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Brief report

Aboriginal and Torres Strait Islander absolute cardiovascular risk assessment and management: systematic review of evidence to inform national guidelines

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Introduction

Australia's absolute cardiovascular disease (CVD) risk assessment algorithm[1] first examines whether individuals meet criteria for clinically determined high CVD risk and, in those not meeting these criteria, applies the Framingham Risk Equation to estimate an individual's risk of having a CVD event in the next 5 years. The same risk equation is used for Aboriginal and Torres Strait Islander people and non-Indigenous Australians, although there is variation in underlying risk across the two populations, with the former experiencing a greater burden of cardiovascular risk factors.

Three main clinical CVD guidelines in Australia provide recommendations on assessing and managing CVD risk in Aboriginal and Torres Strait Islander people.[1-3] All recommend using a similar CVD risk assessment algorithm, although recommendations differ in relation to the age at which CVD risk assessment should start for Aboriginal and Torres Strait Islander people and whether an additional 5% loading should be added to estimated risk scores. These recommendations are primarily based on expert opinion or, in some circumstances, evidence and recommendations from previous New Zealand guidelines.[4] Other international guidelines, such as those of Canada[5] and the US[6], acknowledge the increased risk of CVD in Indigenous populations without providing specific recommendations

for these populations. Evidence from Aboriginal and Torres Strait Islander populations is essential for ensuring that guideline recommendations for this population are evidence based and fit for purpose. The aim of this study was to systematically review recently published primary data on the targeting of, and methods to assess and manage, absolute CVD risk in Aboriginal and Torres Strait Islander people.

Methods

Studies published from 31 December 2010, since the development of the national CVD guidelines[1], to 18 October 2017 were identified using systematic searches of MEDLINE and Scopus, supplemented with forward and backward citation searches of the included studies. The predefined protocol was published in PROSPERO (CRD42017079181). Search terms were “cardiovascular”, "heart disease", "coronary heart disease", "cardiovascular system", “stroke”, “cerebrovascular disease”, “myocardial infarction”, “ischaemic heart disease“, “peripheral vascular disease”, “Indigenous”, “Aboriginal”, “Torres Strait Islander” and “Australia”; and combinations of "risk", “prediction”, “model”, “score”, “assessment”, “management”, “primary”, “prevention” and “control”.

Studies were included if they related to Aboriginal and/or Torres Strait Islander absolute CVD risk assessment and/or treatment, reported primary data, and included participants without existing CVD. Studies were excluded if they only reported results for people with existing CVD or did not separately report results for people without CVD, only included pregnant women or children, reported the development or testing of electronic decision support tools, or reported only the coverage of CVD risk assessment. In addition, we identified studies meeting the selection criteria that were published before 2010, cited in national CVD risk assessment guidelines.[1]

Data were extracted using a prespecified template and were checked independently by a second investigator. Study quality (good, fair or poor), including an assessment of the risk of bias, was independently assessed by two investigators, and discrepancies were resolved by adjudication by a third investigator. Quality was assessed using the Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies from the National Heart, Lung and Blood Institute in the US.

Results

We identified 205 abstracts through our search strategy, of which 32 were eligible for full-text review. Of these, 14 did not report absolute CVD risk, three did not separately report results for people without CVD, four were study protocols or cohort profiles, five were reviews or did not contain primary data, and one reported only the coverage of CVD risk assessment. Five articles met our inclusion criteria. Studies included Aboriginal and/or Torres Strait Islander people (age range 18–76 years) from the Northern Territory[7-10], Queensland[10,11], Western Australia[10] and South Australia.[10] Approximately equal numbers of men and women were included, and all studies were of fair or good quality.

Two studies described absolute CVD risk profiles in Aboriginal and Torres Strait Islander communities.[9,10] High absolute CVD risk commenced at an early age, with approximately 6–9% of those aged 20–34 years having moderate (10–15% over 5 years) or high (>15% over 5 years) absolute CVD risk.[9,10]

There was evidence that the Framingham Risk Equation underestimated CVD risk by around 1.5–2.5 times when used alone, without applying criteria for clinically determined high risk.[8,11] In the study by Wang and Hoy, observed rates of coronary heart disease were estimated at 11 cases per 1000 person-years compared with a predicted rate of 4.4 per 1000 person-years estimated using the Framingham Risk Equation.[8] In the study by Hua

and colleagues, the probability of CVD events was 10% compared with a predicted probability of 6.8%.[11]

Two studies reported on the development of CVD risk scores for Aboriginal and Torres Strait Islander people, using age and waist circumference as predictors[7] or recalibrating the existing Framingham Risk Equation.[11] The first study developed simplified, sex-based charts for absolute 10-year CVD risk based on age and waist circumference.[7] Although waist circumference was found to be a better predictor of CVD than measurements of body mass index and waist-to-hip ratio, it is unclear whether these models perform better than those in current use, because they were not compared with the Framingham Risk Equation.[7] The rationale for using such simplified models in settings where direct measurements are readily available relevant to blood pressure, diabetes and cholesterol – the main ways in which adiposity affects CVD risk – is also not clear.

In the second study[11], the recalibrated score improved the ability to discriminate between people with and without CVD. However, the approach did not account for people at clinically determined high risk and was not externally validated.

Discussion

Overall, there is a dearth of empirical evidence to inform recommendations in Australian clinical guidelines for CVD risk assessment and management in Aboriginal and Torres Strait Islander people. Available evidence suggests that CVD risk starts early in Aboriginal and Torres Strait Islander people, and that the Framingham Risk Equation alone may underestimate CVD risk, at least in communities in remote northern Australia.[8,11] However, the algorithm used in national guidelines first categorises people with certain clinical conditions as being at high absolute CVD risk, and then only applies the Framingham Risk Equation to people without these conditions. Evidence published after the cut-off date for this review suggests that more than 75% of Aboriginal and Torres Strait Islander people classified as being at high risk are classified as such based on clinical criteria, rather than using the Framingham Risk Equation.[12] Therefore, there is no direct evidence on whether the algorithms in use underestimate Aboriginal and Torres Strait Islander CVD risk. It is also unclear how the Framingham Risk Equation performs in other communities. Risk scores should be calibrated specifically for the target population; although the study by Hua and colleagues[11] did this, this study has limited applicability and generalisability.

The paucity of evidence in this review highlights the need for more empirical evidence to inform guidelines. Additional evidence from data collation efforts across existing studies, such as the ongoing study on Cardiovascular Disease Risk Prediction in Indigenous Australians, will be informative for risk estimation, although limitations relating to sample size and generalisability remain. The main determinant of absolute CVD risk is the underlying age- and sex-specific hazard for the relevant population. Therefore, representative data on age- and sex-specific CVD incidence can be used to recalibrate risk scores to more accurately estimate risk in the target population. Hua and colleagues attempted to do this using CVD rates estimated from a cohort of participants from the Well Person's Health Check in remote Far North Queensland.[11] Broader use of these findings is limited by the use of the Framingham Risk Equation without preceding categorisation into high-risk groups using clinical criteria, and issues with generalising the results from this regional primary care population to other Aboriginal and Torres Strait Islander populations. An alternative, pragmatic and probably more generalisable approach is to use national statistics on Aboriginal and Torres Strait Islander CVD incidence rates, when linked hospital and mortality data become available, to revise the relevant algorithm, including recalibrating the Framingham Risk Equation and adjusting the risk threshold.[13]

Conclusion

There is currently little empirical evidence to inform national guidelines on the assessment and management of absolute CVD risk in Aboriginal and Torres Strait Islander people. Reducing CVD morbidity and mortality in Aboriginal and Torres Strait Islander people requires evidence-based guidelines, applying the best contemporary data to the issue and gathering new data.

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Competing interests

None declared.

Author contributions

SP, EP, LOJ, AD and KM undertook the systematic review. All authors contributed to drafting the manuscript or revising it critically for intellectual content.

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