Potential of comorbidity indices and CHA2DS2-VASc to predict ischemic stroke and mortality in patients with atrial fibrillation: a validation study

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Background: Atrial fibrillation represents a large health burden and increases the risk of ischemic stroke and mortality. A large proportion of atrial fibrillation patients also has other comorbidities. It remains unknown whether comorbidity burden summarized as a comorbidity score can predict ischemic stroke and mortality after atrial fibrillation. In an aging population burdened with comorbidities, it thus has become increasingly important to understand the impact of comorbidity burden on the prognosis of atrial fibrillation.

Purpose: We examined the ability of the Danish Comorbidity Index for Acute Myocardial Infarction (DANCAMI), the Charlson Comorbidity Index (CCI), the Elixhauser Comorbidity Index (ECI), and the CHA2DS2-VASc to predict ischemic stroke and all-cause mortality within one year after atrial fibrillation or flutter.

Methods: We identified all patients with a first-time atrial fibrillation or flutter hospital diagnosis in Denmark from 2000 through 2015 (n=318,939). We identified all comorbidities in each index using hospital diagnoses in the 10 years before diagnosis of atrial fibrillation or flutter. For each comorbidity index, we calculated Harrell’s C-Statistic to predict ischemic stroke, all-cause mortality, and cause-specific mortality due to cardiovascular diseases and cancer within one year after atrial fibrillation or flutter. We also calculated hazard ratios of the association of the DANCAMI comorbidities not included in the CCI with ischemic stroke and all-cause mortality within one year after atrial fibrillation or flutter, after conditioning on age, sex, and all CCI comorbidities.

Results: The C-Statistic to predict ischemic stroke was 0.64 (95% confidence interval [CI]: 0.63–0.64) for DANCAMI, 0.63 (95% CI: 0.63–0.64) for CCI, 0.63 (95% CI: 0.63–0.64) for ECI, and 0.64 (95% CI: 0.63–0.64) for CHA2DS2-VASc. The C-Statistic to predict all-cause mortality was 0.74 (95% CI: 0.74–0.75) for DANCAMI, 0.74 (95% CI: 0.73–0.74) for CCI, 0.73 (95% CI: 0.72–0.73) for ECI, and 0.69 (95% CI: 0.69–0.69) for CHA2DS2-VASc. Among the DANCAMI comorbidities not included in the CCI, five predicted increased risk of ischemic stroke (epilepsy, alcohol and drug abuse, schizophrenia, affective disorder, and chronic kidney disease) and eight predicted increased risk of all-cause mortality (coagulopathy, neurodegenerative disorder, epilepsy, alcohol and drug abuse, schizophrenia, affective disorder, chronic kidney disease, and chronic pancreatitis). Compared with all-cause mortality, DANCAMI was better at predicting mortality due to cardiovascular diseases (C-Statistic=0.79, 95% CI: 0.79–0.80) and cancer (C-Statistic=0.78, 95% CI: 0.76–0.80)

Conclusion: In patients with first-time atrial fibrillation or flutter, no comorbidity index predicted ischemic stroke well. However, DANCAMI predicted all-cause mortality on a par with the CCI and the ECI and better than CHA2DS2-VASc.