Is the Caprini Score Predictive of Venothromboembolism Events in Orthopaedic Fracture Patients?

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Objective: Explore the validity of the Caprini Score in orthopaedic patients with lower-extremity fractures.

Design: Retrospective cohort study.

Setting: Level I trauma academic medical center.

Patients/Participants: Eight hundred forty-eight patients with lower-extremity fractures from 2002 to 2015 with exclusion criteria: minors, follow-up less than 30 days.

Intervention: Stratify patients into 2 groups: high-risk (pelvic and acetabular fractures) and low-risk groups (isolated foot and ankle fractures).

Main Outcome: Caprini Score, fracture classification, length of follow-up, deep vein thrombosis (DVT) chemoprophylaxis, and venothromboembolism (VTE) events [DVT and/or pulmonary embolism (PE)] diagnosed with objective testing.

Results: Eight hundred forty-eight patients (499 M; 349 F) 18–93 years of age (average 43.7) with average body mass index of 29. Three hundred high-risk and 548 low-risk patients with no differences in demographics with average follow-up of 288 days. There were 33 (3.9%) VTE events, which were more common in the high-risk group (8%: 9 DVT, 15 PE) than the low-risk group (1.6%: 8 DVT, 1 PE) ($P < 0.0001$). The cutoff that best-predicted VTE events based on receiver-operating curves was 12 (c = 0.74) in the high-risk group, 11 (c = 0.79) in the low-risk group, and 12 (c = 0.83) overall.

Conclusion: There was a significant lower VTE rate found in the low-risk group, but the Caprini prediction model was not significantly different between the 2 groups. This displays that patient factors play a large role in the development of VTE events independent of injury

type. The Caprini score may help identify patients who may require increased protection.

Key Words: VTE, PE, DVT, Caprini Score, fracture, anticoagulation

INTRODUCTION

The topic of venothromboembolisms (VTEs) in orthopaedic surgery is controversial, in that there are differing expert opinions and no validated universal risk assessment tool.[1] Clinical practice varies by orthopaedic provider to determine the risk of developing a VTE and appropriate selection of prophylactic treatment regimen. The provider variation ranges from intermittent pneumatic compressive devices to various pharmaceutical agents: aspirin, low molecular weight heparin, warfarin, factor Xa inhibitors, and other novel anticoagulants.

In general, orthopaedic surgery patients with lower-extremity injuries are at increased risk for VTEs.[1–7] Despite the fact that these patients are recognized to be at higher risk for VTE, no clear metric currently exists to distinguish or stratify these orthopaedic patients relative to one other. There is published evidence identifying specific risk factors associated with a higher risk of developing a VTE, but there have been no clear universal recommendations presented on how to use these factors to guide clinical decision-making.[3,8,9]

However, there is one widely accepted model named the Caprini Score with an established history and utilization as a reliable predictive VTE risk assessment tool outside the field of orthopaedics. The Caprini[11] Score is calculated by adding together the point values for various patient risk factors; the assigned point value for each risk factor is derived from previous research that investigated each risk factor and its association of developing a VTE (Table 1). It has been validated and is regularly used in numerous other surgical fields including general, vascular, plastic, urologic, and head and neck surgery and may be applicable to orthopaedic surgery as well. This risk assessment model is unique, in that it classifies an individual into a specific risk group, identifying those who are at an increased risk of developing a VTE based on specific unique patient factors and injury type. The Caprini Score also includes an associated chemical prophylaxis recommendation.[10–15] There are specific patient factors that place one at higher risk for developing a VTE (ie, undiagnosed clotting disorder and

family history of VTE) and should thus be taken into account and carefully considered when assessing a patient's requirement for VTE prophylaxis.

Given the broad and reliable utilization of the Caprini Score in other surgical fields, the purpose of this study was to explore the validity of the Caprini Score in the orthopaedic fracture population by comparing 2 groups of patients deemed high risk versus low risk for thrombosis based on past literature.

PATIENTS AND METHODS

Study Design

Following approval from our Institutional Review Board, a retrospective review of 1310 patients at a single institution from 2002 to 2015 with lower-extremity fractures. Exclusion criteria included the following: age less than 18 years old, follow-up less than 30 days, death secondary to non-VTE–related complications, and/or incomplete medical records (medical records that did not allow for calculation of the Caprini Score and/or other pertinent medical or injury history). Four hundred sixty-two patients did not meet inclusion criteria resulting in a final study cohort of 848 patients.

The American College of Chest Physician guidelines on when to investigate/workup for VTEs were followed and only included thromboembolic events that were objectively diagnosed through venous duplex ultrasound, ventilation–perfusion (V/Q) scan, and/or pulmonary embolism protocol

computed tomography scan.[3] No routine screening was performed to assess for VTE in the absence of clinical findings.

Inpatient hospital charts and outpatient records were reviewed to assess injuries sustained, treatments rendered, past medical and surgical history, length of follow-up, use, and type of chemoprophylaxis, type and development of VTE, diagnosis of VTE and time from injury, and/or surgery to VTE. Patient age at the time of injury/encounter, sex, body mass index (BMI), and the patient's medical history and injury characteristics necessary to perform a Caprini Score were recorded. Caprini Scores were subsequently performed using data obtained from the chart review.

Patients were stratified as both an overall group and as 2 distinct subgroups: perihip fracture (PHF) with N = 300 and periankle fracture (PAF) with N = 548 (Fig. 1), based on previously published rates of VTE. The PHF group consisted of patients having sustained pelvic (any Young-Burgess classification) and/or acetabular (any Letournel classification) fractures with or without additional injuries, representing injury patterns with historically higher rates of VTE. The PAF group consisted of patients who sustained isolated foot, ankle, and/or pilon fractures that required a period of immobilization, representing injury patterns with historically lower rates of VTE. Patients had a mixture of both high- and low-energy mechanisms of trauma.

The use of VTE chemoprophylaxis was recorded but not used as an exclusion criterion for the study. Most of the high-risk group patients (PHF) received chemoprophylaxis, which included warfarin, low molecular weight heparin,

TABLE 1. Caprini Score Risk Factors

Caprini Score Value		Risk Factors
1	Age 41–60 y	Acute myocardial infarction
	Current swollen legs	Congestive heart failure (<1 mo)
	Varicose veins	Medical patient currently at bed rest
	Obesity (BMI >25)	History of inflammatory bowel disease
	Minor surgery planned	History of prior major surgery (<1 mo)
	Sepsis (<1 mo)	Abnormal pulmonary function (COPD)
	Pregnancy or postpartum (<1 mo)	Serious lung disease including pneumonia (<1 mo)
	Oral contraceptives or hormone replacement therapy	History of unexplained stillborn infant, recurrent spontaneous abortion (3 or more), premature birth with toxemia, or growth-restricted infant
2	Age 61–74 y	Patient confined to bed (>72 h)
	Arthroscopic surgery	Immobilizing plaster cast (<1 mo)
	Malignancy (present or previous)	Central venous access
	Laparoscopic surgery (>45 min)	Major surgery (>45 min)
3	Age 75 y or older	Positive prothrombin 20210A
	History of DVT/pulmonary embolism	Positive lupus anticoagulant
	Positive Factor V Leiden	Elevated anticardiolipin antibodies
	Heparin-induced thrombocytopenia	Elevated serum homocysteine
	Other congenital or acquire thrombophilia	Family history of thrombosis* (often missed factor)
5	Stroke (<1 mo)	Acute spinal cord injury (paralysis) (<1 mo)
	Elective major lower-extremity arthroplasty	Multiple trauma (<1 mo)
	Hip, pelvis, or leg fracture (<1 mo)** (Needs further clarification for orthopaedics)	

COPD, chronic obstructive pulmonary disease.

heparin, or dalteparin (87%). Seventy-two percent of the low-risk group patients (PAF) were treated with aspirin (36%) or no chemoprophylaxis (36%) with 28% in the low-risk group being treated with warfarin, low molecular weight heparin, heparin, or dalteparin.

Outcome Measures

The primary outcome of the study assessed the Caprini Score cutoff associated with development of VTE using a receiver-operating curve and performing a c-statistic. Secondary outcomes included differences in the Caprini Score between the PHF and PAF groups, time to VTE, and specific risk factors associated with development of VTE.

Statistical Methods

A biomedical statistician was used to evaluate the Caprini Score data. To evaluate the cutoff for those who developed a VTE based on Caprini Score, a receiver-operating curve and c-statistic were calculated for each population. For evaluation of patient characteristics, VTE characteristics, and Caprini Score characteristics, normally distributed continuous variables were analyzed with a Student t test between 2 groups, and categorical variables were analyzed using Fisher exact test. These evaluations were performed using the GraphPad online calculator. Significant difference was considered for $P < 0.05$.

Funding

Funding from quality improvement grants were used to obtain a biostatistician for statistical analysis.

RESULTS

Of the 1310 patients whose charts were initially reviewed, 462 were excluded for incomplete chart data, follow-up less than 30 days, and death secondary to non-VTE–related complications. A total of 848 patients were included in the final analysis.

The average age of the overall population in the non-VTE group was 44 years as compared to 51 years in the VTE group, $P = 0.025$. However, when subgrouped as PHF and PAF, age was only found to be significantly different in the PAF group ($P = 0.034$). Both BMI and sex were not significantly different between the non-VTE and VTE groups (Table 2).

VTE Characteristics

Of the 848 eligible patients, a total of 32 patients (3.8%) were diagnosed with a VTE: 17 (2%) DVT events and 16 (1.8%) pulmonary embolism (PE) events (one patient was diagnosed with both a PE and DVT). In comparison of the PHF versus PAF subgroups, there was a statistically significant difference in the number of VTE events overall [$P < 0.0001$, odds ratio (OR): 5.2 with 95% confidence interval (CI) 2.4–11.4] with the breakdown: n = 9 (3%) versus 8 (1.5%) DVT ($P = 0.13$, OR: 2.1 with 95% CI 0.8–5.5) and n = 15 (5%) versus 1 (0.2%) PE ($P < 0.0001$, OR: 28.8 with 95% CI 3.8–219) in PHF versus PAF groups, respectively. There was no significant difference ($P = 0.095$) regarding time to VTE between the PHF and PAF groups (Table 3).

Caprini Score Characteristics

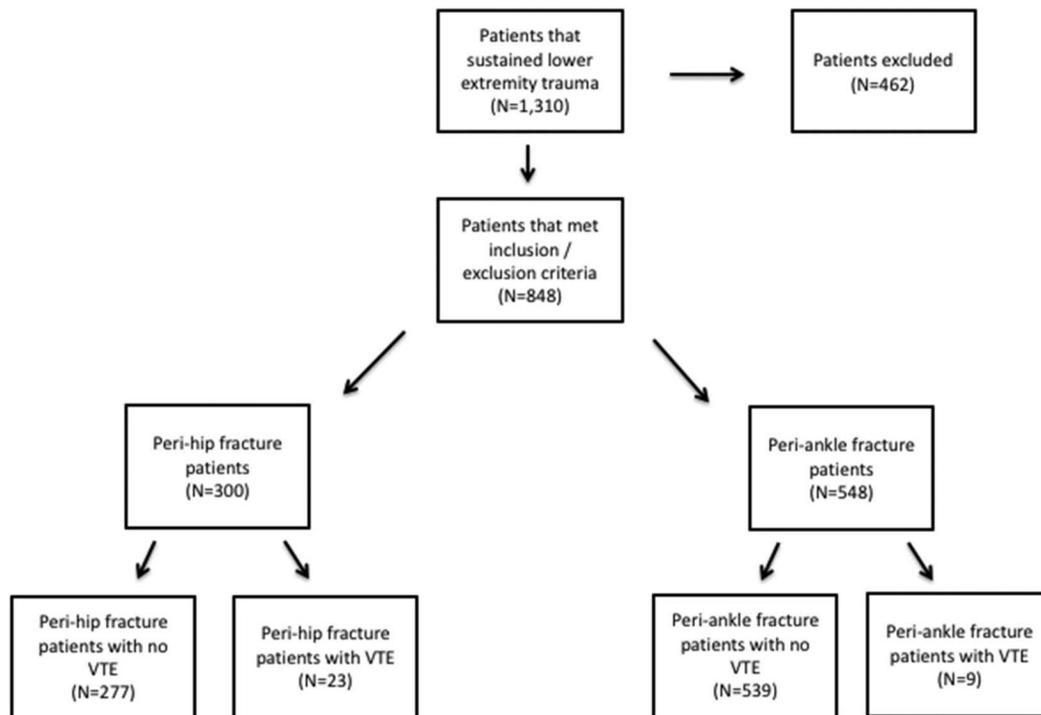Each identifiable risk factor in the Caprini Score was assessed as an independent risk factor for development of VTE.

FIGURE 1. Patient cohort

TABLE 2. VTE Rates in Study Population

Population Characteristic	No VTE (Combined) (n = 816)	VTE (Combined) (n = 32)	P	No VTE (Perihip) (n = 277)	VTE (Perihip) (n = 23)	P	No VTE (Periankle) (n = 539)	VTE (Periankle) (n = 9)	P
Mean age (y) (SD)	44 (16.62)	51 (17.38)	**0.025**	43 (18.08)	49 (15.33)	0.138	44 (15.81)	55 (21.21)	**0.034**
BMI (kg/m^2) (SD)	29 (6.63)	28.5 (6.94)	0.744	28.1 (6.82)	28.3 (7.25)	0.887	29.3 (6.52)	29.2 (6.52)	0.937
Gender			0.469			0.8141			1
Male (%)	478 (58.6)	21 (65.6)		198 (71.5)	16 (69.6)		280 (51.9)	5 (55.6)	
Female (%)	338 (41.4)	11 (34.4)		79 (28.5)	7 (30.4)		259 (48.1)	4 (44.4)	

Bolded values have P-values <0.05.

The factors found to be significantly different in the PHF group were age 41–60 years ($P = 0.019$), BMI > 25 ($P = 0.031$), acute lung pathology ($P = 0.007$), minor surgery performed ($P = 0.006$), patient confined to bed rest ($P = 0.003$), cast immobilization ($P = 0.0031$), and patients with central venous access ($P = 0.001$). The factors that were found to be significantly different in the PAF group were personal or family history of VTE, history of thrombosis ($P = 0.001$), and congenital or acquired thrombophilia ($P = 0.033$). In combining both populations (PHF and PAF), the factors found to be significantly different included acute lung pathology ($P = 0.001$), minor surgery performed ($P = 0.000$), patients confined to bed rest ($P = 0.000$), patients with central venous access ($P = 0.000$), personal or family history of VTE ($P = 0.005$), and polytrauma patients ($P = 0.000$) (Table 4). Caprini Score risk factors not identified in any of the patients in this retrospective review included history of unexplained still infant or other birth complications, arthroscopic surgery, positive Factor V Leiden, elevated serum homocysteine, elevated anticardiolipin antibodies, prothrombin 20210A, stroke, or lower-extremity arthroplasty.

A receiver-operating curve was created to determine a Caprini Score cutoff for incidence of VTE. The overall study population demonstrated a Caprini Score cutoff of 12, above which patients were at an increased risk of developing a VTE. The c-statistic was 0.83 with sensitivity = 90.6%, specificity = 73.9%, positive predictive value = 12%, and negative predictive value = 99.5%. The Caprini Score cutoff for the PHF group was also 12 with a c-statistic of 0.74 (sensitivity = 100%, specificity = 48.6%, positive predictive value = 13.9%, and negative predictive value = 100%). Finally, the PAF group had a Caprini Score cutoff of 11 with a c-statistic of 0.79 (sensitivity = 88.9%, specificity = 68.8%, positive predictive value = 4.6%, and negative predictive value = 99.7%). This data are demonstrated in **Supplemental Digital Content 1** (see **Table**, http://links.lww.com/JOT/A674).

DISCUSSION

Identifying those who are at higher risk of developing VTEs is important because it has the potential to prevent fatal outcomes. The purpose of this study was to act as a pilot study to evaluate the applicability of the Caprini VTE risk stratification tool in orthopaedic fracture patients by comparing the scores for historically low-rate and high-rate VTE populations. In this study, it was determined that a Caprini Score of 11–12 correlated with a higher rate of VTEs in both the high- and low-risk populations, which suggests that this

TABLE 3. VTE Characteristics

VTE Characteristics	Combined Group (n = 33)	Perihip Fracture Group (n = 24)	Periankle Fracture Group (n = 9)	P
VTE Event*		24 (8%)†	9 (1.6%)†	<0.0001
DVT	17 (52%)	9 (3%)†	8 (1.5%)†	0.13
PE	16 (48%)	15 (5%)†	1 (0.2%)†	<0.0001
Days to VTE from injury (range)	21 (2–75)	16 (2–75)	31 (2–58)	0.095
VTE diagnosis				
DVT on U/S below the knee	4 (12%)	3 (13%)	1 (11%)	
DVT on U/S at or above the knee	13 (39%)	6 (25%)	7 (78%)	
Subsegmental PE on CTPA	4 (12%)	4 (17%)	0	
Significant PE on CTPA	11 (33%)	11 (46%)	0	
PE on V/Q scan	1 (3%)	0	1 (11%)	
Chemoprophylaxis				
None or aspirin	5 (15%)	3 (12%)	2 (22%)	
Acceptable chemoprophylaxis for high risk‡	28 (85%)	21 (88%)	7 (78%)	

Reported P-values compare the perihip versus periankle population.
*One patient in the perihip group had a DVT above the knee and subsegmental PE
†Percent of DVT or PE in total perihip or periankle populations.
‡Warfarin; heparin 5000u TID; dalteparin; low molecular weight heparin (mg): 30 qday, 40 qday, 30 bid, 40 bid, therapeutic.
CTPA, computed tomography pulmonary angiogram; U/S, ultrasound.

TABLE 4. Caprini Score Factors Correlated With Development of VTE in Study Population

Caprini Score Characteristics	Caprini Score Point Value	Overall, *P*	Perihip Trauma, *P*	Periankle Trauma, *P*
Age 41–60 years old	1	0.129	**0.019**	1.000
Obesity (BMI >25)	1	0.440	**0.031**	0.701
Oral contraceptive or HRT	1	0.230	0.147	1.000
History of previous major surgery (<1 mo)	1	**0.019**	0.430	1.000
Serious lung disease (include pneumonia <1 mo)	1	**0.001**	**0.007**	0.182
Minor surgery performed (<45 min)	1	**0.000**	**0.006**	1.000
Medical patient at bed rest at baseline	1	**0.021**	0.265	1.000
Age 61–74 years old	2	0.195	0.149	0.258
Malignancy (previous or current)	2	1.000	0.274	1.000
Patient confined to bed for >72 h	2	**0.000**	**0.003**	1.000
Immobilizing plaster cast within 1 mo	2	0.102	**0.031**	1.000
Major surgery (>45 min)	2	0.849	0.235	0.329
Central venous access	2	**0.000**	**0.001**	1.000
Age 75 y old or older	3	0.185	1.000	0.055
Personal history of VTE	3	**0.029**	0.382	**0.017**
Personal or family history of VTE	3	**0.005**	0.382	**0.001**
Congenital or acquired thrombophilia	3	0.072	1.000	**0.033**
History of thrombosis	3	0.230	1.000	1.000
Acute spine cord injury (paralysis) (<1 mo)	5	0.072	0.147	1.000
Multiple trauma (<1 mo)*	5	**0.000**	0.084	1.000

Bolded values have *P*-values <0.05.
*Multiple trauma = lower-extremity injury + trauma to additional organ (example: thoracic, abdominal, and head).
HRT, hormone replacement therapy.

screening tool may have utility in stratifying patients for VTE risk.

Our study found that, for the entire study population, a Caprini Score ≥11 correlated with higher rates of VTEs with Caprini Score cutoff values being ≥11 in the PAF group and ≥12 in the PHF group. This means that a Caprini Score of <11 was associated with a significantly lower incidence of VTE for the total study population. To maintain assessment sensitivity, we would recommend a conservative Caprini Score cutoff of >10 in lower-extremity fracture patients to define those who are at greatest risk for VTE, as this was the lower of both thresholds determined in the study. Our study's findings are consistent with previous literature by Luksameearunothai et al[16] (n = 92) who found that a Caprini Score of 12 or great had a significantly higher relative risk of preoperative DVT versus no DVT in hip fracture patients.

Based on significant findings in other surgical fields having previously validated the Caprini Score, chemoprophylactic medication is suggested for individuals with a Caprini Score of 5 or greater as these individuals are at higher risk of VTEs. The discrepancy between other studies having a Caprini cutoff of 5, and our finding of having a Caprini cutoff of 11–12 is most likely attributed to the fact that all the patients in the current study have an additional 5 points for sustaining "hip, pelvic, or leg fracture <1 month." These additional 5 points were likely not factors added in the previous studies that validated the Caprini Score because they were in a variety of surgical populations that did not have concomitant lower-extremity fractures. This is an important

finding because it implies that a Caprini Score of 5 or greater does in fact have a uniform increased risk of VTE across different surgical patient populations, displaying the importance of patient factors being associated with VTEs. This was additionally confirmed by Saragas et al (n = 216) in foot and ankle patients and required below the knee casting for at least 4 weeks and a period of non–weight-bearing. The study found that, using a risk score similar to the Caprini Score, 90.9% of patient who had a VTE had a score of 5 or greater as compared to 73.7% of patients who did not have a VTE had a score of 5 or greater with an average score of 7.7 in the VTE group.[17]

This speaks directly to the historical skepticism in adopting the Caprini Score in orthopaedic surgery, as the current score does not stratify those that have sustained lower-extremity fractures. A representative example is that both an ankle and a pelvic fracture would have a Caprini Score of 5 for "hip, pelvic, or leg fracture <1 month." Given that patients with lower-extremity trauma have drastically different rates of VTE: 0.6%–30% for fractures below the knee versus 61% for pelvic fractures, the criteria of "hip, pelvis, or leg fracture <1 month" may need to be more clearly defined.[2,18–21]

Anecdotally, current orthopaedic practice across the United States is to provide chemical VTE prophylaxis to individuals with trauma at or above the knee such as femoral shaft, hip, and pelvic fractures. The main discrepancy in practice within the orthopaedic community is for individuals having sustained isolated trauma below the knee. It is this particular orthopaedic patient population who could be at

greatest benefit of the Caprini risk stratification tool in helping to discern those requiring VTE prophylaxis.

There are other risk assessment tools in orthopaedic surgery, which are not ubiquitously used as they are specific to various patient populations or rely on factors that are not unique to the patient's medical history. One such tool is called the risk assessment profile that was validated for the trauma population based on a study of 53 patients.[22] Factors included in this score are obesity, history of malignancy, abnormal coagulation profile at admission, history of VTE, central line access, number of transfusions, surgical procedures, injury to major blood vessels, injury to various organ systems, and age. Many of these factors are also found within the Caprini Score; however, the Caprini Score is more exhaustive with regard to patient factors and has been validated in a greater number of patients across multiple surgical specialties.

An additional risk assessment tool created by Parkland Orthopaedics attempts to predict the risk of a pulmonary embolism in trauma patients.[23] This scoring system includes factors such as age, occurrence of motorcycle accident, method of arrival to hospital, admission to the intensive care unit, presenting heart rate, BMI, and organ systems involved in the trauma. Although this scoring system has some utility and was created based on a population of 38,000 patients, it relies on factors that are surrogates of the patient's injuries and lacks specific patient characteristics that would predispose the patient to development of VTE. Such additional factors not considered include a history of Factor V Leiden and history of malignancy.

It is important to note that the Caprini Score risk stratification tool currently includes anticoagulation recommendations associated with particular Caprini Scores based on studies in other surgical fields. However, this current study did not follow these recommendations, nor does it endorse such recommendations. The reason for this is that there are a variety of methods to provide preventative VTE anticoagulation with no concrete evidence as to the best method or dosage of medication, for example, low molecular weight heparin 40 mg daily versus 30 mg twice a day.[24–28] VTE chemical prophylactic recommendations would need to consider clinician experience and current practices based on evidence that is currently available on this topic. More importantly, this study supports that the Caprini Score factors, excluding "hip, pelvic, or leg fracture <1 month", are associated with a higher rate of VTE with an inability to distinguish between low-risk and high-risk populations.

Our study is inherently limited by its retrospective nature. The lack of prospectively collected data limits the accuracy of identified risk factors such as varicose veins, history of stillbirth, and family history of VTE, etc, and is only as good as the thoroughness of the original questioner. In addition, VTE chemical prophylactic medication was not controlled for, and multiple electronic medical records were used to collect data given the large time frame used for inclusion. Furthermore, the retrospective nature of the study only allowed for the chart reviewers to identify those who developed VTEs at the chart level and does not capture those who presented elsewhere or who did not have accurate documentation of a VTE. Another limit of the study is that the minimum included follow-up was 30 days. This exclusion criteria could have been made longer as

VTEs can occur as late as 60–90 days after injury because some patients may have developed VTE at a later period and did not present to our institution.[3] This was chosen as many ankle fractures are only followed for 6 weeks clinically, and we wanted to make sure that these patients were represented and included in the analysis. Despite the limitations of the study, we were able to demonstrate a direct correlation of a higher Caprini Score associated with a greater risk of VTE.

In conclusion, this study confirms that patient factors play a large role in the development of VTE events independent of injury type, and that the Caprini Score may help to identify these patients who may require increased protection. We found that a Caprini Score greater than 10 is associated with a higher incidence of VTE. As discussed previously, removing the "hip, pelvic, or leg fracture <1 month" criteria revises the Caprini Score to 6, which is similar to the Caprini Score cutoff of 5 that has previously been associated with a higher risk of VTEs in other surgical specialties.

It is our recommendation that additional research is warranted in a prospective fashion where patient history is specifically asked for each factor of the Caprini Score. We believe that with further strategic investigation, the Caprini Score may become an important tool for the orthopaedic surgeon in guiding VTE risk stratification and management.

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Invited Commentary

Risk Assessment After Orthopaedic Trauma: Coming of Age

A fatal pulmonary embolus is the number 1 preventable cause of death after surgery.[1] It has been shown that using traditional anticoagulants prevent almost all these deaths and sublethal thrombotic events which on occasion may be life-changing. To preserve good outcomes, surgeons must carefully weigh the thrombotic versus bleeding risk of each patient. Traditional anticoagulation may cause bleeding that jeopardizes a well-performed procedure.

The incidence of thrombotic events is related to the presence and number of thrombosis risk factors in addition to the type and extent of injury. The Caprini score has been validated in multiple specialties, and when the data are properly collected, every study shows a statistically significant correlation between the score and the incidence of venous thromboembolism (VTE). This is most obvious when the group tested does not receive thrombosis prophylaxis.[2]

The authors report that the Caprini score represents a thorough history and physical. This score, in fact, provides a profile of the patient and allows for a selection of the type, strength, and duration of prophylaxis. One of the main criticisms of the Caprini score after Orthopaedic trauma is that all fractures are scored the same. The authors correctly point out that there is a disparity between different types of fractures depending on location. Ankle fractures overall are associated with a much lower incidence of thrombosis than those involving the proximal leg and/or pelvis.

The key element in applying the Caprini score to a given population is to identify the cutoff between low- and high-risk individuals using the score rather than the type of fracture. This enables selection of the appropriate prophylaxis carefully balancing the risks of bleeding versus thrombosis. The current study was performed to explore the validity of the Caprini score in the orthopaedic fracture population. They also compared the score between 2 groups of fracture patients believed to be high versus low risk of thrombosis.

One of the features of the Caprini score is to look at the entire risk profile of the patient independent of the type of surgery or fracture. A low-risk fracture may be associated with a high risk of thrombosis when additional risk factors are present. Patients with high-risk fractures but no additional risk factors may have a lower risk than average for that type of injury. The bottom line is to look at all the risks associated with an individual patient not just the type of fracture or procedure.

The authors found that the low-risk fracture group had fewer deep vein thrombosis (DVT) events than seen in those with high-risk fractures. The Caprini score was not statistically different between these groups when looking at fracture