



# Application of Predictive Nursing Reduces Psychiatric Complications in ICU Patients after Neurosurgery

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## Abstract

**Background:** Our aim was to investigate the effects of clinical application of perioperative predictive nursing on reducing psychiatric complications in Intensive Care Unit (ICU) patients after neurosurgery.

**Methods:** A total of 129 patients who underwent neurosurgery and received intensive care were enrolled in our study from February 2013 to February 2014. These patients were divided into two groups: the experimental group (n=68) receiving predictive nursing before and after operation, and the control group (n=61) with general nursing. Clinical data including length of ICU stay, duration of the patients' psychiatric symptoms, form and incidence of adverse events, and patient satisfaction ratings were recorded, and their differences between the two groups were analyzed.

**Results:** The duration of psychiatric symptoms and the length of ICU stay for patients in the experimental group were significantly shorter than those in the control group ( $P<0.05$ ). The incidence of adverse events and psychiatric symptoms, such as sensory and intuition disturbance, thought disturbance, emotional disorder, and consciousness disorder, in the experimental group was significantly lower than that in the control group ( $P<0.05$ ). Patient satisfaction ratings were significantly higher in the experimental group than those in the control group ( $P<0.05$ ).

**Conclusion:** Application of predictive nursing on ICU patients who undergo neurosurgery could effectively reduce the incidence of psychiatric symptoms as well as other adverse events. Our study provided clinical evidences to encourage predictive nursing in routine settings for patients in critical conditions.

**Keywords:** Predictive nursing, Neurosurgery, Psychiatric symptoms, Intensive care management

## Introduction

Predictive nursing is the comprehensive intensive care rendered by professional nurses for the benefit of a patient with complex and potentially life threatening illness. It requires that the nursing staffs apply their solid theoretical medical background to evaluate the patients' signs, symptoms, and state of illness, predict and make judgment on potential problems and risk warnings during disease occurrence and development, and provide prompt and early interventions and nursing care, with an ultimate goal of reducing the adverse events and achieving better clinical outcomes (1). Predictive nursing may be beneficial to patients under intensive care (3); however, clinical data are still limited.

In the field of neurosurgery, while the success rate of the surgical intervention itself has increased in recent years, there are still a large number of patients encountering postoperative complications such as epilepsy, convulsion and neuropsychological syndrome, which compromise the benefits of the surgical treatment and may put the patients at risk (4). The incidence of some of these complications could be reduced by holistic perioperative nursing, which was also an important indicator of quality nursing in hospitals (5). From February 2013 to February 2014, our department of Brain Intensive Care Unit enrolled 129 patients who underwent neurosurgery in a comparative study. They received either the perioperative predictive

nursing (the journal experimental group) or the general ICU care (the control group). Our study showed the patients with predictive nursing exhibited more satisfactory outcomes than those in the control group. This finding may provide clinical evidences to promote the application of predictive nursing to patients undergoing neurosurgery in routine settings.

## Materials and Methods

### *Experimental subjects*

A total of 129 patients who underwent neurosurgery and received intensive care were enrolled from February 2013 to February 2014. Among them, 62 cases were injured by traffic accident, 11 cases were with falling injuries, 13 cases with tumbling injuries, 18 cases with blowing injuries and 4 cases were injured for unknown reasons. Glasgow Coma Scale (GCS) scoring was less than 12 points in all these patients. They were assigned into two groups: the experimental group (n=68) receiving predictive nursing before, during and after operation, and the control group (n=61) with general nursing only. In the experimental group, 33 cases were male and 28 cases were female, aged from 6-78 years old with a mean age of 42.0 years old and a mean body mass index (BMI) of  $26.98 \pm 3.47$  kg/m<sup>2</sup>. In the control group, 36 cases were male and 32 were female, aged from 3-79 years old with a mean age of 41.3 years old and a mean BMI of  $26.73 \pm 3.81$  kg/m<sup>2</sup>. No statistically significant differences were found on gender, age, weight, trauma cause and GCS scoring between the two groups ( $P > 0.05$ ).

After entering the Intensive Care Unit (ICU), all patients were carried out by medical personnel risk assessment. With group collaboration, there is a timely rescue personnel and update the family about the condition at the same time, which is feasible in the actual operation of the formal, scientific process. The families with high compliance were explained to the illness and the different nursing operation, to sign informed consent of the study, and then patients underwent randomized grouping. Clinical treatment principle is the same premise with different nursing opera-

tion. ICU has the specified visitation time which makes it feasible in practice.

This study was approved by the Ethics Committee of the university and written informed consent was obtained from all patients and/or their close relatives for participating in this study. The nursing operation was introduced to patients and their families by the nursing staff and informed consent.

### *Experimental methods*

Specific operational process of predictive nursing: firstly, the medical staff introduced the ward environment and the procedure of predictive nursing to the patients and/or their relatives. Upon receiving the notice of patient admission, the nurse in-charge made the primary evaluation according to the clinical signs, consciousness state, functional status of organs of the patients, and other related information on the checklist. Then she set up the requirements for basic care, identified possible risk factors, and formulated a caring scheme for each patient. Care nurses also conducted dynamic observation on patients, made full understanding on the physical and mental conditions of the patients pre-operatively, monitored the patients' state of illness during and after operation, continually recorded the patients' body movement feeling reflection and checked the patients' breath and adverse reactions such as nausea, vomiting, convulsion, epilepsy, and so on. In the ICU, state of the art facilities, such as professional oxygen breathing machines, sputum suction devices, and endotracheal intubation instrument were checked on a regular basis to ensure being ready for use.

During nursing care, unforeseen accidents and complications, including ward infection, scald and frostbite incurred from hot-water bags and ice bags, and aspiration were strictly prevented. On the basis of the responsibility administration system, special caring nurses would make corresponding adjustments on the nursing plan according to the patients' signs and condition changes, so as to reduce the incidence of adverse reactions and post-operative complications. During ICU treatment period, the special caring nurses would record all adverse events and their frequency, and

calculate the incidence rate of these adverse events. After the patients were discharged, the special caring nurses would conduct a questionnaire survey on the patients and/or their relatives to inquire about their satisfaction ratings on the nursing work.

### Observational index

Clinical data including length of ICU stay, duration of the patients' psychiatric symptoms, form and incidence of adverse events, and patient satisfaction ratings were recorded and tabulated on a customized form, and the differences between the two groups were analyzed.

### Statistical methods

Statistical analysis was performed by using SPSS statistical software (version 19.0, IBM, USA). Numerical data were presented as mean  $\pm$  standard deviation,

and *t*-test was applied to detect the differences between the two groups. Categorical data were presented by case or percentage, and chi-squared ( $\chi^2$ ) test was used to compare the two groups.  $P < 0.05$  was considered statistically significant.

## Results

### Comparison on the length of ICU stay and duration of psychiatric symptoms

The duration of psychiatric symptoms and the length of ICU stay were significantly less in the experimental group than those in the control group ( $1.21 \pm 0.43$  days vs  $4.08 \pm 0.61$  days, and  $3.75 \pm 1.59$  days vs  $7.12 \pm 1.08$  days, respectively, both  $P < 0.05$ ) (Table 1).

**Table 1:** Comparisons on duration of psychiatric symptoms and length of ICU stay for patients participating in this study (days)

Group	Duration of psychiatric symptoms	Length of ICU stay
Experimental (n=68)	$1.21 \pm 0.43^a$	$3.75 \pm 1.59^b$
Control (n=61)	$4.08 \pm 0.61$	$7.12 \pm 1.08$

<sup>a</sup> $T=3.526$ ,  $P=0.035$  compared to the control group; <sup>b</sup> $T=4.021$ ,  $P=0.024$  compared to the control group.

### Comparison on total incidence of psychiatric symptoms

The total incidence of psychiatric symptoms, including sensory and intuition disturbance, thought disturbance, emotional disorder, and consciousness disorder, was 20.6% in the experimental group, which was significantly lower than that in the control group (42.6%,  $P=0.028$ ). Fewer cases with individual psychiatric symptoms were reported in the experimental group receiving predictive nursing than in the control group (Table 2).

### Comparison on the form and incidence of adverse events

Two patients in the experimental group had adverse events after operation (1 case hurt others and 1 case hurt himself) and the incidence was 2.94%. In the control group, 9 patients had adverse events after operation (6 cases hurt others and 3 cases hurt himself) and the incidence was 14.75%. The differences between the two groups were statistically significant ( $\chi^2=2.954$ ,  $P=0.041$ , data not shown).

**Table 2:** Comparison on incidence of psychiatric symptoms in patients participating in this study

Group	Sensory intuition disturbance	Thought disturbance	Emotional disorder	Consciousness disorder	Incidence (%)
Experimental (n=68)	1 (1.47)	4 (5.88)	7 (10.29)	2 (2.94)	14 (20.59) <sup>a</sup>
Control (n=61)	2 (3.28)	8 (13.11)	11 (18.03)	5 (8.20)	26 (42.62)

<sup>a</sup> $P=0.028$  compared to the control group.

**Table 3:** Comparison on patients' satisfaction ratings for nursing care

Group	Total case	Very satisfactory	Satisfactory	Somewhat unsatisfactory	Unsatisfactory	Total satisfaction (%)
Experimental	68	31	30	3	4	61 (89.71) <sup>a</sup>
Control	61	19	22	11	9	41 (67.21)

<sup>a</sup> $\chi^2=4.127$ ;  $P=0.015$  compared to the control group

**Comparison on the patient satisfaction ratings with nursing care**

The patient satisfaction ratings with nursing care were significantly higher in the experimental group (89.71%) versus the control group (67.21%) ( $P<0.05$ ) (Table 3).

**Discussion**

The psychological nursing mode emphasizes more on prevention than treatment, which could effectively reduce patients' mental complications post neurosurgery and ICU stay (6). Predictive nursing procedure could, to a great extent, prevent the occurrence of various kinds of adverse events. Patients under intensive care post-neurosurgery were more prone to post-operative complications, which would result in long-term physical impairments on the patients and serious negative effects on their families (7). Therefore, to enhance predictive caring and make the patients as well as their relatives fully understand the risks that might occur during predictive caring were very important in that it could help them develop a right attitude to confront the possible risks and get through the dangerous period (8). Moreover, predictive caring also required that the medical staff cultivate a vigilant awareness and try their best to reduce the patients' psychiatric complications.

The causes of psychiatric complications after neurosurgery and ICU stay were quite complicated. They may be related to various kinds of factors, such as the patients' psychological factors, anesthesia operation, medications used, operation procedure, hospital environment, and so on. Any problems that occurred during the operation may lead to the occurrence of post-operative psychiatric complications (9). We herein proposed the pre-

dictive nursing procedure to minimize the influence of such factors. Predictive nursing was a kind of nursing procedure that paid more attention to prevention than treatment and that had higher requirements on the medical staff. For example, the medical staffs were required to perform professional surveys on the patients' psychological state before operation, to enhance mental nursing and extend the mental nursing time on the young and the seniors as well as the patients that were quite fragile and introverted. Besides, the medical staff were also required to maintain a quiet environment for the patients, to keep good indoor ventilation, to turn off the lights for the patients at night, and to improve the patients' living environment so that the patients could get a complete rest (10).

Besides the aforementioned principle that prevention was more important than treatment, predictive nursing was of greater importance to active intervention than passive intervention. Medical staff would monitor on the patients' facial expressions, consciousness, body movements and gestures, and emotions. When the patients showed psychiatric symptoms, medical staff would connect with psychiatrists immediately to control such symptoms by using proper antipsychotic drugs. When the patients showed depression, mania or bipolar disorder symptoms, medical staff would inform the psychiatrists and psychologists to make psychological counseling and also encourage the patients' family members to go through peri-operative period together with the patients (11). Although predictive nursing did not reduce patients' post-operative psychiatric complications, the behaviors that they hurt themselves or others after the occurrence of psychiatric symptoms were greatly reduced, which indicated that predictive nursing was very important and effective. Before operation, medical staff would evaluate the patients' mental status

and inform their relatives the possible risks and make preventive measures. During operation, medical staff would report the operation to their relatives. After operation, medical staff would comfort and accompany the patients together with their relatives, provide social support to the patients and enhance their confidence in fighting with the disease (12, 13).

## Conclusion

Predictive nursing procedure required that the medical staff make corresponding predictive plan for each patient according to their conditions. It could help improve the medical level of the medical staff and thus ensure the safety of the patients to the greatest extent. On the other hand, predictive nursing procedure could effectively reduce the incidence of adverse events that patients hurt themselves or others, which greatly reduced the economic burden of the patients' families, improved the satisfaction degree of the patients' relatives. Predictive nursing, due to its significant curative effects and wide acclaims among the patients' relatives, has received more and more attention in clinical settings. The increasing popularization of predictive nursing procedure may further emphasize the professional quality of medical staff, motivate the nurses to learn new knowledge and to master new theory, and promote an overall improvement in the nursing quality. Therefore, we believe that predictive nursing procedure should be widely applied and popularized.

## Ethical considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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