ORIGINAL ARTICLE

Application of the SCORE and Wilson–Grundy methods for the assessment of cardiovascular risk in community pharmacies

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SUMMARY

Background: The assessment and follow-up of patients with risk factors, or with cardiovascular disease (CVD), involves estimating and monitoring their CVD risk (CVDR). There are different opinions about the most appropriate method for this.

Objective: To compare the SCORE system and the Wilson–Grundy system (based on Framingham's study).

Methods: A descriptive, observational study over 15 days in six pharmacies, with patients aged between 25 and 74 years, and with a prescription for medications related to hypertension, dyslipidaemia, CVD prevention or type-2 diabetes. Results of patients' absolute CVDR were assessed and compared using the SCORE system and the Wilson–Grundy method, adapted for Spain. The Chi-square test was used to compare proportions, and the Student t-test was used to compare mean values, including odds ratios (OR) and 95% confidence intervals (95%CI).

Result: A total of 257 patients [165 women, 92 men; mean (SD) age, 60.9 (10.8) years; percentage of previous medical history of hypertension (70.0%), dyslipidaemia (42.4%), type-2 diabetes (19.5%) and CVD (22.6%)] participated. With the CVDR assessed with SCORE, the distribution was as follows: low 35.8%, intermediate 21.0% and high 43.2%. The corresponding values using the Wilson–Grundy system was low 60.7%, intermediate 8.2% and high 31.1%.

Conclusion: The cardiovascular risk of patients that attend community pharmacies with prescriptions for cardiovascular medications is significantly higher when assessed using the SCORE system than with the Wilson–Grundy method.

Keywords: cardiovascular disease risk, community pharmacies, pharmacotherapeutic follow-up, SCORE system, Wilson–Grundy method

INTRODUCTION

Background and objective

Cardiovascular disease risk (CDVR) is the probability of suffering a cardiovascular event (coronary, cerebrovascular or peripheral artery disease) within a certain period of time, usually 10 years. A CVDR factor is a biological or a behavioural characteristic of a person that is independently related to the subsequent development of a CVD (1). In this sense, the following characteristics are considered CVDR factors: age (men over 55 and women over 65), high blood pressure (diastolic and systolic), dyslipidaemia (high values of total cholesterol or low-density cholesterol (LDLc) or triglycerides and low values of high-density...
cholesterol (HDLc), smoking, and diabetes mellitus (some authors or guidelines consider this to indicate a CVD) (2).

The global assessment of CVDR divides patients into different risk groups (high, intermediate or low) (3). There are several methods proposed for the assessment of CVDR, most of them based on the results of the follow-up studies of the population of Framingham city, MA, USA (4).

In Spain, the team that elaborated the guidelines for the process of integrated assistance of vascular risk in the Autonomous Community of Andalusia (1), recommends using the adaptation of the Framingham method, proposed by Wilson (5) and Grundy (6). Adaptation consists of establishing an equivalence between the coronary risk of ‘hard’ events (death by a coronary cause, non-fatal myocardial infarction and unstable angina) as indicated in the original Framingham tables, and the absolute CVDR of the Spanish population. Subsequently, the Spanish Interdisciplinary Committee for the Prevention of Cardiovascular Disease (3), has adopted the guidelines of the European Society of Cardiology (7), and adapted them to Spain, as the SCORE model for low risk population (8). However, due to significant and contradictory differences in the results obtained using the SCORE and Framingham methods (9–11), there is confusion as to which method is best. In this study, we have analysed and compared the SCORE system with the Wilson–Grundy system (based on Framingham’s study), adapted for Spain.

METHODS
A descriptive, observational and sectional study was performed in six community pharmacies of Andalusia, Spain. The study was undertaken over 15 days in each pharmacy during September to December 2004.

Study population
Patients aged 24 to 74 years, visiting six community pharmacies in Granada, Malaga or Seville, during the study period, with a prescription for at least one medication for arterial hypertension, dyslipidaemia, cardiovascular prophylaxis or type-2 diabetes, were recruited. Subjects that visited with prescriptions for other people, or pregnant women, were excluded.

General study procedures
Signed, informed consent was required to participate. For the participating patients, the pharmacist required information on the diseases, which the patients acknowledged having, and on prescribed medications. The CVDR of the patients was assessed using both the method recommended by the Spanish Interdisciplinary Committee of Cardiovascular Prevention (3) (the SCORE system) (7, 8) and the method based on the Wilson–Grundy tables (based on the Framingham study) adapted for Spain (1, 5, 6), using the value of total cholesterol and the average values of HDLc of the Spanish population (49 mg/dL in men and 59 mg/dL in women).

Variables needed to calculate CVDR are age, sex, smoking status (regular intake of any quantity of tobacco during the last month), diabetes (declared by the patient), total values of cholesterol (assessed by the pharmacist using the Rapid Control/C210 equipment of Roche Diagnostics) and blood pressure (an average of two determinations, with at least 5 min between each determination, measured by the pharmacist).

The SCORE method considers patients who have type-2 diabetes or type-1 diabetes with microalbuminuria as patients with high CVDR (as also established by the Adult Treatment Panel III) (12). This model also predicts the risk of death by CVD within the next 10 years, and therefore the relationship between the percentage obtained and the risk category varies, and so values of 5% or higher are considered high CVDR (equivalent to 20% in the Wilson–Grundy method, adapted to Spain). The presence, or medical history of CVD, indicates high CVDR with both methods.

Statistical analysis
Statistical analysis was performed using SPSS version 11 (SPSS Inc., Chicago, IL, USA). Data are reported as mean, standard deviation (SD) and 95% confidence interval (CI95%) or as percentage (CI95%). The Chi square test was used to compare proportions, and the Student t-test was used to compare mean values, including odds ratios (OR) and 95% CI.
Assessment of cardiovascular risk in community pharmacies

Comparisons were analysed using a two-tailed test. P < 0.05 was considered statistically significant.

RESULTS

General characteristics of the patients

Two hundred and ninety-six patients potentially eligible were approached, of them 282 agreed to participate and 257 were included in the study [165 women, 92 men; mean (SD) age, 60.9 (10.8)]. Fourteen patients refused to participate, for a variety of reasons, mostly due to time restriction; 25 were excluded, 14 for being older than 74 years and 11 for missing required information. Demographic and clinical characteristics of the patients are shown in Table 1.

CVDR assessment using the method from the SCORE model

Ninety three patients (36.2%; CI95%: 30.3–42.1%) had one or more clinical characteristics, including type-2 diabetes, that automatically placed them in the high CVDR category. Of the 164 patients for whom CVDR assessment could be performed, the mean percentage risk was 2.0% (SD: 2.2; CI95%: 1.6–2.3%). The patients’ distribution into the three risk categories was as follows: low CVDR, 92 patients (35.8%; CI95%: 29.9–41.7%), intermediate CVDR, 54 patients (21.0%; CI95%: 16.0–26.0%), and high CVDR, 111 patients (43.2%; CI95%: 37.1–49.3%) (Table 2).

CVDR assessment using the Wilson–Grundy method adapted for Spain

Sixty two (24.1%; CI95%: 18.9–29.4%) had one or more clinical characteristics (blood pressure ≤180/110 mmHg or ECV) that placed them into the high CVDR category. The 195 patients for whom CVDR assessment could be done, the mean number of points assigned was 7.3 (SD: 4.1; CI95%: 7.7–7.9) and the mean percentage risk was 6.9 (SD: 6.5; CI95%: 6.0–7.8%). The patients’ distribution into the three risk categories was as follows: low CVDR, 156 patients (60.7%; CI95%: 54.7–66.7%), intermediate CVDR, 21 patients (8.2%; CI95%: 4.8–11.5%) and high CVDR, 80 patients (31.1%; CI95%: 25.4–36.8) (Table 2).

Comparison of the results of CVDR assessment using the SCORE and Wilson–Grundy methods

When CVDR values are assigned to two categories (low–intermediate: 1, and high: 2), the relative risk of obtaining a higher assessment with the SCORE system is 3.58 (CI95%: 2.66–4.83). Table 3 gives details of patients’ classifications using the SCORE and Wilson–Grundy methods. Group 1 subjects are those classified similarly by both methods, while group 2 subjects were classified discordantly. The

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Total</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)a</td>
<td>60.9 (10.8)</td>
<td>60.8 (10.7)</td>
<td>61.0 (10.9)</td>
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<tr>
<td>Medical history of associated illnesses</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Hypertension (%)</td>
<td>203 (79.0)</td>
<td>73 (79.3)</td>
<td>130 (78.8)</td>
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<tr>
<td>High levels of cholesterol or triglycerides (%)</td>
<td>109 (42.4)</td>
<td>39 (42.4)</td>
<td>70 (42.4)</td>
</tr>
<tr>
<td>Type-2 diabetes (%)</td>
<td>50 (19.5)</td>
<td>19 (20.7)</td>
<td>31 (18.8)</td>
</tr>
<tr>
<td>Angina (%)</td>
<td>28 (10.9)</td>
<td>13 (14.1)</td>
<td>15 (9.1)</td>
</tr>
<tr>
<td>Myocardial infarction (%)</td>
<td>12 (4.7)</td>
<td>7 (7.6)</td>
<td>5 (3.6)</td>
</tr>
<tr>
<td>Heart failure (%)</td>
<td>17 (6.6)</td>
<td>10 (10.9)</td>
<td>7 (4.2)</td>
</tr>
<tr>
<td>Cardiac arrhythmia (%)</td>
<td>28 (10.9)</td>
<td>13 (14.1)</td>
<td>15 (9.1)</td>
</tr>
<tr>
<td>Peripheral artery disease (%)</td>
<td>13 (5.1)</td>
<td>5 (5.4)</td>
<td>8 (4.8)</td>
</tr>
<tr>
<td>Stroke (%)</td>
<td>10 (3.9)</td>
<td>3 (3.3)</td>
<td>7 (4.2)</td>
</tr>
<tr>
<td>Total cholesterola</td>
<td>197 (33)</td>
<td>193 (34)</td>
<td>199 (32)</td>
</tr>
<tr>
<td>Systolic blood pressure (mmHg)a</td>
<td>136 (18)</td>
<td>138 (17)</td>
<td>134 (19)</td>
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<tr>
<td>Diastolic blood pressure (mmHg)a</td>
<td>81 (11)</td>
<td>82 (11)</td>
<td>79 (11)</td>
</tr>
</tbody>
</table>

aData are reported as mean (standard deviation).
patients’ age, sex, systolic blood pressure (SBP) and medical history of type-2 diabetes, were associated with discordant classification. Older age was associated with the ‘all’ and ‘low’ CVDR categories. Male gender was associated with the ‘low’ CVDR category and female gender with the ‘high’ CVDR category. High SBP was associated with the ‘low’ CVDR category and low values with the ‘high’ CVDR category. Type-2 diabetes was associated with CVDR in all except the intermediate category (Table 3).

**DISCUSSION**

This study presents several limitations and therefore, the results must be interpreted cautiously. This is an observational study; therefore, this study does not allow establishing cause-effect relationships. The higher percentage of female subjects (64%) in our sample, could have led to non-representative results, because male subjects are currently more affected of CVDR.

This study includes patients who went to Spanish community pharmacies with prescriptions for cardiovascular medications. This group of patients is characterized, among other things, by an advanced age (mean of 60.9 years), a predominance of female patients (64.2%) and the presence of one or more CVDR factors or CVD characteristic (13).

The CVDR estimation is higher with the SCORE system than with the Wilson–Grundy method
Table 3. Factors associated with discordant cardiovascular disease risk classification using the SCORE and Wilson–Grundy methods.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Comparison of the two groups according to CVDR categories</th>
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<tbody>
<tr>
<td></td>
<td>All (n = 257)</td>
</tr>
<tr>
<td></td>
<td>Group 1 (n = 74)</td>
</tr>
<tr>
<td></td>
<td>Group 1 (n = 31)</td>
</tr>
<tr>
<td>Age&lt;sup&gt;a&lt;/sup&gt;</td>
<td>65.3 (7.3)</td>
</tr>
<tr>
<td>Difference (CI 95%)</td>
<td>6.2 (3.3–9.0)&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Men (%)</td>
<td>36.5</td>
</tr>
<tr>
<td>Difference (CI 95%)</td>
<td>1.0 (12.1 to 14.0)</td>
</tr>
<tr>
<td>Systolic blood pressure (mmHg)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>136.1 (17.1)</td>
</tr>
<tr>
<td>Difference (CI 95%)</td>
<td>0.7 (42 to 56)</td>
</tr>
<tr>
<td>Medical history of type-2 diabetes (%)</td>
<td>35.1</td>
</tr>
<tr>
<td>Difference (CI 95%)</td>
<td>22.0 (11.6 to 32.5)&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Group 1 patients are those classified similarly by the two methods while Group B patients were classified discordantly.

<sup>a</sup>Data are reported as mean (standard deviation).

<sup>b</sup>Statistically significant.
adapted for Spain. This difference is statistically significant for all categories (Tables 2 and 3). This is similar to the outcome of other studies undertaken in Spain (10) and other European countries (11). Other studies have also shown that the SCORE system in patients aged 65–74 years generates a risk double those obtained with methods based on the Framingham equation (15). This same difference is observed in males when the age limit of comparison is drawn at 60 years (16).

The differences observed cannot be solely attributed to the inclusion of type-2 diabetes as a definite clinical condition of high CVDR in the SCORE method, because only 26 (52%) of the 50 patients with type-2 diabetes had a different estimate of risk. However, it is highly probable that this contributed to the results seen in the intermediate CVDR category (54 for SCORE vs. 21 for Wilson–Grundy). This study, in accordance with similar studies (10, 11, 14–16), indicates that the SCORE system overestimates CVDR in older male patients than using models based on the Framingham equation. This raises concerns about its use for estimating the cardiovascular risk of the Spanish population (1, 3, 8). However, which method is a better predictor of cardiovascular events remains to be determined.

CONCLUSIONS

The use of the SCORE system generally overestimates the CVDR of patients over 60–65 years old (the main population going to pharmacies with prescriptions for cardiovascular-related medications), and of male patients in general, relative to the Wilson–Grundy method, based on the Framingham study. The clinical follow-up of patients with risk factors, or with CVD, requires the assessment of the patients’ CVDR. For this, the Wilson–Grundy method adapted to Spain and the SCORE system are both easy to apply in community pharmacies. Which is better at predicting cardiovascular events in the at-risk Spanish population remains to be determined.

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CONFLICT OF INTEREST

The authors have no potential conflicts of interest or any economical benefit from this article.

REFERENCES


