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

*Paul Tornetta III, MD; **Jesse Dashe, MD**; Robert Parisien, MD;*
Anthony De Giacomo, MD, MS; Matthew Pina, BS; Lauren Roberts, BS
Boston University Medical Center, Boston, Massachusetts, USA

Background/Purpose: The Caprini Score stratifies the risk of venous thrombotic and embolic (VTE) events based on patient factors, injuries, and treatments. This score accurately predicts VTE events in many patient populations; however, it has not been adopted in orthopaedic trauma as it lacks stratification of lower extremity fractures, all of which are placed into one high-risk group. The purpose of this study was to explore the validity of the Caprini Score in orthopaedic patients with fractures and to determine if the lack of stratification had any influence on the predictive model.

Methods: All patients with lower extremity fractures from 2002 to 2015 at a single institution were included. Exclusion criteria were: <18 years old, able to bear weight immediately, and follow-up less than 30 days postinjury. Data collected included the Caprini Score, fracture classification, length of follow-up, DVT (deep vein thrombosis) chemoprophylaxis, and VTE events (DVT and /or PE [pulmonary embolism) diagnosed with objective testing. To examine whether stratification would improve the model, we identified a high-risk group (pelvic and acetabular fractures) and a low-risk group (isolated foot and ankle fractures). Receiver operating characteristic (ROC) curves of the Caprini Scores were generated for all patients and the high and low-risk groups. Patients were prophylaxed based on protocols that changed over the 13 years, but in general, high-risk patients were treated with warfarin or low molecular-weight heparin and others with aspirin or nothing.

Results: We reviewed 848 patients (499 M; 349 F) aged 18-93 years (average 43.7) with an average body mass index of 29 kg/m^2. There were 300 high-risk patients and 548 in the low-risk group with no differences in the demographics between the groups. Average follow-up was 288 days. There were 33 (3.9%) VTE events. VTE events were more common in the high-risk group (8%: 9 DVT, 15 PE) than in the low-risk group (1.6%: 8 DVT, 1 PE) (P = 0.0001). The cutoff that best predicted VTE events based on the ROC 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. The table displays the sensitivity, specificity, positive predictive value, and negative predictive value for the respective groups.

Conclusion: We sought to evaluate the validity of the Caprini Score in orthopaedic fracture patients. Specifically, we were interested if a single assignment of one value (5) in the score was appropriate for patients with high and low-risk fractures (pelvis/acetabulum vs foot and ankle). As expected, we found a lower rate of VTE in the low-risk group, but the Caprini prediction model was not significantly different for the two groups. These data suggest that with current chemoprophylaxis, stratification of orthopaedic high and low-risk fractures does not influence the model, likely as different prophylaxis was given based on the assumed risk of the type of fracture. Most importantly, these data confirm that patient factors play a large role in the development of VTE events independent of injury type. The Caprini Score may help to identify these patients who may require increased protection.

Table #1

	Caprini Cutoff	Sensitivity	Specificity	PPV	NPV	c-statistic
High risk group	12	100%	48.6%	13.9%	100%	0.74
Low risk group	11	88.9%	68.8%	4.6%	99.7%	0.79
All patients	12	90.6%	73.9%	12%	99.5%	0.83

PPV=positive predictive value, NPV=negative predictive value

See pages 49 - 106 for financial disclosure information.