

# Introduction

The ability to correctly interpret an electrocardiogram (ECG), be it a simple six second strip or a 12 lead ECG, is a vital skill in all critical care areas. Of all critical care skills, meaningful ECG interpretation may be the one skill that sets critical care practitioners apart from other clinicians.

**The Six Second ECG** is a practical guidebook designed for you to quickly and effectively interpret ECGs. Delivered in a no-nonsense candid style, each chapter builds on previous chapters. A simple and effective framework is presented that enables you to not only identify ECGs but to make sense of the ECG from a clinical perspective.

While ECG interpretation is well covered in several books, **The Six Second ECG** is unique in its persistent attention to the connections between ECG interpretation, cardiac physiology and clinical significance. A skilled practitioner connects the findings of an ECG to a patient's clinical condition and uses this information to decide upon an appropriate treatment strategy.

## This Book is For You

If you want to *quickly identify* and to readily *make sense* of an ECG from a physiological and clinical perspective, the Six Second ECG is written for you. With an unwavering focus on understanding, the Six Second ECG is designed to help build career-long skills of ECG interpretation. Your time is far too precious to waste on imminently forgotten memory work.

*It is, after all, the pattern on the fabric that holds the interest of most of us,  
rather than the threads.*

Dr. Arnold M. Katz

## How to Use This Book

This book is designed for the busy health care professional, one who needs to quickly address any informational gaps with the least amount of fuss. An expanded table of contents and index facilitates rapid navigation. Each chapter begins and ends with a chapter summary. As well, a “Quick Look” navigator appears on the first page of each chapter to facilitate a quick and focused reference to specific topics of interest.

Each chapter is independent and can stand on its own. Read the book from cover to cover or jump around concentrating on what you need. Choose to complete the exercises and quizzes inside each chapter. Answers to the quizzes are provided at the base of the pages that contain the questions. Detailed annotated answers are provided in Appendix B.

For the like-minded keener whose curiosity in the area of cardiology is almost insatiable, a list of additional resources are included at the end of each chapter. Several resources are freely available on the web. An abundance of resources are also included in the provided CD-ROM for off-line use.

Certain conventions such as the use of icons and gray text boxes have been used throughout the book to draw attention to tips, trivia, details and important points.



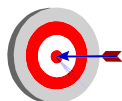
The 'stop' hand signal marks vital information often related to clinical practice.



The symbol of a string tied around the index finger is used as a reminder.



The icon of a magnifying glass marks supplementary explanations on various topics.



A symbol of an arrow on target signifies tips, trivia, and useful short-cuts.



Synonymous with the internet, this icon marks any supplemental resources.

## Brief Synopsis

The **Six Second ECG** follows the order of a workshop of the same name. Twelve chapters make up its contents. The chapters are grouped into four main sections:

- The Basics
- The Six Second ECG
- The 12 Lead ECG
- Appendices

Over 140 illustrations and 300 quiz questions help to clarify the core content. A brief synopsis of the chapters and appendices follow.

**Chapter 1: In a Nutshell** is a brief account of the main concepts, methods and strategies discussed in the subsequent chapters. This chapter delivers an early glimpse on how to identify and make sense of single and 12 lead electrocardiograms.

### Part I: The Basics

**Chapter 2: Chambers, Valves and Vessels** is a brief account of the heart's anatomy.

**Chapter 3: It's All About Cardiac Output** is an introductory discussion on the dynamics of the heart as an effective pump. Concepts of the cardiac cycle and the parameters that determine cardiac output are brought together in case studies.

**Chapter 4: The Electrics** outlines the electrical pathways of the heart. Understanding the electrophysiology of the heart is a necessary foundation to make sense of an ECG.

### Part II: The Six Second ECG

**Chapter 5: An ECG Primer** introduces the cardiac monitoring system: ECG paper, the basic components of an electrocardiogram and methods to determine heart rate.

**Chapter 6: In Four Simple Steps** provides a step-by-step method for rapid ECG interpretation. Practice exercises reinforce rapid ECG interpretation.

**Chapter 7: Mechanisms of Dysrhythmia Generation** delves into the four main causes of dysrhythmias - automaticity, re-entry phenomena, triggering effects and conduction defects.

**Chapter 8: Dysrhythmias** outlines the defining characteristics of dysrhythmias. This chapter serves as a dysrhythmia reference, cataloguing the criteria of a wide range of dysrhythmias.

**Chapter 9: Six Second ECG Practice** delivers a 100 question quiz with answers. Detailed annotated answers are found in Appendix B.

### **Part III: The 12 Lead ECG**

**Chapter 10: Introducing the 12 Lead ECG** reveals the advantages of multiple ECG lead views. Building on steps already established in Chapter, a simple method of 12 lead ECG interpretation is established. The primary use of the 12 lead ECG - to detect cardiac ischemia and infarction - is explored.

**Chapter 11: Advanced Concepts in 12 Lead ECG Interpretation** draws on many of the concepts previously explored to harness the power of the 12 lead ECG in identifying electrical axis, left and right bundle branch blocks, chamber hypertrophies and electrolyte abnormalities.

**Chapter 12: 12 Lead ECG Practice** is a compilation of fifty 12 lead ECG questions, designed to challenge and reinforce your 12 lead ECG interpretation skills. Detailed annotated answers are included in Appendix B.

### **Part IV: Appendices**

**Appendix A: Glossary of Terms** is a quick reference defining terms mentioned throughout this book.

**Appendix B: Detailed Answers to Quiz Questions** provides in depth answers to all chapter quiz questions and to the practice questions of Chapters 9 and 12.

**Appendix C: Resources** lists useful on-line and off-line resources for ECG interpretation.

**Appendix D: About the CD-ROM** outlines how to use and what is contained in the accompanying CD-ROM.

## The Author

I have been a critical care practitioner and educator for the past 16 years. My clinical experience - like many other critical care nurses - spans intensive care units, coronary care units, emergency rooms and flight nursing. I seem to have an insatiable curiosity for the cardiac domain compounded by a strong will to share this knowledge as an educator.

I have been privileged to travel to many regions of United States and Canada facilitating hundreds of ACLS courses, basic ECG and advanced ECG interpretation courses. Much of what I have learned is taken from discussions with talented course participants and fellow instructors.

I also develop web- based learning tools for health care professionals to augment skills learned in the classroom (found at [www.skillstat.com](http://www.skillstat.com) and [www.nursecom.com](http://www.nursecom.com)). Probably my most popular software learning tool is an ECG simulator. The ECG Simulator has been downloaded by over 500,000 health professionals. This ECG Simulator and a host of other software learning tools are included on the CD-ROM.

## The CD-ROM

A Microsoft windows compatible CD-ROM is included on the inside back cover. The CD-ROM includes:

- **The Six Second ECG** in eBook format. The chapters, cross-references and indexes are hyper linked, facilitating rapid access to information of interest. The tests are fully interactive with automatic scoring and 'lively' feedback.
- An animated **ECG Simulator** that includes learning and game modes
- Randomly generated **ECG Skill Test** to practice your skills. Detailed answers are provided for each question. Choose tests of 10, 15 or 20 questions focusing on single lead and/or 12 lead ECGs.

The CD-ROM launches automatically for most computers that use windows operating systems (Windows 98 or newer). The learning tools are fun, fast, effective and simple to use. Even if you are a novice to the computer, this is a good CD-ROM to check out.

## **Acknowledgements**

This book would not have been possible without the invaluable suggestions of several colleagues. In particular, I am particularly grateful for the contributions of Michael Dare, Gaynor Burns, Cecelia L. Crawford, and Global Medical Services. Their proofing and editing has made this book a much more worthy work. Any errors in grammar, spelling or content do not occur from any lack of effort, but remain my shortcomings.

Plans and drafts for this book began about five years ago with a major push beginning two years ago. The ongoing patience, support and encouragement from Janet, my spouse and our two sons - Kieran and Shane - have greatly helped this project go the distance.

Much of the book's content was formed during Six Second ECG workshops for nurses, medical students, paramedics, respiratory therapists and physicians. Thank you all for the many lessons you have taught me over the past 16 years. I hope that you recognize your feedback in these pages.

## **Let's Get Started!**

This book was written to be straightforward and easy to read. Much effort has gone into eradicating errors in spelling, grammar and content. I expect that some may have snuck through, nevertheless. I greatly appreciate all feedback, corrections and questions via e-mail ([tracyb@nursecom.com](mailto:tracyb@nursecom.com)). Your input will likely find its way into future workshops and the next version of this guidebook.

I sincerely hope that you grow in competence and confidence in ECG interpretation whether you are a novice or an experienced practitioner.

**Tracy Barill**

North Vancouver, British Columbia, Canada  
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