical cases with the same disease to explain the recovery process to improve patients' confidence in the recovery, relieve their worries about surgery, eliminate negative emotions, reduce psychological pressure, and encourage patients to receive surgery with a positive attitude.

(5) Comprehensive patient monitoring and nursing: After surgery, the semi-recumbent position with an elevation of the head-of-bed to 30-45° was recommended to facilitate drainage of secretions in the surgical cavity, reduce risks of local congestion and bleeding of the wound, and relieve nasal mucosa edema. Postoperative vital signs, nasal bleeding, exudate, wound oozing and pain in patients were closely monitored. After the operation, the nasal cavity was filled with an expanding sponge, in which case a small amount of bleeding and exudate was normal. Nurses instructed patients to blow their noses softly and control sneezing through ways such as pressing the tongue against the upper jaw and breathing deeply. Patients were required to avoid eating hot food to prevent bleeding from nasal vasodilation. In the cases of extensive oozing, nurses comforted patients carefully and gave them nitrofurazone and ephedrine nasal drops to stop bleeding by achieving vasoconstriction of the mucosal blood vessels. Patients kept their heads down and nostrils up for 3-5 minutes when nitrofurazone and ephedrine nasal drops were used to facilitate the full penetration of the medicine.

(6) Comprehensive pain care: Nurses detailed care interventions for postoperative pain and suggested patients to distract attention from the pain by listening to their favorite operas or music and seeking companionship of family members, thereby achieving pain relief. Patients with unbearable pain were given analgesics as prescribed by the doctor.

(7) Comprehensive care for irrigating nasal cavity and lacrimal duct: Postoperative irrigation and drainage, rational use of drugs, and cleaning of local hyperplasia are the three main measures to prevent adhesion and ostomy closure after surgery. Nasal cavity dressing was changed 3-6 days after surgery to clear blood crust and hyperplastic granulation tissue. One week after surgery, the nasal cavity was rinsed with normal saline to flush blood clots and secretions, and budesonide nasal spray was used to relieve mucosal edema. In the first week after surgery, the lacrimal duct was washed with 10 drops of tobramycin and dexamethasone eye drops and 10 mL of normal saline, were given once a day, and the patency of the lacrimal duct was assessed. The systematic use of antibiotics lasted for 5-7 days after the surgery and then patients received routine blood tests 7 days after the surgery.

(8) Comprehensive discharge guidance: Nurses stressed the importance of the re-examination before discharge and wrote the time of the re-examination in the discharge record. During the first month after discharge, the lacrimal duct of each patient was rinsed with 10 mL of normal saline plus 10 drops of tobramycin and dexamethasone eye drops once a week and the patency of the lacrimal duct was assessed. The nasal crust, secretions, and hyperplastic granulation tissue were cleaned up under the nasal endoscopy. During the second month after discharge, the lacrimal duct was flushed once every two weeks with normal saline. During the three to the sixth months after discharge, flushing was carried out once every month. Patients were instructed to keep the eyes clean and avoid rubbing the eyes hard to prevent bacterial infections. Nurses advised patients to stop eating spicy food and follow a healthier diet consisting of more fresh vegetables, fruits, and high-quality protein foods. Besides, nurses required patients to avoid blowing the nose or sneezing too hard, keep warm, and quit swimming for six months.

Outcome measures

(1) The overall response rates in the two groups: A complete response refers to disappearance of clinical symptoms and an unobstructed lacrimal duct to allow the saline to flow out of the mouth and nasal cavity during flushing, with no tears, pus, local redness, nor pain. A moderate response refers to few clinical

Table 1. Basic information of all patients [n (%)] ($\bar{x}$ ± sd)

Factors	Research group (n = 55)	Control group (n = 48)	t/X^2	P
Sex			0.004	0.948
Male	18 (32.73)	16 (33.33)		
Female	37 (67.27)	32 (66.67)		
Age (year)	52.31 ± 3.85	52.86 ± 4.05	0.705	0.481
BMI (kg/m^2)	23.75 ± 3.12	24.02 ± 3.28	0.427	0.669
Course of disease (month)	9.15 ± 1.27	9.26 ± 1.32	0.430	0.667
Side of the affected eye			0.450	0.501
Left	25 (45.45)	25 (52.08)		
Right	30 (54.55)	23 (47.92)		
Marital status			0.505	0.477
Married	39 (70.91)	37 (77.08)		
Unmarried	16 (29.09)	11 (22.92)		
Place of residence			0.199	0.655
Urban area	23 (41.82)	18 (37.50)		
Rural area	32 (58.18)	30 (62.50)		
Ethnicity			0.767	0.381
Han nationality	42 (76.36)	40 (83.33)		
Minority nationality	13 (23.64)	8 (16.67)		
Educational degree			0.325	0.568
≥ high school	29 (52.73)	28 (58.33)		
< high school	26 (47.27)	20 (41.67)		
Smoking history			0.014	0.903
Yes	12 (21.82)	10 (20.83)		
No	43 (78.18)	38 (79.17)		
Drinking history			0.583	0.444
Yes	20 (36.36)	21 (43.75)		
No	35 (63.64)	27 (56.25)		
Hypertension history			0.523	0.469
Yes	18 (32.73)	19 (39.58)		
No	37 (67.27)	29 (60.42)		

symptoms and a partially obstructed lacrimal duct to allow a small amount of saline to flow out of the mouth and nasal cavity during flushing, and partial reflux was seen, with mild redness and tenderness in local area, without any regurgitation of pus. No response refers to unimproved clinical symptoms and a severely obstructed lacrimal duct which allows no saline to flow out of the mouth and nasal cavity during flushing, with obvious redness, swelling, pain, and pus. The overall response rate = (case number of complete responses + case number of moderate responses)/total number of cases × 100%.

(2) Scores of the Self-Rating Anxiety Scale (SAS) and the Self-Rating Depression Scale (SDS) [23]: The anxiety and depression of patients before and after nursing intervention was assessed by the SAS and SDS. In the SAS, a higher score suggests a higher degree of anxiety: A score of 50-70 out of 100 indicates mild anxiety, 71-90 indicates moderate anxiety, and higher than 90 indicates severe anxiety. In the SDS, a higher score suggests a higher degree of depression: A score ranging from 50 to 70 out of 100 indicates mild depression, from 71 to 90 indicates moderate depression, and higher than 90 indicates severe depression.

(3) Scores of the self-care ability of patients: The self-care ability of patients before and after nursing intervention was assessed by the Exercise of Self-Care Agency Scale (ESCA) [24]. ESCA is a 5-point scale consisting of 43 items that evaluate the self-care ability from 4 dimensions: self-care skills, self-care responsibility, self-concept, and health knowledge. A higher score indicates stronger self-care ability.

(4) Scores of the Visual Analogue Scale (VAS) [25]: The pain intensity of patients 6 hours after surgery was evaluated by the VAS. A score of 0 indicates no pain, 1-3 indicates mild pain, 4-6 indicates moderate pain, and 7-10 indicates severe pain. A higher score indicates higher pain intensity.

(5) Scores of quality of life of patients: The quality of life of patients after nursing intervention was assessed by the MOS 36-item short-form health survey (SF-36) developed by the Institute of Medicine [26]. SF-36 includes 8 items: general health, physiological functioning, role-physical, bodily pain, vitality, social functioning, role-emotional, and mental health, with each item assessed on a 0-100 scale. A higher score indicates a better quality of life.

Table 2. Treatment responses in the two groups [n (%)]

Groups	Complete response	Moderate response	No response	Overall response rate
Research group (n = 55)	38 (69.09)	13 (23.64)	4 (7.27)	51 (92.73)
Control group (n = 48)	24 (50.00)	11 (22.92)	13 (27.08)	35 (72.92)
χ^2	-	-	-	7.299
P	-	-	-	0.007

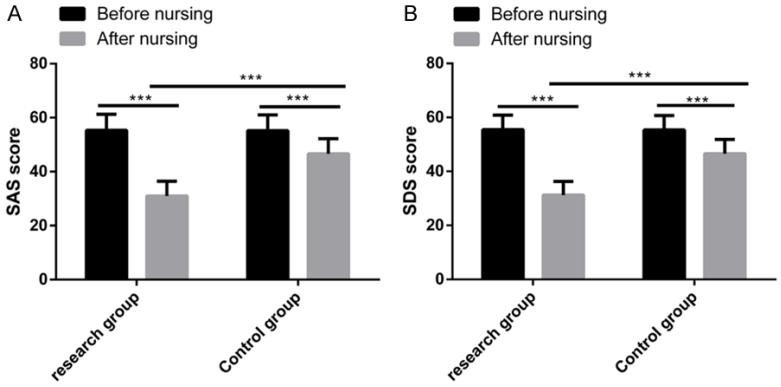

Figure 1. SAS and SDS scores in the two groups. A. There was no significant difference in SAS scores before nursing. After nursing, the SAS scores significantly decreased in both groups, with a markedly lower SAS score in the RG than in the CG. B. There was no significant difference in SAS and SDS scores before nursing. After nursing, the SDS scores significantly decreased in both groups, with a markedly lower SDS score in the RG than in the CG. Note: ***P < 0.001.

(6) Patient satisfaction: Patient satisfaction with the care was assessed by the Satisfaction Questionnaire compiled by our hospital. It is comprised of 20 questions, 5 points for each question. A total score of fewer than 70 points indicates dissatisfaction; a score ranging from 70 to 89 points indicates moderate satisfaction; a score equal to or more than 90 points indicates great satisfaction. Satisfaction rate = (number of cases with moderate satisfaction + great satisfaction)/total case number × 100%.

Statistical analysis

Statistical analysis was performed on SPSS 24.0 (IBM Corp, Armonk, NY, USA) and data visualization on GraphPad Prism 7. The count data were represented by the [n (%)] and compared between the two groups using the chi-square test. When the theoretical frequency in the chi-square test was less than 5, the continuity correction was adopted in chi-square test. The measurement data were represented by the mean ± standard deviation ($\bar{x}$ ± sd) and compared between the two groups using the independent samples t-test. The paired t-test was used for the comparison between before and after nursing within the group. The difference was statistically significant when P < 0.05.

Results

Comparison of basic data

There was no significant difference in sex, age, BMI, course of disease, side of the affected eye, marital status, place of residence, ethnicity, educational degree, smoking history, drinking history, and hypertension history between the two groups (P > 0.05). More details are shown in **Table 1**.

Comparison of overall response rate

The overall response rate was markedly higher in the RG than in the CG after nursing (92.73% vs. 72.92%, P < 0.05). More details are shown in **Table 2**.

Comparison of SAS and SDS scores

There was no significant difference in SAS and SDS scores before nursing. After nursing, the scores significantly decreased in both groups, with markedly lower scores in the RG than in the CG. More details are shown in **Figure 1**.

Comparison of ESCA scores

Before nursing, the differences between the two groups in scores of self-care skills, self-care responsibility, self-concept, health knowledge, and the total ESCA score were not significant. After nursing, scores of the four dimensions and the total ESCA score significantly increased in both groups, with markedly higher scores in the RG than in the CG. More details are shown in **Figure 2**.

Comparison of VAS scores

There was no significant difference in VAS scores before nursing. After nursing, the VAS

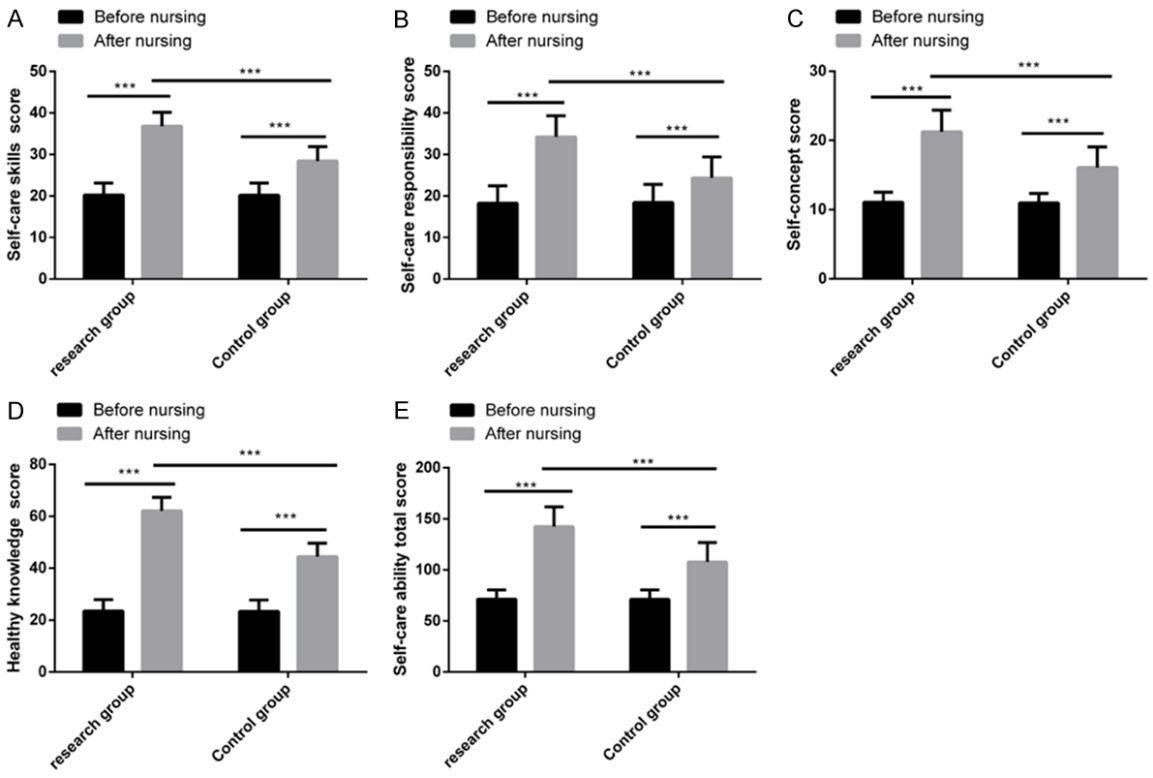

Figure 2. ESCA scores in both groups. A. Before nursing, the comparison between the two groups showed no significant differences in the self-care skill score. After nursing, the self-care skill scores remarkably increased in both groups, with a markedly higher self-care skill score in the RG than in the CG. B. Before nursing, the comparison between the two groups showed no significant differences in the self-care responsibility score. After nursing, the self-care responsibility scores remarkably increased in both groups, with a markedly higher self-care responsibility score in the RG than in the CG. C. Before nursing, the comparison between the two groups showed no significant differences in the self-concept score. After nursing, the self-concept scores remarkably increased in both groups, with a markedly higher self-concept score in the RG than in the CG. D. Before nursing, the comparison between the two groups showed no significant differences in the health knowledge score. After nursing, the health knowledge scores remarkably increased in both groups, with a markedly higher health knowledge score in the RG than in the CG. E. Before nursing, the comparison between the two groups showed no significant differences in the total self-care ability score. After nursing, the total self-care ability scores remarkably increased in both groups, with a markedly higher total self-care ability score in the RG than in the CG. Note: ***P < 0.001.

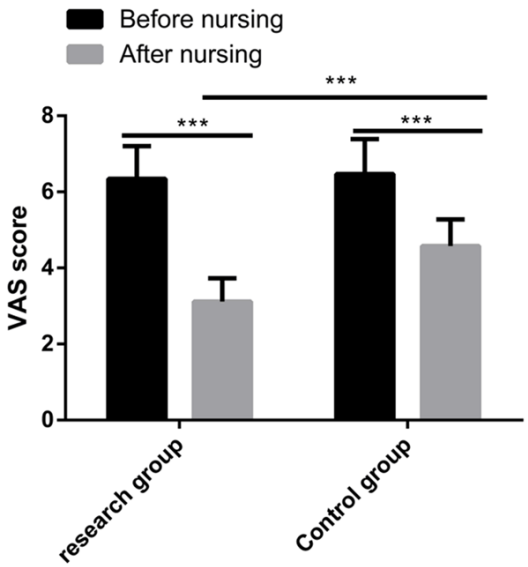

Figure 3. VAS scores in the two groups. There was no significant difference in VAS scores before nursing. After nursing, the scores 6 hours after surgery were markedly lower in the RG than in the CG. Note: ***P < 0.001.

scores decreased in both groups 6 hours after surgery, and scores in the RG were lower than in the CG. More details are shown in **Figure 3**.

Comparison of quality of life scores

After nursing, the scores of general health, physiological functioning, role-physical, bodily pain, vitality, social functioning, role-emotional, and mental health were markedly higher in the RG than in the CG. More details are shown in **Figure 4**.

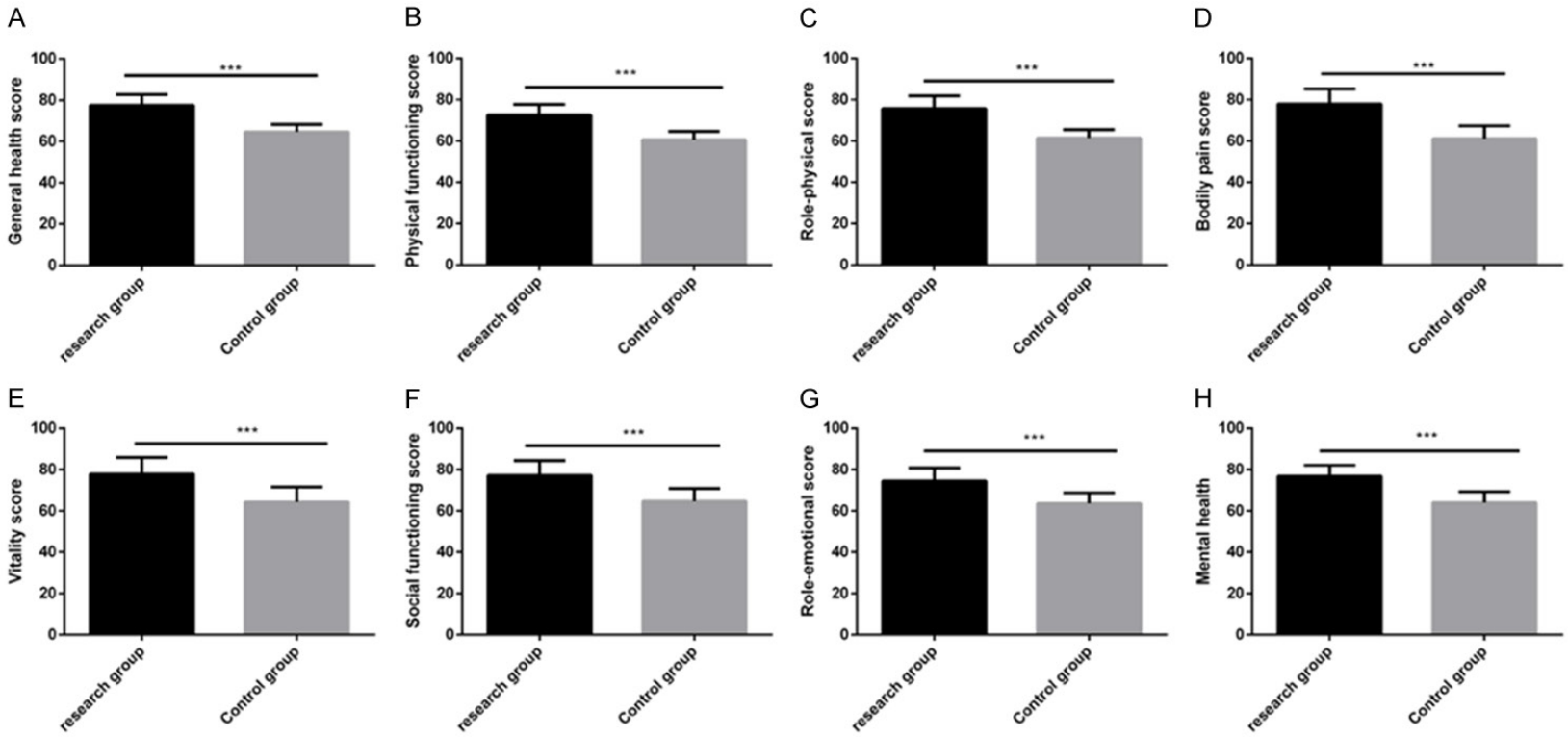

Figure 4. Quality of life scores in the two groups. A. The score of general health was higher in the RG than in the CG. B. The score of physical functioning was higher in the RG than in the CG. C. The score of role-physical was higher in the RG than in the CG. D. The score of bodily pain was higher in the RG than in the CG. E. The score of vitality was higher in the RG than in the CG. F. The score of social functioning was higher in the RG than in the CG. G. The score of role-emotional was higher in the RG than in the CG. H. The score of mental health was higher in the RG than in the CG. Note: ***P < 0.001.

Table 3. Nursing satisfaction levels in the two groups [n (%)]

Levels	Research group (n = 55)	Control group (n = 48)	χ^2	P
Great satisfaction	36 (65.46)	13 (27.08)	-	-
Moderate satisfaction	14 (25.45)	17 (35.42)	-	-
Dissatisfaction	5 (9.09)	18 (37.50)	-	-
Satisfaction rate	50 (90.91)	30 (62.50)	11.930	0.0006

Comparison of patients satisfaction rates

The patient satisfaction rate was markedly higher in the RG than in the CG (90.91% vs. 62.50%). More details are shown in **Table 3**.

Discussion

Acute dacryocystitis is a common and frequently emergency disease seen in ophthalmology. With a rapid onset and quick progression, acute dacryocystitis is prevalent in rural areas, more common in females than in males, and its incidence increases with age [27]. Systemic and local anti-infection measures are the predominant treatment regimen for acute dacryocystitis to control acute inflammation, followed by External-DCR surgery [28]. With deeper understanding of acute dacryocystitis and in-depth studies of naso-orbital diseases and related operations have inspired new treatment options [29]. Acute dacryocystitis can be treated with surgery at the early stage. However, all surgery regimens are traumatic and cause a serious impact on the health and quality of life of patients who, as mostly older adults, have other chronic diseases, poor physical fitness, declined physiological functions, and weakened immunity [30-32]. Therefore, safe and effective perioperative nursing interventions have important clinical significance. In the present study, we provided care bundles to patients with acute dacryocystitis undergoing surgery to explore its application value.

Only a few studies have investigated postoperative nursing interventions for patients with dacryocystitis. Chen and Lui [33] suggest that comprehensive nursing care can enhance the treatment efficacy and safety in patients with chronic dacryocystitis treated with nasal endoscopy dacryocystorhinostomy, improve the quality of life, and reduce postoperative complications. In a study by Lavallee JF et al. [34], patients admitted to the ICU receiving care bundles showed markedly better prognosis and quality of life than patients receiving conventional care. In the present study, the overall response rate was markedly higher in the RG than in the CG, indicating that care bundles can significantly improve the response rate of patients, which is similar to the results of the study by Chen and Lui [33]. The improvement in the response rate in patients receiving care bundles may be contributed to by the implementation of evidence-based nursing measures. A lot of literature that we collected have implemented different nursing measures, such as personalized introduction of disease knowledge during the perioperative period, postoperative psychological care, and postoperative prevention of complications, which significantly improves the treatment efficacy in patients. The study of Morton K et al. [35] shows that care bundles significantly enhance the quality of life and reduce the rate of readmission in patients with chronic obstructive pulmonary disease. Tanner J et al. [36] suggest that care bundles can remarkably reduce the risk of surgical site infections in patients undergoing colorectal surgery. In the present study, the SAS and SDS scores were markedly lower in the RG than in the CG, indicating that care bundles can significantly alleviate negative emotions of patients because comprehensive psychological care in care bundles relieves perioperative anxiety and depression in patients. Lowe J et al. [37] proposes that care bundles can remarkably enhance the quality of life of diabetic female patients and reduce their medical costs. In this study, the quality of life scores were markedly higher in the RG than in the CG, indicating that care bundles can improve the quality of life of patients, which is similar to the results of Lavallee JF et al. and Lowe J et al. [34, 37]. Also, the scores of the four dimensions of the self-care ability were markedly higher in the RG than in the CG, suggesting an improvement of the self-care ability of patients by comprehensive health education and postoperative guidance in care bundles. This study marks the first to evaluate the self-care ability of patients with acute dacryocystitis, which contributes to the recovery and prognosis of patients. The VAS scores 6 hours after surgery were markedly lower in

the RG than in the CG, indicating that postoperative pain care achieves good pain relief for patients. Naik SM et al. [38] suggests that high-quality care can significantly relieve postoperative pain and reduce the VAS scores 24 hours after surgery in patients with acute dacryocystitis undergoing nasal endoscopy dacryocystorhinostomy, which is similar to our findings. We also assessed patient satisfaction with nursing and noted a markedly higher satisfaction rate in the RG than in the CG, indicating that patients are more willing to accept care bundles and that nurses involved in care bundles have better nursing skills. Care bundles have also been reported to significantly enhance the patient satisfaction and nursing quality in patients admitted to the emergency department, which is similar to our results [39].

This study confirmed the benefits of care bundles for patients with acute dacryocystitis, but there are some deficiencies. For example, we did not assess the treatment compliance, nor did we analyze risk factors for poor prognosis of acute dacryocystitis. We will address such problems in the future to perfect this study.

In summary, care bundles applied to patients with acute dacryocystitis undergoing surgery can increase the overall response rate, improve the self-care ability, relieve postoperative anxiety and depression, reduce postoperative pain intensity, enhance the quality of life, and improve patient satisfaction.

Disclosure of conflict of interest

None.

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