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Editorial

Assessment of cardiovascular risk in low resource settings "So much to do - So little done"

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Cardiovascular disease (CVD) is the leading cause of death worldwide. Nearly 80% of the deaths due to CVD occur in low-income and middle-income countries (LMICs), and 58% of deaths are in those aged less than 60 years.[1,2] There has been a marked decline in the CVD mortality rates in many developed nations. Majority of the decline has been attributed to population level risk factor reduction strategies and individual-based primary prevention strategies targeted at high-risk groups to prevent onset of CVD through reduction in the risk factors like total cholesterol, systolic blood pressure, and smoking prevalence. The treatment of established CVD, including secondary preventive therapies, contributed only to a lesser extent to the decline.[2]

The concept of medical intervention based on estimated total CVD risk in the asymptomatic population without CVD is now widely advocated in many developed nations. Total CVD risk for an asymptomatic individual is estimated from several risk factors and is expressed as a probability (percentage chance) of developing CVD over a defined period of time.[3] The rationale for estimating total CVD risk, based on the major risk factors, is that the process of atherosclerosis underlying most of the CVD is usually the result of combined effect of multiple risk factors rather than a single risk factor. These risk factors tend to cluster, and also coexistent risk factors tend to have a multiplicative effect on CVD risk.[4] Identification of individuals with high risk can make it easy for physicians to estimate total CHD risk as a basis for prescribing antiplatelet, antihypertensive, or lipid lowering therapy in the context of CVD prevention in the asymptomatic population.[1] The risk scores can also be used to estimate and monitor population distribution of CVD risk from cross-sectional survey of population samples. National health planners may use population distribution of total CVD risk to assess total preventive needs and associated costs, as well as to monitor net effectiveness of interventions that affect multiple CVD risk factors by different magnitudes and direction.[2]

In this issue of *Indian Heart Journal*, authors Ofori SN and Odia OJ have reviewed various risk estimation systems available for CVD risk stratification and discussed the systems that can be used in LMICs. The first risk estimation system was developed by the Framingham group in 1976. Since then, many risk estimation systems have been developed. A cardiovascular risk prediction model will perform well in a given population if three major characteristics are similar in both the test population and the population from which the model was developed. These characteristics are: (1) the nature and strength of the association between each risk factor included in the model and the risk of a cardiovascular event; (2) mean levels (or prevalences) of the risk factors; and (3) background incidence of CVD.[5] The CVD risk stratification in low- and middle-income countries has few limitations.[6] The risk estimation systems should be derived from a study population with sufficient sample size that is representative of the population to which the function is to be applied.[7] Most of the available risk prediction systems are derived from European descent population in high-income countries. Risk scores based on studies conducted in high-income group populations may not be suitable for use in low resource settings.[6] But many of the developing countries lack information on cardiovascular events that are required for full calibration of cardiovascular risk prediction models.[8] There are no country specific cohort studies of CVD risk factors, morbidity, and mortality in most of the LMICs. Therefore no validated or calibrated cardiovascular risk prediction charts have been developed for their populations.[1] Hence the World Health Organization and International Society of Hypertension (WHO/ISH) have developed sets of regional risk prediction charts based on fewer risk factors that can be assessed by

physicians and nonphysician health workers in primary care setting for CVD prevention in each of the 14 WHO subregions. The charts were produced using population-based standardized collection and assessment of data on risk factor prevalence and relative risk. WHO/ISH charts enable cardiovascular risk assessment and prediction in LMICs populations of all WHO subregions on the basis of age, sex, SBP, type 2 diabetes mellitus, smoking status, and total serum cholesterol.[9] But in a recent study by Selvarajah et al., the WHO/ISH model, which was evaluated in the Malaysian population, incorrectly categorized most people into low cardiovascular risk group. Hence the performance of risk assessment models has to be assessed in the population of interest before the risk assessment models are incorporated into clinical practice.[8]

The second limitation is that the facilities required to assess the biochemical parameters (both in terms of human resources and equipment) for CVD risk stratification may not be available in LMICs. The WHOCVD risk management package in 2002 considered three different scenarios in terms of human resources: (1) the nonphysician health worker, (2) specially trained health nurse or medical doctor, and (3) medical doctor with access to full medical care.[10] The concept of Multipurpose Health Workers (Male and Female) (MPHW) was introduced in India in 1974 for the delivery of preventive and promotive healthcare services to the community at the level of Sub-Health Centers (SHCs), the most peripheral health facilities, covering a population of 5000 people in plains and 3000 in hilly/tribal/difficult areas. Though the main focus of MPHW is mainly on activities that are related to disease control programs, detection, and control of epidemic outbreaks, they are also involved in preventive healthcare. The services of MPHW can be utilized by providing them proper training in collecting various parameters in the risk charts. Involving the MPHW will take care of the human resources problem to a great extent in an Indian context.[11]

Many low resource settings, particularly in the LMICs, have health centers without facilities for cholesterol testing. The WHO/ISH has developed charts that exclude cholesterol measurements and can be used in these settings. It has also been shown that the use of body mass index in place of lipid measurements results in only slightly inferior discrimination.[8,12] In places where blood glucose estimation is not possible, it is often feasible to check urine sugar as a surrogate measure for diabetes. Assessment of proteinuria can also be included in the risk estimation charts as it is easy to measure, though the CVD risk may be higher than indicated in the chart in people with proteinuria.[8] The cost of uristix, which measures both urine sugar and protein, is only 20% of the cost of blood glucose measuring strips by glucometer and costs much less than blood glucose measurement by reagents in the lab. It does not require pricking the body, and thus avoids pain, which may be a deterrent for testing in general population. However, urine testing has few limitations in that it provides a measurement of glucose levels since the person last passed urine and does not reflect the current blood glucose level. Also the results do not differentiate between slightly and markedly raised blood glucose levels. If the urine is free of glucose, it does not necessarily mean that the blood glucose level is normal, as the appearance of glucose in the urine depends on the renal threshold for glucose, especially in the elderly people, where the threshold may be higher.[13]

Measurement and monitoring of population level total CVD risk may provide important guidance to health planners to monitor trends and impact of multifactorial interventions.[14] At an individual level, the total risk approach can help clinicians to ensure that individuals who are at greatest risk receive treatment, which is a more cost-effective approach than treatment based on single, elevated risk factor approach and overall, low total CVD risk.[3] Unfortunately, there is a lot of underutilization of CVD prevention guidelines in clinical practice. Even in the developed countries where the guidelines advocating use of total risk scores are available, their adoption has been slow. Steps should be taken to improve the utilization of available scores. Most of the LMICs are yet to issue any guidelines for screening and management of risk factors based on total CVD risk assessment approach. Hence, it may be of value to intensively pilot the implementation of WHO guidelines using WHO/ISH risk prediction charts. It will help to understand the various operational issues. The validation of charts should be completed before advocating large-scale use.[2]

Lastly, more research is required to quantify clinical benefit and cost effectiveness of the total risk assessment approach. Clinicians are more likely to adopt the new approach if there is evidence of better clinical outcomes and cost effectiveness.[2,7]

Conflicts of interest

The authors have none to declare.

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