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Analysis of the value of intensive care in the prevention of thrombosis associated with central venous catheter placement via peripheral veins in adult ICUs

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Abstract: *To analyse the value of intensive care in the prevention of thrombosis associated with peripheral intravenous central venous catheter placement in adult ICU. Eighty patients who attended ICU and underwent transperipheral venous placement of central venous catheter (PICC) from June 2022 to June 2023 in a certain hospital were selected according to the study, and the 80 patients selected in this hospital were randomly divided into two groups. One group of patients received traditional nursing care services and the name of the group was called traditional care group and the other group of patients was receiving intensive care and the name of the group was called intensive care group and each group included 40 patients. The D-dimer level, the success rate of one-time placement, the incidence of PICC-related thrombosis, and the venous blood flow rate were compared between the two groups. Comparing the D-dimer levels of the two groups of patients at different times of cannulation, it can be seen that the intensive care group was significantly lower than the traditional care group, P<0.05. Comparing the success rate of one-time cannulation and the incidence of PICC-related thrombosis between the two groups of patients, it can be seen that the success rate of one-time cannulation in the intensive care group was higher than that of the traditional care group and the incidence of PICC-related thrombosis was lower than that of the traditional care group, P<0.05. Comparing the complication incidence of the two groups of patients, it can be seen that the success rate of one-time cannulation was higher than that of the traditional care group, P<0.05. Compared with the complication rate of the two groups of patients, P>0.05. Comparing the lower limb venous blood flow rate of the two groups of patients, the cluster care group is higher than the traditional care group, P<0.05. Compared with traditional care, the D-dimer level and the incidence of PICC-related thrombosis of the patients after cluster care have been reduced, and the one-time successful rate of cannulation and the lower limb venous blood flow rate have been improved, which is worth to be promoted and used in the clinic. It is worthwhile to promote its use in clinical practice.*

Keywords: *Cluster care; PICC; thrombosis; value study*

1. Introduction

A PICC, or peripheral intravenous central venous catheter, is a long-term venous access device inserted through a vein in the patient's arm (usually the vein of the noble, cephalic, or brachial vein) and extended to the central venous system (e.g., superior vena cava) [1].PICC catheters are usually made of materials such as silicone or polyurethane, which are soft and durable, and are suitable for patients who need long-term intravenous infusion, chemotherapy nutritional support or for monitoring central venous pressure. In ICU patients, PICCs are widely used because they reduce the pain of repeated puncture, reduce the risk of infection, and can be left in place for a long period of time to provide stable venous access for patients [2]-[4]. However, the use of PICC is accompanied by some complications, one of which is thrombosis. Therefore, it is particularly important to prevent thrombosis. Conventional care may lack a standardised and systematic process for thrombosis prevention, resulting in inconsistent care measures and making it difficult to ensure that each patient receives optimal preventive measures [5]. While cluster care as a new nursing model has also been gaining better intervention results, the aim of this study was to further analyse the comparison of D-dimer levels at different placement times, the success rate of one-time placement and the incidence of PICC-related thrombosis, the occurrence of complications, as well as the venous blood flow velocity of the lower limbs before and after the

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traditional and intensive care in the prevention of central venous catheter-associated thrombosis via peripheral vein placement in adult ICUs.

2. Information and Methods

2.1 General information

According to the study, 80 patients who attended ICU and underwent central venous catheter (PICC) placement via peripheral vein in a hospital from June 2022 to June 2023 were selected, and the 80 patients selected in this hospital were randomly divided into two groups. One group of patients received traditional nursing care services and the name of the group was called traditional nursing care group and the other group of patients was receiving intensive nursing care and the name of the group was called intensive nursing care group and each group included 40 patients.D-dimer levels, success rate of one-time placement, incidence of PICC-related thrombosis, and venous blood flow velocity were compared between the two groups.

2.2 Inclusion and exclusion criteria

Inclusion criteria: (1) patients are adults; (2) normal communication is possible.;(3) Patients consented to this study.Exclusion criteria: (1) patients have mental diseases; (2) vital indicators are unstable;(3) comorbidities with other malignancies; and (4) patients or their families expressed refusal of this study.

2.3 Research Methods

Patients in the traditional nursing group receive traditional nursing services, and the intensive nursing group receives intensive nursing on the basis of traditional nursing, as follows: (1) Establishment of an intensive team: the head nurse is designated as the team leader, and the team members should receive training in the team nursing concept, which is mainly about the daily maintenance of catheters, prevention of complications, etc., and the full implementation of the concept of aseptic operation, as well as the regular evaluation of the training content [6]. (2) Catheter intervention: choose the appropriate catheter size and type to reduce the damage to the vessel wall and the risk of thrombosis. Strict implementation of aseptic operation reduces the risk of infection, and the position and function of the catheter are regularly assessed to detect and deal with catheter-related problems in a timely manner. (3) Optimise puncture methods: Adopt ultrasound-guided puncture techniques to improve the success rate of puncture and reduce the number of punctures and vascular injuries. Appropriate compression and care are provided to the puncture site to reduce bleeding and local inflammatory reactions [10]-[11].

2.4 Statistical methods

SPSS26.0 software was used to analyse the data. Measurements were expressed as x±s and t-test was used; counts were expressed as percentages and X2 test was used; $P<0.05$ was taken as statistically significant difference.

3. Results

3.1 Comparison of clinical data between traditional nursing group and intensive nursing group

Comparing the clinical data of patients in the two groups, there is no statistical significance, $P > 0.05$, as shown in Table 1.

Table 1: Comparison of clinical data of patients in two groups

groups	number of examples	Age (years)	Gender		Average time of retention(d)
			male	female	
Traditional Care Group	40	52.47±9.68	23	17	11.23±2.11
Centralised Care Group	40	52.25±10.03	24	16	11.34±2.07
t/X^2-value		0.054	0.052		0.235
P-value		0.957	0.820		0.815

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groups	number of examples	puncture site	
		expensive vein	Precious Vein
Traditional Care Group	40	27	13
Centralised Care Group	40	25	15
t/X^2-value			0.220
P-value			0.639

3.2 Comparison of D-dimer levels between patients in the traditional nursing group and the intensive nursing group at different times of tube placement

In this study, after a series of different nursing measures, comparing the D-dimer levels of the two groups of patients at different times of tube placement, it can be seen that the intensive nursing group is significantly lower than the traditional nursing group, $P < 0.05$, as shown in Table 2.

Table 2: Comparison of D-dimer levels between the two groups of patients at different times of tube placement (μg/L)

groups	number of examples	Before tube placement	7d after tube placement
Traditional Care Group	40	241.02±57.31	294.48±51.65
Centralised Care Group	40	240.87±58.12	269.46±50.12
t-value		0.012	2.199
P-value		0.991	0.031

3.3 Comparison of the success rate of one-time tube placement and the incidence of PICC-related thrombosis between patients in the traditional nursing group and the intensive nursing group

In this study, after a series of different nursing measures, comparing the success rate of one-time tube placement and the incidence of PICC-related thrombosis between the two groups of patients, it can be seen that the success rate of one-time tube placement in the centralised nursing group is higher than that of the traditional nursing group, and the incidence of related thrombosis is lower than that of the traditional nursing group, with a $P<0.05$, as shown in Table 3.

Table 3: Comparison of the success rate of one-time tube placement and the incidence of PICC-related thrombosis between the two groups of patients

groups	number of examples	Success rate of primary placement	Incidence of PICC-related thrombosis
Traditional Care Group	40	28(70.00)	10(25.00)
Centralised Care Group	40	36(90.00)	2(5.00)
X^2-value		5.000	6.275
P-value		0.025	0.012

3.4 Comparison of the occurrence of complications between patients in the traditional care group and the intensive care group

In this study, after a series of different nursing measures, the complication rates of patients in the two groups were compared, $P>0.05$, as shown in Table 4.

Table 4: Comparison of the occurrence of complications between the two groups of patients

groups	number of examples	Catheter Infection	Phlebitis	Catheter ectasia	Overall incidence(%)
Traditional Care Group	40	0	1	0	1(2.50)
Centralised Care Group	40	1	2	0	3(7.50)
X^2-value					0.271
P-value					0.597

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3.5 Comparison of lower limb venous blood flow velocity between patients in the traditional nursing group and the intensive care group before and after nursing (cm/s)

Before nursing, the comparison of blood flow velocity between the two groups of patients, P>0.05, after a series of different nursing measures, comparing the lower limb venous blood flow velocity of the two groups of patients, the centralised nursing group is higher than the traditional nursing group, P<0.05 , as shown in Table 5.

Table 5: Comparison of lower limb venous blood flow velocity between the two groups of patients before and after nursing care

groups	number of examples	femoral vein		popliteal vein	
		Before Care	After Care	Before Care	After Care
Traditional Care Group	40	17.76±1.37	22.13±3.14	13.49±2.13	19.15±2.47
Centralised Care Group	40	17.71±1.42	25.16±3.72	13.67±2.14	21.42±2.87
t-value		0.160	3.937	0.377	3.792
P-value		0.873	0.000	0.707	0.000

4. Conclusions

Clusterised care is a comprehensive nursing strategy that combines several effective nursing interventions to improve the quality and outcomes of patient care. In the prevention of thrombosis associated with peripheral intravenous central venous catheter (PICC) placement in the adult intensive care unit, the value of cluster care is reflected in the following aspects: standardised operation: cluster care reduces the risk of thrombosis by standardising the placement and care process and reducing the variability in operation. Anticoagulation: The rational use of anticoagulant drugs is an important measure to prevent thrombosis, and individualised anticoagulation protocols for patients are included in the clusterised care to reduce the occurrence of thrombosis. Monitoring and assessment: Regular monitoring of the patient's coagulation parameters and catheter position to assess thrombotic risk in a timely manner is an important part of intensive care. Education and training: Training healthcare professionals in PICC placement and care to improve their knowledge and skills in thromboprophylaxis can help reduce complications. Patient activity and position management: Encouraging patients to move appropriately and adjusting their position reasonably can promote blood circulation and reduce the risk of thrombosis.

This study also shows that by comparing the D-dimer levels of the two groups of patients at different times of tube placement, the intensive care group is significantly lower than the traditional care group, P < 0.05. Comparing the success rate of one-time tube placement and the incidence of PICC-related thrombosis between the two groups, it can be seen that the success rate of one-time tube placement in the intensive care group is higher than that of the traditional care group, and the incidence of related thrombosis is lower than that of the traditional care group, P < 0.05. Comparing the venous blood flow rate of the lower limbs of the two groups of patients, the rate in the intensive care group was higher than that in the traditional care group, with a P<0.05. In conclusion, through the establishment of an intervention group, catheter intervention, optimization of puncture methods, and strengthening of patients' thrombosis risk assessment and other intensive care measures, the incidence of PICC-related thrombosis can be effectively reduced, and the safety of the patients and the quality of nursing care can be improved[12-13].

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