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Identification, risk assessment, and management of patients with atrial fibrillation in a large primary care cohort

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ABSTRACT

Background: Atrial fibrillation (AF) is associated with increased risk of cardiovascular disease (CVD) complications including stroke. We investigated the assessment and management of cardiovascular risk among patients with AF aged 35–74 years, by ethnic group, in a large cohort of people receiving a CVD risk assessment in primary care (PREDICT).

Methods: PREDICT was linked to national dispensing, hospitalisation and mortality records. AF was present if recorded in PREDICT or during a prior hospitalisation; medications were those dispensed ≤6 months before or after a PREDICT assessment; the CHA_2DS_2-VASc score and a New Zealand (NZ) adjusted Framingham CVD risk were calculated. Data were linked to outcomes of stroke or major adverse cardiovascular event (MACE).

Results: 12,739 (2.8%) of 447,020 people aged 35–74 years had AF. Māori, the indigenous population of NZ, had the highest proportion of AF, which by age group, was similar to that among Europeans 10 years older. 77% were at high stroke risk, of whom 42% received anticoagulation; 54% were at high CVD risk, of whom 67% received both lipid- and blood pressure-lowering medication. Per category of predicted risk, stroke risk was overestimated and risk of MACE was underestimated.

Conclusions: The burden of AF and risk factors differed by ethnic group thus recommendations to screen for AF above a universal age threshold may introduce inequity in the detection and management of associated risk. The high burden of comorbidities at younger ages among many ethnic groups contributes to the poor performance of available risk assessment tools, further compounding potential inequity.

1. Introduction

Atrial fibrillation (AF) is the most common abnormal heart rhythm encountered in clinical practice. An estimated 33 million people worldwide have diagnosed AF although many more will have undiagnosed or subclinical AF [1,2] and the prevalence increases with age. Compared with the general population, AF is associated with at least a 5-fold increased risk of stroke [3,4], but also with a significantly greater risk of heart failure, admission to hospital, or death [4].

A focus of management for patients with AF is the assessment of thromboembolic risk, in particular that of stroke; however the assessment and management of all cardiovascular disease (CVD) risk is at least as important [5]. Atrial fibrillation and vascular disease share many of the same risk factors and often co-exist [6]. Among patients with atherosclerosis in the REACH Registry, CVD risk was higher among patients with AF than those without [7]. Conventional risk assessment scores may not reliably incorporate AF in risk prediction. Clinical guidelines for the CVD risk management of patients with AF include strategies that can substantially decrease morbidity and mortality, particularly reducing the risk of stroke. Anticoagulation is advised for all people with AF unless they're at clearly low thromboembolic risk [8–10], and BP- and lipid-lowering medication is recommended for patients at high CVD risk [11–13].

The prevalence of AF is highest in the elderly, increasing from 0.7% among Europeans aged 55–59 years, to over 18% for those aged >85 years [2], and recommendations are to screen for AF in people aged ≥65 years or older [8,13,14]. Yet there is a lack of evidence about AF among younger adults, whether management of stroke and CVD risk is optimised in these patients, and about the accuracy of risk prediction. Similarly, much of our understanding about the prevalence and impact of AF comes from white or Caucasian populations. Data are limited for non-Caucasians; however Indigenous Australians develop

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AF approximately 20 years earlier than non-Indigenous Australians [15], and among Māori, the indigenous population of New Zealand (NZ), 30% of people aged 80–90 years had AF compared with 21% of non-Māori aged 85 years [16]. As AF is a significant risk factor for adverse vascular outcomes, and the prevalence of AF appears to differ by age among some indigenous populations, AF is likely to contribute to disparities in clinical outcomes in these groups.

In common with many countries in the world, NZ has a multi-ethnic population, with differing age distributions, co-morbidity burdens, and disparities in clinical outcomes by ethnicity. Internationally, a "racial paradox" between risk factors and AF has been described, where the non-Caucasian groups that have been studied tend to have a higher burden of risk factors for AF than Caucasian or Western populations, yet have a lower prevalence of AF [17]. Such discordance between risk factors and AF has not been observed in Indigenous Australians [18], and is not suggested among NZ Māori, who are identified at a population level as having a high burden of risk factors for CVD [13]. Using a large primary care cohort of routine CVD risk assessments which had been linked to national hospitalisation and dispensing records, we investigated the identification, vascular risk assessment and management of patients with known AF aged 35–74 years, by ethnic group.

2. Method

The PREDICT cohort study contains information obtained during routine risk assessment for CVD and has been described previously [19]. Briefly, PREDICT is a web-based decision support programme that has been integrated with the most commonly used electronic practice management systems in NZ primary care. When PREDICT is used by a practitioner to estimate CVD risk for a patient, a risk profile is electronically stored both in the patient record and anonymously on a central database. With the permission of health providers, this profile is linked to an encrypted National Health Index number (eNHI) and made available to researchers at the University of Auckland. For the current study, PREDICT records were limited to patients with AF aged 35–74 years, between August 2002–October 2015, and linked to national pharmaceutical dispensing and ICD-10-AM coded national public hospital discharge records via the individual's eNHI. Only the first risk assessment for each patient was included.

Atrial fibrillation was present if "ECG confirmed AF" had been recorded in PREDICT, or if AF or atrial flutter had been coded (ICD-10 I48) during a prior hospitalisation. Anticoagulation was defined as dispensing of warfarin or dabigatran, as other non-vitamin K antagonist oral anticoagulants were not widely available in NZ during the time of data collection. Similarly, the majority of anticoagulation was with warfarin (86%) as dabigatran became available for clinical use in July 2011. Medications were included if they were dispensed within 6 months before or after the PREDICT risk assessment.

The CHA_2DS_2-VASc score [20] was calculated using information available in the database and used to assess thromboembolic risk. The score assigns points on the basis of age, sex, and medical history, specifically heart failure (HF), hypertension, diabetes, previous stroke, transient ischaemic attack (TIA) or systemic embolism, and vascular disease. A CHA_2DS_2-VASc score ≥ 2 was used to indicate a high thromboembolic risk. Clinician-defined diagnoses of HF or hypertension were not available in the PREDICT database. Thus the presence of HF was defined as a prior hospitalisation for HF or dispensing of a loop diuretic on at least 3 occasions in the 5 years prior to the risk assessment, and hypertension was defined as dispensing of at least one BP lowering medication in the 6 months prior to the index risk assessment or a mean systolic BP of ≥150 mm Hg at the time of risk assessment. Vascular disease was defined as a history of CHD, PVD, or revascularisation procedure.

A NZ-adjusted Framingham risk score was used to assess 5-year CVD risk (of CV death, non-fatal myocardial infarction (MI), stroke, or other vascular event) [13,21]. The NZ adjustments are described in Appendix A. A 5-year CVD risk ≥15% was used to indicate high CVD risk, 5–15% is intermediate risk and <5% is low risk. Assessment of CVD risk is recommended for people aged 35–74 years depending on sex and ethnicity [13]. Ethnicity is self-reported and defined according to a national prioritisation protocol in the order: Māori, Pacific, Indian, Chinese/other non-Indian Asian, European (Caucasians of European descent). In addition to lifestyle modification, clinical guidelines advise offering pharmacotherapy with blood pressure (BP) lowering and lipid lowering medications for patients at >15% 5-year CVD risk and consideration of aspirin for those at >20% risk (roughly equivalent to 40% 10-year CVD risk) [13].

Outcomes assessed for this study were non-fatal ischaemic or haemorrhagic stroke, and a composite of major adverse CVD events (MACE) defined as non-fatal MI, stroke, HF, or all-cause death. Analyses of outcomes were limited to patients who experienced an event or who had at least 1 year of follow-up since CVD risk assessment.

Analyses were performed using R statistical software v3.2.3. Proportions were compared using the chi-squared test of proportions. The cohort study and research process was approved by the Northern Region Ethics Committee Y in 2003 (AKY/03/12/314) with subsequent annual approval by the National Multi Region Ethics Committee since 2007 (MEC/07/19/EXP).

3. Results

12,739 of 447,020 (2.8%) people aged 35–74 years who had received a routine CVD risk assessment in primary care had a recorded diagnosis of AF. Half (54%) of those with AF were aged <65 years and one third were female, 78% had hypertension (as defined in the methods), 40% a history of vascular disease, 31% a history of HF, and 30% had diabetes (Table 1).

3.1. Proportion of AF and co-morbidities

AF occurred more frequently among Māori compared with non-Māori at all ages, with the proportion of Māori with AF similar to that among Europeans 10 years older (Fig. 1, Supplementary Table 1). Māori, Pacific and Indian patients were generally younger than European and Chinese/Other Asian patients (consistent with national CVD risk screening recommendations [13]), with two thirds of these groups aged <65 years compared with half of Europeans (Table 1). They had a significantly greater burden of comorbidities: 48%, 42%, and 59% of Māori, Pacific and Indian patients had known vascular disease compared with 36% of Europeans and 33% of Chinese/Other Asians (all p-values <0.001), and 44%, 48% and 56% had diabetes compared with 20–29% of Europeans and Chinese/Other Asians

Table 1
Characteristics of the cohort with atrial fibrillation.

	Total	Māori	Pacific	Indian	Chinese/other Asian	European
n	12,739	2669	1436	302	474	7858
Age, years, mean (SD)	62 (8.9)	60 (9.3)	58 (10.0)	60 (9.4)	63 (8.8)	64 (8.1)
<65 years	6833 (54)	1721 (64)	986 (69)	186 (62)	249 (52)	3691 (47)
Female	4361 (34)	1110 (42)	631 (44)	112 (37)	185 (39)	2323 (30)
Current smoker	1446 (11)	602 (23)	181 (13)	16 (5)	28 (6)	619 (8)
Hypertension	9986 (78)	2227 (84)	1169 (81)	265 (88)	365 (77)	5960 (76)
Prior vascular disease	5073 (40)	1276 (48)	608 (42)	179 (59)	154 (33)	2856 (36)
Prior stroke or TIA	1670 (13)	504 (19)	256 (18)	41 (14)	48 (10)	821 (10)
Heart failure	3943 (31)	1309 (49)	678 (47)	117 (39)	74 (16)	1765 (23)
Diabetes	3759 (30)	1169 (44)	682 (48)	169 (56)	136 (29)	1603 (20)
HbA1c ≥ 64 mmol/mol	990 (26)	359 (31)	229 (34)	57 (34)	19 (14)	326 (20)
Duration ≥ 10 years	850 (23)	270 (23)	149 (22)	52 (31)	20 (15)	359 (22)
With nephropathy	338 (9)	162 (14)	93 (14)	16 (10)	2 (2)	65 (4)
SBP, mm Hg, mean (SD)	129 (15.9)	129 (17.1)	128 (16.8)	130 (18.0)	125 (15.9)	130 (15.2)
Extreme BP*	407 (3)	138 (5)	68 (5)	92 (3)	5 (1)	187 (2)
TC:HDL, mean (SD)	3.9 (1.20)	4.0 (1.26)	3.9 (1.17)	3.8 (1.14)	3.7 (1.04)	3.9 (1.20)
Extreme cholesterol**	149 (1)	46 (2)	11 (1)	3 (1)	2 (0.4)	87 (1)

Values are n (%) unless otherwise stated. BP = blood pressure, SBP = systolic BP, TC:HDL = ratio of total cholesterol to high density lipoprotein, TIA = transient ischaemic attack. *BP consistently ≥ 170/100; **TC ≥ 8 mmol/L or TC:HDL ≥ 8.