Improving Cardiovascular Risk Prediction: A Novel Addition of Automated Coronary Artery Calcium Scoring from Existing Chest CTs

Abstract

The study evaluated the accuracy of the predicted risk by comparing the predicted result to the actual rate of events that occurred during the follow-up period. Performance of the individual models is described in the included table. Calibration plots were drawn on a single bootstrap sample. The new model trained was a simple logistic regression model. This augmented-PCE model was created by training, on each of the train sets, a model containing linear predictor from the PCE model together with the CT-generated CAC scores. The model included interaction terms between the new CT biomarker with age and sex, as suggested by clinician consultation, as the effect of coronary calcium was suspected to be different for the different age and sex groups. The new model trained was a simple logistic regression model.

Results

The new model trained was a simple logistic regression model. This augmented-PCE model was created by training, on each of the train sets, a model containing linear predictor from the PCE model together with the CT-generated CAC scores. The model included interaction terms between the new CT biomarker with age and sex, as suggested by clinician consultation, as the effect of coronary calcium was suspected to be different for the different age and sex groups. The new model trained was a simple logistic regression model.

Conclusions

The new model trained was a simple logistic regression model. This augmented-PCE model was created by training, on each of the train sets, a model containing linear predictor from the PCE model together with the CT-generated CAC scores. The model included interaction terms between the new CT biomarker with age and sex, as suggested by clinician consultation, as the effect of coronary calcium was suspected to be different for the different age and sex groups. The new model trained was a simple logistic regression model.

References


Supplementary Information

Table 1: Standalone model performance

<table>
<thead>
<tr>
<th>Model</th>
<th>Sensitivity (95% CI)</th>
<th>Specificity (95% CI)</th>
<th>AUC (95% CI)</th>
<th>Calibration</th>
<th>SRP</th>
<th>NRI</th>
</tr>
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<tbody>
<tr>
<td>PCE</td>
<td>53% (48% - 66%)</td>
<td>67% (62% - 73%)</td>
<td>0.64 (0.62 - 0.66)</td>
<td>Good</td>
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<td>Augmented-PCE</td>
<td>57% (48% - 66%)</td>
<td>70% (62% - 73%)</td>
<td>0.69 (0.67 - 0.71)</td>
<td>Excellent</td>
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Table 2: Comparative model performance

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Figure 1

Caption: In blue, a smoothed plot of the predicted probabilities for a CVD event, as predicted by the PCE model. In red, the actual observed rate of events is presented. The red line represents perfect calibration.

Figure 2

Caption: Calibration plots - Augmented Model

Figure 3

Caption: Calibration plots - Augmented Model

Conclusion

The new model trained was a simple logistic regression model. This augmented-PCE model was created by training, on each of the train sets, a model containing linear predictor from the PCE model together with the CT-generated CAC scores. The model included interaction terms between the new CT biomarker with age and sex, as suggested by clinician consultation, as the effect of coronary calcium was suspected to be different for the different age and sex groups. The new model trained was a simple logistic regression model.