Individual risk prediction of anticoagulation in atrial fibrillation patients with cirrhosis

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Background: We aimed to assess absolute risk and benefit from OAC therapies in individual AF patients with liver cirrhosis (LC), and to develop the optimal dose selecting risk calculator for each patient.

Methods: We derived and validated a prediction model for major bleeding (MB) and stroke/systemic thromboembolism (SSTE) in AF patients with LC from two-center observational cohort (n=420 in derivation cohort, n=180 in validation cohort) with 4 treatment options (standard-, low-dose NOACs, warfarin, and no OACs). Readily available clinical variables were included in machine learning-based ensembled risk calculation models.

Results: Model calibration and discrimination was adequate with c-statistics of 0.77[0.66-0.87] for MB and 0.74[0.74-0.84] for SSTE. Three-year absolute risk increases (ARIs) for MB with standard-dose NOACs ranged from <10% in 37% of patients to >30% in 18% of patients, with low-dose NOACs ranged from <10% in 47% of patients to >30% in 12% of patients compared without OACs. Three-year absolute risk reductions (ARRs) for SSTE with standard-dose NOACs ranged from <7% in 48% of patients to >15% in 22% of patients, with low-dose NOACs ranged from <7% in 57% of patients to >15% in 17% of patients compared without OACs. The ARI cutoff for MB and ARR cutoff for SSTE with OAC were shown as >2.4%/year and >1.2%/year (c-statistics 0.81[0.78-0.83], 0.75[0.72-0.79]).

Conclusions: Artificial intelligence combining clinical variables was found to predict individual patient’s bleeding and stroke/systemic embolism risks well and it can also guide each patient’s appropriate OAC dose in AF patients with LC (web-calculator can be accessed as: https://riskcalc.shinyapps.io/AFLC/).