EDITORIAL COMMENT

Implications of Estimating Coronary Heart Disease Risk in the U.S. Population*

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Given the profound impact of coronary heart disease (CHD) on the health of the adult population of the U.S. as well as on health care costs, it is important to estimate the national burden of CHD. In this issue of the Journal, Ford et al. (1) have nicely described the extent of the population at significant risk for CHD and how this varies by age group, ethnicity, and gender. In 2001, the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III [ATP/III]), known as the NCEP/ATP III (2), provided recommendations for treatment of dyslipidemia according to the category of risk based on Framingham Heart Study risk prediction algorithms, with the intensity of treatment being related to risk categories. Ten-year risk of CHD, defined as CHD death or myocardial infarction, was divided into low (<10%), intermediate (10% to 20%), and high (>20%), based on modifications of the risk prediction equations provided by the Framingham Heart Study. Those with diabetes or other CHD risk equivalents (e.g., peripheral arterial disease, symptomatic carotid disease, and stroke) are assigned to the high-risk group. From 1988 to 1994, the Third National Health and Nutrition Examination Survey (NHANES III) collected data needed to estimate risk of CHD, including measurements of total and high-density lipoprotein cholesterol, systolic blood pressure, cigarette smoking, and historical information about CHD and CHD risk equivalents (diabetes, stroke, or peripheral vascular disease).

Ford et al. (1) have applied the NCEP/ATP III risk categorization to the data collected from the 1988 to 1994 NHANES population and projected what these findings imply for the adult U.S. population of 2000 (1). This information provides a framework for estimating the number of patients needing treatment according to low-, intermediate-, or high-risk treatment guidelines. Because treatment guidelines such as the NCEP/ATP III for dyslipidemia (2) and Joint National Committee for hypertension (3) suggest that the intensity of treatment depends on patients’ risk and/or presence of vascular disease or target organ damage, appropriate classification of patients is of importance to the entire health care system for estimating needed health care resources.

The authors found that of 159 million adults between 20 and 79 years of age in the U.S. in 2000, an estimated 72.6% were at low risk, 11.9% were at moderate risk, and 15.6% were at high risk (>20% calculated risk) or already had CHD or a CHD risk equivalent, thus warranting treatment according to secondary prevention guidelines. A higher proportion of men (17.3%) than women (14.1%) fit within this category, and 30% of the population age 60 to 69 years and 43.3% of those age 70 to 79 years were classified as high risk. Given significant increases in the prevalence of diabetes since this time, re-estimation of risk using recently released NHANES IV data from 1999 to 2000 is likely to yield an even greater proportion of high-risk patients. Moreover, the authors note that the proportion of patients in the high-risk group was probably further underestimated because noninvasive imaging tests for identifying subclinical high-risk patients were not included in the NHANES III data. The finding that 11.9% of the overall population (and approximately one-third of those age 60 years or greater) were at intermediate risk is of particular interest in considering the potential health resource utilization because it is widely held that additional testing for the purposes of more accurate risk stratification may be indicated in this group (4).

From a practical standpoint, the treating physician needs to understand the limitations of these risk estimates from the large epidemiologic studies. Although risk estimates work very effectively in populations, variation of estimated risk leads to misclassification of true risk in individual patients. Although this consideration has implications for all levels of risk (i.e., some patients classified as high risk may not actually be at high risk), the most difficult problems for treating physicians occur in the intermediate-risk group; for example, when a patient presents with intermediate risk, the NCEP/ATP III would typically recommend a low-density lipoprotein cholesterol goal of <130 mg/dl. The NCEP/ATP III has suggested that the presence of significant subclinical disease (e.g., coronary calcium score ≥75th percentile for age and gender, ankle–brachial index <0.9, or carotid intimal thicknesses ≥1 mm) would warrant stratification into the next higher risk category (e.g., as a CHD risk-equivalent warranting that the low-density lipoprotein cholesterol goal be <100 mg/dl). The recent European Society of Cardiology guidelines (5) also suggest further testing (including magnetic resonance imaging, computed tomography, carotid ultrasound, and detection of left ventricular hypertrophy by electrocardiogram or echocardiography) may help to define those at higher risk of future
cardiovascular events with greater precision than models based on classical risk factors. Also, the Bethesda Conference has indicated that noninvasive imaging and detection may be useful for those in the range of 6% to 20% 10-year risk of CHD (4). For example, among persons with the metabolic syndrome but without diabetes, many persons would fall within this range of risk. We recently reported that although 21% of persons with the metabolic syndrome (but without diabetes) had a calculated 10-year risk of CHD of >20%, 25% had coronary calcium scores ≥75th percentile, and 41% had either or both, indicating a significantly greater number of high-risk individuals potentially warranting aggressive risk factor modification may be identified through subclinical disease testing (6).

Regarding the accuracy of the estimates by Ford et al. (1), there are several areas of potential concern beyond those noted above. First, as acknowledged by the authors, there could be an underestimation of risk due to the reliance (at least in part) of self-reporting of cardiovascular conditions, diabetes, and smoking. Second, the risk assessments do not take into account family history of early CHD, some of the key metabolic syndrome risk factors (such as abdominal obesity or triglycerides), or serum markers now frequently obtained as part of standard risk assessment (e.g., high sensitivity C-reactive protein). Third, there could be error in underestimation of risk of CHD in women. Although 10-year estimated risk of CHD may be substantially lower in women than in men, the lifetime risk of CHD remains substantial in women.

Despite these limitations, the estimates by Ford et al. (1) have demonstrated that a large proportion of the U.S. population is at high or intermediate risk. This suggests a call to action to: 1) identify those patients at high risk for whom numerous clinical trials have documented that aggressive risk factor intervention strategies will cost-effectively reduce risk of future CHD events; 2) consider how we can better stratify risk for individuals at intermediate risk of CHD events in whom novel risk factors or testing for subclinical atherosclerosis may provide the information necessary to identify those warranted for more aggressive risk-factor intervention; and 3) further public health and population-based approaches, such as implementation of dietary and other lifestyle strategies, health-focused advertising in the media, and other strategies aimed at shifting the overall distribution curve of population risk of CHD downward.

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