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Original Article

The effect of systematic nursing on the prevention of pressure sores in neurological patients

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Abstract: Objective: To analyze and evaluate the clinical effects of systematic nursing care on preventing pressure sores in neurological patients. Methods: Neurological patients were randomly assigned into a systematic nursing group and a conventional nursing group. The number and degree of pressure sores and the incidence of complications during their hospitalization, the average length of the hospital stays, and the satisfaction rate were observed. Results: Each group included 52 patients. In the systematic nursing group, 2 patients developed degree I pressure sores, but in the conventional nursing group, 12 patients developed pressure sores, including 8 cases of degree I and 4 cases of degree II. The difference in the occurrences of pressure sores between the two groups was statistically significant ($P<0.05$). The incidences of the complications included sore infections, nausea, and muscle soreness and were all significantly lower in the systematic nursing group than in the conventional nursing group (all $P<0.05$). The average hospital stay was significantly shorter in the systematic nursing group than in the conventional nursing group ($P<0.05$). The patient/family satisfaction rate was significantly higher in the systematic nursing group than in the conventional nursing group ($P<0.05$). Conclusion: Systematic nursing is effective at preventing pressure sores in neurological patients and in improving the patient/family satisfaction.

Keywords: Systematic nursing, neurology, inpatients, pressure sores

Introduction

In recent years, the aging process has intensified worldwide, and with the changes in diet structure and living environment, neurological diseases caused by stroke and cerebral hemorrhage are more frequently seen [1, 2]. There are a growing number of critical patients in neurology departments, most of whom are the long-term bedridden who cannot take care of themselves, which increases the incidence of pressure sores during hospitalizations [3, 4]. Mild pressure sores cause discomfort in patients, while severe ones can lead to complications such as dehydration, anemia, infection, or even sepsis, which is life-threatening without timely treatment [5, 6].

At present, pressure sores are symptomatically treated in the clinic, that is, treating the sores after the symptoms appear to prevent further expansion, using antibiotics for sore infections, and using analgesics for the pain caused by the sores [7, 8]. However, symptomatic treatment is a remedial treatment, during which patient suffering cannot be avoided. Therefore, the prevention of pressure sores is more important in clinical practice [9]. Systematic nursing is a novel nursing concept, and it is people-oriented and provides comprehensive nursing care, including psychological care, health education, bedside nursing, and discharge treatment according to the patients' actual needs [10]. Systematic nursing is now widely practiced in clinics, but there are few published studies on preventing pressure sores in neurological patients, so the practical methods need to be studied.

This study aimed to evaluate the clinical effect of systematic nursing in order to find a safer and more effective method of preventing pressure sores in neurological patients.

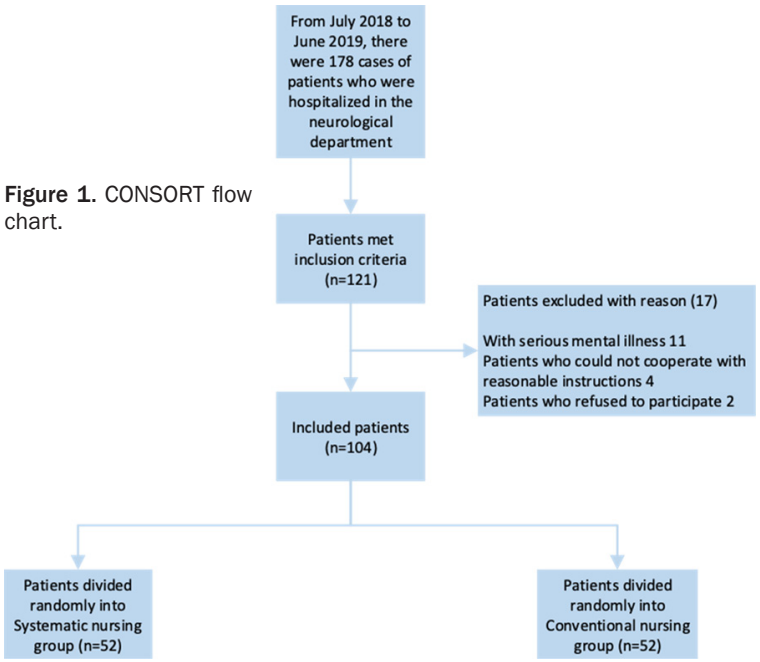

Figure 1. CONSORT flow chart.

Materials and methods

Subjects

Patients treated in the Department of Neurology of Weishan County People's Hospital from July 2018 to June 2019 were randomly assigned into a systematic nursing group and a conventional nursing group. This trial was approved by the Ethics Committee of Weishan County People's Hospital, and informed consent was obtained from all patients/family members.

Patients were eligible if they needed to stay in bed for a long period and were not expected to be discharged in the short term, for example, patients with cerebral infarction, dementia, or diabetic encephalopathy, patients who were awake and able to cooperate, patients aged 18-85 years old, and patients who voluntarily participated in this trial. Patients were excluded if they had serious injuries in their major organs, patients who were suffering from mental illness, patients who were not able to cooperate, patients who quit the study voluntarily, or patients who had a previous history of pressure sores.

Experimental methods

In the systematic nursing group, the following nursing measures were implanted in addition to conventional nursing. First, psychological nursing: at admission, the nurses adopted various effective strategies to communicate with the patients or their family members. Active comfort and psychological counseling were performed to reduce each patient's psychological pressure and resistance, to increase the patient's mental tolerance of the disease, to inform the patients about the disease complications, and to gain the patients' trust so as to increase the cooperation level of the patients and their families. Second, health education: before treatment, the nurses explained the basics of their diseases and pressure sores to the patients and their families, such as the pathogenesis, the effectiveness and safety of hospitalization, as well as the causes, prevention, treatment, and rehabilitation of pressure sores, so as to guide the patients and their families to actively cooperate with medical stuff and to reduce their stress levels. Third, diet care: the diet was to preferably contain cellulose, protein, and enough calories to maintain normal gastrointestinal function and to provide energy for normal body metabolism. Last, high-quality nursing: a professional nurse was responsible for the nursing work of one patient throughout the whole hospital stay to provide one-on-one professional nursing. The conventional nursing followed the doctor's instructions, including daily care, ward inspection, pre-inspection for invasive operations, disease observation, and symptomatic care.

Outcome measures

The main outcome measure was to observe the incidence of pressure sores (cases with pressure sores/number of patients in the group) and the degree of sores during the first 15 days of the hospital stay and during the whole stay period.

The secondary outcome measures included the average length of stay, the satisfaction rate, and the incidence of complications (sore infections, nausea, vomiting, muscular soreness, and malnutrition).

Table 1. Comparison of the baseline data

	Systematic nursing group	Conventional nursing group	t/χ^2	P
Cases (n)	52	52		
Age (year)	62.42±9.41	63.11±8.99	-0.382	0.703
Body mass index (kg/m^2)	28.13±5.60	27.78±5.39	0.325	0.746
Weight (kg)	71.32±11.41	72.58±12.09	-0.547	0.586
Sex (n)				
Male	28	25	0.346	0.556
Female	24	27		
Disease classification (n)				
Ischemic cerebrovascular disease	21	23	0.743	0.946
Hemorrhagic cerebrovascular disease	14	11		
Spinal cord disease	8	9		
Central nervous system infection	5	6		
Others	4	3		
Basic diseases (n)				
Yes	32	35	0.378	0.539
No	20	17		
Malnutrition (n)				
Yes	14	16	0.187	0.665
No	38	36		

Table 2. Comparison of the number of cases and the degree of pressure sores

	Systematic nursing group (n=52)	Conventional nursing group (n=52)	χ^2	P
In 15 days				
Degree I	1	8	7.081	0.008
Degree II	0	1		
Degree III	0	0		
Degree IV	0	0		
Total	1	9		
Whole stay				
Degree I	2	8	8.254	0.004
Degree II	0	4		
Degree III	0	0		
Degree IV	0	0		
Total	2	12		

The pressure sores were classified into 4 degrees [11]. Degree I, non-pale redness was seen at the protrusion of bone, showing a clear boundary line with the surrounding skin and no color fading when pressed. Degree II, the patients' skin showed basal redness, superficial sores without a scab, or blood bubbles. Degree III, the patients showed a deficiency of full-thickness skin, with crabs or subcutaneous tunnels, but without any exposure of muscle, tendon, or bone. Degree IV, the patients showed full-thickness defect with crabs, subcutaneous tunnels, and an exposure of muscle, tendon, or bone.

The satisfaction rate of the patients/families was evaluated before discharge with a self-made satisfaction questionnaire. The contents of the questionnaire included the hospitalization environment, the nurses' attitudes, the nursing methods, the nursing contents, the discomfort during hospitalization, the treatment effects, the adverse reactions, and the physical recovery. The questionnaire's total possible score was 100 points, 81-100 points indicated a great satisfaction, 61-80 points indicated satisfaction, and a score below 60 points indicated dissatisfaction. Patient/family satisfaction rate = (number of great satisfaction + number of satisfaction)/total number of cases * 100%.

Statistical methods

SPSS 22.0 statistical software was used for the data analysis. The count data were expressed

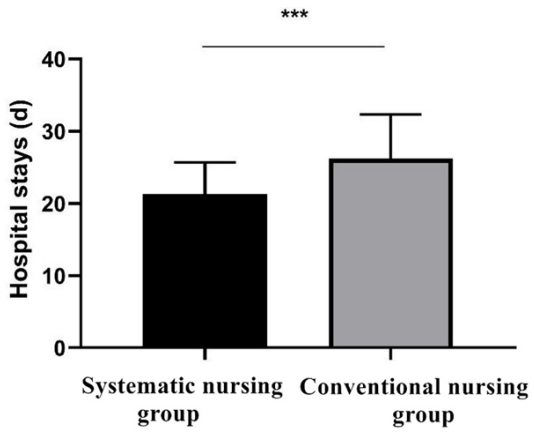

Figure 2. Comparison of the average hospital stays. Systematic nursing group *vs.* the conventional nursing group, ***P<0.001.

as a rate and compared between groups using χ^2 tests. The measurement data were expressed as the mean ± standard deviation and compared between groups using independent sample t tests. P<0.05 indicated a statistically significant difference.

Results

Baseline data

A total of 104 out of the 178 neurology inpatients admitted to Weishan County People's Hospital from July 2018 to June 2019 were included in this study according to the inclusion and exclusion criteria. They were randomly assigned to the systematic nursing group or the conventional nursing group, with 52 patients in each group. There were no uncontrollable accidents during the treatment period, and all the subjects completed the trial (**Figure 1**). There were no significant differences in the baseline data in the two groups (all P>0.05). See **Table 1**.

Cases and degree of pressure sores

During the first 15 days of their hospital stays, there was one patient in the systematic nursing group who developed degree I pressure sores, and 9 patients in the conventional nursing group who developed pressure sores, including 8 cases of degree I and 1 case of degree II, with a statistically significant difference between the two groups (P<0.05). During the whole hospital stay, there were 2 patients who developed degree I pressure sores in the systematic nursing group, and 12 patients in the conventional nursing group who developed pressure sores, including 8 cases of degree I and 4 cases of degree II, with a statistically significant difference between the two groups (P<0.05). See **Table 2**.

Length of hospital stay

The average length of hospital stay in the systematic nursing group was 21.34±4.38 days, which was significantly shorter than the 26.24± 6.11 days in the conventional nursing group (t=-4.700, P<0.001). See **Figure 2**.

Complications

There were 0, 1, and 2 cases of sore infections, nausea, and muscle soreness, respectively, in the systematic nursing group, which were significantly fewer than those in the conventional nursing group (all P<0.05). See **Table 3**.

Patient/family satisfaction

The patient/family satisfaction rate in the systematic nursing group was 82.69%, which was significantly higher than the 59.62% in the conventional nursing group (P<0.05). See **Table 4**.

Discussion

There is a large number of critical patients in neurology, most of whom are the long-term bedridden, so the development of pressure sores is commonly seen in neurologic departments, increasing the consumption of medical resources, and the nursing workload. In addition, further complications may occur without timely or effectively treatment, so a patient's life might be in danger [12, 13]. Therefore, the timely treatment of pressure sores or prevention-based care should be given more attention.

The main risk factors of pressure sores are friction, pressure, and the patient's skin condition. Among them, pressure is the most important factor and includes the magnitude and duration of the pressure [14, 15]. A pressure of about 5 kPa for 4 hours can lead to changes in local skin tissues. If the pressure is doubled, the time required for tissue changes will be halved to 2 hours [16]. Systematic nursing emphasizes health education and high-quality care, including the assessment of a patient's

Table 3. Comparison of the complications during the hospital stays

	Systematic nursing group (n=52)	Conventional nursing group (n=52)	χ^2	P
Sore infections	0	5	5.253	0.022
Nausea	1	7	4.875	0.027
Vomiting	1	3	1.040	0.308
Muscular soreness	2	8	3.983	0.046
Malnutrition	2	5	1.378	0.240

Table 4. Comparison of the patient/family satisfaction

	Systematic nursing group (n=52)	Conventional nursing group (n=52)	χ^2	P
Great satisfaction	28	20	6.749	0.034
Satisfaction	15	11		
Dissatisfaction	9	2		
Satisfaction rate	82.69%	59.62%	6.746	0.009

overall state, as well as the explanation and implementation of timely and effectively nursing methods, which provide favorable conditions for the prevention of pressure sores [17, 18]. Our research confirmed that systematic nursing can significantly reduce the incidence and the severity of pressure sores. Also, systematic care can reduce the length of hospital stays, which may be related to the combined nursing strategy of psychological care, health education, high quality care and nutritional care, so that the patients are psychologically and physically well cared for, leading to an improvement in the treatment effect [19]. Furthermore, our trial confirmed that systematic care can indeed reduce the incidence of complications such as sore infections, nausea, and muscle soreness. A lower incidence of complications can also be a favorable factor for shortening hospital stays.

The patients' skin conditions include the humidity and nutritional status, which also play a key role in the development of pressure sores. The humidity can be improved in time through close observation. However, the nutritional status, as a long-term factor, can only be ideally improved *via* targeted systematical nursing [20, 21]. We did not find a statistically significant difference in the incidence of malnutrition between the two groups during the treatment process, but the number of malnourished patients in the systematic nursing group was lower than it was in the conventional nursing group. The reason might be that the skin status was improved by short-term nutritional care, but the time period was too short to achieve an ideal nutrition therapy [22, 23].

The patient/family satisfaction rate in this study was significantly higher in the systematic nursing group than it was in the conventional nursing group, which may be due to the lower incidence of complications, psychological and physical care, as well as the effective prevention and treatment in the systematic nursing group. However, a relatively small sample size and short follow-up time may lead to biased results, so we will conduct a follow up study with a larger sample size in the future to verify the above results.

In summary, systematic nursing has a significant effect on preventing pressure sores and improving the quality of life in neurological patients, so it is worthy of further clinical promotion.

Disclosure of conflict of interest

None.

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