

Original Article

Effects of care bundles for patients with pressure ulcers and the impact on self-care efficacy

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Abstract: Objective: To investigate the effects of care bundles for patients with pressure ulcers and the impact on self-care efficacy. Method: A total of 160 patients with pressure ulcers were enrolled and divided into two groups using a lottery method. The control group (n=80) was cared for with routine nursing while the observation group (n=80) was additionally nursed with care bundles for 3 months. Both groups were compared in terms of grading of pressure ulcers, self-care efficacy, pressure ulcer management, awareness rate, and quality of life. Results: At 3 months after nursing, the grading of pressure ulcers was significantly improved in both groups. The observation group exhibited higher incidence of pressure ulcers, unstageable and deep tissue injury than the control group ($P<0.05$). DSES scores were improved in both groups ($P<0.05$). Scores of daily living, health behavior, compliance behavior, and emotional management in the observation group were higher than those in the control group ($P<0.05$). The skills of pressure ulcer management were strengthened in both groups ($P<0.05$). Scores of nutritional support, repositioning, skin care, dressing changes, and pressure ulcer assessment in the observation group were higher than those in the control group ($P<0.05$). The observation group also exhibited higher scores in terms of diet, pressure ulcer monitoring, lesion staging, complications and knowledge of pressure ulcer triggers than the control group ($P<0.05$). Quality of life was significantly improved in both groups after 3 months of nursing. PH, RP, BP, GH, VT, SF, RE and MH scores in the observation group were higher than those in the control group ($P<0.05$). Conclusion: Care bundles can improve pressure ulcer grading, enhance patient self-care efficacy and skills of pressure ulcer management, and help improve patient awareness rates and quality of life for patients with pressure ulcers, which is worth of promoting.

Keywords: Care bundles, pressure ulcer, self-efficacy, awareness rate, quality of life

Introduction

Pressure ulcers are caused by sustained pressure to a particular part of the body, and this pressure interrupts the blood supply to the affected skin area, resulting in sustained tissue ischemia, hypoxia, coupled with malnutrition as well as varying degrees of tissue ulceration and necrosis [1]. The specific mechanism of pressure ulcers has not yet been clarified. It is related to pressure factors (including vertical pressure, friction, shear, etc.), nutritional status (systemic nutritional deficiencies, muscle atrophy, etc.), and decreased skin resistance (moisture, friction and other physical stimuli) [2, 3]. Studies have shown that [4] the occurrence of pressure ulcers is related to the position of patients. It often occurs on the occipital protuberance, elbows, the spine and heels in a

supine posture; on the ears, elbows, ribs, internal and external ankles in a lateral posture; on the ears, female breasts, male genitalia and knees in a prone posture [5]. According to an epidemiological survey [6], there are nearly 1 million cases of pressure ulcers in the United States each year, and the medical costs can reach 1.6 billion U.S. dollars; the annual funding for pressure ulcer treatment in the United Kingdom is 180-320 million pounds; and the incidence of pressure ulcers in the emergency department in China is 9.2%. Due to the need for long-term bed rest, rapid changes in the condition of patients and the lack of nursing experience from families, patients are in demand of a high quality of nursing care [7, 8].

Care bundles are a set of three to five evidence-informed practices performed collectively and

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reliably to improve the outcomes of patients with special conditions [9]. With the development and popularization of evidence-based medicine, the “evidence-based practice guidelines” have played an important role in modern medical care. Care bundles can address challenges such as how to effectively provide more effective treatment and care services in clinical applications and improve patient outcomes and prognosis with high evidence-based treatment and care approaches [10]. At the same time, the implementation of care bundles is helpful to summarize and develop effective measures that can be implemented, so that patients can receive effective nursing and care [11]. Studies have shown [12] that each portion of the care bundle has been validated by clinical practice, and the joint implementation of the above interventions is far more effective than single measures. Currently, care bundles are widely used in the nursing of patients with malignant tumors and craniocerebral trauma, and they have achieved good results. However, the impact of this care model on self-care efficacy in patients with pressure ulcers has not been explored [13, 14]. Therefore, this study was conducted to explore the effect of care bundles in patients with pressure ulcers.

Materials and methods

Baseline data

A total of 160 patients with pressure ulcers admitted to our hospital were enrolled as study subjects and were divided into two groups using a lottery method. The control group (n=80) was cared for with routine nursing while the observation group (n=80) was additionally nursed with care bundles for 3 months. This study was approved by the ethics committee of The First People’s Hospital of Wenling, and all treatments were completed with obtained written consent of the patients/families.

Inclusion and exclusion criteria

Inclusion criteria: patients (1) who met the diagnostic criteria for pressure ulcers [15] and were assessed with staging of pressure ulcers; (2) who had good verbal communication skills without other serious comorbidities; (3) who required prolonged bed rest, difficulty getting up for a short period of activity; and (4) who had stable vital signs and a Braden score of ≤ 16 .

Exclusion criteria: (1) patients with cognitive abnormalities, severe malnutrition, or advanced tumor malignancy; (2) patients with long-term glucocorticoid use and severe liver and kidney dysfunction; and (3) patients with moderate to severe obesity, severe spinal cord injury, hematologic disorders, or concomitant immunologic disorders.

Methods

The control group was given routine nursing after admission. All patients underwent a comprehensive examination to assess the grading of their pressure ulcers. The health education regarding pressure ulcers was strengthened in patients/their families to guide their behaviors and skills on pressure ulcer management and inform them of the common symptoms, clinical manifestations and outcomes of pressure ulcers so that they could have a comprehensive understanding of the disease. Patients received on-time dressing changes, and were repositioned every two hours. Patients were instructed to eat food rich in protein, calories and fiber, and were limited in the intake of salt and sugar to improve their nutritional status [16, 17].

The observation group received care bundles combined with routine nursing. (1) Pressure ulcer risk assessment. After admission, skin examination was performed for each patient. The Braden score was used to assess the patient’s risk of pressure ulcers, including their own sensation, mobility, nutritional intake, moisture level, shear and friction forces, and other factors, and the corresponding nursing intervention was implemented according to the assessment results. Scores of 15-18 points indicated mild risk, and patients were recommended to complete the assessment once a week. Scores of 13-14 points suggested moderate risk, and patients were advised to complete two assessments per week. Scores of 10-12 points meant a high risk, and patients completed an assessment once a day to dynamically monitor the changes in the condition. (2) Repositioning. For patients with high-risk of pressure ulcers, warning signs were routinely placed at the bedside. Patients were assisted in repositioning every 2 h. The psychological assessment of patients was performed to understand the psychological changes. Tension-free techniques were employed to help turn patients as gentle as possible to avoid

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dragging, pulling, dragging and other violent behaviors. "R" soft pillows were placed on the patient's back to ensure 30° between the body and the bed surface. Heels were elevated to increase comfort. (3) The treatment of pressure ulcer wounds. Under a prone position, disposable urinary pads were used. The wound was cleaned with saline, and the urinary pad was replaced regularly. The sterile gauze dipped in iodine was utilized to disinfect the wound. Within 10 cm around wound surface, black tissue, necrotic tissue and secretions were removed to expose normal granulation. An electromagnetic wave spectroscopy instrument was adopted in the treatment of pressure ulcers for 30 min per lesion. After treatment, the wound was sprayed with liquid dressings and covered with foam dressings, three times a day. Patients who did not respond to the wound treatment were treated with negative pressure closed drainage. (4) Follow-up. For patients discharged from the hospital, telephone or home visits were conducted to evaluate the condition at 3 days, 7 days, 1 month, 2 months and 3 months after discharge. Patients/families were given illustrations and easy-to-understand cards, which informed patients of risk of pressure ulcers, prevention methods, treatment procedures, repositioning, etc., which were placed at the patient's bedside. Both groups completed 3 months of nursing care.

Observation indicators

(1) Grading of pressure ulcers. Both groups of patients were graded before and at 3 months after nursing care according to NPIAP Pressure Injury Stages, including: 1, 2, 3, 4, non-stageable and deep tissue injury. A lower grade indicates better nursing effect [18]. (2) Self-care efficacy. The two groups were assessed by the Self-Efficacy Scale (DSES) before and at 3 months after nursing in terms of daily life, health behavior, medical compliance, and emotional management. A higher score indicates higher self-care efficacy [19]. (3) Skills of pressure ulcer management. The two groups were assessed from the perspectives of nutritional support, skin management, on-time dressing changes and pressure sore assessment using a self-designed scale before and 3 months after nursing care, with a total of 20 items with 60 points. A higher score indicates better ability to manage pressure ulcers [20]. (4) Awareness rate. A self-designed awareness

questionnaire was used to investigate the awareness rate at 3 months after nursing in both groups, including: diet, pressure ulcer monitoring, lesion staging, complications and pressure ulcer triggers, with a total score of 100 points. A score of ≥ 90 points was defined as awareness [21]. (5) Quality of life. Quality of life was assessed in both groups before and at 3 months after nursing using the SF-36 scale in terms of physical functioning (PH, 3rd-12th item), role physical (RP, 13th-16th item), body pain (BP, 21-22th item), general health (GH, 1, 33-36th item), vitality (VT, 23, 27, 29, and 31th item), social functioning (SF, 20-32nd item), role emotional (RE, 17-19th item), and mental health (MH, 24-26th, 28, 30th item), and higher score indicates better quality of life [22].

Statistical analysis

Data were processed by SPSS 18.0 software. The count data were examined by χ^2 test and expressed as n (%). The measurement data were examined by *t* test and expressed as ($\bar{x} \pm s$). $P < 0.05$ indicated a significant difference.

Results

Comparison of baseline data

There was no significant difference in terms of baseline data including gender, age, BMI, length of stay in bed, pressure ulcers size, location of pressure ulcers and education level between the two groups ($P > 0.05$, **Table 1**).

Comparison of grading of pressure ulcers

The number of patients with pressure sores in stage 1, 2, 3 of the observation group was significantly more than that in the control group ($P < 0.05$). The observation group also had more cases of stage 4, non-stageable and deep tissue injury than the control group ($P < 0.05$, **Table 2**).

Comparison of self-efficacy between the two groups

The two groups showed no statistical difference in DSES scores before nursing ($P > 0.05$). The DSES scores of the two groups at 3 months after nursing were higher than those before nursing ($P < 0.05$). The scores of daily life, health behavior, compliance behavior, and emotional management in the observation group were all

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Table 1. Comparison of clinical data

Baseline data		Observation group (n=80)	Control group (n=80)	χ^2/t	P
Gender	Male	52 (65.00)	48 (60.00)	0.618	0.338
	Female	28 (35.00)	32 (40.00)		
Age (years)		71.59±4.34	72.11±4.39	1.423	0.669
BMI		20.81±2.16	20.82±2.17	0.216	0.531
Length of stay in bed (months)		3.69±0.62	3.70±0.63	1.119	0.601
Pressure ulcers size (cm ²)		0.5 × 0.5 - 4 cm × 6 cm	0.6 × 0.4 - 4.1 cm × 6.4 cm	1.636	0.679
Location of pressure ulcers	Sacrum	42 (52.50)	38 (47.50)	0.946	0.591
	Hips	18 (22.50)	20 (25.00)		
	Buttocks	8 (10.00)	10 (12.50)		
	Heels	6 (7.50)	4 (5.00)		
	Knee joint	4 (5.00)	6 (7.50)		
	Back	2 (2.50)	2 (2.50)		
Education level	Below secondary school	20 (25.00)	16 (20.00)	0.782	0.447
	Middle school - high school	32 (40.00)	34 (42.50)		
	High school and above	28 (35.00)	30 (37.50)		

Table 2. Comparison of pressure ulcer grades between the two groups [n (%)]

Grouping		1	2	3	4	Non-stageable	Deep tissue injury
Observation group (n=80)	Before nursing	4 (5.00)	8 (10.00)	24 (30.00)	20 (25.00)	16 (20.00)	8 (10.00)
	At 3 months after nursing	20 (25.00) ^{a,b}	16 (20.00) ^{a,b}	32 (60.00) ^{a,b}	3 (7.40) ^{a,b}	6 (7.50) ^{a,b}	0 (0.00) ^{a,b}
Control group (n=80)	Before nursing	4 (5.00)	6 (7.50)	20 (25.00)	22 (27.50)	18 (22.50)	10 (12.50)
	At 3 months after nursing	10 (12.50) ^b	10 (12.50) ^b	20 (25.00) ^b	18 (22.50) ^b	14 (17.50) ^b	8 (10.00) ^b

Compared with the control group, ^aP<0.05; compared with those before nursing, ^bP<0.05.

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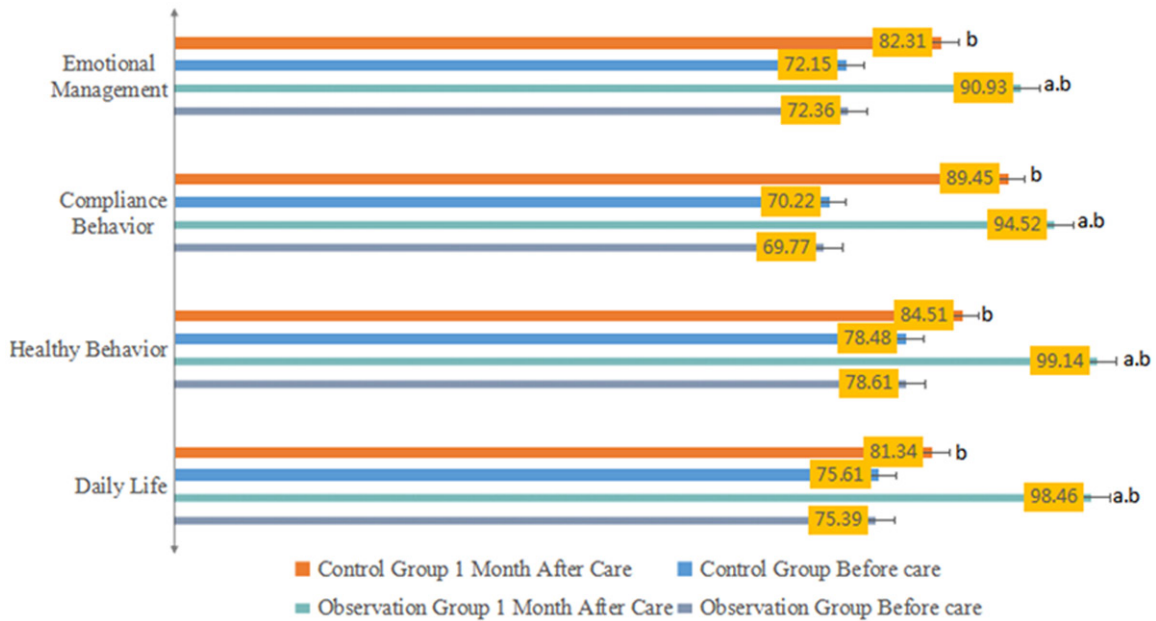


Figure 1. Comparison of self-care efficacy between the two groups.

higher than those in the control group ($P < 0.05$, **Figure 1**).

Comparison of the two groups' skills to manage pressure ulcers

At 3 months after nursing, the skills of pressure sore management of the two groups were improved significantly ($P < 0.05$). The scores of the nutritional support, repositioning, skin management, dressing changes and pressure ulcers assessment of the observation group were higher than those of the control group ($P < 0.05$, **Table 3**).

Comparison of awareness rates between the two groups

The awareness rate with regard to diet, pressure ulcer monitoring, lesion staging, complications and knowledge of pressure ulcer triggers in the observation group were higher than those in the control group at 3 months after nursing ($P < 0.05$, **Table 4**).

Comparison of quality of life in the two groups

The quality of life scores of the two groups were not statistically different before nursing ($P > 0.05$), and were improved at 3 months after nursing. The PH, RP, BP, GH, VT, SF, RE and MH scores of the observation group were higher

than those of the control group at 3 months after nursing ($P < 0.05$, **Figure 2**).

Discussion

Pressure ulcers occur in patients who have been bedridden for a long time. They are a kind of skin tissue ulceration or necrosis which is difficult to heal [23]. Once infected, a pressure ulcer not only bears a financial burden, but also affects the quality of life. Studies have shown [24] that pressure ulcers are more likely to affect people with limited movement, elderly and bedridden people and those with spinal cord damage who are at high risk of developing pressure ulcers. Therefore, it is crucial clinically to take effective measures to reduce the incidence of pressure ulcers and improve patient prognosis. Patients with pressure ulcers currently receive nursing management in hospital. However, a lack of professional nursing at home often leads to a low level of self-care efficacy [25].

In recent years, care bundles have been applied in patients with pressure ulcers with satisfactory results [26]. In this study, the grading of pressure ulcers at 3 months after nursing care in both groups was significantly reduced; the number of patients with pressure ulcers in grade 1, 2, and 3 in the observation group was

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Table 3. Comparison of the ability of the two groups to manage pressure ulcers (score, $\bar{x} \pm s$)

Grouping		Nutritional support	Repositioning	Skin care	On time dressing changes	Pressure ulcers assessment
Observation group (n=80 cases)	Before nursing	11.39±3.21	11.61±3.18	11.52±3.26	11.98±3.20	11.79±3.21
	At 3 months after nursing	16.49±3.36 ^{a,b}	15.98±4.19 ^{a,b}	16.83±2.69 ^{a,b}	16.41±2.95 ^{a,b}	17.11±2.15 ^{a,b}
Control group (n=80 cases)	Before nursing	11.40±3.23	11.63±3.19	11.54±3.28	12.00±3.25	11.84±3.24
	At 3 months after nursing	13.25±3.31 ^b	13.29±3.53 ^b	14.09±3.14 ^b	13.29±3.12 ^b	14.36±3.21 ^b

Compared with the control group, ^a $P < 0.05$; compared with those before nursing, ^b $P < 0.05$.

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Table 4. Comparison of the awareness rates between the two groups [n (%)]

Grouping	Number of cases	Diet	Pressure sore monitoring	Lesion staging	Complications	Pressure sore triggers
Observation group	80	74 (92.50)	78 (97.50)	76 (95.00)	76 (95.00)	40 (100.00)
Control group	80	62 (77.50)	64 (80.00)	60 (75.00)	66 (82.50)	62 (77.50)
χ^2	/	5.691	4.334	7.015	5.413	6.784
<i>P</i>	/	0.045	0.048	0.021	0.035	0.033

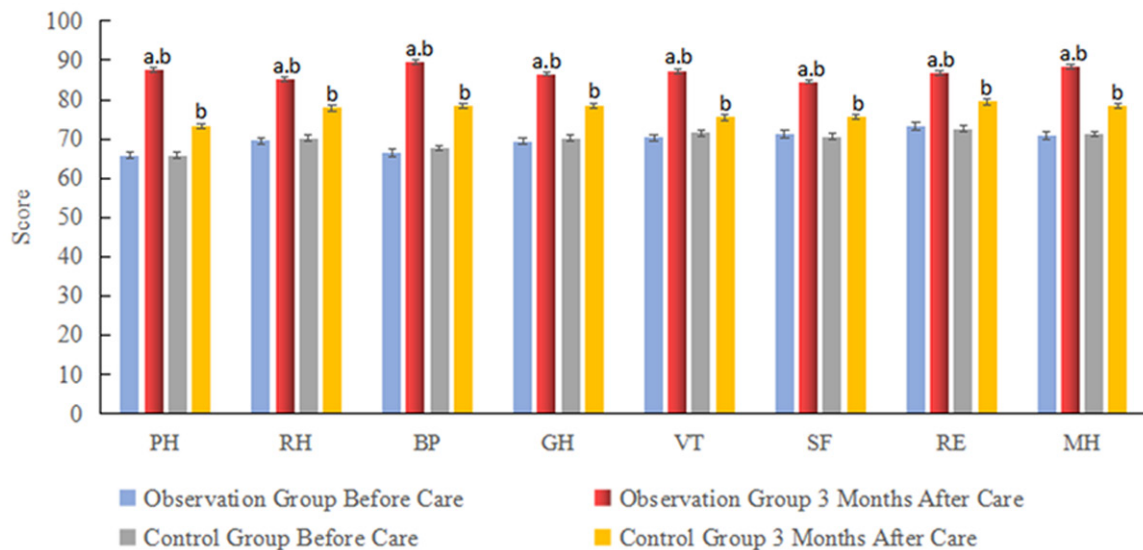


Figure 2. Comparison of quality of life between the two groups.

more than that in the control group ($P < 0.05$); and the number of cases of stage 4, non-stageable and deep tissue injury was more than that in the control group ($P < 0.05$), indicating that care bundles can reduce the grade of pressure ulcers, which is conducive to recovery and rehabilitation. Care bundles are a set of nursing interventions, each part of which has been proven in clinical practice to improve patient outcomes. Previous studies have shown that care bundles introduce new nursing concepts and develop targeted nursing interventions that are tailored to patients with pressure ulcers, which contribute to the improvement of quality of life. Clinical studies have shown [27] that care bundles can reduce the incidence of pressure ulcers and improve quality of life of patients by scientific, aggressive and effective nursing interventions. Meanwhile, care bundles also improve quality of life, shorten the length of hospital stay, and lower medical costs of the patients. Previous studies have shown [28] that the specific condition of patients with pressure ulcers should be assessed before implement of nursing, which could identify risk factors and

establish optimal nursing interventions based on clinical knowledge and accumulated experience. In research with pressure ulcer patients as the subjects [29], the control group received routine nursing, and the observation group received routine nursing combined with care bundles; both groups were nursed for 4 weeks and completed patient self-care efficacy assessment, and the results showed that the implementation of care bundles can improve the level of patient self-care efficacy, which is consistent with the results of our study. In this study, the DSES scores of the two groups at 3 months after nursing were higher than those before nursing ($P < 0.05$); the scores of daily life, health behavior, medical compliance and emotional management of the observation group at 3 months after nursing were higher than those of the control group ($P < 0.05$), which may be because the implementation of care bundles improved the self-care efficacy of pressure ulcer patients, helped develop good eating and behavioral habits, and as such reduced the incidence rate of pressure ulcers.

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The care bundles were implemented based on clinical evidence, which is conducive to improving patients' self-management skills by bundling care measures that have been clinically proven to be effective. In this study, the skills of pressure ulcer management at 3 months after nursing in the observation group were improved more significantly than those in the control group ($P<0.05$); the observation group showed higher scores in diet, pressure ulcer monitoring, lesion staging, complications and knowledge of triggers of pressure ulcers than the control group, indicating that the implementation of care bundles improved the pressure ulcer management skills and awareness rate of patients/family ($P<0.05$). At the same time, the continuity of nursing measures reduced the physical burden, emotional burden and financial burden of patients, helped improve the ability of daily living, reduced the psychological suffering of patients, thereby contributing to the improvement of their quality of life [30]. Clinically, care bundles in pressure ulcer patients provided scientific nursing interventions from different angles and levels, which is helpful to improve the quality of life of patients. In this study, the quality of life of both groups was significantly improved at 3 months after nursing care. The scores of PH, RP, BP, GH, VT, SF, RE and MH in the observation group were higher than those in the control group ($P<0.05$), indicating that care bundles can improve the quality of life of patients with pressure ulcers. However, there are also some limitations in this study. On one hand, the number of cases included in the study is small, which needs to be further verified by a large sample size. On the other hand, there may be errors in the analysis and processing of the data, which can lead to biased results, and further research is still needed.

In summary, care bundles can improve grading of pressure ulcers, enhance patient self-care efficacy and self-management skills, and improve patient awareness and quality of life, which is worthy of promoting.

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Disclosure of conflict of interest

None.

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