Decline in Incident Coronary Heart Disease
Why Are the Rates Falling?

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In the fall of 1979, the National Heart, Lung, and Blood Institute held a conference on the decline in coronary heart disease (CHD) death rates. It was apparent that in the previous 10 to 15 years, the epidemic crested and began to fall.1 The reasons for this decline were unclear, but many hypotheses were offered. Explanations ranged from death ascertainment artifact, new coronary care units, and coronary surgery to broad social change. Many were more than willing to take credit for this change, but few data were available. A search for explanations began.

Three major themes emerged as possible explanations: (1) primary prevention through risk factor reduction, including public health measures such as reduction in cigarettes and clinical approaches such as lipid and blood pressure management; (2) modern care for acute coronary syndromes, including emergency services, coronary care units, and revascularization strategies; and (3) secondary prevention in those with known CHD, including revascularization, medications, and lifestyle approaches. Each of these has substantial clinical trial evidence to support its utility in reducing new cases (incidence), recurrent events, and/or death.

Early attempts to understand the causes were hampered by a lack of data. Stern2 suggested that a decline in mortality was related to improved diet, reduced smoking, reduced blood pressure, and increased leisure-time physical activity. He noted in 1979 that coronary care units might play a role, but he doubted that surgical revascularization was common enough to affect national rates. Later in 1984, Goldman et al3 noted in 1979 that coronary care units might play a role, but the lack of data. Stern2 suggested that a decline in mortality was related to improved diet, reduced smoking, reduced blood pressure, and increased leisure-time physical activity. He noted in 1979 that coronary care units might play a role, but he doubted that surgical revascularization was common enough to affect national rates. Later in 1984, Goldman et al3 performed a modeling experiment based on available risk factor data from the National Health and Nutrition Examination Survey (NHANES) using clinical trial data to estimate magnitude of effect. With these data, they suggested that about half of the decline was due to risk factor reduction and half to other factors.

More recently, reports from the United States and Western Europe have used surveys and registries to estimate the relative contributions of the different components influencing disease reduction. In 2001, Goldman et al4 modeled costs of various approaches to the decline, including widespread risk factor change, concluding that this was the most cost-efficient approach. Capewell and colleagues,5 using the population of Scotland as a basis, suggested that 51% of the decline in CHD mortality was due to risk factor reduction, with the main component being reduced cigarette smoking. Forty percent was attributed to treatment, including care for acute myocardial infarction, heart failure, revascularization, and secondary prevention. A similar study in Finland explaining the decline in CHD mortality between 1982 and 1997 suggested that improved CHD treatments explain ≈23% of the mortality reduction and risk factor reduction explained 53% to 72%.6

A recent study in the United States examined CHD events from 1980 to 2000. It attributed 47% of the decline to CHD treatment and 44% to changes in cholesterol, blood pressure, smoking, and physical activity. The authors noted that the benefits of risk factor reduction were offset by increasing weight in the population.7

The study by Hardoon and colleagues8 in this issue of Circulation analyzes changes in CHD incidence with unique data and statistical approach. Using the totality of family practices in the United Kingdom, they randomly sampled these practices. In the context of the universal care of the National Health Service in the United Kingdom, this technique provides a population-based sample. At baseline and 20 years later, they measured risk factors using standard methods, ensuring comparability with stored samples. This technique results in risk factor data that are directly relevant to this population. Finally, using methods from the Monitoring Trends and Determinants in Cardiovascular Disease (MONICA) study,9 they were able to evaluate incidence. Incidence or first event is the best indicator of the role of primary prevention in CHD rates.

Hardoon and colleagues found a 62% decline in age-adjusted CHD incidence from the baseline survey (1978 to 1982) to 2004. This translates into a 3.8% decrease per annum. Of the various factors measured, cigarette smoking, systolic blood pressure, and non–high-density lipoprotein cholesterol all fell. High-density lipoprotein cholesterol, body mass index, and physical activity rose, with body mass index as a negative factor. In total, this accounted for 46% of the decline in incident myocardial infarction.

The study is well done, and the conclusions are justified. It has weaknesses, however, including a loss to follow-up that resulted in a participation rate of 77% in the final survey. In addition, the study includes only men and contains no data on women. Finally, much of the interim data do not include measured risk factors but only questionnaires.

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These findings in the United Kingdom are particularly interesting. For trends in CHD mortality, the UK mortality peaked in the 1970s and then began to fall. This lagged the United States by ≈10 years. Similarly, despite the central role played by UK investigators in major clinical trials of risk factor reduction, many experts in the United Kingdom were ambivalent about risk factors and the diet hypothesis. They also comment that revascularization procedures were less likely in the United Kingdom than in other places. During the period of this study, the United Kingdom was among the lowest of Western European countries for revascularization procedures, presumably influencing use of the treatment for both angina pectoris and acute coronary disease. These rates continue to be lower than those in the United States.

The United Kingdom, like many other industrialized countries, has observed a substantive fall in CHD death rates over the past decades. This study of incidence highlights the role of widespread prevention in contributing to this decline. The data from this study are confirmatory in both direction and magnitude with other studies done in Europe and the United States. All find that risk factors play a crucial role in the trends, approximating 50%. This finding does not negate the effect of acute care and secondary prevention, both of which play important roles. Nonetheless, falls in population-wide levels of cigarette smoking and systolic blood pressure, as well as favorable lipid effects, are attributed to both public health and clinic care strategies. These data confirm and extend our understanding of the CHD epidemic and inform our attempts to eliminate it.

Disclosures

None.

References


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