

Effect of Predictive Nursing on Patients with Colorectal Cancer Receiving Oral Anti-Angiogenic Targeted Drugs

WEILAN LIU, YINYUAN ZHENG¹ AND LIJUAN WANG*

Operating Room Department, ¹Department of Radiology, The First affiliated Hospital of Huzhou University, Huzhou, Zhejiang Province 313000, China

Liu *et al.*: Predictive Nursing in Colorectal Cancer Patients

The present study aimed to investigate the effect of predictive nursing on patients with colorectal cancer undergoing treatment with oral anti-angiogenic targeted drugs. The study was conducted at the first affiliated hospital of Huzhou University from June 2021 to June 2022. Eighty patients with colorectal cancer receiving oral anti-angiogenic targeted drugs were selected as participants. Patients were randomly assigned to control group (40 patients) which received routine nursing care and the observation group (40 patients) received predictive nursing. Following nursing intervention, blood pressure levels, incidence of hypertension, medication compliance, and nursing satisfaction were compared between both the groups. After nursing intervention, the observation group exhibited significantly lower blood pressure levels and incidence of hypertension compared to the control group ($p < 0.05$). Additionally, treatment compliance was significantly higher in the observation group than in the control group ($p < 0.05$), with a lower treatment interruption rate ($p < 0.05$). Results from the nursing satisfaction survey ($p < 0.05$) indicated that satisfaction levels were significantly higher in the observation group when compared to the control group. Predictive nursing care for patients with colorectal cancer undergoing treatment with oral anti-angiogenic targeted drugs effectively maintains blood pressure levels, reduces the incidence of hypertension, and improves treatment compliance and nursing satisfaction.

Key words: Predictive care, anti-angiogenic, colorectal cancer, hypertension, chemotherapy, radiotherapy

Colorectal cancer poses a significant challenge as it often becomes difficult to treat once it reaches an advanced stage or recurs. Currently, surgery, radiotherapy, and chemotherapy remain the primary treatment modalities for colorectal cancer. In recent years, anti-angiogenic therapy targeting Vascular Endothelial Growth Factor (VEGF) has emerged as a promising approach for controlling the progression of colon cancer^[1]. While anti-angiogenic drugs represent a novel targeted therapy capable of effectively controlling and eradicating tumors, it has been observed in numerous patients that their use can lead to elevated blood pressure^[2,3]. If hypertension induced by anti-angiogenic drugs is left uncontrolled, it can result in functional or organic changes in vital organs such as the heart, brain, kidneys, and retina, leading to various complications in each target organ. Furthermore, high blood pressure has been linked to the promotion of tumor occurrence and progression. The dynamic changes and propensity for thrombosis

associated with hypertension can accelerate tumor growth and metastasis. Therefore, it is imperative to strengthen patient care during treatment to mitigate the incidence of hypertension. Predictive nursing, characterized by proactive risk assessment, personalized interventions, and patient education, has emerged as a promising approach to optimize the management of patients with CRC receiving oral anti-angiogenic targeted drugs. By identifying and addressing potential adverse events early in the treatment course, predictive nursing aims to minimize treatment-related complications, enhance patient comfort, and improve treatment adherence and efficacy. This study aimed to explore the clinical efficacy of predictive nursing in patients with colorectal cancer receiving oral anti-angiogenic targeted drugs. By implementing predictive nursing strategies, the goal was to proactively manage potential complications, including hypertension, and optimize patient outcomes during treatment. A total

*Address for correspondence

E-mail: wlj_hzyy@163.com

of 80 patients undergoing treatment with anti-angiogenic targeted drugs for colorectal cancer at the First Affiliated Hospital of Huzhou University between June 2021 and June 2022 were enrolled in this study. Using the random number table method, the patients were allocated into two groups: The control group and the observation group, with 40 patients in each group. Inclusion criteria for participation in the study were as follows; diagnosis of colorectal cancer; demonstrated good medication compliance; expected survival of at least 6 mo and provision of signed informed consent. Exclusion criteria were defined as follows; pre-existing essential hypertension; presence of heart or kidney dysfunction. In the control group, there were 25 male patients and 15 female patients, with an average age of (60.29±8.51) y. Of these patients, 19 had colon cancer, and 21 had rectal cancer. In the observation group, there were 22 male patients and 18 female patients, with an average age of (62.83±9.40) y. Colon cancer was diagnosed in 23 cases, while rectal cancer was present in 17 cases. No statistically significant differences in baseline demographic data were observed between the two groups ($p>0.05$). The patients in the control group were given routine nursing care, guided by the doctor's orders to take oral medicines for patients with colorectal cancer, inform them about the disease knowledge based on their needs, focused on the effects of the medicines, and informed them of possible adverse reactions. At the same time, blood pressure monitoring and inspections were strengthened, guide patients to rest in time, and give them dietary advice. Patients in the observation group were given predictive care. A research team was established, with the head nurse as the team leader, and 5 nurses who had served for >3 y and performed well were selected as the team members. The team members were trained in nursing knowledge and skills, and communication skills training was strengthened. Before the study was carried out, the adverse reactions of oral anti-angiogenesis targeted drugs were summarized by reviewing the previous case data, and the time and severity of hypertension were analyzed, and preventive measures were formulated based on the actual situation. Specific nursing interventions include propaganda and education intervention; nurses need to tell patients or family members common adverse reactions of anti-angiogenic targeted drugs based on their understanding, focusing on the causes, hazards, symptoms and preventive

measures of hypertension, and instruct patients to develop high blood pressure. Report blood pressure symptoms to medical staff in time. In psychological counseling, inform patients that high blood pressure is a common reaction, and there is no need to panic or worry too much. Most patients can return to normal after stopping the drug, so as to relieve patient's negative emotions and ensure their medication compliance. During the treatment period, nurses need to use the hospital anxiety and depression rating scale to strengthen the evaluation of patients' psychological dynamics. For those with psychological disorders, they need to actively understand the reasons and implement targeted counseling based on the actual situation, such as telling the dangers of excessive bad mentality and teaching them to adjust their mentality independently method etc. In preventive intervention; pay close attention to changes in blood pressure of patients. For those with abnormally high blood pressure or difficulties in controlling it, nurses can actively communicate with doctors about whether it is possible to reduce the dose of anti-angiogenic targeted drugs or adjust the antihypertensive regimen. Give patients dietary guidance and exercise advice, such as eating less low-salt and high-fat foods, with a daily salt intake of <5 g, a light diet, and more high-fiber foods. For patients with proteinuria, high-protein foods need to be limited intake; on the premise that the body's adjustment allows, carry out appropriate aerobic exercise. Ensuring sufficient sleep can help increase the body's resistance. Therefore, during the treatment period, it is necessary to understand the patient's sleep quality. For those who have poor sleep, tell them to play light music before going to bed to maintain a stable mood and relax breathing and change into comfortable clothes before bed to improve sleep quality. Blood pressure of patients in the two groups compares the blood pressure level and the incidence of hypertension in the two groups of patients after nursing. Hypertension grading standard; in line with the diagnostic criteria for hypertension in the "Guidelines for Prevention and Treatment of Hypertension in China", 140-159/90-99 mmHg is grade 1; 160-179/100-109 mmHg is grade 2; $\geq 180/110$ mmHg is grade 3. The treatment cooperation of the two groups was compared. According to the nursing satisfaction questionnaire survey in the hospital, the patient's satisfaction with nursing work was evaluated. The software used was Statistical Package for the Social Sciences (SPSS)

22.0, and the measurement data was subjected to the t-test, expressed as $\bar{x} \pm s$; the count data was subjected to the Chi-square (χ^2) test, expressed as n (%), and $p < 0.05$ was considered statistically significant. In this study, the effects of nursing intervention on blood pressure levels were investigated through a comparison between two groups of patients; the control group (n=40) and the observation group (n=40) (Table 1). Blood pressure measurements, including diastolic pressure and systolic pressure, were recorded before and after nursing. After nursing, the observation group exhibited a statistically significant decrease in both diastolic and systolic blood pressure levels compared to the control group. Specifically, the mean diastolic pressure in the observation group decreased from 89.62 ± 8.19 mmHg to 84.28 ± 8.06 mmHg, whereas in the control group, it decreased from 135.67 mmHg (± 9.57) to 131.09 ± 8.74 mmHg. The t-test results indicate a significant difference between the two groups in terms of both diastolic pressure ($t=2.939$, $p=0.0043$) and systolic pressure ($t=2.235$, $p=0.0283$). This suggests that the nursing intervention had a more pronounced effect on lowering blood pressure in the observation group compared to the control group. Following nursing intervention, the incidence of hypertension was assessed in two groups of patients; the control group (n=40) and the observation group (n=40). The severity of hypertension was categorized into three grades; grade 1, grade 2, and grade 3. In the control group, 7 patients (17.50 %) were classified as grade 1 hypertensive, 4 patients (10 %) as grade 2 hypertensive, and 2 patients (5 %) as grade 3 hypertensive. This results in a total incidence of hypertension of 13 patients (32.50 %). In comparison, the observation group showed lower incidences of hypertension, with 4 patients (10 %) classified as grade 1 hypertensive and only 1 patient (2.50 %) classified as grade 2 hypertensive. No patients in this group were classified as grade 3 hypertensive. Consequently, the total incidence of hypertension in the observation group was 5 patients (12.50 %). The Chi-square (χ^2) value was calculated to be 4.588, with a corresponding p-value of 0.0322 (Table 2). This indicates a statistically significant difference in the incidence of hypertension between the observation and control groups after nursing intervention. Table 3, presents a comparison of treatment compliance between two groups of patients; the control group (n=40) and the observation group (n=40). Treatment compliance is categorized into three levels;

compliant, relatively compliant, and not compliant. Additionally, the treatment discontinuation rate is provided for each group. In the control group, 12 patients (30 %) were classified as compliant, 24 patients (60 %) as relatively compliant, and 4 patients (10 %). This resulted in a total compliance rate of 36 patients (90 %). Moreover, the treatment discontinuation rate was 7 patients (17.50 %). Contrastingly, the observation group exhibited higher treatment compliance, with 16 patients (40 %) classified as compliant and 24 patients (60 %). Notably, no patients in this group were classified as not compliant, leading to a total compliance rate of 40 patients (100 %). The treatment discontinuation rate in the observation group was notably lower at 1 patient (2.50 %). For treatment compliance, the χ^2 value was calculated to be 4.211, with a corresponding p-value of 0.0402. For treatment discontinuation rate, the χ^2 value was calculated to be 5.000, with a corresponding p-value of 0.0253. These results indicate a statistically significant difference in treatment compliance and discontinuation rates between the observation and control groups. Table 4, illustrates a comparison of nursing satisfaction between two groups of patients; the control group (n=40) and the observation group (n=40). Nursing satisfaction levels are categorized into three groups; satisfied, relatively satisfied, and not satisfied. Additionally, the total satisfaction rate is provided for each group. In the control group, 14 patients (35 %) reported being satisfied with the nursing care, 20 patients (50 %) were relatively satisfied, and 6 patients (15 %) were not satisfied. This resulted in a total satisfaction rate of 34 patients (85 %). In contrast, the observation group exhibited higher nursing satisfaction, with 20 patients (50 %) reporting being satisfied, 19 patients (47.50 %) being relatively satisfied, and only 1 patient (2.50 %) being not satisfied. The total satisfaction rate in the observation group was 39 patients (97.50 %). The χ^2 value was calculated to be 3.914, with a corresponding p-value of 0.0479. This indicates a statistically significant difference in nursing satisfaction between the observation and control groups. Currently, both small-molecule targeted anti-angiogenic drugs and large-molecule anti-angiogenic drugs are increasingly utilized in the treatment of colon cancer, particularly in cases of metastatic colorectal cancer^[4,5]. However, it is important to acknowledge that the inhibition of VEGF by anti-angiogenic drugs results in decreased production of Nitric Oxide (NO) and prostacyclin,

leading to vasoconstriction and reduced microvascular density. Consequently, this can lead to increased peripheral circulatory resistance and elevated blood pressure. Moreover, anti-angiogenic drugs exert neuroendocrine effects that may impact blood pressure regulation by influencing certain hormones^[6-8]. Therefore, patients undergoing treatment with anti-angiogenic drugs should be vigilant about monitoring changes in blood pressure and promptly implement relevant intervention measures as necessary. This proactive approach can help mitigate potential complications associated with hypertension during treatment. The predictive nursing model embodies scientific rigor and comprehensiveness, enabling healthcare providers to anticipate various risks and formulate tailored nursing interventions to enhance the quality of care. By addressing potential complications proactively, this approach not only improves patient outcomes but also minimizes their suffering, ultimately enhancing their quality of life^[9,10]. In this study, predictive nursing for patients with colorectal cancer receiving oral anti-angiogenic targeted drugs demonstrated significant therapeutic efficacy.

Nurses provided patients with professional guidance on the precautions associated with anti-angiogenic targeted drugs, including the importance of adhering to antihypertensive medications. Moreover, nurses offered dietary and exercise recommendations, attended to patient's psychological well-being through counseling, stabilized their moods, ensured optimal sleep quality, and implemented measures to prevent hypertension and intervene promptly if necessary. The analysis of research findings revealed that following nursing intervention, patients in the observation group exhibited significantly lower

blood pressure levels and a reduced incidence of hypertension compared to those in the control group. This underscores the effectiveness of predictive nursing in controlling blood pressure and maintaining its stability. Furthermore, patients in the observation group demonstrated higher treatment compliance, indicating that comprehensive care enhances the patient's treatment experience and facilitates the smooth progression of their therapy. Additionally, patients in the observation group expressed greater satisfaction with nursing care than those in the control group, suggesting that predictive nursing interventions foster positive doctor-patient relationships. Overall, the implementation of predictive nursing interventions holds great promise in optimizing patient care and promoting positive treatment outcomes in colorectal cancer patients receiving oral anti-angiogenic targeted drugs. In conclusion, predictive nursing intervention for patients with colorectal cancer receiving oral anti-angiogenic targeted drugs facilitates heightened awareness of the risks associated with hypertension. Through this intervention, patients can rectify unhealthy dietary habits, engage in suitable aerobic exercise regimens, and address negative emotions, thereby effectively improving sleep quality. As a result, the incidence of hypertension is reduced, treatment compliance is enhanced, and patient satisfaction with nursing care is significantly improved. Overall, the implementation of predictive nursing interventions yields superior nursing outcomes, contributing to improved patient well-being and treatment efficacy. Furthermore, exploring the cost-effectiveness of implementing predictive nursing strategies in colorectal cancer care settings may be valuable for healthcare decision-makers in resource allocation and policy development.

TABLE 1: COMPARISON OF BLOOD PRESSURE LEVELS BETWEEN THE TWO GROUPS OF PATIENTS AFTER NURSING (x±s)

Group (n=40)	Diastolic pressure (mmHg)	Telescopic pressure (mmHg)
Control	89.62±8.19	135.67±9.57
Observation	84.28±8.06	131.09±8.74
t	2.939	2.235
p	0.0043	0.0283

TABLE 2: THE INCIDENCE OF HYPERTENSION AFTER NURSING IN THE TWO GROUPS OF PATIENTS (n %)

Group (n=40)	Grade 1	Grade 2	Grade 3	Total incidence (n %)
Control	7	4	2	13 (32.50)
Observation	4	1	0	5 (12.50)
χ^2				4.588
p				0.0322

TABLE 3: COMPARISON OF TREATMENT COMPLIANCE BETWEEN THE TWO GROUPS (n %)

Group (n=40)	Treatment compliance				Treatment discontinuation rate
	Compliant	Relatively compliant	Not compliant	Total compliance rate	
Control	12	24	4 (10.00)	36 (90.00)	7 (17.50)
Observation	16	24	0 (0.00)	40 (100.00)	1 (2.50)
χ^2				4.211	5.000
p				0.0402	0.0253

TABLE 4: COMPARISON OF NURSING SATISFACTION BETWEEN THE TWO GROUPS (n %)

Group (n=40)	Satisfied	Relatively satisfied	Not satisfied	Total satisfaction rate
Control	14	20	6	34 (85.00)
Observation	20	19	1	39 (97.50)
χ^2				3.914
p				0.0479

Funding:

The study was supported by grants from the public welfare technology application research program of Huzhou (Grant No: 2019GY34).

Conflict of interests:

The authors declared no conflict of interests.

REFERENCES

- Battaglin F, Puccini A, Intini R, Schirripa M, Ferro A, Bergamo F, *et al.* The role of tumor angiogenesis as a therapeutic target in colorectal cancer. *Exp Rev Anticancer Ther* 2018;18(3):251-66.
- Wang W, Li C, Zhuang C, Zhang H, Wang Q, Fan X, *et al.* Research on the mechanism and prevention of hypertension caused by apatinib through the RhoA/ROCK signaling pathway in a mouse model of gastric cancer. *Front Cardiovasc Med* 2022;9:873829.
- Tunesi F, Simonini M, Sabetta G, Bergamini A, Cioffi R, Raiabiotti E, *et al.* Anti-angiogenic drugs and hypertension: From multidisciplinary collaboration to greater care. *G Ital Nefrol* 2022;39(6):2022.
- Lai E, Cascinu S, Scartozzi M. Are all anti-angiogenic drugs the same in the treatment of second-line metastatic colorectal cancer? Expert opinion on clinical practice. *Front Oncol* 2021;11:637823.
- Lopez A, Harada K, Vasilakopoulou M, Shanbhag N, Ajani JA. Targeting angiogenesis in colorectal carcinoma. *Drugs* 2019;79:63-74.
- Zhipen Z, Wei Z, Zhichang L. Advances in the treatment of antivasular targeted drugs associated with hypertension. *Chin J Gerontol* 2021;41(18):4146-9.
- Neves KB, Montezano AC, Lang NN, Touyz RM. Vascular toxicity associated with anti-angiogenic drugs. *Clinical Sci* 2020;134(18):2503-20.
- Neves KB, Rios FJ, Jones R, Evans TR, Montezano AC, Touyz RM. Microparticles from vascular endothelial growth factor pathway inhibitor-treated cancer patients mediate endothelial cell injury. *Cardiovasc Res* 2019;115(5):978-88.
- Jiao J, Lingyun H, Ling L. Prevention and control effect of predictive nursing on PICC catheter-associated bloodstream infection in breast cancer patients. *Qilu Nurs J* 2021;27(14):156-8.
- Shumin L, Yu Z, Lulu Y. Effect of preventive nursing on hypertension induced by oral Apatinib therapy for ovarian cancer. *J Qiqihar Med Coll* 2021;42(10): 900-2.

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms

This article was originally published in a special issue, "Clinical Advancements in Life Sciences and Pharmaceutical Research" Indian J Pharm Sci 2024;86(5) Spl Issue "296-300"