

## Original Article

# Rehabilitation therapy outside of the hospital via the Internet combined with suggestive psychological intervention in patients with trigeminal neuralgia

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**Abstract:** Objective: To explore the effect of rehabilitation therapy outside of the hospital via the Internet combined with suggestive psychological intervention on the mental state, sleep quality, self-rehabilitation, and psychological resilience of patients with trigeminal neuralgia. Methods: A total of 90 patients with trigeminal neuralgia in our hospital from May 2018 to December 2019 were selected and divided into a control group and an observation group according to different nursing methods. The control group (n=45) was given the conventional nursing intervention, and the observation group (n=45) was given the rehabilitation therapy outside of the hospital via the Internet combined with suggestive psychological intervention. The mental state, sleep quality, self-rehabilitation, psychological resilience and compliance rate of the two groups before and after care were compared. Results: After care, the SAS and SDS scores of the observation group were lower than those of the control group (P<0.05). After care, the VAS score and PSQI score of the observation group were lower than those of the control group (P<0.05). After care, the scores of self-care responsibility, self-concept, self-care skills, and health knowledge in the ES-CA scales of two groups and the total score were significantly increased, and the observation group was higher than the control group (P<0.05). After care, the scores of optimism, self-improvement, and resilience in the CD-RISC scales of the two groups and their total scores were significantly increased, and the observation group was higher than the control group (P<0.05). The compliance rate of the observation group was 95.23%, which was significantly higher than 76.19% of the control group (P<0.05). Conclusion: Rehabilitation therapy outside of the hospital combined with suggestive psychological intervention via Internet is a promising method for trigeminal neuralgia recovery.

**Keywords:** Internet, rehabilitation outside hospital, suggestive psychological care, trigeminal neuralgia, mental state, sleep quality

## Introduction

Trigeminal neuralgia (TN), a common neurological disease, is often triggered by chewing or frequently brushing teeth, and its clinical manifestations are mainly repetitive, transient and paroxysmal pains [1]. According to epidemiological statistics [2], middle-aged and elderly persons are prone to have TN, with 70% to 80% of patients having it being over 40 years old, and TN is more common in females. The etiology and pathogenesis of TN has not yet been clearly stated. Having been disturbed by repetitive pain for a long time, most patients have different degrees of panic, sadness, fear and anxiety and other bad emotions, which results in poor sleep quality and life quality [3]. In addition,

due to the lack of nursing knowledge after leaving the hospital and with poor care compliance, this leads to a somber prognosis [4]. On account of this, importance should be given to TN-related nursing services outside of the hospital. The rehabilitation treatment outside of the hospital through a professional network platform was conveyed to patients in a simple and easy-to-understand way, which not only solved patients' self-management problems outside of the hospital, but also promoted the patient's rehabilitation [5]. With the continuous exploration and development of psychology, clinical application of the treatment of diseases, and suggestive psychology was provided. Suggestive psychology attempts to eliminate negative emotions and mobilize positive emo-

## Rehabilitation therapy outside of the hospital via the Internet

tions through psychological hints. Subsequently, patients are capable of actively following the guidance of doctors, and further promote a better prognosis [6]. The use of the Internet makes it more convenient for patients to receive information, improves patient compliance, and avoids the inconvenience of physical challenges. The Internet combined with suggestive psychology allows patients to receive family intervention available to avoid time restriction factors, resulting in failure to obtain effective intervention. At present, there are few reports on the application of rehabilitation therapy outside of the hospital via the Internet combined with suggestive psychology in TN patients. Therefore, in this study, 90 patients with TN in our hospital from May 2018 to December 2019 were selected to analyze the effect of rehabilitation therapy outside of the hospital via the Internet combined with suggestive psychological intervention.

### Materials and methods

#### *General materials*

A retrospective analysis of 90 patients with TN in our hospital from May 2018 to December 2019 was conducted.

Inclusion criteria: 1) Patients who were diagnosed with TN [7]; 2) Patients who had clear consciousness; 3) Complete clinical data; 4) Patients and families who gave informed consent. Exclusion criteria: 1) Patients with liver, kidney, heart, lung and other organ dysfunction; 2) Patients with a history of infectious diseases and diabetes; 3) Patients during pregnancy and lactation. This study was approved by the ethics committee of our hospital.

According to different nursing methods, patients were divided into a control group (n=45) and an observation group (n=45). In the control group, there were 20 males and 25 females ranging in age from 43 to 73 years with an average age of (59.46±8.64); and their courses of disease were 5 months to 7 years, with an average course of (3.79±0.44) years; with regard to disease position, there were 26 patients who had disease on the left and 23 patients on the right. In the observation group, there were 20 males and 29 females ranging in age from 42 to 72 years with an average age of (59.46±8.64); and their courses of disease

were 5 months to 7 years with an average course of (3.79±0.44) years; with the regard to disease position, there were 26 patients with disease on the left and 23 patients with it on the right.

#### *Methods*

The control group was treated with conventional nursing. Patients were provided with health education, dietary instruction and physical therapy upon admission. After leaving the hospital, patients were repeatedly informed of the importance of taking medicine based on the instructions of doctors.

Apart from the conventional nursing, the observation group was treated with the rehabilitation therapy outside of the hospital via the Internet combined with suggestive psychological intervention. Details are as follows.

*Rehabilitation therapy outside of the hospital via the internet:* (1) We established a rehabilitation therapy team outside the hospital via the Internet. It consisted of one department director, one lead nurse, two team leaders and three experienced primary nurses, and team members mastered the WeChat platform. Patients were invited to follow the official accounts of the department and the hospital on the day of discharge. The primary nurse patiently instructed patients and their families in the specific operation methods such as how to seek outpatient schedules, how to register, how to seek relevant health information and scientific articles, etc. (2) We built a WeChat official platform. A team was established to run the WeChat official account and platform of the department, and the primary nurses linked the personal details of patients with their personal diagnosis and treatment materials. The director and the lead nurse finalized the articles posted on the WeChat platform daily, including the health education videos for NT diseases and the scientific articles related to disease prevention and treatment, and pushed dietary instruction, exercise guidance, prevention of complications, etc. by means of pictures and words as to improve the self-care ability of patients. (3) We answered all related difficult questions for patients. The primary nurses sent messages regularly or irregularly via WeChat or QQ to remind patients to take medicine as required, which helped doctors acquire

the conditions of patients. (4) We encouraged patients or their families to upload their treatment experience and self-care methods. In this way, it strengthened the connection among patients and helped them learn about each other, which expanded their friendship circles and kept patients in a good mood.

*Suggestive psychological nursing:* (1) Communication was strengthened. After admission to the hospital, it was essential to establish a harmonious nurse-patient relationship and conduct a comprehensive assessment of patient conditions. Communication methods were given according to their awareness of the disease. Doctors patiently listened to patients' complaints, encouraged them to express their feelings, gave active psychological hints to patients, and led them to accurately understand the relevance between mood and disease. (2) Health was explained. We combined patients' conditions and clinical experience, and the doctors made a specific health education plan, and explained the basic knowledge about the incidence and treatment to patients so as to assist patients and their families in improving their understanding of this disease; with common dangerous factors explained. (3) We provided explanation for prevention and self-care methods. Patients were instructed in exercise, diet, prevention of complications, etc. by means of pictures, videos, PPT and so on. Thus patients were able to pay close attention to the prevention of complications, avoid dangerous factors in order to improve self-management. Meanwhile, patients adopted correct relaxation methods such as chatting, deep breathing, listening to music, etc., which helped bring their minds to ease, reduced the subjective discomfort and improve their tolerance. (4) Patients were guided to take medicine according to their conditions. Patients were informed of possible adverse reactions in the course of treatment and were prepared so as to avoid an increase in negative emotions. In the meantime, questions were answered in real time, and patients were assisted in dealing with uncomfortable symptoms, as well guided on how to take medicine after discharge and issued contact cards for consultation.

### *Observation indexes and evaluation criteria*

(1) Comparison of mental state in the two groups before and after care. The Self-rating

anxiety scale (SAS) [7] was used for evaluating the anxiety of patients. The cut-off value was 50 points, <50 points was normal, and >50 points was anxious; and the higher the score, the more serious the anxiety. The self-rating depression scale (SDS) was used for evaluating the depression of patients. The cut-off value was 53 points, <53 points was normal, and >53 was depressive; the higher the score, the more severe the depression. (2) Comparison of the pain level and sleep quality before and after care. The visual analogue scale (VAS) was used for assessing the pain level of patients with a total score of 10 points; the higher the score, the more intolerable the pain. Pittsburgh sleep quality index (PSQI) was used for evaluating the sleep quality of patients. There were 18 items in 7 dimensions, and each component was scored 0 to 3. The cumulative scores of each dimension were the total score of PSQI that ranged from 0 to 21, the higher the score, the worse the sleep quality. (3) Comparison of the self-rehabilitation ability scores before and after care. Exercise of self-care agency scale (ES-CA) [8] was used for evaluating self-rehabilitation. This scale contained questions regarding health knowledge (17 items), self-care responsibility (6 items), self-care skills (12 items) and self-concept (8 items) with 43 items in 4 dimensions and a total score of 172 points, each item scored from 0 to 4 points; of which 11 items were reverse scores, and the rest were positive scores, the higher the scores, the better the self-care ability. (4) Comparison of the psychological resilience before and after care. The patients psychological resilience was evaluation by the Connor-Davidson resilience scale (CD-RISC) [9] which included tenacity (13 items), self-improvement (8 items) and optimism (4 items) with 25 items in 3 dimensions. Each item was rated according to the Likert 5-level scale (1 to 5 points), and the total score was 100 points; the higher the scores, the better the psychological resilience of patients. (5) Comparison of the compliance rate in the two groups; judgement criteria [10]: ① Compliance: patients received the standard treatment and did as their doctors told them in the course of treatment. ② Partial compliance: patients basically did as their doctors told them. However, they sometimes didn't accept the standard treatment. ③ Non-compliance: patients neither did as their doctors told them in the course of treatment, nor adhered to the standard

# Rehabilitation therapy outside of the hospital via the Internet

**Table 1.** Comparison of the SAS score and the SDS score before and after care ( $\bar{x} \pm sd$ , point)

Group	SAS score		SDS score	
	Before care	After care	Before care	After care
Observation group (n=45)	69.93±12.59	41.44±7.85 <sup>a</sup>	68.58±11.25	39.28±9.02 <sup>a</sup>
Control group (n=45)	69.89±12.66	50.68±9.02 <sup>a</sup>	68.46±11.33	45.78±9.78 <sup>a</sup>
<i>T</i>	0.015	9.395	0.049	3.166
<i>P</i>	0.988	<0.001	0.961	<0.001

Note: <sup>a</sup>means the SAS score and SDS score were compared before care in the same group  $P < 0.05$ .

**Table 2.** Comparison of the sleep quality before and after care ( $\bar{x} \pm sd$ , point)

Group	VAS score		PSQI score	
	Before care	After care	Before care	After care
Observation group (n=45)	7.58±1.74	2.81±1.01 <sup>b</sup>	13.62±4.28	6.20±2.38 <sup>b</sup>
Control group (n=45)	7.60±1.72	4.77±1.26 <sup>b</sup>	13.60±4.30	8.64±3.11 <sup>b</sup>
<i>t</i>	0.055	8.142	0.022	4.180
<i>P</i>	0.956	<0.001	0.982	<0.001

Note: <sup>b</sup>means the VAS score and PSQI score were compared before care in the same group ( $P < 0.05$ ).

treatment. Compliance rate = (numbers of completely compliance + numbers of partial compliance)/total numbers  $\times 100\%$ .

## Statistical methods

SPSS 23.0 software was used for processing and analyzing all the data in this study. Measurement data were expressed by ( $\bar{x} \pm sd$ ) and *t* test was used to determine the statistical difference. Enumeration data were described by percentage, and chi-square test was carried out for comparison. When  $P < 0.05$ , the difference was statistically significant. GraphPad prism 8 software was used to illustrate the figures.

## Results

### Comparison of mental state before and after care

Before care, the SAS score and the SDS score in the two groups were not statistically different ( $P > 0.05$ ). After care, the SAS score and the SDS score in the observation group were lower than those in the control group ( $P < 0.05$ ). See **Table 1**.

### Comparison of the sleep quality before and after care

Before care, the VAS score and PSQI score in the two groups exhibited no marked difference

( $P > 0.05$ ). After care, the VAS score and PSQI score in the observation group were lower than those in the control group ( $P < 0.05$ ). See **Table 2**.

### Comparison of self-rehabilitation score before and after care

Before care, the self-care responsibility score, self-concept score, self-care skills score and health knowledge score in the ES-CA and their total scores in the two groups were compared, and the difference did not reach significance ( $P > 0.05$ ). After care, the self-care responsibility score, self-concept score, self-care skills score and health knowledge score in the ES-CA and their total scores in the two groups all significantly increased, and these scores in the observation group were higher than those in the control group ( $P < 0.05$ ). See **Table 3** and **Figure 1**.

### Comparison of psychological resilience before and after care

Before care, the tenacity score, the self-improvement score and the optimism score in the CD-RISC and their total scores in the two groups were basically the same ( $P > 0.05$ ). After care, the tenacity score, the self-improvement score and the optimism score in the CD-RISC and their total scores in the two groups significantly increased, and these scores in the observation group were higher than those in

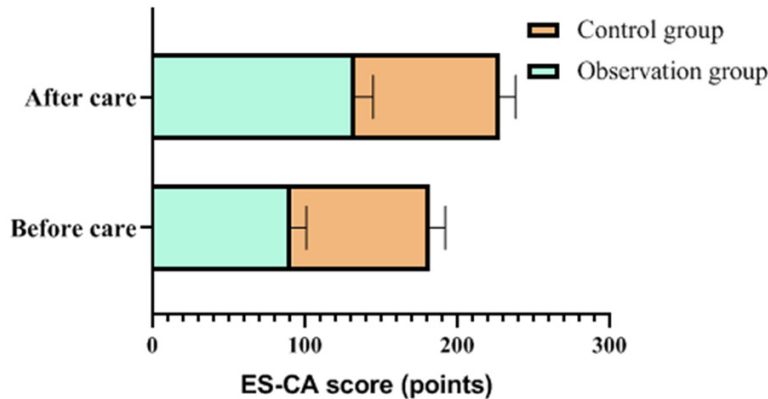
## Rehabilitation therapy outside of the hospital via the Internet

**Table 3.** Comparison of self-rehabilitation score before and after care ( $\bar{x} \pm sd$ , point)

Group	Self-care responsibility		Self-concept		Self-care skills		Health knowledge		Total score	
	Before care	After care	Before care	After care	Before care	After care	Before care	After care	Before care	After care
Observation group (n=45)	25.72±3.18	33.70±3.97 <sup>c</sup>	16.94±2.79	23.37±3.72 <sup>c</sup>	17.02±3.45	25.66±4.70 <sup>c</sup>	17.38±2.27	22.87±4.05 <sup>c</sup>	90.89±9.77	132.44±11.92 <sup>c</sup>
Control group (n=45)	25.67±3.21	29.34±3.43 <sup>c</sup>	16.97±2.81	20.45±3.23 <sup>c</sup>	17.04±3.42	21.79±3.74 <sup>c</sup>	17.41±2.33	19.59±3.32 <sup>c</sup>	91.02±9.76	95.28±10.19 <sup>c</sup>
<i>t</i>	0.074	5.575	0.051	3.976	0.028	4.322	0.062	4.402	0.063	15.90
<i>P</i>	0.941	<0.001	0.959	<0.001	0.978	<0.001	0.951	<0.001	0.950	<0.001

Note: <sup>c</sup>means the self-rehabilitation scores were compared before care in the same group P<0.05.

## Rehabilitation therapy outside of the hospital via the Internet



**Figure 1.** Comparison of self-rehabilitation ability scores before and after care.

the control group ( $P < 0.05$ ). See **Table 4** and **Figure 2**.

### Comparison of nursing satisfaction

The compliance rate in the observation group was 95.23%, which was higher than 76.19% in the control group ( $P < 0.05$ ). See **Table 5**.

### Discussion

TN, a common neurological disease, can cause severe pain. Research has shown that the common pain point was on one side, and then the pain gradually spread from a point of the mandible or face to a branch of the trigeminal nerve [11], and its clinical manifestation was episodic severe pain in the facial trigeminal nerve. Although the disease is not fatal, it causes patients to experience anxiety, depression and other unhealthy emotions, which affects patients' sleep quality and quality of life [12]. At present, surgery is predominantly used for treatment, but a single surgical treatment also has multiple flaws such as adverse reactions and the psychological pressure, negatively affects the prognosis [13]. In order to improve the treatment efficacy, perioperative patients were clinically given the relevant nursing intervention. However, the traditional nursing measures are insufficient due to the lack of a specific target. After discharge, patients' inner needs cannot be effectively met due to the multiple factors, nor do patients receive effective care, which results in poor application effects [14]. In view of this, more effective nursing and strengthened psychological counseling plays an important role in improving the conditions of patients.

Rehabilitation therapy outside of the hospital via the Internet is an exploration of modern nursing models and medical models, and its main purpose is to improve the compliance and satisfaction of care, and stabilize the prognosis of patients [15]. Suggestive psychological nursing is developed from the combination of psychological nursing and suggestive therapy. In process of nursing, it affects the psychology and behavior of patients by means of behavior, words,

hints, and suggestions so as to encourage patients to accept outside opinions or follow suggestive behaviors. This nursing model assists patients to correctly recognize and face their own diseases and psychological conditions [16]. Studies have shown [17] that suggestive psychological nursing has helped patients with TN improve their confidence in disease treatment through positive psychological suggestion, overcome psychological barriers, mobilize positive emotions, eliminate negative emotions, and solve contradictions in the mind. In this study, an Internet center platform was built and integrated into a out-of-hospital care model to facilitate the consultation and interaction of patients with TN.

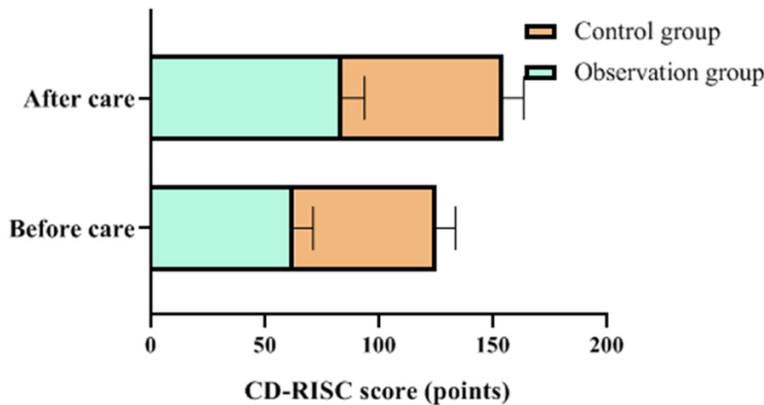
The results of this study showed that the SAS score and the SDS scores in the observation group after care were lower than those before care and those in the control group, indicating that the rehabilitation therapy outside of the hospital via the Internet combined with suggestive psychology effectively improved the negative mood of patients with TN. Measures such as watching TV, listening to music, chatting, etc. effectively improved patients' negative mood and relieve their pain to ensure a good sleep quality. Additionally, the authors found that after care, the VAS score and the PSQI score in the observation group were higher than those before care and those in the control group; indicating that rehabilitation outside of the hospital via the Internet combined with suggestive psychology effectively relieved the pain of patients and improved patients' sleep quality. Of note, we also observed that rehabilitation therapy outside of the hospital via the Internet combined with suggestive psy-

# Rehabilitation therapy outside of the hospital via the Internet

**Table 4.** Comparison of psychological resilience before and after care ( $\bar{x} \pm sd$ , point)

Group	Resilience		Self-improvement		Optimism		Total score	
	Before care	After care	Before care	After care	Before care	After care	Before care	After care
Observation group (n=45)	28.68±5.28	38.62±6.77 <sup>d</sup>	21.61±4.17	28.43±4.99 <sup>d</sup>	10.17±3.28	14.62±4.15 <sup>d</sup>	62.62±8.28	83.71±9.83 <sup>d</sup>
Control group (n=45)	28.70±5.28	34.62±5.72 <sup>d</sup>	21.64±4.20	25.02±4.37 <sup>d</sup>	10.25±3.30	12.29±3.54 <sup>d</sup>	62.56±8.24	70.62±9.02 <sup>d</sup>
t	0.018	3.028	0.034	3.449	0.115	2.865	0.034	6.582
P	0.986	0.003	0.973	<0.001	0.908	0.005	0.972	<0.001

Note: <sup>d</sup>means the tenacity score, the self-improvement score and the optimism score in the CD-RISC and the total score were compared before care in the same group P<0.05.



**Figure 2.** Comparison of psychological resilience before and after care.

chology effectively improved patients' self-rehabilitation ability, enhanced their psychological resilience, and improved their quality of life. Due to the lack of medical resources in China, doctor-patient disputes have increased sharply, and the course of TN is rather long and prone to recurring attacks. After discharge, patients were inevitably in need of self-care. Prior studies have shown [18] that collaborative nursing with medical staff effectively improved patients' self-care ability, enhanced patients' psychological resilience, and improved patients' quality of life. At present, telephone or outpatient follow-up are the main forms of out-of-hospital care in China. Rehabilitation outside of the hospital via the Internet effectively makes up for flaws in care such as absence of information in telephone follow-ups and infeasible schedules of outpatient follow-ups'. As the information era develops, there are many out-of-hospital rehabilitation platforms such as mobile medical software, WeChat, QQ, etc., and they are characterized by their simple operation and close interaction [19], wherein patients can discuss the treatment resolutions and learn about each other in the chat groups. Online platforms are places where appropriate encouragement and support are given by nurs-

es to improve patients' self-rehabilitation ability, enhance patients' self-confidence, and boost patients' psychological resilience. The results of this study showed that the compliance rate in the observation group was 95.23%, which was significantly higher than 76.19% in the control group, indicating that rehabilitation therapy outside of the hospital via the Internet combined with suggestive psychology effectively improved the treatment compli-

ance rate of patients. Similar to the findings of Yang et al. [20], suggestive psychology is a fusion of suggestive therapy and psychological care models. In the process of care, language suggestion and behavior reinforcement suggestions are used to help patients correctly recognize their own diseases and psychological conditions, overcome psychological barriers, mobilize positive emotions, eliminate negative emotions, and enhance confidence in treatment. However, due to the number of patients included in this study being small, and the fact that a long-term follow-up was not performed, bias may exist. In the future, trials with larger sample sizes and longer-term follow-ups are needed. In summary, rehabilitation therapy outside of the hospital via the Internet combined with suggestive psychology effectively helps patients with TN alleviate their bad mental moods, improve their sleep quality and enhance their self-rehabilitation ability and psychological resilience, and increase nursing satisfaction. As such, it is worthy of clinical application and promotion.

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**Table 5.** Comparison of nursing satisfaction

Group	Compliance	Basic compliance	Non-compliance	Satisfaction
Observation group (n=45)	32 (71.11)	12 (26.67)	1 (2.22)	44 (97.78)
Control group (n=45)	19 (42.22)	18 (40.00)	8 (17.78)	37 (82.22)
$\chi^2$				6.049
<i>P</i>				0.014

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**Disclosure of conflict of interest**

None.

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## Rehabilitation therapy outside of the hospital via the Internet

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