

---

Charles Darwin University

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

Paige, Ellie; O'Donoghue Jenkins, Lily; Agostino, Jason; Pennings, Susan; Wade, Vicki; Lovett, Raymond; Daluwatta, Amanda; McLoughlin, Kirstie; Banks, Emily

*Published in:*  
Public health research & practice

*DOI:*  
[10.17061/phrp29231910](https://doi.org/10.17061/phrp29231910)

Published: 30/06/2020

*Document Version*  
Publisher's PDF, also known as Version of record

[Link to publication](#)

*Citation for published version (APA):*

Paige, E., O'Donoghue Jenkins, L., Agostino, J., Pennings, S., Wade, V., Lovett, R., Daluwatta, A., McLoughlin, K., & Banks, E. (2020). Aboriginal and Torres Strait Islander absolute cardiovascular risk assessment and management: systematic review of evidence to inform national guidelines. *Public health research & practice*, 30(2), 1-4. <https://doi.org/10.17061/phrp29231910>

**General rights**

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

**Take down policy**

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

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

Ellie Paige<sup>a,g</sup>, Lily O'Donoughue Jenkins<sup>a</sup>, Jason Agostino<sup>a,b</sup>, Susan Pennings<sup>c</sup>, Vick Wade<sup>d</sup>, Raymond Lovett<sup>a</sup>, Amanda Daluwatta<sup>a</sup>, Kirstie McLoughlin<sup>e</sup> and Emily Banks<sup>a,f</sup>

<sup>a</sup> National Centre for Epidemiology and Population Health, Research School of Population Health, Australian National University, Canberra, ACT

<sup>b</sup> Academic Unit of General Practice, Medical School, Australian National University, Canberra, ACT

<sup>c</sup> School of Philosophy, Australian National University, Canberra, ACT

<sup>d</sup> Rheumatic Heart Disease Australia, Menzies School of Health Research, Darwin, NT

<sup>e</sup> Department of Zoology, University of Oxford, UK

<sup>f</sup> Sax Institute, Sydney, NSW, Australia

<sup>g</sup> Corresponding author: [ellie.paige@anu.edu.au](mailto:ellie.paige@anu.edu.au)

## Article history

Publication date: June 2020

Citation: Paige E, O'Donoughue Jenkins L, Agostino J, Pennings S, Wade V, Lovett R, Daluwatta A, McLoughlin K, Banks E. Aboriginal and Torres Strait Islander absolute cardiovascular risk assessment and management: systematic review of evidence to inform national guidelines. *Public Health Res Pract.* 2020;30(2):e29231910. First published 29 August 2019. <https://doi.org/10.17061/phrp29231910>

## Introduction

Australia's absolute cardiovascular disease (CVD) risk assessment algorithm<sup>1</sup> 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.<sup>1-3</sup> 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.<sup>4</sup> Other international guidelines, such as those of Canada<sup>5</sup> and the US<sup>6</sup>, 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<sup>1</sup>, 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.<sup>1</sup>

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<sup>7–10</sup>, Queensland<sup>10,11</sup>, Western Australia<sup>10</sup> and South Australia.<sup>10</sup> 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.<sup>9,10</sup> 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.<sup>9,10</sup>

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.<sup>8,11</sup> 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.<sup>8</sup> In the study by Hua and colleagues, the probability of CVD events was 10% compared with a predicted probability of 6.8%.<sup>11</sup>

Two studies reported on the development of CVD risk scores for Aboriginal and Torres Strait Islander people, using age and waist circumference as predictors<sup>7</sup> or recalibrating the existing Framingham Risk Equation.<sup>11</sup> The first study developed simplified, sex-based charts for absolute 10-year CVD risk based on age and waist circumference.<sup>7</sup> 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.<sup>7</sup> 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<sup>11</sup>, 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.<sup>8,11</sup> 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.<sup>12</sup> 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<sup>11</sup> 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.<sup>11</sup> 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.<sup>13</sup>

## 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.

## Acknowledgements

This research was funded by a grant from the Australian Government Department of Health. The authors thank Rod Jackson for advice on CVD risk recalibration.

## Peer review and provenance

Externally peer reviewed, not commissioned.

## 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.

## References

1. National Vascular Disease Prevention Alliance. Guidelines for the management of absolute cardiovascular disease risk. NVPA; 2012 [cited 2019 Jun 12]. Available from: [cvdcheck.org.au/pdf/Absolute\\_CVD\\_Risk\\_Full\\_Guidelines.pdf](http://cvdcheck.org.au/pdf/Absolute_CVD_Risk_Full_Guidelines.pdf)
2. Central Australian Rural Practitioners Association. CARPA standard treatment manual: a clinic manual for primary health care practitioners in remote and rural communities in Central and Northern Australia. 7th ed. Alice Springs: CARPA; 2017 [cited 2019 Aug 27]. Available from: [www.remotephcmmanuals.com.au/home.html](http://www.remotephcmmanuals.com.au/home.html)
3. National Aboriginal Community Controlled Health Organisation and the Royal Australian College of General Practitioners. National guide to a preventive health assessment for Aboriginal and Torres Strait Islander people. 3rd ed. Melbourne: RACGP; 2018 [cited 2019 Jun 12]. Available from: [www.racgp.org.au/FSDEDEV/media/documents/Clinical%20Resources/Resources/National-guide-3rd-ed-Sept-2018-web.pdf](http://www.racgp.org.au/FSDEDEV/media/documents/Clinical%20Resources/Resources/National-guide-3rd-ed-Sept-2018-web.pdf)
4. New Zealand Ministry of Health. Cardiovascular disease risk assessment: New Zealand primary care handbook 2012 (updated 2013). Wellington: New Zealand Guidelines Group; 2013 [cited 2019 Jun 12]. Available from: [www.health.govt.nz/publication/new-zealand-primary-care-handbook-2012](http://www.health.govt.nz/publication/new-zealand-primary-care-handbook-2012)
5. Anderson TJ, Gregoire J, Pearson GJ, Barry AR, Couture P, Dawes M, et al. 2016 Canadian Cardiovascular Society guidelines for the management of dyslipidemia for the prevention of cardiovascular disease in the adult. *Can J Cardiol.* 2016;32(11):1263–82.
6. Goff DC, Jr., Lloyd-Jones DM, Bennett G, Coady S, D'Agostino RB, Gibbons R, et al. 2013 ACC/AHA guideline on the assessment of cardiovascular risk: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *Circulation.* 2014;129(25 Suppl 2):S49–73.
7. Adegbija O, Hoy W, Wang Z. Prediction of cardiovascular disease risk using waist circumference among Aboriginals in a remote Australian community. *BMC Public Health.* 2015;15:57.

8. Wang Z, Hoy WE. Is the Framingham coronary heart disease absolute risk function applicable to Aboriginal people? *Med J Aust.* 2005;182(2):66–9.
9. Burgess CP, Sinclair G, Ramjan M, Coffey PJ, Connors CM, Katekar LV. Strengthening cardiovascular disease prevention in remote indigenous communities in Australia's Northern Territory. *Heart Lung Circ.* 2015;24(5):450–7.
10. Matthews V, Burgess CP, Connors C, Moore E, Peiris D, Scrimgeour D, et al. Integrated clinical decision support systems promote absolute cardiovascular risk assessment: an important primary prevention measure in Aboriginal and Torres Strait Islander primary health care. *Front Public Health.* 2017;5:233.
11. Hua X, McDermott R, Lung T, Wenitong M, Tran-Duy A, Li M, et al. Validation and recalibration of the Framingham cardiovascular disease risk models in an Australian Indigenous cohort. *Eur J Prev Cardio.* 2017;24(15):1660–9.
12. Calabria B, Korda RJ, Lovett RW, Fernando P, Martin T, Malamoo L, et al. Absolute cardiovascular disease risk and lipid-lowering therapy among Aboriginal and Torres Strait Islander Australians. *Med J Aust.* 2018;209(1):35–41.
13. Moons KG, Kengne AP, Grobbee DE, Royston P, Vergouwe Y, Altman DG, et al. Risk prediction models: II. External validation, model updating, and impact assessment. *Heart.* 2012;98(9):691–8.

Copyright: 

© 2019 Paige et al. This article is licensed under the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International Licence, which allows others to redistribute, adapt and share this work non-commercially provided they attribute the work and any adapted version of it is distributed under the same Creative Commons licence terms. See: [www.creativecommons.org/licenses/by-nc-sa/4.0/](http://www.creativecommons.org/licenses/by-nc-sa/4.0/)