Determining Venous Thromboembolic and Pulmonary Embolism Risk in Orthopaedic Trauma Patients

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Purpose: Patients with orthopaedic trauma are at an elevated risk of venous thromboembolic events (VTE) because of immobility, surgery, and comorbidities. Accurate risk prediction is crucial for guiding prophylaxis. Accurate prediction of VTE and pulmonary embolism (PE) risk is crucial for guiding prophylactic interventions. The purpose of this study was to assess the ability of the Caprini score and a novel pulmonary risk (PR) score to risk stratify patients with skeletal trauma.

Methods: Data from 12,211 patients in the PREVENT CLOT Study were included. Existing demographic data were used to calculate Caprini and PR scores. The Caprini score was used to risk stratify VTEs while the PR score was used for PE risk. Multivariable logistic regression models were generated. Caprini scores stratified VTE risk as low: 0–4, moderate: 5–7, high: 8–10, or severe: 11+. PR scores stratified PE risk as low: ≤38, medium: 39–45, or high: >45. Discriminative ability was assessed using area under the receiver operating characteristic curve (AUC).

Results: We analyzed 2923 low, 4829 moderate, 2571 high, and 1887 severe Caprini risk patients. The risk of VTE increased incrementally for the low (OR: 1.0), moderate (OR: 1.9, 95% CI: 1.4–2.7), high (OR: 3.1, 95% CI: 2.2–4.3), and severe-risk cohorts (OR: 5.2, 95% CI: 3.8–7.3; $p<0.001$ for all OR). For the PR score, the three categories demonstrated progressive increase in PE rates: low-risk (n = 5115, PE rate: 0.65%, 95% CI: 0.43–0.87), medium-risk (n = 3516, PE rate: 1.59%, 95% CI: 1.18–2.01), and high-risk (n = 3508, PE rate: 2.57%, 95% CI: 2.04–3.09). The AUC for the Caprini score was 0.65, and for the PR score it was 0.68.

Conclusion: The Caprini and PR scores effectively stratified patients into risk categories, demonstrating a progressive increase in VTE and PE rates. Although AUCs were less than 0.70, risk stratification remains valuable when it leads to clinically meaningful differences in event rates, as demonstrated here. These tools can aid in decision-making when used alongside clinical judgment. Further external validation is needed to refine these models and assess their broader applicability in orthopaedic trauma populations.