

MOH CLINICAL PRACTICE GUIDELINES 1/2011

Screening for Cardiovascular Disease and Risk Factors



College of Family Physicians, Singapore



Academy of Medicine, Singapore



Singapore Cardiac Society



Singapore Medical Association



MINISTRY OF HEALTH
SINGAPORE



Clinical Neuroscience Society, Singapore



Chapter of Cardiologists
College of Physicians,
Singapore



College of Radiologists,
Singapore



Chapter of Public Health &
Occupational Physicians,
Academy of Medicine, Singapore



Executive summary of key recommendations

This Executive Summary lists the recommendations in this CPG on the screening of cardiovascular disease and risk factors. Details of the recommendations listed can be found in the main text as the pages indicated.

Screening for cardiovascular risk factors

B All patients should be asked if they use tobacco and their smoking status be documented on a regular basis (pg 14).

Grade B, Level 2+

B Consistent update of smoking cessation status of every tobacco user is recommended at each clinical consultation (pg 15).

Grade B, Level 2+

D All patients aged 18 and older should be asked if they are participating in any physical activity and if so, the level, intensity and duration, of such activity (pg 15).

Grade D, Level 4

D It is recommended that each individual be screened for adherence to the Singapore Health Promotion Board's guidelines for healthy eating (pg 16).

Grade D, Level 4

C It is recommended that screening for obesity be done for individuals 18 years and older annually. The height, weight and waist circumference should be measured and the body mass index be calculated (pg 16).

Grade C, Level 2+

B It is strongly recommended that clinicians routinely screen men and women aged 40 years and older for lipid disorders (pg 18).

Grade B, Level 2++

GPP It is recommended that clinicians routinely screen younger adults (men and women aged 18 and older) for lipid disorders if they have other risk factors for coronary artery disease (pg 18).

GPP

GPP It is recommended that clinicians review patients' lipid levels at regular levels depending on the risk categories and whether on lipid modifying drug therapy (pg 19).

GPP

D Periodic screening for hypertension is recommended for all adults aged 18 years or older. Blood pressure should be measured at least once every 2 years for individuals with diastolic pressure below 80 mmHg and a systolic pressure below 130 mmHg (i.e. normal blood pressure). Measurements are recommended annually for persons with a diastolic blood of 80-89 mmHg or systolic blood pressure of 130-139 mmHg (i.e. high normal blood pressure). Persons with higher blood pressures or a major coronary risk factor such as diabetes mellitus require more frequent measurement (pg 19).

Grade D, Level 4

- D** The following procedures are recommended when recording BP:
- Allow the patient to sit or lie down for several minutes before measuring the BP.
 - The patient should refrain from smoking or ingesting caffeine during the 30 minutes preceding the measurement.

- Use a cuff with a bladder that is 12-13 cm X 35 cm in size, with a larger bladder for fat arms. The bladder within the cuff should encircle at least 80% of the arm.
- Use the disappearance of phase V Korotkoff sound to measure the diastolic BP.
- Measure the BP in both arms at the first visit.
- Take 2 or more readings separated by 2 minutes. Average these 2 values. If the first 2 readings differ by more than 5 mmHg, additional readings should be obtained and averaged.
- Measure the BP in both the standing and supine position for elderly subjects and diabetic patients.
- Place the sphygmomanometer cuff at the heart level, whatever the position of the patient.

(pg 19)

Grade D, Level 4

D Screening of asymptomatic individuals for type 2 diabetes mellitus should be carried out on an opportunistic basis. Testing should be considered in adults of any age who have one or more risk factors for diabetes. In those without risk factors, testing should begin at 40 years (pg 21).

Grade D, Level 4

D When screening for diabetes mellitus, fasting plasma glucose should be used. If the blood cannot be processed within 60minutes, the blood should be placed in a tube containing sodium fluoride (pg 21).

Grade D, Level 3

B In patients with typical symptoms, diabetes mellitus can be diagnosed if any one of the following is present:

Casual ^{b,c} plasma glucose	> 11.1 mmol/L
Fasting ^{d,e} plasma glucose	> 7.0 mmol/L
2h plasma glucose during oral glucose tolerance test ^f	> 11.1 mmol/L

- where the diagnostic criterion is met in the absence of typical symptoms, a second confirmatory test should be performed on another day.
- casual is defined as any time of day without regard to interval since last meal
- fasting is defined as no caloric intake for at least 8 hours
- fasting plasma glucose is the more convenient screening test when compared to the glucose tolerance test

- e. Subjects with fasting glucose from 6.1 to 6.9 mmol/L should undergo an oral glucose tolerance test
 - f. 75 g oral glucose tolerance test should be performed according to WHO recommendations.
- (pg 22) **Grade B, Level 2++**

GPP It is recommended that HbA1c not be used as a screening and diagnostic tool for diabetes mellitus until its performance in our multi-ethnic population has been evaluated (pg 22).

GPP

Screening for asymptomatic coronary artery disease

C In asymptomatic individuals it is recommended that the risk of cardiovascular disease first be estimated based on the global assessment of risk factors (pg 26).

Grade C, Level 2+

D The Framingham Risk Score adapted to the Singapore population should be used to give an estimate of an individual's risk of major coronary artery disease events (pg 27).

Grade D, Level 4

A People with diabetes should no longer be automatically assigned to the high risk category for cardiovascular risk. They should therefore be based on appropriate patients' coronary artery disease risk estimates (pg 27).

Grade A, Level 1++

C In low risk individuals (<10% 10-year risk of coronary artery disease) further testing for coronary artery disease is not routinely recommended (pg 28).

Grade C, Level 2++

C There is insufficient evidence to recommend for or against routine screening for coronary artery disease in asymptomatic individuals with intermediate (10-20% 10-year risk of coronary artery disease) or high risk (>20% 10-year risk of coronary artery disease). Given the lack of evidence, in intermediate and high risk asymptomatic individuals, further screening should be limited to the following selected situations:

- The exercise treadmill test (exercise treadmill testing) may be performed to: evaluate those with multiple risk factors as a guide to risk-reduction therapy; evaluate asymptomatic men older than 45 years of age and women older than 55 years of age who plan to start vigorous exercise, are involved in occupations in which impairment might impact public safety, or are at high risk for coronary artery disease because of other diseases; evaluate asymptomatic persons with diabetes who plan to start vigorous exercise.
- The coronary calcium score (CACs) on electron-beam computed tomography may be used in the intermediate coronary artery disease risk patient to decide if the patient should be reclassified to a higher risk status based on a high CACS.
(pg 29) **Grade C, Level 2++**

B The routine use of the resting ECG for screening for coronary artery disease in asymptomatic individuals is not recommended (pg 29).
Grade B, Level 2++

B Routine use of the exercise treadmill testing to screen for coronary artery disease in asymptomatic low-to-moderate risk individuals is not recommended. Its use among those in the highest risk group (10-year predicted coronary artery disease risk of 20%) may be considered (pg 30).
Grade B, Level 2++

D Cardiac stress imaging is not recommended for routine screening for coronary artery disease in asymptomatic patients at low risk (pg 31).
Grade D, Level 4

D Cardiac stress imaging or stress echocardiography may be considered in a patient who has moderate to high risk of coronary artery disease and abnormal exercise ECG (pg 32).
Grade D, Level 4

D Stress imaging is not useful for patients with no clinical risk factors who are undergoing intermediate-risk non-cardiac surgery. Such testing is also not useful for asymptomatic patients undergoing low-risk non-cardiac surgery (pg 33).
Grade D, Level 4

D Cardiac stress imaging may be considered as pre-operative screening in asymptomatic individuals prior to non-cardiac surgery whose: (a) functional status is poor (less than 4 Mets) or unknown, (b) undergoing vascular surgery or intermediate risk surgery (intra-peritoneal and intra-thoracic surgery, carotid endarterectomy, head and neck surgery, orthopaedic surgery, prostate surgery) with (c) 1 or more risk factors (history of heart disease, history of compensated or prior heart failure, history of cerebrovascular disease, diabetes mellitus, or renal insufficiency) and (d) in whom the results of testing will change management (pg 34).

Grade D, Level 4

D The use of coronary artery calcium score (CACs) by means of computerised tomography may be considered in selected situations, namely:

- asymptomatic patients with intermediate coronary artery disease risk (between 10% and 20% 10-year risk of estimated coronary events, based on the possibility that such patients might be reclassified to a higher risk status based on high CACS, and subsequent patient management may be modified,
- patients who have atypical cardiac symptoms but otherwise considered to be at low risk of coronary disease, who may benefit from CACS to help in ruling out the presence of obstructive coronary disease.

(pg 34)

Grade D, Level 4

D Use of CT coronary angiography as a screening test in low- and intermediate-risk asymptomatic persons is not recommended (pg 36).

Grade D, Level 4

C Carotid intima-media thickness measurement is not recommended for routine cardiovascular disease screening (pg 37).

Grade C, Level 2+

D It is recommended that the ankle brachial index (ABI) be considered as a screening test for individuals with high risk for peripheral vascular disease, namely

- Age less than 50 years, with diabetes and one other atherosclerosis risk factor (smoking, dyslipidemia, or hypertension).

- Age 50-69 years and history of smoking or diabetes.
 - Age 70 years and older.
- (pg 39)

Grade D, Level 4

B The ankle brachial index may be considered for purpose of reclassification of an individual who has intermediate risk of coronary artery disease (pg 39).

Grade B, Level 2+

Biochemical tests in cardiovascular screening

GPP For lipid screening, it is recommended that testing be carried out on a venous sample sent for laboratory analysis and not from a finger-prick capillary sample tested on a physician office or bedside testing device (pg 41).

GPP

B For lipid screening, it is recommended that a fasting venous sample should be collected for lipid levels of total cholesterol, triglycerides, high density lipoprotein cholesterol (HDL-C). The low density lipoprotein cholesterol (LDL-C) can be reported as a calculated value or as a directly measured result (pg 41).

Grade B, Level 2++

B Lipoprotein(a) determination is not recommended for routine cardiovascular screening (pg 42).

Grade B, Level 2++

C Further to a global cardiovascular risk assessment, lipoprotein(a) measurements may be useful in individuals with a strong family history of premature cardiovascular disease (pg 43).

Grade C, Level 2+

D Routine apolipoprotein B determination is not recommended (pg 43).

Grade D, Level 4

C It is recommended that caution be exercised in the application of high sensitivity C-reactive protein as a screening test as risk prediction is not established in Asians and in the elderly (pg 43).

Grade C, Level 2+

B The measurement of high sensitivity C-reactive protein is recommended only if the 10-year predicted risk based on standard global risk assessment is 5% or more (pg 44).

Grade B, Level 2+

GPP If the high sensitivity CRP concentration is <3 mg/L, it does not need to be repeated. If the value is >3 mg/L, repeat the measurement at least 2 weeks later with patient in stable state, free of infection or acute illness. Select the lower of the 2 results as the patient's value (pg 44).

GPP

GPP Plasma homocysteine measurement is not recommended in cardiovascular screening (pg 44).

GPP

B Fibrinogen measurement is not recommended for cardiovascular disease screening (pg 45).

Grade B, Level 2++

B Natriuretic peptides (BNP and NT-proBNP) measurement is not recommended for cardiovascular disease screening (pg 45).

Grade B, Level 2++

Screening for asymptomatic cardiovascular disease in diabetes mellitus and chronic renal disease

D Global cardiovascular assessment is recommended for all patients with diabetes mellitus (pg 46).

Grade D, Level 4

D It is recommended that the assessment of cardiovascular risk in persons with type 2 diabetes mellitus include a medical history, physical examination, blood pressure, fasting serum lipids, assessment of urine for microalbuminuria or proteinuria, and a resting ECG at baseline (pg 47).

Grade D, Level 4

D For asymptomatic individuals with diabetes above 40 years of age and intending to engage in more than low intensity exercise, a pre-exercise evaluation and a graded exercise stress ECG are recommended (pg 48).

Grade D, Level 4

D In patients at risk of chronic kidney disease, screening for risk factors for cardiovascular disease and for coronary artery disease is recommended at baseline and when patients become symptomatic of renal disease (pg 49).

Grade D, Level 4

D Since the single most important determinant of cardiovascular disease burden is the severity of chronic kidney disease, screening for the presence and level of renal impairment is recommended (pg 49).

Grade D, Level 4

Screening for abdominal aortic aneurysm, peripheral arterial disease, cerebrovascular disease and atrial fibrillation

B Routine ultrasonographic screening of men 65 years and older for abdominal aortic aneurysm may be considered, particularly in those who have ever smoked (current and former smokers) (pg 52).

Grade B, Level 2++

B Routine screening for abdominal aortic aneurysm in women is not recommended (pg 52).

Grade B, Level 2+

D Routine screening for carotid artery stenosis is not recommended (pg 53).

Grade D, Level 4

GPP Routine screening for cerebrovascular disease by MRI is not recommended (pg 54).

GPP

B Opportunistic screening for atrial fibrillation should be routinely performed for all patients by examining the rate and rhythm by pulse palpation, followed by ECG if atrial fibrillation is suspected (pg 54).

Grade B, Level 2++

Pre-participation screening for exercise

D Pre-participation screening should be done on risk-stratified groups of athletes (pg 58).

Grade D, Level 4

D All sports participants and national athletes should preferably undergo an appropriate level of annual pre-participation screening (pg 60).

Grade D, Level 4

D Sports participants involved in strenuous sporting activities, but at a less competitive level than national athletes, should be encouraged to undergo voluntary pre-participation screening (pg 60).

Grade D, Level 4

D Participants in sports and recreational activities should be encouraged to complete a self-administered pre-participation screening questionnaire annually, and consult a doctor if the questionnaire indicates it (pg 61)

Grade D, Level 4

D For pre-participation screening, a two- or more stage screening process is encouraged, where the first stage consists of personal and family history taking and physical examination. Based on the findings of the first stage, further tests such as a resting ECG (if not already done), chest X-ray, exercise stress test, echocardiogram, blood investigations, urine tests, etc. may be ordered if indicated (pg 61).

Grade D, Level 4

GPP Abbreviated screening protocols are acceptable in the intervening years between the full screening (pg 61).

GPP

Levels of evidence and grades of recommendation

Levels of evidence

Level	Type of Evidence
1 ⁺⁺	High quality meta-analyses, systematic reviews of randomised controlled trials (RCTs), or RCTs with a very low risk of bias
1 ⁺	Well conducted meta-analyses, systematic reviews of RCTs, or RCTs with a low risk of bias
1 ⁻	Meta-analyses, systematic reviews of RCTs, or RCTs with a high risk of bias
2 ⁺⁺	High quality systematic reviews of case control or cohort studies. High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal
2 ⁺	Well conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal
2 ⁻	Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal
3	Non-analytic studies, e.g. case reports, case series
4	Expert opinion

Grades of recommendation

Grade	Recommendation
A	At least one meta-analysis, systematic review of RCTs, or RCT rated as 1 ⁺⁺ and directly applicable to the target population; or A body of evidence consisting principally of studies rated as 1 ⁺ , directly applicable to the target population, and demonstrating overall consistency of results
B	A body of evidence including studies rated as 2 ⁺⁺ , directly applicable to the target population, and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 1 ⁺⁺ or 1 ⁺
C	A body of evidence including studies rated as 2 ⁺ , directly applicable to the target population and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 2 ⁺⁺
D	Evidence level 3 or 4; or Extrapolated evidence from studies rated as 2 ⁺
GPP (good practice points)	Recommended best practice based on the clinical experience of the guideline development group

