Value Analysis of the of ABCDE Bundle-based Eye Care in the Prevention of Keratitis in ICU Critically Ill Patients

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Abstract: To analyze the value of eye care based on ABCDE clustering strategy in the prevention of keratitis in ICU critically ill patients. Method: From July 2024 to July 2025,60 critically ill patients admitted to ICU in our hospital were selected as the research objects. According to different nursing modes, they were divided into control group and observation group, with 30 cases in each group. The control group was given routine nursing, and the observation group was given eye nursing based on ABCDE clustering strategy. The incidence of keratitis was compared between the two groups. Results: The incidence of keratitis in the observation group was 6.67 % (2/30), and the incidence of keratitis in the control group was 26.67 % (8/30). Compared between groups, the observation group was lower, $X2 = 4.320$, $P < 0.05$. Conclusion: The application of eye care based on ABCDE clustering strategy in the prevention of keratitis in ICU critically ill patients is helpful to reduce the incidence of keratitis.

***Keywords*:** ABCDE clustering strategy; eye care; ICU critically ill patients; keratitis

1. Introduction

Patients admitted to the intensive care unit (ICU) are mostly critically ill patients, often due to disturbance of consciousness, sedation, analgesia, mechanical ventilation and other reasons lead to incomplete eyelid closure or blink reflex weakened, is exposed keratitis, infectious keratitis and other eye complications of high-risk groups [1-2]. If these patients fail to receive timely and effective intervention, the incidence of keratitis can reach 20 % -60 %. The occurrence of keratitis can cause corneal ulcer, perforation, and even permanent visual impairment, which seriously affects the quality of life of patients and is not conducive to the improvement of their prognosis. Routine nursing relies on the work experience of nursing staff, insufficient attention to keratitis, and the lack of systematic standards in the nursing process, and the intervention effect is not good. Cluster nursing is a kind of nursing mode commonly used in clinic. Based on the theory of evidence-based medicine, its clinical application aims to improve the clinical outcome of patients [3-4]. ABCDE cluster nursing was initially applied to the management of delirium prevention in critically ill patients. It has systematic and sequential characteristics. In recent years, it has been tried to apply to the prevention of other complications in critically ill patients. The ABCDE bundle includes five steps: A (Assessment), B (Basic Cleaning), C (Closure & Protection), D (Dynamic Monitoring), E (Education & Evaluation). It aims to provide comprehensive and seamless eye protection for such patients. [5]. Based on this, this study further analyzed the value of eye care based on ABCDE clustering strategy in the prevention of keratitis in ICU critically ill patients.

2. Data and Methods

2.1 General information

The subjects of this study were 60 critically ill patients admitted to the ICU of our hospital from July 2024 to July 2025. According to different nursing modes, they were divided into control group and observation group, with 30 cases in each group. In the control group, there were 19 males and 11 females; the age was 54-69 years old, with an average of (59.89 ± 0.41) years old. In the observation group, there were 17 males and 13 females; the age was 52-69 years old, with an average of (59.71 ± 0.45) years old. There was no significant difference in general data between the two groups ($P > 0.05$).

2.2 Inclusion and exclusion criteria

Inclusion criteria: (1) ICU mechanical ventilation time less than 2 days; (2) Glasgow coma scale (GCS) score < 12 points, or agitation-sedation scale (RASS) score ≤ -2 points; (3) Family members know the research content and sign the consent form.

Exclusion criteria: (1) There was keratitis before admission to ICU; (2) Abnormal anatomical structure of eyelid; (3) The estimated survival time was less than 72 hours.

2.3 Methods

The control group received routine eye care. Methods: The nursing staff wiped the eyelids and surrounding skin with cotton balls soaked in normal saline every day, and wiped them in the order of inner canthus to outer canthus twice a day. At the same time, follow the doctor's advice for patients to use artificial tears. The observation group was treated with eye care based on ABCDE cluster strategy. Methods: (1) In the evaluation stage, within 2 hours after the patient entered the ICU, the patient's state of consciousness, eyelid closure, and eye reflex were evaluated, and the corneal gloss was observed. The traits and quantities of secretions were evaluated every 8 hours. (2) In the basic cleaning stage, strictly implement the eyelid cleaning operation, 'one towel one eye', use a special eye cleaning wipes when cleaning the eyelids, and clean the eyelids and surrounding skin in the order of 'from the inner canthus to the outer canthus, from top to bottom'. If the patient's eyelid secretions more, you can increase the number of cleaning. (3) In the stage of closure and protection, if the width of palpebral fissure is more than 2mm after evaluation, it can be evaluated that there is incomplete eyelid closure, and corresponding intervention measures should be taken, mainly including: physical closure of eyelid. The patient's upper eyelid was gently lifted to cover the lower eyelid, and the middle of the lower eyelid was horizontally pasted with medical paper tape to avoid compression on the eyeball. If the patient's local skin is sensitive, eye gel can be used to cover the cornea and then close the eyelid. If the patient's eyelid closure is more serious, the silicone eye mask can be used to protect the eye, once a day, 4-6h each time, and artificial tears are dripped on the surface of the eyeball. (4) In the dynamic monitoring stage, the nursing staff of each shift filled in the 'ICU patient eye care observation record sheet', and recorded the eye care content and the patient's condition changes in detail. The head nurse evaluates the intervention effect once a day. If the corneal condition score increases, or the secretion increases, the nature changes, etc., ophthalmic consultation should be required to formulate a treatment plan.(5) In the stage of education and evaluation, ICU nurses were trained regularly, including the specific content of ABCDE cluster strategy eye care, the causes and influencing factors of keratitis in critically ill patients in ICU. The nursing work was summarized every week, the existing problems were analyzed, and the nursing plan was optimized accordingly. At the same time, nursing staff explained the necessity of eye care for patients.

2.4 Observation indicators

The incidence of keratitis was compared between the two groups. The diagnostic criteria of keratitis: corneal fluorescein staining was positive, and the patient had increased secretions, congestion, and pain reactions.

2.5 Statistical analysis

SPSS25.0 statistical software was used for data analysis, and the normality test was used. The data met the normal distribution. The measurement data were expressed as ($x \pm s$), and the t test was performed. The count data were expressed as a percentage (%), and the chi-square (X2) test was performed. $P < 0.05$ was considered statistically significant.

3. Results

The incidence of keratitis in the observation group was 6.67 % (2/30), and the incidence of keratitis in the control group was 26.67 % (8/30). Compared between groups, the observation group was lower, $X2 = 4.320$, $P < 0.05$.

4. Discussion

The lack of attention to eye care in ICU critical care nursing in the past has led to keratitis becoming a relatively high incidence of complications in such patients. Strengthening eye care for critically ill patients admitted to ICU is of great significance, which is conducive to reducing the incidence of keratitis and avoiding affecting the recovery effect of patients. Standardized eye care for ICU patients is essentially a "quality of life" beyond "life-saving", and is an indispensable part of holistic and humanized care. This study mainly analyzes the value of eye care based on ABCDE clustering strategy in the prevention of keratitis in ICU critically ill patients. The core value of this eye care model is to systematize and streamline evidence-based measures, forming a complete management closed-loop from risk identification to continuous improvement, effectively avoiding the decentralized model of traditional care model relying on the personal experience of nursing staff, and ensuring the reliability of nursing quality. During the implementation of eye care based on ABCDE clustering strategy, it is divided into five stages: (1) A (assessment): to achieve forward-looking risk identification. This stage is the starting point of eye care and belongs to structured assessment. Its clinical application is helpful to screen high-risk patients. The assessment covers neurological status, treatment intervention, eye signs and environmental factors. It will transform clinical observation into objective risk level, which can ensure the accuracy and pertinence of eye care, so as to lay the foundation for subsequent stratified intervention. (2) B (basic cleaning): Maintain ocular surface homeostasis. This stage is the universal protection of eye care, through artificial tears or lubricating eye ointment to compensate for the lack of tears, through the

development of sterile eye secretions to prevent pollution. The above basic nursing measures are to maintain the homeostasis of ocular surface microenvironment, so as to prevent corneal dryness and epithelial injury. (3) C (closure and protection): create a strengthened barrier for high-risk patients. The eye care taken at this stage is highly targeted. High-risk patients are screened out through evaluation. The key measures taken include actively promoting eyelid closure, using medical-grade eyelid closure tape or transparent moisturizing dressing for functional closure, rebuilding physical barrier for patients' ocular surface, and isolating external stimuli. This is the most effective measure to prevent keratitis. (4) D (dynamic assessment): dynamic monitoring, to ensure that abnormal conditions can be handled in time, and take the appropriate early warning mechanism to ensure the continuity of care.(5) E (education and evaluation): At the same time, through team education, the overall implementation ability of the team can be improved, the nursing measures can be implemented smoothly, and the continuous improvement of nursing quality can be ensured. Eye care at this stage can ensure the sustainable development of nursing measures. Through regular training for ICU nurses, the specific content of ABCDE cluster strategy eye care, the inducement and influencing factors of keratitis in ICU critically ill patients, etc., to ensure that nursing staff can master the methods of eye care for patients, recognize the importance and increase vigilance. The application of ABCDE-based cluster strategy in eye care fully confirmed the effective extension of ICU critical care from "disease-centered" to "organ system protection-centered", changed the isolated operation characteristics of previous eye care, and upgraded it to the overall process requiring continuous intervention.

In summary, the application of eye care based on ABCDE clustering strategy in the prevention of keratitis in ICU critically ill patients is helpful to reduce the incidence of keratitis.

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