

# World Journal of *Clinical Cases*

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**ABOUT COVER**

Editorial Board Member of *World Journal of Clinical Cases*, Ravi Kant, MD, Associate Professor, Division of Endocrinology, Diabetes and Metabolism, Medical University of South Carolina/Anmed Campus, Anderson, SC 29621, United States. rkant82@hotmail.com

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## Case Control Study

# Benefits of multidisciplinary collaborative care team-based nursing services in treating pressure injury wounds in cerebral infarction patients

You-Hua Gu, Xun Wang, Si-Si Sun

**ORCID number:** You-Hua Gu 0000-0002-7632-0399; Xun Wang 0000-0002-9530-0027; Si-Si Sun 0000-0002-5231-2589.

**Author contributions:** Gu YH and Wang X share the same with this article and should be regarded as co-first authors; Gu YH and Wang X design the experiment; Sun SS drafted the work, Gu YH and Wang X collected the data; Sun SS and Gu YH analysed and interpreted data, Wang X and Sisi Sun SS wrote the article.

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**You-Hua Gu**, Department of Neurology, District 27, First Affiliated Hospital of Soochow University, Suzhou 215006, Jiangsu Province, China

**Xun Wang**, Outpatient Department of Wound, Ostomy and Incontinence, First Affiliated Hospital of Soochow University, Suzhou 215006, Jiangsu Province, China

**Si-Si Sun**, Emergency Surgical Ward 48, First Affiliated Hospital of Soochow University, Suzhou 215000, Jiangsu Province, China

**Corresponding author:** Si-Si Sun, BM BCh, Chief Nurse, Emergency Surgical Ward 48, First Affiliated Hospital of Soochow University, No. 188 Shizi Street, Gusu District, Suzhou 215000, Jiangsu Province, China. [sssunbisheng@163.com](mailto:sssunbisheng@163.com)

## Abstract

**BACKGROUND**

Cerebral infarction patients need to be bedridden for long periods of time often resulting in pressure injuries, which may represent a serious threat to patients' life and health. An effective nursing program should be adopted for timely intervention in patients with pressure wounds.

**AIM**

To explore the value of nursing services based on a multidisciplinary collaborative treatment team in patients with pressure injury wounds following cerebral infarction.

**METHODS**

Patients with cerebral infarction pressure injury wounds in our hospital from December 2016 to January 2021 were selected and divided into one study group and one control group based on the simple random number table method. The control group was treated with conventional nursing care (CNC), and the study group was treated with care services based on multidisciplinary collaborative care (MDCC). The Pressure Ulcer Scale for Healing (PUSH), healing effect, Self-Perceived Burden Score (SPBS), and satisfaction with the intervention were calculated before and after 2 and 4 wk of intervention in both groups.

**RESULTS**

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Sixty-two patients were enrolled, and 31 patients were assigned to each group. The results of the interventions were as follows: (1) There was no significant difference between the PUSH scores of the MDCC group ( $11.19 \pm 2.46$ ) and CNC group ( $12.01 \pm 2.79$ ) before the intervention ( $P > 0.05$ ), and the PUSH scores were lower after 2 and 4 wk of intervention in the MDCC group ( $6.63 \pm 1.97$  and  $3.11 \pm 1.04$ ) than in the CNC group ( $8.78 \pm 2.13$  and  $4.96 \pm 1.35$  points) ( $P < 0.05$ ); (2) The rate of wound healing in the MDCC group (96.77%) was higher than that in the CNC group (80.65%) ( $P < 0.05$ ); (3) There was no significant difference between the SPBS scores of emotional factors ( $21.15 \pm 3.11$ ), economic factors ( $9.88 \pm 2.15$ ), and physical factors ( $8.19 \pm 2.23$ ) in the two groups before the intervention. The scores of emotional factors ( $13.51 \pm 1.88$ ), economic factors ( $6.38 \pm 1.44$ ), and physical factors ( $5.37 \pm 1.08$ ) were lower in the MDCC group than in the CNC group ( $16.89 \pm 2.05$ ,  $7.99 \pm 1.68$  and  $7.06 \pm 1.19$ ) after 4 wk of intervention ( $P < 0.05$ ); and (4) Satisfaction with the intervention was higher in the MDCC group (93.55%) than in the CNC group (74.19%) ( $P < 0.05$ ).

## CONCLUSION

Interventions for patients with cerebral infarction pressure wounds based on an MDCC treatment team can effectively reduce patients' self-perceived burden, improve pressure wound conditions, facilitate wound healing, and increase patient satisfaction with the intervention.

**Key Words:** Multidisciplinary collaborative treatment team; Pressure injury wounds from cerebral infarction; Pressure Ulcer Scale for Healing score; Self-Perceived Burden Score; Healing effect

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**Core Tip:** Pressure injury is a serious threat to patient life and health, as it not only aggravates their condition and increases their pain, but also prolongs their hospital stay; it also increases their medical burden, and can lead to infections and other adverse events. This study clarified the value of multidisciplinary collaborative team-based care services in patients with cerebral infarction pressure injury wounds, using selected patients.

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## INTRODUCTION

Pressure injuries are mainly local injuries to the skin caused by shear stress, friction, and pressure[1,2]. Cerebral infarction is a clinically prominent cerebrovascular disease, and patients need to be bedridden for long periods of time; local tissues and skin are highly susceptible to pressure injuries due to the long-term effects of pressure, edema, malnutrition, and dampness[3,4].

Pressure injury is a serious threat to patient life and health, as it not only aggravates their condition and increases their pain, but also prolongs their hospital stay; it also increases their medical burden, and can lead to infections and other adverse events[5,6]. Therefore, an effective nursing program should be adopted for timely intervention in patients with pressure wounds[7-10].

Compared with conventional nursing care (CNC), which tends not to be systemic and comprehensive, multidisciplinary team-based care focuses on team spirit and advocates patient-centered care, with nursing staff responsible for organization, coordination, feedback, and decision-making during patient care[11,12]. This study aimed to further clarify the value of multidisciplinary collaborative team-based care

services in patients with cerebral infarction pressure injury wounds, using selected patients from our hospital.

## MATERIALS AND METHODS

### General information

This study was approved by the Ethics Committee of our hospital. Patients with pressure injury wounds from cerebral infarction in our hospital from December 2016 to January 2021 were selected and divided into two groups, a control group and a study group, based on a simple random number table method. The inclusion criteria for the selected patients were (1) meeting the diagnostic criteria for cerebral infarction in the Guidelines for Diagnosis and Treatment of Acute Ischemic Stroke; (2) pressure injury wounds after the onset of cerebral infarction; (3) good communication skills; (4) normal state of consciousness; and (5) ability to provide informed consent. Exclusion criteria comprised the following: (1) presence of malignant tumor wounds; (2) presence of multi-organ failure; (3) presence of speech and communication disorders, cognitive dysfunction, psychiatric pathology; and (4) poor compliance and inability to cooperate in the completion of the study.

### Methods

The control group was treated with CNC, including pressure injury wound treatment (maintaining wound moistening, wound cleaning, infection control), health education (life guidance, diet guidance, wound protection education), and pain care. The study group was treated with nursing services based on a multidisciplinary collaborative care (MDCC) approach, incorporating similar management to that of the control group but with involvement of a multidisciplinary team. The procedure for the MDCC was as follows: (1) establish an intervention team, clarify responsibilities, and set up a WeChat group; the intervention team was formed by a cerebrovascular physician, endocrinologist, outpatient nurse, department nurse, nutrition physician, and pain physician. A dedicated person from the outpatient dressing exchange room was responsible for team management and organized regular learning; (2) the responsibilities of each member: (a) Outpatient nurses and department nurses are responsible for the assessment and treatment of pressure injury wounds, prepare for wound treatment, and transmit wound pictures to general surgeons or orthopedic surgeons *via* WeChat, if closed surgery or surgical dilation is required; if vascular problems are suspected in foot and lower limb wounds, inform the supervising physician/vascular surgeon *via* WeChat for collaborative diagnosis; inform family members how to take effective pressure injury wound at discharge pictures, and send text and pictures *via* WeChat, with regular telephone or WeChat video follow up by the department nurses after discharge; (b) Within 48 h, the physician of the department conducts relevant examinations and laboratory tests on the patient, completes the diagnosis and assessment of the whole body according to the laboratory and examination results, and if malnutrition, lower limb vascular disease, diabetes mellitus, and cardiovascular disease are combined, issues a consultation request through WeChat and uploads the patient's personal data; (c) After receiving the consultation request, the physicians of the diabetic medicine and cardiovascular medicine departments conduct a consultation within 24 h and write a diagnosis and treatment opinion at the bedside in the WeChat group. If the condition is special or complex, the consultation will be held at the bedside; (d) Nutrition physician responsibilities: provide nutritional guidance and assessment within 24 h of admission and closely monitor the nutritional status of the patient during hospitalization; and (e) Pain physician responsibilities: after receiving the consultation request, prescribe pain prescription within 24 h according to the patient's pain level; if the pain is mild, listening to music and other ways to distract or relieve the pain are recommended; if the pain is severe, implementing nerve blocking anesthesia and other treatments is recommended; and (3) Out-of-hospital follow-up responsibilities: after the patient is discharged from hospital, carry out follow-up management of the patient by means of WeChat, telephone, or instructing the patient to return to the hospital for regular review to grasp the local status of the patient's pressure injury wound, psychological status, nutritional status, and pain level; if the patient has a pressure injury wound problem and is unable to visit to the hospital for treatment, let the family member take clear pictures of the wound site and the nursing staff instruct the family member through WeChat. Both groups continued the intervention for 4 wk.

### Observation indicators

The pressure injury wound scores of the two groups were counted before and after 2 and 4 wk of intervention, assessed according to the Pressure Ulcer Scale for Healing (PUSH), with scores ranging from 0 to 17; the higher the score, the more severe the degree of pressure ulcer. To count the healing effect of the two groups, complete healing of the wound was considered as healing; reduction of the wound area by > 50% was considered as significant effect; reduction of the ulcer area but less than 50% was considered as improvement; no reduction of the wound was considered ineffective; wound healing rate = (healed + significant effect)/total number of cases × 100%. The self-perceived burden scores of the two groups before and after the intervention were counted and assessed according to the Self-Perceived Burden Score (SPBS) scale, including three dimensions of emotional factors, economic factors, and physical factors; the higher the score, the more severe the self-perceived burden. Comparison of the two groups' satisfaction with the intervention: assessed by the Newcastle Satisfaction with Nursing Scale, containing 19 of 95 items, with scores > 85 being very satisfied, 67-85 being generally satisfied, and < 67 being dissatisfied; satisfaction = (generally satisfied + very satisfied)/total number of cases in the group × 100% [13].

### Statistical analysis

The data were analyzed using SPSS Vers.22.0. The measurement data (mean ± SD) were analyzed with *t*-test, the count data *n* (%) were analyzed with the  $\chi^2$  test, and *P* < 0.05 indicated that the difference was statistically significant.

## RESULTS

### Patients

Sixty-two patients with pressure injury wounds from cerebral infarction were enrolled in the study and divided into two groups comprising 31 patients each. In the CNC group, there were 17 male and 14 female patients, aged 45 to 76 years old (mean 60.48 ± 9.33 years old); Education level: 11 cases of educational level of primary school, 14 cases of middle school and high school, 6 cases of college and above; body mass index (BMI) 17.6–24.9 kg/m<sup>2</sup>, mean 21.25 ± 2.09 kg/m<sup>2</sup>. In the MDCC group, there were 19 men and 12 women; aged 43 to 79 years, mean 62.04 ± 8.62 years; education level: 13 cases of educational level of primary school, 13 cases with the educational level of middle school and high school, 5 cases of college and above; BMI 17.3–25.6 kg/m<sup>2</sup>, mean 22.01 ± 2.32 kg/m<sup>2</sup>. The clinical data of the two groups were balanced and comparable (*P* > 0.05).

### PUSH scores

There was no significant difference between the PUSH scores of the MDCC group (11.19 ± 2.46) and CNC group (12.01 ± 2.79) before the intervention (*P* > 0.05). The PUSH scores after 2 and 4 wk of intervention were lower in the MDCC group (6.63 ± 1.97 and 3.11 ± 1.04) than in the CNC group (8.78 ± 2.13 and 4.96 ± 1.35) (*P* < 0.05) (Table 1).

### Healing effect

The rate of wound healing in the MDCC group (96.77%) was higher than that in the CNC group (80.65%) (*P* < 0.05), as shown in Table 2.

### SPBS scores

There was no significant difference (*P* > 0.05) between the pre-intervention groups' scores for emotional factors (21.15 ± 3.11), economic factors (9.88 ± 2.15), and physical factors (8.19 ± 2.23). After 4 wk of intervention, the MDCC group's scores for emotional factors (13.51 ± 1.88), economic factors (6.38 ± 1.44), and physical factors (5.37 ± 1.08) were lower than those of the CNC group (16.89 ± 2.05, 7.99 ± 1.68, and 7.06 ± 1.19) (*P* < 0.05), as shown in Table 3.

### Intervention satisfaction

Satisfaction with the intervention was higher in the MDCC group (93.55%) than in the CNC group (74.19%) (*P* < 0.05) (Table 4).

**Table 1 Comparison of Pressure Ulcer Scale for Healing scores between the two groups (mean  $\pm$  SD, points)**

| Group          | Number of cases | Before intervention | After 2 wk of intervention | After 4 wk of intervention |
|----------------|-----------------|---------------------|----------------------------|----------------------------|
| MDCC group     | 31              | 11.19 $\pm$ 2.46    | 6.63 $\pm$ 1.97            | 3.11 $\pm$ 1.04            |
| CNC group      | 31              | 12.01 $\pm$ 2.79    | 8.78 $\pm$ 2.13            | 4.96 $\pm$ 1.35            |
| <i>t</i> value |                 | 1.227               | 4.126                      | 6.044                      |
| <i>P</i> value |                 | 0.225               | 0.000                      | 0.000                      |

MDCC: Multidisciplinary collaborative care; CNC: Conventional nursing care.

**Table 2 Comparison of the healing effect between the two groups, *n* (%)**

| Group          | Number of cases | Healed     | Wound healing rate | Improved  | Ineffective | Wound healing rate |
|----------------|-----------------|------------|--------------------|-----------|-------------|--------------------|
| MDCC group     | 31              | 21 (67.74) | 9 (29.03)          | 1 (3.23)  | 0 (0.00)    | 30 (96.77)         |
| CNC group      | 31              | 14 (45.16) | 11 (35.48)         | 5 (16.13) | 1 (3.23)    | 25 (80.65)         |
| $\chi^2$ value |                 |            |                    |           |             | 4.026              |
| <i>P</i> value |                 |            |                    |           |             | 0.045              |

MDCC: Multidisciplinary collaborative care; CNC: Conventional nursing care.

**Table 3 Comparison of Self-Perceived Burden Score between the two groups (mean  $\pm$  SD, points)**

| Time                       | Group          | Number of cases | Emotional factors | Economic factors | Physical factors |
|----------------------------|----------------|-----------------|-------------------|------------------|------------------|
| Pre-intervention           | MDCC group     | 31              | 21.15 $\pm$ 3.11  | 9.88 $\pm$ 2.15  | 8.19 $\pm$ 2.23  |
|                            | CNC group      | 31              | 20.76 $\pm$ 2.95  | 10.15 $\pm$ 2.23 | 8.49 $\pm$ 2.45  |
|                            | <i>t</i> value |                 | 0.507             | 0.485            | 0.504            |
|                            | <i>P</i> value |                 | 0.614             | 0.629            | 0.616            |
| After 4 wk of intervention | MDCC group     | 31              | 13.51 $\pm$ 1.88  | 6.38 $\pm$ 1.44  | 5.37 $\pm$ 1.08  |
|                            | CNC group      | 31              | 16.89 $\pm$ 2.05  | 7.99 $\pm$ 1.68  | 7.06 $\pm$ 1.19  |
|                            | <i>t</i> value |                 | 6.766             | 4.051            | 5.855            |
|                            | <i>P</i> value |                 | 0.000             | 0.000            | 0.000            |

MDCC: Multidisciplinary collaborative care; CNC: Conventional nursing care.

**Table 4 Comparison of intervention satisfaction between the two groups, *n* (%)**

| Group          | Number of cases | Highly satisfied | Fairly satisfied | Unsatisfied | Satisfaction with the intervention |
|----------------|-----------------|------------------|------------------|-------------|------------------------------------|
| MDCC group     | 31              | 19 (61.29)       | 10 (32.26)       | 2 (6.45)    | 29 (93.55)                         |
| CNC group      | 31              | 12 (38.71)       | 11 (35.48)       | 8 (25.81)   | 23 (74.19)                         |
| $\chi^2$ value |                 |                  |                  |             | 4.292                              |
| <i>P</i> value |                 |                  |                  |             | 0.038                              |

MDCC: Multidisciplinary collaborative care; CNC: Conventional nursing care.

## DISCUSSION

The reduced mobility, impaired intelligence, and poor self-care ability of patients following cerebral infarction signify the requirement for long-term bed rest[14]; this can cause local blood circulation abnormalities, tissue hypoxia, and ischemia necrosis,

which can eventually lead to pressure injury[15-17]. Pressure injuries are hazardous and can lead to many complications; if not intervened in a timely and effective manner, they can lead to sepsis and other adverse events, which may affect rehabilitation and the recovery process[18,19].

At the same time, with the increasing popularity of new technologies and concepts in the treatment of pressure injuries, CNC is challenged to meet the actual clinical needs because of lack of comprehensiveness and systematization; the multidisciplinary treatment model is gradually being promoted and applied. Some scholars have shown that an MDCC model integrates the best resources and technical backbone of each department to implement bedside consultations for patients, to comprehensively formulate intervention plans, and to dynamically monitor the wound healing of pressure trauma by paying high attention to the local conditions, psychological activities, and systemic condition of patients through a modern nursing concept. Some scholars have shown that the application of an MDCC team intervention model during the treatment and care of patients with pressure ulcers resulted in shorter hospital stay, reduced hospital treatment costs, lower risk of pressure ulcer recurrence, and higher patient satisfaction. In our study, after the MDCC team-based intervention for pressure wound patients with cerebral infarction, it was found that the PUSH score of the MDCC group was lower than that of the CNC group, and the reduction in SPBS scores was more significant than that of the CNC group, while the wound healing rate (96.77%) was higher than that of the CNC group (80.65%) ( $P < 0.05$ ). This indicates that the MDCC team-based service is of high value; it can effectively regulate the physical and mental states of patients with pressure wounds from cerebral infarction and promote the healing of pressure ulcer wounds. The main reasons for this are as follows: The interventions for patients with conventional pressure wounds are mainly performed by the wound specialist nurses alone, while the managing physicians are mainly responsible for the systemic treatment, and there is lack of timely and direct communication between them resulting in lack of adequate attention to factors affecting wound healing in pressure injuries (*e.g.*, lower limb vascular function, level of patient pain during debridement, nutritional status). The wound specialist has difficulty in managing the cleaning of complex wounds and the administration of systemic medication for infected wounds. The MDCC team-based nursing service can effectively avoid the above-mentioned shortcomings, as it integrates the medical and nursing personnel to form an intervention team, which improves the standardization and systematization of treatment, and results in better prognosis for patients[20]. Patients with cerebral infarction pressure injury wounds can receive timely and effective systemic treatment, painless wound debridement, and internal environment regulation when care services are based on multidisciplinary collaborative diagnosis and treatment teams. Patient families can also learn of wound management and nutrition to provide good and effective care interventions for patients in daily life. In addition, in an MDCC team-based service, doctors from different departments explain the causes and treatment of the disease from their own professional point of view during the intervention and provide targeted answers to questions and guidance on medication, which can enhance patient knowledge of their disease and treatment, build their trust in the doctors, learn self-adjustment and control, better self-management, and promote disease recovery. The program is designed to improve patient knowledge of their disease and treatment, build trust in the practitioner, learn self-management and self-control, and promote recovery.

The results of our study also showed that satisfaction with the intervention was higher in the MDCC group (93.55%) than in the CNC group (74.19%) ( $P < 0.05$ ), suggesting that the MDCC team-based service also deepened the acceptance of clinical care by patients with cerebral infarction pressure wounds, mainly because the intervention model not only improved wound healing, but also reduced the patient's self-perceived burden. The intervention not only improves wound healing, but also regulates the patient's physical and psychological state, thus helping to increase patient satisfaction with the care provided.

## CONCLUSION

The adoption of multidisciplinary team-based nursing care for patients with cerebral infarction pressure wounds can effectively reduce patient self-perceived burden, improve pressure wound conditions, facilitate wound healing, and increase patient satisfaction with the intervention. However, this was a single-center small-sample study, so whether the research results are representative still needs to be further

explored and confirmed by expanding the scope of sample selection and increasing the sample size. Moreover, the sample size of our study was relatively small, and we will conduct joint multicenter research in the future.

## ARTICLE HIGHLIGHTS

### Research background

Patients with cerebral infarction are susceptible to stress injuries, which seriously threaten the lives and health of patients.

### Research motivation

Look for nursing measures to cope with stress injury in patients with cerebral infarction.

### Research objectives

This study aimed to explore the value of nursing service for stress wounds after cerebral infarction based on a multidisciplinary collaborative treatment team.

### Research methods

A set of studies was conducted on patients with pressure injury wounds from cerebral infarction in our hospital from December 2016 to January 2021.

### Research results

Before intervention, there was no significant difference in Pressure Ulcer Scale for Healing score between multidisciplinary collaborative care (MDCC) group and conventional nursing care (CNC) group. After 2 wk and 4 wk, the score was lower than the CNC group. The wound healing rate of MDCC group was higher than that of CNC group. The comparison of Self-Perceived Burden Score of emotional factors, economic factors, and physical factors between the two groups before the intervention was not statistically significant.

### Research conclusions

Interventions for patients with cerebral infarction pressure wounds based on an MDCC treatment team can effectively reduce patients' self-perceived burden, improve pressure wound conditions, facilitate wound healing, and increase patient satisfaction with the intervention.

### Research perspectives

Intervention based on the MDCC treatment team in patients with cerebral infarction pressure injury can have greater application in the treatment of cerebral infarction pressure injury.

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