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Australian general practitioners initiate statin therapy primarily on the basis of lipid levels; New Zealand general practitioners use absolute risk

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ABSTRACT

Objectives: To compare the determinants of initial statin prescribing between New Zealand and Australia. New Zealand has a system-wide absolute risk-based approach to primary care cardiovascular disease (CVD) management, while Australia has multiple guidelines.
Method: Classification and Regression Tree (CART) analysis of two observational studies of primary care CVD management from New Zealand (PREDICT-CVD) and Australia (AusHeart). Over 80% of eligible New Zealanders have been screened for CVD risk. PREDICT-CVD is used by approximately one-third of New Zealand GPs to perform web-based CVD risk assessment in routine practice, with the sample consisting of 126,519 individuals risk assessed between 1 January 2007 and 30 June 2014. AusHeart is a cluster-stratified survey of primary care CVD management that enrolled 534 GPs from across Australia, who in turn recruited 1381 patients between 1 April and 30 June 2008. Eligibility was restricted to 55–74 year old patients without prior CVD.
Results: The CART analyses demonstrated that New Zealand GPs prescribe statins primarily on the basis of absolute risk, while their Australian counterparts are influenced by a variety of individual risk factors, including total cholesterol, LDL cholesterol and diabetes.
Conclusions: Countries seeking to improve their management of CVD should consider adopting a 'whole of system' absolute risk-based approach with clear guidelines that are consistent with drug reimbursement rules; and include computerized decision-support tools that aid decision-making and allow monitoring of outcomes and continual improvement of practice.

1. Introduction

The benefits of statins for the prevention of cardiovascular disease (CVD) have been shown to be proportional to a patient's estimated absolute CVD risk prior to treatment initiation [1]. As a result, many prediction models have been developed to estimate a patient's absolute risk of CVD, with a recent systematic review identifying 363 of such models across North America, Europe, Asia and Oceania [2]. While knowing a patient's absolute risk of CVD should help a general practitioner (GP) determine optimal treatment, in practice this appears to be lost in the translation from model development to GP behaviour to patient outcome. The proliferation of prediction models has not resulted in real benefits to patients [3].

Australia and its close neighbour New Zealand share many cultural, economic and historical similarities, and cooperate closely on a range of socio-economic policies including immigration (a trans-Tasman travel arrangement allows citizens of one country to freely enter, live and work in the other), trade (a comprehensive bilateral free-trade agreement) and defence (ongoing relationships since the ANZACs of 1915 and before). The similarities and cooperation continue in health care delivery. The Australian Medical

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Council collaborates with its equivalent, the Medical Council of New Zealand, in assessment, accreditation and professional development programs. The countries share many organisational and representative bodies, including the Royal Australasian College of Physicians, the Royal Australasian College of Surgeons and the Cardiac Society of Australia and New Zealand. However the two countries have contrasting models of primary care: access to publically funded primary health care in New Zealand requires eligible persons to enrol with a general practitioner and practices have a population health responsibility [4]. This has not been the case in Australia where practice enrolment and payment models designed to support prevention, coordination and integration of primary care are only now receiving serious attention [5]. The two countries have also followed different paths when specifying guidelines for prevention of cardiovascular disease. New Zealand was an early adopter of absolute risk assessment with the inclusion of a Framingham-based risk equation in their 1993 hypertension guidelines. Across the Tasman, the Framingham risk equation did not appear in hypertension guidelines until a decade later. These differences have been amplified by early adoption of one unified national CVD risk management guideline in New Zealand, accompanied by decision support tools to help translate the guideline into clinical practice [6], while Australia has had a range of sometimes conflicting guidelines. For example, the National Vascular Disease Prevention Alliance (NVDPA) guidelines are now based on absolute risk, while the Pharmaceutical Benefits Scheme (PBS) drug subsidy program limits eligibility on the basis of individual risk factors.

We compared the initial prescribing of statins for the primary prevention of CVD between Australia and New Zealand. We hypothesized that the system-wide approach to CVD risk management in New Zealand, including unified absolute risk-based guideline and long-standing use of web-based decision support tools integrated with electronic medical records, would result in GP initial prescribing practices being more consistent with absolute risk-based guidelines in New Zealand than in Australia. To test this hypothesis, we identified and compared the determinants of initial prescribing in each country using a classification tree technique often used in 'big data', and compared the resulting initial prescribing outcomes across the two countries. The determinants of initial statin prescribing in Australia have been previously established in Schilling et al. (2016) [7]; that analysis is revised here to allow comparability with the New Zealand dataset.

2. Background of CVD management in New Zealand and Australia

In New Zealand, paper-based CVD risk assessment charts were originally distributed to GPs in the early 1990s [6,8]. These were subsequently replaced in the early 2000s with web-based tools, of which PREDICT was the first and remains the most frequently used [6]. The PREDICT electronic decision support system provides clinicians with a user-friendly and patient-specific translation of New Zealand's single, unified national CVD risk management guideline. It recommended drug therapy for all patients with an estimated absolute risk above 15 per cent in 5 years when it was first introduced in 2003, and more recently has recommended shared decision-making between the GP and the patient about initiation of drug therapy for those with absolute risk above 10 per cent over 5 years [9]. Computerized decision-support tools integrated with patient management systems are available in most primary care settings to estimate absolute risk. In 2012, CVD risk assessment was made a national priority by the New Zealand Ministry of Health with an aspirational target of 90% coverage supported by modest funding to help primary care organisations reach the target [10].

In Australia, historically there have been a range of guidelines available to inform GPs about managing CVD based on individual risk factors such as hypertension, dyslipidaemia and diabetes [11]. During the 2000s, many Australian guidelines followed the trend away from managing isolated risk factors towards assessment based on absolute CVD risk [12]. The National Heart Foundation's *Hypertension management guide for doctors 2004* and subsequent *Guide to management of hypertension 2008* used Framingham absolute CVD risk calculations with some adjustments [13]. In 2009, Diabetes Australia, Kidney Health Australia, the Heart Foundation and the Stroke Foundation, aligned to release specific CVD risk guidelines based on absolute risk under the banner of the National Vascular Disease Prevention Alliance [14]. However the Australian Government's universal drug insurance scheme, the Pharmaceutical Benefits Scheme (PBS), limited the subsidising of lipid-lowering medicines using eligibility criteria based on individual risk factors such as diabetes and cholesterol [15], perhaps because of the lack of widely adopted decision-support tools that could help translate the guideline(s) into practice [12]. This was the background at the time of data collection for the Australian Hypertension and Absolute Risk (AusHeart) study which reviewed CVD management practices across Australia [11]. As a result, lipid levels were found to be the predominant driver of prescribing practices [7], and there were large variations in prescribing practices across GPs [16]. Today, there is increased consensus around the NVDPA's absolute risk guideline [17]; however there are still no widely adopted decision-support tools and the PBS guidelines still base eligibility on individual risk factors [15]. There are no routinely collected data that allows the evaluation of prescribing patterns or the determinants of prescribing in relation to CVD management.

3. Methods

3.1. Data

We used country-specific but broadly equivalent data from New Zealand and Australia. In New Zealand, we used CVD risk assessment data from the PREDICT-CVD cohort study from 1 January 2007 to 30 June 2014 [18]. Since 2002, PREDICT-CVD has been available for GPs to perform web-based risk assessment in routine practice. National pharmaceutical dispensing records for lipid lowering medications were linked for each individual via an anonymized linkage system. PREDICT-CVD is used by 35–40% of GPs across New Zealand [18] but there are other similar tools being used by GPs to help meet the Ministry of Health's 90% CVD screening target [10].

In Australia, we used linked survey and administrative data from the AusHeart Study, a cluster-stratified survey of primary care CVD management [13]. 534 GPs were enrolled from across Australia, and in turn recruited 15–20 consecutively presenting adults between 1 April to 30 June 2008 aged 55 years or older, and gathered a range of patient information including CVD risk and socioeconomic factors. These data were linked to pharmaceuticals dispensed under the PBS [13]. Unfortunately no later Australian data exists to compare with the New Zealand data, however in supplementary analyses we limited the New Zealand sample to GP visits during 2008, and complete a propensity score matching procedure to better align the two samples.

Data exclusions were designed to deliver similar samples across the two countries: in both countries, we excluded those with prior CVD or exposure to statin treatment to minimize the possibility that prior treatments had influenced observed risk factors; those younger than 55 years of age or over 75 years of age to align the age cohort for which risk assessment is promoted. In the New Zealand dataset, where an individual had more than one risk assessment, the earliest assessment was retained. After exclusions, we had New

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