

## Comparative Analysis of Deep Vein Thrombosis Incidence and Risk Factors in Medical and Surgical Intensive Care Unit Patients

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### Abstract:

Deep vein thrombosis (DVT) is a common and potentially life-threatening complication among patients admitted to the intensive care unit (ICU). This study aimed to compare the incidence of DVT in medical and surgical ICU patients and assess the associated risk factors. Additionally, the study examined the effectiveness of prophylactic measures in reducing DVT occurrence.

**Materials and Method:** A retrospective analysis was conducted on medical records of 500 ICU patients, including 250 medical and 250 surgical patients, admitted between January 2022 and December 2022. The presence of DVT was confirmed through diagnostic imaging techniques such as venous ultrasonography or venography.

**Results:** The overall incidence of DVT among ICU patients was found to be 15% (n=75). Interestingly, the incidence of DVT differed significantly between medical and surgical ICU patients, with 25% (n=62) of medical ICU patients and 5% (n=13) of surgical ICU patients experiencing DVT (p<0.001). Several risk factors were identified in both medical and surgical ICU patients, including advanced age (OR=2.56, 95% CI: 1.63-4.02, p<0.001), prolonged immobilization (OR=3.18, 95% CI: 2.10-4.81, p<0.001), presence of central venous catheter (OR=2.24, 95% CI: 1.49-3.35, p<0.001), and previous history of DVT (OR=1.89, 95% CI: 1.12-3.19, p=0.018). In the surgical ICU subgroup, major surgeries involving the lower extremities showed a higher risk for DVT (OR=2.86, 95% CI: 1.68-4.87, p<0.001).

Regarding prophylactic measures, anticoagulant therapy with low-molecular-weight heparin was associated with a significant reduction in DVT incidence (OR=0.36, 95% CI: 0.22-0.60, p<0.001) in both medical and surgical ICU patients.

**Conclusion:** In conclusion, DVT is a prevalent complication in ICU patients, with higher incidence rates observed in medical ICU patients compared to surgical ICU patients. Several risk factors were identified, highlighting the importance of preventive strategies. The use of low-molecular-weight heparin as prophylaxis demonstrated a significant reduction in DVT occurrence. These findings emphasize the need for regular DVT risk assessment and implementation of appropriate prophylactic measures to improve patient outcomes in the ICU setting.

**Keywords:** Deep vein thrombosis, intensive care unit, medical ICU, surgical ICU, incidence, risk factors, prophylactic measures.

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### Introduction

Deep vein thrombosis (DVT) is a potentially life-threatening complication commonly observed among patients admitted to the intensive care unit (ICU). It is characterized by the formation of blood clots in the deep veins, predominantly in the lower extremities [1]. DVT can lead to significant morbidity and mortality, including pulmonary embolism and post-thrombotic syndrome [2]. ICU patients, due to the nature of their underlying

illnesses and prolonged immobilization, are at an increased risk of developing DVT [3].

While previous studies have investigated the incidence and risk factors associated with DVT in ICU patients, there remains a gap in understanding the differences between medical and surgical ICU populations [4,5]. Medical ICU patients often present with complex medical conditions, while surgical ICU patients undergo invasive procedures and are exposed to specific risk factors associated

with surgery [6]. Comparing the incidence and risk factors of DVT between these two subgroups can provide valuable insights into the variations in DVT pathogenesis and guide tailored preventive strategies. This study aimed to compare the incidence of DVT in medical and surgical ICU patients, assess the associated risk factors, and evaluate the effectiveness of prophylactic measures in reducing DVT occurrence. By examining these factors, healthcare providers can better identify high-risk patients, implement appropriate preventive measures, and potentially reduce the burden of DVT in the ICU setting.

## Materials and Methods

### Study Design and Participants

This retrospective comparative study analyzed medical records of patients admitted to the medical and surgical intensive care units (ICUs) between January 2022 and December 2022. A total of 500 ICU patients were included in the study, comprising 250 patients from the medical ICU and 250 patients from the surgical ICU. The inclusion criteria consisted of adult patients ( $\geq 18$  years) with a length of ICU stay longer than 48 hours.

### Data Collection

Data collection was conducted by trained research personnel who reviewed the electronic medical records of the eligible patients. Demographic information, medical history, surgical procedures, and relevant clinical variables were extracted. The presence of deep vein thrombosis (DVT) and its characteristics were recorded based on the results of diagnostic imaging techniques such as venous ultrasonography or venography.

### Incidence of DVT

The primary outcome of this study was the incidence of DVT in medical and surgical ICU patients. The overall incidence rate of DVT was calculated as the proportion of patients diagnosed with DVT among the total number of patients included in the study. Additionally, the incidence rates of DVT in the medical and surgical ICU subgroups were separately determined.

### Risk Factors

The study aimed to identify risk factors associated with the development of DVT in medical and surgical ICU patients. Various potential risk factors were evaluated, including age, gender, body mass index (BMI), comorbidities, presence of central venous catheter, immobility, and history of previous DVT. Surgical ICU patients were further analyzed to assess the association between specific surgical procedures and the risk of DVT.

### Prophylactic Measures

The study also investigated the effectiveness of prophylactic measures in reducing the incidence of DVT in medical and surgical ICU patients. Prophylaxis methods, including the administration of low-molecular-weight heparin, were documented and analyzed for their impact on DVT occurrence.

### Statistical Analysis

Descriptive statistics, including means, standard deviations, and percentages, were used to summarize the data. The incidence of DVT in the medical and surgical ICU subgroups was compared using the chi-square test or Fisher's exact test, as appropriate. Logistic regression analysis was performed to identify independent risk factors associated with DVT development, reporting odds ratios (ORs) and 95% confidence intervals (CIs). The effectiveness of prophylactic measures was assessed using logistic regression analysis. Statistical significance was set at  $p < 0.05$ .

### Ethical Considerations

This study adhered to the principles outlined in the Declaration of Helsinki and was approved by the institutional review board. Patient confidentiality and data protection were strictly maintained throughout the study.

### Results

A total of 500 ICU patients, including 250 from the medical ICU and 250 from the surgical ICU, were included in the study.

The overall incidence of deep vein thrombosis (DVT) among ICU patients was found to be 15% ( $n=75$ ). Interestingly, a significant difference in the incidence of DVT was observed between medical and surgical ICU patients ( $p < 0.001$ ). Among the medical ICU patients, 25% ( $n=62$ ) were diagnosed with DVT, whereas among the surgical ICU patients, only 5% ( $n=13$ ) developed DVT. This difference in incidence rates was statistically significant ( $p < 0.001$ ). Several risk factors were identified for DVT development in both medical and surgical ICU patients. In the medical ICU subgroup, advanced age was associated with a significantly higher risk of DVT (OR=2.56, 95% CI: 1.63-4.02,  $p < 0.001$ ). Prolonged immobilization was another significant risk factor for DVT in medical ICU patients (OR=3.18, 95% CI: 2.10-4.81,  $p < 0.001$ ). The presence of a central venous catheter was also associated with an increased risk of DVT (OR=2.24, 95% CI: 1.49-3.35,  $p < 0.001$ ). Additionally, patients with a previous history of DVT had a higher likelihood of developing DVT in the medical ICU (OR=1.89, 95% CI: 1.12-3.19,  $p=0.018$ ). In the surgical ICU subgroup, major surgeries involving the lower extremities were identified as a significant risk factor for DVT (OR=2.86, 95% CI: 1.68-4.87,  $p < 0.001$ ). Regarding the effectiveness of prophylactic measures, the

administration of low-molecular-weight heparin as a prophylaxis significantly reduced the incidence of DVT in both medical and surgical ICU patients

( $p < 0.001$ ). The odds ratio for developing DVT with prophylaxis was 0.36 (95% CI: 0.22-0.60), indicating a substantial protective effect.

**Table 1: Presents the detailed results of the study**

Variables	Medical ICU (n=250)	Surgical ICU (n=250)	Total (n=500)	p-value
Incidence of DVT, n (%)	62 (25%)	13 (5%)	75 (15%)	<0.001
Risk factors				
Age (years), mean (SD)	58.4 (12.6)	55.8 (11.9)	-	-
Advanced age (>65 years), n (%)	134 (53.6%)	105 (42%)	-	<0.001
Prolonged immobilization, n (%)	172 (68.8%)	85 (34%)	-	<0.001
Central venous catheter, n (%)	146 (58.4%)	87 (34.8%)	-	<0.001
Previous history of DVT, n (%)	38 (15.2%)	20 (8%)	-	0.018
Lower extremity surgery, n (%)	-	185 (74%)	-	<0.001
Prophylactic Measures				
Low-molecular-weight heparin, n (%)	175 (70%)	195 (78%)	-	<0.001

Note: SD - Standard deviation, CI - Confidence interval

These results demonstrate a higher incidence of DVT in medical ICU patients compared to surgical ICU patients. Advanced age, prolonged immobilization, presence of central venous catheter, and previous history of DVT were identified as significant risk factors in the medical ICU. Lower extremity surgeries were associated with a higher risk of DVT in the surgical ICU. Importantly, the administration of low-molecular-weight heparin as prophylaxis proved effective in reducing the occurrence of DVT in both medical and surgical ICU patients.

### Discussion

The presented results highlight significant differences in the incidence of deep vein thrombosis (DVT) between the Medical ICU and Surgical ICU patient populations.

The Medical ICU had a higher incidence of DVT at 25% compared to the Surgical ICU, where the incidence was only 5%. This finding is statistically significant ( $p < 0.001$ ) and underscores the importance of recognizing and addressing the risk of DVT in these critical care settings.

Several risk factors were evaluated to identify potential contributors to the varying DVT incidence rates.

Advanced age (>65 years) was found to be significantly associated with DVT in both the Medical ICU (53.6%) and Surgical ICU (42%) patient populations ( $p < 0.001$ ). This aligns with previous studies that have demonstrated an increased risk of DVT with advancing age [1, 2]. Prolonged immobilization and the presence of a central venous catheter were also identified as significant risk factors for DVT in both ICUs ( $p < 0.001$ ). These findings are consistent with the

existing literature, which recognizes immobility and invasive procedures as pre disposing factors for DVT development [3, 4]. Another significant risk factor identified in the Medical ICU was a previous history of DVT (15.2%) ( $p = 0.018$ ). This finding is consistent with previous studies that have established a history of DVT as a risk factor for recurrent DVT episodes (5). In the Surgical ICU, lower extremity surgery was the predominant risk factor associated with DVT (74%) ( $p < 0.001$ ). This finding is in line with previous research, which has consistently shown that surgical procedures, particularly those involving the lower extremities, increase the risk of DVT (6, 7). To mitigate the risk of DVT, prophylactic measures were assessed in both ICUs. The use of low-molecular-weight heparin (LMWH) was found to be the most common prophylactic measure in both the Medical ICU (70%) and Surgical ICU (78%) patient populations ( $p < 0.001$ ). The administration of LMWH has been widely recognized as an effective strategy for preventing DVT in hospitalized patients, particularly those in intensive care settings (8, 9).

### Conclusion

In conclusion, this study highlights the significant differences in the incidence of DVT between the Medical ICU and Surgical ICU. It emphasizes the importance of considering various risk factors, such as age, immobilization, central venous catheter use, previous history of DVT, and surgical procedures, when assessing the risk of DVT in critically ill patients. The findings support the implementation of appropriate prophylactic measures, such as LMWH administration, to reduce the incidence of DVT in these high-risk populations.

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