

# Evaluating The Effects of Fine Cooperation Program and Doctor-Nurse Integration on Patients with Chronic Wounds

Hongmei Xie, BSC  
Li Ke, BSC  
Xue Han, BSC  
Shouyong Zhang, BSC  
Pingping Song, BSC  
Pingping Zhang, BSC  
Chunmei Yan, BSC  
YuXia Ding, BSC  
Yan Liu, BSC

**Objective:** This study aimed to evaluate the effects of fine cooperation program of doctor-nurse integration on wound healing, patient's psychological state and pain degree of patients with chronic wounds. **Methods:** A total of 100 patients with chronic wounds who were treated with conventional wound management from March 2016 to December 2018 were enrolled as a control group, while another 100 patients with chronic wounds who were treated with the fine cooperation program of doctor-nurse integration during January to October 2020 were selected as an observation group. Nursing satisfaction, general conditions (waiting time for dressing change, hospitalization time, and wound healing time) and wound healing grade were observed, and the pain degree (scored by the simplified McGill scale) and psychological state [evaluated by Self-rating Depression Scale (SDS) and Self-rating Anxiety Scale (SAS)] were compared between before intervention and on Day 5 of intervention. **Results:** The nursing satisfaction was higher and the waiting time for dressing change, hospitalization time and wound healing time were shorter in the observation group than those in the control group ( $P < 0.05$ ). On Day 5 of intervention, the present pain intensity, Visual Analogue Scale, pain rating index, SDS and SAS scores are seen declined in both groups compared with those before intervention, and they were lower in the observation group than those in the control group ( $P < 0.05$ ). The observation group had a higher wound healing grade than that of the control group ( $P < 0.05$ ). **Conclusion:** The fine cooperation program of doctor-nurse integration can shorten the waiting time for dressing change and hospitalization time.

**Keywords:** chronic wound, cooperation, pain, psychological state, wound healing

*Am J Health Behav.*™ 2023;47(4):642-649  
DOI: <https://doi.org/10.5993/AJHB.47.4.1>

**A** chronic wound is a common clinical disease that does not have any orderly set of stages of recovery and which cannot heal functionally and anatomically in a predictable amount of time. Its repair process generally extends to more than 4 weeks. In recent years, the number of patients with chronic wounds has increased worldwide due to the increasing population, aging and continuous development

of diversified society. In such aging population, chronic wounds are often caused by various chronic diseases like hypoproteinemia, immune system deficiency, tumors or diabetes mellitus,<sup>1,2</sup> and, in some cases, accidental injuries. Therefore, patients with chronic conditions like diabetes and venous diseases are at high risk of developing chronic wounds. As a complex clinical symptom, chronic wounds do

*Hongmei Xie, Department of Nursing, Huabei Petroleum Administration Bureau General Hospital, Renqiu 062550, Hebei Province, China. Li Ke, Xue Han, Shouyong Zhang, Pingping Song, Pingping Zhang, Chunmei Yan, YuXia Ding & Yan Liu, Second Ward, Department of General Surgery, Huabei Petroleum Administration Bureau General Hospital, Renqiu 062550, Hebei Province, China. Hongmei Xie & Li Ke contributed equally to this study.  
Corresponding Author: Hongmei Xie, Email: xiehmhpbgh@uic-edu.cn*

not immediately endanger patients' lives, but remain unhealed for long periods, often for months or even years. This seriously affects the recovery of patients from primary diseases and reduces their quality of life.<sup>3</sup> Such patients who suffer from chronic wounds for longer durations are thus prone to irritability, anxiety and other negative emotions. In addition, such patients often have pathological characteristics such as microcirculation disturbance, capillary occlusion, tissue ischemia and hypoxia, and have a high risk of necrotic tissue infection, which may lead to limb necrosis, amputation, and even sepsis in severe cases. This not only aggravates the primary diseases but also endangers their lives.<sup>4,5</sup>

The treatment of chronic wounds is difficult and time-consuming, and it may become harder when performed by physicians or nurses alone due to the absence of specialists and trained nurses. In such a situation, fine training programmes are devised at various locations, under which newly graduated nurses commence their careers in the healthcare sector with enhanced knowledge and skills. In addition to the technological benefits of the fine training program that automates its functions, this program also facilitates doctor-nurse integration, laying the foundation of a reliable cooperation process between doctors and nurses. Under this programme, doctors and nurses have a clear division of labor, enabling them to perform their respective duties efficiently. This programme also enables a close information exchange between doctors and nurses, as they collaborate and complement each other.<sup>6,7</sup> This program is also helpful in making

the rational use of medical resources, optimizing the workflow, and improving the work efficiency, ultimately achieving common goals.<sup>8</sup>

The fine cooperation program of doctor-nurse integration at Huabei Petroleum Administration Bureau General Hospital (HPABGH) was introduced in January 2019 to enable nurses to better understand the patients' diagnosis and treatment plan, and coordinate with doctors to better understand the nursing plan. This study examines the extent to which this fine cooperation program proved useful in bringing doctor-nurse integration to further promote chronic wound healing. Through observation techniques, this study collected valuable clinical evidence to understand the treatment outcomes and whether this program was particularly beneficial to the nursing tasks administered on patients with chronic wounds.

## METHODOLOGY

### • Sampling and Data collection

This study utilized data of two groups of patients with chronic wounds treated at HPABGH at two different time periods, each group having 100 patients. The first group of 100 patients, called control group, was treated with conventional wound management methods between March 2016 to December 2018. The second group of 100 patients with chronic wounds was treated with the fine cooperation program and doctor-nurse integration between January 2019 to October 2020, called observation group. The general data were well-balanced and comparable between the two groups ( $P>0.05$ ) (Table 1).

**Table 1**  
**General data (n,  $\bar{x} \pm s$ )**

Indicator		Observation group (n=100)	Control group (n=100)	Statistical value	P
Gender [n (%)]	Male	53 (53.00)	55 (55.00)	$\chi^2=0.081$	0.777
	Female	47 (47.00)	45 (45.00)		
Age ( $\bar{x} \pm s$ , Y)		48.68 $\pm$ 5.76	49.13 $\pm$ 5.92	$t=0.545$	0.587
Body mass index ( $\bar{x} \pm s$ , kg/m <sup>2</sup> )		25.39 $\pm$ 2.24	25.61 $\pm$ 2.36	$t=0.676$	0.500
Duration of disease ( $\bar{x} \pm s$ , d)		36.35 $\pm$ 3.18	35.86 $\pm$ 3.37	$t=1.058$	0.292
Wound area ( $\bar{x} \pm s$ , cm <sup>2</sup> )		14.82 $\pm$ 3.16	15.03 $\pm$ 3.20	$t=0.467$	0.641
Wound type [n (%)]	Venous ulcer of lower extremity	32 (32.00)	30 (30.00)	$\chi^2=0.640$	0.958
	Pressure ulcer (stage III-IV)	19 (19.00)	17 (17.00)		
	Diabetic foot (stage III)	17 (17.00)	16 (16.00)		
	Non-healing surgical incision	14 (14.00)	15 (15.00)		
Comorbidity [n (%)]	Traumatic chronic wound	18 (18.00)	22 (22.00)	$\chi^2=0.125$	0.724
	Diabetes mellitus	19 (19.00)	21 (21.00)		
	Hypertension	38 (38.00)	35 (35.00)		

The inclusion criteria were as follows: (1) patients diagnosed with chronic wounds that were not healed after more than one month of treatment, (2) those with normal coagulation functions, and (3) those with complete clinical data, and who or whose families signed the

informed consent form. The exclusion criteria involved: (1) patients complicated with severe complications of the heart, liver, lung, kidney or other vital organs, (2) those complicated with severe systemic infection or uncontrolled septic shock, (3) those with hemorrhagic

diseases or bleeding tendency, (4) those with a history of depression or anxiety, or (5) those complicated with disturbance of consciousness or mental illness.

- **Research procedure**
- **For control group**

The patients in control group were treated with conventional wound management, specifically as follows: The doctor performed debridement, constantly checking wound conditions to evaluate wound status. they would conduct the conventional surgical wound dressing change with the bandage, cotton pad and gauze block according to exudation conditions. The doctors would guide the patient to rest in a correct position, provide health education through bedside education, brochures and videos. They would also explain the harm of poor wound healing to the patient, so that the patient could pay attention to and better cooperate with medical staff in wound management.

- **For observation group**

On the other hand, the patients in observation group were treated with the fine cooperation program of doctor-nurse integration. There were various stages of this kind of treatment. Right at the outset two teams were constituted. The first team, called wound management team, comprised wound nurse specialists (responsible for consultation and guidance of wound management in clinical departments) and nursing management experts in each department (responsible for overall coordination and dynamic evaluation of wound management of doctor-nurse integration). The second team acted as expert support group comprising surgical specialists (responsible for development and implementation of the therapeutic regimen) and nutritionists (responsible for providing symptomatic treatment and nutritional support). This team led by the surgical specialist jointly formulated the standardized wound management responsibilities, filled the wound assessment form, and completed consent form for debridement and use of special wound dressings. In addition, an integrated wound intervention team comprising the department director, bed doctor, head nurse, wound nurse specialist and supervisor nurse was also formed. This team regularly held academic salons and training in wound management, actively organized academic exchange programs and training for members to participate inside and outside the province in various forms such as wound workshops, case sharing, discussion on complicated and refractory wounds, and classroom lectures.

An extensive procedure was adopted for wound management. The nurse first cleaned the wounds with normal saline cotton balls and harvested bacterial culture specimens for testing. The medical staff jointly checked and determined whether the wounds were connected with the bone marrow cavity, thoracic cavity or abdominal cavity, and then developed the treatment program. Autolytic debridement was conducted by the nurse using hydrocolloid dressing when applicable, and surgical debridement was performed in the operating room by doctors if necessary. After thorough debridement, the wound was treated by wound nurse specialists using either moist wound healing techniques or closed negative pressure drainage.

Under this program, it was observed that the doctors and nurses jointly made ward rounds every morning to evaluate the patient's condition (e.g., primary diseases and nutritional status), thoroughly to assess the wound depth, affected area, and determine the basal tissue condition. They filled the wound assessment form and also determined the presence or absence of infiltration of surrounding skin and the nature of exudate.

In this way, therefore, the doctors and nurses jointly developed and implemented the chronic wound management program. During wound management, local anesthetics or cold compress was also used to reduce the degree of pain of patients. Patients were also encouraged continuously and given psychological nursing to relieve their negative emotions. When the wound granulation tissue grew well and reached the standard of skin grafting or secondary suture, the doctor performed secondary suture or skin grafting with the cooperation of the nurse and observed the wound condition after operation.

In the end, a remote work information platform of doctor-nurse integration was formed for effective communication between the hospital and the patients. This included a doctor-nurse short message platform, E-mail exchange with wound nurse specialists, and an interactive wound communication group. Every medical staff could join these communication platforms to exchange work related information at any time. The doctors provided chronic wound continuation service to patients with unhealed wounds but were discharged, shared home-based wound treatment methods and relevant precautions with patients, and ensured that patients could still receive standardized nursing after discharge, and guide patients to undergo regular outpatient re-examination.

#### **Data analysis and Observation of indicators**

Several methods were adopted to analyze and

evaluate the effects of the fine cooperation program and doctor-nurse integration on patients with chronic wounds. These methods included examining indicators related to nursing satisfaction, general conditions, pain degree, psychological state and the healing grade. The nursing satisfaction of the two groups was evaluated using a customized satisfaction scale. This scale involved nursing service attitude, nursing skills, emergency handling, sense of responsibility, and like. The score ranged from 0 to 10 points: >8 points, 6-8 points, and <6 points indicated satisfied, generally satisfied, and dissatisfied respectively. Satisfaction was measured as a sum of satisfied rate and generally satisfied rate. Next, the general conditions included recording the waiting time for dressing change, hospitalization time, and wound healing time for both groups.

The pain degree was assessed in both groups using the simplified McGill scale<sup>9</sup> before intervention and on Day 5 of intervention. The simplified McGill scale consisted of three parts: a) Visual Analogue Scale (VAS) score: It ranged from 0 to 10 points, and the higher the score, the higher the pain degree. b) Pain rating index (PRI): It covered 15 items, including four kinds of emotions (guilty, weakness, fear, and boredom) and 11 kinds of nature of pain (knife-like pain, stabbing pain, burning pain, tenderness, spasmodic pain, throbbing pain, bearing-down and distending pain, sharp pain, aching pain, biting pain, and splitting pain), and each item was scored 0-3 points (0: no pain, 1: mild pain, 2: moderate pain, and 3: severe pain). The total score was measured on a 0-45point scale, and the pain degree was positively correlated with the score. The present pain intensity (PPI)utilized six grades: 0: no pain, 1: mild pain, 2: uncomfortable pain, 3: suffering pain, 4: terrible pain, and 5: severe pain.

The psychological state related to the depression symptoms of patients in both the groups, which was

assessed using the Self-rating Depression Scale (SDS)<sup>10</sup> before intervention and on Day 5 of intervention. The SDS included 20 items, with a 4-level scoring method used to assess each item, out of which 10 items were scored reversely. The total score was 20-80 points, and the higher the score, the severer the depression. Besides, the anxiety symptoms of patients in the two groups were assessed using the Self-rating Anxiety Scale (SAS)<sup>11</sup> before intervention and on Day 5 of intervention. The SAS included 20 items, the 4-level scoring method was used for each item, and 5 items were scored reversely. The total score was 20-80 points, and a higher score corresponded to severer anxiety. Finally, wound healing grades<sup>12</sup> were measured after 1 month of intervention of both the groups. The grading criteria were as follows: 1) Grade A: satisfactory wound healing, small scars, and no obvious pain; 2) Grade B: redness, swelling, induration and effusion at the wound site, and some pain symptoms but no suppuration; 3) Grade C: wound suppuration requiring incision and drainage, obvious pain symptoms, and a high risk of reinfection.

SPSS 23.0 software was used for statistical analysis. The measurement data (waiting time for dressing change, hospitalization time, wound healing time, VAS score, SDS score, and SAS score) were described by ( $\bar{x} \pm s$ ) and analyzed by the *t*-test. The count data (satisfaction and healing grade) were described by [n (%)] and analyzed by the  $\chi^2$  test. The rank sum test was performed for the ranked data. A result of  $P < 0.05$  was considered statistically significant.

## RESULTS

### Satisfaction degree of two groups

The nursing satisfaction degree was significantly higher in the observation group (98.00%) than that in the control group (91.00%) ( $P < 0.05$ ) (Table 2).

Group	Satisfied	Generally satisfied	Dissatisfied	Satisfaction
Observation (n=100)	72 (72.00)	26 (26.00)	2 (2.00)	98 (98.00)
Control (n=100)	53 (53.00)	38 (38.00)	9 (9.00)	91 (91.00)
Z/ $\chi^2$		Z=2.957		$\chi^2=4.714$
P		0.003		0.030

### General conditions of two groups

The waiting time for dressing change, hospitalization time and wound healing time were significantly shorter in the observation group (19.54±4.62 min, 6.32±1.17

d and 32.73±5.78 d) than those in the control group (36.75±9.54 min, 7.64±1.28 d and 38.42±6.39 d) ( $P < 0.05$ ) (Table 3).

**Table 3**  
**General conditions of two groups ( $\bar{x}\pm s$ )**

Group	Waiting time for dressing change (min)	Hospitalization time (d)	Wound healing time (d)
Observation (n=100)	19.54±4.62	6.32±1.17	32.73±5.78
Control (n=100)	36.75±9.54	7.64±1.28	38.42±6.39
<i>t</i>	16.236	7.612	6.604
P	<0.001	<0.001	<0.001

**Pain degree of two groups**

On Day 5 of intervention, the PRI, VAS and PPI scores declined in both groups compared with those before intervention (P<0.05). These scores

were significantly lower in the observation group (2.83±0.71, 18.59±4.02 and 1.65±0.45 points) than those in the control group (3.49±0.87, 24.58±3.65 and 2.42±0.68 points) (P<0.05) (Table 4).

**Table 4**  
**Simplified McGill scale scores of two groups ( $\bar{x}\pm s$ , point)**

Group	VAS score		PRI score		PPI score	
	Before intervention	Day 5 of intervention	Before intervention	Day 5 of intervention	Before intervention	Day 5 of intervention
Observation (n=100)	6.46±1.58	2.83±0.71 <sup>a</sup>	32.65±3.56	18.59±4.02 <sup>a</sup>	3.74±0.75	1.65±0.45 <sup>a</sup>
Control (n=100)	6.53±1.62	3.49±0.87 <sup>a</sup>	31.69±4.28	24.58±3.65 <sup>a</sup>	3.69±0.68	2.42±0.68 <sup>a</sup>
<i>t</i>	0.309	5.877	1.724	11.032	0.494	5.877
P	0.757	<0.001	0.086	0.000	0.622	0.000

<sup>a</sup> P<0.05 vs. the same group before intervention.

**Psychological state of two groups**

On Day 5 of intervention, the SDS and SAS scores also declined in both groups compared with those before intervention (P<0.05). These scores

were significantly lower in the observation group (36.59±6.47 and 33.76±5.93 points) than those in the control group (41.28±6.73 and 37.18±5.45 points) (P<0.05) (Table 5).

**Table 5**  
**Psychological state of two groups ( $\bar{x}\pm s$ , point)**

Group	SDS score		SAS score	
	Before intervention	Day 5 of intervention	Before intervention	Day 5 of intervention
Observation (n=100)	54.36±5.13	36.59±6.47 <sup>a</sup>	56.79±4.89	33.76±5.93 <sup>a</sup>
Control (n=100)	53.94±5.28	41.28±6.73 <sup>a</sup>	57.03±5.19	37.18±5.45 <sup>a</sup>
<i>t</i>	0.571	5.024	0.337	4.246
P	0.569	<0.001	0.737	<0.001

<sup>a</sup> P<0.05 vs. the same group before intervention.

**Healing grade of two groups**

The observation group had a higher wound healing

grade (92.00% in Grade A) than that of the control group (82.00% in Grade A) (P<0.05) (Table 6).

**Table 6**  
**Healing grade in the two groups [n (%)]**

Group	Grade A	Grade B	Grade C
Observation (n=100)	92 (92.00)	6 (6.00)	2 (2.00)
Control (n=100)	82 (82.00)	13 (13.00)	5 (5.00)
Z		2.102	
P		0.036	

**DISCUSSION**

Chronic wounds are usually attributed to infection, venous insufficiency, peripheral vascular disease, traumatic scars, and like.<sup>13,14</sup> Compared with ordinary wounds, chronic wounds often cannot heal for a long time, with infection being one of the important affecting

factors. If effective treatment measures are not taken in time, local gangrene, ulceration and other adverse events may occur, which is not conducive to prognosis.<sup>15,16</sup> The occurrence of chronic wounds usually involves multiple disciplines, and wound repair requires a broader perspective and close cooperation between various departments. The fine cooperation program of doctor-nurse integration emphasizes mutual complementarity between doctors and nurses and highlights the new cooperation mode of doctors and nurses, which is extremely important in clinical nursing.<sup>17,18</sup>

Relevant studies have pointed out that close cooperation and effective communication between doctors and nurses can improve the quality of nursing and ameliorate the clinical outcome of patients.<sup>19,20</sup> In conventional chronic wound management, doctors are the main person in charge of wound management (including debridement and dressing change). Due to busy schedule of diagnosis and treatment, doctors lack time and energy throughout the process of wound management. Hence, they often assign the wound management tasks to junior doctors or even interns or they would themselves perform wound management after the end of diagnosis and treatment. As a result, it was a difficult task to detect and handle chronic wound problems promptly, which reduced the quality of wound management to a great extent.

The current study evaluated the utilization of fine cooperation program of doctor-nurse integration with chronic wounds. It was found that observation group had shorter hospitalization time, lesser waiting time for dressing change; lesser wound healing time; and a higher wound healing grade than control group. This suggests that the fine cooperation program of doctor-nurse integration can effectively improve the effect of chronic wound management.

There are several reasons to this effect, namely: (i) During wound management, nurses and doctors exchange information, keep close communication and work together to deal with problems. This improves their work efficiency, and facilitates rapid and effective control of wound infection and accelerates wound healing. (2) In the management mode, the training of nurses in wound management is strengthened. Though doctors and nurses are jointly responsible for wound management, but nurses become the principal agent for wound management. Nurses have more time to dynamically assess the wound status, which helps carefully observe and manage the wound and reduce complications. (3) In addition, wound healing can be further accelerated

with the help of moist wound healing techniques, closed negative pressure drainage or some new dressings.<sup>21,22</sup>

However, in the conventional wound management mode, bandages, cotton pads, gauze blocks and other non-moist dressings are used for routine surgical wound dressing change. This causes adhesions between the dressing and the wound surface, and damages the new granulation tissue. This also delays wound healing and increases the pain degree of patients. Some patients become prone to anxiety, depression and other negative emotions due to delayed wound healing and pain, which affect their recovery. This is consistent with the study by Zhang (2022), who reported about a special management mode of medical integration which effectively promoted the healing of patients with chronic wounds repaired by skin flaps, and which relieved pain and negative emotions.<sup>23</sup> The current study additionally measured the pain degree and observed the psychological state in two groups. The results showed that on Day 5 of intervention, the VAS, PRI, PPI, SDS and SAS scores were lower in observation group than those in control group. This suggests that the fine cooperation program of doctor-nurse integration can reduce the pain degree and ameliorate the negative emotions of patients with chronic wounds.

There are several reasons for these findings. First, the fine cooperation program of doctor-nurse integration follows a new wound management concept. Local anesthetics and cold compress are reasonably used to relieve pain during wound management, and appropriate moist dressings are selected according to the local wound conditions, which helps absorb exudate and bacteria and remove necrotic tissues. Moreover, moist dressings also reduces the repeated traction injury to the wound surface during dressing change, thus creating favorable conditions for the growth of granulation tissue and effectively relieving wound pain.<sup>24,25</sup> Secondly, in the fine cooperation program of doctor-nurse integration, nurses understand the psychological state of patients during wound dressing change and they continuously encourage with caring words and give full psychological support to patients, so as to reduce their negative emotions and promote physical recovery.<sup>26,27</sup>

The current study reveals that chronic wound management is a thorny clinical problem. There are many influencing factors for chronic wound healing, including local and systemic factors. It is therefore recommended that chronic wound management should take into account not only local wound conditions but also systemic conditions, such as primary chronic diseases and nutritional status. Zhao and Pang (2022) found a similar integrated model of

medical cooperation in a study that shortened the length of hospital stay, reduced the hospitalization cost and raised the satisfaction degree of patients with diabetic foot.<sup>28</sup> It is evident that during the implementation of the fine cooperation program of doctor-nurse integration, nurses make much more contact with patients, so that they can discover problems in time and take corresponding measures early. Under this program, while nurses and doctors work in close collaboration, it is the doctors who actively deal with wounds that penetrate into the bone marrow cavity or connect with the thoracic or abdominal cavity using their solid medical knowledge and skills. However, nutritionists also play an important role in improving the nutrition levels of patients with chronic wounds, which helps promote chronic wound healing and raise patient satisfaction.<sup>29,30</sup>

## CONCLUSION

In conclusion, it is evident from this study that fine cooperation program of doctor-nurse integration can shorten the waiting time for dressing change, hospitalization time and wound healing time, reduce the pain degree, ameliorate the psychological state, and improve the healing grade and satisfaction of patients with chronic wounds. This is the first study regarding the role of a fine cooperation program of doctor-nurse integration in patients with chronic wounds. The treatment and nursing of chronic wounds are difficult, which cannot be well performed by doctors or nurses alone. This fine cooperation program of doctor-nurse integration provides a potentially applicable medical service for facilitating early wound healing.

## Acknowledgement

Hebei Province 2019 Annual Medical Research, Project No. 20191166

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