

Preface

As the aging of America continues, ever increasing numbers of patients present to the hospital with signs and symptoms consistent with an acute coronary syndrome. This has challenged our health-care system, both in terms of sheer numbers and the complexity of their presentations. With increasing age, confounding comorbidities increase in a nearly logarithmic fashion. Noncardiac conditions can obscure the patient's ability to accurately report their symptoms, or mask a true cardiac presentation. This confluence of events results in the creation of a situation where the task of early emergency department risk stratification and diagnostic evaluation becomes increasingly difficult. In fact, the complaint of chest pain, once considered *prima facie* evidence of a potential acute coronary syndrome, has been replaced by the ischemic equivalent. Furthermore, in one recent large study, up to 30% of patients suffering a myocardial infarction had no chest pain whatsoever [1].

In 2008 it was estimated that 8% (11.2 million people) of all emergency department visits would be for chest pain. Considering the above data, more than 400,000 would be with myocardial infarction whose symptomatic manifestation does not even include chest pain. This is a problem for the ED. The currently available diagnostic tools are blunt and suspected ACS patients are at high risk of adverse outcomes. For emergency physicians, missed MI represents the single highest malpractice award. This creates a challenge as it is well established that coronary artery disease is the number one killer of Americans, that early diagnosis and intervention saves lives, and that if patients are discharged home while in the throes of an unsuspected myocardial infarction, their acute mortality is 30% higher than if accurately diagnosed.

Thus, this book was written to provide scientific and clinical insight on the management of patients who arrive at the hospital with a presentation consistent with a potential acute coronary syndrome. Who was this book written for? That would be the physicians and nurses working in the overcrowded emergency departments of the United States, where the majority of patients with suspected ACS present, the cardiologists and nurses who care for patients identified with possible ACS, and the hospital administrators charged with making it all work financially.

While at one extreme some clinical presentations are obviously low risk, some less clear presentations may result in sudden cardiac death. Separating these groups can be challenging. Yes, ST segment elevation myocardial infarction diagnosed by ECG rapidly identifies the highest risk population. However, a diagnostic ECG is found in not more than 4% of all chest pain presentations [2]. The remaining 96% fall into a gray zone where undefined risk of adverse outcomes drives a large number of individualized testing strategies.

The management of patients presenting to the hospital with a suspected acute coronary syndrome has undergone marked changes in the last decade. As little as 10 years ago, patients presenting to the hospital with suspected acute coronary syndromes were admitted to the coronary care unit for expensive and time-consuming evaluations. Despite this, as many as 5% of patients were discharged home to suffer an out-of-hospital acute myocardial infarction. Although some of this “misdiagnosis rate” was the result of technological limitations in testing and patient care process, the practice of emergency physicians evaluating suspected ACS patients and making admission and discharge decisions solely upon clinical grounds is clinically inaccurate. The bottom line is that the subjective impression is not good enough. Thus, the era of diagnostic inaccuracy resulted in medical errors, some with adverse outcomes, and emergency physicians had to collectively lower their admission threshold.

With the addition of rapid turnaround troponin assays in the mid-1990s, identification of high-risk patients became more objective. Although an improvement over the prior approach, it suffers a critical sensitivity deficit as an early isolated troponin measurement has no ability to discriminate all but the highest risk patients. While a positive troponin identifies the patient with an acute coronary syndrome, an undetectable troponin does not exclude an event. In fact, in an ED study of low-risk patients [3], despite a specificity of 99.2%, troponin’s sensitivity was 9.5% for predicting acute adverse events. Therefore, with troponin we can confirm a diagnosis and identify the requirement for intervention (e.g., advanced antiplatelet therapy or the need for revascularization); however, we do not exclude an ongoing event. In the big picture, identifying that an acute event has already occurred (e.g., necrosis) is helpful; in the hierarchy of clinical value, it cannot stand as the sole diagnostic test.

To address the inability to exclude an acute coronary syndrome diagnosis, chest pain centers were developed. These units provide an environment where serial cardiac marker testing can be performed, and the potential for coronary perfusion deficits evaluated by provocative myocardial perfusion testing or radiographic imaging. Eligible candidates are the majority of patients with nondiagnostic ECG and troponin levels. The results have been impressive. Chest pain centers have markedly decreased adverse events. In one before-and-after study of their impact on 4,477 patients, Kugelmass et al. [4] reported that the implementation of CPC resulted in a 37% lower mortality, while simultaneously increasing the safe discharge rate by 36%.

Therefore, the current evaluation of a patient with a suspected acute coronary syndrome commonly consists of serial marker testing over several hours and possibly followed by an evocative test (e.g., stress testing) or coronary artery visualization (e.g., coronary artery-computed tomographic scanning). Medicolegal issues notwithstanding, this process rarely concludes with a discharged patient suffering a short-term adverse cardiac event, but only at significant cost in time, money, and ED resources.

As would be predicted by a simple noninvasive and accurate strategy, chest pain center use is skyrocketing and some centers report that 98% of all CPC test results are negative [5, 6] for acute coronary syndromes. Overall, ED physicians are 94.7% sensitive, 74% specific in identifying patients who were subsequently diagnosed with ACS within 30 days of ED visit [7]. It should be noted that while the exclusion of an acute coronary syndrome is valuable, and this book is focused on the cardiology aspects of chest pain, the chest pain center has evolved to now become a rapid diagnosis unit. It is commonly called the chest pain unit because this is how the undiagnosed patient presents, and it is only after a period of testing will those with high-risk acute coronary syndromes be identified. It is therefore inherent in the mission of these units that significant, but noncardiac, disease is identified (e.g., pulmonary embolism, aortic dissection, pneumonia). While not specifically covered by this book, it is important to recognize that the elimination of acute coronary syndromes from the list of probable diagnoses does not equate to the stability for discharge and further appropriate investigations are commonly necessary in the cohort of patients without an identified underlying cardiac cause of their symptoms.

The purpose of this book is to present the science and methodology that has allowed remarkable improvements in diagnostic accuracy and improved patient outcomes for the evaluation of patients presenting with suspected acute coronary syndromes. It will be of value to all acute care physicians, nurses, and hospital administrators charged with caring for this population.

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References

1. Canto JG, Shlipak MG, Rogers WJ, et al. Prevalence, clinical characteristics, and mortality among patients with myocardial infarction presenting without chest pain. *JAMA*. 2000;283:3223–3229.
2. Pope JH, Aufderheide TP, Ruthazer R, Woolard RH, Feldman JA, Beshansky JR, Griffith JL, Selker HP. Missed diagnoses of acute cardiac ischemia in the emergency department. *NEJM*. 342(16); 2000, 1163–1170.
3. Peacock WF, Emerman CL, McErlean ES, et al. Prediction of short and long term outcomes by troponin-T in low risk patients evaluated for acute coronary syndromes. *Ann Emerg Med*. 2000;35:213–20.

4. Kugelmass AD, Anderson AL, Brown PP, et al. Does having a chest pain center impact the treatment and survival of acute myocardial infarction patients? *Circulation*. 2004;110:111–409.
5. Mitchell AM, Garvey JL, Chandra A, et al. Prospective multicenter study of quantitative pretest probability assessment to exclude acute coronary syndrome for patients evaluated in emergency department chest pain units. *Ann Emerg Med*. 2006;47:438–447.
6. Reilly BM, Evans AT, Schaidt JJ, et al. Triage of patients with chest pain in the emergency department: A comparative study of physicians' decisions. *Am J Med*. 2002;112:95–103.
7. Christenson J, Innes G, McKnight D, et al. Safety and efficiency of emergency department assessment of chest discomfort. *CMAJ*. 2004;170:1803–7.



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