Critical Decisions in Emergency and Acute Care Electrocardiography
Dr Brady’s dedication – To my wife, King, for her constant support, patience, and guidance; and for my children, Lauren, Anne, Chip, and Katherine, for their love.

Dr Truwit’s dedication – To my wife Jeanne and my children, Jason, Matthew and Lauren without whom I could not be personally or professionally fulfilled nor accomplish as much.
Critical Decisions in Emergency and Acute Care Electrocardiography

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Contents

Part 1 | The ECG in Clinical Practice, 1
1 What are the clinical applications of the ECG in emergency and critical care? 3
2 What are the indications for the ECG in the pediatric emergency department? 12
3 What are the limitations of the ECG in clinical practice? 19
4 Is the ECG indicated in stable, non-cardiac patients admitted to the hospital? 24
5 What is the use of the ECG in preoperative assessment and cardiovascular risk stratification? 28
6 Which patients benefit from continuous electrocardiographic monitoring during hospitalization? 33

Part 2 | The ECG in Cardinal Presentations, 39
7 How should the ECG be used in the syncope patient? 41
8 How should the ECG be used in the chest pain patient? 49
9 How should the ECG be used in the dyspeic patient? 58
10 How should the ECG be used in the patient with altered mentation? 64
11 How should the ECG be used in the patient during and following cardiac arrest? 69
12 What is the impact/proper role of the ECG in the undifferentiated cardiorespiratory failure patient? 75

Part 3 | The ECG in ACS, 83
13 What is the role of the ECG in ACS? 85
14 What pseudoinfarction patterns mimic ST elevation myocardial infarction? 92
15 What ECG changes might myocardial ischemia cause other than ST segment elevation or Q waves and what are the differential diagnoses of these changes? 103
16 What is a hyperacute T Wave? 115
17 What is the significance of Q waves? 122
18 What are the ECG indications for additional electrocardiographic leads (including electrocardiographic body-surface mapping) in chest pain patients? 128
19 What further diagnostic adjuncts to the standard 12-lead ECG may help to diagnose ACS? 138
20 Is serial electrocardiography (serial ECGs and ST segment monitoring) of value in the ECG diagnosis of ACS? 148
21 What QRS complex abnormalities result in ST segment elevation that may mimic or obscure AMI? 155
22 What are the electrocardiographically silent areas of the heart? 167
23 What is the value of the prehospital acquired 12-lead ECG? 176
24 What are the electrocardiographic indications for reperfusion therapy? 182
25 What are the ECG manifestations of reperfusion and reocclusion? 195
26 Does localization of the anatomic segment/identification of the infarct-related artery affect early care? 204
27 Can the ECG be used to predict cardiovascular risk and acute complications in ACS? 216

Part 4 | The Dysrhythmic ECG, 231
28 Can the electrocardiogram determine the rhythm diagnosis in narrow complex tachycardia? 233
29 Can the ECG guide treatment of narrow QRS tachycardia? 244
30 How can the ECG guide the diagnosis and management of wide complex tachycardias? 251
31 Can the ECG guide management in the patient with bradydysrhythmias? 267
32 What are the electrocardiographic indications for temporary cardiac pacing? 276
33 Can the ECG accurately diagnose pacemaker malfunction and/or complication? 284
34 How can the ECG guide acute therapy in the Wolff Parkinson White (WPW) patient? 295
35 What is the role of the ECG in PEA cardiac arrest scenarios? 303

Part 5 | The ECG in Critical Care, 315
36 What is the role of the ECG in the critically ill, non-coronary patient? 317
37 Can the ECG distinguish between coronary and non-coronary etiologies in the critically ill patient? 326
38 What is the role of the ECG in therapeutic considerations/medical management decisions in the critically ill patient? 335
39 Can the ECG predict risk in the critically ill, non-coronary patient? 345
40 What is the proper role of the ECG in the evaluation of patients with suspected PE? 354
41 What is the role and impact of the ECG in the patient with hyperkalemia? 362
42 What is the role and impact of the ECG in the patient with electrolyte abnormalities other than hyperkalemia? 371
43 What is the role of the ECG in the hypothermic patient? 378
44 What are the non-ACS “deadly” ECG presentations? 384

Part 6 | The Toxicologic ECG, 395
45 How useful is the ECG in the evaluation of the poisoned patient? 397
46 Can the ECG guide management in the critically ill, poisoned patient? 402
47 Do characteristics of the QRS complex in the poisoned patient correlate with outcome? 407
48 What is the treatment for wide complex dysrhythmias in the poisoned patient? 412

Part 7 | Electrocardiographic Differential Diagnosis, 417
49 What is the ECG differential diagnosis of ST segment elevation? 419
50 What is the ECG differential diagnosis of ST segment depression? 428
51 What is the ECG differential diagnosis of the abnormal T wave? 436
52 What is the ECG differential diagnosis of narrow complex tachycardia? 444
53 What is the ECG differential diagnosis of wide complex tachycardia? 452
54 What is the ECG differential diagnosis of bradycardia? 461
55 What is the ECG differential diagnosis of the abnormally wide or large QRS complex? 469
56 What is the ECG differential diagnosis of a prolonged QT interval? 479
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Electrocardiography is performed widely throughout medicine, ranging from the clinician’s office in a scheduled, routine application to the critical care unit with an unanticipated decompensation during active resuscitation. And, of course, a multitude of other areas rely heavily on the ECG as a valuable tool in the patient evaluation – the prehospital setting in an EMS unit, the emergency department, the surgical suite and post-anesthesia care area, among many others. In fact, it is appropriate to state that some form of electrocardiographic monitoring is one of the most widely applied diagnostic tests in clinical medicine today. Electrocardiography, whether single-lead monitoring for rhythm disorders or 12-lead analysis for ACS or other morphologic abnormality, remains one of the most cost-effective and useful tests in medicine – rapid, non-invasive, inexpensive, portable, easily interpreted – often providing clinical information that will make the difference between life and death.

In acute care medicine, whether it be the acute care ward, emergency department, or critical care unit, the ECG can assist in establishing a diagnosis, ruling-out various ailments, guiding the diagnostic and management strategies in the evaluation, providing indication for certain therapies, determining inpatient disposition location, offering risk assessment, and assessing end-organ impact of a syndrome. In more routine, though no less crucial, settings, the ECG assists in disease surveillance and screening in office-based evaluations as well as risk stratification in pre-operative assessments.

The ECG, similar to other clinical investigations, must be interpreted within the context of the clinical presentation. An understanding of this concept and its application at the bedside is crucial for the appropriate use of the ECG in clinical practice – and is the focus of this textbook, *Critical Decisions in Emergency and Acute Care Electrocardiography*. This textbook focuses on the breadth of acute care medicine – the ward, ED, OR, and critical care unit. Each section is organized around traditional topics such as acute coronary syndrome or dysrhythmia. Within each section, however, are a range of chapters, focusing on a specific use or clinical situation, involving the ECG; each chapter is presented in the form of an inquiry, followed by a series of cases, illustrating the issues, controversies, or questions. For instance, what are the electrocardiographic indications for urgent reperfusion therapy in ACS, can the ECG guide the clinician in the management of the patient with wide complex tachycardia, or what is the value of the 12-lead ECG in the poisoned patient? The chapter itself is the answer to the question with appropriate electrocardiographic examples and adequate supporting evidence.

This work stresses the value of the ECG in the range of clinical situations encountered daily by healthcare providers – it illustrates the appropriate applications of the electrocardiogram in acute care medicine today. We have enjoyed its creation – we hope that you the clinician will find it of value in your care of the patient.

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September 2008
In clinical medicine, there are a finite number of clinical skills that are considered essential areas of expertise in the management of critically ill patients. Such a short list might include advanced physical assessment, airway management, critical care problem solving, initiation of resuscitation efforts, identification of the need for early surgical intervention, and the immediate diagnostic interpretation of tests. One of the earliest and most common diagnostic studies performed in the critically ill patient is the electrocardiogram. The tremendous value of the electrocardiogram in the acutely and critically ill patient is unequivocally established—in fact, it is considered essential in management. Certainly, the basic electrocardiographic skill set is considered fundamental; the intricacies and nuances of advanced interpretation offers an abundance of clinical data that can alter patient course and outcome—and should also be considered fundamental in acute, emergency, and critical care settings. Drs. Brady and Truwit have assembled such a text which very nicely explores and reviews the impact of the electrocardiogram, from the prehospital arena and emergency department to the inpatient ward and critical care unit.

Patient safety and outcome goals have moved electrocardiographic analysis from the sole responsibility of the cardiologist to the point of care contact for our patients. Expertise in electrocardiographic interpretation is considered the standard of training in emergency medicine and critical care. Appropriately, there has been mounting pressure on acute care and critical care clinicians to rapidly and accurately assess electrocardiograms in a time dependent fashion. Critical time points have been established for electrocardiographic interpretation in acute ST segment elevation myocardial infarctions that directly impact patient treatment strategies, hospital resources and outcomes. Correct interpretation of the electrocardiogram alter treatment decisions for the management of non-ST elevation myocardial infarctions, dysrhythmias, undifferentiated cardiovascular diseases, and poisoning and ingestions. Additionally, electrocardiograms offer insights into other medical conditions that place acutely and critically ill patients in life threatening situations.

Developing expertise in electrocardiographic analysis requires dedicated study, practice and review. The management of critically ill patients at risk for cardiovascular compromise requires not just a basic familiarity in electrocardiography, but an advanced interpretation skill level. Failure to develop expertise in the area of electrocardiography places patients at risk. Acute care electrocardiographic expertise is developed through meaningful self-education, clinical practice, and thoughtful review. Standardizing this process is essential because clinical experience alone is inadequate in addressing the breadth and extent of the required knowledge base.

This textbook on Critical Decisions in Electrocardiography represents an excellent example of standardizing the educational process of electrocardiography. By reviewing case scenarios, learners can explore and actively participate in critical decision making that is required for developing these essential diagnostic skills. The breadth of clinical presentations offers the learner an opportunity to review and reflect on high risk cardiovascular disease states that may not frequently present in their own clinical practice. The text allows for independent study and reflection that can lead to expertise in the field of electrocardiography, providing an integral component in the pursuit of a competency that our patients rely on and deserve.

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William Brady and Jon Truwit have done a masterful job at taking a topic that, while central to the Operating Room, ICU, Emergency Department environments, it is not usually the focus for the personnel regularly working in these areas. As a practicing pulmonary-intensivist, I know that when it comes to ECG abnormalities in the ICU we are exposed to anything and everything, often with very short notice and little time for diagnosis or to think about the most appropriate therapeutic interventions. The common problems such as atrial tachy arrhythmias, ischemic changes, ventricular tachycardia and signs of myocardial infarction occur with such frequency that it is relatively easy to maintain skills necessary to recognize and treat them. However, the uncommon problems are often seen so infrequently that recognition and treatment can be much more of a challenge. Thus Brady and Truwit in *Critical Decisions in Emergency and Acute Care Electrocardiography* have created a text that makes common and obscure ECG findings relevant and accessible.

Intensivists and others who do not regularly work in cardiac units must still maintain skills sufficient to recognize and provide at least the initial management of serious and/or life-threatening diseases manifesting in or resulting from abnormal ECGs. Though complex and challenging, these clinical problems are systematically dealt with by Brady and Truwit in a practical, easily readable format. The format of case presentations followed by a complete and systematic well-organized discussion is designed to give the reader information in a natural flow that facilitates assimilation into practice. The concise but very meaningful discussions of the controversies that loom large in some areas are well-articulated and serve to place much of the information into proper context. The fact that a whole chapter is devoted to the limitations of the ECG in clinical practice is a refreshing testament the pragmatism this volume brings to the field.

The ECG has been around a long time, has many limitations and must be interpreted in the light of the overall clinical presentation including prior probabilities. While the shape of the squiggles on the paper strips have not changed since Einthoven’s work in 1895, the true underlying diseases or processes (diagnoses) these represent have been greatly clarified. In addition the prognostic value of the ECG has greatly improved and we are still learning. Brady and Truwit efficiently takes us right up to the edge of the current state of knowledge.

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Part 1 | The ECG in Clinical Practice