Validity of cardiovascular risk prediction models in Latin America and among Hispanics in the United States of America: a systematic review

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ABSTRACT

Objective. *To assess the use and validity of prediction models to estimate the risk of cardiovascular disease (CVD) in Latin America and among Hispanic populations in the United States of America.*

Methods. *This was a systematic review of three databases: Ovid MEDLINE (1 January 1950–15 April 2010), LILACS (1 January 1988–15 April 2010), and EMBASE (1 January 1988–15 April 2010). MeSH search terms and domains were related to CVD, prediction rules, Latin America (including the Caribbean), and Hispanics in the United States. Database searches were supplemented by correspondence with experts in the field.*

Results. *A total of 1 655 abstracts were identified, of which five cohorts with a total of 13 142 subjects met inclusion criteria. A Mexican cohort showed that the predicted/observed event-rate ratio for coronary heart disease (CHD) according to the Framingham risk score (FRS) was 1.68 (95% CI, 1.26–2.11); incident myocardial infarction, 1.36 (95% CI, 0.90–1.83); and CHD death, 1.21 (95% CI, 0.43–2.00). In Ecuador, a prediction model for CVD and total deaths in hypertensive patients had an area under the curve (AUC) of 0.79 (95% CI, 0.72–0.86), while the World Health Organization method had an AUC of 0.74 (95% CI, 0.67–0.82). A study predicting mortality risk in people with Chagas' disease had an AUC of 0.81 (95% CI, 0.72–0.90). Among a United States cohort that included Hispanics, FRS overestimated CVD risk for Hispanics with an AUC of 0.69. Another study in the United States that assessed FRS factors predicting CVD death among Mexican-Americans had an AUC of 0.78.*

Conclusions. *The evidence regarding CVD risk prediction rules in Latin America or among Hispanics in the United States is modest at best. It is likely that the FRS overestimates CVD risk in Hispanics when not properly recalibrated.*

Key words Cardiovascular diseases; risk factors; Hispanic Americans; Latin America.

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In 2010, Latin America, including the Caribbean, had a combined population of approximately 600 million people; while another 40 million Hispanics constituted the largest minority (16%) in the United States (1).

According to the World Health Organization (WHO), about 25% of all annual deaths in Latin America are due to cardiovascular diseases (CVD) (2, 3). Cardiovascular risk factors, including obesity, hypertension, hypercholesterolemia, diabetes mellitus, and tobacco use are highly prevalent in Latin America and contribute to three-fourths of its CVD cases (4). The prevalence of most, if not all, of these factors has been steadily increasing in recent years in Latin America, and the trend is expected to continue (3).

Data regarding CVD burden and trends among Hispanics living in the United States is also alarming and represents the most likely cause of death among this population (5), about 31% of all deaths (6). The prevalence of heart disease is 8.1% in Hispanics and 12.1% in Caucasians (7) and the prevalence of obesity (8), diabetes mellitus, hypertension, and dyslipidemia, is generally higher among Hispanics than Caucasians (7, 9).

Estimation of CVD risk using prediction models is considered of high importance to public health since it can aid clinical decision-making, guide therapy, and make interventions more cost effective. It may also help direct public policy when measuring risk trends at the population level (10). In the last few decades, several cardiovascular risk prediction models have been created and introduced worldwide.

The Framingham risk score (FRS) was the first of such tools and is arguably the most commonly used model for calculating 10-year risk for CVD events in the world. The FRS has been validated and recalibrated in several different populations, including Australia, China, Japan, New Zealand, Spain, and the United States (11–14). These studies have shown that the FRS may overestimate CVD risk in some populations and underestimate it in others. Some other prediction models include the Prospective Cardiovascular Munster Heart Study (PROCAM) (15), the Reynolds score (16), and the Systematic Coronary Risk Evaluation system (SCORE) (17).

The aim of this study was to assess the use and validity of CVD risk prediction models in Latin America and the Caribbean and among Hispanic populations in the United States through a systematic review of the literature from 1950–2010.

MATERIALS AND METHODS

Selection criteria and search strategies

A systematic review of the literature was undertaken. The predefined inclusion criteria for the analysis were two: the study was carried out in one or more countries in Latin America or the Caribbean or among a Hispanic population in the United States; and the study involved the creation or validation of a cardiovascular risk prediction model.

Three databases were searched: Ovid MEDLINE® (Ovid Technologies, Inc., New York City, United States); LILACS (Latin American and Caribbean Center on Health Sciences Information, São Paulo, Brazil); and Embase™ (Elsevier, B.V., Amsterdam, The Netherlands). Ovid MEDLINE was searched from 1 January 1950–15 April 2010; and both the LILACS and Embase databases were searched from 1 January 1988–15 April 2010.

To identify studies that evaluate prediction models and Latin America or the Caribbean, the search employed MeSH® terms (National Library of Medicine, Washington, DC, United States) for the following domains and their combinations using the commands "*and*" and "*or*": (1) Cardiovascular (cardiovascular diseases *or* myocardial infarction *or* coronary heart disease *or* coronary artery disease *or* angina *or* atherosclerosis); *and* (2) Prediction rule (Framingham score *or* PROCAM *or* ASSIGN *or* QRISK1 *or* QRISK2 *or* SCORE *or* Reynolds Score *or* calibration *or* validation *or* risk score *or* prediction rule); *and* (3) Latin America *or* South America *or* Central America *or* Caribbean *or* Caribe *or* a Country Name (i.e., Argentina, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Falkland Islands, French Guiana, Guadeloupe, Guatemala, Guyana, Haiti, Honduras, Martinique, Mexico, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Saint Bartholomey, Saint Lucia, Saint Martin, Suriname, Uruguay, or Venezuela).

To identify studies that evaluate prediction models among Hispanic populations in the United States, the search criteria were applied to the same three databases for the identical time period using the following: (1) Cardiovascular (cardiovascular disease *or* myocardial infarction *or* coronary heart disease *or* coronary artery disease *or* angina *or* atherosclerosis), *and* (2) the MeSH term "Hispanic Americans," as well as Hispanic ethnicity words (Latino *or* Hispanic *or* Mexican American *or* Puerto Rican American *or* Dominican American *or* Cuban American), *and* (3) Prediction rules (Framingham risk score *or* PROCAM *or* Reynolds score).

In addition, to minimize publication bias, cross-references were sought and 17 global experts in epidemiology and CVD prediction rules were consulted via email to identify any unpublished studies.

Two reviewers, MCB and FA, then independently screened the studies based on the information included in the titles and abstracts, and excluded those that were unrelated to the primary aim of the project. Agreement between reviewers was assessed using chance-adjusted kappa statistics. Disagreements were resolved by discussion and consensus. Studies considered as publications that would likely meet all the criteria were read in full by two of the researchers to determine final eligibility.

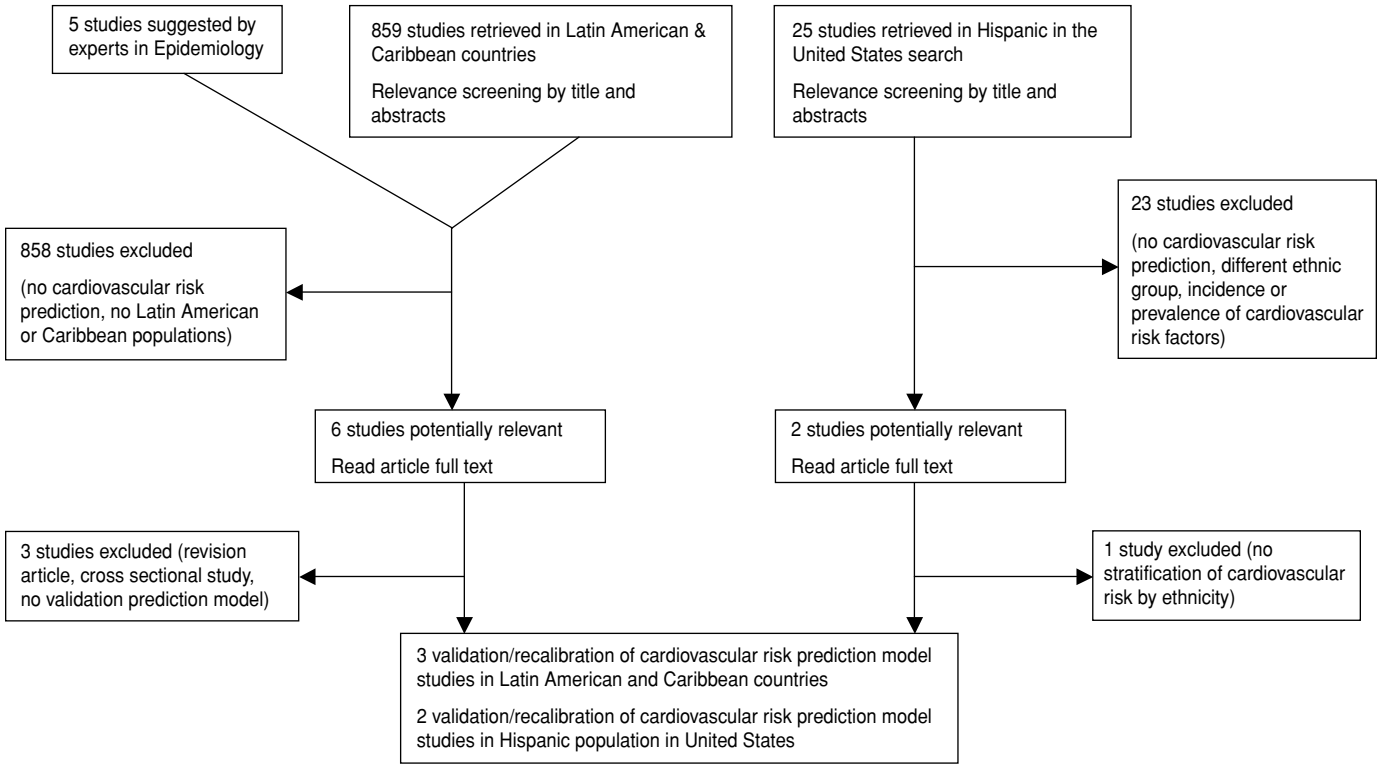
The following predefined variables of interest measured the prognostic performance and were used to compare prediction rules: area under the receiver operating characteristic curve (AUC), ratio of predicted/observed event rates, sensitivity and specificity, and diagnostic accuracy. To assess the methodological quality of the studies included, key components were evaluated that correlate with internal and external validity of studies assessing risk scores. These components included sample characteristics, generalizability, and length of follow up, ascertainment and validation of a new risk score in a subset of the sample, and use of standard statistics to report prognostic performances like C-statistics or AUC. There was no attempt in this study to create a quality score.

RESULTS

Studies selected

The search strategy and number of studies identified in each step are displayed in Figure 1. In all, five studies were identified as validating a cardiovascular risk prediction model: three cohort studies in Latin America/the Ca-

FIGURE 1. Flowchart describing study selection process in a systematic review of literature validating cardiovascular risk prediction models in Latin America, the Caribbean, and among Hispanics in the United States, 1950–2010



ribbean and two among Hispanic populations in United States (Annex 1). The total number of participants in the identified cohorts was 13 142, ranging from 424–8 713 individuals in each. The age range of the subjects was 18–64 years. There was significant heterogeneity in the way the validity of risk scores was reported. General characteristics of the selected studies are shown in Annex 1.

Jimenez-Corona and colleagues (18) assessed the applicability of the FRS equations to calculate total coronary heart disease (CHD), incident myocardial infarction, and CHD death in a Mexican population using different formulas from the Framingham study. They observed that the FRS overestimated the risk when comparing observed to predicted incidence. The number of total CHD events using the formula suggested by Wilson and colleagues (19) for both sexes was 58 observed cases versus 98 predicted, with a ratio of predicted/observed of 1.68 (95% CI, 1.26–2.11). For incident myocardial infarction using the formula presented by Anderson and colleagues (20), there was also an overestimation of events, with 34 observed cases versus 46 predicted and a ratio predicted/observed of 1.36 (95% CI, 0.90–1.83). For CHD deaths, using the formula suggested by Anderson and colleagues (20), the number of observed cases was 9 versus 11 predicted, and the ratio of predicted/observed was 1.21 (95% CI, 0.43–2.00). These authors did not report AUC for the models.

Montalvo and colleagues (21) validated a new prediction model for CVD events and total deaths in patients with hypertension in a poor, rural area of Ecuador. The study assessed the predictive power of a risk stratification method based on "essential" methods, described as procedures that were affordable, applicable, and reliable even in the less economically-developed areas of the world. The model included measurement of blood pressure, fasting blood glucose, urinalysis, smoking status, and associated clinical conditions. It was compared in the same population to the method proposed by the 1999 WHO/International Society of Hypertension (ISH) guidelines (22). There was a highly-significant association between the level of predicted risk and the incidence of cardiovascular events and total deaths, with up to three-quarters of all deaths reported among people classified as "high" or "very high" risk with either method. The specificity of the "essential" method was close to that of the WHO/ISH criteria, presenting an AUC of 0.79 (95% CI, 0.72–0.86) versus 0.74 (95% CI, 0.67–0.82), respectively. As the majority of study participants were of African descent (85%), this study probably does not represent the majority of the Latin American population. Another limitation was that the risk stratification did not provide a quantitative risk estimate (absolute risk), limiting its clinical value.

Rassi and colleagues (23) conducted a long-term, follow-up study of a large group of well-characterized patients with Chagas' disease and cardiac involvement in order to develop a predictive model for risk of death. A combination of clinical factors were used including New York Heart Association class III or IV, presence of cardiomegaly on chest radiography, segmental or global wall motion abnormality on echocardiography, non-sustained ventricular tachycardia on 24-hour Holter monitor-

ing, low QRS voltage on electrocardiography, and male sex. To calculate a risk score, each of the six prognostic variables were assigned a number of points that was proportionate to its regression coefficient. The mean follow-up was 7.9 years. The validation cohort consisted of patients with Chagas' disease treated in another institution, with characteristics similar to those of the development cohort. The AUC for the derivation cohort was 0.84 (95% CI, 0.79–0.89), and for the validation cohort, 0.81 (95% CI, 0.72–0.90). The difference in the probability of death between the high-risk and the lower-risk groups was 0.53% at 5 years and 0.76% at 10 years.

For the Hispanic populations in the United States, two articles assessed the FRS and FRS factors among Mexican-Americans and Puerto Ricans. D'Agostino and colleagues (24) tested the validity and transportability of the Framingham CHD prediction functions in a multiethnic group, including the Puerto Rico Heart Health Program cohort. Per their observations, the FRS systematically overestimated CHD risk among Hispanics. The diagnostic performance was fair, with an AUC of 0.69.

Hurley and colleagues (5) assessed the ability of Framingham risk factors to predict cardiovascular death in Caucasians compared to Mexican-Americans and African-Americans. The risk factors identified were sex, age, smoking, diabetes, total cholesterol (without categorization), HDL cholesterol, and systolic blood pressure (treated or not). The association between age and CVD mortality for Mexican-Americans was not as strong as in Caucasians; that is, the hazard ratio (HR) was 2.46 (95% CI, 1.95–3.11) versus 3.37 (95% CI, 2.80–4.05), respectively. The AUC for CVD death was 0.78 for Mexican-Americans. It was observed that the predicted/observed mortality rate was higher for Mexican-Americans than for non-Hispanics Caucasians. The calibration goodness-of-fit χ^2 statistics for CVD mortality for Mexican-Americans indicated adequate fit for racial/ethnic group when the model was developed separately for each racial/ethnic group.

DISCUSSION

This study identified five studies that assessed cardiovascular risk prediction models in cohorts from Latin America or Hispanic populations in the United States (5, 18, 21, 23, 24). Overall, evidence supporting the validity of CV prediction rules among these populations is scare.

The limited number of studies and the heterogeneity of the manner in which results were reported did not allow for a meta-analysis. Nonetheless, the results of this systematic review provide important insights and information useful to public policy and CVD prevention in Latin America and among Hispanics. This study may help to fill the gaps considering the lack of evidence and resources for developing a predictor model designed for this population group, which is at-risk and does not share the same characteristics as the populations that validated the models currently in use.

Estimation of CVD risk and interventions on the modifiable risk factors could be of high impact to CVD morbidity and mortality, as well as to each country's economics. First, risk prediction models, including the FRS, could help stratify cardiovascular risk events among Hispanics, but the models need to be recalibrated to the level of underlying cardiovascular risk observed in this population, which is generally lower than that from which the Framingham was derived. It has been shown that among young individuals with multiple CVD risk factors, the 10-year risk may be low, but the long-term risk may be high (24). This has been seen in Latin American countries whose populations are younger than the populations used to validate FRS, and is probably a reason for the observed CVD risk underestimation (24).

In the two studies assessing FRS prognostic performance (18, 24), the predicted number of events among Hispanics was almost double the number of actual events that occurred in those cohorts. After recalibration, the diagnostic performance of the FRS improved significantly. Of note, the FRS applicability among Puerto Ricans yielded a modest AUC, suggesting that the diagnostic performance of the FRS might still be inferior among Hispanics versus Caucasians, even after recalibration. These results are consistent with other studies that have tried to implement the FRS in populations other than the one in which it was derived (13, 25–27). In China, Liu and colleagues (14) compared the performance of the FRS to that of a local risk-prediction equation derived from a local cohort. The FRS systematically overestimated the event rates, but after recalibration for this specific population's underlying cardiovascular risk, its prognostic capabilities improved.

Principally, the FRS commonly needs recalibration because the risk prediction score used to calculate absolute risk is strongly influenced by the population-specific risk. Since it would be impractical to have a risk prediction rule developed for each country in the world, it seems most feasible to use well-known cardiovascular risk prediction rules, recalibrating them according to the underlying cardiovascular risk of each specific country or geographic area (e.g., Latin America). In Chile, Icaza and colleagues (28) applied the FRS, but recalibrated the risk assuming a cardiovascular event rate lower than that of the United States, based on their national epidemiologic data for cardiovascular mortality. European populations with a low underlying cardiovascular risk have used the SCORE prediction system, adjusted for a low 10-year risk for fatal CVD (17). Because the recalibration process relies on accurate estimates of CVD event rates, epidemiologists and investigators must have valid sources reporting regional or national CVD events, using definitions of outcomes similar to the definitions used during the development and validation of the scores to be implemented.

The search also identified a study that validated the WHO/ISH cardiovascular risk score system (22). It tested a modified minimalist method and showed good performance when applied to a sample of hypertensive individuals in Ecuador. The system relies on hypothetical data sets for each WHO Region on the basis of risk factor prevalence and other information, as part of a collaborative risk assessment project (22). Conclusions by Montalvo and colleagues (21) might be implemented in areas of Latin America that have scare healthcare resources and where policymakers are willing to implement public health policies focused on primary prevention of CVD.

The search also identified a study that created and validated a risk prediction rule for Chagas' disease and proves that risk prediction models for conditions other than atherosclerotic CVD can be created and validated with good results and potential clinical use (23). Chagas is the leading cause of heart failure in the

Amazon area that spans several countries, and its prevalence is growing in some parts of South America. Thus, these prediction rules will likely help clinicians in a large area of South America to stratify patients with Chagas' disease according to risk of death and support the clinical decision making process.

Very limited data from the published literature was found that could assist with calculating cardiovascular risk in Latin America and among Hispanics in the United States. With more than 600 million Hispanics in Latin America and the worrisome trends in CVD risk factors, the expectation was that there would be more data supporting the use or validity of risk prediction rules in this large segment of the world population. The scarcity of research on which to base and validate cardiovascular prediction rules is not limited to Latin America or Hispanics in the United States; nearly every less developed area of the world and most minority groups in the United States are challenged by it. About 75% of all cardiovascular deaths in the world occur in less developed countries, but all of the major scores to predict cardiovascular events have been created and validated in North America and Europe. The epidemiologic transition in less developed countries has prompted WHO and others to take important steps toward creating simple predictive rules that use a pragmatic approach to target modifiable cardiovascular risk factors (29). The development and validation of risk prediction rules will help to target primary prevention strategies to those who will benefit the most, thereby improving the cost-effectiveness of atherosclerotic CVD prevention programs and treatment.

Study limitations

This systematic review has several limitations. There are possibly some articles on validation of cardiovascular risk scores that were missed because they were either unpublished or were published by a Latin American medical journal that was not indexed by the major indices for scientific publications. In an effort to overcome this limitation, unpublished data was sought through direct contact with leaders in preventive cardiology in Latin America, and with epidemiologists with CVD risk prediction expertise in the United States.

Another limitation is the heterogeneity of Latin American populations and the inability to do further subgroup analysis among the intermediate risk populations. The databases are simply not available. Latin America boasts significant variability in diet, lifestyle, and even, genetics. Some areas, such as Argentina and the southern part of Brazil, have populations of predominantly Caucasian descent, and a diet rich in saturated fat and red meat, while vast portions of Central America have a large percentage of Indigenous Americans and a diet based on grains and vegetables. Therefore, because of the important differences among countries and communities in Latin America, the recalibration process applied in one country would need to be tested for validity in another.

A final limitation is that the definition of "Hispanic" includes a heterogeneous group of people linked by cultural and ethnic factors, and a common language that may, or may not, have anything to do with underlying CVD risk. Although studies have shown that Hispanics living in the United States may have lower CVD incidence than Caucasians, other studies have challenged this determination (9).

Conclusions

This systematic review revealed that the evidence of testing and validating CVD risk prediction rules among Latin American populations and/or Hispanics in United States is modest at best. Without proper recalibration, the FRS tested among Hispanic populations overestimates CVD risk. Ideally, risk prediction tools should incorporate affordable and accessible clinical and demographic information.

There are now a few cohort studies that could be imminently useful: in the United States, the Design and Implementation of the Hispanic Community Health Study/Study of Latinos (30); and in Latin America, the CESCAS I study in Argentina, Chile, and Uruguay (31); the INTERHEART study in Argentina, Brazil, Colombia, Chile, Guatemala, and Mexico) (3); and the Estudo Longitudinal de Salude do Adulto (ELSA) study in Brazil (32). The information from these could be helpful to future efforts to validate or calibrate current risk prediction rules in Latin America and among Hispanics in the United States.

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ANNEX 1. Characteristics of studies selected for a systematic review of the literature on cardiovascular risk prediction models in Latin America, including the Caribbean and among Hispanics in the United States of America, 1950–2010

Study (authors, year, country)	Objectives	Outcome	Design	Sample size and inclusion criteria	Age/sex	Follow up	Scoring system	Summary of results	Methodology quality
Jimenez-Corona et al. (18) 2009 Mexico	To predict the risk of coronary heart disease and incident myocardial infarction using Framingham risk score	Fatal MI[a], non-fatal MI, or both	Cohort study: The Mexico City Diabetes Study (prevalence and incidence of diabetes and CV[b] risk factors in low income urban populations of Mexico City)	*n* = 1 667 Males and females without MI at baseline	35–64 years 681 men 986 women	6.2 years (range 0.2–9.8 years)	Age, current smoking, SBP[c], DBP[d], hypertension, diabetes, cholesterol, HDL-cholesterol[e]. Formulas used: Wilson P and Anderson HM (for CHD[f], incident MI and CHD death; incident MI, CHD death).	Framingham score prediction overestimated the observed number of total CHD cases in both men and women. Overall ratio of predicted/observed 1.68 for CHD and 1.36 for incident MI.	Sample representative of the population. Good length of follow up. Assessed three different outcomes. Ascertainment of outcomes was appropriate. AUC[g] not reported.
Montalvo et al. (21) 2008 Ecuador	To assess the predictive power of a risk stratification method for people with hypertension based on "essential" procedures and comparing with the results given by the method suggested by the WHO/ISH[h]	CV events and total deaths	Prospective cohort study. Performed in a rural area of the Ecuadorian forest (85% black, 10% Indigenous, and 5% white)	*n* = 504 Males and females with hypertension	≥18 years 67% females	6.7 years (range 4.4–9.0 years)	"Essential method": blood pressure, medical history smoking, age, sex, diabetes WHO/ISH: fasting blood glucose, cholesterol, creatinine, urinalysis and ECG[i].	Up to three-fourths of all CV events and two-thirds of all deaths were among high or very high risk	Model could be used in poor areas. Population studied is not representative of the entire country (mainly Blacks). Ascertainment of outcomes was appropriate. Model validated only internally. No quantitative risk estimation.
Rassi et al. (23) 2006 Brazil	To develop a model to predict the risk of death in patients with Chagas' heart disease	Death	Prospective cohort study. Rural and urban population of central Brazil that were served by a regional referral hospital.	*n* = 424 Male and female outpatients with Chagas' disease and cardiac involvement	47 ± 11 years 247 (58.3%) males	7.9 (range 4.7–11.1 years)	NYHA[j] functional class III or IV, cardiomegaly on chest X-ray, segmental or global wall-motion abnormality on echocardiography, nonsustained ventricular tachycardia on 24 hour Holter monitoring, low QRS voltage on ECG, male sex	The difference in the probability of death between the high risk and the low risk groups was 0.53 at 5 years and 0.76 at 10 years. C statistic was 0.81 (95% CI-0.72–0.90)	Representative of the entire population. Appropriate follow up. Validated using a subset data. Model could be routinely used. Ascertainment of outcomes was appropriate.

(continued)

ANNEX 1. (Continued)

Study (authors, year, country)	Objective	Outcome	Design	Sample size and inclusion criteria	Age/sex	Follow up	Scoring system	Summary of results	Methodology quality
D'Agostino et al. (24) 2001 United States	To test the validity and transportability of the Framingham CHD prediction functions per a National Heart, Lung, and Blood institute workshop organized for this purpose.	Coronary death or myocardial infarction ("hard" outcomes)	Prospective, nested case-control study. Six prospective, ethnically diverse cohorts. For Hispanic cohort used the Puerto Rico Heart Health program (urban and rural men).	*n* = 23 424 Males only Whites, Blacks, Native-Americans, Japanese-Americans, Hispanics	45–64 years 8 713 Hispanic men	3 years for Hispanics	Age, blood pressure, total cholesterol, HDL cholesterol, diabetes, current smoking	For Hispanic men, the Framingham functions overestimated the risk of 5-year CHD events. After recalibration, the function worked well in this population.	Performed internal validation and recalibration. Sample limited to men. Ascertainment of outcomes was appropriate. Follow up limited to 3 years.
Hurley et al. (5) 2010 United States	To assess the ability of Framingham risk factors to predict cardiovascular death in Caucasians compared with Latinos and African-Americans.	Cardiovascular death.	Cross sectional survey plus mortality data using national registries. Data sources from the Third National Health and Nutrition Examination Survey (NHANES[k] III)	*n* = 7 125 non-Hispanic White, non-Hispanic Black, and Mexican Americans	40–80 years. 1 834 Mexican-Americans (919 males, 913 females)	6 years	Sex, age, SBP, total cholesterol, HDL cholesterol, smoking and diabetes.	There is no categorization of cholesterol or BP[l] values. The predicted mortality rate is higher for Mexican-Americans than non-Hispanic Whites.	Good representation of the U.S. population of Hispanics. Appropriate follow up. Ascertainment of outcomes was appropriate. Assessed prediction of CV death using Framingham risk factors, but does not provide a risk score system nor use a previously validated prediction model.

[a] Myocardial infarction.
[b] Cardiovascular.
[c] Systolic blood pressure.
[d] Diastolic blood pressure.
[e] High density lipoprotein cholesterol.
[f] Coronary heart disease.
[g] Area under the curve.
[h] World Health Organization/International Society of Hypertension.
[i] Electrocardiogram.
[j] New York Heart Association.
[k] National Health and Nutrition Examination Survey.
[l] Blood pressure.

Validez de los modelos de predicción del riesgo de enfermedades cardiovasculares en América Latina y en la población hispana en los Estados Unidos de América: una revisión sistemática

RESUMEN

Objetivo. Evaluar el uso y la validez de los modelos de predicción para calcular el riesgo de padecer enfermedades cardiovasculares en América Latina y en poblaciones hispanas en los Estados Unidos de América.

Métodos. Se llevó a cabo una revisión sistemática de tres bases de datos: Ovid MEDLINE (1 de enero de 1950 al 15 de abril del 2010), LILACS (1 de enero de 1988 al 15 de abril del 2010) y Embase (1 de enero de 1988 al 15 de abril del 2010). Los términos de búsqueda MeSH y los dominios se relacionaron con las enfermedades cardiovasculares, las reglas de predicción, América Latina (que incluye el Caribe) y los hispanos en los Estados Unidos. Las búsquedas en las bases de datos se complementaron con la opinión de expertos en el tema.

Resultados. Se identificaron 1 655 resúmenes, de los cuales reunieron los criterios de inclusión cinco cohortes con un total de 13 142 sujetos. En una cohorte mexicana la razón entre las tasas de sucesos previstos y observados para la cardiopatía coronaria según la escala de valoración del riesgo de Framingham (FRS) fue 1,68 (IC de 95%, 1,26–2,11); para el infarto de miocardio nuevo, 1,36 (IC de 95%, 0,90–1,83); y para la muerte por cardiopatía coronaria, 1,21 (IC de 95%, 0,43–2,00). En el Ecuador, un modelo de predicción de defunción por enfermedades cardiovasculares y total en los pacientes hipertensos presentó un área bajo la curva (AUC) de 0,79 (IC de 95%, 0,72–0,86), mientras que el método de la Organización Mundial de la Salud mostró un AUC de 0,74 (IC de 95%, 0,67–0,82). Un estudio enfocado a predecir el riesgo de mortalidad en las personas con enfermedad de Chagas reveló un AUC de 0,81 (IC de 95%, 0,72–0,90). En una cohorte de los Estados Unidos que incluía población hispana, la FRS sobrestimó el riesgo de sufrir enfermedades cardiovasculares para los hispanos con un AUC de 0,69. Otro estudio realizado en los Estados Unidos en el que se evaluó los factores de la FRS que predecían la muerte debida a enfermedades cardiovasculares en estadounidenses de origen mexicano reveló un AUC de 0,78.

Conclusiones. Los datos relacionados con las reglas de predicción del riesgo de sufrir enfermedades cardiovasculares en América Latina o en la población hispana en los Estados Unidos son, en el mejor de los casos, limitados. Es probable que la FRS sobrestime el riesgo de sufrir enfermedades cardiovasculares en la población hispana cuando no se la recalibra de manera adecuada.

Palabras clave Enfermedades cardiovasculares; factores de riesgo; hispanoamericanos; América Latina.