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Research on the Risk Classification Nursing Model in the Prevention of Pressure Injuries in Critically Ill Patients in ICU

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Abstract: *Objective*: The purpose of the study was to explore the application effect of the risk classification nursing model in the prevention of pressure injury in critically ill patients in the ICU. *Methods*: A total of 186 critically ill patients admitted to the ICU of our hospital from January 2024 to December 2024 were randomly divided into the control group and the observation group according to the time of admission, with 93 cases in each group. Conventional pressure injury prevention nursing measures were used in the control group, while risk classification nursing model was adopted in the observation group. The incidence, staging, time of occurrence, length of hospital stay and nursing satisfaction of pressure injury were compared between the two groups. *Results*: The results showed that the incidence of pressure injury in the observation group was 5.38%, significantly lower than 15.05% in the control group ($p < 0.05$); The proportion of stage I pressure injury in the observation group was higher than that in the control group, and the proportion of stage II and above was lower than that in the control group ($p < 0.05$); The occurrence time of pressure injury in the observation group was later than that in the control group, and the length of hospital stay was shorter than that in the control group ($p < 0.05$); The nursing satisfaction score of the observation group was higher than that of the control group ($p < 0.05$). *Conclusion*: The risk classification nursing model can effectively reduce the incidence of pressure injury in critically ill patients in the ICU, delay the occurrence time, shorten the length of hospital stay, and improve nursing satisfaction. It is worthy of clinical promotion and application.

Keywords: Risk-graded nursing; ICU; Critical care; Pressure injury; Preventive effects

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1. Introduction

Pressure injury is one of the common complications for critically ill patients in the ICU. It not only adds to the patient's suffering and prolongs the hospital stay, but also significantly increases the medical burden. ICU patients are at high risk of stress injury due to long-term bed rest, consciousness disorders, hemodynamic instability, poor nutritional status, etc. Conventional preventive care mostly follows a uniform standard, lacking specificity and

dynamics, and fails to meet the individualized needs of patients at different risk levels. The risk classification nursing model is based on the risk assessment results of patients and adopts a stratified and differentiated management approach to preventive measures for patients, with the aim of optimizing nursing resources. This paper mainly studies the application effect of the risk classification nursing model in the prevention of pressure injury in critically ill patients in the ICU, providing a basis for clinical nursing practice [1].

2. Data and methods

2.1. General information

186 critically ill patients admitted to our ICU from January 2024 to December 2024.

2.1.1. Inclusion criteria

Age at least 18 years; Stay in the ICU for at least 48 hours; Braden score less than or equal to 18; The patient or family member gave informed consent to participate in this study.

2.1.2. Exclusion criteria

Pressure injury at admission, skin disease affecting skin observation, and extremely critical condition with an expected survival time of less than 48 hours.

2.1.3. Study design

A total of 93 patients admitted from January 2022 to December 2022 were divided into the control group, and 93 patients admitted from January 2023 to December 2023 were divided into the observation group in order of admission time. There were 52 males and 41 females in the control group, aged 28–79 years, with an average age of (56.83 ± 12.47) years; APACHEII score (18.64 ± 4.32) points; Braden score (12.35 ± 2.18) points. There were 54 males and 39 females in the observation group; The age ranged from 26 to 81 years, with an average age of (57.21 ± 13.05) years; APACHEII score (18.92 ± 4.57) points; Braden score (12.18 ± 2.34) points. There was no statistically significant difference ($p > 0.05$) in general information such as gender, age, APACHEII score and Braden score between the two groups of patients, and they were comparable [2].

2.2. Methods

The control group received conventional pressure injury prevention care measures such as turning over every 2 hours, keeping the bed unit clean and dry, using an air cushion bed, placing a soft pillow on the bony protrusion for decompression, enhancing nutritional support, and observing and recording the skin condition.

The observation group adopted a risk-graded care model with the following measures.

(1) Risk assessment

Within 2 hours after admission to the ICU, patients were evaluated using the Braden Scale, which included six aspects: sensation, moisture, mobility, nutritional status, friction, and shear force, with a total score of 6 to 23. According to the Braden score, patients were divided into the low-risk group (15–18 points), the medium-risk group (13–14 points), the high-risk group (10–12 points), and the extremely high-risk group (≤ 9 points). Assess twice a week and reassess and adjust the risk level at any time if the condition changes.

(2) Graded care measures

The low-risk group takes basic preventive measures such as using standard mattresses, turning over every 2–3 hours, keeping the skin clean and dry, guiding patients to move actively, and nutritional screening and support. The medium-risk group, on top of the low-risk group, added the use of decompression dressings to protect bony protrusions (sacrococcygeal region, heel, etc.), the use of alternating inflatable mattresses, turning over every 2 hours, and enhanced skin observation. The high-risk group turned over every 1–2 hours on top of the medium-risk group, used high-specification decompression mattresses, used foam dressings preventatively on key areas, conducted a comprehensive daily skin assessment, and strengthened position management (30° lateral position). The very high-risk group turned over every hour on top of the high-risk group, with a multidisciplinary team intervention (doctors, nutritionists, wound therapists), continuous low-pressure turning beds, microenvironment management (temperature and humidity control), individualized nutritional support plans, and daily recording of changes in pressure injury risk assessment trends.

(3) Quality control

Establish a pressure injury management team, with the head nurse as the team leader, the wound therapist as the technical advisor, and the responsible nurse as the team member. The group is responsible for supervising the implementation of graded nursing measures, conducting a quality inspection once a week, and organizing a specialized training assessment once a month, covering risk assessment skills, the use of new dressings, turning techniques, etc. Establish a continuous improvement mechanism, provide timely feedback and rectification of existing problems to ensure the continuous improvement of nursing quality.[3]

2.3. Observation indicators

(1) Occurrence of pressure injury

The incidence of pressure injury during ICU stay was recorded in both groups of patients, which was classified as stage I, stage II, stage III, stage IV, unstaged, and deep tissue injury according to the 2016 NPUAP pressure injury staging criteria.

(2) Time of occurrence of pressure injury

The time from ICU admission to the first occurrence of pressure injury.

(3) Length of hospital stay

Record the number of days a patient stays in the ICU.

(4) Nursing satisfaction

Evaluation using a self-made nursing satisfaction questionnaire, which included 10 items such as nursing skills, service attitude, health education, psychological support, etc. Each item was scored on a 5-point scale (1–5 points), with a total score of 10–50 points. The higher the score, the higher the satisfaction. The questionnaire was filled out by the patients before they were transferred out of the ICU [4].

2.4. Statistical processing

Data analysis was conducted using SPSS 25.0 statistical software. Measurement data were expressed as mean ± standard deviation ($\overline{x} \pm s$), and independent sample *t*-tests were used for comparisons between groups; Count data were expressed as frequency and percentage (%), and the χ^2 test was used for comparison between groups. $p < 0.05$ was considered statistically significant [5].

3. Result

3.1. Comparison of the incidence of pressure injury between the two groups

The incidence of pressure injury was 5.38% in the observation group, which was lower than 15.05% in the control group. The difference between the two groups was statistically significant ($p < 0.05$). See **Table 1** for details.

Table 1. Comparison of incidence of pressure injury between the two groups [n(%)]

Groups	Number of cases	Pressure injury occurs	No pressure injury occurred
Control group	93	14 (15.05)	79 (84.95)
Observation group	93	5 (5.38)	88 (94.62)
χ^2 value		4.812	
p value		0.028	

3.2. Comparison of staging of pressure injury between the two groups of patients

Of the 5 cases of pressure injuries in the observation group, 4 cases (80.00%) were stage I, 1 case (20.00%) was stage II, and no stage III or higher pressure injuries occurred; Of the 14 cases of pressure injuries in the control group, 6 cases (42.86%) were stage I, 5 cases (35.71%) were stage II, 2 cases (14.29%) were stage III, and 1 case (7.14%) was deep tissue injury. There was a statistically significant difference in the staging distribution of pressure injuries between the two groups ($p < 0.05$).

3.3. Comparison of time of occurrence of pressure injury and length of hospital stay between the two groups of patients

The occurrence time of pressure injury in the observation group was later than that in the control group, and the hospital stay was shorter than that in the control group. The differences between the two groups were statistically significant ($p < 0.05$). See **Table 2** for details.

Table 2. Comparison of time to pressure injury and length of hospital stay between the two groups ($\overline{x} \pm s$)

Groups	Number of cases	Time of occurrence of pressure injury (d)	Length of hospital stay (d)
Control group	93	5.24 ± 1.86	12.58 ± 3.74
Observation group	93	8.37 ± 2.15	9.26 ± 2.83
t value		3.128	4.356
p value		0.004	< 0.001

3.4. Comparison of nursing satisfaction between the two groups

The nursing satisfaction score of the observation group was (45.37 ± 3.28) points, which was higher than that of the control group [(39.84 ± 4.16) points], and the difference between the two groups was statistically significant ($t = 4.925$, $p < 0.001$).

4. Discussion

ICU critically ill patients are a high-risk group for pressure injuries, and there are problems such as poor targeting

and inadequate dynamic adjustment of routine preventive care measures. The risk classification nursing model, based on the risk assessment results of patients, implements stratified and differentiated preventive measures, embodying the idea of precision nursing. According to the research results, the incidence of pressure injuries in the observation group was significantly lower than that in the control group, indicating that this risk-stratified nursing model can effectively reduce the occurrence of pressure injuries in ICU patients. Patients were classified as high-risk and extremely high-risk based on the Braden score, and more intensive and proactive preventive measures were taken for high-risk and extremely high-risk patients, such as shortening the turning interval, using high-specification decompression equipment, and multidisciplinary team intervention, to prevent the occurrence and development of stress injuries at key points.

The staging of pressure injuries reflects the severity of tissue damage. In this study, the majority of pressure injuries in the observation group were stage I, accounting for 80.00%, while in the control group, the proportion of pressure injuries above stage II was 57.14%, with one case of stage III and one case of deep tissue injury. The differences suggest that the risk classification nursing model can reduce the occurrence of pressure injuries and also alleviate the severity of the injuries. Risk-graded care emphasizes early identification, early intervention, preventive dressing protection for high-risk patients, and more frequent skin observation, which can detect and treat pressure injuries while they are still in the reversible stage and prevent the damage from progressing to deep tissues.

The time of occurrence of pressure injury is an indicator for evaluating the preventive effect. Pressure injury occurred later in the observation group than in the control group, indicating that risk classification nursing can delay the occurrence of pressure injury. The risk of ICU patients was assessed immediately upon admission, and corresponding preventive measures were taken based on the risk, providing effective protection during the window period of pressure injury occurrence. The length of hospital stay in the observation group was significantly shorter than that in the control group. The incidence of pressure injury was reduced, the degree of injury was lessened, and the problem of complicated treatment and prolonged hospital stay caused by pressure injury was improved.

Nursing satisfaction is a dimension for evaluating the quality of nursing. The observation group scored higher than the control group in terms of nursing satisfaction, indicating that the risk classification nursing model was recognized by patients. The model emphasizes individualized care, patients feel the targeted and professional nature of the care measures, enhances skin care and health education, improves the effect of nurse-patient communication, and the reduction in the incidence of pressure injuries directly increases patients' trust in the care work.

5. Conclusion

In summary, the risk classification nursing model is based on scientific risk assessment and uses stratified preventive measures to reduce the incidence, occurrence time, injury degree, length of hospital stay of pressure injuries in critically ill patients in the ICU and improve nursing satisfaction. This model has good clinical application value and can be promoted and applied in ICU nursing work. The sample size of this study is small, and subsequent multi-center large-sample studies can be conducted to verify its effect.

Disclosure statement

The author declares no conflict of interest.

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