Original Article
Development of a predictive model for deep vein thrombosis in burn patients based on the Caprini Risk Assessment Scale

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Abstract: Objective: To explore the applicability of the Caprini Risk Assessment Scale in burn patients for evaluating the risk of deep vein thrombosis (DVT). Methods: A retrospective case-control study was conducted involving 278 burn patients from March 2021 to March 2023, with an additional independent test set of 119 patients for external validation. Patients were stratified into DVT and non-DVT groups based on the DVT incidence within one month after burn. The Caprini Risk Assessment Scale was employed to calculate scores and determine risk factors. Multivariate logistic regression analyses identified significant risk factors, and receiver operating characteristic (ROC) curves evaluated the model's predictive power. Results: The mean Caprini score was significantly higher in the DVT group (6.61 ± 2.64) compared to the non-DVT group (4.89 ± 2.36; *P* < 0.001). Key risk factors included older age, increased body mass index (BMI), and a personal or family history of thrombosis. DVT patients were more prone to higher Caprini scores and classified as 'very high risk'. Logistic regression demonstrated a positive correlation between Caprini scores, risk stratification, and DVT incidence (β = 0.284, O*R* = 1.329; β = 0.466, O*R* = 1.594, respectively). The predictive model displayed strong discriminatory power, with an area under the curve (AUC) of 0.853 in the training set and 0.937 in the test set. Conclusion: The Caprini Risk Assessment Scale is an effective tool for predicting DVT risk in burn patients, aiding in risk stratification and targeted prophylaxis.

Keywords: Deep vein thrombosis, Caprini Risk Assessment Scale, burn patients, venous thromboembolism, risk stratification, predictive model

Introduction

Deep vein thrombosis (DVT) is a significant and potentially life-threatening complication in burn patients, leading to prolonged hospital stays, increased healthcare costs, and, in severe cases, pulmonary embolism [1-3]. The pathophysiology of thromboembolism in burn patients is complex, involving systemic inflammatory responses, increased coagulation factor levels, and immobilization, all contributing to a hypercoagulable state [4, 5]. Despite advancements in burn care and thromboembolic prophylaxis, the incidence of DVT in burn patients remains substantial, necessitating effective risk assessment tools to stratify patients and guide prophylactic strategy efficiently [6].

The Caprini Risk Assessment Scale is widely used for evaluating venous thromboembolism (VTE) risk, both in surgical and non-surgical patients [7]. The scale incorporates a comprehensive array of risk factors, including age, body mass index (BMI), personal and family history of thrombosis, and immobilization, assigning weighted scores to each factor. The aggregate score classifies patients' risk levels from low to very high. While the scale has proven its efficacy across various medical domains, its application in specialized populations, such as burn patients, remains underexplored.

Previous studies on DVT in burn patients have primarily focused on identifying individual risk factors or evaluating the efficacy of various prophylactic measures [6, 8-10]. However, few have sought to create comprehensive predictive models tailored to this group. The primary aim of this study was to validate the applicability of the Caprini Risk Assessment Scale for

developing a predictive model for DVT in burn patients, thereby refining the scale's utility and extending its clinical applicability.

Materials and methods

Case selection

In this retrospective case-control study, we included 278 burn patients admitted to Jinhua Central Hospital in Zhejiang Province from March 2021 to March 2023. Additionally, 119 patients were included in an independent test set for external validation, selected based on the same inclusion and exclusion criteria and grouping requirements. Patient information, including demographic data, baseline characteristics, Caprini risk score, and risk stratification, was collected from the hospital's case management system.

The study was approved by the Institutional Review Board and Ethics Committee of Jinhua Central Hospital in Zhejiang Province, adhering to the principles outlined in the Declaration of Helsinki. Informed consent was waived due to the retrospective nature of the study and the exclusive use of de-identified patient data, which posed no potential harm to patients.

Inclusion, exclusion, and grouping criteria

Inclusion criteria: 1) Participants aged over 18 years of age, with no history of mental illness; 2) Patients with normal cognitive function, and the ability to cooperate with various treatments and examinations; 3) Patients met the diagnostic criteria for burn injury [11]; 4) Patients with complete clinical data.

Exclusion Criteria: 1) Severe compound injuries, such as asphyxia, fractures; 2) Previous treatment at another hospital or request transfer during the course of treatment; 3) Severe underlying diseases, such as liver or kidney dysfunction, or primary hematological disorders; 4) Malignant tumors or autoimmune diseases; 5) High risk of bleeding, rendering the patient unable to tolerate anticoagulant or antiplatelet therapy, such as peptic ulcers or recent major surgery.

According to whether the patients developed DVT within 1 month after burn injury, they were divided into a DVT group (n = 102) and a non-

DVT group (n = 176). In addition, 119 patients who met the same inclusion and grouping criteria were included in the external test set, further divided into a DVT group (n = 52) and a non-DVT group (n = 67).

Caprini Risk Assessment Scale

The Caprini Risk Assessment Scale was employed to evaluate and categorize the DVT risk for patients in both groups. This scale comprises roughly 40 risk factors, each assigned a score ranging from 1 to 5 points according to its severity. Based on the aggregate score, DVT risk was classified into four levels: low risk (≤ 1 point), moderate risk (2 points), high risk (3-4 points), and very high risk (≥ 5 points). The detailed scoring criteria are presented in **Table 1**.

The weightings for the risk factors were determined through a combination of expert consensus and empirical data from previous studies. For example, the weight assigned to age (≥ 70 years) was 3 points, reflecting its strong association with DVT risk as supported by the literature. Similarly, the weight assigned to obesity (BMI ≥ 30 kg/m^2) was 2 points, based on evidence from multiple studies demonstrating the significant contribution of obesity to DVT risk. For lower-weighted variables, such as acute medical illness (1 point) and varicose veins (1 point), the weights were also carefully selected. Acute medical illness is a known risk factor for DVT, and a weight of 1 point aligned with previous findings. Varicose veins, while not as strong a risk factor as age or obesity, still contribute to the overall risk of DVT. Therefore, a weight of 1 point was assigned to this variable [12-14].

Statistical method

The minimum sample size was calculated using G*Power 3.1.9.7, based on the "Means: Difference between two independent means (two groups)" option for t-tests.

Total: With a significance level (α) of 0.05 and a power (1-β) of 0.95, the minimum required sample size was determined to be 88 patients.

Validation: With a significance level (α) of 0.09 and a power (1-β) of 0.88, the minimum required sample size was determined to be 52 patients.

Table 1. Scoring criteria of the Caprini DVT Risk Assessment Scale

1 Point	41 years ≤ Age ≤ 60 years
	Body Mass Index ≥ 25 kg/m²
	Abnormal pregnancy or within one month post-delivery
	Use of contraceptives or hormones
	Bedridden due to concurrent medical conditions
	History of inflammatory disease
	Varicose veins
	Pneumonia (within one month) or other serious lung diseases
	Sepsis occurring within the past month
	History of major surgery within the past month
	Scheduled minor surgery
	Other risk factors
2 Points	61 years ≤ Age ≤ 74 years
	History of casting within the past month
	Bedridden for more than 72 hours
	History of malignancy, or currently with malignancy
	Central venous catheterization
	History of laparoscopic surgery (> 45 minutes)
	History of major surgery (> 45 minutes)
	History of arthroscopic surgery
3-4 Points	Age > 75 years
	History of DVT
	Family history of thrombosis
	Heparin-induced thrombocytopenia due to heparin therapy
	Other congenital or acquired thrombophilias
	Positive antiphospholipid antibodies
	Positive prothrombin 20210A mutation
	Positive Factor V Leiden mutation
	Positive lupus anticoagulant
	Elevated serum homocysteine levels
5 Points	Stroke occurring within one month
	History of cerebral palsy within the past month
	Lower limb joint replacement
	Hip, pelvic, or lower limb fractures
	Multiple traumas occurring within the past month

DVT: deep vein thrombosis.

The sample size calculation was performed using the following formula:

$$n = [(Z_{1-\alpha/2}+Z_{1-\beta})/d]2\times[p1(1-p1)+p2(1-p2)]$$

Measured data were expressed as either mean ± standard deviation or median interquartile range, depending on whether the data followed a normal distribution. Categorical data were presented as frequencies and percentages. Continuous variables between the two groups were compared using unpaired t-tests. Multivariate logistic regression analyses were performed to calculate the odds ratio (OR) and 95% confidence interval (CI) for each data item treated as a continuous variable. A *P*-value of less than 0.05 was considered significant. All statistical analyses were conducted using SPSS version 19 (SPSS Inc., Chicago, IL, USA) and the R software package version 3.0.2 (Free Software Foundation, Inc., Boston, MA, USA).

Results

Demographic and baseline characteristics

The proportion of patients aged 60 years or older was significantly higher in the DVT group compared to the non-DVT group (73.53% vs 59.09%; *P* = 0.015). The mean body mass index (BMI) in the DVT group was also higher (27.63 ± 3.17 kg/m²) than in the non-DVT group (26.64 ± 3.12 kg/m²) (*P* = 0.012). A history of DVT was notably more common among DVT patients (33.33%) compared to non-DVT patients (14.77%) (*P* < 0.001). Additionally, a family history of thrombosis was reported significantly higher in the DVT group (22.55%) than in the non-DVT group (9.09%) (*P* = 0.002). The severity of burns was significantly greater in the DVT group, with a higher proportion of patients having 'very severe' and 'severe' burns (25.49% and 43.14%, respectively) compared to the non-DVT group (13.64% and 25.00%, respectively; *P* < 0.001). There were no significant differences between groups in terms of gender, smoking status, alcohol consumption, residential status, education level, employment status, or marital status. Details are shown in **Table 2**.

Table 2. Demographic and baseline characteristics of patients in the training set

Data	DVT Group (n = 102)	Non-DVT Group (n = 176)	t/χ^2	P
Age [n (%)]			5.871	0.015
≥ 60 years	75 (73.53%)	104 (59.09%)		
< 60 years	27 (26.47%)	72 (40.91%)		
Body Mass Index (kg/m^2)	27.63 ± 3.17	26.64 ± 3.12	2.524	0.012
Gender (male/female)	73/29	113/63	1.582	0.209
Smoking (yes/no)	40/62	74/102	0.214	0.644
Drinking (yes/no)	27/75	53/123	0.418	0.518
Residential Status [n (%)]			0.005	0.945
Urban	61 (59.80%)	106 (60.23%)		
Rural	41 (40.20%)	70 (39.77%)		
Education Level [n (%)]			0.081	0.960
Primary School	16 (15.69%)	26 (14.77%)		
Secondary School	31 (30.39%)	56 (31.82%)		
College	55 (53.92%)	94 (53.41%)		
Employment Status [n (%)]			0.131	0.937
Employed	46 (45.10%)	76 (43.18%)		
Unemployed	21 (20.59%)	36 (20.45%)		
Retired	35 (34.31%)	64 (36.36%)		
Marital Status [n (%)]			0.002	0.999
Married	76 (74.51%)	131 (74.43%)		
Single	14 (13.73%)	24 (13.64%)		
Divorced	12 (11.76%)	21 (11.93%)		
History of DVT [n (%)]	34 (33.33%)	26 (14.77%)	13.144	< 0.001
Family history of thrombosis [n (%)]	23 (22.55%)	16 (9.09%)	9.698	0.002
Severity of Burns [n (%)]			23.935	< 0.001
Very Severe	26 (25.49%)	24 (13.64%)		
Severe	44 (43.14%)	44 (25.00%)		
Moderate	21 (20.59%)	61 (34.66%)		
Mild	11 (10.78%)	47 (26.70%)		

DVT: deep vein thrombosis.

Caprini risk scores and risk stratification

The mean Caprini score was notably higher in the DVT group (6.61 ± 2.64 points) compared to the non-DVT group (4.89 ± 2.36 points) (*P* < 0.001) (**Figure 1**). Furthermore, the distribution of patients across different risk stratification levels varied significantly between the two groups (*P* = 0.001) (**Table 3**). In the DVT group, a larger proportion of patients were classified as 'very high risk' (56.87%) compared to the non-DVT group (33.52%). Conversely, the non-DVT group had higher proportions of patients in the 'low risk' (14.77%), 'moderate risk' (23.30%), and 'high risk' (28.41%) categories compared to the DVT group, where these percentages were 8.82%, 11.76%, and 22.55%, respectively. These findings indicate a strong association between higher Caprini risk scores and increased risk of DVT in burn patients.

Multivariate logistic regression analysis of the relationship between Caprini risk score, risk stratification, and DVT incidence in patients

The multivariate logistic regression analysis demonstrated a significant relationship between the Caprini risk score, risk stratification, and the incidence of DVT in burn patients (**Table 4**). Specifically, an increase in the Caprini score was significantly associated with an increase in the likelihood of DVT, as indicated by a β coefficient of 0.284 (*P* < 0.001), with an odds ratio (OR) of 1.329 (95% CI, 1.190-1.484). Similarly, higher risk stratification levels was also significantly correlated with an increased
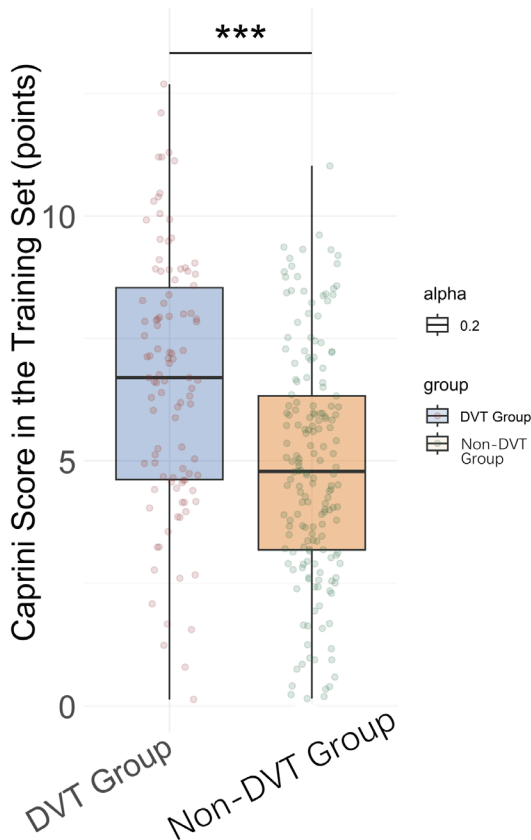
Figure 1. Comparison of Caprini risk scores between groups in the training set. DVT: deep vein thrombosis. ***: P < 0.001.

DVT incidence, as evidenced by a β coefficient of 0.466 (P < 0.001) and an OR of 1.594 (95% CI, 1.221-2.082). These results underscore the importance of Caprini risk assessment as a predictive tool for evaluating DVT risk, indicating that higher scores and stratification levels may reflect a higher risk of DVT among burn patients.

Receiver Operating Characteristic (ROC) (Training Set)

In the training set, a predictive model for DVT in burn patients was developed based on the Caprini Risk Assessment Scale (**Figure 2**). The model exhibited an area under the curve (AUC) of 0.853, indicating high predictive accuracy for assessing the risk of DVT in burn patients.

Multivariate logistic regression analysis of risk factors in the Caprini Risk Assessment Model

The multivariate logistic regression analysis of risk factors within the Caprini Risk Assessment

Model identified several factors significantly associated with the incidence of DVT in burn patients (**Table 5**). Age had a notable effect, where an increase in age corresponded with an increased likelihood of DVT, as indicated by a β coefficient of 0.596 and an OR of 1.814 (95% CI, 1.032-3.191; P = 0.039). BMI also showed a significant direct relationship with DVT incidence (β = 0.109, OR = 1.115, 95% CI, 1.025-1.212; P = 0.011). A history of DVT was a significant predictor, drastically increasing the odds of DVT occurrence (β = 1.034, OR = 2.813, 95% CI, 1.527-5.182; P < 0.001). Additionally, a family history of thrombosis significantly raised DVT risk (β = 1.084, OR = 2.957, 95% CI, 1.441-6.069; P = 0.003). These findings highlight the utility of the Caprini risk factors in predicting DVT risk among burn patients, emphasizing the importance of each risk factor's contribution to the overall assessment.

Demographic and baseline characteristics (Test Set)

In the test set, the proportion of patients aged 60 years or older were significantly higher in the DVT group (75.00%) compared to the non-DVT group (52.24%) (P = 0.011) (**Table 6**). The mean BMI was also higher in the DVT group (27.86 ± 3.11 kg/m^2) than in the non-DVT group (26.12 ± 3.13 kg/m^2; P = 0.003). A history of DVT was significantly more common in the DVT group (32.69%) than in the non-DVT group (10.45%) (P = 0.003), as was a family history of thrombosis (26.92% vs 8.96%) (P = 0.009). Furthermore, the severity of burns showed a significant difference between the groups, with higher proportions of 'very severe' and 'severe' cases in the DVT group (26.92% and 42.31%, respectively) compared to the non-DVT group (13.43% and 25.37%; P = 0.009). Gender, smoking status, drinking status, residential status, education level, employment status, or marital status did not significantly differ between the groups.

Caprini risk scores and risk stratification (Test Set)

The mean Caprini score was notably higher in the DVT group (6.82 ± 2.51 points) compared to the non-DVT group (4.73 ± 2.24 points) (P < 0.001) (**Figure 3**). Furthermore, risk stratification exhibited a significant disparity between the groups (P = 0.003) (**Table 7**). In the DVT

Table 3. Comparison of risk stratification between groups in the training set

Data	DVT Group (n = 102)	Non-DVT Group (n = 176)	t/χ²	P
Risk Stratification [n (%)]			15.522	0.001
Low Risk	9 (8.82%)	26 (14.77%)		
Moderate Risk	12 (11.76%)	41 (23.30%)		
High Risk	23 (22.55%)	50 (28.41%)		
Very High Risk	58 (56.87%)	59 (33.52%)		

DVT: deep vein thrombosis.

Table 4. Multivariate logistic regression analysis of the relationship between Caprini risk score, risk stratification, and DVT incidence in patients

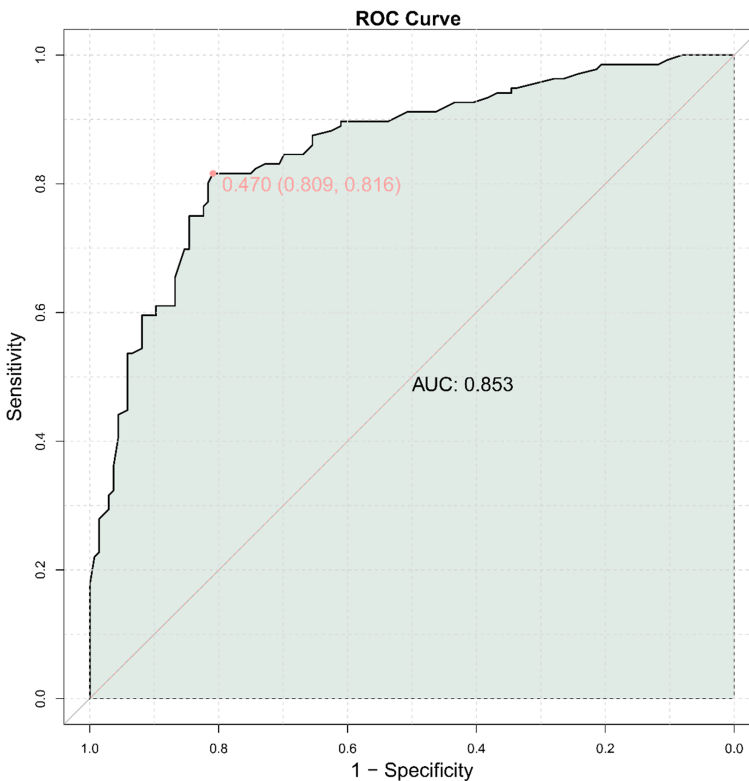| Variable	β	SE	Wald	OR (95% CI)	P
Caprini Score	0.284	0.056	5.036	1.329 (1.190-1.484)	< 0.001
Risk Stratification	0.466	0.136	3.426	1.594 (1.221-2.082)	< 0.001

OR: odds ratio. DVT: deep vein thrombosis.

Figure 2. ROC curve of Caprini Risk Assessment Scale Score for predicting DVT in burn patients in the training set. ROC: Receiver Operating Characteristic; DVT: deep vein thrombosis.

'low risk' (19.40%), 'moderate risk' (25.37%), and 'high risk' (29.85%) categories compared to the DVT group, where these percentages were 7.69%, 11.54%, and 23.08%, respectively. These findings underscore the effectiveness of the Caprini risk assessment in differentiating burn patients at varying risks of developing DVT.

ROC (Test Set)

In the test set, a predictive model for DVT in burn patients was developed based on the Caprini Risk Assessment Scale (**Figure 4**). The model exhibited an AUC of 0.937, indicating a high predictive value for assessing the risk of DVT in burn patients.

Discussion

Our study reveals that the Caprini Risk Assessment Scale, traditionally used for surgical and non-surgical patients, is also applicable in the burn patient population. The scale's comprehensive inclusion of multiple variables offers a comprehensive understanding of a patient's susceptibility to thrombotic events, particularly in burn patients who are inherently predisposed to hypercoagulability due to systemic inflammatory responses, endothelial injury, and prolonged immobility [13].

group, a considerable majority were classified as 'very high risk' (57.69%), in contrast to only 25.37% in the non-DVT group. The non-DVT group had higher proportions of patients in the

Table 5. Multivariate logistic regression analysis of risk factors in the Caprini risk assessment model

Risk Factor	Caprini Score	β	SE	Wald	OR (95% CI)	P
Age	2	0.596	0.288	2.068	1.814 (1.032-3.191)	0.039
Body mass index	1	0.109	0.043	2.546	1.115 (1.025-1.212)	0.011
History of DVT	3	1.034	0.312	3.319	2.813 (1.527-5.182)	< 0.001
Family history of thrombosis	3	1.084	0.367	2.956	2.957 (1.441-6.069)	0.003

SE: standard error. DVT: deep vein thrombosis.

Table 6. Demographic and baseline characteristics of patients in the test set

Data	DVT Group (n = 52)	Non-DVT group (n = 67)	t/χ^2	P
Age [n (%)]			6.450	0.011
≥ 60 years	39 (75.00%)	35 (52.24%)		
< 60 years	13 (25.00%)	32 (47.76%)		
Body Mass Index (kg/m^2)	27.86 ± 3.11	26.12 ± 3.13	3.012	0.003
Gender (male/female)	37/15	46/21	0.087	0.769
Smoking (yes/no)	21/31	37/30	2.580	0.108
Drinking (yes/no)	14/38	27/40	2.319	0.128
Residential Status [n (%)]			0.217	0.642
Urban	32 (61.54%)	44 (65.67%)		
Rural	20 (38.46%)	23 (34.33%)		
Education Level [n (%)]			2.689	0.261
Primary School	8 (15.38%)	13 (19.40%)		
Secondary School	16 (30.77%)	28 (41.79%)		
College	28 (53.85%)	26 (38.81%)		
Employment Status [n (%)]			0.840	0.657
Employed	24 (46.15%)	35 (52.24%)		
Unemployed	10 (19.23%)	14 (20.90%)		
Retired	18 (34.62%)	18 (26.87%)		
Marital Status [n (%)]			0.215	0.898
Married	39 (75.00%)	49 (73.13%)		
Single	7 (13.46%)	11 (16.42%)		
Divorced	6 (11.54%)	7 (10.45%)		
History of DVT [n (%)]	17 (32.69%)	7 (10.45%)	8.998	0.003
Family history of thrombosis [n (%)]	14 (26.92%)	6 (8.96%)	6.760	0.009
Severity of Burns [n (%)]			11.49	0.009
Very Severe	14 (26.92%)	9 (13.43%)		
Severe	22 (42.31%)	17 (25.37%)		
Moderate	10 (19.23%)	30 (44.78%)		
Mild	6 (11.54%)	11 (16.42%)		

One striking observation was the significant prevalence of older patients within the DVT group. Age served as an independent risk factor for thrombus formation, possibly due to the age-associated vascular changes that lead to increased venous stasis and diminished anticoagulant factors [15]. Furthermore, older adults often present with co-morbidities that may exacerbate the coagulation cascade or impair physiological responses to burn injuries [16]. Several factors contribute to a correlation between older age and increased DVT risk, including a decline in nitric oxide levels, impaired fibrinolysis due to decreased tissue plasminogen activator levels, and a prothrombotic state exacerbated by age-related increases in proinflammatory cytokines [17, 18]. Among them, older adults often exhibit a chron-
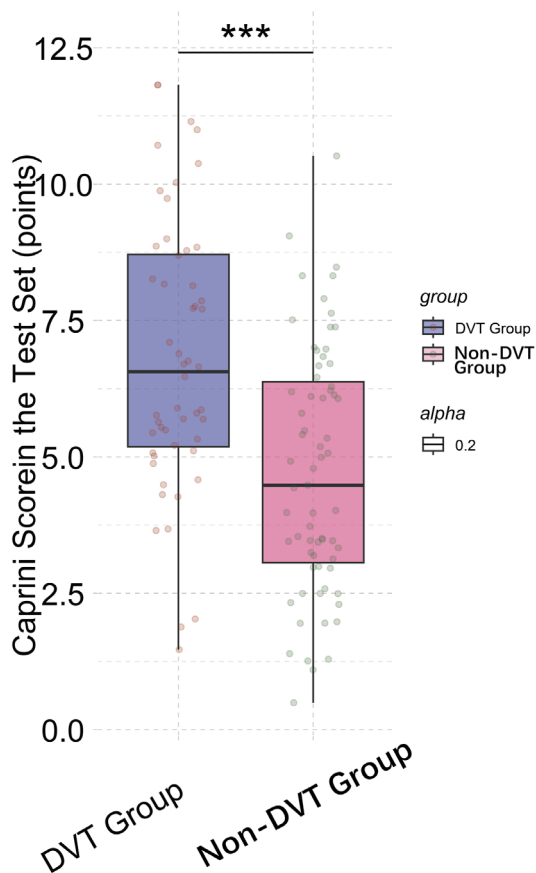
Figure 3. Comparison of Caprini risk scores between groups in the test set. ***: P < 0.001.

ic low-grade inflammatory state, which can contribute to the development of DVT [19, 20]. Studies have shown that elevated inflammatory markers such as C-reactive protein (CRP) and interleukin-6 (IL-6) are associated with a higher risk of thrombosis. Chronic inflammation contributes to endothelial dysfunction, which in turn promotes platelet adhesion and thrombi formation [21, 22]. Although our study did not measure inflammatory markers, existing literature supports the notion that chronic inflammation is a significant risk factor for DVT in older adults.

Similarly, body mass index (BMI) emerged as a significant risk factor for DVT in our analysis. Obesity, characterized by increased BMI, is associated with inflammation-induced muscular microcirculatory dysfunction and impaired venous return, both of which contribute to increased DVT risk [23, 24]. Adipose tissue is now recognized as an active endocrine organ that produces various proinflammatory cyto-

kines, such as TNF-α, IL-6, and leptin. These cytokines can induce a chronic low-grade inflammatory state, which is associated with endothelial dysfunction and increased coagulation [25, 26]. Elevated levels of CRP, a marker of systemic inflammation, have been found to be higher in obese individuals and are independently associated with an increased risk of thrombosis [27]. Studies have shown that adipose tissue from obese individuals exhibits increased expression of proinflammatory genes and higher secretion of inflammatory cytokines compared to lean individuals [25, 28]. Moreover, the augmented pressure on venous systems in obese patients, resulting from increased intra-abdominal pressure, may further enhance venous stasis and elevate DVT risk [29].

Patients with a previous history of DVT or a family history of thrombosis were also more susceptible to DVT. This aligns well with the understanding that genetic predispositions and acquired risk factors contribute to an individual's overall risk of thrombotic events. A history of DVT could indicate the presence of underlying thrombophilic conditions, such as Factor V Leiden or prothrombin gene mutations, which predispose individuals to recurrent thrombosis [30, 31]. These genetic factors, persistent even after burn injuries, may contribute to a hypercoagulable state, facilitating clot formation [32].

The severity of the burn injuries correlated significantly with DVT risk. Severe burns trigger a robust inflammatory cascade that can lead to systemic responses with profound effects on the coagulation system [33]. The release of cytokines and acute phase reactants in response to burn trauma exacerbates endothelial damage, and fosters a pro-thrombotic state, leading to heightened coagulation activation [34, 35]. This connection between inflammatory responses and coagulation pathways could explain the higher incidence of DVT in severely burned patients [36, 37].

Our multivariate analysis reflects the complex interplay of risk factors, where not all aspects of the risk stratification contribute equally across different patient populations [38]. For instance, variables such as age or previous surgical history might weigh less in a burn population that already has a unique pathophysiological background [39].

Table 7. Comparison of risk stratification between groups in the test set

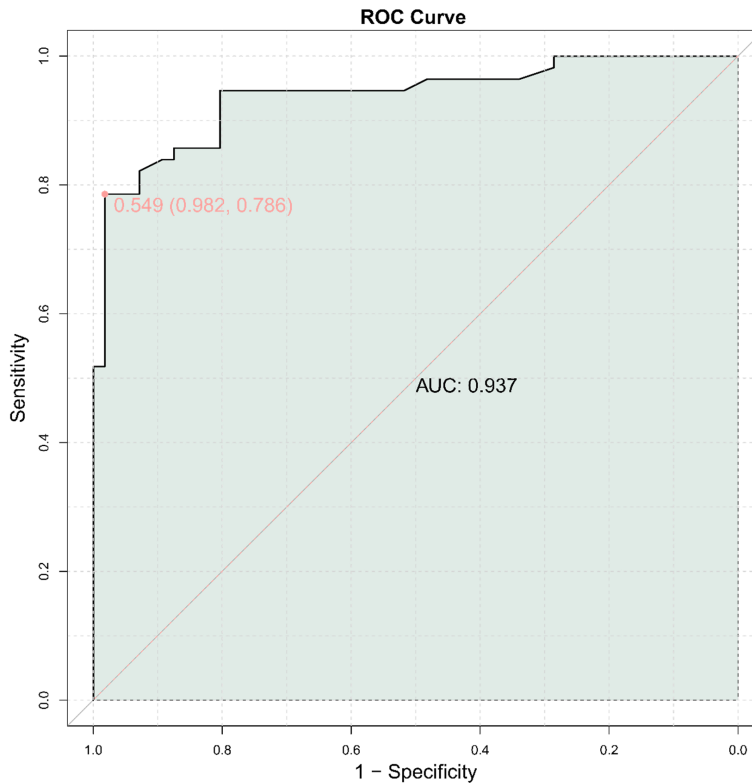| Data	DVT Group (n = 52)	Non-DVT group (n = 67)	t/χ²	P
Risk Stratification [n (%)]			13.952	0.003
Low Risk	4 (7.69%)	13 (19.40%)		
Moderate Risk	6 (11.54%)	17 (25.37%)		
High Risk	12 (23.08%)	20 (29.85%)		
Very High Risk	30 (57.69%)	17 (25.37%)		

DVT: deep vein thrombosis.

Figure 4. ROC curve of Caprini Risk Assessment Scale scores for predicting DVT in burn patients in the test set. ROC: Receiver operating characteristic; DVT: deep vein thrombosis.

tion of biomarkers indicative of endothelial injury or coagulopathy into the assessment framework, thus amplifying the predictive power of the Caprini model.

While our study provides valuable insight into the predictive modeling of DVT in burn patients, several limitations warrant acknowledgment. First, the retrospective nature of the study may introduce selection and information biases, potentially limiting the generalizability of the findings to broader patient populations. Additionally, our model was developed and validated using data from a single institution, which may limit its applicability to other settings with different patient demographics or care protocols. Although the Caprini Risk Assessment Scale is comprehensive, it may not account for all potential risk factors specific to burn patients, such as specific inflammatory markers or genetic predispositions, which could enhance predictive accuracy. Furthermore, variations in clinical practices and the timing of risk factor assessment might introduce variability in the recorded data. Future studies should adopt a prospective design and include multiple centers to confirm the model's robustness and adaptability across different clinical environments.

The robust performance of the predictive model, as evidenced by the high AUC in both training and test sets, underscores the adaptability of the Scale. This high AUC value reflects the precise calibration of Caprini scores concerning DVT outcomes, thereby certifying its potential utility in clinical decision-making.

Our study highlights the importance of vigilant assessment and stratification of burn patients to mitigate the risk of DVT. Thromboprophylaxis tailored to identified high-risk individuals could significantly decrease complication rates and improve patient outcomes post-burn [40]. Future research could explore the incorpora-

Conclusion

The adoption of the Caprini Risk Assessment Scale for predicting DVT among burn patients offers a practical approach that combines clini-

cal acumen with methodical risk evaluation. By stratifying patients based on a wide array of risk factors, care providers can apply targeted prophylactic strategies to reduce the incidence of thromboembolic events. Our findings highlight its potential for advancing burn patient management and underscore the importance of personalized medicine in addressing the complex thrombotic risks associated with trauma care. The consistent evolution of our understanding of DVT pathophysiology in specialized populations, such as burn patients, remains crucial for shaping effective prevention and therapy.

Disclosure of conflict of interest

None.

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