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Original Article

Effect of cognitive behavioral therapy and WeChat-based health education on patients underwent peripherally inserted central catheter line placement

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Abstract: Objective: To investigate the effect of cognitive behavioral therapy (CBT) and WeChat-based health education on patients underwent peripherally inserted central catheter (PICC) line placement. Methods: The clinical data of 113 patients with PICC line placement in our hospital from January 2019 to January 2021 were retrospectively collected and the patients were divided into two groups according to the intervention methods. Group A (n=56) received routine care of PICC line placement, while group B (n=57) received CBT and WeChat-based health education. The social support, Self-rating Anxiety Scale (SAS) scores, Self-rating Depression Scale (SDS) scores, Quality of Life Scale (QLQ-C30) scores, catheter care compliance, complications and score of self-care ability were compared between the two groups before and after intervention. Results: After intervention, group B had higher social support utilization, subjective and objective support scores, social support scores, quality of life scores, lower SAS and SDS scores, and higher catheter maintenance compliance than group A ($P < 0.05$). The complication rate was 3.51% in group B, which was significantly lower than 25.00% in group A ($P < 0.05$). The score of self-care ability in group B was higher than that in group A after intervention ($P < 0.05$). Conclusion: CBT and WeChat-based health education have significant effects on improving patients' catheter maintenance compliance, score of self-care ability, social support and quality of life, which can alleviate dysphoria and reduce the incidence of complications.

Keywords: PICC line placement, cognitive behavioral therapy,WeChat-based health education, social support, self-management ability

Introduction

Peripherally inserted central catheter (PICC), introduced in China in the early 1990s, has been widely used in tertiary hospitals for repeated blood collection, total parenteral nutrition, long-term infusion for chronic and neonatal patients, and chemotherapy cycles for tumors [1-3]. The peripheral intravenous puncture is not only simple and convenient to operate, but also easy to fix and maintain after puncture without restricting daily activities. The drugs can be delivered directly to the superior vena cava to avoid long-term stimulation of the peripheral vessels. It is a painless way to give intravenous infusion [4, 5].

Although PICC line placement has many advantages over other intravenous accesses, the complications of PICC line placement should not be underestimated [6]. Catheter disconnection, embolism, catheter-related bloodstream infection, hematoma, exudate, bleeding at the puncture site, phlebitis, etc., are all common complications after PICC line placement, and the occurrence of complications not only aggravates the pain level of patients, but also brings heavy psychological burden to patients [7, 8]. Meanwhile, some patients lack relevant knowledge of PICC line placement, which leads to the low compliance of PICC catheter maintenance [9]. Good compliance is a crucial guarantee of rehabilitation, and there is a strong correlation between compliance and social support [10]. Good social support can assist patients with chronic diseases to improve their self-management ability. At present, patients with PICC line placement are usually treated with routine

nursing, i.e., according to the actual situation of patients, nursing staff should strengthen communication before catheterization, carry out lecture and education, strengthen cooperation and guidance during catheterization, and strengthen catheter maintenance and discharge guidance after catheterization. Although this nursing method may achieve certain effects, it also has time and space limitations, and it is subject to certain restrictions in the process of clinical application. WeChat is a real-time communication platform integrating emoticons, pictures, video, audio, and text, supporting real-time chat and online group discussion. Cognitive behavioral therapy (CBT) is a psychosocial intervention aimed at improving the mental health, with the purpose of effectively solving the visitor's current problems, correcting their incorrect cognitive behaviors, and relieving their symptoms [11, 12]. Currently, cognitive behavioral therapy has been widely used in clinical intervention in various fields of disease, most commonly for various chronic diseases, and has achieved ideal intervention effects in improving the mood of patients.

At present, although WeChat-based health education and CBT have been widely used in many fields of disease nursing, there are few studies on their combined application [13]. Therefore, through CBT and WeChat-based health education, this study is feasible and innovative to improve the catheter maintenance compliance, social support and quality of life, improve poor psychological status, and reduce the incidence of complications in patients with PICC line placement.

Materials and methods

Clinical data

The clinical data of 113 patients with PICC line placement in our hospital from January 2019 to January 2021 were retrospectively collected, and the patients were divided into two groups according to the intervention methods, including 56 patients in group A with routine care of PICC line placement and 57 patients in group B with CBT and WeChat-based health education.

Inclusion criteria: patients and their families signed informed consent prior to participating in the research; patients who were clinically diagnosed as malignancy; patients who received the first time placement; patients who met the criteria for PICC line placement; patients with no history of systemic infection; patients with normal communication ability; patients with the ability to use WeChat software. The study had obtained the approval from the Ethics Committee of the First People's Hospital of Fuyang Hangzhou (Approval No. 2021-LW(021)).

Exclusion criteria: patients who requested to withdraw from the study; patients who complicated with severe organic pathology; patients with mental or cognitive dysfunction; patients with other catheters on the puncture side; patients had allergies; patients with severe bleeding disorders; patients with a history of vascular surgery, trauma, venous thrombosis, or radiation at the established puncture site.

Methods

Group A received routine care for PICC line placement. Nursing staff strengthened communication before placement, conducted health education through brochures or presentation according to the patient's condition, strengthened cooperation and guidance during placement, and provided catheter maintenance and discharge guidance after placement.

Group B received CBT and WeChat-based health education.

CBT: (1) Cognitive reconstruction: nursing staff strengthened communication with patients, established a good nurse-patient relationship of mutual trust, and conducted cognitive interventions for patients through case analysis, interactive group discussions, lectures, role playing and other ways to ensure that patients' cognitive needs were met to the maximum extent, so as to correct patients' previous misconceptions on PICC placement and establish correct cognitions; helping patients abandon their misconceptions on PICC line placement through three stages of psychological diagnosis, comprehension and repair, and alleviate the adverse emotions, so that they could finally face PICC line placement. (2) Behavioral intervention: After successful placement, nursing staffs held PICC catheter maintenance lectures twice a week for 30-60 min each time. The PICC nurse explained patiently to the patients and their families about PICC line placement

Table 1. Comparison of baseline data [n (%)]/($\bar{x}$±s)

Data		Group A (n=56)	Group B (n=57)	t/X^2	P
Gender (cases)	Male	38 (67.86)	40 (70.18)	0.071	0.790
	Female	18 (32.14)	17 (29.82)		
Age (years)		42.19±2.19	42.22±2.13	0.074	0.941
Punctured vein (cases)					
Cephalic vein		5 (8.93)	7 (12.28)	0.025	0.968
Median cubital vein		13 (23.21)	15 (26.32)		
Basilic vein		38 (67.86)	35 (61.40)		
Type of malignancy (cases)		21 (37.50)	23 (40.35)		
Lung carcinoma		11 (19.64)	9 (15.79)	0.636	0.885
Gastric carcinoma		9 (16.07)	10 (17.54)		
Hepatic carcinoma		9 (16.07)	8 (14.04)		
Breast carcinoma		6 (10.71)	7 (12.28)		
Others		21 (37.50)	23 (40.35)		

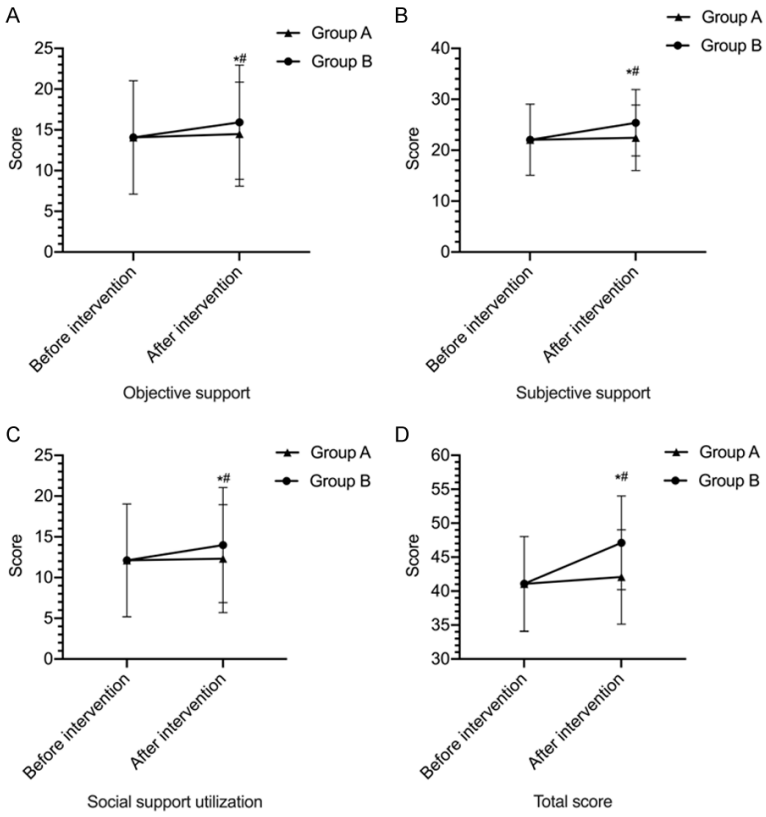

Figure 1. Comparison of social support between the two groups. A: Objective support scores; B: Subjective support scores; C: Social support utilization scores; D: Social support score. $^{*}P < 0.05$ compared with group A, $^{\#}P < 0.05$ compared with before intervention.

and instructed the patients to avoid excessive external rotation of the arm, over-flexion and overextension of the elbow joint and weight bearing. Patients and their families were instructed to perform daily catheter maintenance independently during hospitalization and were informed of the methods of handling of the catheter in emergency settings. After discharge, telephone follow-up was performed to understand the maintenance of the catheter and develop good maintenance habits.

WeChat-based health education: (1) Establishment of a PICC line placement group. All patients were enrolled in the group by scanning the SR code, and the members of the group included counselors, nurse managers, full-time nurses, patients and their families. The professional nursing team composed of counselor, nurse manager and full-time nurses uploaded the texts, videos and pictures related to PICC line placement in the WeChat group from 19:00 to 22:00 every day to help patients systematically master the correct knowledge of PICC line maintenance. The psychological counselor understood the psychological status of patients and provided one-to-one psychological guidance and support for patients; the patients were encouraged to actively share their daily maintenance and psychological status in the WeChat group, and the nursing team corrected the patients' wrong procedures in time, and encouraged patients to strengthen communication and share their experiences. (2) Nursing staff created an official WeChat account for PICC line placement and regularly uploaded knowledge relat-

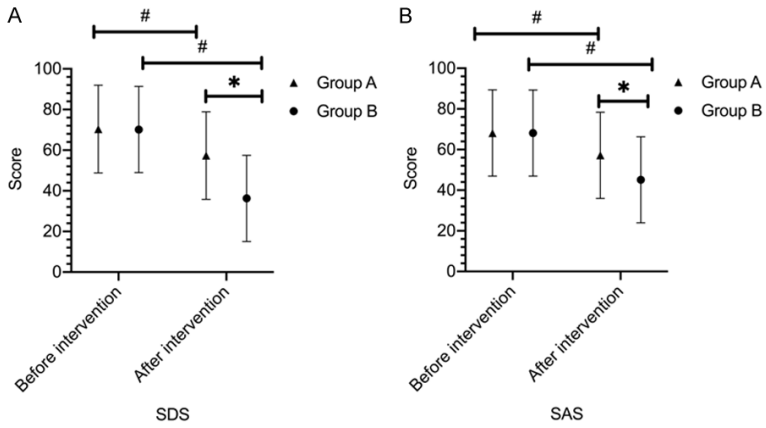

Figure 2. Comparison of psychological status. A: SDS scores; B: SAS scores. $^{*}P < 0.05$ compared with group A, $^{\#}P < 0.05$ compared with before intervention.

Table 2. Comparison of catheter maintenance compliance before and after intervention [n (%)]

Group	Number of cases	Before intervention		After intervention	
		Good compliance	Poor compliance	Good compliance	Poor compliance
Group A	56	12 (21.43)	44 (78.57)	21 (37.50)$^{\#}$	35 (62.50)$^{\#}$
Group B	57	11 (19.30)	46 (80.70)	49 (85.86)$^{*,\#}$	8 (14.04)$^{*,\#}$
X^2	-	0.079		28.147	
P	-	0.779		< 0.001	

Note: *In comparison with group A, $P < 0.05$, $^{\#}$in comparison with before intervention, $P < 0.05$.

ed to PICC line placement; patients could search for what they wanted to know through keywords and also applied for manual services to obtain knowledge and guidance from professional nursing staff in time.

Outcome measurement

Social support [14]: Before intervention and 3 months after intervention, the Social Support Self-Rating Scale (SSRS) was used to assess the social support of patients in both groups, including social support utilization, subjective support, and objective support. The total scale score was the sum of the scores of each area, and the level of social support was proportional to the scores.

Psychological status [15, 16]: Before intervention and 3 months after intervention, Self-rating Anxiety Scale (SAS) and Self-rating Depression Scale (SDS) were used to assess the psychological status of both groups, with a cut-off value of 50 for SAS and 53 for SDS, and the degree of anxiety and depression was proportional to the score.

Catheter maintenance compliance [17, 18]: Before intervention and 3 months after intervention, catheter maintenance compliance was evaluated in both groups, and patients were considered to have good compliance if they strictly followed the doctor's advices; otherwise, they were considered to have poor compliance.

Quality of life [19, 20]: Before intervention and 3 months after intervention, the Quality of Life Core Scale (QLQ-C30) was used to evaluate the quality of life in both groups, including social function, emotional function, cognitive function, role function, and somatic function, ranging 0-100 points. The quality of life was directly proportional to the scores.

Complications such as venous thrombosis, catheter dislodgement, catheter-associated infection, catheter occlusion, bleeding at the puncture site, and phlebitis were recorded in both groups.

Self-care ability: Before intervention and 3 months after intervention, Exercise of Self-Care Agency (ESCA) scale was used to evaluate the ability of self-care of patients in both groups. There are 43 items in total, and the total score of the scale is 172 points. All were evaluated using a 5-point system, and self-care ability was directly proportional to the score.

Statistical methods

SPSS22.0 was used to analyze the data. Measurement data were expressed as mean ± standard deviation (mean ± SD). The *t* test was performed for data conforming to normal distribution, and the Mann-Whitney U test was performed for data not conforming. Counting data

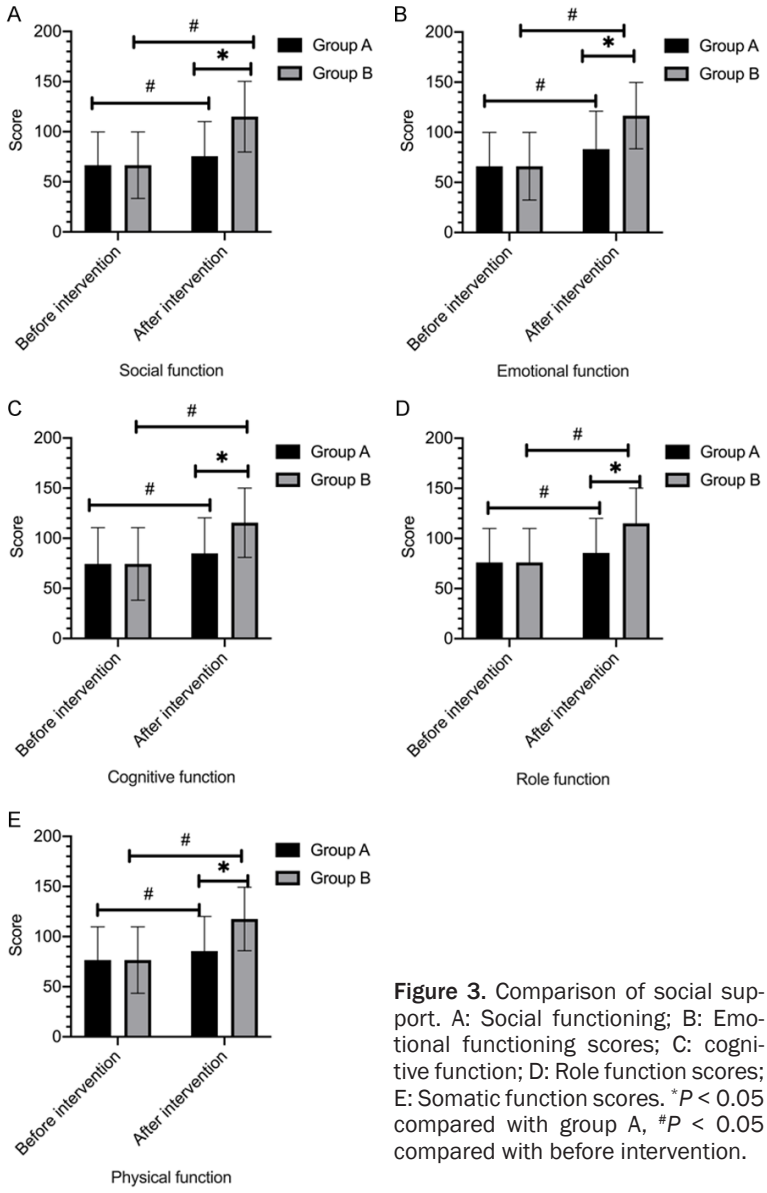

Figure 3. Comparison of social support. A: Social functioning; B: Emotional functioning scores; C: cognitive function; D: Role function scores; E: Somatic function scores. $^{*}P < 0.05$ compared with group A, $^{\#}P < 0.05$ compared with before intervention.

[n (%)] were examined by X^2 test. Paired t test was used for comparison between groups before and after treatment. $P < 0.05$ suggested statistical significance.

Results

Comparison of baseline data

The baseline data in terms of gender, age, punctured veins, and type of malignancy exhibited no difference between the two groups ($P > 0.05$) (**Table 1**).

Comparison of social support

Before intervention, there was no significant difference in social support utilization, subjective support, objective support scores, and total social support scores between the two groups ($P > 0.05$). After intervention, the scores of both groups were higher than before intervention, and in the scores of group B were higher than those of group A ($P < 0.05$) (**Figure 1**).

Comparison of psychological status

Before intervention, there was no significant difference in SAS and SDS scores between the two groups ($P > 0.05$). After intervention, SAS and SDS scores were decreased in both groups than before intervention ($P < 0.05$), and the scores in group B were lower than those in group A ($P < 0.05$) (**Figure 2**).

Comparison of catheter maintenance compliance

Before intervention, there was no significant difference in catheter maintenance compliance between the two groups ($P > 0.05$). After intervention, the catheter maintenance compliance in both groups were better than before intervention, and the catheter maintenance compliance in group B was higher than those in group A ($P < 0.05$) (**Table 2**).

Comparison of quality of life

Before intervention, there was no significant difference in quality of life between the two groups ($P > 0.05$). After intervention, the quality of life scores in both groups were higher than before intervention ($P < 0.05$), and the scores in group B were higher than those in group A ($P < 0.05$) (**Figure 3**).

Comparison of incidence of complications

The complication rate was 3.51% in group B, which was significantly lower than 25.00% in group A ($P < 0.05$) (**Table 3**).

Table 3. Comparison of complications [n (%)]

Group	Number of cases	Venous thrombosis	Catheter dislodgement	Catheter-associated infection	Catheter blockage	Bleeding from puncture site	Phlebitis	Total occurrence
Group A	56	2 (3.57)	3 (5.36)	1 (1.79)	2 (3.57)	3 (5.36)	3 (5.36)	14 (25.00)
Group B	57	0 (0.00)	1 (1.75)	0 (0.00)	0 (0.00)	1 (1.75)	0 (0.00)	2 (3.51)*
X^2	-	-	-	-	-	-	-	10.734
P	-	-	-	-	-	-	-	0.001

Note: *In comparison with group A, $P < 0.05$.

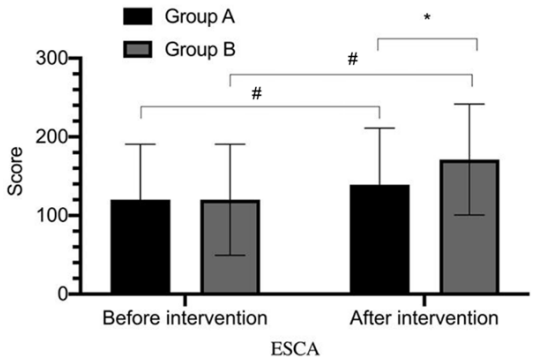

Figure 4. Comparison of self-care ability scores between the two groups. Before intervention, no significant difference was found in the self-care ability scores of the two groups, $P > 0.05$. After intervention, the self-care ability scores of group B were higher than those of group A, $P < 0.05$. *indicates in comparison with group A, $P < 0.05$, #indicates in comparison with before intervention, $P < 0.05$.

Comparison of self-care ability between the two groups

Before intervention, there was no significant difference in the care-ability scores between the two groups ($P > 0.05$). After intervention, the care-ability scores in both groups were increased ($P < 0.05$), and group B had a higher care-ability score than group A ($P < 0.05$) (**Figure 4**).

Discussion

Due to cognitive biases in PICC line placement, most patients have low compliance with catheter maintenance and high complication rates [21, 22]. The present study strengthened CBT and WeChat-based health education. The results showed that the catheter maintenance compliance were higher, and SAS and SDS scores, and complication rates were lower in group B after intervention compared with group A, suggesting that CBT and WeChat-based health education could improve catheter maintenance compliance of patients, reduce dysphoria, and reduce complication rate. The mechanism of action was investigated. Under CBT, nursing staff evaluated and reconstructed patients' knowledge of PICC to improve their cognition and understanding of the importance and necessity of PICC line placement, so as to improve the catheter maintenance compliance, alleviate the fear of placement, and improve psychological status of patients. Secondly, in CBT, nursing staff guided patients to develop good behavioral habits, do wrist rotation, fist release and fist clenching to promote blood circulation in the affected limb and reduce the incidence of complications. Through WeChat platform, PICC line placement knowledge was shared by audio, pictures and videos to make it more intuitive and understandable, improve patient compliance and reduce complication rate [23, 24].

Social support refers to the material and psychological assistance [25] that individuals get from colleagues, friends, family, and various sectors of society. In this study, total social support scores in group B were higher than those in group A after intervention, suggesting that CBT and WeChat-based health education can improve social support. The reason shall attribute to the close correlation between social support and compliance. Patients with PICC line placement have fewer social activities and are highly likely to have strong inner feelings through encouraging words. In this study, patients, healthcare professionals, and family members were the main sources of social support, and on the WeChat platform, patients could get information and emotional support from healthcare professionals and wardmates, and could receive care and support from family members in their daily life, so level of social support and catheter maintenance compliance increased [26]. Quality of life refers to a person's perception of their position in life in the

context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns [27]. In this study, quality of life scores in group B were higher than those in group A after intervention ($P < 0.05$), demonstrating the effectiveness of CBT and WeChat-based health education in improving their quality of life. The study of Cai [28] also showed that the quality of life of patients with PICC line placement was significantly improved after CBT, which was highly consistent with this study. The reason may be that in this study, the implementation of CBT reduced the psychological stress of patients, improved their psychological state, and then improved their quality of life through positive and optimistic emotional experiences. Secondly, patients could obtain sufficient information and emotional support on the WeChat platform, thus improving the quality of life.

In conclusion, CBT and WeChat-based health education for patients underwent PICC line placement have significant effects on improving patients' catheter maintenance compliance, social support and quality of life, reducing adverse emotions and lowering the incidence of complications.

Limitations: The sample size is small, and the study period is short, which needs to be improved in future studies.

Disclosure of conflict of interest

None.

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