Cardiovascular risk screening beyond the Australian Cardiovascular Risk calculator: A guide for general practitioners

Chelsea Smith, Tarun Sen Gupta, Andrew Mallett, Anthony Leicht

Background
Cardiovascular disease (CVD) remains the leading cause of mortality worldwide. Despite the release of the updated Australian Cardiovascular Disease (AusCVD) Risk calculator, many general practitioners (GPs) have raised concerns regarding the calculator's ability to be 'personalised' to the patient. As a result, inappropriate investigations are ordered in an attempt to individualise cardiovascular disease risk.

Objective
The aim of this paper was to summarise the indications and pros and cons of different CVD screening tests to support GPs in managing a patient's CVD risk.

Discussion
We recommend that everyone above the age of 45 is screened with the AusCVD Risk calculator. If the patient's CVD risk is in doubt, a coronary artery calcium score may assist in sharpening the diagnosis. For those at high-risk, an exercise stress test, myocardial perfusion scan or computed tomography (CT) coronary angiography may be useful (provided they are conducted in safe environments) to determine the patients who require referral for specialist assessment.

THE PUBLICATION of the updated Australian Cardiovascular Disease (AusCVD) Risk calculator in late 2023 has improved the yield from screening for cardiovascular disease (CVD).[1] The calculator is based on the New Zealand PREDICT[1] model and incorporates additional risk factors important in the Australian population, such as socioeconomic status and ethnicity (eg Aboriginal and Torres Strait Islanders and South Asian migrant populations).[1] However, Bonner et al[2] noted in a 2024 qualitative study that many Australian general practitioners (GPs) still have concerns about the implementations of the AusCVD Risk calculator and its ability to be 'personalised' to the patient.[2] Further, there are currently no guidelines on alternative CVD screening tools that GPs can use when CVD risk assessments remain in doubt.[3] Subsequently, GPs may prescribe low-evidence tests to determine individualised CVD risk, such as the coronary artery calcium (CAC) score, even when it may not be indicated.[2] To date, there has been no review that summarises the strengths and weaknesses of CVD screening tests.

Aim

The aim of this brief review was to summarise the clinical indications, benefits and contraindications of different CVD screening tests for assessing a patient's individualised CVD risk.[2]

Discussion

The 2024 preventive guidelines ('Red Book') of The Royal Australian College of General Practitioners' (RACGP) recommend initial screening for CVD should commence for all asymptomatic patients between the ages of 45 and 79 using the AusCVD Risk calculator.[4] This tool calculates the absolute risk of a person having a cardiovascular event in the next 5 years based on their risk factors including age, sex, blood pressure, total cholesterol-high-density lipid ratio, presence of diabetes and smoking status.[1,4,5] Individuals are classified as either low (<5%), intermediate (5–10%) or high (>10%) risk for CVD. The AusCVD Risk calculator is based on the effective PREDICT equation; however, several limitations exist.[6,7] For example, the tool does not identify all people as high-risk for CVD prior to their first coronary event as it does not consider the influence of risk factors such as body composition or dietary and/or physical activity habits.[6,7] Moreover, risk calculators are less reliable for females with 45% of women with >2 CVD risk factors still being identified as low-risk despite having significant calcified coronary arteries.[6] Individuals' CVD risk can be assessed more accurately by considering additional risk factors and/or the CAC score.[4]

Following initial classification as low, intermediate or high CVD risk, the AusCVD Risk calculator allows for the input of additional risk factors (eg being an Indigenous Australian, socioeconomically disadvantaged

or a history of mental illness)[1,4] to modify the individual's risk category.[1,3] For practitioners who are concerned that a patient's risk may not be reflected accurately by the AusCVD Risk calculator, a CAC score may provide important additional information.[4] The CAC score quantitates the amount of calcium deposits in the coronary arteries that occur during atherosclerotic plaque formation and can be detected non-invasively via computed tomography (CT) scan.[8] People exhibiting a CAC score >101 and/or >75th percentile of the Australian population are deemed high-risk (>15% risk of CVD in ten years) and require further investigation and management.[8] The Multi-Ethnic Study of Atherosclerosis[9] reported that nearly 70% of people with low prediction risk nevertheless exhibited a large increase in CVD risk when their CAC score was >0, highlighting its utility when clinicians are faced with diagnostic uncertainty.[9,10] However, the CAC test has limitations with the score not identifying non-calcified plaques that may be present in a large proportion of high-risk individuals.[8] Further, the scan exposes individuals to potentially unnecessary radiation and costs a substantial amount ($AUD250–300 out-of-pocket), ruling it out for socioeconomically disadvantaged people who are at a greater risk of CVD.[8] Notwithstanding these barriers, if a person is reclassified as high-risk based on additional risk factors or their CAC score, further screening investigations are warranted to determine clinically appropriate interventions.

Using these various tests to identify individuals at high risk of a CVD event, together with individuals whose clinical history confirms that they are at high risk; for example, patients with ischaemic chest pain, allows the clinician to determine if early risk modifications need to be employed.[4,11] Tests available for the further assessment of patients at high risk include the exercise stress test (EST) and exercise stress echocardiogram, myocardial perfusion scan (MPS) and CT coronary angiography (CTCA).[4,11] To determine the test of choice, the patient's pre-test probability of having significant coronary artery disease (CAD) should be clinically evaluated.[11,12] For example, a patient with typical ischaemic chest pain in the absence of CVD risk factors, would be deemed to have a low pre-test probability making the EST the test of choice.[4,11,13] An EST is a non-invasive and low-cost screening tool that involves a person walking/running on a treadmill or cycling on a cycle ergometer while being monitored via an electrocardiogram (ECG) to detect myocardial ischaemic changes induced by exercise.[13] However, ESTs often have frequent positive results in the absence of obstructive CAD (eg angina with non-obstructive coronary arteries),[14] and frequent non-diagnosis because peak exercise stress is unable to be achieved or the patient's ECG is not interpretable (eg left bundle branch block).[11] An alternative when the patient's ECG is non-interpretable is the exercise stress echocardiogram where, instead of an ECG, an ultrasound of the heart (echocardiogram) is taken to assess the heart's anatomical structure and functional capacity under stress.[15] For people with an intermediate pre-test probability of CAD or a non-diagnostic EST or exercise stress echocardiogram, the MPS may be the preferred screening modality.[11] The MPS is a nuclear medicine procedure that uses a small dose of a radiotracer to identify myocardial ischaemia when placed under stress.[11] It has a higher sensitivity (89%) and specificity (75%) for obstructive CAD compared with EST.[11] Patients with equivocal findings from MPS can alternatively be evaluated with a CTCA, a non-invasive CT scan of the coronary arteries with contrast dye, which has an excellent negative predictive value (99%).[16] On the other hand, a patient with typical ischaemic chest pain with CVD risk factors would be deemed to have a high pre-test probability and should be referred to cardiology for consideration of a coronary angiogram.[11,12]

Based on RACGP guidelines and the limitations of the AusCVD Risk calculator, we have provided recommendations for CVD screening by GPs in Australia (Figure 1). To summarise these recommendations, all individuals above the age of 45 should be screened with the AusCVD Risk calculator.[4] Low-risk individuals should opportunistically be encouraged to modify their lifestyle (eg smoking cessation and weight loss).[3,4] Intermediate-risk individuals can be reclassified based on additional risk factors (eg ethnicity) or the CAC score.[8] Medical management of modifiable risk factors (eg anti-hypertensives, lipid-lowering therapy and oral hypoglycaemics) should be employed in this group.[3] High-risk individuals can be further investigated with the EST, exercise stress echocardiogram, MPS or CTCA to determine if a referral to cardiology is warranted.[4,11,13,15,16]

Conclusion

Screening for CVD remains complicated in the primary healthcare setting with no single screening test being deemed optimal.[2,6–8,11] Further, clinicians must evaluate the benefits of disease prevention with the risks of overdiagnosis and treatment when screening asymptomatic individuals.[17] Hence, a range of screening modalities with a simple flowchart for GPs to follow has been proposed and based on contemporary research.[4,18] Prior research has examined alternative tools and reported some to be simple, non-invasive and easy-to-interpret by GPs, such as heart rate variability[19] and arterial stiffness,[20,21] while others, such as novel CVD risk biomarkers (eg lipid, inflammatory, cardiac stress and genetic biomarkers) have performed poorly as sensitive and specific tests.[22,23] The continued search for new strategies to identify individuals who may benefit from appropriate preventive/early therapeutic interventions for CVD remains essential.[7] This brief review has summarised a simple process (Figure 1) to support clinicians to individualise their patients' care in primary health.

Key points

- Everyone above the age of 45 years should be screened with the AusCVD Risk calculator.
- If the identified risk is in doubt, a CAC score can be used, provided the patient is able to afford it.
- Patients who are high-risk, have a low pre-test probability for CAD, have an interpretable ECG and are able to tolerate exercise should be screened with an EST or, alternatively, an exercise stress echocardiogram.
- An MPS is advised for patients who are high-risk, have an intermediate-pre-test probability for CAD, have a non-interpretable ECG, are unable to exercise or have a non-diagnostic/equivocal EST.
- If a patient has an equivocal MPS, follow-up with a CTCA is recommended.

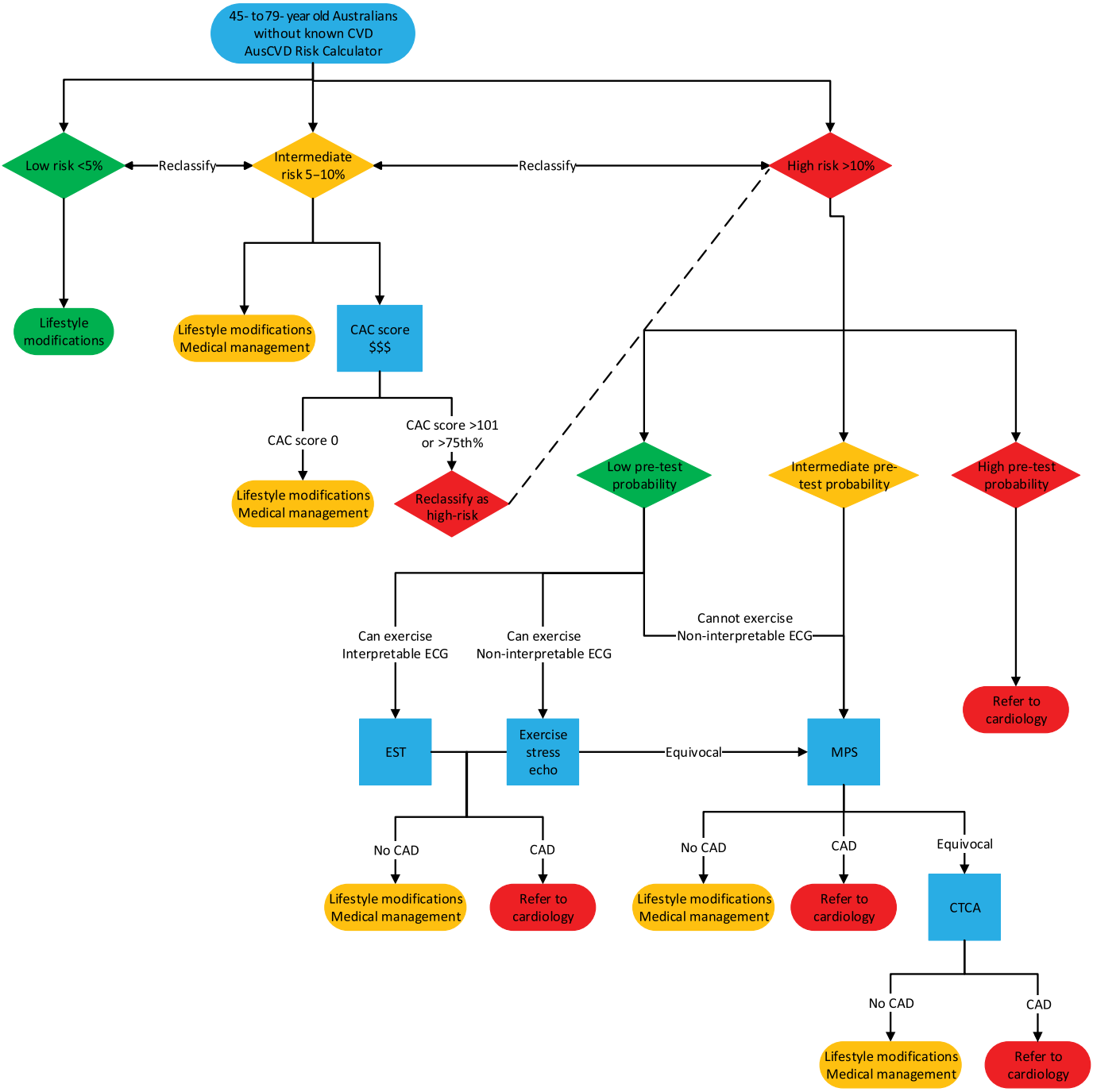

Figure 1. Recommended cardiovascular disease screening pathway to be used by general practitioners.

AusCVD Risk calculator, Australian cardiovascular disease risk calculator; CAC, coronary artery calcium; CAD, coronary artery disease; CVD, cardiovascular disease; CTCA, computed tomography coronary angiography; ECG, electrocardiogram; EST, exercise stress test; MPS, myocardial perfusion scan.

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