CLINICAL RESEARCH

Assessment of cardiovascular risk in primary care patients in France

Évaluation du risque cardiovasculaire en médecine générale en France

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KEYWORDS
Cardiovascular disease; Primary care; Risk assessment

Summary
Background. — Current guidelines for the prevention of cardiovascular disease emphasize the importance of assessing global cardiovascular risk, but there is evidence that risk is often assessed inaccurately.
Aims. — To compare general practitioner-reported global cardiovascular risk in French primary care patients with estimates based on established risk-scoring systems, and to identify factors accounting for any mismatch between the analyses.
Methods. — Data on patients aged greater or equal to 50 years seen during two 3-day periods were provided by 619 general practitioners. Physicians rated each patient’s cardiovascular risk as low, moderate or high, according to their perception; in addition, risk was assessed using the Framingham and Systematic coronary risk evaluation (SCORE) risk-scoring systems.
Results. — A total of 13,446 patients aged greater or equal to 50 years were included. Of 11,241 patients with no previous history of cardiovascular disease, 47% were considered by their physicians to be at low risk of cardiovascular disease and 14% to be at high risk. In that population, 72% of patients rated as high risk according to the Framingham system and 77% rated as high risk according to SCORE system were incorrectly assessed by their physicians; similar results were observed in patient cohorts based on whether or not patients had received treatment for dyslipidaemia. Weighted kappa analysis showed poor agreement between physician risk assessment and both the Framingham and SCORE risk-scoring systems.

Abbreviations: GP, General practitioner; HDL, High-density lipoprotein; LDL, Low-density lipoprotein; SCORE, Systematic coronary risk evaluation; SD, Standard deviation; WK, Weighted kappa.
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MOTS CLÉS
Maladie cardiovasculaire ; Prévention primaire ; Évaluation du risque cardiovasculaire

Résumen
Rationnel. — Les recommandations actuelles concernant la prévention des maladies cardiovasculaires mettent en avant l’importance d’évaluer le risque cardiovasculaire global. Ce risque est cependant souvent estimé de manière insuffisante.
Objectifs. — Cette étude a été menée dans le but de comparer le risque évalué par les médecins généralistes chez les patients de plus de 50 ans, au risque recalculé par les échelles de risque, et de déterminer quels facteurs étaient déterminants pour la discordance entre les deux analyses.
Méthodes. — Six cent dix-neuf médecins généralistes ont inclus et récupéré les informations concernant tous les patients de 50 ans et plus consultant pendant deux périodes de trois jours consécutifs. Ils devaient estimer le risque cardiovasculaire de chaque patient entre bas, modéré, sévère ; ce risque était par la suite recalculé selon les échelles de Framingham et de Systematic Coronary Risk Evaluation (SCORE).
Résultats. — Treize mille quatre cent quatre-vingt-six patients de 50 ans ou plus ont été inclus dans l’étude. Parmi les 11,241 patients sans antécédent personnel de maladie cardiovasculaire, 47 % ont été considérés par le médecin comme étant à bas risque cardiovasculaire et 14 % à haut risque. Dans cette population, le risque cardiovasculaire avait été sous-évalué par les médecins chez 72 % des patients évalués à haut risque selon l’échelle de Framingham et 77 % de ceux évalués à haut risque selon SCORE et des résultats similaires étaient obtenus selon que les patient recevaient ou non un traitement hypolipémiant. Le test de Kappa pondéré a montré qu’il existait une faible concordance entre l’évaluation du risque cardiovasculaire par les médecins généralistes et les scores de Framingham et de SCORE.
Conclusion. — Cette étude met en avant la discordance entre le risque estimé par les médecins généralistes et le risque évalué par les échelles de risque, particulièrement chez les patients à haut risque cardiovasculaire.
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Background

Current guidelines for the prevention of cardiovascular disease emphasize the importance of evaluating a patient’s overall (global) cardiovascular risk — a process that requires consideration of both modifiable risk factors, such as hypertension and dyslipidaemia, and non-modifiable risk factors such as age and sex [1–3]. This recommendation is based upon extensive epidemiological evidence, which shows that many patients have multiple cardiovascular risk factors, and that these risk factors have additive or synergistic effects on the overall level of risk [4–6]. The impact of such clustering of risk factors is highlighted by data from the Framingham study, which showed that the risk of coronary heart disease in patients with three or more risk factors was approximately 2.4 times higher in men, and almost six times higher in women, compared with that in patients with no risk factors [6].

A number of validated risk-scoring systems are available for the estimation of global cardiovascular risk, including the Framingham risk-scoring system [7] and the Systematic coronary risk evaluation (SCORE) system developed by the European Society of Cardiology [8]. However, there is evidence that, despite widespread acceptance of the concept of global cardiovascular risk, risk assessment is not performed routinely in clinical practice. For example, in a survey of 754 general practitioners (GPs) in five European countries (France, Germany, Italy, Sweden and the UK), 81% of respondents reported using the current guidelines but only 18% thought that the guidelines were being widely implemented [9]. Furthermore, there is evidence that risk is often estimated inaccurately even when guidelines are followed. For example, in the CONTORISK study in Spain, cardiovascular risk was correctly estimated in only 48% of patients treated in primary care and in 55% of those treated by specialists [10]. Similar results were obtained in a study in hypertensive primary care patients in the UK, in which global cardiovascular risk (assessed using Framingham-based tables) was correctly estimated in only 21% of patients and was under-estimated in 63% [11].

To our knowledge, no studies have evaluated cardiovascular risk assessment in French patients. Hence, the present study was undertaken to compare assessments of cardiovascular risk by French primary care physicians with the actual level of risk, as calculated using the Framingham and SCORE systems, and to identify potential factors associated with inaccurate risk estimation. This paper presents results from patients without a previous history of cardiovascular disease (i.e. candidates for primary prevention of cardiovascular disease).

Methods

The study was a survey of 619 French GPs. The physician sample was chosen from the online Kantar Health France
panel of 4134 primary care physicians and was representative of primary care physicians. A total of 3885 GPs were sent an e-mail invitation to participate in the study. Participating physicians were asked to complete an online questionnaire for all patients aged 50 years and older who were seen during one of two 3-day periods (16–18 December 2009 and 11–13 January 2010). In addition, physicians were asked to estimate the patient’s level of cardiovascular risk on a three-point scale (low, medium, or high). Risk scores for each patient were also assessed according to the Framingham [7] and SCORE [8] (for countries with low cardiovascular risk) systems using published algorithms [7,8]. Risk was analysed according to the Framingham system (low, < 10%; intermediate, 10% to ≤ 20%; high, > 20%) and the SCORE system (low, < 2%; intermediate, 2–4%; high, ≥ 5%).

To allow analysis according to the total number of consultations, each doctor received a weighting [12] based on the geographical region in which they practised, and the number of consultations was weighted according to the relative number of GP consultations in France and the age and sex distribution of the French population. All data relating to the total number of consultations were adjusted based on this weighting.

The data analysis was essentially descriptive. Due to potential gain in cardiovascular risk control, two cohorts of patients were analysed: those who were receiving treatment for dyslipidaemia and those who were not. Analysis was performed using QUANTUM® software, version 5.8. Student’s t test was used at a level of 95–99% (i.e. 1–5% risk of error). Bases with less than 30 individuals are not statistically significant for this test.

Results

The mean age (standard deviation [SD]) of the participating physicians was 49.7 (7.8) years (50.0 [7.8] years after adjustment for weighting); 83% were men. Approximately 16% were practising in the Paris area and similar proportions were practising in all other regions of France. Overall, participating GPs believed that the two 3-day study periods were typical of their usual practice workload.

Study population

The 619 participating physicians provided data for a total of 13,483 patients (average 22 patients per GP), of whom 37 were excluded because of abnormal findings. Patients excluded from the analysis were those for whom blood pressure, total cholesterol, triglyceride, high-density lipoprotein (HDL) and low-density lipoprotein (LDL) values were inconsistent. Of the remaining 13,446 patients, 6380 (47%) were aged 50–64 years and 7066 (53%) were aged 65 years or older. A total of 11,241 patients (84%) had no previous history of cardiovascular disease and were included in the analysis. Of these, 3359 (30%) were receiving treatment for dyslipidaemia with statins or other lipid-lowering drugs.

Table 1 summarizes the cardiovascular risk factors present in the overall study population, the primary prevention population, and the cohorts that were treated or untreated for dyslipidaemia. For patients that had had a carotid ultrasonography (prescribed by a GP or specialist), results are presented depending on the reported atherosclerosis severity (none, mild, obstructive). In the overall study population, the average number of risk factors per patient, as defined by the Agence Française de Sécurité Sanitaire des Produits de Santé, was 1.7; 45% of patients had elevated LDL-cholesterol, 29% had uncontrolled hypertension and 18% had diabetes (Table 1). In the primary prevention population, the mean number of risk factors per patient was 1.5 and the incidence of individual risk factors was similar to that in the overall study population (Table 1).

Cardiovascular risk estimation for primary prevention population

Overall, 47% of patients in the primary prevention population were considered by their GPs to be at low risk of cardiovascular disease and 14% were considered to be at high risk (Fig. 1). Comparison with the levels of risk obtained with the Framingham and SCORE systems suggested that high levels of risk were widely underestimated (Fig. 1). Using the Framingham risk assessments as a basis, it was calculated that only 45% of high-risk patients were correctly identified by their GPs: risk was over-estimated in 29% and under-estimated in 26% (Table 2). Similarly, using the SCORE assessments as a basis, which exclude diabetes as a cardiovascular risk factor, only 41% of high-risk patients were correctly identified (Table 2).

A further analysis assessed levels of cardiovascular risk according to the Framingham and SCORE systems (Table 3). Both analyses excluded 2604 patients with poorly controlled dyslipidaemia, or whose lipid status was unknown to their GP. In addition, the Framingham analysis excluded 154 patients with type 1 diabetes mellitus [7]; thus, this analysis included 8483 patients. The latter patients were
Table 1 Cardiovascular risk factors in the overall study population and in primary prevention patients with no history of cardiovascular disease.

<table>
<thead>
<tr>
<th></th>
<th>Overall study population (n = 13,446)</th>
<th>Primary prevention population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total (n = 11,241)</td>
<td>Not treated for dyslipidaemia (n = 7882)</td>
</tr>
<tr>
<td>Sex, men/women (%)</td>
<td>48/52</td>
<td>45/55</td>
</tr>
<tr>
<td>Mean age (years)</td>
<td>66.7</td>
<td>65.9</td>
</tr>
<tr>
<td>Total cholesterol &gt; 2.4 g/L (%)</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>LDL-cholesterol ≥ 1.3 g/L (%)</td>
<td>45</td>
<td>48</td>
</tr>
<tr>
<td>HDL-cholesterol ≥ 0.6 g/L (%)</td>
<td>36</td>
<td>38</td>
</tr>
<tr>
<td>TG &gt; 2g/L (%)</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Family history of cardiovascular disease (%)</td>
<td>16</td>
<td>8</td>
</tr>
<tr>
<td>Smoker (%)</td>
<td>14</td>
<td>13</td>
</tr>
<tr>
<td>Uncontrolled high blood pressure (%)</td>
<td>29</td>
<td>28</td>
</tr>
<tr>
<td>Diabetes (%)</td>
<td>18</td>
<td>15</td>
</tr>
<tr>
<td>Mild atherosclerosis on US examination (%)</td>
<td>18</td>
<td>13</td>
</tr>
<tr>
<td>Obstructive carotid plaque on US examination (%)</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Chronic inflammatory disease (%)</td>
<td>14</td>
<td>13</td>
</tr>
</tbody>
</table>

HDL: high-density lipoprotein; LDL: low-density lipoprotein; TG: triglyceride; US: ultrasound examination.

a p < 0.05 vs. untreated patients.

included in the SCORE analysis, which therefore included 8637 patients. This analysis showed that 72% of patients rated as high risk according to the Framingham system and 77% of patients rated as high risk according to the SCORE system were incorrectly assessed by their GPs (Table 3). This mismatch between GP assessment of cardiovascular risk and the real calculated level of risk was different depending on whether or not patients were treated for dyslipidaemia. For the total population in primary prevention, weighted kappa (WK) analysis showed a lack of agreement between physician risk assessment and both the Framingham system (WK, 0.21; 90% confidence interval 0.20–0.23) and the SCORE system (WK, 0.19; 90% confidence interval 0.18–0.21).

Patients in primary prevention not receiving treatment for dyslipidaemia

Overall, 41% of patients who were not receiving treatment for dyslipidaemia were considered by their GPs to be at moderate or high risk of cardiovascular disease; by contrast, 46% and 60% were estimated to be at moderate or high risk using the Framingham and SCORE systems, respectively (Fig. 2). The proportions of patients identified by the Framingham and SCORE systems who were correctly identified by their GPs were 49% and 43%, respectively (Table 2). Analysis according to the Framingham and SCORE systems showed that 81% and 86% of high-risk patients, respectively, were inaccurately rated by their GPs (Table 3).

Table 2 Proportion of high-risk patients correctly identified by their general practitioner, in comparison with risk assessments performed using the Framingham or Systemic Coronary Risk Evaluation (SCORE) systems.

<table>
<thead>
<tr>
<th></th>
<th>Framingham</th>
<th>SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Accurately estimated</td>
<td>Over-estimated</td>
</tr>
<tr>
<td>Primary prevention population (%) (n = 11,241)</td>
<td>45</td>
<td>29</td>
</tr>
<tr>
<td>Not treated for dyslipidaemia (%) (n = 7882)</td>
<td>49</td>
<td>22</td>
</tr>
<tr>
<td>Treated for dyslipidaemia (%) (n = 3359)</td>
<td>38</td>
<td>41</td>
</tr>
</tbody>
</table>

Table 3 Rating of cardiovascular risk according to the Framingham or Systemic Coronary Risk Evaluation (SCORE) systems.

<table>
<thead>
<tr>
<th></th>
<th>Framingham (n=11,241)</th>
<th>SCORE (n=8,437)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimated proportion</td>
<td>Accurately estimated proportion</td>
</tr>
<tr>
<td>Low (%)</td>
<td>47</td>
<td>53</td>
</tr>
<tr>
<td>Medium (%)</td>
<td>39</td>
<td>45</td>
</tr>
<tr>
<td>High (%)</td>
<td>14</td>
<td>18</td>
</tr>
<tr>
<td>Not treated for dyslipidaemia (n=7,882)</td>
<td>20</td>
<td>28</td>
</tr>
<tr>
<td>Low (%)</td>
<td>65</td>
<td>54</td>
</tr>
<tr>
<td>Medium (%)</td>
<td>65</td>
<td>54</td>
</tr>
<tr>
<td>High (%)</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Treated for dyslipidaemia (n=3,359)</td>
<td>40</td>
<td>38</td>
</tr>
<tr>
<td>Low (%)</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>Medium (%)</td>
<td>51</td>
<td>51</td>
</tr>
<tr>
<td>High (%)</td>
<td>17</td>
<td>19</td>
</tr>
</tbody>
</table>

GP: general practitioner.

Figure 2. Risk estimate and risk calculation with the Framingham and Systematic coronary risk evaluation (SCORE) systems for the primary prevention population not treated for dyslipidaemia (n=7,882). GP: general practitioner.

In this population of patients not receiving treatment for dyslipidaemia, the Framingham system showed that 54% of men aged 50 years or older and who were smokers, and 69% of men aged 50 years or more with hypertension and low HDL were at high cardiovascular risk. Similarly, with the SCORE system, 51% of men aged 50 years or more with hypertension and 53% of women aged 60 years or more with hypertension were at high cardiovascular risk.

For patients in primary prevention not receiving treatment for dyslipidaemia, WK analysis showed a lack of agreement between physician risk assessment and both the Framingham system (WK, 0.21; 90% confidence interval 0.19–0.23) and the SCORE system (WK, 0.19; 90% confidence interval 0.17–0.21).

Patients receiving treatment for dyslipidaemia

A total of 81% of patients who were receiving treatment for dyslipidaemia were considered by their GPs to be at moderate or high cardiovascular risk; the corresponding proportions based on the Framingham and SCORE criteria were 58% and 73%, respectively. Only 38% of patients were correctly identified by their GPs according to the Framingham or SCORE systems (Table 2). Similarly, analysis according to the Framingham or SCORE criteria showed that high-risk patients were inaccurately assessed in 60% and 65% of cases, respectively (Table 3).

For patients in primary prevention receiving treatment for dyslipidaemia, WK analysis showed a lack of agreement between physician risk assessment and both the Framingham system (WK, 0.15; 90% confidence interval 0.13–0.17) and the SCORE system (WK, 0.12; 90% confidence interval 0.09–0.14).
Discussion

Risk-scoring systems classify patients into several categories according to their risk factors, enabling physicians to make appropriate treatment decisions and reduce the risk of cardiovascular events. However, evidence shows that these systems are not systematically used by GPs, leading to inappropriate identification of cardiovascular risk level and therefore subsequent treatment. Application of the Framingham and SCORE risk-evaluation systems to the patients in this study showed that at least half of the patients were at moderate or high cardiovascular risk. This is consistent with the results of studies from other countries, which show that high-risk patients are a common finding in routine clinical practice. For example, in a study of 4059 hypertensive patients in Italy, 56.5% were considered to be at high or very high risk according to the World Health Organization/International Society of Hypertension guidelines, although only 35.8% of these were considered by their physicians to be at high risk [13].

The characteristics of patients considered to be at high cardiovascular risk were examined in the cohort of patients who were not receiving treatment for dyslipidaemia. As might be expected, high cardiovascular risk tended to be associated with age over 50 years in men and over 60 years in women, and the proportion of patients considered to be at high risk tended to increase with the number of risk factors present.

The large proportion of high-risk patients in the present study is perhaps not surprising given that most patients had more than one cardiovascular risk factor. However, despite the high prevalence of such risk factors, cardiovascular risk was accurately assessed in only a minority of patients; this finding is also consistent with previous studies in other European countries [10,11,13]. The level of cardiovascular risk, as assessed using the Framingham system, was correctly assessed in only 28–53% of patients. However, a recognized limitation of the Framingham system is that it was validated using data from a large US population, and as such cannot readily be extrapolated to European countries, particularly countries where the risk of cardiovascular disease is low (such as France) [14,15]. Comparison of the GP estimates in the present study with those derived using the SCORE system may thus be more informative, because the SCORE system was developed for use in European populations and includes specific charts for low-risk and high-risk countries [8,15]. However, due to the original study population, the SCORE system has never been validated for patients older than 65 years, even though the formula allows the calculation. In our study, patients at high risk, as assessed by the SCORE system, were inaccurately assessed by their GPs in 77% of cases, and this increased to 86% in the cohort who were not receiving treatment for dyslipidaemia; indeed, even in patients receiving lipid-lowering therapy (in whom the index of suspicion for cardiovascular risk might be expected to be raised), 65% of those at highest risk were incorrectly assessed by their GPs. This discrepancy between real and GP-reported cardiovascular risk level suggests that GPs undertake an empirical examination without considering all risk factors in their diagnosis. One of the reasons for the under-utilization of risk assessment systems is probably the fact that high cardiovascular perception is frequently associated with secondary prevention only and it is thought that patients in primary prevention could not have such a high cardiovascular risk. This has to be added to the classical reasons for the under-use of such scoring systems (lack of time and/or confidence).

Some limits should be noticed in our study. The Framingham and SCORE systems are not assessing exactly the same risk. Indeed, Framingham evaluated the 10-year risk of coronary heart disease risk and SCORE evaluated the 10-year risk of fatal cardiovascular disease. Furthermore, the items used to assess the risk are not the same in the two formulae (i.e. SCORE does not include diabetes in its evaluation). These differences limit the comparisons between the two scoring systems. It should also be noticed that these formulae allow risk assessment for untreated patients and that they could theoretically not be used for patients receiving treatment for dyslipidaemia.

Conclusion

This study has shown that a high proportion of patients presenting to primary care physicians in France are at high risk of cardiovascular disease. However, there is a marked mismatch between GP assessment of cardiovascular risk and the actual level of risk as calculated by risk-scoring systems such as Framingham or SCORE. Thus, GPs should be encouraged to use risk-scoring systems in order to better predict the risk of cardiovascular events and adapt treatment accordingly.

Disclosure of interest

Genevieve Bonneleye is an employee of Kantar Health. Lucas André, Florence Thomas-Delecourt and Pierre-Henri Delaage are employees of AstraZeneca France.

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