Can novel competing risks prediction models improve population health in adults with newly diagnosed atrial fibrillation?

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ISBN
9781369464382

Abstract
Atrial fibrillation (AF) is a cardiac rhythm disorder that affects more than 33 million people worldwide, including 1-4% of adults in Western Europe, the United States, and Australia. AF increases the risk of ischemic or thromboembolic stroke by 5 times. The risk of stroke is reduced significantly by the use of oral anticoagulants (OACs); however, anticoagulation increases the risk of major bleeding. To help physicians weigh these consequences of treatment for individual patients, clinical guidelines recommend the use of risk prediction models. The existing risk prediction models have limited clinical utility in part because they estimate only OAC-associated bleeding risk and do not differentiate bleeding events by low vs. high mortality.

This research addresses the following three aims using data from the United Kingdom Clinical Practice Research Datalink: (1) To examine treatment patterns of OACs among patients first diagnosed with nonvalvular AF (NVAF) in the period from 2010-2014; (2) To develop and validate new prediction models for the one-year risks of the competing first events of stroke, intracranial hemorrhage, extracranial hemorrhage, and death as a function of treatment and other important predictors; and (3) To determine, through simulation, whether and how the new risk prediction models impact 1-year AF-related health outcomes when used to individualize treatment decisions in patients with incident AF.

We show that prescribing of OACs in moderate-to-high risk patients in the UK has increased annually with 70% of patients prescribed therapy in 2014 while 1/3 of very low risk patients were prescribed OACs contrary to guidance. We developed new prediction models that: confirmed prognostic factors from the currently-advocated CHA_2DS_2-VASc and HAS-BLED risk schemes; and performed well in terms of discrimination (c-statistics ranging from 55 to 74) and calibration. When our new model is used to select patients for OAC only if they have 1-year stroke risk 1%, quality-adjusted life expectancy is improved compared to current treatment patterns. This treatment strategy was superior to others intended to balance stroke and bleeding risk. Our result reinforces the current use of CHA_2DS_2-VASc for stroke risk stratification. Treatment decisions should focus on minimizing strokes — not bleeding — to maximize population health.

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