Original Article
The effect of evidence-based cluster nursing intervention on the incidences of delirium and the prognoses of ICU patients

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Abstract: Objective: This study explored the effect of evidence-based cluster nursing intervention on the incidences of delirium and the prognoses of ICU patients. Methods: 108 ICU patients admitted to our hospital from January 2020 to June 2020 were recruited as the study cohort and randomly divided into a control group and an observation group, with 54 cases in each group. The patients in the control group underwent routine nursing intervention, and the patients in the observation group underwent evidence-based cluster nursing intervention. The incidences of delirium, the durations of the mechanical ventilation, the ICU hospitalization durations, as well as the satisfaction levels in the two groups of patients were compared. Result: The incidences of delirium in the observation group were conspicuously lower than they were in the control group (14.81%, 40.74%, X^2 = 9.0462, P = 0.0026). The duration of the delirium in the observation group was conspicuously lower than it was in the control group (2.87 ± 1.28), (5.21 ± 1.33), t = 9.3155, P = 0.0000. The durations of the mechanical ventilation and the ICU hospitalizations in the observation group were conspicuously shorter than they were in the control group. The differences were statistically significant (P < 0.05). The nursing satisfaction levels in the observation group were conspicuously higher than they were in the control group (94.44%, 72.22%, X^2 = 9.6000, P = 0.0019). There was no significant difference in the in-hospital mortality between the two groups (X^2 = 2.1862, 0.1393). Conclusion: Evidence-based cluster nursing intervention can conspicuously reduce the incidences of delirium, shorten the durations of the mechanical ventilation and the ICU stays, and improve patient prognosis, so it is worthy of clinical application.

Keywords: Evidence-based medicine, cluster nursing intervention, delirium, ICU, prognosis

Introduction

Delirium refers to an acute central nervous system disorder syndrome with cognitive function or attention problems, and is a common complication of ICU patients known as ICU delirium [1]. Delirium in ICU patients leads to increases in the accidental extubation rate and in the incidences of complications such as pressure sores, pulmonary infections, and venous thrombosis. It also prolongs the hospital stay durations, increases the hospitalization costs, and even continues to cause sensory, consciousness, and psychological dysfunction after discharge, which serious affect patient prognosis [2]. According to previous studies, due to the noisy environment in the ICU and the long dura-

tion of the separation between the patients and their families, the patients are prone to negative emotions such as depression and anxiety, and the incidence of delirium is also conspicuously increased and can be as high as 20%-80% [3]. Studies have confirmed that an early diagnosis of delirium in the ICU and the corresponding treatment can conspicuously improve patient prognosis [4, 5]. With the rapid development of evidence-based medicine and the introduction of new nursing concepts, the cluster nursing intervention combines evidence-based medicine theory with nursing measures to carry out the centralized and targeted management of patients with same disease. Research shows that cluster nursing intervention can effectively improve the nega-

Table 1. Comparison of the general data between the two groups

project	Control group (n = 54)	Observation group (n = 54)	X^2/t	P
Gender (male/female, case)	35/19	31/23	0.6234	0.4298
Age (x ± s, years old)	63.57 ± 5.25	63.11 ± 6.14	0.4184	0.6765
Acute physiology chronic health score at ICU (x ± s, score)	13.07 ± 2.13	13.14 ± 2.28	0.1649	0.8694
Barthel index score (x ± s, score)	16.44 ± 9.87	16.13 ± 8.55	0.1745	0.8618

tive emotions of ICU patients such as depression and anxiety [6]. However, there are few studies on the prevention of delirium in the ICU. In this study, we searched and summarized the influencing factors and nursing measures for delirium in the ICU and constructed a cluster evidence-based nursing intervention, which we used in our ICU department. The purpose of this study was to explore and analyze the impact of the evidence-based cluster nursing intervention on incidences of delirium and the prognoses of ICU patients.

Data and methods

General information

108 ICU patients admitted to our hospital from June 2019 to June 2020 were recruited as the study cohort and randomly divided into a control group and an observation group with 54 cases in each group. There were no significant differences in terms of gender, age, acute physiology chronic health score, Barthel index score, or the other general data between the two groups (P > 0.05). The study was carried out under the approval of the ethics committee of our hospital (**Table 1**).

Inclusion and exclusion criteria

Inclusion criteria : (1) All the patients included in the study were critically ill patients who were eligible for ICU admission; [7]; (2) The patients were ≥ 18 years old; (3)The length of the hospital stays and the mechanical ventilation in the ICU were ≥ 24 hours; (4) Patients who were sufficiently conscious to cooperate; (5) Patients or their families who voluntarily participated and who signed the informed consent.

Exclusion criteria: (1) Patients with severe hemodynamic instability or arrhythmia; (2) Patients who had already developed delirium in the ICU; (3) Patients who died on exiting the ICU or who abandoned treatment midway through the treatment.

Method

Mechanical ventilation

Artificial airways were established through tracheal intubation, and mechanical ventilation through tracheal intubation was carried out in both groups. Synchronous intermittent command ventilation (SIMV) + pressure support ventilation (PSV) + positive end-breathing pressure (PEEP) or auxiliary/controlled ventilation (A/C) were used. The tidal volume (VT) was 8~10 L/min, the respiratory rate (RR) was 15~18 times/min, the peak flow rate was 35~65 L/min, the PSV level was 10~15 cmH$_2$O, and the PEEP was 3~6 cmH$_2$O.

The development of an evidence-based cluster nursing intervention scheme

(1) The cluster nursing intervention group was established to determine the clinical problems. The group was made up of one head nurse, five experienced nurses, and three systematic evidence-based training personnel. The evidence-based issues were raised on the basis of international evidence-based medicine formats, and the construction of the nursing problems was as follows: ① whether reducing the stimulation of adverse factors such as noise and light in the ICU ward can reduce the incidence of delirium in the ICU; ② Whether repeated directional stimulation to promote the patients' perception of the ICU ward environment can reduce the incidence of delirium in the ICU; whether correcting the circadian rhythm and the sleep and wake cycle can reduce the incidence of delirium; whether instructing and assisting the patients to conduct early activities suitable for their conditions can reduce the incidence of delirium in the ICU. (2) Retrieval of evidence. The key words and strategies in Chinese and English were: delirium, noise, light, directional stimulation, sleep wake cycle, functional exercise, mood, etc; The retrieval databases were: the Evidence-Based Health Care Center Database, CNKI, the Wanfang Database,

Table 2. Evidence-based cluster nursing intervention program

Influencing factor	Nursing measures	Recommendation level
Environmental factors of ICU ward	Reduce the stimulation of bad factors such as noise and light	Grade C
Cognitive function factors of patients	The patients were stimulated repeatedly to promote their perception of the ICU ward environment	Grade C
Factors of the sleep wake cycle in patients	Reduce the number of night treatments and nursing visits, implement a daily wake-up plan, correct the sleep wake-up cycle	Grade A
Early activity factors	Guide and assist patients to carry out early activities step by step according to the patient's condition	Grade A
Emotional and spiritual needs of patients	Flexible family visit system to meet the emotional and spiritual needs of the patients	Grade B

the VIP Database, and the China Biomedical Database (CBM). The retrieval time was limited to up to December 2018. (3) Literature evaluation: two systematic evidence-based training personnel independently evaluated the quality of the literature. When a conclusion was inconsistent, the principle of evidence quality and authoritative literature was the priority. When the evaluation opinions conflicted, we consulted and discussed with a third system evaluator to decide whether the study should be included or not. (4) Standard for inclusion: the study on the influencing factors of ICU delirium and targeted nursing intervention were put forward in the included literature. Standard for exclusion: according to the literature quality evaluation standard developed by JBI in Australia, a study with a score lower than 70% was excluded. After rechecking and re-reading the abstracts of the 216 articles retrieved according to inclusion and exclusion criteria, 191 articles were screened out and 25 remained. After reading the full text, the poor quality studies, the studies with incomplete research data, unclear outcome indicators, or inconsistent research types were excluded, and ultimately six articles were included [8-13]. (5) Development of the evidence-based cluster nursing intervention program: the feasibility of the systematic evaluation results in clinical practice was discussed by combining the opinions of experts in the clinical critical disease department. After getting the consensus of the clinical critical care experts, an evidence-based cluster nursing intervention program was finally developed, as shown in **Table 2**.

The implementation of the nursing intervention

The control group was administered routine nursing intervention measures: (1) Health education; (2) Close monitoring of their blood gas levels, blood pressure, heart rates, and other important physiological indicators; (3) Routine antibiotics; (4) Targeted measures for the patients with complications; (5) Encouraging and assisting the patients to carry out early active activities.

The patients in the observation group were administered evidence-based cluster nursing intervention measures in addition to the routine nursing intervention measures administered to the control group: (1) An intervention team composed of ICU nursing staff with the head nurse as the core was established to carry out training on the development of an evidence-based cluster nursing intervention program, ensuring that each nursing staff mastered the detailed implementation rules of the cluster nursing intervention program. After the training, the qualified nurses could join the cluster nursing intervention team. (2) According to the cluster nursing intervention plan, the team members took personalized nursing measures according to each patient's situation and influencing factors, and held a group meeting every month during the following work, and summarized and analyzed the implementation of each measure during the nursing process.

Observation indexes

(1) The incidences and durations of delirium were compared between the two groups; (2) The durations of the mechanical ventilation and the ICU hospitalizations in the two groups were compared; (3) The nursing satisfaction levels of the two groups were compared. (4) The in-hospital mortality rates of the two groups of patients were compared.

Statistical methods

SPSS 19.0 statistical software was used for the statistical analysis and processing. The measurement data were expressed as ($\bar{x} \pm s$). The comparisons between groups were conducted

Table 3. Comparison of the occurrences and durations of delirium in the two groups

group	Incidence of delirium [cases (%)]	Duration (x ± s, d)
Control group (n = 54)	22 (40.74)	5.21 ± 1.33
Observation group (n = 54)	8 (14.81)	2.87 ± 1.28
X^2/t	9.0462	9.3155
P	< 0.05	< 0.05

Table 4. Comparison of the mechanical ventilation and ICU hospitalization durations in the two groups (x ± s, d)

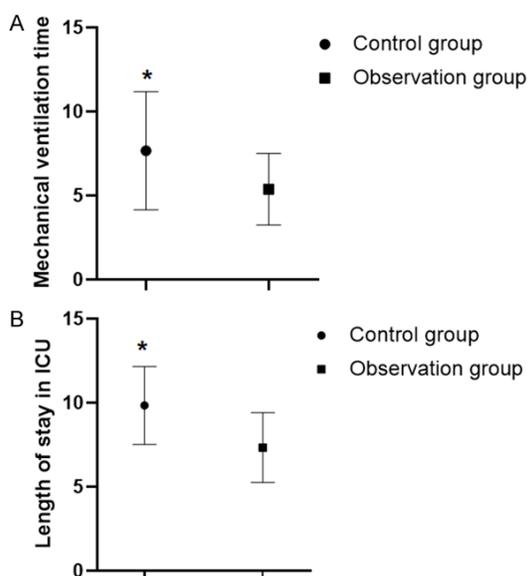| Group	Mechanical ventilation time	Length of stay in the ICU
Control group (n = 54)	7.67 ± 3.51	9.84 ± 2.32
Observation group (n = 54)	5.38 ± 2.12	7.33 ± 2.07
T	4.1038	5.9322
P	< 0.05	< 0.05

Figure 1. Comparison of mechanical ventilation times and the ICU hospitalization time between the two groups. Note: A: Mechanical ventilation time. B: Length of stay in the ICU. Compared with the observation group, *P < 0.05.

using t-tests of independent samples, and the count data were expressed as percentages. The results were analyzed using x^2 tests, and P < 0.05 indicated that a difference was statistically significant.

Results

Comparison of the delirium occurrences and durations in the two groups

The incidences of delirium in the observation group were conspicuously lower than they were in the control group (14.81%, 40.74%, 2 = 9.0462, P = 0.0026); the durations of the delirium in the observation group were conspicuously lower than they were in the control group [(2.87 ± 1.28), (5.21 ± 1.33), t = 9.3155, P = 0.0000], as shown in **Table 3**. The patients with delirium were treated according to their conditions, including general treatment such as oxygen inhalation, the supplementation of energy and nutrition, the correction of any internal environmental disorders, and maintaining stable circulation, etc.

Comparison of the mechanical ventilation and ICU hospitalization durations in the two groups

The durations of the mechanical ventilation and the ICU stays in the observation group were conspicuously shorter than they were in the control group (P < 0.05), as shown in **Table 4** and **Figure 1**.

Comparison of the nursing satisfaction levels in the two groups

The nursing satisfaction level in the observation group was conspicuously higher than it was in the control group (94.44%, 72.22%, X^2 = 9.6000, P = 0.0019), as shown in **Table 5**.

Comparison of the number of in-hospital deaths in the two groups

There were four deaths in the observation group, so the hospital mortality rate was 7.41%. In the control group, 6 patients died in the hospital, so the hospital mortality rate was 11.11%. There was no significant difference in the in-

Table 5. Comparison of the nursing satisfaction levels in the two groups [cases (%)]

group	Very satisfied	Quite satisfied	dissatisfied	Total satisfaction	X^2	P
Control group (n = 54)	32 (59.26)	7 (12.96)	15 (27.78)	39 (72.22)	9.6000	< 0.05
Observation group (n = 54)	46 (85.19)	5 (9.25)	3 (55.56)	51 (94.44)		

hospital mortality between the two groups (X^2 = 2.1862, 0.1393).

Discussion

The basic characteristics of ICU delirium patients include: an inability to concentrate, thinking disorders, sensory or cognitive dysfunction, and fluctuating consciousness disorder. According to the patients' clinical manifestations, they can be classified into three types, hypoactive, hyperactive, and mixed types [14]. At present, the etiology of delirium in the ICU is still unclear, and most scholars believe that it is mainly related to the following factors [15, 16]: (1) Negative emotions such as depression, anxiety, and helplessness brought about by isolation in the ICU; (2) The pain levels of the ICU patients caused by their conditions lead to sleep and wake cycle disorders; (3) Stress caused by instrument noise in the ICU ward; (4) Severe conditions and blood flow in the ICU patients, mechanical changes and hypoxemia. Studies have confirmed that delirium is an important risk factor affecting the outcomes of ICU patients [17]. ICU patients with delirium will not only affect the treatment effect, but the delirium will also cause dysfunction of the central nervous system, aggravate their own primary disease, and increase the difficulty of the treatment, prolonging the treatment times and affecting the patient prognosis [18, 19]. Therefore, it is important to implement scientific and effective targeted nursing intervention measures to prevent delirium in ICU patients.

Although conventional nursing interventions can achieve certain nursing effects, the incidence of delirium in ICU patients still cannot be reduced [20]. Based on the evidence-based research on the influencing factors of ICU delirium and the targeted nursing measures, combined with the expert opinions of clinical critical care department of our hospital, the cluster nursing intervention program is based on evidence-based medicine, which integrates basic nursing measures and targeted preventive intervention to solve the problems that nurses may encounter, including current thorny issues

in the nursing process [21]. We set up a nursing intervention group, with the head nurse as the team leader, and trained the team members on the construction of evidence-based medicine based on the cluster nursing intervention program. Through strengthening the study of the cluster nursing intervention program, we improved the nurses' awareness of ICU delirium prevention and ensured that each ICU nursing worker can provide the patients with more professional nursing [22, 23]. The nursing intervention measures mainly included: (1) improving the ICU environment to minimize the adverse stimulation caused by noise and light; (2) improving the cognitive function of the patients and conducting repeated directional stimulation to promote their cognitive functions; promptly improve the perception of the ICU ward environment and lessen the occurrence of hallucinations and illusions of the patients; (3) correcting the sleep and wake cycles of the patients and reducing the scheduling of treatments and nursing during nighttime, promote the normalization of the sleep and wake cycle by implementing a daily wake-up plan; (4) early activities, according to the patient's condition, consciousness guidance and assist the patients to carry out early activities step by step; (5) meet the emotional and spiritual needs of the patients through a flexible family visit system, which is beneficial for alleviating the patients' sense of helplessness. The results showed that the incidence of delirium in the observation group was conspicuously lower than it was in the control group. The duration of delirium in the observation group was conspicuously lower than it was in the control group. The mechanical ventilation and ICU stay durations in the observation group were conspicuously shorter than they were in the control group. The patients' nursing satisfaction levels in the observation group were conspicuously higher than they were in the control group. These findings show that cluster nursing intervention based on evidence-based medicine can effectively reduce the incidences of delirium, shorten the mechanical ventilation and ICU hospitalization durations, findings consistent with most research results [24, 25].

Due to the small sample size included in this study and the lack of evidence-based conversion studies, further improvement of the evidence-based evidence is needed to provide a more reliable basis for improving the clinical prognosis of patients by combining the application of evidence-based evidence with clinical reality.

In conclusion, evidence-based cluster nursing intervention can conspicuously reduce the incidence of delirium, shorten the patients' mechanical ventilation durations and their ICU stays, and improve their prognoses, so it is worthy of clinical application.

Disclosure of conflict of interest

None.

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