

## Original Research

# Overestimation and Underestimation of Cardiovascular Risk in Clinical Practice: Usefulness of Risk Estimation Charts

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**Introduction:** Charts for the estimation of cardiovascular risk contribute greatly to clinical decision making in the management of asymptomatic individuals. However, most decisions are taken without consulting the charts. The aim of our study was to record the degree of overestimation or underestimation of cardiovascular risk in everyday clinical practice.

**Methods:** Seven cases of asymptomatic individuals at different levels of cardiovascular risk as a result of different combinations of risk factors (one at very low, one at very high and five at intermediate risk) were presented in random order to 30 doctors who deal with primary prevention consultations in their daily clinical practice. They were asked if hypolipidaemic therapy was needed and their answers were compared with the recommended management of the current European guidelines on prevention using the risk charts of the European Society of Cardiology.

**Results:** The mean percentage of agreement was 70%. In the two extreme cases agreement with the guidelines was absolute, but in the intermediate cases it varied widely. Particularly in those cases with cholesterol level 200-240 mg/dl it was just 40%, due either to overestimation or to underestimation of the risk.

**Conclusion:** In the cases of obviously low or obviously high risk, clinical judgement is in accordance with the guidelines. However, in cases of intermediate risk there is either overestimation of risk with non-indicated prescription of hypolipidaemic treatment, or underestimation of risk with no administration of indicated therapy. The use of risk charts in clinical practice may provide substantial help towards a more objective practice of prevention.

**T**he main priority in primary prevention is to identify asymptomatic individuals at high risk for future cardiovascular events with a view to modifying risk factors and possibly administering medical therapy. Cardiovascular risk depends on the presence of several risk factors and can often be higher if moderate increases in several factors coexist than if a single factor is greatly abnormal. Thus, the concept of total cardiovascular risk has been introduced and models for easy calculation have been developed, such as the Framingham score.<sup>1</sup> The

European Society of Cardiology has used data from the SCORE project<sup>2</sup> and has created handy risk charts to calculate total cardiovascular risk for asymptomatic individuals, separately for low risk and high risk countries. The guidelines for the management of asymptomatic individuals have incorporated the calculated risk into the recommended algorithms.<sup>3</sup> However, in everyday clinical practice decisions are usually taken without using the charts. The aim of our study was to record the degree of overestimation or underestimation of cardiovascular risk in daily clinical prac-

tice and the degree of agreement of clinical decisions with the current recommendations of cardiovascular prevention guidelines.

**Methods**

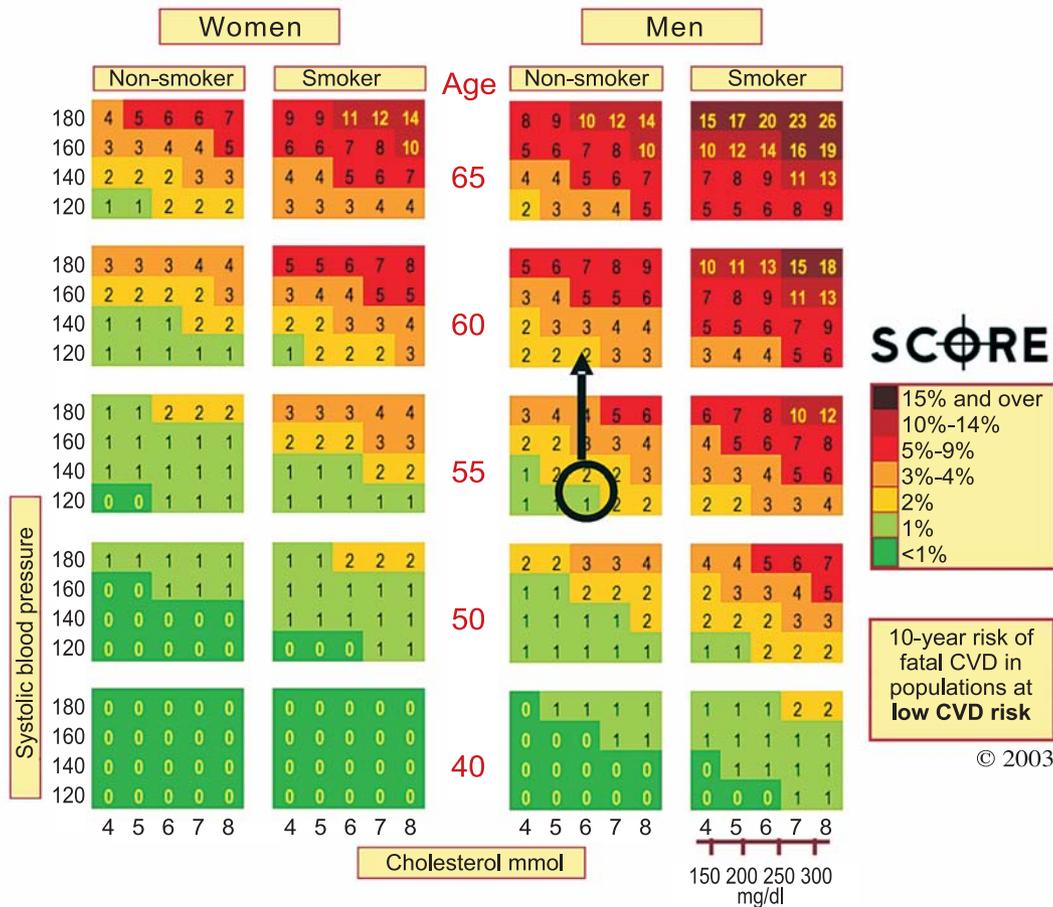
We prepared a list of seven cases with different combinations of cardiovascular risk factors (Table 1). Depending on age, sex, smoking habit, arterial blood

pressure and levels of total, high-density lipoprotein (HDL) and low-density lipoprotein (LDL) cholesterol, the 10-year total cardiovascular risk varied, according to the European Society of Cardiology charts for low risk countries, between 1% (low) and 8% (high) (Figure 1). These seven cases were presented in random order to 30 doctors (25 internists and 5 cardiologists) of our hospital. Although there were no specific selection criteria, we identified doctors who

**Table 1.** Characteristics of cases.

No	Sex	Age	Smoking	BP	Chol	HDL	LDL
1	F	50	NO	120/70	190	60	100
2	M	55	NO	120/80	240	45	165
3	M	50	YES	120/80	185	45	150
4	M	50	YES	120/75	220	50	145
5	M	60	NO	155/85	260	60	170
6	M	60	YES	140/85	200	40	130
7	M	60	YES	145/85	260	35	190

Blood pressure (BP) in mmHg; Cholesterol, HDL, LDL in mg/dl.



**Figure 1.** European Society of Cardiology risk charts for low-risk countries. Case no. 2 of the questionnaire (non smoker, systolic BP 120 mmHg, cholesterol 240 mg/dl) has low risk now (1%) and after projection to age 60 (2%). According to the guidelines no hypolipidaemic treatment is needed as the risk is <5%.

had obtained their speciality title at least 2 years before, and who in their daily routine practice regularly provided prevention consultations to asymptomatic individuals during their outpatient, check-up and inpatient duties. It was explained that the individuals described in the case list were asymptomatic, without diabetes, without a family history, and without evidence of coronary or vascular disease; they had exhausted diet and exercise programmes and were not going to change their smoking habits. The question posed to the doctors was whether they would prescribe hypolipidaemic treatment. Their answers were compared with the recommended management of the European Society of Cardiology's guidelines for prevention, according to which hypolipidaemic therapy is recommended if total cardiovascular risk is equal to or exceeds 5% (either currently or projected at age 60). We used the European Society of Cardiology risk charts for low risk countries to calculate risk since the Greek charts had not at that time been published.

## Results

Table 2 shows the recommended management (with or without administration of hypolipidaemic treatment) in each of the seven cases, according to the European Society of Cardiology's guidelines for low risk countries. It also shows the percentage of agreement with the interviewed doctors. The first four cases do not need treatment as the total risk is below 5%. The other three need treatment as the risk equals or exceeds 5%. The degree of agreement between guidelines and clinical practice was 70%, with wide variation per case. In cases 1 and 7 with obviously low and obviously high risk, respectively, the agreement

was absolute (100%). In contrast, in the other five cases the degree of agreement varied between 20-90% and we recorded either an overestimation of risk with consequent unnecessary drug prescription (cases 2, 3 and 4), or an underestimation of risk with no administration of indicated therapy (cases 5 and 6). The lowest agreement was recorded in cases 2, 4 and 6, which had as common characteristics levels of total cholesterol 200-240 mg/dl and LDL cholesterol 130-165 mg/dl. This finding supports the view that in everyday clinical practice decisions about the need of hypolipidaemic treatment are based mainly on cholesterol level, ignoring other coexisting risk factors.

If the Greek charts were to be used instead of those for the low risk countries, cases 3 and 4 would fall into a higher risk category; nevertheless, a similar disagreement would be recorded (59%). If the Framingham model was used, case 5 would be classified as medium risk (10-year coronary risk 10-20%) but would still require treatment (as LDL was >160 mg/dl, according to NCEP-ATP III guidelines).

## Discussion

An active approach to the area of cardiovascular prevention should be one of the main responsibilities of doctors and nurses. Since cardiovascular disease is multifactorial and can be partly prevented with dietary or lifestyle modifications and medical treatment, it is important to identify those asymptomatic individuals at high risk who could benefit from these measures. The interaction and the additive effects of the classical risk factors (such as smoking, hyperlipidaemia, hypertension, diabetes) on cardiovascular morbidity and mortality were shown in large epidemiological studies, such as the Framingham study. The concept of total cardiovascular risk was thus introduced and it became evident that this risk can often be higher if moderate increases of several factors coexist than if only a single factor is greatly abnormal. The Framingham score was developed for an easy calculation of the 10-year risk of a coronary event.<sup>1</sup> The European Society of Cardiology, in its guidelines of 1994 and 1998, has adopted the same model.<sup>4</sup> However, although the application of this model in northern European countries was successful, its application in low-risk countries, such as the Mediterranean countries, was problematic because of risk overestimation.<sup>5</sup> Thus, the European Society of Cardiology proceeded to the SCORE project<sup>2</sup> and created handy charts to estimate the 10-year risk of fatal

**Table 2.** Agreement between prevention guidelines and clinical practice.

No	10-year risk according to SCORE charts*	Need for treatment according to guidelines	Agreement
1	1	No	100%
2	2	No	43%
3	4	No	80%
4	4	No	57%
5	5	Yes	90%
6	6	Yes	20%
7	8	Yes	100%

\* projected at age 60

cardiovascular disease in asymptomatic individuals. Separate charts for high- and low-risk countries were introduced and national societies were encouraged to develop country-specific models. Current guidelines for prevention have incorporated total risk estimation in their recommended algorithms for the management of asymptomatic individuals<sup>3</sup> and suggest active intervention if the risk exceeds 5%.

In everyday clinical practice, most of the time, decisions are made without using the charts. The main reason for not using the guidelines is lack of time. Family practitioners from five different European countries have stated that, although they have a positive opinion about guidelines, they can only devote 16 minutes to discussing risk factors and lifestyle interventions. At the same time they believed that the patient does not understand or follow the conversation.<sup>6</sup> A different opinion has also been recorded in a postal survey study, where 74% of general physicians use the guidelines either rarely or never because they consider them as oversimplifications leading frequently to overtreatment.<sup>7</sup> A factor that contributes to this underuse of guidelines is the different approaches that scientific societies may have to the same problems. A Canadian study showed that if prevention guidelines from scientific societies of Canada, USA, Britain, New Zealand, Australia or Europe were applied to the same population, then a different number of people would be treated each time.<sup>8</sup> In fact, the best prevention with the least use of medication would be achieved if the New Zealand guidelines were applied; if the American guidelines were applied, almost twice the number of people would need treatment without further prevention of fatal events! The number of individuals needed to treat to prevent one major cardiovascular event varies widely with different guidelines.<sup>9</sup> The aim is to achieve the most benefit at the population level with the least use of medical treatment, in order to ensure maximal value from health resources. In Holland, in individuals older than 55 who were prescribed statin therapy, it was found that the treatment was considered as “non-guideline-indicated” in 69% of the cases, while at the same time undertreatment of high risk individuals was evident. These findings call for a redistribution of available resources from those receiving unnecessary treatment to those who need it.<sup>10</sup>

The aim of our study was to explore the discrepancy between clinical practice and current European Society of Cardiology guidelines in the area of primary prevention. Our main finding was the significant disagreement between the doctors interviewed who

were dealing with the same prevention problems. We included only one female case in our list, to serve as the obviously low risk case. If more female cases were included, disagreement might have been greater, a finding that has been reported in other studies.<sup>11</sup> In our study we recorded both overestimation and underestimation of risk. It seems that in everyday clinical practice the decision to use hypolipidaemic treatment or not relies mainly on total and LDL cholesterol level, ignoring the coexistence or absence of other risk factors. In a similar study on antihypertensive therapy, the degree of agreement between clinical practice and guidelines was 64%, with overtreatment being recorded in 88% and no administration of indicated therapy in 12% of the cases.<sup>12</sup> Our results reinforce the need for simple and clear recommendations as a basis for uniform management. Patient compliance with the guidelines would be greater if there was no disagreement between physicians. Such an approach is suggested by the European Society of Cardiology with its cardiovascular risk charts; they are easy to use and allow the patient’s participation in the decisions. Many countries, like Greece, have created their own risk charts based on local epidemiological data, in order to ensure higher prediction accuracy than that offered by the crude division into high- and low-risk countries.<sup>13</sup> Our study was carried out before the publication of the Hellenic risk charts.<sup>14</sup> Therefore, we used the proposed charts for low-risk countries, and more specifically those based on cholesterol rather than on cholesterol: HDL ratio, because they are the ones that we commonly use in our practice. If the cholesterol: HDL ratio charts had been used then the results would have been identical. Moreover, using either the Greek charts (which place Greece closer to the high-risk rather than the low-risk countries) or the Framingham model our results would be the same, since a similar level of disagreement would be recorded. Of course the degree of disagreement depends not only on which guidelines are selected as a reference standard but also on the characteristics of the physicians interviewed. Although we have no reason to believe that our sample was significantly different from a random sample of physicians who practice preventive strategies, it could be argued that our results might be different if the same study was performed, for example, in a Lipid Clinic of a University Hospital. Finally, another limitation of our study is the small number of cases and the fact that the reality of everyday practice is often not reflected in the answers given in a questionnaire.

An interesting observation was that, after completing the questionnaire, the interviewed doctors showed interest in the charts and asked to be informed about how to use them. It is, therefore, necessary to inform the medical community about the presence of the SCORE project, the cardiovascular risk charts, and the highly illustrative web-based Heartscore.<sup>15</sup> During medical consultations, asymptomatic individuals and patients usually understand very few things about total cardiovascular risk and about the multifactorial aetiology of disease.<sup>16</sup> Therefore, using the risk charts during consultations could improve understanding of the gradual increase of risk if several risk factors coexist, guarantee the patient's active involvement in setting priorities, changing lifestyle and diet, and improving compliance with eventual drug therapy.

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