Predicting Atrial Fibrillation in Ischaemic Stroke

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Background:

Atrial Fibrillation (AF) is responsible for approximately 20% of ischaemic stroke. In addition, up to 30% of patients with embolic stroke of unknown source (ESUS) have demonstrable AF.

Oral anti-coagulants (warfarin and DOACs) reduce the risk of ischaemic stroke by approximately 60-70%. However, current guidelines do not recommend the commencement of an anticoagulant without documented AF. AF is not always captured on traditional 24-hour telemetry, and loop recorders and Holter monitors, while sensitive, are invasive and costly.

Should we continue focusing on detection or expand our evaluation to include accurate prediction of AF?

Aim:

To conduct a systematic review of the literature to identify clinical predictor tools for AF.

Methods:

We conducted a systematic review of the literature to identify clinical predictors of AF. Databases interrogated included MEDLINE, CINAHL, ScienceDirect, Informit Health Collection, Directory of Open Access Journals, Research Starters, Cochrane Library, and PubMed, Embase, Web of Science, and Oxford Medicine Online. We included original research published in a peer-reviewed journal between May 2017 and January 2018, available in English.

Results:

Author, year, country	Score	N (derivation)	Period of data collection	Population	Age (years) mean +/- SD (derivation)	% male	Study design (P/R/CC)	External validation (Y/N)	C statistic (derivation) (mean, 95% CI)
Schnabel, 2009, USA	Framingham	4,764	1968 – 1984	Outpatients with no prior AF	60.9±9.9	45	P/R	Y	0.78 (0.74-0.79) 0.79 (0.77–0.82) with transthoracic echo findings (p=0.18)
Sulissa, 2009, France	STAF	456	2007 – 2880	ESUS inpatients	65.25±14.76	59.4	R	N	Not reported
Chamberlain, 2011, USA	ARIC	14,546	1987 – 1989	Outpatients	45.64	NR	P	N	0.78 (no 95% confidence interval reported)
Alonso, 2013, USA	CHARGE-AF	18,556	1971 – 2006	Outpatients	60.76	54.6-65.9	P/R	N	0.765 (0.748 - 0.781) Augmented score: 0.767 (0.750 - 0.783).
Chao, 2013, Japan	CHADS2	702,502	2000 – 2001	Outpatients	41.3±16.4	24.9 - 57.7	P	N	0.713 (0.707–0.719)
Everett, 2013, USA	WHS AF risk algorithm	20,822	Not reported	Outpatients (women) with no CVD	52.9±4	0	P	N	0.718 (0.684–0.753) 0.741 (0.709–0.774, p< 0.001) for SNP algorithm addition
Fuji, 2013, Japan	Unnamed	354	2006 – 2008	In patients with acute ischaemic stroke in last 24 hours	70.2	64.2%	R	N	0.89 (0.83 - 0.95)
Brunner, 2014, USA	Unnamed	100,000	2002 – 2007	Outpatients	42.9±18.5	40.5	P	N	0.812 (0.805-0.820).
De Figueiredo, 2014, Brazil	ASAS	257	2009 – 2010	Inpatients within 24 hours of symptom onset with acute ischemic stroke or TIA	80.4±14.3	51.1	CC	Y	0.78 (0.70-0.86)
Yoshioka, 2015, Japan	iPAB	449	2013 – 2014	Patients with acute ischemic strokes	42.9±18.5	Not reported	P	Y	0.90
Muscari, 2017, Italy	McWALLETS	571	2007 – 2015	Inpatients with ischemic stroke	72.7±13.5	49.4	R	N	0.89 (0.83 – 0.95)
Ricci, 2018, USA	ESUS-AF	296	2013 – 2016	Inpatients with ischemic stroke	63.9±14.8	57.2	R	N	0.725

Risk factors for Atrial Fibrillation utilised in risk prediction models

Discussion:

Our review of the available literature has identified 11 tools that reliably predict the development of atrial fibrillation, with a C statistic ranging from 0.713 to 0.90. Commonly included variables were age (7), hypertension (8) and left heart strain based on ECG and/or echocardiography (9). Some of these tools also incorporate genetic features (1) and biochemical markers (2). Only 3 studies have been externally validated and surprisingly, none of these tools are routinely used in clinical practice. We suggest that the risk of developing AF can be predicted and should be part of routine clinical assessment of ESUS patients. Moreover, the addition of more recently identified variables of AF risk to preexisting tools may improve their sensitivity. The ideal tool would be applicable in both advanced and resource poor regions.