

Original Article

Application of a crisis management nursing system in the novel coronavirus pneumonia epidemic

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Abstract: Objective: To explore the application of a nursing crisis management system in the novel coronavirus pneumonia epidemic. Methods: A retrospective nursing method was implemented. A total of 280 cases of patients were diagnosed with coronavirus pneumonia in the isolation ward of our hospital. The 280 cases of newly diagnosed pneumonia were divided into two groups: the nursing crisis management system group (n=150, the nursing crisis management was given) and the non-nursing crisis management system (n=130, routine nursing management was given). The psychological status (profile of mood states (POMS) score) of nursing staff before and after the implementation of the nursing crisis management, the psychological status of patients after the implementation of nursing crisis management (POMS score), emotion, cognition, behavior severity, patients' satisfaction with nursing, treatment compliance (Morisky Medication Compliance Scale (MMAS) score) of patients, the rate of cure of patients and the infection rate of nursing staff were compared. Results: Compared with the non-nursing crisis management system group, the POMS scores of patients and nurses in the nursing crisis management system group decreased (all $P < 0.05$). Compared with the non-nursing crisis management system group, the emotional, cognitive and behavioral scores of patients in the nursing crisis management system group were lower, while the MMAS score, satisfaction with nursing and cure rate were significantly increased (all $P < 0.05$). The 142 nursing staff did not catch coronavirus. Conclusion: During the novel coronavirus pneumonia outbreak and the current normal epidemic prevention and control periods, our crisis management mode was introduced into nursing work. The construction of the nursing crisis management mode under the epidemic situation can improve the psychological state and improve the management efficiency of the patients and nurses. The patients' satisfaction is high and the treatment compliance is good.

Keywords: Nursing crisis management, novel coronavirus pneumonia, psychological state, nursing satisfaction, treatment compliance

Introduction

Coronavirus pneumonia (COVID-19) patients were first discovered in Wuhan, Hubei Province in December 2019, and then COVID-19 spread rapidly to the whole country and even the whole world. The nature of the outbreak of the disease caused the first response to a major public health emergency in the whole country and even the whole world [1-3]. Although the tradi-

tional nursing system can achieve satisfactory nursing effects in daily nursing work in the hospital, it still has some limitations, such as insufficient psychological attention to patients and medical staff, and insufficient crisis attention in the face of the outbreak of new crown pneumonia, the tremendous pressure and the strong contagion level. In the face of the novel coronavirus pneumonia, medical staff must have enough nursing crisis management concepts to

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formulate and implement a series of management measures and strategies, integrate epidemic prevention and control into the nursing management framework and prevent the disease from occurring, which is the best way of reducing the infection rate of the nursing staff and the death rate of the patients [4, 5].

Nursing crisis management refers to the nursing management of various types of emergencies that may occur at an unpredictable time, place and specific situation, and may cause serious consequences, to resolve various possible crises and improve clinical safety [6, 7]. Compared with routine nursing, nursing for crisis management pays more attention to prevention [8]. In this study, we collected the common problems of clinical nursing management in our hospital during the epidemic of the novel coronavirus pneumonia. We also compared the changes in patients' and nurses' psychological state and management effects before and after the introduction of the nursing crisis management system.

Materials and methods

General information

We adopted a retrospective method of nursing in this study. The study subjects were 280 patients diagnosed with coronavirus pneumonia in the isolation ward of our hospital. According to a different nursing management system, 280 patients diagnosed with novel coronavirus pneumonia were divided into the nursing crisis management group ($n=150$) and the non-nursing crisis management system group ($n=130$). A group of 142 nursing staff in the Qiqihar District of Heilongjiang Province, who were the first-line staff of the Wuhan anti-epidemic medical team, were also divided into the nursing crisis management system group and non-nursing crisis management system group, with 71 nurses in each group. The basic data of patients and nursing staff in the two groups were shown below. This study was approved by the Medical Ethics Committee of our hospital.

Inclusive criteria: patients aged 20-65 years; patients with positive nucleic acid detection for COVID-19; those who signed the informed consent. Exclusion criteria: psychiatric patients; patients with cognitive dysfunction; patients who were unable to complete the questionnaire

survey; participants in other research projects at the same time.

Methods

Patients in the non-nursing crisis management system group were given routine nursing management, such as initiating a primary response to major public health emergency, setting the "three areas and three channels" in the isolation area, disinfection and isolation, medical waste treatment, fabric treatment, final treatment and other conventional nursing strategies.

Patients in the nursing crisis management system group were given nursing crisis management [7-9]: (1) Construct a three-level nursing management system: The nursing department director and head nurse are the main members to form a nursing crisis management team and implement vertical management. (2) Standard system: To ensure the stability of nursing quality and emergency system, the work responsibility system, work flow and nursing guidance were formulated to achieve standardized management. (3) Set up of emergency nursing echelons: In the emergency nurse database, nurses were divided into three echelons according to the nurse's working years, grades, professional and technical ability, combined with health status, psychological state, family situation, personal wishes, etc. The first echelon included nurses with high professional titles, solid theoretical foundation and skilled operation skills especially in departments like Emergency Department, Intensive Care Unit (ICU), Respiratory Department, Infectious Diseases Department. The second echelon is composed of middle-level nurses who are competent in the nursing work of critically ill patients. Junior nurses, the staff of outpatient care units and operating rooms, medical technicians are the third echelon. (4) Implementation of training: We formulated the training plan, implemented pre-job training and on-the-job training. It was not suitable to gather and get training in a special period. All staff were trained and assessed in the form of online teaching, morning meeting, WeChat, nailing meeting, etc., to ensure that everyone can master the required skills and knowledge. Under the overall arrangement of the hospital districts, all nursing staff could go to the closed ward for field simulation in batches before taking up their posts, familiarize themselves with the routes and protection

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requirements of the isolation ward in and out of different areas, and simulate various emergency scenarios on the spot, including the wearing of process of protective items, the treatment process of medical waste, the transfer process of patients and specimens, the prevention and treatment process of occupational exposure, and rescue equipment using methods, cardiopulmonary resuscitation, airway management, blood purification, extracorporeal membrane oxygenation (ECMO), etc. (5) Isolation ward management: The hospital nursing quality control group conducts irregular inspection on the ward, feeds back the inspection results, puts forward rectification opinions, and carries out continuous improvement and tracking evaluation. (6) Management of materials and equipment: During the epidemic period, materials were allocated in strict accordance with the principle of “from near to far, to meet the urgent needs, and from primary to secondary”, including drugs, protective articles, medical consumables, instruments and equipment. (7) Safety management: Patient safety: Seriously implement the system of checking, identifying and informing, prevent adverse events such as falling out of bed and pressure sores, strengthen the monitoring and evaluation of patient's condition, actively carry out life support and rescue nursing, and ensure the safe handover of transferred and transferred patients. Safety of nursing staff: The work area was divided scientifically and reasonably. All kinds of signs, flow charts, wearing of glasses and quick hand sanitizer were provided according to the protection standards. The specialist for infection control were assigned according to the shift to check and guide the safety of nursing staff or cleaning staff to wear and take off protective items, to minimize the risk of occupational exposure when taking off protective items. (8) Psychological crisis intervention and response: Patient psychology: The emergency organization was composed of professional psychological doctors and nurses with the qualification of a psychological counselors. According to “Guiding Principles of Emergency Psychological Crisis Intervention for Pneumonia Infected by Novel Coronavirus”, the patients were evaluated before, during and after hospitalization [10]. After professional evaluation, the intervention plan and drug treatment for psychological problems were formulated. Nurses' psychology: Nurses received

psychological consultations from medical staff through the establishment of WeChat psychological post station, psychological counseling hotline and psychological assistance channel.

Outcome measures

Main outcome measures: (1) Profile of mood states (POMS) was used to evaluate the psychological status of patients and nursing staff in the two groups, including tension (24 points), panic (20 points), depression (24 points), anger (28 points), energy (24 points), fatigue (20 points). The lower the scores, the better the mental state [11]. (2) The Triangle Assessment Form (TAF) was used to evaluate emotion, cognition and the severity of behavior of the two groups [12]. Each dimension had 10 points. The higher the score, the more serious the damage.

Secondary outcome measures: (1) Nursing satisfaction survey scale was used to compare patients' satisfaction with a nursing of the two groups, which was divided into satisfaction, basic satisfaction and dissatisfaction. Satisfaction = number of satisfaction and basic satisfaction/total numbers * 100% [13]. (2) Morisky Medication Compliance Scale (MMAS) was used to evaluate the treatment compliance of the two groups, with a total of 8 points [14]. The higher the score, the better the treatment compliance. (3) The cure rate of patients in two groups and the infection rate of nursing staff.

Statistical analysis

SPSS 20.0 was used for statistical analysis. The count data was expressed as cases/percentage (n/%). The chi-square test was used. Kolmogorov Smirnov test method was used for the normality test, and mean \pm standard deviation ($\bar{x} \pm sd$) was used for measurement data under the normal distribution. The independent t-test was used for comparison between the two groups. $P < 0.05$ was considered as the difference was statistically significant.

Results

Basic data

There was no significant difference in basic data between the two groups ($P > 0.05$), and the two groups were comparable. As shown in **Tables 1, 2**.

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Table 1. Comparison of basic data of patients between the two groups (n, $\bar{x} \pm sd$)

	Non-nursing crisis management system group (n=130)	Nursing crisis management system group (n=150)	χ^2/t	P
Gender (n)			2.995	0.084
Male	55	79		
Female	75	71		
Age (year)	54.2±6.3	53.4±5.6	1.115	0.266
BMI (kg/m ²)	23.6±1.6	23.3±1.2	1.753	0.081
Smoking history (n)			1.402	0.236
Yes	30	44		
No	100	106		
Severity of illness (n)			1.943	0.379
Mild	62	80		
Middle	58	55		
Severe	10	15		

Note: BMI: body mass index.

Table 2. Comparison of basic data of nursing staffs between two groups (n, $\bar{x} \pm sd$)

	Non-nursing crisis management system group (n=71)	Nursing crisis management system group (n=71)	χ^2/t	P
Gender (n)			0.530	0.467
Male	3	5		
Female	68	66		
Age (year)	34.4±4.3	35.1±3.9	1.016	0.311
BMI (kg/m ²)	23.6±2.2	22.9±3.1	1.552	0.123

Note: BMI: body mass index.

Table 3. Comparison of POMS scores of patients between the two groups (score, $\bar{x} \pm sd$)

Indicators	Non-nursing crisis management system group (n=130)	Nursing crisis management system group (n=150)	t	P
Anxiety	17.59±3.20	16.40±3.05	3.171	0.002
Panic	14.40±3.10	12.84±2.94	4.301	<0.001
Depression	18.06±3.55	16.67±3.85	3.142	0.002
Anger	20.05±4.33	18.77±3.90	2.583	0.010
Energy	19.75±2.44	18.22±2.65	5.028	<0.001
Fatigue	16.75±2.50	15.97±2.05	2.817	0.005

Note: POMS: profile of mood states.

Comparison of profile of mood states (POMS) scores of patients between the two groups

Compared with the non-nursing crisis management system group, the POMS scores of the nursing crisis management system group decreased (all $P < 0.05$). As shown in **Table 3**.

Comparison of POMS scores of nursing staff between the two groups

Compared with the non-nursing crisis management system group, the POMS scores of nursing staff in the nursing crisis management system group decreased (all $P < 0.001$), as shown in **Table 4**.

Comparison of triangle assessment form (TAF) scores of patients between the two groups

Compared with the non-nursing crisis management system group, the score of emotion, cognition and behavior of patients in the nursing crisis management system group were lower than those of the non-nursing crisis management system group (all $P < 0.05$), as shown in **Table 5**.

Comparison of satisfaction with the nursing of patients between the two groups

The satisfaction with nursing of patients in the nursing crisis management system group was significantly higher than that in the non-nursing crisis management system group ($P < 0.05$), as shown in **Table 6**.

Comparison of morisky medication compliance scale (MMAS) scores between the two groups

The MMAS scores of the non-nursing crisis management system group and the nursing crisis management system group were 5.67 ± 1.03 points and 6.04 ± 1.11 points. Statistical analy-

Table 4. Comparison of POMS scores of nursing staffs between two groups (score, $\bar{x} \pm sd$)

Indicators	Non-nursing crisis management system group (n=71)	Nursing crisis management system group (n=71)	t	P
Anxiety	10.94±2.22	8.89±1.84	5.991	<0.001
Panic	9.80±1.93	8.49±1.60	4.403	<0.001
Depression	14.64±2.55	13.03±2.40	3.874	<0.001
Anger	14.23±3.20	12.04±3.08	4.155	<0.001
Energy	16.39±3.04	14.05±3.27	4.416	<0.001
Fatigue	15.04±2.36	13.26±2.80	4.096	<0.001

Note: POMS: profile of mood states.

sis showed that the MMAS score of the nursing crisis management system group was significantly higher than that of the non-nursing crisis management system group ($t=2.891$, $P<0.01$), as shown in **Figure 1**.

The cure rate of patients and the infection rate of nursing staff in two groups

A total of 122 cases were cured in the non-nursing crisis management system group and the cure rate was 93.85. Another 148 cases were cured in the nursing crisis management system group and the cure rate was 98.67%. The cure rate of the nursing crisis management system group was significantly higher than that of the non-nursing crisis management system group ($\chi^2=4.699$, $P<0.05$). No novel coronavirus pneumonia was diagnosed in any of the 142 nursing staff in the two nursing management systems.

Discussion

In this study, the score of stress, panic, depression, anger, energy and fatigue in the nursing crisis management system group were significantly lower than those in the non-nursing crisis management system group, suggesting that the introduction of a nursing crisis management system during the period of novel coronavirus pneumonia can help improve the unhealthy psychological state of medical staff. Crisis management is a prevention and treatment system and response measures established in advance or in response to crisis events to resist sudden disasters and minimize damage as much as possible [15]. After the outbreak of novel coronavirus pneumonia, nurses are facing many crisis factors such as a sudden

increase in hospitalization rates, shortage of protective materials, high risk of infection, a serious shortage of nursing staff, lack of professional competence, protective injury and communication barriers between nurses and patients. Under intensive protection, nurses have more work intensity and difficulty, more exhaustion of physical strength and long-term overworked pressure.

The majority of nursing staff will have different degrees of depression, anxiety, fear [16]. Cao et al. also pointed out that the implementation of nursing crisis management during the period of novel coronavirus pneumonia helps patients and medical staff to improve their mental health [17]. This is because psychological care for patients and nurses is emphasized in the nursing crisis management system, for example psychological support groups composed of professional psychiatrists and qualified nurses with mental counselors were established immediately. Then psychological evaluation was carried out and a targeted psychological intervention program was given to improve the adverse psychological state of patients [15].

We found that POMS of patients in the nursing crisis management system group was significantly lower than those in the non-nursing crisis management system group, suggesting that introducing the nursing crisis management system can improve the patients' mental state during the outbreak of novel coronavirus pneumonia. Through establishing Wechat psychological post station and psychological counseling hotline, nurses can get professional psychological counseling, which can improve their psychological state [18]. During the outbreak of novel coronavirus pneumonia, the psychological anxiety of patients is more obvious once they are diagnosed due to the uncertainty of treatment [19]. Talevi et al. also believe that the nursing crisis intervention during the epidemic period is helpful to the psychological improvement of patients [20].

This study showed that the scores of emotional, cognitive and behavior in the nursing crisis management system group were significantly

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Table 5. Comparison of TAF scores of patients between the two groups (score, $\bar{x} \pm sd$)

Groups	Emotion	Cognition	Behavior
Non-nursing crisis management system group (n=130)	7.04±1.03	7.35±1.29	7.98±1.02
Nursing crisis management system group (n=150)	6.11±1.24	6.04±1.30	7.72±1.11
t	6.854	8.444	2.042
P	<0.001	<0.001	0.042

Note: TAF: Triangle Assessment Form.

Table 6. Comparison of satisfaction with nursing of patients between two groups (n, %)

Groups	Satisfaction	Basic satisfaction	Dissatisfaction	Satisfaction rate
Non-nursing crisis management system group (n=130)	60 (46.15)	48 (36.92)	22 (16.92)	108 (83.08)
Nursing crisis management system group (n=150)	77 (51.33)	62 (41.33)	11 (7.33)	139 (92.67)
χ^2	0.748	0.568	6.160	6.160
P	0.387	0.451	0.013	0.013

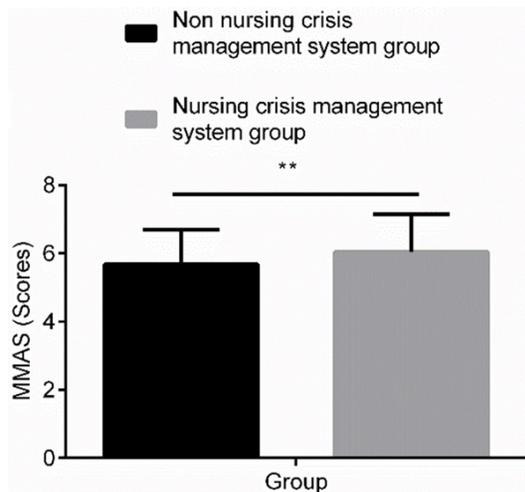


Figure 1. Comparison of MMAS scores between the two groups. Comparison of MMAS scores between the two groups, **P<0.01. MMAS: Morisky Medication Compliance Scale.

lower than those in non-nursing crisis management system group, suggesting that the introduction of a nursing crisis management system can assess the severity of patients' crisis more effectively and help to adjust strategies for nursing measures in time. Crisis assessment plays a very important role in the process of crisis intervention. The intervener must quickly and accurately understand the individual's crisis and its response through the assessment in a short period time, which is the premise of the whole crisis intervention. The intervener must determine the severity of the crisis through the assessment, and constantly evaluate the indi-

vidual's psychological state, to understand the effectiveness of the support system and identify effective coping strategies [21, 22]. Besides, we also found that the MMAS score, cure rate and satisfaction degree with nursing care of patients in the nursing crisis management system group were significantly higher than those of the non-nursing crisis management system group. It was suggested that introducing nursing crisis management system can help improve hospital management effect, enhance patient' satisfaction with nursing and compliance of treatment. However, the sample size in this study is small and a long-term follow-up is not conducted. We plan to conduct a long-term follow-up to observe the prognosis and quality of life of patients diagnosed with coronavirus pneumonia.

In conclusion, during the novel coronavirus pneumonia outbreak and the current normal epidemic prevention and control period, the introduction of a crisis management mode and the construction of nursing crisis management mode can obviously improve the psychological state of the confirmed patients and nurses, improve the management effects, increase the patients' satisfaction and the treatment compliance.

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Disclosure of conflict of interest

None.

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