Analysis of The Effect of Bundled Nursing Intervention on Lung Cancer Patients with a High Risk of PICC-Related Thrombosis

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Abstract: *Objective:* To explore the effect of bundled nursing intervention on lung cancer patients with a high risk of PICC-related thrombosis. *Methods:* Eighty-six PICC patients were selected and randomly divided into a control group and an observation group of 43 patients each. The control group received general nursing care and the observation group received bundled nursing intervention based on the control group. The occurrence of venous thrombosis, quality of life score, Zung self-rating depression scale (SDS) score, self-rating anxiety (SAS) score, and nursing satisfaction after treatment were compared between the two groups. *Results:* The incidence rate of PICC-related venous thrombosis in the observation group (2/4.652%) was lower than that of the control group (13/30.231%) after nursing intervention ($P < 0.05$). After the intervention, the quality-of-life scores of the observation group were higher than those of the control group ($P < 0.001$). After the intervention, the SDS and SAS scores of the observation group were lower than those of the control group ($P < 0.001$). The nursing satisfaction rate of the observation group (41/ 4.652%) was higher than that of the control group (35/18.604%) ($P < 0.05$). The difference is statistically significant. *Conclusion:* In the care of lung cancer patients with a high risk of PICC-related thrombosis, bundled nursing care achieved better results.

Keywords: Care bundle; Lung cancer; PICC; Thrombosis

1. Introduction

Lung cancer is one of the most common malignancies worldwide and its treatment often involves long-term infusions of chemotherapy drugs. To ensure the continuity of chemotherapy and the stable infusion of drugs, peripherally inserted central catheters (PICC) are often used [1,2]. Although PICC provides convenience, it also increases the risk of PICC-related thrombosis, which seriously endangers the patient's health, complicates treatment, and may even lead to fatal consequences [3]. To reduce the incidence of PICC-related thrombosis, bundled nursing intervention has been proposed to integrate multiple nursing measures [4,5]. The purpose is to reduce PICC-related thrombosis through standardized nursing procedures and practices. This study compares the application effects of general nursing and bundled nursing intervention in lung cancer patients with high risk

of PICC-related thrombosis to provide a more scientific and systematic intervention strategy for PICC nursing management of lung cancer patients to improve patient prognosis and ensure safe and effective care.

2. Materials and methods

2.1. General information

Eighty-six PICC patients were selected and randomly divided into a control group and an observation group of 43 patients each. Inclusion criteria: (1) Patients pathologically diagnosed with lung cancer; (2) require PICC catheterization; (3) aged 18–75 years old; (4) high-risk factors for PICC-related thromboses, such as female gender, obesity, tumor compression, previous history of thrombosis; (5) patients with complete clinical data and consented. Exclusion criteria: (1) Presence of other serious diseases, such as heart disease, liver, and kidney dysfunction; (2) cognitive impairment; (3) unable to undergo ultrasound examination and determine the presence of thrombosis; (4) unwilling to participate in this study.

2.2. Method

The control group received general care, including basic care, dietary guidance, activities, and rest. The observation group received bundled nursing intervention based on the control group, which included the following aspects. A comprehensive assessment of the patient was conducted to understand the patient's condition, thrombosis risk factors, living habits, etc., and a personalized care plan was formulated. Preventive care was provided based on the patient's needs, such as regular blood tests, coagulation function, and other indicators, to detect and deal with abnormalities promptly. At the same time, the patient's condition and self-cognition were also evaluated. The patient's vital signs and symptoms were dynamically monitored to detect and deal with abnormalities promptly. The patient's psychological state was closely monitored and any signs of anxiety, depression, and other emotional problems were promptly dealt with. According to the patient's condition, appropriate rehabilitation training was carried out to promote physical recovery.

2.3. Observation indicators

The observation indicators analyzed in this study are listed in **Table 1**.

Table 1. Observation indicators

Observation indicators	Description
The occurrence of venous thrombosis	(1) Severe venous thrombosis (2) Moderate venous thrombosis (3) Mild venous thrombosis (4) Note: The incidence rate of venous thrombosis = (number of cases of severe venous thrombosis + number of cases of moderate venous thrombosis + number of cases of mild venous thrombosis) / total number of cases * 100%.
Quality of life score	SF-36 was used to evaluate the quality of life of the two groups of patients before and after intervention.
SDS score and SAS score	(1) SDS score: assessed using the Self-Rating Depression Scale (2) SAS score: assessed using the Self-Rating Anxiety Scale (3) Note: The higher the score, the more serious the patient's depression and anxiety.
Nursing satisfaction	(1) Very satisfied (2) Generally satisfied (3) Not satisfied (4) Description: Using the questionnaire survey method, comprehensive satisfaction rate = (number of very satisfied cases + number of generally satisfied cases) / total number of cases * 100%.

2.4. Statistical methods

The SPSS 19.0 software was used to perform statistical analysis. Measurement data were expressed as mean ± standard deviation and compared using the t-test. Count data were expressed as a % and analyzed using the chi-squared (χ^2) test. Results were considered statistically significant at $P < 0.05$.

3. Results

3.1. Comparison of the incidence rate of PICC-related venous thrombosis between the two groups of patients

As shown in **Table 2**, when compared with the control group (13/30.231%), the incidence rate of PICC-related venous thrombosis in the observation group (2/4.652%) was lower ($P < 0.05$).

Table 2. Comparison of the incidence of PICC-related venous thrombosis between the two groups of patients

Indicator	Control group (n = 43)	Observation group (n = 43)	χ^2	P
Severe venous thrombosis	2 (4.651%)	0 (0.000%)	-	-
Moderate venous thrombosis	5 (11.627%)	1 (2.326%)	-	-
Mild venous thrombosis	6 (13.953%)	1 (2.326%)		
Overall venous thrombosis incidence	13 (30.231%)	2 (4.652%)	9.771	0.002

3.2. Comparison of the quality-of-life scores between the two groups of patients

As shown in **Table 3**, after the intervention, the quality-of-life scores of the control group were lower than those of the observation group ($P < 0.001$).

Table 3. Comparison of the quality-of-life scores between the two groups of patients before and after nursing intervention

Observation indicators	Time	Control group (n = 43)	Observation group (n = 43)	t	P
Physiological function	Before intervention	65.35 ± 4.26	65.12 ± 4.23	0.251	0.802
	After intervention	75.39 ± 5.03	90.26 ± 5.32	13.318	0.000
Sentiment score	Before intervention	73.68 ± 6.51	74.30 ± 6.37	0.446	0.657
	After intervention	79.31 ± 3.98	89.99 ± 4.06	12.318	0.000
Psychological function	Before intervention	62.15 ± 3.81	62.34 ± 3.79	0.230	0.817
	After intervention	76.64 ± 4.49	90.35 ± 4.53	14.095	0.000
Social function	Before intervention	70.64 ± 5.37	70.71 ± 5.28	0.061	0.951
	After intervention	76.98 ± 5.84	90.67 ± 6.12	10.612	0.000

3.3. Comparison of SDS and SAS scores between the two groups of patients

As shown in **Table 4**, after the intervention, the SDS and SAS scores of the control group were higher than those of the observation group ($P < 0.001$).

Table 4. The SDS and SAS scores of patients in the two groups of patients before and after nursing intervention

Indicator	Time	Control group (n = 43)	Observation group (n = 43)	t	P
SDS score	Before intervention	58.69 ± 1.72	59.01 ± 1.62	0.888	0.377
	After intervention	50.67 ± 1.08	34.26 ± 0.85	78.296	0.000
SAS score	Before intervention	60.36 ± 1.72	60.42 ± 1.63	0.166	0.869
	After intervention	52.36 ± 1.04	35.03 ± 0.82	85.806	0.000

3.4. Comparison of nursing satisfaction between the two groups of patients

As shown in **Table 5**, the comprehensive nursing satisfaction rate of the observation group (41/4.652%) was higher than that of the control group (35/18.604%) (P < 0.05).

Table 5. Comparison of patient care satisfaction between the two groups of patients

Indicator	Control group (n = 43)	Observation group (n = 43)	χ^2	P
Very satisfied	10 (23.256%)	30 (69.767%)	-	-
Generally satisfied	25 (58.140%)	11 (25.581%)	-	-
Not satisfied	8 (81.396%)	2 (95.348%)	-	-
Overall satisfaction rate	35 (18.604%)	41 (4.652%)	4.074	0.044

4. Discussion

Lung cancer is a common malignant tumor that originates from the bronchial mucosa or glands of the lungs. It is one of the leading causes of cancer-related death worldwide. Due to the influence of factors such as smoking, air pollution, and occupational exposure, the incidence and mortality of lung cancer are increasing yearly [6,7]. Early diagnosis and treatment are of great significance to the prognosis of lung cancer patients. PICC is a common requirement during the treatment of lung cancer patients. Due to the need for long-term drug treatment, nutritional support, and infusion, lung cancer patients often require safe, reliable, and durable intravenous access. PICC is a solution to meet these needs [8,9].

PICC has many advantages. It can provide central venous access for several months, meeting the long-term treatment needs of lung cancer patients. Second, PICC punctures the peripheral veins, avoiding direct damage to the central vein and reducing central vein stenosis and the risk of thrombosis. At the same time, PICC catheters are easy to remove and maintain, which reduces the pain and inconvenience caused by frequent punctures. PICC can also reduce the vascular damage caused by repeated punctures, thereby improving the quality of life of lung cancer patients.

Nonetheless, PICC has a certain risk of complications. It may cause mechanical damage to the vascular endothelium during the operation. This can activate the coagulation system and increase the risk of thrombosis [10]. In addition, when the dressing of the PICC catheter is not changed and flushed on time, it may also lead to catheter-related infection and thrombosis. The formation of blood clots is also closely related to lung cancer. First, the tumor or its metastases may compress adjacent blood vessels, causing the narrowing of the lumen of the blood vessels and blockage of blood flow. This compression can alter hemodynamics, causing blood stagnation in local areas and increasing the risk of thrombosis. Secondly, lung cancer patients often lack sufficient exercise due to pain, fatigue, or other reasons during treatment. Long-term bed rest or prolonged

sitting can slow down blood flow and increase the contact time between the formed components in the blood and the blood vessel wall, thereby increasing the risk of thrombosis.

With the advancement of medical technology, the professionalism and refinement of nursing work are also constantly improving. Bundled nursing intervention was then introduced into clinical practice to reduce the incidence of thrombosis in patients with indwelling PICCs [11]. Bundle nursing management is a relatively new nursing model based on evidence-based medicine theory. It analyzes the patient's condition and uses disease-related books and materials to formulate and implement an optimal care plan. Specifically, the cluster nursing team carries out nursing intervention from various aspects, such as before, during, and after catheterization, life, medication, and rehabilitation, and actively controls the factors that cause thrombosis [12,13].

This study found that in the care of patients with high-risk lung cancer PICC-related thrombosis, cluster care achieved better results. Many studies have also confirmed its effect on thrombosis prevention. Liang pointed out that cluster care achieved better results [14]. Bundle nursing can effectively prevent perioperative venous thrombosis in patients undergoing surgery for lower limb fractures. Sarula believed that bundled nursing intervention can not only prevent postoperative deep vein thrombosis in the lower limbs of patients with cerebral hemorrhage but also improve the patient's quality of life [15].

5. Conclusion

In the care of lung cancer patients at high risk of PICC-related thrombosis, bundled care achieved better results and deserves further promotion.

Disclosure statement

The authors declare no conflict of interest.

References

[1] Shao M, 2017, Research on Self-Care Ability and Influencing Factors of Cancer Patients During PICC Catheterization, dissertation, Shandong University, Jinan.

[2] Yi XL, Chen J, Li J, et al., 2013, Risk Factors Associated with PICC-Related Upper Extremity Venous Thrombosis in Cancer Patients. J Clin Nurs, 2013(23): 837–843.

[3] Zhang Y, Cui Y, Qian Z, et al., 2016, Analysis of Risk Factors for PICC-Related Upper Limb Deep Vein Thrombosis in Patients Undergoing Chemotherapy for Lung Cancer. Chinese Journal of Nursing, 51(4): 434–437.

[4] Shan J, Zhu J, Gu Y, 2010, Research Progress on The Cluster Nursing Concept and its Clinical Application. Journal of Nursing Education, 25(10): 889–891.

[5] Zhou Qi, Wang X, Yu P, 2023, Nursing Care of a Patient with Lung Cancer Complicated by Superior Vena Cava Syndrome via Lower Extremity PICC Catheterization. Contemporary Nurse (Later Issue), 30(11): 122–124.

[6] Li P, 2016, Observation on the Effect of Bundled Nursing in Preventing Venous Thrombosis of Lower Limbs in Postoperative Patients. Chinese Folk Medicine, 28(23): 65–66 + 80.

[7] Ye Y, 2016, Observation on the Effect of Bundled Nursing Intervention in Preventing Deep Vein Thrombosis of Lower Limbs After Orthopedic Surgery. Nursing Practice and Research, 13(13): 41–42.

[8] Liu B, 2024, Analysis of Related Risk Factors and Nursing Strategies for PICC Catheter Infection in Cancer Patients. Chinese Journal of Metallurgical Industry Medicine, 41(1): 103–104.

[9] Wu J, Du J, Liu Y, et al., 2018, Analysis of PICC Catheter-Related Infection Factors and Nursing Strategies in Tumor

Patients Undergoing Concurrent Radiotherapy and Chemotherapy. Electronic Journal of General Stomatology, 5(36): 171+173.

[10] Xiao P, Chen M, Shen P, et al., 2023, Bundle Nursing Intervention to Prevent PICC-Related Bloodstream Infection in Premature Infants. Nursing Practice and Research, 20(24): 3744–3748.

[11] Wen Y, Wang J, 2021, Effect of Bundled Care on The Incidence of Deep Vein Thrombosis of The Lower Limbs in Patients Undergoing Cerebral Hemorrhage Surgery. Thrombosis and Hemostasis, 27(2): 343–344.

[12] Chang H, 2021, The Application Effect of Cluster Nursing in The Prevention of Deep Vein Thrombosis of The Lower Limbs in Patients with Breast Cancer After Surgery. Chinese Folk Medicine, 33(3): 157–158 + 161.

[13] Yang J, Ma X, Wang Y, 2021, Preventive Effect of Bundled Nursing Intervention on Deep Vein Thrombosis of Lower Limbs After Surgery in Patients with Colorectal Cancer. Qilu Nursing Journal, 27(2): 42–44.

[14] Liang Y, 2023, Analysis of the Effect of Cluster Nursing on Preventing Perioperative Deep Vein Thrombosis of The Lower Limbs in Patients Undergoing Orthopedic Trauma Surgery for Lower Limb Fractures. Heilongjiang Medicine, 47(12): 1511–1513.

[15] Sarula, 2023, Effect of the Bundled Nursing Model on Preventing Deep Vein Thrombosis of Lower Limbs in Patients Undergoing Cerebral Hemorrhage Surgery. Chinese Health Care, 41(9): 152–155.