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1. Preamble

HeartScore® is the electronic counterpart of the **SCORE** (Systematic Coronary Risk Evaluation) risk charts and is a unique and interactive tool for predicting and managing the risk of heart attack and stroke in Europe. It is aimed at supporting clinicians to optimise individual cardiovascular risk reduction.

The programme is based on the 2007 European Guidelines on CVD Prevention and offers two European versions based on the SCORE risk charts: "European Low Risk" and "European and "European High Risk".

HeartScore® also enables the **development of country-specific versions**. This will allow **tailored advice in local language**.

HeartScore® is a primary prevention tool. Patients at high risk of ongoing atherosclerotic disease need appropriate secondary prevention. HeartScore® gives risk estimates for subjects without prior cardiovascular diseases.

2. Benefits of using HeartScore

- Allows quick & easy risk estimation
- Gives a graphical picture of absolute CVD risk (based on SCORE data)
- Helps optimise the potential benefits of intervention
- Identifies the relative impact of modifiable risk factors
- Offers direct access to relevant information in current guidelines
- Gives a tailored printed health advice based on actual risk profile to your patient
- Encourages behavioural change & compliance to treatment

3. Accessing HeartScore®

3.1. Technical Requirements & recommendations

- To access HeartScore®, you will need a Web browser (i.e. Internet explorer, FireFox) and an Internet connection (a low bandwidth modem line 56kb/s is sufficient)
- HeartScore® has been optimized for Internet Explorer 6 as web browser and for a screen definition of 1024x768 pixels.
- Setting up a HeartScore User account is free, but users are required to register via My ESC on the ESC website www.escardio.org

3.2. Accessing HeartScore®

- Enter the following address : <http://www.heartscore.org>
- Select your HeartScore® version (PC, Web-Based, European or National version)
- Click on the **Access HeartScore®** button on the welcome page
- Enter your **login** and **password** (My ESC) when prompted (A disclaimer is displayed on the first connection to HeartScore)



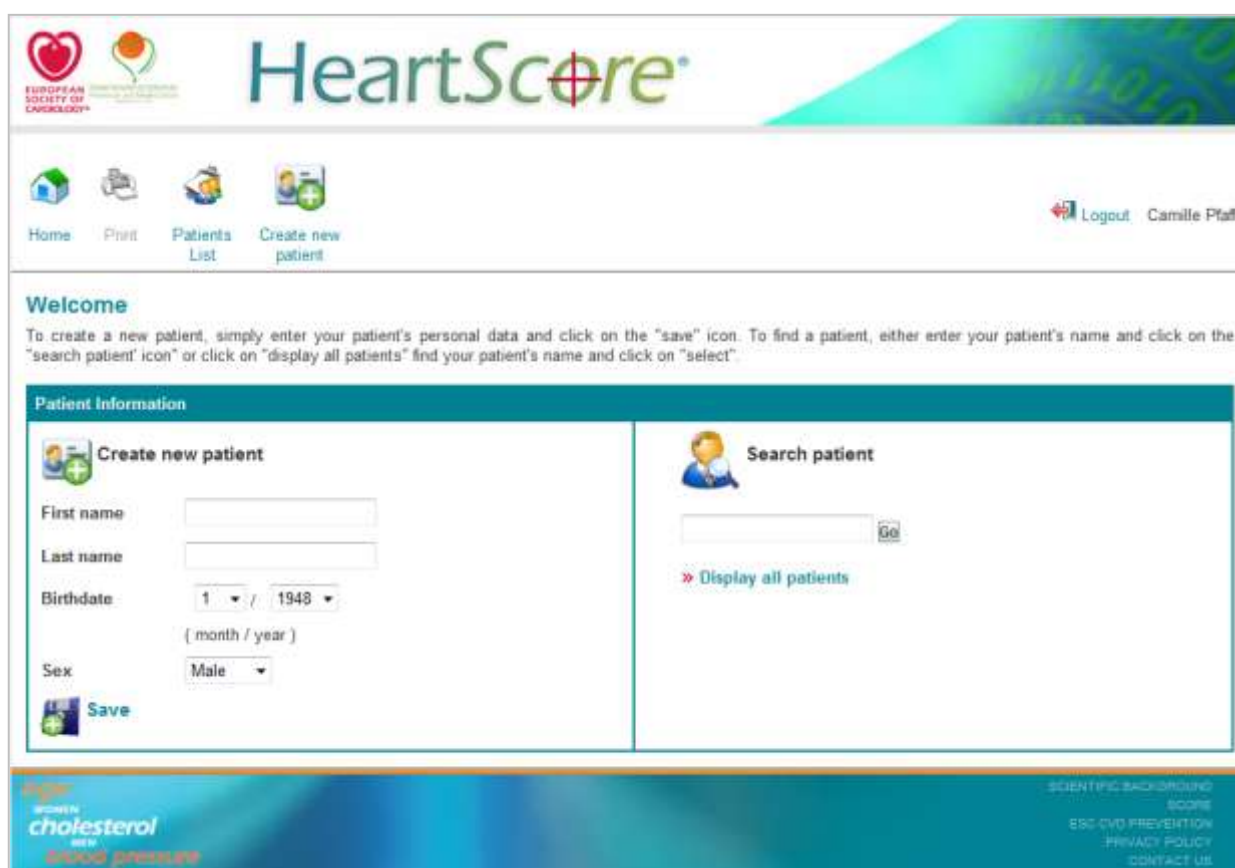
The screenshot shows the login interface of the HeartScore website. At the top, there are logos for the European Society of Cardiology and HeartScore. Below the logos, there are navigation links for 'Home' and 'Print'. The main section is a 'Login' form with fields for 'UserName' and 'Password', a 'Remember me' checkbox, and a 'GO' button.

4. HeartScore® Web Application Home page

Navigation buttons are displayed at the top left hand corner of the HeartScore® pages



Figure 1 : HeartScore Web Application Home Page



4.1. Create a new patient

To create a new patient, enter his/her information:

- first name
- last name,
- birth date (MM & YYYY)
- gender (Male/Female).
- click on the **<Save>** button

This action will then display a page summarizing the newly created patient's personal details: the **patient card**. (see section 5).



Search patient

4.2. Searching a patient

- To search from a keyword: enter your keyword and click on the <Go> button
- To display the full list: click on **<Display all patients>**.

The patient list:

Click on one of the column names to sort patients by name/ first name/ birth-date/ gender.




The <Select> button will open the Patient Card.



The <Delete> button will remove the patient from the list.

Figure 1 : Patient List



From the list displayed, you can either delete a patient by clicking on the Delete button or go to the Patient Card by directly clicking on the Select button. Patients can be sorted either by last name, first name, birthdate or gender simply by clicking on the column names.

		First name	Last name	Birthdate	Sex
		camille	pfaff	01/1943	Female
		test	ttest	01/1940	Male
		test	ttest	01/1958	Male
		r-e(-"è-	ryeur(u(-	01/1947	Male

5. Patient Card


The top section display the Patient Information: Name - birth date (MM/YYYY) - gender

The bottom section displays the **<history>** and **<Progress>** tabs:









Patient name:

Birthdate:

Sex:

 Create new examination for this patient

History Progress

		Examination date	Age	Systolic blood pressure	Cholesterol	Smoker	Absolute CVD Risk
		05/09/2005	62	165 mmHg	6.5 mmol/L (≈ 245 mg/dl)	Yes	6 %
		05/09/2005	62	155 mmHg	5.5 mmol/L (≈ 205 mg/dl)	Yes	4 %
		05/09/2005	62	145 mmHg	5 mmol/L (≈ 185 mg/dl)	No	2 %
		12/08/2008	65	158 mmHg	6.5 mmol/L (≈ 245 mg/dl)	Yes	7 %

<History>

Displays the overview of all previous examination data for this patient.

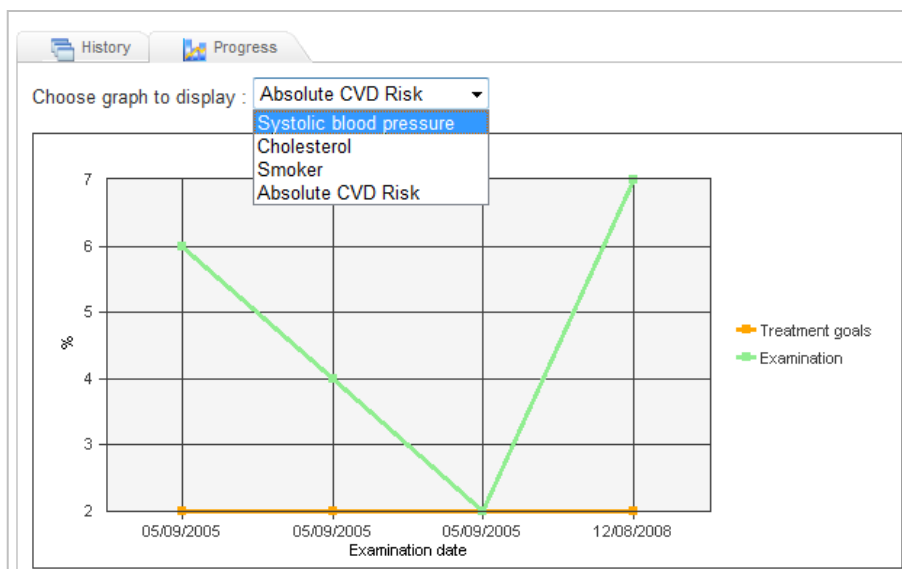
To access or remove examinations data click on the <View> / <Delete> buttons.

<Progress>:

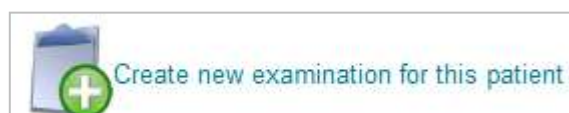
Displays your patient's test results in a progression graph.

Simply scroll down the menu and choose the graph you wish to display.

- Absolute CVD risk
- Systolic blood pressure
- Cholesterol
- Smoking status



To add a new examination click on:



6. Create a new examination

How to calculate the 10-year CVD risk of your patient at the time of the examination:

The current risk model, patient gender and birth date are displayed on top.

Step 1 Enter the examination date

Step 2 Enter your patient's medical data in the **<examination>** column.

- Systolic blood pressure (mmHg)
- Cholesterol (mmol/L or in mg/dl)
- Smoking status (Y/N)

Step 3 Enter the treatment goals in the **< treatment goals>** column

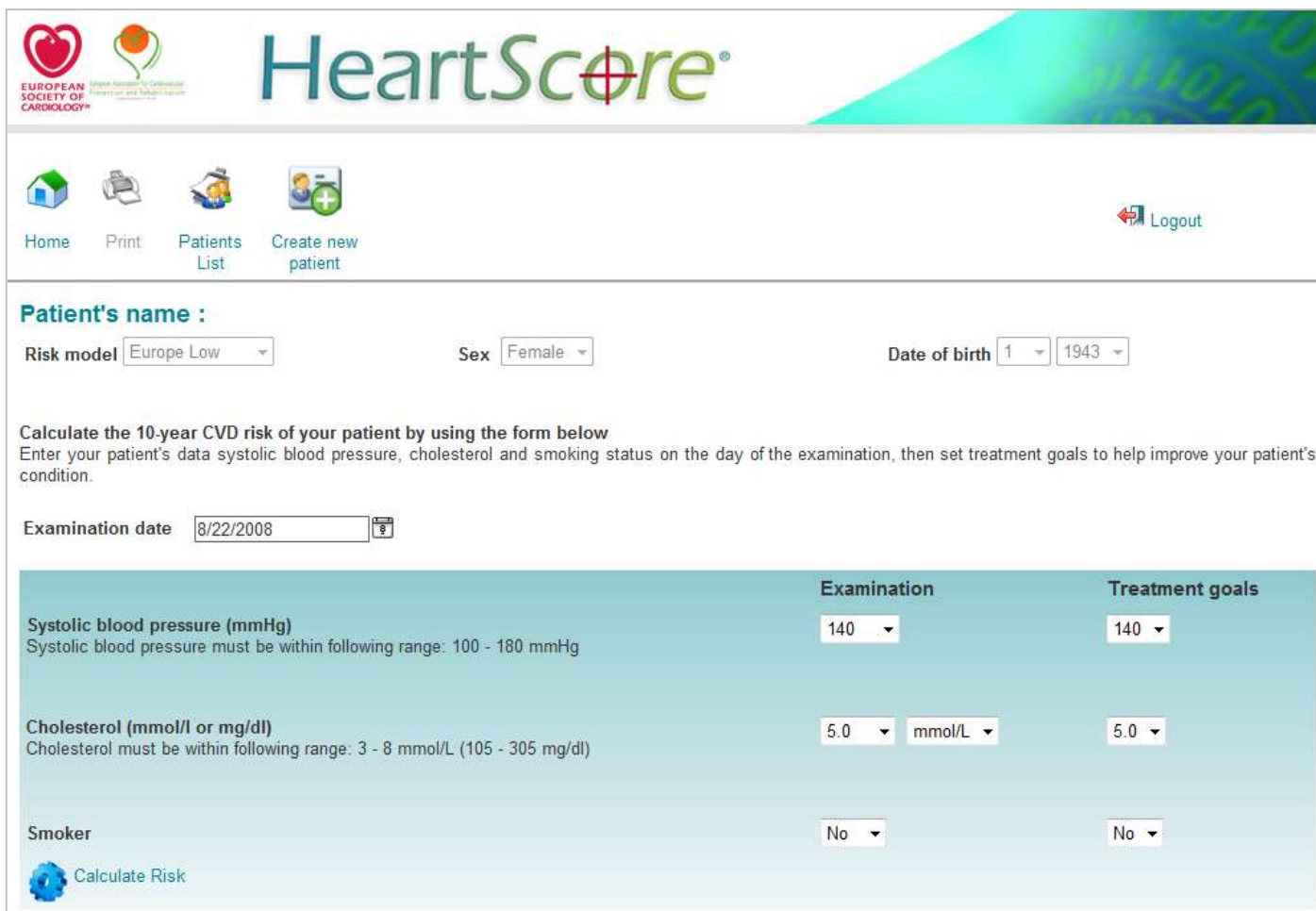
As baseline values, the program contains the recommended treatment goals as formulated by the Fourth Joint European Societies Task Force on CVD Prevention in Clinical Practice:

- Systolic blood pressure of 140 mmHg or below
- Cholesterol of 5.0 mmol/L (190 mg/dl) or below
- Smoking: no

Finally, click on



Figure 2: Patient Card - New Examination:



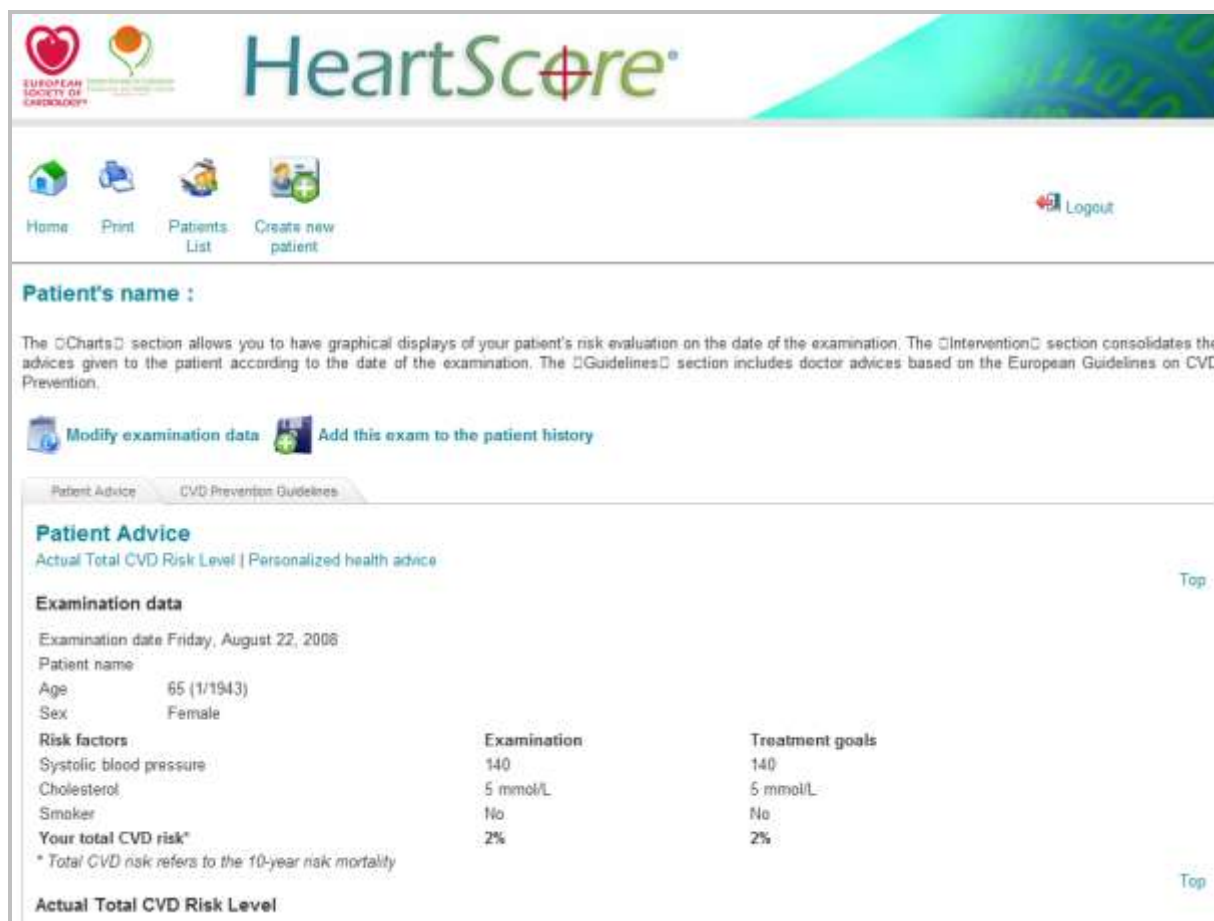
The screenshot shows the 'Patient Card - New Examination' interface. At the top, there are logos for the European Society of Cardiology and HeartScore. Below the logos are navigation icons for Home, Print, Patients List, and Create new patient, along with a Logout button. The main form area includes fields for Patient's name, Risk model (set to Europe Low), Sex (set to Female), and Date of birth (set to 1943). A section titled 'Calculate the 10-year CVD risk of your patient by using the form below' provides instructions and a date field for the examination date (set to 8/22/2008). The core of the form is a table with two columns: 'Examination' and 'Treatment goals'. The rows correspond to 'Systolic blood pressure (mmHg)', 'Cholesterol (mmol/l or mg/dl)', and 'Smoker'. Each row has dropdown menus for the 'Examination' and 'Treatment goals' values. A 'Calculate Risk' button is located at the bottom left of the table area.

	Examination	Treatment goals
Systolic blood pressure (mmHg) Systolic blood pressure must be within following range: 100 - 180 mmHg	140	140
Cholesterol (mmol/l or mg/dl) Cholesterol must be within following range: 3 - 8 mmol/L (105 - 305 mg/dl)	5.0 mmol/L	5.0
Smoker	No	No

7. Examination Risk Analysis

By default this page displays the **patient's Advice** Tab. You may consult the recommendations for practitioners by clicking on the **CVD Prevention Guidelines Tab**

7.1. Patient Advice Tab:



The screenshot shows the HeartScore web interface. At the top, there are logos for the European Society of Cardiology and HeartScore. Below the logos are navigation icons for Home, Print, Patients List, and Create new patient, along with a Logout button. The main content area is titled "Patient's name :" and contains a description of the "Charts" section. Below this, there are two buttons: "Modify examination data" and "Add this exam to the patient history". The "Patient Advice" section is active, showing "Actual Total CVD Risk Level | Personalized health advice". Under "Examination data", it lists the examination date as Friday, August 22, 2008, and patient name as 65 (1/1943). A table compares examination results with treatment goals:

Risk factors	Examination	Treatment goals
Systolic blood pressure	140	140
Cholesterol	5 mmol/L	5 mmol/L
Smoker	No	No
Your total CVD risk*	2%	2%

* Total CVD risk refers to the 10-year risk mortality.

At the bottom of the screenshot, there are three buttons: "Print", "Modify examination data", and "Add this exam to the patient history".



Print

To print the Personalized examination risk analysis for your patient including all the results, graphs, measured values and doctor's comments.



Modify examination data

To change the examination data.



Add this exam to the patient history

To save the newly created examination data in the patient card history.

Comments: At the bottom, the **<Comments>** box enables you to add comments related to your patient's health condition. Please note that the text will be printed on the patient printout.

Note:

The **<Modify examination data>** and the **<Add this exam to the patient history>** buttons are only available for a newly created examination.

Your internet browser must allow pop-up windows in order to display the patient printout

7.1.1. Actual Total CVD Risk Level

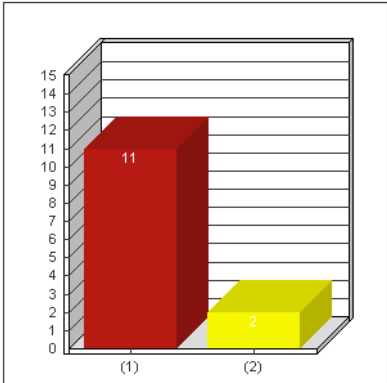
The actual total CVD risk is defined as the probability of a clinical event (here: CVD death) happening to a person within a given time range.

Actual Total CVD Risk Level

The total cardiovascular disease risk level (left bar below) shows you the percentage risk of having a fatal cardiovascular event, such as a stroke or heart attack. Based on examination results, your total CVD risk is 11%.

However, by becoming aware of your risk factors and taking a few preventive actions, you can reach the treatment goals and reduce your risk to 2% as shown by the treatment goal level (right bar below).

Absolute CVD Risk










(1) Your current risk is 11%
 (2) Your risk if you reach your treatment goals will approach 2%

The CVD absolute risk chart consists of two bars:

- (1) Current risk: the patient's absolute risk of a CVD event within the next ten year period
- (2) Risk if the patient achieve the treatment goals

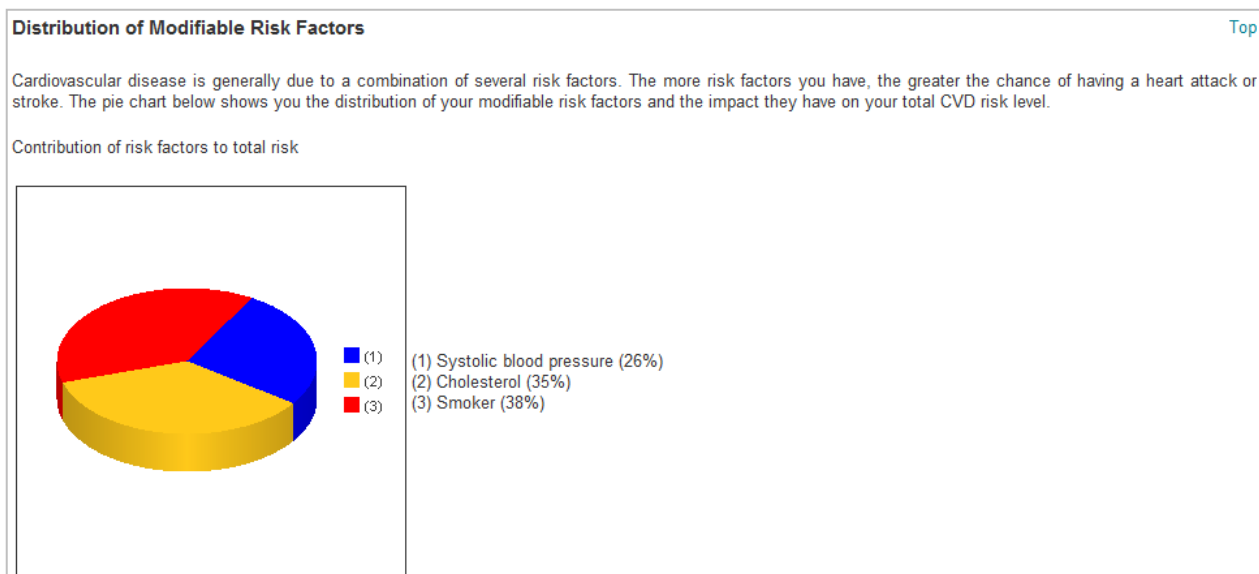
The colour code is as follows:

	Dark green: low risk	<1%)
	Light green: low risk	1<2%
	Yellow: low risk	2<3%
	Orange: low risk	3<5%
	Light red: high risk	5<10%
	Red: high risk	10<15%
	Dark red: high risk	>15%

7.1.2. Distribution of modifiable risk factors

The distribution of modifiable risk factors to total risk is represented by a pie chart. (blood pressure, smoking status, and cholesterol).

The legend of the pie chart shows the contribution percent of each modifiable risk factor.



7.2. The CVD Prevention Guidelines tab

HeartScore gives a number of general health recommendations to each individual patient, from the 2007 European Guidelines on CVD Prevention in Clinical Practice*

These recommendations are automatically selected according to your patient's risk profile.

The menu allow you to click on a risk factor to access its section

Patient Advice CVD Prevention Guidelines

CVD Prevention Guidelines

[Smoker](#) | [Systolic Blood Pressure](#) | [Cholesterol](#) | [About](#) | [Priorities](#) | [Diet](#) | [Strategies](#) | [Score](#)

Smoker Top

Your patient is noted to be a smoker.

All smokers should be professionally encouraged to permanently stop smoking all forms of tobacco.

The 5 A's can help:

- A - Ask:** systematically identify all smokers at every opportunity
- A - Assess:** determine the person's degree of addiction and his/her readiness to cease smoking
- A - Advise:** unequivocally urge all smokers to quit
- A - Assist:** agree on a smoking cessation strategy including behavioural counselling, nicotine replacement therapy and/or pharmacological intervention
- A - Arrange:** a schedule of follow-up visits.

* 2007 European Guidelines on CVD Prevention in Clinical Practice: Executive Summary (European Heart Journal 2007;28:2375-2414) and Full text (European Journal of Cardiovascular Prevention and Rehabilitation 2007; 14(suppl2):S1-S113).

8. HeartScore® Risk Information

HeartScore® is a primary prevention tool and as such it is about predicting an event. We have thus taken a major step away from population surveys (groups) towards individuals. It is therefore important to make it clear to the patient that the program indicates the probability that something will happen, and that the absolute size of the various columns should not be solely decisive for the choice of the method of prevention.

HeartScore® intention is not to replace the clinical judgement of the doctor but rather to support and supplement it.

Risk information should be carefully adapted to the resources of individual patients. The intention behind HeartScore® is not to impose unnecessary risk knowledge on a large group of people if they are not prepared to cope with the changes in lifestyle proposed.

The idea is that doctor and patient together can determine the risk reduction which will give the best result while at the same time being adapted to the individual patient and his or her ability to cope with these lifestyle changes.

The HeartScore® program may also be used in cases where there is doubt as to whether a certain patient has a high risk of developing a cardiovascular disease, or to have an overview of a patient's risk profile and suggestions as to how it can be changed.

8.1. Risk Factors

In the HeartScore® program risk factors are divided into modifiable and non-modifiable risk factors.

8.1.1. Modifiable Risk Factors

In the program, **blood pressure** is defined as systolic blood pressure, preferably as an average between two measurements with patient in sitting position. Note that diastolic blood pressure is not used.

Smoking is defined as a self-reported yes and no. The subject must smoke more than seven cigarettes weekly to be identified as a smoking person.

Cholesterol is measured on a fasting/non-fasting basis using venous blood. For the TC/HDL ratio models the ratio is used instead of total cholesterol.

8.1.2. Non-modifiable Risk Factors

Sex: Male / Female

Age in full years (calculated by the program), must be between 40 and 65.

8.1.3. The Effect of Changing Risk Factors

In the case of modifiable risk factors, the risk involved if the treatment goals are achieved has been compared with data from large-scale international intervention studies. In regards to cholesterol, the studies used are the CARE, 4S, WOSCOPS and LRC studies, and for blood pressure the studies used are the MRC, STOP, SHEP and SYSTEUR studies. Epidemiological, non-interventional studies have been used in relation to tobacco and weight.

The risk of developing a cardiovascular disease if treatment goals are achieved has thus been calculated on the basis of the actual implication of a reduction in the risk factor status for the development of cardiovascular diseases.

8.1.4. Extreme Values

For statistical reasons the program is consolidated best around the normal ranges. If all risk factors are "increased" it may be possible to find patients with a risk of 100%. There may also be patients with a "high risk" although they are only 35 years old and in good health. We do not recommend the use of the program for these extremes of the scale but only for the range where the 10-year risk for CVD is between 1% and 15%.

8.2. Patient Considerations

HeartScore® merely helps to assess risk, not certainty of developing disease or not. The healthcare professional will wish to temper its use with realism and humanity, especially for patients who have major difficulties in reducing risk, and for those who may be frightened to be told that they are at very high risk.

8.3. When to Treat?

HeartScore® does not interfere with how you should treat your patients, or at what level of risk you initiate treatment. This is, of course, still your choice.

According to the European Guidelines on CVD Prevention, it is recommended that treatment should be initiated if the 10-year risk of cardiovascular disease death exceeds 5%. In younger individuals, please refer to the Relative Risk Chart.

9. Support

If you are experiencing technical problems in using the HeartScore® web-based program or have queries regarding the program features please visit our FAQ section at www.heartscore.org

Alternatively, please contact the European Society of Cardiology:

1. Visit <http://www.escardio.org/pages/contactus.aspx>
2. Fill in the "contact us" form by selecting "HeartScore" as category

10. Disclaimer

This disclaimer shall be governed by and construed in accordance with the French laws with jurisdiction in the court of Grasse, France.

Registration with the HeartScore® web-based program indicates your acceptance of the terms and conditions set forth in this disclaimer.

10.1. Copyright

Copyright to the HeartScore® web-based program and its content is owned solely by the European Society of Cardiology (ESC) - © ESC 2007. All rights reserved.

ESC copyright materials may not be reproduced in whole or in part by persons, organizations or corporations other than the ESC, its affiliates, divisions and units without the prior written permission of the ESC.

10.2. Conditions of use

HeartScore® is a risk assessment and management program aimed at supporting clinicians in optimising individual cardiovascular risk reduction. It is intended to be used by health professionals only and not by the general public. Any information contained herein should not be understood or used by any person as a substitute for obtaining medical advice or treatment from a physician.

The ESC does not provide professional medical evaluation, advice, diagnosis, treatment or endorsement, but rather provides the physicians with a risk assessment tool to better identify patients at high total risk of developing cardiovascular disease. In no event will the ESC be liable to the user or anyone else for any decision made or action taken in reliance upon the information contained in or provided through the HeartScore® web-based program, nor for any incidental, indirect, special or consequential damages.

HeartScore® and the published paper charts of the European Guidelines on CVD Prevention show minor differences. This is due to the use of two different statistical models. The published charts use a Weibull-model with specific models for each sex. The program HeartScore® uses a Cox-model with sex as a risk factor. If you have any doubts about using HeartScore®, it is recommended that you use the published paper charts.

11. Qualifiers

- The charts should be used in the light of the clinician's knowledge and judgement, especially with regard to local conditions.
- As with all risk estimation systems, risk will be overestimated in countries with a falling CVD mortality rate, and under estimated if it is rising.
- At any given age, risk appears lower for women than men. This is misleading since, ultimately, more women than men die from CVD. Inspection of the charts shows that their risk is merely deferred by 10 years.
- Risk may be higher than indicated in the chart in:
 - Sedentary or obese subjects, especially those with central obesity
 - Those with a strong family history of premature CVD
 - The socially deprived
 - Subjects with diabetes- risk may be 5 fold higher in women with diabetes and 3 fold higher in men with diabetes compared to those without diabetes
 - Those with low HDL cholesterol or high triglycerides
 - Asymptomatic subjects with evidence of pre-clinical atherosclerosis, for example a reduced ankle-brachial index or on imaging such as carotid ultrasonography or CT scanning.