Novel Risk Prediction Tool for Identifying Atrial Fibrillation Patients with Significant Sleep-Disordered Breathing

Kadhim Kadhim
Adrian Elliott
Melissa Middeldorp
Jeroen Hendriks
Dian Andina Munawar
Kashif Khokhar
Mehrdad Emami
Rajiv Mahajan
R. Doug McEvoy
Dennis Lau
Prash Sanders
Dominik Linz

**Introduction:** Sleep-disordered breathing (SDB) is an important risk factor for developing atrial fibrillation (AF), and treatment of concomitant SDB can improve AF rhythm outcomes. Diagnosis of SDB requires sleep studies which can pose a significant time and resource burden. We sought to develop a prediction score based on clinical characteristics that can help identify AF patients who require further assessment for SDB.

**Methods:** Prospectively-collected data for 442 consecutive patients treated for AF from 2009 to 2017 were analysed. All patients were considered candidates for rhythm-control and therefore referred for sleep studies. The diagnosis of SDB was confirmed using in-lab polysomnography and classified using the apnoea-hypopnoea-index (AHI), with cut-offs of ≥15/hr and ≥30/hr indicating moderate-to-severe and severe SDB respectively. Patients treated up to 2015 formed the derivation cohort (n=311) and the remainder (n=113) formed the validation cohort. Multivariate logistic regression analysis was used to identify clinical variables predictive of moderate-to-severe SDB. A risk score model was developed based on regression coefficients and tested using receiver-operating-characteristics analyses on the validation cohort.

**Result:** Overall, mean age was 60±11 years, mean body mass index (BMI) was 30±5 kg/m2 and 69% were men. The prevalence of moderate-to-severe SDB was 33.7%. There were no significant differences in baseline characteristics between the derivation and validation cohorts. Male gender (score=1), overweight (BMI: 25-29 kg/m2, score=2), obesity (BMI≥30 kg/m2, score=3), diabetes (score=1), and stroke (score=2) were significantly independently predictive of moderate-to-severe SDB and formulated the score. The score performed well to predict moderate-to-severe SDB with a C-statistic of 0.73 (95%CI: 0.67-0.79, P<0.001) in the derivation cohort, and 0.67 (95%CI: 0.57-0.77, P<0.001) in the validation cohort. As a rule-out test, a score of ≤3 had a negative predictive value of 77% for moderate-to-severe SDB (91% for severe SDB). A score of ≥4 had an intermediate positive likelihood ratio (PLR) of 2 for moderate-to-severe SDB (2.2 for severe SDB), while a score of ≥5 had a high PLR of 6.5 and 6.8 for moderate-to-severe SDB and severe SDB respectively.
Conclusion: A novel risk score comprising clinical characteristics can identify patients with AF likely to benefit from further assessment for SDB. Application of this model may aid optimise resource utilisation and facilitate timely patient care.