Rapid, online self-assessment of individual risk for cardiovascular events in "apparently healthy" persons according to the new ESC Guidelines

ESC
European Society
of Cardiology

ACCA
Acute Cardiovascular
Care Association

EACVI
European Association of
Cardiovascular Imaging

EAPC
European Association
of Preventive Cardiology

EAPCI
European Association of
Percutaneous Cardiovascular
Interventions

EHRA
European Heart
Rhythm Association

HFA
Heart Failure
Association

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Despite tremendous progress in the diagnosis and treatment of cardiovascular diseases (CVD), CVDs remain the number one killer in most countries. Therefore, more efforts must be made regarding awareness, especially in "apparently healthy" persons. The new ESC Guideline on CVD prevention offers two new risk calculators: the SCORE2 (40 to 69 years) and the SCORE2-OP (≥ 70 years). The calculators can be rapidly and easily used online by "apparently healthy" persons themselves or by their health care provider. In many cases, especially in low-risk countries, "risk modifiers", such as the measurement of the coronary calcium score, are additionally useful. Specific recommendations are derived from the determination of the final risk category.

Take-Home Messages

Despite tremendous progress in the diagnosis and treatment of cardiovascular diseases, they are still the number one cause of death in most countries, especially in Europe. In 2020, approximately four times more men and women died in Germany from CVD than from COVID-19 [1]. These facts alone show that the general population has to be much better informed about cardiovascular risks and their consequences.

In 2021, the ESC published an update of its guideline for primary and secondary prevention of cardiovascular diseases (CVD) [2,3]. It comprises 78 pages of text and figures, citing 837 scientific references. The focus of this article is on "pure" primary prevention: how to rapidly assess an individual's risk of developing a CVD event (defined as heart attack, stroke or cardiovascular death in "apparently healthy" persons) and the therapeutic consequences. "Apparently healthy" persons are defined as having no diabetes mellitus and no history of familial hypercholesterolaemia or chronic kidney disease. The concept of the new guideline is a stepwise and personalized approach.

General recommendations for all persons

For all persons - independent of their individual CVD risk - the recommendations in Step 1 are to be followed (Table 1). Further recommendations are: an upper limit of waist circumference of 102 cm in men and 88 cm in women; there are no known beneficial effects of vitamins and food supplements.

Table 1. Modifiable cardiovascular risk factors.

- Blood pressure <140/90 mmHg, optimal at rest <120/80 mmHg (I A)

- Aerobic physical activity: moderate intensity at least 150 - 300 minutes/week or of vigorous intensity of at least 75 - 150 minutes/week (I A)

- Additionally, resistance exercise ≥2x per week (I B)

- Persons not being able to do so, should stay as active as their abilities and health condition allows (I B).

- Mediterranean (or similar) diet (I A)

- Replacement of saturated with unsaturated fats (I A), including olive oil

- Preference of a more plant-based food pattern, rich in fibre, including whole grains, fruits, vegetables, pulses and nuts (I B)

- Fatty fish, at least once a week (I B)

- Restrict (processed) red meat (I B)

- Alcohol consumption reduced to < 100g/week (I B)

- Avoid sugar-sweetened beverages (I B)

- All smoking of tobacco should be stopped (I A)

- In selected cases nicotine replacement therapy, Varenicline, Bupropion or in combination should be considered (IIa A).

- BMI (Body Mass Index) optimally 20 - 25 kg/m^2 (I A)

- Bariatric surgery for obese high-risk individuals should be considered when lifestyle changes do not result in maintained weight loss (IIa B).

Treatment goals and levels of recommendations for general measures in primary prevention of all "apparently healthy" persons - independent of the individual risk (Step 1).

Special recommendations depending on the individual 10-year risk for a CVD event:

The determination of the individual CVD risk in asymptomatic men <40 years and women <50 years without any known cardiovascular risk factors is not recommended (III C).

a) New scores to calculate the Individual risk for a CVD event in men ≥40 and women ≥50 years

Over the last 30 years, a number of algorithms have been created to determine an individual's risk for the development of a CVD, including the FRAMINGHAM, ASCVD, REYNOLDS and the PROCAM risk scores [3-5]. Since each score uses different risk factors with different weighting factors, the results for a specific person can be conflicting and therefore confusing [4,5].

According to the new ESC guideline, the risk for a fatal or nonfatal CVD event during the next 10 years should be calculated in all "apparently healthy" persons with at least one CVD risk factor (I B). The ESC risk calculator from the previous guideline, SCORE, was updated and is now called SCORE2 [6], and is valid for persons from 40 to 69 years. It can be rapidly and easily calculated online here:

https://u-prevent.com/calculators/score2.

For persons ≥70 years, the new SCORE2-OP [7] ("older persons") has been introduced and can be easily accessed here: **https://u-prevent.com/calculators/score2OP**.

The following parameters are included in both scores: age, gender, nicotine consumption, systolic blood pressure, total cholesterol, HDL- and LDL-cholesterol. In addition, in SCORE2-OP, diabetes mellitus is incorporated. Both scores are adapted regionally. For example, France, Spain and Denmark are countries of low risk, Germany, Italy and Sweden of moderate risk, Poland and Turkey of high risk and Lithuania and Russia of very high risk. For both calculators, medical doctors, their assistants, non-medical personnel and especially the "apparently healthy" persons themselves can rapidly and easily assess their personal risk for developing a heart attack, stroke or cardiovascular death within the next 10 years.

The results are classified into three categories (Table 2). For persons at low to moderate risk, the Step 1 lifestyle modifications (Table 1) are usually sufficient, additional medical therapy is usually not necessary. For persons at high risk, in addition to Step 1, medical treatment of the risk factor(s) should be considered (Step 2). In persons at very high risk, the medical treatment of the risk factor(s) is generally recommended (I B).

Table 2. Risk categories in primary prevention.

Risk Categories	40-49 Years	50-69 Years	≥70 Years
Low to Moderate Risk	<2.5%	<5%	<7.5%
High Risk	2.5% to <7.5%*	5% to <10%*	7.5% to <15 %**
Very High Risk	≥7.5%*	≥10%*	≥15%**

The numbers reflect the results using the SCORE2 resp. SCORE2-OP calculators to determine the individual, age-dependent risk of "apparently healthy" persons for a heart attack, stroke or cardiovascular death within the next 10 years. For persons at low to moderate risk, Step 1 is usually sufficient (Table 1). In addition to Step 1, for persons at high or very high risk, statins are recommended at a IIa C (*) or at a IIb B (**) level. Regarding "risk modifiers", please see text.

Risk modifiers:

For persons <50 years and a risk factor of <7.5% as well as for persons 50 - 69 years with a risk of <10% and for persons ≥70 years with a risk of ≥ 7.5%, the initially calculated risk should be reclassified according to the so called "risk modifiers" to obtain the "true risk". A recently published population-based cohort study included 66,909 "apparently healthy" white low-risk Europeans (aged 40-69 years) with a follow-up of 9.2 years [8]. The prognostic value of the ESC SCORE2 was compared with the American College of Cardiology and the American Heart Association (ACC/AHA), the UK's National Institute for Health and Care Excellence (NICE) and the 2019 ESC/European Atherosclerosis Society (EAS) scores regarding the occurrence of CVD events. For the SCORE2, only 4% qualified for a statin indication, compared with 34% for the ACC/AHA, 26% for the NICE and 20% for the 2019 ESC/EAS scores. Although this study concluded that the SCORE2 dramatically reduces eligibility for primary prevention with statins in low-risk European countries, it did not consider risk modifiers like coronary artery calcium score or carotid ultrasound.

Coronary calcium score:

The coronary artery calcium (CAC) score has been proven to be independent of the traditional cardiovascular risk factors. It is measured by cardiac computed tomography (CT) without application of contrast agent and at a low radiation dose (<1 mSv). It can considerably increase or decrease the initially calculated risk for a CVD event [9,10]. The guidelines recommend the CAC score especially for borderline risk categories, such as those between "low and high" risk or between "high and very high" risk (IIb B). This can be very helpful in younger persons to detect a risk of CVD early [11,12]. While the CAC score is a valid predictor of CVD events, one cannot draw conclusions about the presence of relevant epicardial coronary stenoses. Whether a non-invasive coronary angiography with contrast agent provides more relevant information than the CAC score alone is currently not known, according to the ESC guideline. Unfortunately, the ESC guideline does not provide recommendations on how to exactly integrate the risk modifiers into either SCORE2 or SCORE2-OP. For this purpose, other risk calculators such as the MESA score can be useful: **https://www.mesa-nhlbi.org/MESACHDRisk/MesaRiskScore/RiskScore.aspx**.

In the USA guideline there is a clear recommendation to use statins, if the CAC score is >100 [13,14].

Carotid ultrasound:

Measurement of the IMT (intima-media thickness) is not recommended by the ESC guideline [3] (III A). Since the prognostic value of carotid plaques as regards the prediction of future CVD events has not been as thoroughly investigated as the CAC score ("CAC scoring is the best-established imaging modality to improve CVD risk stratification"[2]), the new ESC guideline recommends carotid ultrasound for reclassification only if "CAC scoring is unavailable or not feasible" (IIb B).

Further risk modifiers:

Ethnic as well as genetic factors (i.e., positive family history) can be used as risk modifiers, as well as psychosocial or socioeconomic determinants. Measurement of the ankle brachial index or arterial stiffness are only of limited value. In view of the lack of convincing evidence that it improves CVD risk reclassification, echocardiography is not recommended in this context. The assessment of genetic risk scores, circulating or urinary biomarkers is not recommended (III B).

b) Treatment goals for LDL-cholesterol according to the individual risk for CVD events:

In persons at low to moderate risk (Table 2), Step 1 is usually sufficient (Table 1). In persons at high or very high risk, the therapeutic goal for the LDL-Cholesterol is pivotal. This goal can be usually achieved by lipid lowering medications (Step 2). Please note that persons can shift to a lower risk group e.g., by stopping smoking.

> Treatment goal for persons <70 years and high-risk:
> LDL-Cholesterol <70 mg/dl (<1,8 mmol/L) (IIa C)
>
> Treatment goal for persons <70 years and very high-risk:
> LDL-Cholesterol <55 mg/dl (<1,4 mmol/L) (IIa C)

For persons ≥70 years, the same targets are recommended but at a lower level of recommendation (IIb B).

In the new ESC guideline, patients with diabetes mellitus are not included as "apparently healthy" persons. For these patients, another dedicated risk calculator has been developed, the ADVANCE risk score: **https://u-prevent.com/calculators/advanceScore**.

For the diagnosis of diabetes mellitus, measurement of fasting glucose and HbA1c are preferred over oral glucose tolerance testing. For patients with diabetes mellitus without known CVD, a HbA1c <7% (I A) or even <6.5% (IIa B) is recommended. The goal for LDL-Cholesterol is analog to "apparently healthy" persons (see above) but at a Class I indication.

For antithrombotic treatment (e.g., low-dose ASA), there is no recommendation for persons at low, moderate, or high-risk (III A). In persons at very high-risk, an antithrombotic treatment might be reasonable – depending on the individual balance between ischaemic and bleeding risk – in accordance with the latest recommendations from the USA [15].

New to the prevention guidelines is the recommendation for persons at (very) high risk for CVD events to avoid long-term exposure to regions with high levels of air pollution (IIb C). In regions where people have long-term exposure to high levels of air pollution, CVD risk screening programmes may be considered (IIb C). Also new is the appeal to politicians to reduce the impact of the climate change.

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Notes to editor

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