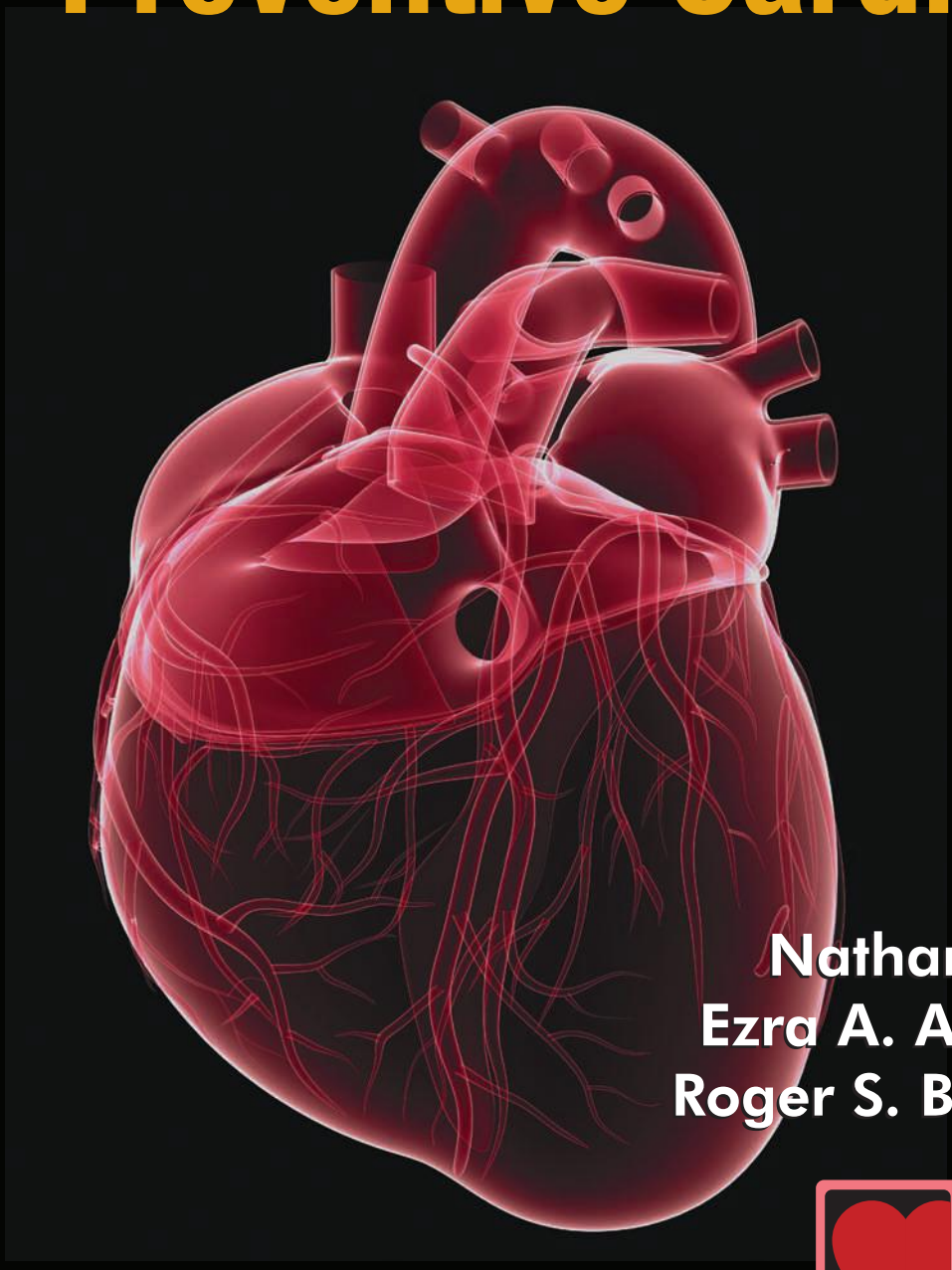
ASPC Manual of Preventive Cardiology



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Foreword

The publication of this *ASPC Manual of Preventive Cardiology* coincides with the twentieth anniversary of the 1994 publication of the *Primer in Preventive Cardiology* by the American Heart Association (1). As the chair of its editorial committee, I can vouch that the *Primer* and the *ASPC Manual* share the goal of "summarizing the knowledge and experience gained" in the efforts to control this greatest epidemic of the twentieth century. Also shared is the target audience of the publications, namely students and practitioners of medicine, nursing, and other health professions, who will be responsible for translation of that knowledge and experience into better cardiovascular health at the patient, community, and societal levels.

The foreword for the *Primer* (2) was contributed by Dr. Jeremiah Stamler, a member of everyone's Preventive Cardiology Hall of Fame. His remarks emphasized the role of populationwide, primordial prevention, as the main driver of the 50% decline in coronary heart disease mortality since the late 1960s. He also provided a challenge for physicians to contribute to the cardiovascular disease prevention efforts: "physicians should work at three levels: (i) in their practices, with their patients, and with their patients' families; (ii) in their communities, to advance implementation of preventive efforts in neighborhoods, schools, workplaces, and medical centers …, and (iii) at the national level to influence public policy, resource allocation, and national priorities."

The *ASPC Manual* summarizes the considerable progress made in all three of these areas. The *Manual* especially provides practitioners with evidence-based knowledge and tools to reduce the risk of heart attack, stroke, and sudden death. These guidelines have evolved also from those oriented to primary (3) versus secondary prevention (4) to those that consider a continuum of risk and cost effectiveness. Complementary to clinical guidelines, community-level prevention has been re-emphasized in the original "American Heart Association Guide for Improving Cardiovascular Health at the Community Level" in 2003 (5). Its 2013 update provides practitioners and planners alike with community-based strategies focused on improving cardiovascular health rather than reducing cardiovascular risk (6). The policy infrastructure alluded to by Dr. Stamler has also evolved (7), with large initiatives such as the Community Transformation Grant Program focusing on creating environments in which the heart healthy option is the easier and less expensive one. The knowledge, skills, and tools available to practitioners in 2014 dwarf those available in 1994. The *ASPC Manual* assembles these for its readers.

The final chapter of the *Primer* consisted of a "Postscript: Preventive Cardiology in the 21st Century" (8), which I had the pleasure of coauthoring with our late friend and colleague from the American Heart Association, Dr. Mary Winston. In that brief document, we warned: "The continuation of the decline in cardiovascular mortality rate is by no means a foregone conclusion." Indeed, by the late 1990s, there was concern about the slowing of the decline in coronary and stroke mortalities (9). The new epidemics of obesity and diabetes posed real threats to the progress made. Yet, the subsequent data show sizeable and continuing declines in coronary and stroke mortality,

disproving our prediction that "cardiovascular disease will probably remain the leading cause of death in the United States and most Western countries well into the 21st century." Indeed, for a number of states in the United States, coronary heart disease is currently not the leading cause of death for the first time in 100 years. Although community-level and policy initiatives clearly continue to play significant roles, studies of health plan populations have documented large and rapid declines in myocardial infarction incidence and case fatality, coinciding with increased use of individual preventive cardiology interventions such as lipid-lowering and antihypertension therapies (10). This evidence base has led to national programs such as the Million Hearts Initiative to implement the ABCS (Aspirin, Blood Pressure Control, Cholesterol Management, and Smoking Cessation) more widely into the nation's clinics and hospitals (11).

Underpinning these programs is the notion that we have the knowledge and tools to effectively prevent most cases of coronary heart disease and stroke. The next (and final?) challenge then is to implement what we already know into the flow of clinical care, through the use of evidence-based strategies shown to be feasible and effective in a wide variety of contexts. The relatively new area of implementation science has identified a number of strategies that could be implemented at the clinical institution (e.g., hospital, clinic) or the practitioner levels to increase quickly the proportion of eligible patients who are receiving interventions recommended by guidelines.

This *ASPC Manual* is essential to this effort, in providing the knowledge, tools, and the evidence to support the clinical practice of preventive cardiology. In 1994 we wrote (8): "Whatever the 21st century brings, future prevention and treatments will surely be built upon the foundation of knowledge and experience summarized in the publication. It is hoped that this primer will prepare the physician for the exciting times ahead." The *ASPC Manual* clearly continues this tradition. The 20-year perspective might include that, although much remains to be done, we now have expanded confidence that the knowledge, tools, and strategies included in the *Manual* are proven to provide huge benefits to our patients and communities. The apathy and doubts about preventive cardiology as a discipline can be set aside and replaced by its inclusion in all health professional curricula. The *ASPC Manual* should play an important role in this coming-of-age of preventive cardiology.

Thomas A. Pearson, MD, MPH, PhD

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Preface

Preventive cardiology has made substantial contributions to reducing the toll of cardiovascular disease (CVD) during the past 50 years but despite these advances, CVD remains the leading cause of death in the United States, and the global burden of the disease continues to rise. In addition, the epidemic of obesity and the increase in diabetes threaten to reverse the downward trend of CVD. Coronary heart disease (CHD) is the primary etiology of this public health crisis and claims more than one million victims annually in the United States, and stroke, heart failure, and peripheral arterial disease are also major contributors to the burden of CVD. The crucial personal and economic benefits of preventing CVD compared to treatment of advanced atherosclerotic vascular disease have been convincingly demonstrated but optimal application of this evidence into daily practice lags, a deficiency that has gained recognition as the "knowledge–practice gap."

This situation necessitates intensification of efforts to prevent a reversal of past achievements in the struggle against CVD. It has also provided the background and incentive for the development of the *American Society for Preventive Cardiology (ASPC) Manual of Preventive Cardiology.* The editors have devoted their careers to this field in both practice and research and we are gratified that this *Manual* is an official publication of the ASPC.

Although textbooks on preventive cardiology have detailed its science and application, the goals of the *ASPC Manual of Preventive Cardiology* are to address contemporary practical approaches to the most vital aspects of preventing cardiac and vascular disease. Clinical utility for practitioners is foremost and special efforts have been made by the authors and editors to ensure that the content of all chapters is as up to date as possible.

The extent of this field now far exceeds its traditional designation of "preventive cardiology," as reflected by the spectrum of topics in the *ASPC Manual of Preventive Cardiology*. In addition to the time-honored topics of CVD risk factors, we also include chapters on peripheral artery disease, stroke, smoking, contemporary cardiovascular imaging, heart failure, metabolic syndrome, thrombosis, nutrition, special populations, novel risk factors, and psychosocial stress. An important feature is inclusion and expert assessment of the most recent prevention guidelines of the American College of Cardiology and American Heart Association, including those on risk assessment, lifestyle recommendations, blood cholesterol, and obesity as well as the new guidelines on hypertension.

This volume is the first of its kind since the publication of the original *Primer in Preventive Cardiology* in 1994 by the American Heart Association, edited by Dr. Thomas Pearson and colleagues. It is hoped that the expertise and access of current approaches to prevention in this compact *Manual* will promote translation of knowledge into daily practice to stem the tide of CVD worldwide.

Acknowledgments

We wish to acknowledge all those who have dedicated their lives to the prevention of cardiovascular disease, in particular Dr. William B. Kannel, Dr. Jeremiah Stamler, and Dr. Nanette K. Wenger.

I wish to acknowledge my wife Mia, parents Donald and Mew Lun, and friends Dr. David Kurtz, John Yasuda, and Ken Posthuma for their inspiration.

—NDW

I wish to acknowledge my wife, Beulah, for her inspiration, support and understanding during this work.

—EAA

I would like to acknowledge two leaders in preventive cardiology: Irene Pollin (founder of Sister to Sister) and the late Dr. Kenneth L. Baughman for their leadership in the field of preventive cardiology. I am most grateful for the support of my wife Dr. Wendy Post, my parents, Anita and the late Dr. Stanley L. Blumenthal, and my son Ross.

—RSB

Finally we wish to express our appreciation for the tireless efforts of the Demos Medical publishing staff, including Rich Winters, Brian Black and Joe Stubenrauch, and the staff and past and present officers, board, and membership of the American Society for Preventive Cardiology for their efforts and contributions to education, research, and patient care related to preventive cardiology.

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ASPC Manual of Preventive Cardiology

Jamal S. Rana, MD, PhD
and Alan S. Go, MD

1

National Burden of Cardiovascular Disease and Associated Risk Factors

Cardiovascular disease (CVD) and associated contributing risk factors impose a major burden on our society nationally and internationally (1). Despite successful advances over the past several decades in treatment of cardiovascular disease, risk factors such as obesity, lack of physical activity, and diabetes mellitus are all on the rise. In this chapter, we briefly summarize the burden of cardiovascular disease and major vascular risk factors, along with the resulting economic and human costs. Toward this end, the American Heart Association (AHA), in conjunction with the Centers for Disease Control and Prevention, the National Institutes of Health, and other government agencies, brings together the most up-to-date statistics on heart disease, stroke, other vascular diseases, and their risk factors, and presents them in its annual Heart Disease and Stroke Statistical Update (1) which serves as a major resource for highlighting key statistics most pertinent to practicing physicians.

CARDIOVASCULAR DISEASE

CVD includes all diseases of the circulatory system. In general, however, we focus on patients with clinical coronary heart disease (CHD), hypertension, heart failure, stroke, peripheral artery disease (PAD), and diseases of the veins (eg, deep venous thrombosis). Although congenital heart disease is an important form of CVD, it is not typically included in national estimates for total CVD unless otherwise specified (1).

Mortality and Morbidity Attributable to CVD

Overall Cardiovascular Disease

- The 2010 rate of death attributable to CVD was 236 per 100,000 in the United States. The CVD death rate varied by race and gender: 278 per 100,000 for white men, 369 per 100,000 for black men, 192 per 100,000 for white women, and 261 per 100,000 for black women.
- On a positive note, from 2000 to 2010, the death rate attributable to CVD declined a relative 31%, with a decline in the actual number of CVD deaths per year of ≈17%. However, in 2010, 32% of all ≈2.5 million deaths were attributed to CVD, or ≈1 of every 3 deaths in the United States.
- Based on 2010 estimates, >2150 Americans die of CVD each day, representing ≈1 death every 40 seconds. About 150,000 Americans who died of CVD in 2010 were younger than 65 years old. Furthermore, 34% of deaths attributable to CVD occurred before the age of 75 years, which is younger than the current average life expectancy of ≈79 years old.
- In 2010, the age-standardized death rate attributable to CVD was 237 per 100,000 (including congenital heart disease), which is 8.8% lower compared with 2007 (259 per 100,000) (2). However, the overall CVD mortality burden remains high nationally (Figure 1.1).

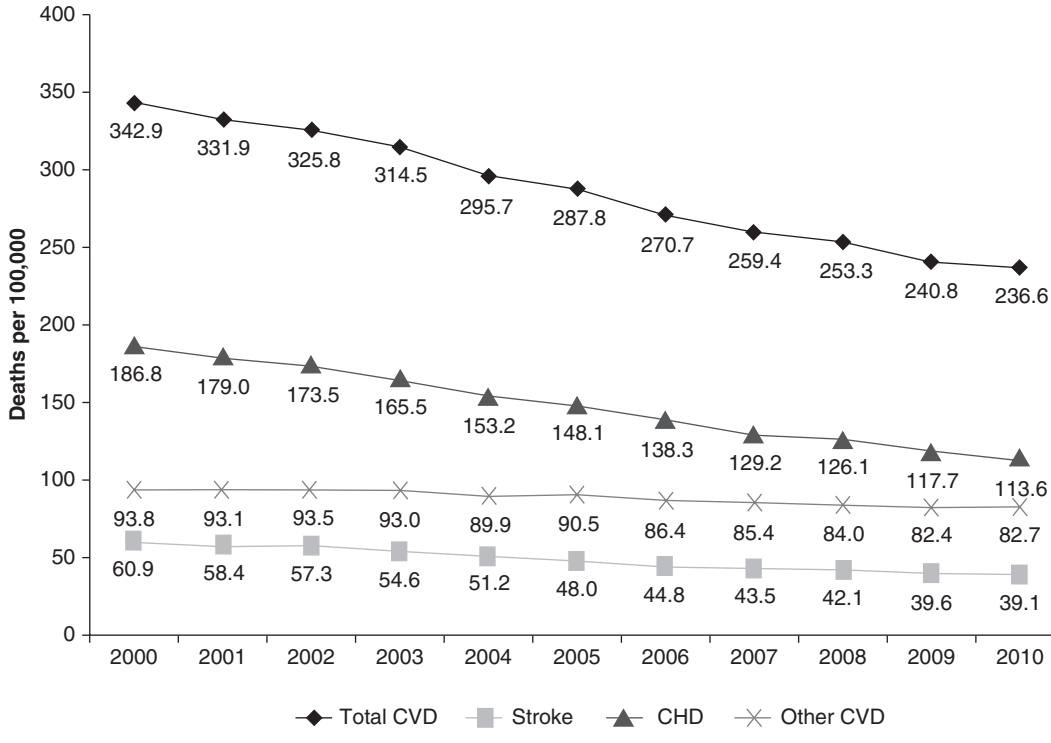

FIGURE 1.1 Age-standardized rate of death attributed to CVD (based on ICD-10 coding used for death certificates) in the United States (2000 to 2010). Based on data from Centers for Disease Control and Prevention and the National Center for Health Statistics.

Coronary Heart Disease

CHD (defined as acute myocardial infarction, other acute coronary syndrome, angina pectoris, and chronic ischemic coronary heart disease) alone caused ≈1 of every 6 deaths in the United States in 2010. In 2010, there were 379,559 deaths in the United States attributed to CHD. Each year, an estimated ≈620,000 Americans experience either a first hospitalized myocardial infarction or die secondary to CHD, and ≈295,000 have a recurrent hospitalized myocardial infarction. Furthermore, it is estimated that an additional 150,000 silent first myocardial infarctions occur each year which is associated with a poorer long-term prognosis. Based on these estimates, approximately every 34 seconds, 1 American has an acute coronary event, and approximately every 1 minute 23 seconds, an American will die of one.

Stroke

From 2000 to 2010, the relative rate of stroke-related death fell by 35.8% and the actual number of stroke deaths declined by 22.8%. Despite this encouraging news, ≈795,000 people continue to experience a new or recurrent stroke (ischemic or hemorrhagic) annually in the United States. Approximately 610,000 of these are first events and 185,000 are recurrent stroke events, with an estimated 85% of all strokes being ischemic. In 2010, stroke caused ≈1 of every 19 deaths in the United States.

- On average, every 40 seconds, someone in the United States experiences a stroke, and someone dies of one approximately every 4 minutes.
- The decline in stroke-related death over the past several decades—a major improvement in population health observed for both sexes and all race and age groups—has resulted from both reduced stroke incidence and lower case fatality rates.

Heart Failure

- In 2010, 1 in 9 death certificates (≈280,000 deaths) in the United States mentioned heart failure. Heart failure was assigned as the underlying cause in ≈58,000 of those deaths in 2010. Of interest, the number of deaths attributable to heart failure was approximately as high in 1995 (≈287,000) as it was in 2010 (≈280,000).
- In addition, annual hospitalizations for heart failure remained stable from 2000 to 2010, with first-listed