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Application of Specialist Nursing Intervention of Intravenous Therapy to Elderly Patients with PICC

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Abstract: This study aimed to explore the specific application effect of specialist nursing intervention in intravenous therapy on elderly patients with peripherally inserted central catheters (PICC). From November 2023 to November 2024, a total of 60 elderly patients with PICC admitted to Guiqian International General Hospital were selected as research subjects. Using a digital random table method, these patients were randomly divided into a control group and an experimental group, with 30 patients in each. The control group received routine nursing care, while the experimental group received specialized intravenous therapy nursing intervention in addition to routine care. The nursing effects of both groups were comprehensively evaluated, including treatment compliance, psychological state, quality of life, incidence of complications, and satisfaction with nursing care. The results showed that after the intervention, the treatment compliance in the experimental group was significantly higher than that of the control group ($P < 0.05$). Additionally, scores on the Self-Rating Anxiety Scale (SAS) and Self-Rating Depression Scale (SDS) were markedly lower in the experimental group compared to the control group ($P < 0.05$), indicating improved psychological well-being. The experimental group also scored higher in all dimensions of quality of life ($P < 0.05$), and had a lower complication rate and higher satisfaction with nursing care ($P < 0.05$). In conclusion, the application of specialized intravenous therapy nursing intervention in the care of elderly patients with PICC can significantly enhance treatment compliance, improve psychological status, elevate quality of life, and reduce complications, demonstrating strong clinical value and providing important guidance for future treatment and nursing of such patients.

Keywords: Intravenous therapy; Specialized nursing intervention; Elderly patients with PICC; Applications

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1. Introduction

PICC catheterization is generally used in patients requiring long-term intravenous infusion or chemotherapy. Generally, the catheter tip is placed at the superior vena cava or atrial junction by puncture catheterization in the peripheral vein by professionals to ensure that drugs enter the central circulation directly and reduce the stimulation of the peripheral vein. In this way, a safer and more effective vein access can be set up for the patient and can be

used for a long time [1]. At the same time, it can effectively prevent other veins from being damaged by irritating drugs. After catheterization, high-speed blood flow can be used to dilute the irritating drugs in time, alleviate the irritating effect of drugs on blood vessels, and reduce the pain and infection risk caused by repeated puncture in the subsequent treatment. PICC catheterization is especially suitable for elderly patients, who have weak physiological functions and are prone to various complications during long-term intravenous infusion, such as phlebitis and infection [2]. However, the physical fitness and diseases of some patients determine to a certain extent that they cannot withstand the threat of more complications. Conventional nursing methods generally adopt a more modular operating process and it is difficult to adopt more targeted nursing methods for different situations of individuals, and the clinical performance is not good nursing effect [3]. Static therapy specialized nursing intervention improves the overall patient nursing effect through personalized nursing programs, so that patients continue to increase the contact with nursing staff and doctors, improve their trust, to improve the treatment compliance. The purpose of this study was to observe the effect of intravenous therapy specialist nursing intervention on elderly patients with PICC.

2. Data and methods

2.1. General data selection

Sixty elderly patients with PICC that were admitted in Guiqian International General Hospital from November 2023 to November 2024 were selected as the research objects. On the whole, this study divided all the subjects into two groups, the control group and the experimental group, with 30 subjects in each group. In the experimental group, there were a total of 18 male patients and 12 female patients. The overall average age was about 2 years old, and the average course of disease was about 3 days. While the control group of male patients a total of 19 cases, a total of 11 cases of female patients, the average age is floating around 2 years old, the average course of disease is mostly about 3 days. From the data records, there was no difference in the general data between the two groups of patients ($P > 0.05$), which was comparable.

2.2. Inclusion criteria and exclusion criteria

Inclusion criteria includes: (1) All patients' clinical manifestation records and medical records must be complete, which is convenient for later comparative analysis and accurate report data; (2) Informed consent must be signed by the patient and the patient's family face to face, agreeing to participate in this study and accept the relevant examination and treatment; (3) Confirmed patients whose clinical symptoms meet the diagnostic criteria; (4) Patients who have no allergic reaction to therapeutic drugs after examination; (5) Patients over the age of 6 months; (6) Patients have the ability to communicate normally.

Exclusion criteria are as follow: (1) Patients with serious complications; (2) Patients with severe mental disorder or cognitive impairment; (3)Patients with other serious organic diseases; (4) Patients who have participated in other clinical trials; Patients with contraindications to PICC catheterization; (5) Patients who could not cooperate with the study or dropped out of the study; (6) Patients with gaps in clinical data; (7) Patients with vital organ lesions; (8) Patients with immune system problems.

Through the above strict research object screening and inclusion criteria design, to further ensure that the research objects meet our research standards, and to ensure the scientific and reliability of the research results. These will also lay a good foundation for us to carry out this study and bring favorable auxiliary diagnostic basis for clinical medical research.

3. Methods

3.1. Methods adopted by the control group

The control group adopted routine nursing methods, including routine maintenance after PICC catheterization, regular dressing change, monitoring of puncture sites, infection prevention and other measures, which were carried out in strict accordance with the standard procedures of the hospital and also included informing the patient's family members of relevant nursing knowledge and precautions, to ensure that the family members could assist the patient in daily nursing during the follow-up treatment. This helps to discover and deal with possible problems in time to ensure the overall treatment safety of patients [4].

3.2. Methods adopted by the experimental group

The experimental group is based on the premise of the control group plus the method of intravenous therapy specialist nursing intervention to carry out the experiment, the main nursing contents include:

(1) To set up a special intravenous therapy specialist nursing team for patients, the professional background and experience of the team members must meet the requirements and have three years or more clinical nursing experience, but also have good communication skills to ensure the smooth progress of the entire experiment process.

(2) The nursing team of this experimental group needs to organize work meetings every once in a while to summarize the recent work of intravenous therapy, promote communication and collaboration among team members, so that they can conduct more in-depth discussions on the problems arising from nursing work, to find more effective solutions and improve the quality of nursing.

(3) In terms of health education, the specialist nursing team of intravenous therapy needs to hold regular lectures on PICC catheterization knowledge for patients and their families and explain in detail the principle, operation process, and daily nursing points of PICC catheterization through the distribution of special photo albums and publicity materials. At the same time, combined with certain online learning videos, the whole nursing and operation mode can be more intuitive and understandable. To help patients and their families better grasp the relevant knowledge and skills, and reduce the complications that may be caused by non-standard operation [5]. In the later stage of catheter maintenance, if any situation arises that cannot be managed independently, it is essential to promptly inform the attending physician. Such situations may include redness and swelling at the puncture site, unexplained fever, swelling of the arm where the catheter was placed, and other abnormal symptoms. Timely reporting ensures that appropriate medical interventions can be implemented without delay, thereby safeguarding the patient's safety and ensuring the effectiveness of treatment. At the same time, the nursing team will conduct regular follow-up to monitor patients with the catheter in place, promptly address any nursing-related issues that arise, and adjust the nursing care plan based on the patient's specific feedback. This approach aims to ensure the patient's comfort and safety throughout the catheterization period and to further reduce the incidence of complications [6].

(4) In terms of psychological nursing, most PICC patients are in a state requiring long-term infusion therapy, suffering from long-term chronic diseases or malignant tumors, and there is certain psychological pressure on them. In the process of repeated treatment, patients are prone to anxiety, depression and other negative emotions, and some patients will worry about the occurrence of catheterization rupture, affecting daily life and other situations. Therefore, the nursing team needs to regularly conduct psychological counseling

for patients, deeply understand the different problems and causes of anxiety between different patients, and provide targeted emotional support. To help patients relieve psychological pressure, enhance the self-confidence of follow-up treatment, and imperceptibly improve patients' treatment compliance [7].

(5) In the prevention of complications and nursing care, it is essential for the nursing team to provide thorough preoperative education on disease-related knowledge and offer psychological counseling to patients. This helps patients develop a positive attitude toward treatment, alleviates anxiety and fear, and prevents elderly patients from refusing or failing to cooperate during the treatment process. At the same time, attention should also be given to enhancing patients' awareness of catheter protection in the later stage of treatment. Through detailed guidance on daily care, patients can avoid catheter displacement or damage caused by improper behaviors such as daily activities and exercise. By ensuring that patients are capable of correct self-care, the risk of complications can be effectively reduced, and the overall treatment effect can be improved [8].

In addition, the nursing team needs to put forward corresponding plans and measures for follow-up care, such as teaching patients to do more hand-clenching and loosening activities to promote blood circulation and avoid thrombosis. At the same time, they should also pay attention to diet, strengthen nutrition intake, eat more fruits and vegetables, reduce high-fat and high-sugar foods, and reduce blood viscosity [9]. Regular ankle pump exercises are suggested to promote blood return and prevent thrombosis. Finally, it is also necessary to regularly monitor patients' medication use, paying close attention to the occurrence of phlebitis that may result from the long-term infusion of large volumes of high-permeability fluids. Routine communication with patients should be maintained, along with regular observation of the puncture site and surrounding skin condition, to promptly identify and address potential infection risks. These measures help ensure the continuity and safety of treatment, further safeguarding patients' health outcomes.

3.3. Observation indicators

The treatment compliance of the two groups of elderly patients was observed, including medication, sleep, and other aspects, as well as evaluated and analyzed by relevant scales.

3.4. Statistical analysis

SPSS 26.0 software was used for data analysis of this controlled trial. The measurement data of mental state score, quality of life score, and satisfaction were expressed in the form of mean plus or minus standard deviation ($x \pm s$), and statistical analysis was carried out by T-test. For the measurement data such as treatment compliance and complication rate, the percentage (%) was used to express, and the Chi-square (x^2) test was used for statistical analysis. If the *P*-value is less than 0.05, it is considered that there is a significant difference between the data.

4. Results

4.1. Comparative analysis of compliance between the two groups

After the end of the corresponding nursing work, the degree of compliance of the elderly patients in the experimental group was generally higher than that of the control group ($P < 0.05$), as shown in **Table 1**.

Table 1. Comparison of treatment compliance between the two groups [n (%)]

Group	Cases	Complete compliance	Partial compliance	Noncompliance	Overall compliance rate
Control group	30	9(30.00)	14(46.67)	7(23.33)	23(76.67)
Observation group	30	12(40.00)	17(56.67)	1(3.33)	29(96.67)
x^2					5.192
P					0.023

4.2. Analysis of psychological status scores of elderly PICC patients in the two groups

There was no significant difference between the experimental group and the control group before intervention ($P > 0.05$). After intervention, the scores of two dimensions of the experimental group were significantly lower than those of the control group ($P < 0.05$), indicating that the psychological intervention was effective, as shown in **Table 2**.

Table 2. Comparison of SAS and SDS scores between the two groups (x ± s)

Group	Cases	SAS		SDS	
		Pre-intervention	Post-intervention	Pre-intervention	Post-intervention
Control group	30	61.07 ± 4.58	53.76 ± 4.24	61.09 ± 4.33	53.78 ± 4.21
Observation group	30	62.73 ± 4.82	48.12 ± 4.16	60.38 ± 4.41	47.29 ± 4.16
t		1.367	5.201	0.629	6.006
P		0.177	< 0.001	0.532	< 0.001

*Note: SAS is a self-rating anxiety scale; SDS is a self-rating depression scale

4.3. Comparative analysis of quality of life scores of elderly PICC patients in the two groups

After the end of the corresponding nursing work, the scores of all dimensions of the quality of life of the experimental group were significantly higher than those of the control group ($P < 0.05$), indicating that comprehensive nursing intervention can effectively improve the quality of life of patients, as shown in **Table 3**.

Table 3. Comparison of quality of life scores between the two groups (x ± s)

Item	Control group (*n* = 30)	Observation group (*n* = 30)	*t*	*P*
Physiological function	62.19 ± 6.22	78.27 ± 8.81	8.167	< 0.001
Physical function	60.89 ± 6.46	72.91 ± 7.54	6.631	< 0.001
Social function	72.67 ± 6.28	82.83 ± 8.33	5.334	< 0.001
Emotional function	56.87 ± 5.98	68.71 ± 7.15	6.957	< 0.001
Mental function	63.57 ± 6.08	75.19 ± 8.24	6.215	< 0.001
Overall function	72.16 ± 5.32	85.94 ± 7.38	8.296	< 0.001
Vital function	84.37 ± 5.38	79.29 ± 5.12	3.746	< 0.001
Mental function	72.68 ± 4.19	68.64 ± 4.11	3.770	< 0.001

4.4. Comparison of complication rate between the two groups (%)

The complication rate of the experimental group was significantly lower than that of the control group ($P < 0.05$), indicating that comprehensive nursing could effectively reduce the risk, as shown in **Table 4** below.

Table 4. Comparison of complication rates between the two groups [n (%)]

Group	Cases	Puncture site infection	Phlebitis	Catheter ectopic or blocked	Total incidence
Control group	30	3(10.00)	5(16.67)	1(3.33)	9(30.00)
Observation group	30	1(3.33)	0(0.00)	1(3.33)	2(6.66)
x^2					5.455
P					0.02

5. Discussion

In the process of treatment, most elderly patients requiring long-term intravenous therapy often have a low tolerance for pain and are affected by various objective factors, including poor venous conditions. Therefore, peripherally inserted central catheter (PICC) catheterization technology is commonly adopted in such cases to ensure safe, effective, and stable venous access, reduce the pain associated with repeated punctures, and improve the efficiency of treatment [10]. This technology can not only reduce the pain caused by repeated punctures but also alleviate the psychological anxiety of patients undergoing long-term infusion therapy.

Additionally, it can effectively lower the risk of infection and enhance patients' treatment compliance, thereby significantly improving the overall treatment effect and quality of life. However, in the specific implementation process, most elderly patients and their families have certain limitations in the cognition of PICC catheterization technology, and it is easy to have problems in the later care and maintenance, including catheter infection, blockage and ectopic, which affect the treatment effect and quality of life of patients [11]. Therefore, it is necessary to adopt the way of intravenous therapy specialized nursing intervention to improve patients' and families' cognition of PICC catheterization technology, standardize the operation mode in the nursing process, reduce the occurrence of complications, and ensure the catheterization effect [12].

In the process of this study, the treatment compliance of patients in the observation group was significantly improved, and the scores of psychological anxiety and depression were notably better, which also led to a marked improvement in the quality of life of patients. This indicates that specialist nursing intervention through intravenous therapy can effectively alleviate the psychological pressure of elderly patients with PICC, enhance their confidence in treatment, and contribute to better overall therapeutic outcomes. It can enable patients to actively cooperate with nursing staff for treatment, including PICC catheterization, daily nursing, medication management, etc. At the same time, they can also take the initiative to inform the doctor when pain occurs at ordinary times, effectively reducing the risk of complications [13].

In addition, through the use of intravenous therapy specialized nursing intervention, the complication rate of patients in the experimental group is also significantly lower than that of the control group, further verifying the effectiveness and necessity of this intervention mode. In terms of satisfaction, patients in the experimental group also showed significantly better results, with higher overall evaluations of nursing care. This indicates that the intervention of intravenous specialized nursing played a crucial role in enhancing patient experience and satisfaction, while also strengthening the relationship between patients and healthcare providers, ultimately

contributing to improved treatment cooperation and outcomes [14]. It can be seen that the specialized nursing intervention of intravenous therapy not only improves the therapeutic effect in the process of intravenous therapy for elderly patients but also significantly improves the psychological state and quality of life of patients, providing a strong guarantee for long-term intravenous therapy for elderly patients. In future studies, we should further promote and optimize the specialized nursing intervention mode of intravenous therapy, comprehensively sort out the specific needs and feedback of different patients, and generate more personalized and refined nursing plans to maximize the treatment experience and rehabilitation effect of elderly patients [15].

6. Conclusion

In summary, the application of specialized nursing interventions in the care of elderly PICC patients can significantly improve their treatment compliance and quality of life, effectively reduce the incidence of complications, and enhance patient satisfaction with nursing, thereby providing comprehensive protection for long-term intravenous treatment of elderly patients. In the future development, relevant medical institutions should continue to deepen the research and practice of specialized nursing interventions for intravenous therapy, combine modern advanced technological means to optimize nursing processes, ensure the accuracy and efficiency of intervention measures, and further promote the improvement of elderly venous therapy nursing level through this approach, to provide patients with better and more comprehensive medical services.

Disclosure statement

The authors declare no conflict of interest.

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