



# Analysis of the Current Status and Influencing Factors of Knowledge, Beliefs, and Behaviors Regarding Deep Vein Thrombosis Prevention in Postoperative Patients Among Nursing Students

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**Abstract:** Objective: To investigate nursing students' knowledge, beliefs, and behaviors (KBB) regarding deep vein thrombosis (DVT) prevention in postoperative patients and analyze influencing factors. Methods: A cross-sectional survey was conducted via a general information questionnaire and the Chinese version of the DVT Prevention KBB Questionnaire. Data were analyzed with SPSS 27.0, including descriptive statistics, Mann-Whitney U (M-W U) test, Kruskal-Wallis H (K-W H) test, and multiple linear regression analysis (MLRA). Results: Nursing students' DVT prevention knowledge, belief, and behavior scores were  $(11.35 \pm 2.23)$ ,  $(37.86 \pm 9.00)$ , and  $(53.68 \pm 13.99)$  points, respectively. MLRA showed gender and prior DVT knowledge learning influenced knowledge scores; gender, prior DVT knowledge learning, and surgical internship experience affected belief scores; gender and prior DVT knowledge learning impacted behavior scores. Conclusion: Intern nurses had moderate DVT prevention KBB, influenced by modifiable factors. Systematic training integrating theory and practice, and optimized clinical teaching strategies are needed to improve their DVT prevention capabilities.

**Keywords:** intern nurses; deep vein thrombosis; knowledge-belief-behavior; influencing factors; nursing

## 1. Background

Deep vein thrombosis (DVT) is a common and severe complication in postoperative surgical patients, potentially leading to life-threatening consequences such as pulmonary embolism[1]. As the future backbone of clinical nursing, nursing students' level of knowledge and practical skills regarding DVT prevention directly impact the quality of patients' postoperative recovery. The Knowledge-Belief-Behavior (KBB) theory serves as an important framework for evaluating the professional behavior of healthcare personnel, positing that knowledge forms the foundation, belief provides the motivation, and behavior represents the goal[2]. Recent domestic and international studies indicate that clinical nurses exhibit gaps in knowledge and deficiencies in practice regarding DVT prevention[3]. Therefore, this cross-sectional study aims to evaluate nursing students' knowledge, beliefs, and behaviors regarding postoperative DVT prevention, analyze key factors influencing these levels, and provide evidence-based recommendations for improving nursing curricula and optimizing clinical internship programs.

## 2. Subjects and Methods

### 2.1 Study Subjects

Nursing students undergoing clinical training at a university-affiliated hospital in Hainan Province from December 2024 to February 2025 were selected using convenience sampling.

### 2.2 Research Instruments

#### 2.2.1 General Information Questionnaire

This 12-item questionnaire assessed gender, educational background, internship duration, department assignment, receipt of DVT prevention education, and proactive learning of DVT-related knowledge.

#### 2.2.2 DVT Prevention Knowledge-Attitude-Practice Questionnaire

The questionnaire, adapted and revised by Zong Qian[4], comprised three sections:(1) Knowledge Dimension: 15 items covering DVT fundamentals, risk assessment, and preventive measures. Scored using a dichotomous scale, with a total range of 0–15 points. This dimension's Cronbach's  $\alpha$  coefficient was 0.778. (2) Belief Dimension: 10 items using a 5-point Likert scale, with a total score range of 10–50 points. Cronbach's  $\alpha$  coefficient for this dimension: 0.896. (3) Behavior Dimension: 15 items using a 5-point Likert scale, total score 15–75 points. Cronbach's  $\alpha$  coefficient for this dimension: 0.852.

## 2.3 Statistical Methods

Data were analyzed using SPSS 27.0 software for descriptive statistics, Mann-Whitney U test, Kruskal-Wallis H test, and multiple linear regression analysis. The significance level was set at  $\alpha=0.05$ .

## 3. Results

### 3.1 General Characteristics of Study Participants

Among 210 nursing interns, 63 (30.0%) were male and 147 (70.0%) were female. The age range was 20–24 years, with a mean age of  $(22.3 \pm 1.2)$  years. Seventy-eight (37.1%) were undergraduate students. One hundred thirteen (53.8%) had internship durations of 21–30 weeks.

### 3.2 Intern Nurses' DVT Prevention Knowledge-Belief-Behavior Scores

The study results indicate that the average score for the knowledge dimension among nursing students was  $(8.40 \pm 2.58)$  points. The average score for the belief dimension was  $(43.10 \pm 3.16)$  points. The average score for the behavioral dimension was  $(57.71 \pm 12.89)$ .

### 3.3 Comparison of Knowledge, Belief, and Behavior Scores Among Intern Nurses with Different Characteristics

Univariate analysis revealed statistically significant differences in knowledge scores among intern nurses based on gender, internship duration, and prior learning of DVT knowledge ( $P < 0.05$ ). Significant differences in belief scores were observed among intern nurses categorized by gender, internship duration, surgical internship experience, prior DVT knowledge learning, and Caprini Scale usage ( $P < 0.05$ ). Significant differences in behavior scores were observed among interns who had studied DVT knowledge and those who had used the Caprini scale ( $P < 0.05$ ).

### 3.4 Multivariate Analysis of Factors Influencing Knowledge, Belief, and Practice Regarding DVT Prevention Among Nursing Students

Multivariate linear regression analysis was conducted with knowledge, belief, and practice scores as dependent variables and general characteristics as independent variables. Results showed: Knowledge score: Gender and having studied DVT knowledge entered the regression equation. Belief scores: Gender, prior learning of DVT knowledge, and prior surgical internship experience entered the regression equation. Behavior Score: Gender and prior learning of DVT knowledge entered the regression equation.

## 4. Discussion

### 4.1 Analysis of Intern Nurses' Knowledge, Beliefs, and Behaviors Regarding DVT Prevention

The study reveals that nursing interns scored an average of  $(11.35 \pm 2.23)$  in DVT knowledge, with strong belief scores of  $(37.86 \pm 9.00)$ . However, their DVT prevention behavior scores were notably low at  $(53.68 \pm 13.99)$ . During clinical rotations, nursing students have limited opportunities to practice physical prevention measures for deep vein thrombosis (DVT). Therefore, specialized training and practical experience in DVT-prone departments are crucial [5-6].

### 4.2 Analysis of Factors Influencing Nursing Students' Knowledge, Beliefs, and Practices Regarding DVT Prevention

#### 4.2.1 Gender Factors

This study found that gender is a common influencing factor across all dimensions of DVT knowledge, beliefs, and practices, with male nursing students generally scoring higher than females. This may be related to the higher confidence and proactivity demonstrated by males in clinical practice[7].

#### 4.2.2 Educational Factors

The study findings indicate that prior learning of DVT knowledge is the strongest positive predictor of DVT knowledge-belief-behavior levels among nursing students. This aligns with the Knowledge-Belief-Behavior Theory, which posits that knowledge acquisition serves as the foundation and starting point for generating positive beliefs and ultimately triggering lasting behavioral change. Therefore, during clinical internships, a critical phase for integrating theory with practice and establishing nursing concepts, healthcare institutions should intensify education on cautionary cases of DVT occurrence and conduct specialized DVT prevention training. This ensures interns gain a comprehensive understanding of the importance of DVT prevention in clinical nursing[8]. Concurrently, during DVT prevention training, interactive methods such as case

sharing and experience exchange facilitated by preceptors should be employed to enhance the autonomy and initiative of clinical students.

## References

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- [1] Goyal A ,Rohela R ,Singh H , et al.Evaluation of the Incidence and Risk Factors of Deep Vein Thrombosis in Lower Limb Surgery in the North Indian Population[J].Cureus,2025,17(10):e93701-e93701.
- [2] Zhang Chunxia, Lu Liping, Yu Yan'e, et al. Survey on Intern Nurses' Knowledge, Beliefs, and Practices Regarding Prevention of Venous Thromboembolism in Patients [J]. Fujian Medical Journal, 2023, 45(05): 118-121.
- [3] Zhi Yanru, Li Haiyan, Lu Qingsheng. Expert Consensus on Nursing Care and Management for Preventing Venous Thromboembolism in Hospitalized Patients [J]. Journal of PLA Nursing, 2021, 38(06):17-21.
- [4] Zong Qian. Survey on Knowledge, Beliefs, and Practices Regarding Deep Vein Thrombosis Prevention Among Perioperative Nursing Staff in Qingdao City [D]. Qingdao University, 2019.
- [5] Al-Mugheed K, Bayraktar N. Knowledge, risk assessment, practices, self-efficacy, attitudes, and behaviour's towards venous thromboembolism among nurses: A systematic review. Nurs Open. 2023 Sep;10(9):6033-6044.
- [6] Jin ZG, Zhang ZQ, Liu BB, et al. Smart Technology Facilitated Patient-Centered Venous Thromboembolism Management (the SmaVTE Study): Protocol for a Randomized Controlled Trial. JMIR Res Protoc. 2025 Jun 5;14:e67254. doi: 10.2196/67254. PMID: 40473232; PMCID: PMC12179571.
- [7] Faioni EM, Zighetti ML, Vozzo NP. Sex, gender and venous thromboembolism: do we care enough? Blood Coagul Fibrinolysis. 2018 Dec;29(8):663-667.
- [8] Toth S, Flohr TR, Schubart J, et al. A meta-analysis and systematic review of venous thromboembolism prophylaxis in patients undergoing vascular surgery procedures. J Vasc Surg Venous Lymphat Disord. 2020 Sep;8(5):869-881.e2.

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