Acute Coronary Syndromes in Clinical Practice

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Editors

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Springer

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To the interventional fellows I have worked with: Drs Chacko, Chhatriwalla, Christofferson, de Oliveiro, Duffy, Filby, Jefferson, Karha, Kelly, Overly, Rajagopal, Shishehbor, and Simpfendorfer. I am honored to have trained with such an exceptionally talented group of individuals.

AAB

To my wife Shanthala and to my sons Vinayak, Arjun, and Ram, for allowing me to spend time at the hospital caring for patients with acute coronary syndromes and at home writing about acute coronary syndromes.

DLB

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Author biographies

Anthony A Bavry MD, MPH, is an Assistant Professor of Medicine at the University of Florida. He received his medical degree from the University of Florida and a masters in public health from Harvard University. He completed his internal medicine residency at the University of Arizona, and general cardiology and interventional cardiology fellowship at the Cleveland Clinic.

Deepak L Bhatt MD, FACC, FSCAI, FESC, FACP, FCCP, FAHA, is Chief of Cardiology of the VA Boston Healthcare System and Director of the Integrated Interventional Cardiovascular Program at Brigham and Women's Hospital and the VA Boston Healthcare System. He is also a Senior Investigator in the TIMI Group and on the faculty of Harvard Medical School.

After graduating as valedictorian from the Boston Latin School, Dr Bhatt obtained his undergraduate science degree as a National Merit Scholar at the Massachusetts Institute of Technology, while also serving as a research associate at Harvard Medical School. He received his medical doctorate from Cornell University. His internship and residency in internal medicine were performed at the Hospital of the University of Pennsylvania, and his cardiovascular training was completed at the Cleveland Clinic. He also completed fellowships in interventional cardiology and cerebral and peripheral vascular intervention, as well as serving as chief interventional fellow at the Cleveland Clinic, where he went on to spend several years as an interventional cardiologist and Associate Professor of Medicine. He served for many years as the Director of the Interventional Cardiology Fellowship and as Associate Director of the Cardiovascular Medicine Fellowship. Dr Bhatt was listed in Best Doctors in America in 2005, 2006, 2007, and 2008.

Dr Bhatt's research interests include preventive cardiology, as well as the optimal management of patients with acute coronary syndromes. He also has research interests in advanced techniques in cardiac, cerebral, and peripheral intervention. He has authored or co-authored over 200 articles, including in *Circulation Research*, *Journal of the American Medical Association*,

Lancet, *Nature Reviews Drug Discovery*, and *New England Journal of Medicine*. He is on the editorial boards of *Acute Coronary Syndromes*, *American Heart Journal*, *Cardiosource* (Associate Editor, Clinical Trials), *CCI*, *Circulation*, *Indian Heart Journal*, *Journal of the American College of Cardiology* (named an Elite Reviewer in 2004, 2005, and 2006), and *Journal of Thrombosis and Thrombolysis*, and is Section Editor of Adjunctive Therapy for the *Journal of Invasive Cardiology*. He is the editor of *Essential Concepts in Cardiovascular Intervention* and *Guide to Peripheral and Cerebrovascular Intervention*, as well as co-editor of the *Handbook of Acute Coronary Syndromes*. He is the international principal investigator for the CHARISMA and CRESCENDO trials and co-principal investigator of the CHAMPION and LANCELOT trials. He serves as the co-chair of the REACH registry. He is also on the steering committees of ARCHIPELAGO, APPRAISE, ATLAS ACS-TIMI 46, CRUSADE, and SEPIA-PCI.

Dr Bhatt has been a visiting lecturer at a number of institutions, including Baylor College of Medicine, Boston University, Emory University, Massachusetts General Hospital/Harvard, Mayo Clinic, Penn State, University of Alabama, University of Massachusetts, University of North Carolina, University of Pennsylvania, University of Virginia, and Yale. He has also lectured internationally, including at the Brazilian Society of Cardiology, French Society of Cardiology, Japanese Society of Thrombosis and Hemostasis, Italian Society of Cardiology, Indonesian Heart Association, McGill University, McMaster University, Montreal Heart Institute, and Swiss Cardiac Society. He has been interviewed extensively by news agencies such as CBS, CNN, FOX, NBC, the *New York Times*, NPR, and the *Wall Street Journal* on topics ranging from premature coronary artery disease to the role of inflammation and genetics in heart attacks.

Preface

Acute coronary syndromes affect millions of individuals annually by causing considerable morbidity and mortality. In developed countries this disease remains the number one killer, despite significant improvements in its management over the last several decades. Acute coronary syndromes are challenging, as the field is a fast moving one with a rapid proliferation of drug and device trials. These new studies become incorporated into separate guideline recommendations by both American and European writing committees, which are frequently updated. Moreover, there are separate guideline recommendations for stable angina, non-ST-elevation acute coronary syndrome, ST-elevation myocardial infarction, and percutaneous coronary intervention. This may make it relatively difficult for practitioners to keep up-to-date with the field. Unfortunately, there is often a gap between the guideline recommendations and the care that is delivered in the 'real world.'

In this book we have attempted to distil the considerable literature on this topic into an accurate, succinct and up-to-date review of acute coronary syndromes. Many specialties are involved in the diagnosis and management of these syndromes; therefore, our audience includes a variety of practitioners: cardiologists, general practitioners, emergency medicine physicians, nurses, nurse practitioners, nursing students, physician trainees, medical students, pharmacists, and paramedics. We take the reader through the epidemiology and prognosis, diagnosis and clinical manifestations, risk stratification, and percutaneous and medical therapies across the entire spectrum of acute coronary syndromes. We end with a discussion on current controversies and future approaches to the treatment of acute coronary syndromes.

In short, we have taken pride and diligence in producing a review that we hope will provide our audience with the necessary knowledge to provide optimal evidence-based care for the acute coronary syndrome patient.

Anthony A Bavry
Deepak L Bhatt

Definition, epidemiology, and prognosis

Cardiovascular disease is an all-encompassing term that includes diseases of the heart and coronary arteries, as well as diseases in other vascular beds. It is a major cause of death and disability in the United States, Europe, and worldwide (*see* Figure 1.1) [1]. Cardiovascular disease that is present in vascular beds outside of the coronary arteries is broadly termed peripheral arterial disease, and patients frequently have disease in such overlapping locations (*see* Figure 1.2) [2]. Examples include carotid and cerebrovascular disease, which are responsible for stroke and transient ischemic attack. Aortoiliac and femoral artery disease are responsible for limb ischemia and claudication. Cardiovascular disease can also manifest itself in stable or unstable forms. Stable coronary artery disease is characterized by stable angina or silent ischemia detected by stress testing, while unstable coronary artery disease (categorized, more generally, as coronary heart disease) includes myocardial infarction and unstable angina. An increasingly used and preferred term for an unstable event is acute coronary syndrome (ACS). ACS encompasses the spectrum from unstable angina to non-ST-elevation myocardial infarction and, finally, ST-elevation myocardial infarction. This

Figure 1.1 Percentage of deaths attributable to cardiovascular disease in the United States

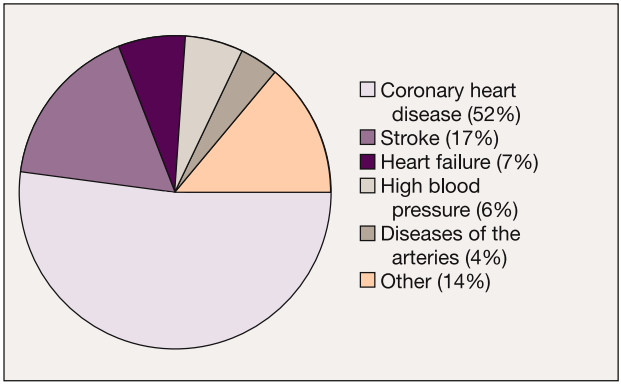

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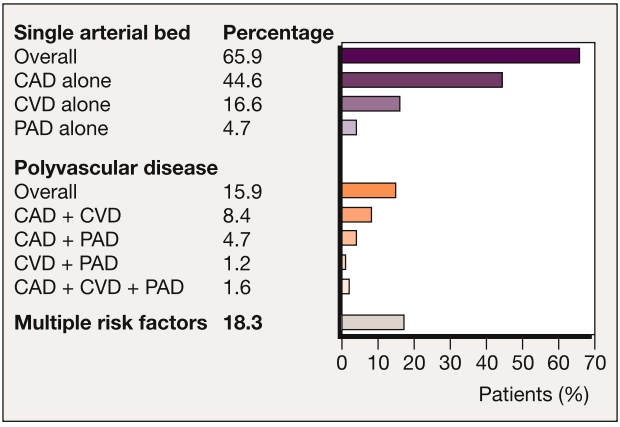
Figure 1.2 Prevalence and overlap of various forms of cardiovascular disease



CAD, coronary artery disease; CVD, cerebrovascular disease; PAD, peripheral arterial disease. Reproduced with permission from Bhatt *et al.* [2].

chapter will review the epidemiology and prognosis of cardiovascular disease in general, with a special focus on ACS.

In the United States, cardiovascular disease will affect nearly 80 million individuals at some point in their lives. Approximately one-half of these individuals are 65 years of age or older. In fact, the lifetime risk of cardiovascular disease is more than 70–80% (*see* Figure 1.3) [1]. Globally, approximately 10–15 million individuals die each year from cardiovascular disease, accounting for approximately one-third of all deaths [3,4]. The World Heath Organization (WHO) has projected that the number of deaths attributable to cardiovascular disease will continue to increase to the year 2030, while deaths from communicable causes will continue to decline [5].

There are nearly 8 million Americans who have had a myocardial infarction, with an incidence of approximately 1.5 million ACS per year and nearly 200,000 silent myocardial infarctions per year [1]. Of the ACS, two-thirds are due to unstable angina or non-ST-elevation myocardial infarction, while one-third is due to ST-elevation myocardial infarction. The incidence of ACS, similar to cardiovascular disease in general, increases with advanced