

Health Promotion

Cardiovascular Risk and Assessment

Cardiovascular diseases (CVDs) refer to a broad spectrum of diseases that affect the heart and blood vessels. CVDs include coronary heart disease (CHD), such as angina and myocardial infarction (commonly known as heart attack), stroke, heart failure, hypertensive heart disease, rheumatic heart disease, cardiomyopathy, heart arrhythmia, congenital heart disease, valvular heart disease, carditis, aortic aneurysms, peripheral artery disease and venous thrombosis. Heart diseases and cerebrovascular diseases are the third and fourth leading causes of death in Hong Kong respectively. Heart diseases and cerebrovascular diseases are also medical conditions of aeromedical significance that affect the outcome of medical certification of a HKCAD medical certificate holder.

CVD risk prediction is important for prevention of CVD events because it enables health professionals to identify individuals in the community who are at high risk of CVD to assess and discuss their modifiable risk factors early, such as a) elevated blood pressure, b) total cholesterol and high density cholesterol level, c) elevated blood sugar, d) unhealthy eating, e) alcohol drinking, f) poor physical activities and g) smoking, and, if necessary, refer them for appropriate treatment.

Numerous risk prediction models, e.g., Framingham Risk Model, Qrisk3 score, the ASCVD Risk Estimator Plus, etc., have been developed to quantify the risks of CVD over the next 10 years. In 2022, The Department of Health (DH) utilized the widely-used Framingham Risk Model for general CVD risks to predict the risk of CVD over the next 10 years in the general adult population aged 30-74 in Hong Kong. Based on the Framingham Risk Model adapted for local use, the Population Health Survey 2020-22 appraised that 18.4% of land-based non-institutional persons aged 40-70 were classified as high risk with cardiovascular risk 20% or more over the next 10 years. While 37.6% of persons aged 40-70 with high cardiovascular risk received both drug therapy and counselling to prevent heart attacks and strokes, 28.1% of persons with high cardiovascular risk did not receive any drug therapy or counselling.

As computed using the calculator in the form of spreadsheet from <https://www.framinghamheartstudy.org/fhs-risk-functions/cardiovascular-disease-10-year-risk/>, the following two examples were used to illustrate the two different outcomes of the Framingham Risk Model for general CVD risks in predicting the

risk of CVD over the next 10 years for a 30-year-old male with or without control of some of the modifiable risk factors.

From The Framingham Heart Study General CVD Risk Prediction		Enter Values Here	
Risk Factor	Units	(Type Over Placeholder Values in Each Cell)	Notes
Sex	male (m) or female (f)	m	
Age	years	30	
Systolic Blood Pressure	mmHg	145.0	
Treatment for Hypertension	yes (y) or no (n)	n	
Smoking	yes (y) or no (n)	y	
Diabetes	yes (y) or no (n)	n	
HDL	mg/dL	45	
Total Cholesterol	mg/dL	180	
Your 10-Year Risk (The risk score shown is derived on the basis of an equation. Other print products, use a point-based system to calculate a risk score that approximates the equation-based one.)		4.2%	<i>If value is < the minimum for the field, enter the minimum value. If value is > the maximum for the field, enter the maximum value.</i>
Your Heart/Vascular Age		41	

Legend:
 ■ YOUR RISK
 ■ OPTIMAL
 ■ NORMAL

Calculator prepared by R.B. D'Agostino and M.J. Pencina based on a publication by D'Agostino et al. in Circulation

Diagram 1 - General CVD Risk Prediction for a 30-year-old male, who smokes, with untreated hypertension, high total cholesterol and low high-density cholesterol

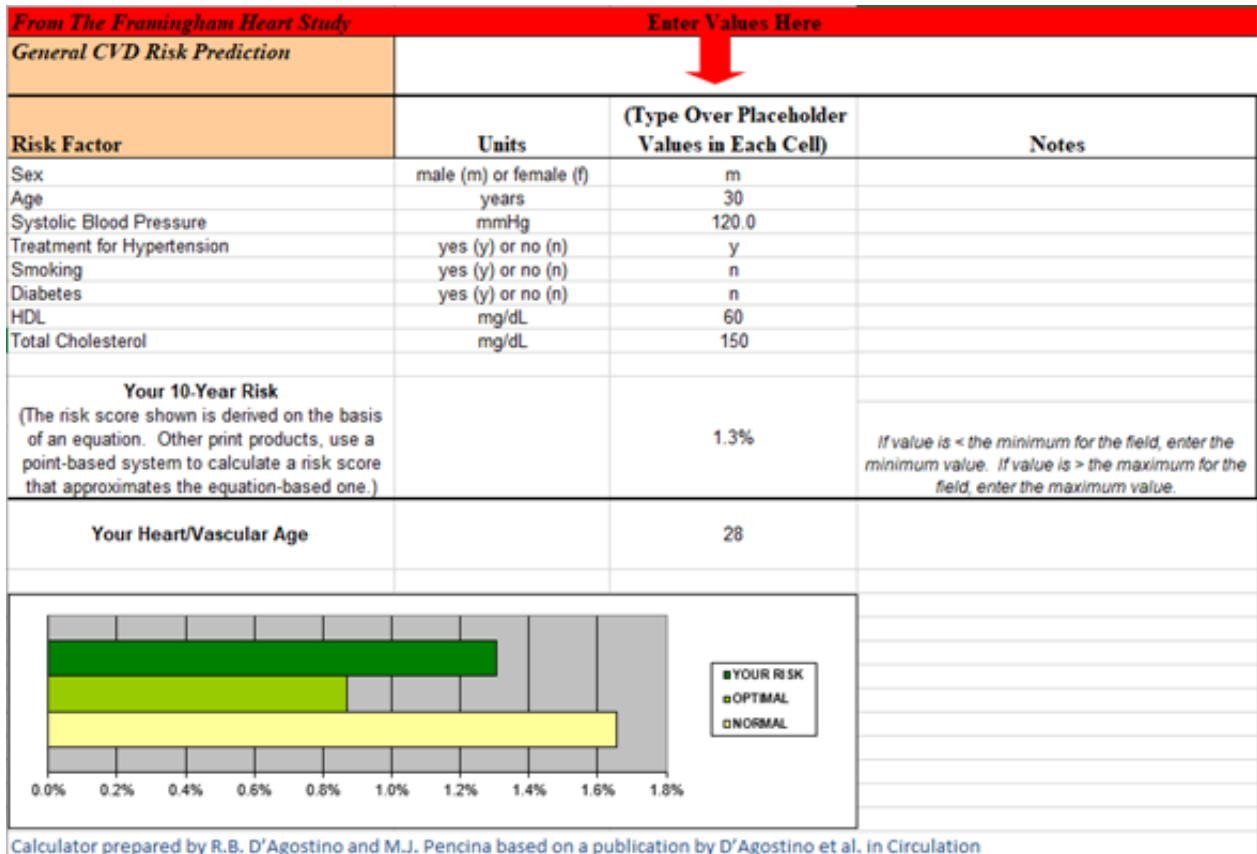


Diagram 2 - General CVD Risk Prediction for a 30-year-old male, who did not smoke, with well-controlled hypertension and desirable cholesterol levels

The 10-year risk as shown from Diagram 1 is 4.2% while that in Diagram 2 is 1.3%, suggesting that there is a significant risk reduction by stopping smoking as well as controlling hypertension and cholesterol level.

Hence, it is worthwhile to discuss with your doctor on whether a CVD risk prediction model be used to assess and manage your cardiovascular risk, especially for those over 40 years old. Since every risk model has its strengths and limitations, the results of predicted risks from a risk model should to be interpreted with caution with the help of your doctor. Also, it is important to be consistent and use the same model to follow up on the cardiovascular risk.

References:

- 1) <https://www.framinghamheartstudy.org/fhs-risk-functions/cardiovascular-disease-10-year-risk/>
- 2) https://www.chp.gov.hk/files/pdf/dh_phs_2020-22_part_2_report_eng_rectified.pdf
- 3) <https://qrisk.org/>