Cardiovascular Risk Assessment

Introduction

Risk assessment tools to estimate the patient's 10-year risk of developing cardiovascular disease (CVD) should be used to identify high-risk people for primary prevention. The National Institute for Health and Care Excellence (NICE) guidance, last updated in 2016[1], recommends the use of the QRISK®2 calculator, but this has been superseded by the QRISK®3 calculator, which is cited as the tool of preference in the NICE/Clinical Knowledge Summaries (NICE/CKS) assessment[2].

Those calculators which are based on the Framingham risk equation may overestimate risk in UK populations. This may be as much as 5% for UK men[3].

How to use the assessment tools

A systematic strategy, rather than a primarily opportunistic approach, should be adopted[1].

The tools are an aid to making clinical decisions about how intensively to intervene on lifestyle and whether to use antihypertensive and lipid-lowering medication. A patient-centred approach is essential and the risk assessment should be documented in the record[1]. Decisions on treatment should be made after full explanation, and due note taken of the patient’s needs and preferences[1].

Once all risk factors have been identified, cardiovascular risk charts or calculator should be used to estimate the total risk of developing CVD over the following 10 years. People with a total CVD risk of over 10% over 10 years should be offered lipid-lowering treatment with a statin[1]. People with moderate-to-high risk are more likely to be compliant with lifestyle changes and preventative medication if given information about their individual cardiovascular risk[4, 5].

Who should NOT use them[2]

Formal risk assessment is not necessary for the following people, as they are considered already to be at high enough risk to justify lifestyle and other interventions (antithrombotic, antihypertensive and lipid-lowering therapies).

- Patients over 85 years - these patients should be considered as being at high risk because of age alone, especially if they also smoke or have hypertension.
- Patients with pre-existing atherosclerotic CVD.
- Patients at high risk of developing CVD because of familial hypercholesterolaemia, or other inherited disorders of lipid metabolism as identified by Simon Broome diagnostic criteria[6].

For people with the following conditions, a CVD risk assessment is not required as they are automatically considered at high risk of CVD. However, if such patients are reluctant to take a statin, a CVD risk assessment may help them to make an informed choice:

- Type 1 diabetes mellitus.
- Chronic kidney disease (CKD) stages 3, 4, or 5.

The QRISK®3 calculator

This calculator was derived from data of a cohort of 1.28 million anonymised UK primary care patients without evidence of diabetes mellitus or CVD. They were followed for 10 years, looking for the first development of CVD as an endpoint[7].

QRISK®3 is the recommended formal risk assessment tool to assess CVD risk for the primary prevention of CVD in people up to and including the age of 84 years. Adults aged 85 years and over and those with existing CVD, type 1 diabetes, CKD or familial hypercholesterolaemia should be considered to be at an increased risk of CVD events without using QRISK®3[8].

The current version of the calculator (QRISK®3) uses the following parameters (if known - missing values are calculated by a complex averaging procedure called multiple imputation)[9]:

- Patient age (25-84).
- Patient sex.
- Ethnicity.
- Smoking status (non, ex, light, moderate, heavy).
- Diabetes.
- Angina or heart attack in a first-degree relative <60 (yes/no).
- CKD stage 3, 4 or 5.
- Atrial fibrillation.
- Existing treatment with blood pressure agent (yes/no).
- Postcode (postcode-related Townsend score) - a geographical measure of deprivation.
- Migraines.
- Rheumatoid arthritis.
- Systemic lupus erythematosus (SLE).
- Severe mental illness, including schizophrenia, bipolar disorder or moderate/severe depression.
- Atypical antipsychotics.
- Regular steroid tablets.
- Diagnosed erectile dysfunction.
- BMI (height and weight).
- Systolic blood pressure (use current not pre-treatment value).
- Total and HDL cholesterol.
- Self-assigned ethnicity (should not be confused with nationality).

The calculator is available at [http://www.qrisk.org](http://www.qrisk.org).

An advanced calculator is also available at [www.qintervention.org](http://www.qintervention.org) which combines QRISK® with QDScore® (which calculates risk of diabetes) and also enables you to work out how the risk would change with various interventions such as losing weight, better blood pressure control, use of statins and stopping smoking.

**Advantages**

- Works over a wider age range (30-84) instead of 35-74 years which means it better meets QOF requirements.
- Calculated risk is calibrated to the contemporary UK population, so is likely to provide more appropriate risk estimates to help identify high-risk patients.
- Calculated risk is adjusted for additional variables - obesity, social deprivation, ethnicity, rheumatoid arthritis and current treatment with antihypertensives.
- It has been validated in the UK using an alternative research database.[10]
- It is updated every year to ensure that it takes account of changes in the population (obesity is rising, smoking rates are falling); improvements in data quality (eg, more patients' ethnicity recorded) and changes in national guidelines and requirements (such as the extended age range now in QOF).

**Disadvantages**

- It is less well established than Framingham. However, QRISK® is now integrated into all major GP computer systems and included in national guidelines.

**Joint British Societies' Coronary Risk Prediction Chart**

The *Joint British Societies' Coronary Risk Prediction Chart* has been used for many years. The Joint British Societies' (JBS3) risk calculator can be used to estimate both 10-year risk and lifetime risk of CVD in all individuals except for those with existing CVD or certain high-risk diseases, ie diabetes age >40 years, patients with CKD stages 3-5, or familial hypercholesterolaemia[11].

The use of these charts is not appropriate for patients with established CVD, familial hypercholesterolaemia or other inherited dyslipidaemias, chronic renal dysfunction or type 1 or 2 diabetes mellitus.

**Method**

- To estimate an individual's absolute 10-year risk of developing CVD, choose the table for his or her gender, glucose level (normal or impaired), smoking status (smoker/non-smoker) and age.
- Within this square, define the level of risk according to the point where the co-ordinates for systolic blood pressure and the ratio of total cholesterol to HDL cholesterol meet.
- Higher-risk individuals are defined as those whose 10-year coronary heart disease (CHD) risk exceeds 15%, which is equivalent to a combined risk of CHD and stroke (cardiovascular risk) of >20% over the same period.

**Patient data required are as follows**

The initial blood pressure and the first random (non-fasting) total cholesterol and HDL cholesterol are used to estimate an individual's risk. However, the decision on using drug therapy should generally be based on repeat risk factor measurements over a period of time.

- Gender.
- Age (years).
- Systolic blood pressure (mm Hg).
- Smoking status (yes/no): smoking status should reflect lifetime exposure to tobacco and not simply tobacco use at the time of assessment (eg, those who have given up smoking within five years should be regarded as current smokers for the purposes of the charts).
- Total cholesterol
- HDL cholesterol (if no HDL cholesterol result is available, assume this is 1 mmol/L and the lipid scale can be used for total serum cholesterol alone).

**Inaccuracies of the charts**

All charts are based on groups of people with untreated levels of blood pressure, total cholesterol and HDL cholesterol. The use of these charts is not appropriate for patients who have existing diseases which already put them at high risk - eg, pre-existing CVD, familial lipid disorders, renal dysfunction or established hypertension or diabetes with associated target organ damage.
As a result, CHD risk is higher than indicated in the charts for[2]:

- Those with a family history of premature CHD (male first-degree relatives aged less than 55 years and female first-degree relatives aged less than 65 years) which increases the risk by a factor of approximately 1.5.
- Those with raised triglyceride levels.
- Women with premature menopause.
- Those who have not yet developed diabetes but have impaired fasting glucose (6.1-6.9 mmol/L).
- As the person approaches the next age category. Risk increases exponentially with age so the risk will be closer to the higher decennium for the last four years of each decade.
- High-risk ethnic groups such as South Asians will have their risk underestimated. This is because the charts have not been validated in these populations. For example, in people originating from the Indian subcontinent it is safest to assume that the CVD risk is higher than predicted from the charts (1.4-1.5 times). QRISK®3 takes ethnicity into account.
- Inaccuracies in estimating risk may also occur in people already taking antihypertensive treatment. In this group, when considering whether to introduce lipid-lowering medication, the charts can act as a guide but, unless recent pre-treatment risk factor values are available, it is generally safest to assume that CVD risk is higher than that predicted by current levels of blood pressure or lipids on treatment.

**Further reading & references**

1. Cardiovascular disease: risk assessment and reduction, including lipid modification; NICE Guidance [CG181] (July 2014 - last updated 2016)
2. CVD risk assessment and management; NICE CKS, March 2019 (UK access only)
8. Cardiovascular risk assessment and lipid modification; NICE Quality Standard, September 2015

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