Supplementary statistical methods

Internal validation

Internal validation was performed by evaluating the shrinkage factor and correcting overfitting optimism:

- Shrinkage factor: this first approach is based on the principle that by shrinking the score towards its mean its performance on future datasets improves. The closer the estimated shrinkage factor gets to one, the more the proposed score is expected to perform adequately on other datasets.
- Overfitting optimism: it refers to fitting the score on bootstrapped datasets and measuring the distance between the score slope and 1. This estimated overfit is the amount needed to shrink the coefficient(s) in the original model in order to have acceptable behavior on future datasets. The closer this distance gets to zero, the better the performance of the score will be.

Score calibration in external datasets

To assess the score calibration in the external datasets (i.e. if predicted values of stroke recurrence for a given score value corresponded to those actually observed), we first derived the cumulative baseline hazard from the CHUV data and, assuming that this curve is valid for the external dataset, we evaluated the baseline cumulative hazard for this dataset using its event time points. Next we calculated the score for the new dataset and, combining it with the baseline cumulative hazard obtained in the previous step, we evaluated the cumulative hazard for the external dataset. Then an appropriate regression analysis was performed with the response variable being the cumulative hazard derived before, and the covariates being the score and the baseline cumulative hazard as an offset evaluated as described already. The score was considered calibrated in the external dataset if the score coefficient (slope) in the regression model was close to 0.42 (i.e. its 95% confidence interval contains 0.42). The 0.42 target value corresponds to the coefficient obtained from implementing the calibration process to the CHUV dataset.