Original Article
Application of nursing intervention based on Snyder's hope theory in individuals with spinal cord injury

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Abstract: Objective: To study the effect of nursing intervention derived from Snyder's hope theory in individuals with spinal cord injury. Methods: We retrospectively analyzed clinical data of 80 patients with spinal cord injury who were admitted to General Hospital of Pingxiang Mining Group Co., from August 2021 to October 2023. According to different nursing methods, they were assigned into a control group (n = 40, routine curative care) and an observation group (n = 40, routine curative care plus nursing intervention derived from Snyder's hope theory). The two groups were compared in terms of emotional state, level of hope, living standard, occurrence of complications, and nursing satisfaction. According to the occurrence of complications after nursing, the patients were divided into a good prognosis group and a poor prognosis group, and the influencing factors for prognosis were analyzed by univariate analysis and logistic multivariate analysis. Results: After nursing, the anxiety and depression scores decreased in both groups when compared to their pre-nursing scores, with lower scores in the observation group than in the controls (P<0.05). Also, the observation group exhibited significantly higher score of hope, higher score of quality of life, and lower occurrence of complications when compared to the control group (P<0.05). The nursing satisfaction rate in the observation group was 95.00% (38/40), which was noticeably greater than 65.00% (26/40) in the control group (P<0.05). Multivariate analysis showed that nursing methods (P = 0.007, OR = 7.828, 95% CI: 1.766-34.688) and HB after intervention (P = 0.029, OR = 0.965, 95% CI: 0.935-0.996) were the influencing factors of complications after nursing intervention in patients with SCI. Conclusion: The implementation of nursing intervention derived from Snyder's hope theory can decrease the anxiety and depression levels, lower the occurrence of complications, enhance the hope level, increase the satisfaction rate, and improve the overall quality of life in patients with spinal cord injury.

Keywords: Snyder's hope theory, spinal cord injury, nursing, hope level, nursing satisfaction, quality of life

Introduction

Spinal cord injury (SCI) is an incapacitating condition resulting from damage to spinal cord function or nerve root function, caused by trauma or non-trauma [1]. Due to the variation in the severity and location of the lesion, SCI may lead to partial or complete impairment of sensory and/or motor functions at the site of spinal injury, such as hemiplegia resulting from thoracic SCI and quadriplegia caused by cervical SCI [2, 3]. It has been reported that 50% of SCIs involve cervical spine, and other types include injuries of thoracic spine (35%) and lumbar vertebrae (11%) [4, 5]. SCI has a long course of disease, and the long recovery period

and long-term hospitalization can cause patients to experience adverse emotions like anxiety and depression and bring a great economic burden, greatly impacting their quality of life [6]. Hence, it is of high significance to adopt appropriate nursing measures in the treatment for SCIs.

Snyder is a psychologist who put forward the hope theory, which includes three elements: goal, path thinking, and dynamic thinking. This 'hope therapy' is primarily used to help patients alleviate negative emotions, enhance self-control ability, and promote rehabilitation, which has gained extensive utilization in the medical domain [8]. It has been shown that Snyder's

hope theory in nursing for patients with malignant tumors helped guide patients to see hope and promoted their rehabilitation [9]. In the management of young and middle-aged stroke patients, Snyder's hope theory exhibited a positive effect on reducing patients' stigma and improving their daily living ability [10]. However, there is limited research on the application of Snyder's hope theory in individuals with SCIs. Hence, this study examined the effect of nursing intervention derived from Snyder's hope theory on individuals with SCI, analyzed the prognostic factors, aiming to provide a theoretical basis for the selection of nursing methods when dealing with patients with SCIs.

Material and methods

Subjects

We retrospectively analyzed the data of 80 individuals with SCI who were admitted to the General Hospital of Pingxiang Mining Group Co., between August 2021 and October 2023. According to different nursing methods, they were assigned into a control group (n = 40, routine curative care) and an observation group (n = 40, routine curative care plus nursing intervention derived from Snyder's hope theory). Inclusion criteria: (1) Patients with SCI diagnosed by imaging [11]; (2) Patients ≥18 years; (3) Patients with onset time of 1-12 months; (4) Patients who were able to communicate normally. Exclusion criteria: (1) Patients with unstable vital signs; (2) Patients with liver or kidney diseases; (3) Patients with severe cardiovascular or cerebrovascular conditions; (4) Patients with deep vein thrombosis. This study was approved by the Ethics Committee of General Hospital of Pingxiang Mining Group Co., Ltd.

Methods

Both groups of patients received uninterrupted treatment for a duration of three months.

The control group received routine nursing care, including administering nutritional nerve drugs as per the doctor's advice, carrying out psychological counselling according to the their individual situation, providing health-related education, helping them to adjust their posture, and guiding them through joint activity sitting training.

The observation group received additional nursing intervention derived from Snyder's hope theory. (1) A Snyder Hope theory healthcare crew was formed, with the department's senior nurse in charge of managing the nursing tasks and 6 specialist nurses responsible for the specific nursing work. A nursing plan was formulated based on Snyder's hope theory. The nursing team learnt Snyder's hope theory, clinical symptoms of SCIs, treatment plan, concurrent prevention, nutrition, and related drug management, and passed an examination after the learning. (2) Goal establishment: The patients were guided to express their feelings about treatment, and rehabilitation training, and targeted psychological intervention was provided according to their individual situation to increase their interest and passion for treatment and rehabilitation. The nurses communicated with the relatives of the patients to establish a mutually trusting nurse-patient relationship, understand the psychological or physiological needs of the patients, and formulate phased rehabilitation goals. (3) Belief path: The nurses explained the importance of treatment and rehabilitation training to patients, asked patients about the completion of goals on a daily basis, observed the psychological changes of patients, and connected current actions to future goals. Also, patients were encouraged to communicate with friends and loved ones to receive their support. Simultaneously, psychological intervention and emotional counselling were implemented for patients to alleviate their self-perceived burden. (4) Dynamic thinking: Psychological techniques, such as the 'commitment strategy', and happiness factor method, were applied to motivate patients. This involved organizing regular patient meetings, fostering interaction among patients, instructing them in self-care methods, discussing recent positive changes in rehabilitation, and enhancing the motivation to achieve their goals. Simultaneously, there was an emphasis on enhancing guidance for family members regarding rehabilitation, actively involving them as emotional support to alleviate the negative feelings experienced by patients.

Observation indicators and evaluation tools

(1) The Chinese-Herth hope index (C-HHI) was used to assess the level of hope [12]. The measurement consisted of three aspects: an optimistic outlook on reality and the future (4 items), positive behavior (4 items), and having a close bond with others (4 items), with a total of

12 items. The Likert 4-level scoring method was used: 1 point for strongly opposed, 2 points for opposed, 3 points for agreed, 4 points for strongly agreed. Scores ranging from 12-23 points were categorized as low, 24-35 points as intermediate, and 36-48 points as advanced. Higher scores indicated an elevated level of hope. A total score of ≥36 points was indicative of a high level of hope.

(2) The emotional condition of the patients was assessed utilizing the self-rating anxiety scale (SAS) and the self-rating depression scale (SDS). There are 20 items in both scales, using a 4-point response scale. The scores of each item are summed up to obtain a rough score, and the standard score = rough score * 1.25. An SAS score of ≤50 points indicates no anxiety; 50-59 points: mild anxiety, 60-69 points: moderate anxiety; over 69 points: severe anxiety. An SDS score of ≤53 points indicates no depression; Mild gloom in the SDS score is indicated by a range of 53-62 points: mild depression; 63-72 points: moderate depression; over 72 points: severe depression. Higher scores indicate severer adverse emotions [13].

(3) A self-developed table was used to record and compare the occurrence of treatment complications between the two groups.

(4) The quality of life was evaluated using the MOS 36-item short-form survey (SF-36). SF-36 consists of 8 aspects, vitality, physical functioning, bodily pain, general health perceptions, physical role functioning, emotional role functioning, social role functioning, mental health or emotional wellbeing, with a total of 36 items. Each dimension is scored out of 100 points, indicating that a higher score corresponds to better quality of life [14]. A total score of >80 points indicates a high quality of life.

(5) The nursing satisfaction was evaluated using the hospital's own satisfaction questionnaire after intervention. Patients scoring ≥80 points were considered very satisfied, those scoring 60-80 points were deemed satisfied, and those scoring <60 points were considered not satisfied. The overall satisfaction rate was determined by multiplying the quotient of the sum of the number of very satisfied and satisfied cases divided by the total number of cases by 100%.

(6) Laboratory indicators: After nursing, fasting venous whole blood were collected in the morning in all patients to measure their hemoglobin (HB) level. According to the anemia criteria assessed by the World Health Organization (WHO) (male Hb<130 g/L, female Hb<120 g/L) [15], according to whether the HB of men and women is lower than the lower limit of the normal value, it is divided into Hb<120 g/L and Hb≥120 g/L, and analyzed in a conventional two-category manner.

Statistical analysis

The data were analyzed using SPSS 20.0 and visualized using GraphPad Prism 8. The age, SAS and SDS scores, hope level score, SF-36 score, etc. were shown as mean ± standard variation ($\bar{x} \pm s$), and processed using t-test. Counted data, such as gender, working status, injury stage, and injury type were expressed as [n (%)], and compared using χ^2 test. A difference was considered statistically significant when the *P* value was less than 0.05.

Results

Comparison of baseline characteristics

According to the t/χ^2 test results, there were no significant differences in terms of age, gender, employment status, injured area, or type of injury between the two groups (P>0.05). See **Table 1**.

Comparison of SAS and SDS scores

The results of t test showed that there were no significant differences in SAS and SDS scores between the two groups before intervention (62.38±4.23 vs. 63.83±4.41, 62.70±5.02 vs. 62.93±5.17, respectively; P>0.05). After the intervention, the observation group revealed significant lower SAS and SDS scores than the control group (43.13±3.82 vs. 49.85±3.88, 42.58±3.65 vs. 48.73±4.52, respectively; P< 0.05) (**Figure 1**).

Comparison of hope level

The results of t test showed that there were no significant differences in the scores of overall hope level and each dimension between the two groups before intervention (all P>0.05). After the intervention, the observation group

Table 1. Comparison of baseline characteristics between the two groups

| Item		Control group (n = 40)	Observation group (n = 40)	χ^2/t value	P value
Age		47.28±4.21	47.10±3.75		
Sex	Male	23 (57.50)	21 (52.50)	0.202	0.653
	Female	17 (42.50)	19 (47.50)		
Working condition	Employed	25 (62.50)	28 (70.00)	0.503	0.478
	Unemployed	15 (37.50)	12 (30.00)		
Injury site	Cervical spinal	10 (25.00)	11 (27.50)	0.082	0.960
	Thoracic part	15 (37.50)	14 (35.00)		
	Lumbar segments	15 (37.50)	15 (37.50)		
Damage type	Traumatic spinal cord injury	24 (60.00)	26 (65.00)	0.213	0.644
	Non-traumatic spinal cord injury	16 (40.00)	14 (35.00)		
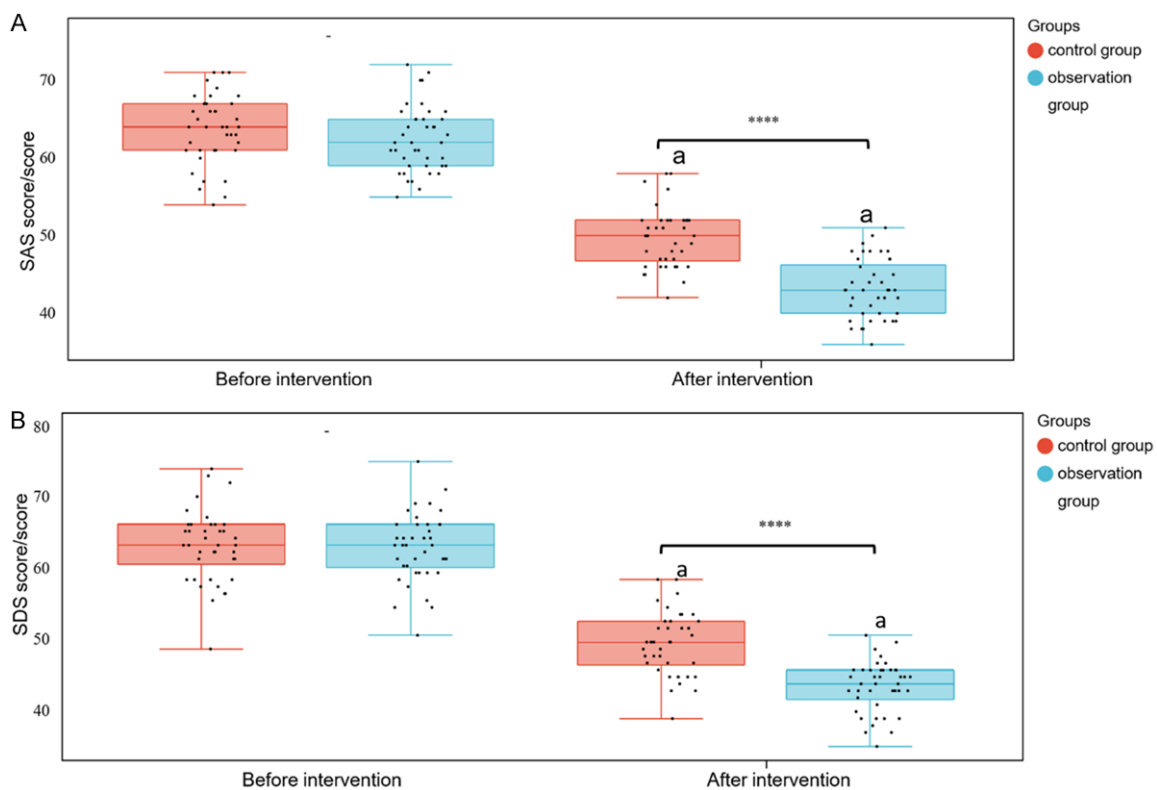
Figure 1. Comparison of SAS and SDA scores between the two groups. Note: vs. the control group: ****P<0.0001; vs. before intervention: aP<0.05. A: SAS score; B: SDS score. SAS: self-rating anxiety scale; SDS: self-rating depression scale.

exhibited higher scores in each dimension as well as overall level of hope than the control group (all P<0.05) (**Figure 2**).

Comparison of incidence of complications

According to the results of χ^2 test, incidence of complications was significantly lower in the observation group than that of the control group (P<0.05). See **Table 2**.

Comparison of SF-36 scores

The results of t test showed that after the intervention, the observation group showed appreciably higher SF-36 score than the control
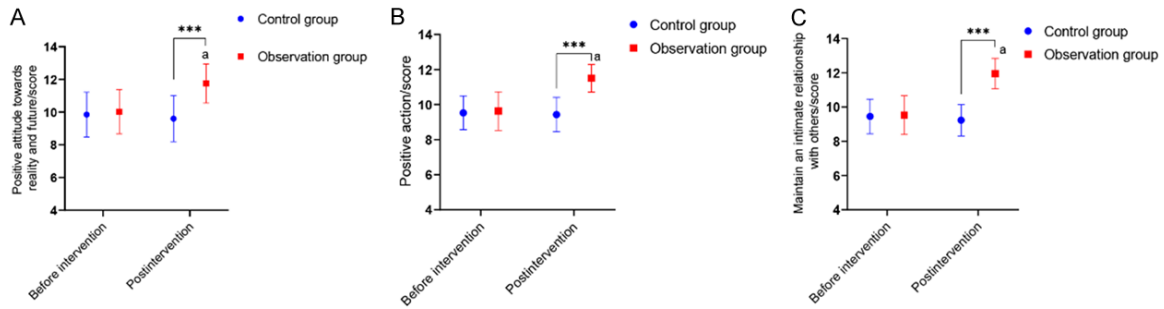
Figure 2. Comparison of hope level between two patient groups. Note: vs. the control group: ***P<0.001; vs. the same group before intervention: aP<0.05. A: Positive attitude towards reality and future; B: Positive action score; C: The score of maintaining intimate relationship with others.

Table 2. Comparison of incidence of complications between the two groups [n (%)]

Group	n	Pulmonary infection	Pressure ulcer	Venous thrombus	Total incidence
Observation group	40	1 (2.50)	1 (2.50)	1 (2.50)	3 (7.50)
Control group	40	3 (7.50)	7 (17.50)	5 (5.00)	15 (37.50)
χ^2 value					10.323
P value					0.001

group across the 8 dimensions (P<0.05). See **Table 3**.

Comparison of nursing satisfaction rate

As shown in **Table 4**, the observation group achieved a remarkable total satisfaction rate of 95.00% (38/40), which was considerably higher than 65.00% (26/40) for the control group (*P*<0.05).

Univariate analysis of factors affecting the prognosis

Patients (with or without complications) were divided into a good prognosis group (GP group, 67 cases) and a poor prognosis group (PP group, 13 cases). The continuous variables such as SAS, SDS, C-HHI score, C-HHI total score and SF-36 total score after intervention were converted into dichotomous variables according to the scoring criteria (i.e., in 1.3, C-HHI≥36 points, SAS, SDS with or without depression/anxiety, SF-36 total score >80 points), and variables with significant results in univariate analysis were included in logistic multivariate analysis. The results of univariate analysis showed significant differences in nursing methods, SAS score, and HB level after intervention between the GP group and the PP

group (P = 0.001, P = 0.030, P = 0.042, respectively), as shown in **Table 5**.

Multivariate analysis of factors affecting the prognosis

The dependent variable was the occurrence of complications after nursing intervention, and the variables with statistical significance in univariate analysis (nursing method, SAS score, and HB) were used as independent variables. The assignment is shown in **Table 6**. Multivariate analysis showed that nursing methods (P = 0.007, OR = 7.828, 95% CI: 1.766-34.688) and HB after intervention (P = 0.029, OR = 0.965, 95% CI: 0.935-0.996) were influencing factors for complications after nursing intervention in patients with SCI, as shown in **Table 7**.

Discussion

Spinal cord injury (SCI) is a serious orthopedic disease resulting from damage to the spinal cord or spinal nerve, causing dysfunction in movement, sensation, and reflexes [16]. With the continuous improvement of social modernization, traffic accidents, industrial injuries, and other incidents occur frequently, and the incidence of SCI is high. At present, the global incidence of SCI is 12/1,000,000 to 65/1,000,000 [17]. The total population of individuals with SCI in China has surpassed one million and has increased at a dramatic rate of 120,000 per year [18]. Due to long-term bed rest, SCI patients have high blood coagulation and poor blood reflux, which can lead to an increased likelihood of venous thrombosis and seriously

Table 3. Comparison of SF-36 scores between the two groups

Groups	Times	Physiological function	Physiological role	Social function	Bodily pain	Sanity	Emotional function	Vitality	General health
Observation group (n = 40)	Before intervention	68.47±4.28	71.64±5.22	68.68±4.45	72.36±6.17	67.32±4.61	67.86±4.17	68.62±5.31	70.56±6.24
	After intervention	81.23±6.25*	83.15±6.53*	82.03±6.22*	81.43±7.08*	83.25±5.29*	82.08±5.23*	78.05±6.21*	82.18±6.11*
t		10.650	8.708	11.040	6.108	14.360	13.450	7.299	8.415
P		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Control group (n = 40)	Before intervention	69.69±4.52	72.88±5.47	68.92±5.01	73.89±6.53	68.46±5.34	69.78±5.37	68.74±5.24	71.66±5.37
	After intervention	71.70±5.16	74.60±5.21	70.68±5.44	75.73±6.32	70.58±4.42	71.65±4.35	70.55±5.24	73.85±5.13
t		1.853	1.440	1.505	1.281	1.934	1.711	1.545	1.865
P		0.068	0.154	0.136	0.204	0.057	0.091	0.126	0.066

Note: vs. the control group after intervention: *$P<0.05$.

Table 4. Comparison of nursing satisfaction between two groups [n (%)]

Group	n	Very satisfied	Satisfied	Dissatisfied	Total satisfaction
Control group	40	16 (40.00)	10 (25.00)	14 (35.00)	26 (65.00)
Observation group	40	27 (67.50)	11 (27.50)	2 (5.00)	38 (95.00)
χ^2 value					11.250
P value					0.001

Table 5. Univariate analysis of factors affecting the prognosis of patients with spinal cord injury

Item	GP group (n = 62)	PP group (n = 18)	χ^2/t value	P value
Age	47.11±3.90	47.44±4.27	0.311	0.757
Sex			2.464	0.119
Male	37 (59.68)	7 (38.88)		
Female	25 (40.32)	11 (61.12)		
Working condition			2.743	0.098
Unemployed	18 (29.03)	9 (50.00)		
Employed	44 (70.97)	9 (50.00)		
Nursing methods			10.323	0.001
Routine care	25 (40.32)	15 (83.33)		
Routine care + nursing Based on Snyder's hope theory	37 (59.68)	3 (16.67)		
The total score of C-HHI after intervention (points)			2.750	0.097
≥36	19 (30.65)	2 (11.11)		
<36	43 (69.35)	16 (88.89)		
Total score of SF-36 (points)			2.654	0.103
>80	23 (37.10)	3 (16.67)		
≤80	39 (62.90)	15 (83.33)		
SAS score after intervention (points)			4.683	0.030
>50	50 (80.65)	8 (44.44)		
≤50	12 (19.35)	10 (55.56)		
SDS score after intervention (points)			0.937	0.333
>53	59 (95.16)	16 (88.89)		
≤53	3 (4.84)	2 (11.11)		
HB/g/L	129.59±18.41	118.94±22.03	-2.065	0.042

GP: good prognosis; PP: poor prognosis; C-HHI: Chinese-Herth hope index; SAS: self-rating anxiety scale; SDS: self-rating depression scale; HB: hemoglobin.

threaten their life [19]. Surgery is an important means of treatment for SCI, and postoperative patients need to receive long-term rehabilitation training to recover the body functions and improve the prognosis [20, 21]. However, the long-term recovery period seriously impacts their daily activities and gives rise to various adverse emotions, which lead to resistance to rehabilitation training, a reduction in the level of hope, and an impediment to recovery.

Some studies have indicated that routine nursing, while addressing the basic physiological needs of patients, lacks specificity and system-atic approaches, so it cannot fully address the psychological issues of patients, resulting in limited therapeutic effect [22]. Nursing based on Snyder's hope theory can improve treatment confidence and management ability by setting goals, planning path strategies, and using dynamic thinking to uphold a positive psychological state and maximize the rapid recovery [23]. The results of this research showed that after intervention, the observation group exhibited lower SAS and SDS scores than the control group, indicating that nursing intervention guided by Snyder's hope theory, can notably alleviate the adverse emotions associated with SCI.

Table 6. Variable assignment table

Variable	Assignment
Nursing methods	Conventional care = 1; conventional care + based on Snyder's hope theory = 0
SAS score after intervention (points)	>50 = 1; ≤50 = 0
Hb/g/L	Original value input

SAS: self-rating anxiety scale; HB: hemoglobin.

Table 7. Multivariate analysis of factors affecting the prognosis

Variable	β	S.E.	P	OR	95% CI
Nursing method	2.058	0.760	0.007	7.828	[1.766, 34.688]
SAS score after intervention (points)	0.366	0.656	0.577	1.442	[0.399, 5.212]
Hb/g/L	-0.035	0.016	0.029	0.965	[0.935, 0.996]

SAS: self-rating anxiety scale; HB: hemoglobin.

A possible reason is that through active and effective communication with patients, they understand their psychological changes, identifying factors that may affect these changes, and establishing goals according to relevant factors, patients can achieve goals through the promotion of motivation and path thinking, leading to an improvement in negative emotions.

Snyder's theory suggests that individuals with higher levels of hope are more optimistic about how things are going, and are more likely to motivate themselves to achieve their desired goals through positive thinking [24, 25]. The results of this paper showed that our intervention brought forth a great improvement in the hope level of every dimension in the observation group, indicating that nursing measures based on Snyder's hope theory helped patients to reduce their psychological burden and to improve their hope level. This is consistent with previous research [9]. The reason may be that a nursing model based on Snyder's hope theory can enhance the patient's hope level by understanding the patient's rehabilitation demands and organizing activities to give peer support and family care, so that the patient has an increased desire to survive and a sense of belief in overcoming the disease. At the same time, the model uses hope therapy to give health education, enabling patients to focus on the positive aspects. This strengthens patients' path thinking by formulating intervention goals collaboratively, encouraging active participation in nursing management, thereby improving

patients' sense of hope and enhancing the effectiveness.

A previous study on emergency care for patients with acute myocardial infarction showed that Snyder's theory significantly improved the patient's level of hope, helped patients form a positive coping style, and increased the treatment compliance, thus reducing complications and shortening the recovery period [26]. It was hypothesized that when applying the nursing model based on Snyder's theory of hope to SCI patients, a similar effect can be achieved. In this research, the occurrence of complications in the observation group was significantly reduced in comparison to the control group (P<0.05), suggesting a good preventive effect of the intervention. It can leverage the enhancement of psychological development, boost the patient's motivation for treatment, and decrease the likelihood of negative occurrences such as noncompliance and opposition to therapeutic interventions. This research also discovered that after intervention, the SF-36 scores significantly elevated in 8 dimensions in the observation group in comparison with the control group. Furthermore, the observation group exhibited significantly greater overall satisfaction. This suggests that implementing the nursing approach inspired by Snyder's hope theory can successfully enhance the quality of life and patient satisfaction. The reason could be that the nursing framework based on Snyder's hope theory focuses on 'health promotion', and provides patients with healthcare information about the management of spinal

cord damage, and improves the patient's awareness of the disease. At the same time, it underscores the patient goals and motivates patients to engage in repeated training every day, thereby reducing the occurrence of complications related to SCI, improving the rehabilitation effect and prognosis, and enhancing patients' quality of life [27].

Studies have shown that HB can be used in prognostic model of SCI, and monitoring HB concentration has an important value for assessing the nutritional status of patients [28]. In the analysis of the prognostic factors of SCI, this study found that HB and nursing methods were influencing factors for poor prognosis after nursing intervention in patients with SCI. The nursing model that uses Snyder's hope theory provides patients with more comprehensive nursing services and information support for the rehabilitation of related diseases, which is conducive to helping avoid prognostic risk, actively fighting against disease, improving nutritional status, thus improving prognosis. Therefore, monitoring the hemoglobin concentration and adjusting the care plan accordingly may be an effective way to assess prognosis.

In summary, this research employed nursing measures based on Snyder's hope theory in patients with SCI. Our findings indicate that nursing intervention derived from Snyder's hope theory can enhance patients' hope level, improve negative emotions, and have a beneficial influence on their rehabilitation. Therefore, it is worthy of clinical promotion. Nonetheless, this research only gathered clinical information from 80 individuals with SCI who were admitted to a medical facility in southwestern China. The limitation of this study is its single-centered design, and limited number of samples, which may result in bias in the findings. In the future, it is necessary to broaden the scope of research subjects and conduct extensive surveys involving multiple centers and large samples.

Disclosure of conflict of interest

None.

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