

REFINING VENOUS THROMBOEMBOLISM (VTE) RISK PREDICTION OVER TIME WITH MACHINE LEARNING IN TRAUMA

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I. INTRODUCCIÓN

The risk of venous thromboembolism (VTE) is increased after emergency trauma laparotomy. There are several traditional risk-stratification systems that can identify the population at highest-risk, but the discriminatory abilities are only modest with areas under the receiver-operator curves (AUROC) of

II. MATERIALES Y MÉTODOS

Patients from the American College of Surgeons Trauma Quality Improvement Project database (TQIP) 2017-2021 who received a laparotomy within 90 minutes of arrival were included. ML models were created to predict VTE at three different time points: on admission (POD 0), at POD 2-3, and at POD 4-5. Models were optimized based on AUROC. Area under the precision-recall curve (AUC-PR), a metric that evaluates a model's tradeoff between precision and recall and can be informative in predicting rare events, was also evaluated for each model.

III. RESULTADOS

In 74,643 trauma patients, the VTE and mortality rates were 4.6% and 18.2% with a median length of stay of 8 [interquartile range: 4-16] days. AUROC increased from 0.828 [95% CI 0.814-0.842] on admission to 0.877 [95% CI 0.866-0.887] at POD 4-5. While the most important variable in the model's predictions changed over time, number of injuries, facility VTE rate, initial transfusion requirement, ventilator days, time to VTE prophylaxis and intensive care unit length of stay were some of the most important (Figure 1).

IV. CONCLUSIONES

VTE risk in trauma patients requiring emergency laparotomy can be accurately predicted with ML algorithms, and these risks can be refined over the hospital course. Personalized risk profiles can allow for customized VTE prophylaxis regimens, though future prospective work is needed to validate the tool.