Cardiovascular disease risk screening in Australia: evidence and data gaps

Data on the expected effectiveness of a formal cardiovascular risk screening program are needed

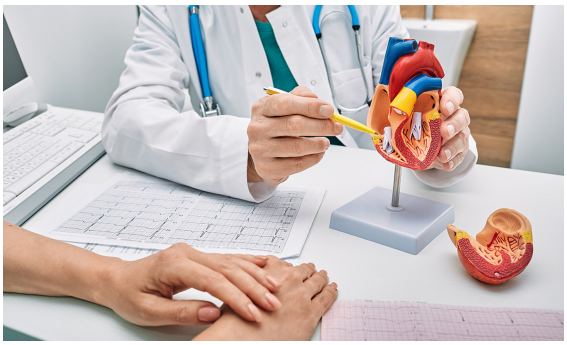
Population-based screening programs for early disease detection are important for preventing morbidity, disability, and premature death. Australia has five structured population-based health screening programs for cancer and for newborn conditions.[1] Australia's current guidelines for cardiovascular disease (CVD) prevention recommend risk assessment for the general population aged 45–74 years using a validated risk equation.[2] Yet, recent data show that less than 50% of eligible Australians have relevant risk factor data recorded in primary care to enable risk assessment,[3] and there are huge shortfalls and inequities in treatment for individuals at high risk.[4-6] Although enhancement of chronic disease risk assessment is identified as a priority in the 2021 Australian National Preventive Health Strategy,[7] no formal structured population screening programs are currently in place for CVD or related chronic diseases, such as chronic kidney disease (CKD) and diabetes. The Population Based Screening Framework sets out criteria to inform decision making on screening programs.[1] We outline the evidence and data gaps for a formal CVD risk screening program in Australia, including elements relating to diabetes and CKD, against key criteria of the Framework (Box).

Key Population Based Screening Framework criteria to inform decision making on national screening programs[1]

Criterion	Description	Assessment
1	The condition is an important health problem and has a recognisable latent or early symptomatic stage	Criterion met
2	The screening test should be highly sensitive and specific, validated, safe and acceptable	Criterion partly met
3	Systems should be in place for evidence-based follow-up assessment of all people with a positive screening test	Criterion met
4	The treatment must be effective, available, easily accessible and acceptable	Criterion met
5	There should be a high level of evidence from randomised controlled trials (RCTs), or systematic reviews of RCTs, of the benefit of screening for the disease or condition with a particular screening test and treatment in terms of reduction in burden of disease (morbidity and mortality)	Evidence gap; criterion not met

Criterion 1

CVD is a leading cause of death and morbidity in Australia and globally.[8] In 2019, CVD accounted for a quarter of deaths in Australia[9] and is estimated to cost the Australian economy around $5 billion annually.[10] Around 80% of CVD events are preventable through early detection of risk and treatment.[11,12] CVD typically develops slowly over many decades before acute events occur. The risk factors for CVD, many of which are shared with diabetes and CKD, are well established and there is direct evidence that addressing these factors leads to a reduced probability of developing CVD. A range of predictive scores are available to quantify an individual's future risk of experiencing CVD events, including myocardial infarction, stroke, and death from CVD. These risk equations can be used in asymptomatic individuals. There are also measures of atherosclerosis for subclinical disease detection including coronary artery calcium scoring, intima-media thickness measurement, and ankle brachial index,[13] but their validity varies and these measures are not broadly recommended in Australia.[2]



Criterion 2

CVD risk can be assessed in primary care settings using predictive equations with information on risk factors, including age, sex, smoking, diabetes, blood pressure and cholesterol. The Framingham risk equation, recommended for use in Australia's soon to be updated 2012 guidelines,[2] has been validated in several populations, including Australia.[14] CVD risk assessment is non-invasive and considered safe and acceptable, although it may raise anxiety in some patients. In certain circumstances, additional testing with coronary calcium scoring may also be used to target preventive treatments.

Sensitivity and specificity measures rely on being able to dichotomise outcomes based on people truly having or not having a disease and this being reflected in the screening test. Rather than diagnosing CVD, absolute CVD risk assessment quantifies

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the likelihood that an individual will experience a primary CVD event in given period of time. People above a specific threshold are considered at high risk and may be offered treatment. Risk treatment thresholds can change over time; if risk thresholds decrease (as has been typically observed around the world), then more people would be treated and more CVD events would be prevented. Thus, sensitivity and specificity are difficult to determine for absolute CVD risk assessment. In terms of the population that would be potentially treated, around 11.2% (95% CI, 10.2–12.2%) of the Australian population aged 45–74 years were estimated to be at high risk of a first time CVD event (> 15% risk over five years) in 2012.[4] For comparison, 11% of women are recalled after a first mammogram as part of the Australian national BreastScreen program.[15]

Criterion 3

The follow-up care of patients identified at high risk of CVD is embedded in Australian primary care and may include referral to allied health professionals and other specialists, further diagnostic testing and pharmacotherapy. Risk assessment usually occurs in primary care with general practitioners and practice nurses well equipped to conduct the screening activity and associated follow-up. Equity of access to medicines prescribed for the management of high CVD risk is through subsidy under the Pharmaceutical Benefits Scheme (PBS). Evidence-based guidelines for the assessment of CVD risk are available, and the Medicare Benefits Schedule currently supports this activity via items 699 and 177.

Criterion 4

Preventive treatments for those at high risk of developing CVD are cost-effective, safe, widely available, and acceptable. Evidence from large-scale randomised trials show that lipid- and blood pressure-lowering therapies reduce the risk of CVD events and all-cause mortality by around 25%.[16,17] Lipid- and blood pressure-lowering therapies are listed as a cost-effective intervention for preventing chronic disease in the population in both the Australian Assessing Cost-Effectiveness in Prevention (ACE-Prevention) study[18] and the World Health Organization's "Best Buy" interventions.[19] Treating CVD risk can also help tackle chronic diseases such as CKD, diabetes and dementia. Statins and blood pressure-lowering medications are readily available and subsidised through the PBS. Acceptability studies that have looked at patient preferences around statins found that people were more worried about clinical outcomes such as myocardial infarction and stroke than potential adverse effects of treatment.[20]

Criterion 5

Like many conditions, including cancer, the disease processes underpinning CVD operate on a continuum, with atherosclerosis typically starting many years before CVD is diagnosed. CVD risk assessment involves using a combination of a person's observable risk factors to identify individuals most likely to have a future event, generally within five to ten years. CVD events will still occur in people assessed as low risk, but treating those identified as high risk is international best practice and more effective than treating individual risk factors, such as high blood pressure. Due to the imperfect nature of risk assessment and the long subclinical disease period, RCTs assessing the clinical impact of CVD risk assessment would need to be large-scale and long term to detect changes in CVD outcomes.

A systematic review of systematic reviews found little evidence to support the clinical effectiveness of CVD risk assessment,[21] although small reductions in individual risk factor levels (smoking, systolic blood pressure, and cholesterol)[21] and predicted risk level[22] have been found. Overall, studies have generally been of poor quality, with short follow-up periods (maximum 18 months), and have not assessed CVD events and mortality.[21]

Conclusions

Absolute CVD risk assessment and treatment meets three, and partly meets a further one, of the five key criteria for disease screening programs in Australia. The key evidence gap for supporting structured population CVD risk screening in Australia is a lack of RCT evidence on the effectiveness of screening programs in reducing CVD events and mortality. However, RCTs of CVD risk screening programs would need to be large-scale and long term to be sufficiently powered to detect a change in clinical outcomes. Other data need to be considered in absence of RCT data for this criterion. There is precedence for this: cervical cancer screening in Australia was recommended based on the effectiveness of the individual components of screening and prevention, despite lacking RCT data on the screening program.

Likewise, there is strong evidence to support individual components of CVD prevention:

- universal CVD risk assessment and management is already recommended in local and international guidelines;[2,23,24]
- validated risk equations exist and are already used in primary care;[2]
- systematic reviews of RCTs consistently show that lipid- and blood pressure-lowering medications are safe and effective in reducing CVD events and deaths;[16,17]
- assessment and treatment are acceptable to most patients;[20] and
- there are primary care systems already in place to support the identification, treatment and follow-up of individuals identified as high risk.

A formal CVD risk screening program is likely to reduce the burden of CVD across the population, but we currently lack data to support this. This evidence gap could be bridged with models that combine high quality, large-scale data on components of CVD risk assessment and prevention to assess

the expected impact of population-wide screening. Similar modelling provided the evidence to underpin changes in bowel and cervical cancer screening.[25,26] Such models are lacking for CVD in Australia but are currently being developed. In the meantime, interventions that target chronic disease risk factors across the population, and improving systems for embedding CVD risk assessment, management and follow-up within primary care are crucial for continued prevention of CVD in Australia.

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