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# Use of Venous Thromboembolism Prophylaxis in Hospitalized Patients: Knowledge and Practice Among Physicians in Nepal

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## Abstract

**Introduction:** Despite the importance of Venous Thromboembolism (VTE) prophylaxis in hospitalized patients, audits have shown inadequate use of VTE prophylaxis methods around the world. We aimed to assess knowledge, attitudes, and behaviors regarding VTE prophylaxis among clinicians in Nepal.

**Methodology:** A cross-sectional questionnaire-based survey was conducted using an online survey platform.

**Results:** 199 (60.7%) of the respondents were aware of the risk factors-based risk stratification approach to VTE prophylaxis in hospitalized patients. Only 154 (47%) of the physicians reported institute-based protocols for VTE prophylaxis.

**Conclusion:** We found a significant lack of awareness on risk factors-based stratification strategy for VTE prevention practices among Nepalese physicians. We recommend educational efforts for Nepalese physicians on the overall impact of VTE on mortality and morbidity of hospitalized patients. Our study highlights the needs for adoption of institution-based protocols for VTE prophylaxis and prevention.

**Keywords:** Venous thromboembolism, Prophylaxis, Hospitalized patients, Nepal, VTE risk stratification

## 1. Introduction

Venous thromboembolism (VTE) is a leading cause of preventable hospital deaths. Healthcare-associated VTE-related morbidity and mortality is a public health problem<sup>1</sup> but is preventable with appropriate use of anticoagulants and or use of compression stockings, however, fewer than half of patients receive these interventions.<sup>2</sup> Inpatient VTE prophylaxis has received increased attention from the agency for Healthcare Research and Quality (AHRQ), and the Centers for Medicare and Medicaid Services (CMS) over the last decade.<sup>3</sup> The American College of Chest Physician (ACCP)

guidelines are the most commonly followed protocols for inpatient VTE prophylaxis management.<sup>4</sup> Despite the availability of such guidelines, audits have shown inadequate use of VTE prophylaxis methods in hospitalized patients.<sup>5</sup>

Several earlier studies have suggested the possibility of lower susceptibility and incidence of VTE in Asian population. However, newer data show a similar rate of VTE after major surgery and in medical patients among Asian population compared to the Western populations. VTE is increasing across Asia due to several factors including an aging population, increasing number of complex surgeries, higher rates of cesarean deliveries, rising obesity,

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increasing incidence of cancers, and low rates of chemoprophylaxis.<sup>6</sup> There is very little published data on the VTE prophylaxis methods being adopted in Nepal, and it is unclear if there is any consensus on the protocols being followed for VTE prophylaxis in the country. This study aimed to explore the comprehension and practice of VTE prophylaxis among physicians in Nepal.

## 2. Materials and methods

A cross-sectional survey was designed to assess the knowledge of VTE prophylaxis among clinicians in Nepal. We collected data using an online survey platform (Survey Monkey). Additionally, using the principles of snowballing, the link was circulated by the investigators through social media for capturing data.

The survey was anonymous, with no names or other identifying data. The period of data collection was between July 14, 2019, till August 13, 2019. A total of 331 questionnaires were collected, 3 questionnaires were partially filled and were excluded from the final analysis. We collected information from the participants including:

- Level of Medical Degree (medical school vs postgraduate training)
- Physician's prior experience with VTE events and VTE related mortality
- Use of Institution-based protocol for VTE and doctor's belief in such protocol
- Risk stratification based on risk factors
- Prophylaxis methods used for each risk group
- Physician's beliefs regarding the incidence of VTE in Nepalese population and need for prophylaxis
- Concerns regarding pharmacological prophylaxis
- Physician's beliefs on how to raise awareness among medical professionals regarding VTE

The collected data was analyzed using descriptive statistics. Statistical analyses were performed with SPSS Version 21.

## 3. Results

The majority of our respondents were medical school graduates practicing independently (291 out of 328, 88.7%) and worked in medical wards (231 or 74%) (See [Table 1](#)). 246 (75%) of respondents had encountered VTE in their clinical practice while 87 (35.37%) of the participants reported encountering VTE-related mortality. 60.7% of the respondents were aware of the risk factors-based risk

Table 1. Demographic profile of participants in the study.

		Female	Male	Total
Highest level of education	MBBS	122	169	291
	MD	15	22	37
Predominant place of work	Medical floor/ward	99	135	
	Surgical floor/ward	13	38	
	Medical ICU	16	28	
	Surgical ICU	5	18	
	Orthopedics floor	6	16	
	Obstetrics/Gynecology floor	22	6	
	Other departments	28	34	

MBBS: Bachelor of Medicine, Bachelor of Surgery; MD: Doctor of Medicine; ICU: Intensive Care Unit.

stratification approach to VTE prophylaxis in hospitalized patients. It was interesting to know that 101 (30.8%) of the respondents did not have any idea about the risk stratification for VTE, and among them, 95 were medical school graduates with no specialty training (See [Fig. 1](#)). 73% of clinicians with postgraduate training were well acquainted with risk stratification whereas only 59.1% of medical school graduates were aware of risk stratification strategies.

292 (89%) reported the use of pharmacologic prophylaxis for VTE with the highest use proportion reported in ICU set up. However, only 81.8% reported using VTE chemoprophylaxis in the Orthopedics department. LMW Heparin was the most commonly used chemoprophylaxis agent for VTE prophylaxis (68.6%), followed by Heparin (35%) and factor Xa inhibitors (20%) while only Aspirin use was reported by 27.7% of the respondents (See [Table 2](#)). The risk of bleeding was seen as a major concern for VTE prophylaxis use by 77.7% of the participants followed by cost (29.8%) (See [Fig. 2](#)).

We found that only 206 (62.8%) percent of the physicians used a combination of mechanical and pharmacological means for DVT prophylaxis in high-risk patients (See [Table 3](#)). Only 154 (47%) of the physicians reported institute-based protocols for VTE prophylaxis in their hospitals (See [Table 2](#)). Significant proportions of the physician didn't believe either problem-based learning in medical schools (56%) or workshops (60.7%) and institutional policy (59.1%) helps increase the awareness of VTE prophylaxis among physicians (See [Fig. 3](#)).

## 4. Discussion

### A. Incidence of VTE events:

The majority of the respondents were not aware of the incidence of VTE events in Nepalese population. Most participants had no idea if Nepalese population is more susceptible to VTE than white or

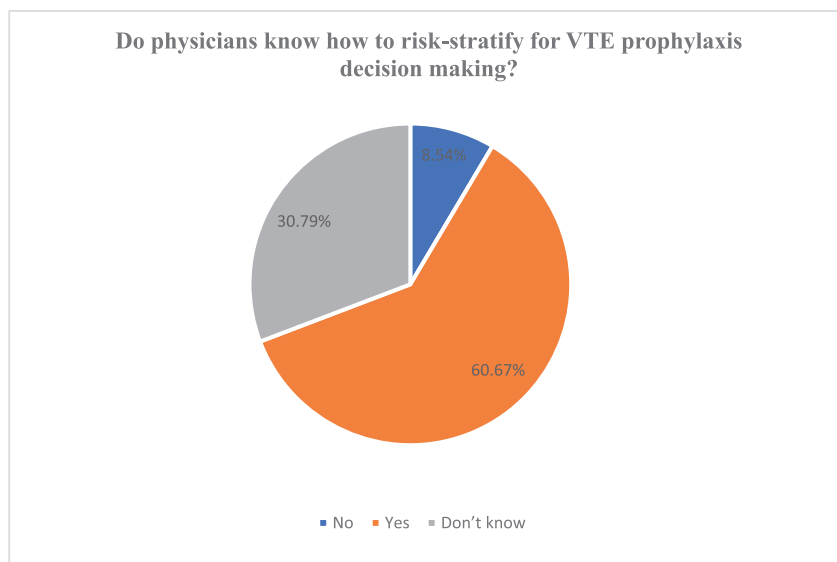


Fig. 1. Knowledge on risk-stratification for Venous thromboembolism prophylaxis.

Caucasians. On review of literature, we were not able to find any studies on the incidence of VTE events in the Nepalese population. A smaller study done in Eastern Nepal involving 66 patients with hip fracture, showed DVT in 5 patients (8%); however, the study evaluated only clinical signs of DVT for diagnosis, which is likely to miss asymptomatic cases.<sup>7</sup>

Traditionally, Asian population has been considered to be at low risk of VTE events compared to the Western population.<sup>8</sup> A retrospective study in Pakistan reported the prevalence of VTE in post-

operative patients as 5.6/10,000 despite pharmacological thromboprophylaxis being used in only 24% of the patients.<sup>9</sup> Another study from India, however, reported the incidence of VTE at 17.46 per 10,000 admissions.<sup>10</sup> A systematic review by Lee et al. reported annual incidence of VTE at 15–20% of the levels recorded in the Western population but also notes that the incidence is increasing.<sup>11</sup> It is noteworthy that most of this data is derived from countries like South Korea, Taiwan, Hongkong with a relatively higher standard of medical practice compared to south Asian countries with low gross

Table 2. Venous Thromboembolism (VTE) in clinical picture.

	No	Yes	Total
VTE Encounter in Clinical Practice	82 (25%)	246 (75%)	328
VTE-Mortality Encounter in Clinical Practice	159 (64.63%)	87 (35.37%)	246
Institute-Based Protocol for VTE Prophylaxis	174 (53.0%)	154 (47.0%)	328
Use of any drug for pharmacological prophylaxis of VTE			
Medical Ward	32 (13.7%)	202 (86.3%)	234
Surgical Ward	4 (7.8%)	47 (92.2%)	51
Medical ICU	2 (4.5%)	42 (95.5%)	44
Surgical ICU	2 (8.7%)	21 (91.3%)	23
Orthopedic Ward	4 (18.2%)	18 (81.8%)	22
Obstetrics/Gynecology/Ward	4 (14.3%)	24 (85.7%)	28
Other Departments	6 (9.7%)	56 (90.3%)	62
Agents for Pharmacological VTE Prophylaxis			
Use of any drug	36 (11.0%)	292 (89.0%)	328
Aspirin	237 (72.3%)	91 (27.7%)	328
Heparin	213 (64.9%)	115 (35.1%)	328
Low Molecular Weight Heparin	103 (31.4%)	225 (68.6%)	328
Factor Xa Inhibitors	308 (93.9%)	20 (6.1%)	328
Other drugs	321 (97.9%)	7 (2.1%)	328

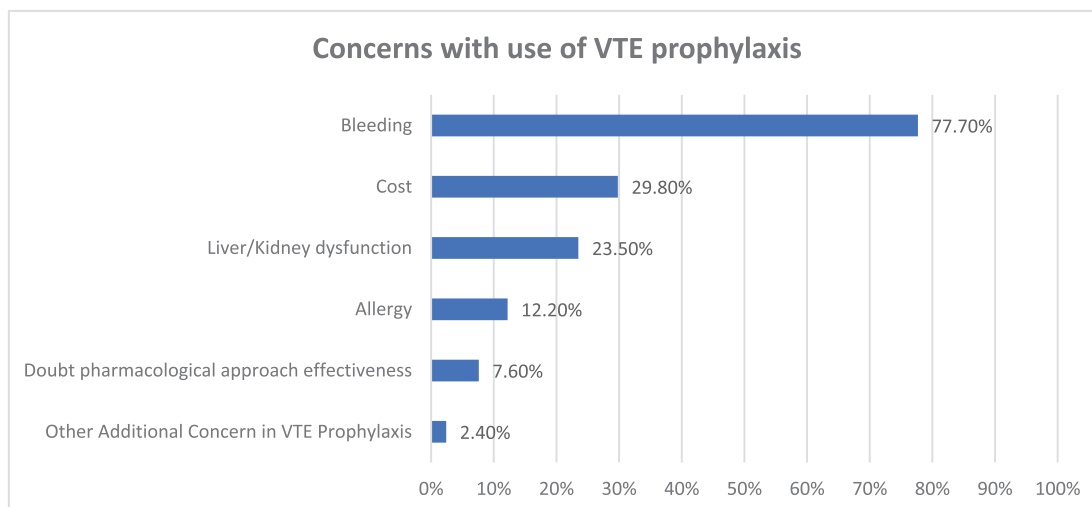


Fig. 2. Concerns with use of Venous thromboembolism prophylaxis.

domestic product (GDP) including Nepal. However, the SMART study, a prospective observational study in Asian population, showed a comparable incidence of DVT between Asian and Western populations in patients undergoing orthopedic surgery.<sup>12</sup>

In our study 75% of the respondents reported encountering at least one VTE event in their clinical practice and 35.3% reported encountering VTE-related mortality with the highest percentage reported in ICU setting and surgical units. This suggests that the risk of VTE events in Nepalese population is not lower than others. This further highlight lack of data on the burden of VTE in Nepalese population. This knowledge gap should be addressed with further studies.

**B. Knowledge and practices on Risk Stratification and VTE chemoprophylaxis:**

We found a significant lack of awareness on risk factors-based risk stratification for VTE events and appropriate guidelines-based VTE prevention practices among Nepalese physicians. Physicians without postgraduate training knew less about VTE risk stratification in comparison to medical school graduates with a difference of 14% (73% vs 59.1%). It is noteworthy that all medical school graduates can independently practice after completing one year of

compulsory internship. The lack in VTE prevention practices can be attributed to lack of adequate education on VTE prophylaxis in medical school.

A significant proportion of the respondents did not believe either problem-based learning in medical schools or workshops and institutional policy can increase the awareness of VTE prophylaxis among physicians. ACCP recommends thromboprophylaxis based on risk stratification for prevention of VTE in hospital admitted patients and emphasizes on the adoption of VTE protocol by all institutes. ACCP advocates using risk stratification tools such as Capriani and Rogers score in non-orthopedic surgical patients and Padua Prediction Score risk assessment model in non-surgical patients to guide clinicians’ decision to initiate chemoprophylaxis.<sup>13</sup> Despite multiple VTE prophylaxis guidelines, the rate of utilization of these measures worldwide remains low as highlighted by a multinational ENDORSE study.<sup>5</sup> Data on the practice of VTE prophylaxis in Nepalese hospital is lacking. We found only one cross-sectional study from a teaching hospital in Nepal that reported 58% (40/69) of patients eligible for VTE chemoprophylaxis did not receive any prophylaxis.<sup>14</sup>

Studies have shown inconsistent and inappropriate VTE prophylaxis practices even in developed countries. A large Canadian study showed that only

Table 3. Assessment of knowledge on Venous Thromboembolism (VTE).

	No specific	Mechanical	Heparin + Related Products	Mechanical + Pharmacological	Total
VTE Prophylaxis (Low Risk Patients)	70 (21.3%)	121 (36.9%)	103 (31.4%)	34 (10.4%)	328
VTE Prophylaxis (High Risk Patients)	7 (2.1%)	4 (1.2%)	111 (33.8%)	206 (62.8%)	328

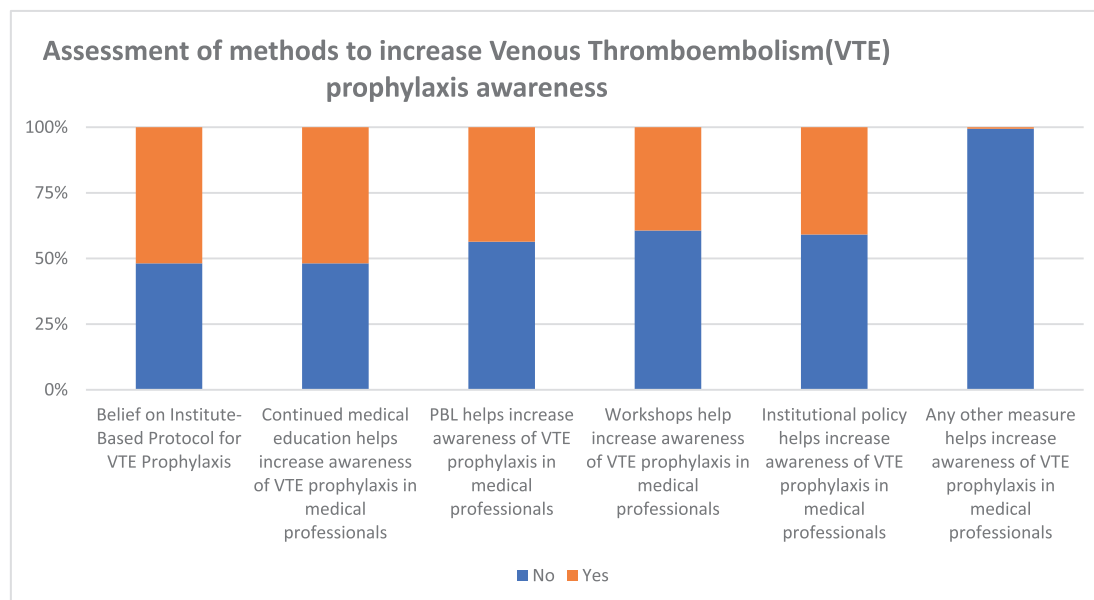


Fig. 3. Interventions to improve Venous thromboembolism prophylaxis.

16% of hospitalized patients who had indications for thromboprophylaxis received appropriate prophylaxis.<sup>15</sup> The reported use of thromboprophylaxis by clinicians in Nepal in our study is higher than the reported use in Western countries. However, this result should be cautiously interpreted, as it was difficult to confirm the actual usage of thromboprophylaxis due to the lack of Electronic Medical Records (EMR) in Nepal.<sup>16</sup>

#### C. Interventions to increase VTE Risk assessment and thromboprophylaxis:

VTE prevention is key in reducing VTE-related morbidity and mortality in hospitalized patients and overall healthcare costs.<sup>17</sup> We have noticed in our study that 51.8% of the physicians felt they needed institute-based protocol for VTE prophylaxis but only 47% reported having such protocol at workplace. It has been well accepted that implementation of effective protocols can minimize the incidence of healthcare-acquired VTE. The protocol-driven approach for VTE prophylaxis needs to be bolstered by using a quality improvement framework, a multidisciplinary team approach, and ongoing monitoring of the process.<sup>18</sup>

Several institutions in the United States reported decreased rates of VTE events after implementation of mandatory risk stratification.<sup>19,20</sup> It is noteworthy that clinical decision support systems were utilized in those institutions. Computerized clinical decision support and mandatory tools integrated into provider workflows such as alerts and can be more

effective than passive ones such as continuing education, dissemination of guidelines, audit, and feedback.<sup>21,22</sup> In a developing nation like Nepal, it would be logistically and financially difficult to provide such active tools based on information technology, where EMR is still not widely adopted.

#### 4.1. Limitations of the study

We adopted a questionnaire-based interview strategy which is at risk for reporting bias. Due to lack of EMR, the actual data in clinical practice couldn't be ascertained to correlate with reported data. A significant number of participants in our study were medical school graduates with no specialty training. This could have skewed our data as specialty-trained physicians could have a better understanding of the risk stratification process and appropriate use of VTE prophylaxis.

Most of the participants in our study were working in medical units. The units with a higher risk of DVT including surgical and intensive care units (ICUs) represent only a small portion of the data. The information collected needs to be analyzed with caution as surgical units and ICUs are more likely to house patients with a higher risk of VTE events.

## 5. Conclusion

Our study highlighted a significant lack of knowledge and expertise on evidence based VTE prophylaxis in hospitalized patients among

Nepalese physicians. We found that Nepalese health institutions lack institutional protocols and guidelines for VTE prophylaxis in hospitalized patients. Furthermore, there is limited data on the burden and susceptibility of VTE events among Nepalese population, leading to failure of appraisal of the huge public health cost associated with VTE. We recommend educational efforts for Nepalese physicians on the overall impact of VTE on mortality and morbidity of hospitalized patients. We advocate for adoption of institution-based protocols for VTE prophylaxis and prevention in Nepal.

## 6. Disclaimer

All authors vouch for the originality of this work and confirm that this work or manuscript has not been submitted to any other journal for publication consideration.

## 7. Financial disclosure

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