BRIEF COMMUNICATION

Can the SCORE and NCEP Function Charts be Applied in Primary Prevention to Estimate Cardiovascular Risk in the Argentine Population?

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SUMMARY

Background
The estimation of cardiovascular risk in primary prevention using equations specially developed for risk stratification allows optimizing the use of public health resources.

Objective
To assess the cardiovascular risk using the SCORE and NCEP function charts and to analyze the agreement between both charts in an Argentine population.

Material and Methods
We obtained clinical and biochemical data from 234 adult people of both genders who attended the Department of Preventive Medicine at the Hospital Municipal de Bahía Blanca. Metabolic syndrome was defined according to the AHA criteria and low cardiovascular risk was considered with NCEP III < 20% and SCORE < 5%.

Results
The accuracy of SCORE and NCEP function charts to classify subjects with low cardiovascular risk was 93.16%, with a moderate agreement (kappa: 0.452).

Conclusions
The SCORE and NCEP function charts may be useful tools in primary prevention and cost-efficient in daily clinical practice.

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Key words > Cardiovascular Diseases - Risk Factors - Risk Assessment

Abbreviations >

HDL-C	High density lipoprotein-cholesterol	**SBP**	Systolic blood pressure
TC	Total cholesterol	**CVR**	Cardiovascular risk
CVD	Cardiovascular disease	**SCORE**	Systematic Coronary Risk Evaluation
RF	Risk Factors	**MS**	Metabolic syndrome
BMI	Body mass index	**TG**	Triglycerides
NCEP	National Cholesterol Education Program		

BACKGROUND

Cardiovascular diseases are the leading cause of death in Argentina and around the world.

Atherosclerotic cardiovascular disease (CVD) is the consequence of the interaction of different cardiovascular risk factors (RF) that increase cardiovascular risk (CVR) and, if the situation does not revert, may lead to cardiovascular ischemia. (1, 2)

In approximately 50% of cases, CVD may present as death or severe and permanent disability, thus emphasizing the need and importance of cardiovascular prevention. For these reasons, scientific societies in different regions have elaborated charts to be applied in primary prevention, based on prospective studies, which allow the estimation of the probability of developing ischemic cardiovascular events in a given person during a determined period.

The Framingham and the SCORE risk charts are the most widely used of the risk-scoring tools. (1)
The former, based on the American cohort, (2) estimate the risk of suffering an ischemic event in the next 10 years. (3)

The SCORE (Systematic Coronary Risk Evaluation) charts, (4) based on the European population, estimate fatal CVR in the next 10 years and has separate charts for high and low risk regions.

The goal of the present study was to evaluate the CVR in a population-based cohort in Argentina using the SCORE and NCEP (National Cholesterol

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Education Program) function charts and to analyze the agreement between both charts.

MATERIAL AND METHODS

We conducted a cross-sectional descriptive study that included 234 subjects of both sexes, between 40 and 67 years, attending the Department of Preventive Medicine of the Hospital Municipal de Agudos de Bahía Blanca for a medical check-up. Patients with diabetes and established CVD were excluded.

The following data were recorded: age, gender, smoking habits, weight, height, body mass index (BMI) and central obesity measured by waist circumference. (5)

Blood samples were obtained after a 12-hour fast. An ADVIA 1200 autoanalyzer was used for biochemical determinations of total cholesterol (TC), blood glucose levels and triglycerides (TG) with enzymatic colorimetric assay method, and high-density lipoprotein cholesterol (HDL-C) was detected using direct method.

The following charts were selected for the estimation of CVR:

1. SCORE charts: we used the low risk region charts using the variables age, gender, TC, systolic blood pressure (SBP) and smoking habits. (4)
2. NCEP charts: we included the variables age, gender, HDL-C, SBP and smoking habits. (3)

Risk was classified in low, moderate and high, and the cut-off values were < 15%, 15-19% and ≥ 20%, respectively, for NACEP charts and < 4%, 4-5% and ≥ 5%, respectively, for SCORE charts.

Metabolic syndrome (MS) was defined using the criteria of the American Heart Association (AHA). (3)

Patients' characteristics and CVR were described using measures of central tendency and dispersion for quantitative variables and percentages for categorical variables. Quantitative variables were analyzed using Student's t test, and chi-square test was used for qualitative variables. The level of agreement among the equations was determined using contingency tables and applying the kappa index. (6, 7) All statistical analyses were carried out using the Statistical Package for the Social Sciences version 15 for Windows. A p value < 0.05 was considered statistically significant.

RESULTS

Table 1 shows the levels of the variables analyzed in the studied population and the differences by gender.

The proportion of high-risk patients was 3.85% (all men) and 5.13% (all men) according to SCORE and NCEP charts, respectively, while that of low-risk patients was 95.73% (52.56% men and 43.17% women) and 89.75% (46.58% men and 43.16% women) for SCORE and NCEP charts, respectively (Figure 1).

When CVR risk was analyzed according to the presence of a specific risk factor in the population, both function charts showed that most people had low risk (Table 2). Table 3 demonstrates that both charts agreed that 93.16% of the population had low risk.

The coefficient of agreement (kappa index) was 0.452 (95% confidence interval: 0.289-0.615; p = 0.000).

Table 1 Characteristics of the general population and of patients by gender

	Total (n = 234)	Men (n = 133)	Women (n = 101)	p
Age (years)	50.35 ± 7.65	50.50 ± 7.69	50.16 ± 7.63	0.733
Obesity (BMI > 30)	101 (43.5%)	46 (34.6%)	26 (25.7%)	0.495
BMI (kg/m2)	28.70 ± 4.88	29.6 ± 4.30	27.51 ± 5.35	0.001
Waist circumpherence (cm)	91.49 ± 14.10	97.59 ± 12.25	83.46 ± 12.28	0.000
Current smokers	105 (45.3%)	36 (27%)	32 (31.6%)	0.824
Glycemia (mg/dl)	93.83 ± 29.20	97.24 ± 31.78	89.35 ± 24.85	0.040
Total cholesterol (mg/dl)	204.19 ± 36.51	207.92 ± 39.39	199.27 ± 31.84	0.064
Total cholesterol ≥ 200 mg/dl	101 (43.5%)	53 (39.8%)	47 (46.5%)	0.553
HDL-C (mg/dl)	53.33 ± 15.29	49.02 ± 13.16	59.01 ± 16.09	0.000
Triglycerides (mg/dl)	127.2 ± 116.7	147.27 ± 144.73	100.77 ± 53.17	0.001
Systolic blood pressure (mm Hg)	119.83 ± 17.50	123.27 ± 17.26	115.3 ± 16.85	0.000
Diastolic blood pressure (mm Hg)	75.18 ± 12.20	78.7 ± 11.45	70.54 ± 11.64	0.000
Metabolic syndrome	22 (9.4%)	13 (9.8%)	9 (8.9%)	0.901
CVR SCORE	0.92 ± 1.72	1.41 ± 2.11	0.27 ± 0.53	0.000
CVR NCEP	6.5 ± 5.66	8.41 ± 6.97	1.99 ± 2.46	0.000

p value: Differences among men and women. Data are shown as mean ± standard deviation or as numbers and percentages.

DISCUSSION

The estimation of CVR allows the identification of people requiring early and aggressive prevention, motivating the adherence of patients to treatment; in addition, the intensity of treatment can be adjusted by the patient's overall risk, facilitating an efficient use of resources. (2, 8, 9)

The use of these charts in primary health care as a tool of early diagnosis of cardiovascular risk has some limitations that should be considered. The charts cannot be applied in patients with atherosclerosis, with genetic disorders predisposing to atherosclerosis or with a single, yet severe risk factor, hypercholesterolemia, and severe hypertension, or in heavy smokers. They are not applied in diabetes, as this condition per se carries a high cardiovascular risk.

Some considerations should be made related to patient's age. When these charts are applied to older patients, they used to be considered candidates to aggressive therapies just for having advanced age. On the contrary, young patients with several moderate risk factors may be included in a low risk category due to their age.

The cohort analyzed in this study may be considered representative of the target population of patients encountered in daily medical practice for prevention activities.

In this study, moderate CVR in both charts was greater in men than in women and only men had moderate and high risk. Guzmán Padilla et al. found a greater proportion of men with moderate and high risk compared to women. (10)

The use of both methods altogether allowed the identification of subjects with low CVR with a precision of 93.16%; however, the proportion of patients with low CVR measured by SCORE charts was greater compared to NCEP charts. In a population in Costa Rica, more than 70% of subjects had low CVR according to different charts; (14) 87% of health care workers in the Balearic Islands had low CVR using the SCORE charts. (11)

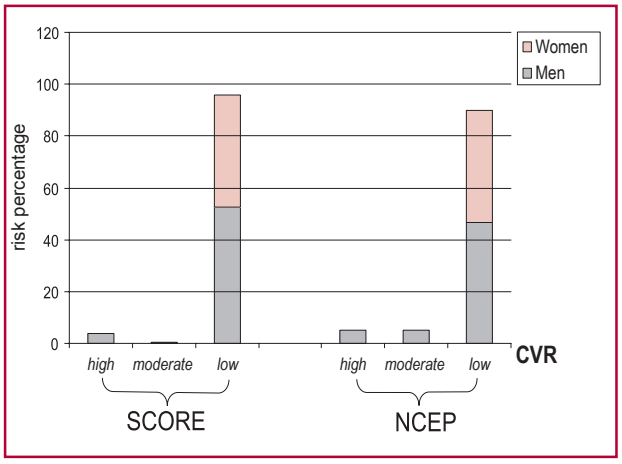

Fig. 1. High, moderate and low cardiovascular risk according to SCORE and NCEP charts in men and women.

	Low risk	Moderate risk	High risk
Percentage of smokers with cardiovascular risk			
SCORE	90	1.25	8.75
NCEP	85	3.75	11.25
Percentage of hypertensive patients with cardiovascular risk			
SCORE	90.38	0	9.62
NCEP	73.08	11.54	15.38
Percentage of patients with hypercholesterolemia with cardiovascular risk			
SCORE	94.26	0.82	9.52
NCEP	81.97	8.2	9.83
Percentage of obese patients with cardiovascular risk			
SCORE	90.48	0	4.92
NCEP	78.57	9.53	11.9
Percentage of subjects with metabolic syndrome with cardiovascular risk			
SCORE	86.49	0	13.51
NCEP	64.86	10.81	24.32

Table 2. Distribution of the population according to the presence of a risk factor and level of cardiovascular risk (low, moderate or high risk) according to the SCORE and NCEP function charts

Table. 3. Classification of cardiovascular risk in high risk and non-high risk

	CVR SCORE ≥ 5%	CVR SCORE < 5%
CVR NCEP ≥ 20%	5 (2.14%)	7 (2.99%)
CVR NCEP < 20%	4 (1.71%)	218 (93.16%)

High cardiovascular risk: CVR SCORE ≥ 5% and CVR NCEP ≥ 20%. Non-high cardiovascular risk: CVR SCORE < 5% and CVR NCEP < 20%. Data are expressed as n (%) of total population.

When CVR risk was analyzed according to the presence of a single risk factor in the population, both function charts showed that most people had low risk. Guzman Padilla et al. reported the same findings in a population in Costa Rica. (10)

The level of agreement between both function charts in this population was slightly lower than that reported in the population of Costa Rica, which compared the traditional Framingham and European charts (kappa index: 0.490), (10) yet it was higher the agreement reported in Italy (kappa index: 0.25). (12)

The moderate level of agreement in this study might be related to the fact that NCEP function charts estimate the risk of morbidity and mortality due to coronary artery disease, while the SCORE charts estimate cardiovascular mortality.

CONCLUSIONS

The need for estimating CVR in primary health care centers is unquestionable, as it allows the identification of subjects who require early and aggressive preventive interventions. In our study, we accurately detected that 93.16% of the population had low CVR; this result indicates that the use of both charts would detect 7% of the population with moderate or high risk, demonstrating that SCORE and NCEP function charts may be useful tools in cardiovascular prevention and cost-efficient in daily clinical practice.

RESUMEN

Son aplicables las funciones SCORE y NCEP para el cálculo del riesgo cardiovascular en prevención primaria en la población Argentina

Introducción
La estimación del riesgo cardiovascular en prevención primaria mediante ecuaciones elaboradas para tal fin permite optimizar la utilización de recursos disponibles en salud pública.

Objetivo
Evaluar el riesgo cardiovascular mediante la aplicación de las funciones SCORE y NCEP y analizar la concordancia entre ambas tablas en una población argentina.

Material y métodos
Se obtuvieron datos clínicos y bioquímicos de 234 personas adultas, de ambos sexos, que concurrieron al Servicio de Medicina Preventiva del Hospital Municipal de Bahía Blanca. Se definió el síndrome metabólico según criterios de la AHA y se determinó riesgo cardiovascular bajo según NCEP III < 20% y según SCORE < 5%.

Resultados
Las funciones SCORE y NCEP clasificaron con una precisión del 93,16% a los individuos con riesgo cardiovascular bajo y la concordancia fue moderada (kappa: 0,452).

Conclusión
La aplicación de las tablas SCORE y NCEP en prevención primaria puede ser una herramienta útil y costo-eficiente en la práctica clínica diaria.

Palabras clave > Enfermedades cardiovasculares - Factores de riesgo - Medición de riesgo

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Competing interests
None declared