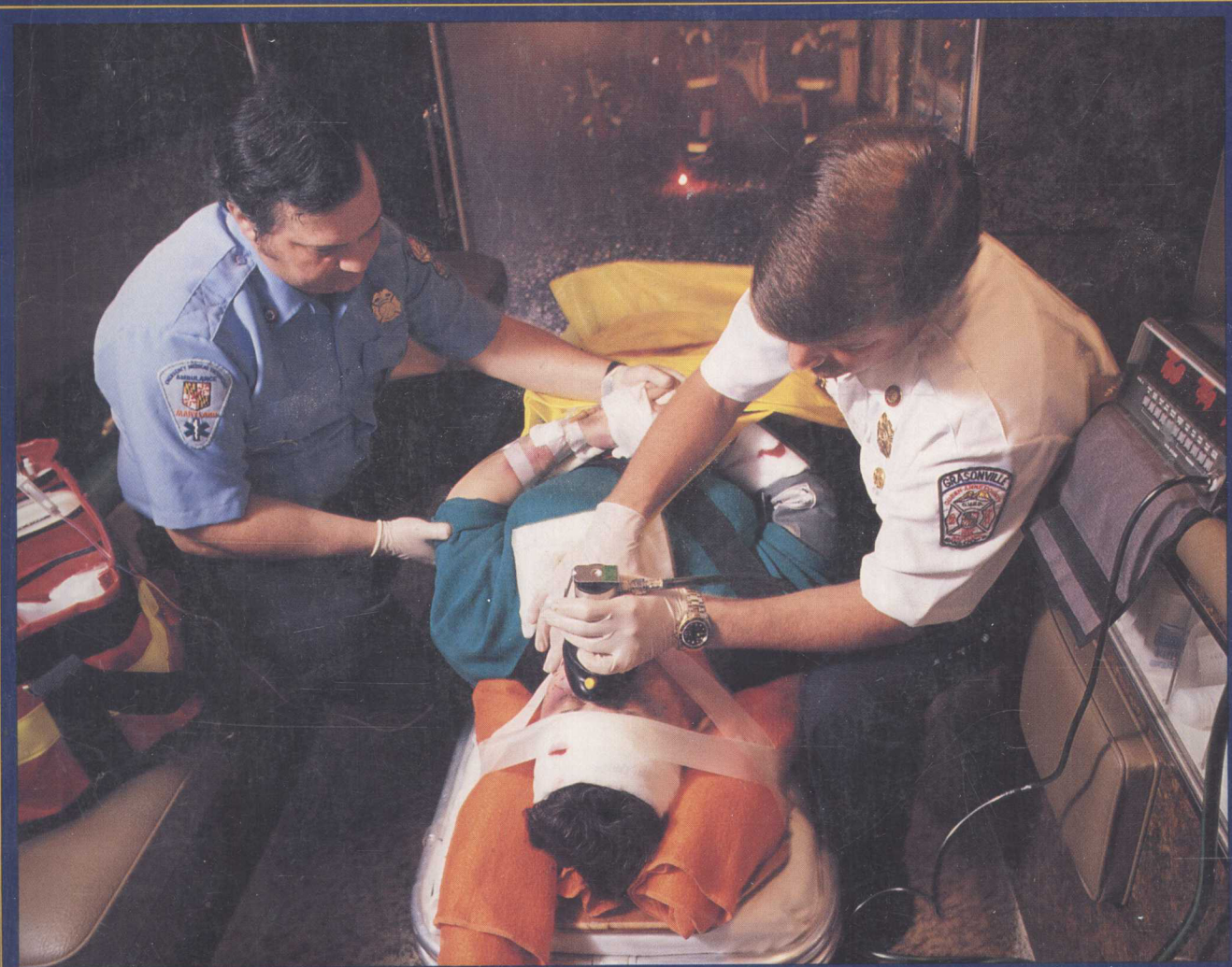


BRADY EMERGENCY CARE

FIFTH EDITION



HARVEY D. GRANT • ROBERT H. MURRAY, Jr. • J. DAVID BERGERON

MEDICAL ADVISORS:

Norman E. McSwain, Jr., M.D., F.A.C.S. • William R. Roush, M.D., F.A.C.E.P.

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FIFTH EDITION

NOT FOR RESALE

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NOTICE

It is the intent of the authors and publishers that this textbook be used as part of a formal Emergency Medical Technician course taught by a qualified instructor. The care procedures presented here represent accepted practices in the United States. They are not offered as a standard of care. EMT-level emergency care is to be performed under the authority and guidance of a licensed physician. It is the reader's responsibility to know and follow local care protocols as provided by the medical advisors directing the system to which he or she belongs. Also, it is the reader's responsibility to stay informed of emergency care procedure changes.

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NOTE ON GENDER USAGE

Past attitudes have allowed our language to develop with the pronouns "he" and "his" being used in general to signify persons of either gender. For example, when describing the care for an injury to the upper limb, most people will say "his arm" even though 50% of the patients will probably be females. Our editors tell us that the repeated use of "he or she" is not proper in a long manuscript and the use of (s)he is incorrect in all cases.

Authorities in both professional journals and popular publications have stated that the "quick fix" approach should be discouraged. They recommend different sentence structures when appropriate and the traditional use of "he" and "his" when necessary. This is why you will find "he" often used when referring to the actions taken by an EMT. It is not the intent of the authors or the publisher to imply that women should not be EMTs or that they are any less professional than men in carrying out EMT-level care.

TO THE STUDENT

A self-instructional workbook for this text is available through your college bookstore under the title *Self-Instructional Workbook for EMERGENCY CARE, Fifth Edition Revised*, by J. David Bergeron, with Allan Braslow, Ph.D. *EMT Review: Examination Preparation, 3rd Edition*, a comprehensive question and answer workbook correlated to this text (with sample examination), is also available. If not in stock, ask the bookstore manager to order a copy for you. If your course is being offered off-campus, ask your instructor where to obtain a copy. The *Workbook* and *Review Questions* can help you with course material by acting as a tutorial review and study aid.

BRADY EMERGENCY CARE

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Dedication



**Dr. R Adams
Cowley**

The authors of *Emergency Care, 5th edition*, wish to dedicate this text to R Adams Cowley, M.D., the pioneer of emergency medical services and trauma patient care. Literally thousands of persons are alive today because Dr. Cowley remained persistent in his goal to treat trauma patients with a 24-hour system of specially trained emergency medical tech-

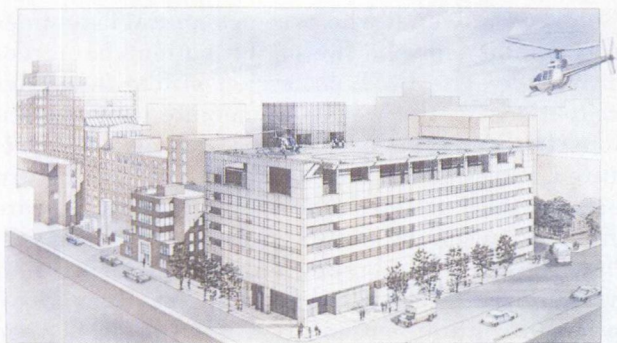
nicians, allied health workers, nurses, and physicians. He created the Maryland Institute for Emergency Medical Services and its internationally known Shock Trauma Center, providing the model for modern systems established to care for the critically ill and injured.

Dr. Cowley believed that there were too many “unnecessary deaths” associated with trauma. He viewed trauma as a disease, requiring specific approaches to care. The concept of the “golden hour” was Dr. Cowley’s. He proved that the development of shock was responsible for many trauma-related deaths and, if the proper care to prevent or arrest the development of shock could be applied during the first hour after accidents, then the majority of trauma patients could be saved. In fact, the survival rate for patients at the Shock Trauma Center has grown from 40 percent at the time of its founding in the early 1960s to today’s figure of 90 percent.

The dream of a trauma care network started in 1961 with a U.S. Army grant to open a two-bed clinical research unit at the University of Maryland. So impressive were the early results that the Na-

tional Research Council gave \$800,000 in 1963 for the renovation of a five-floor trauma treatment center at the hospital. Dr. Cowley worked with the Maryland State Police to utilize helicopters for the transport of trauma patients and was instrumental in the development of specialized training programs

The new Maryland Shock Trauma Center.



Jim Faulkner

for rescue and hospital personnel. This led the way to the creation of the first statewide Emergency Medical Services System in 1973, with the Shock Trauma Center serving as the primary hospital-based center of trauma care.

Dr. Cowley's development of emergency medical services continued until his retirement in the spring of 1989. His tenure as director of the Institute and the Maryland Shock Trauma Center has provided specialized medical training for hospital personnel, advanced pre-hospital emergency care training for emergency medical technicians, and a statewide telecommunications system. In 1989, the new Maryland Shock Trauma Center opened, providing Maryland with a state-of-the-art 138-bed facility for the care of the critically ill and injured.

At the time of his retirement, Dr. Cowley accepted the position of director of the University of Maryland-based Charles McC. Mathias, Jr. National Trauma Study Center. The Center is designed to be a worldwide source of information on trauma treatment. Certainly, it is to benefit from Dr. Cowley's standard of excellence.

Foreword

In 1795, the flying ambulance—a horse-drawn carriage staffed with trained medical personnel—was developed by Baron Larrey for Napoleon during his campaign in Prussia. Thus the era of prehospital care began. During the War between the States, Tripler and Letterman of the Army of the Potomac reintroduced these concepts, but little else was accomplished for almost another 100 years. Military conflicts, especially WW II, Korea, and Vietnam, demonstrated that non-physician technicians could improve the survival of trauma casualties by initiating treatment before the patient reached the hospital. Despite this experience, it was not until the mid-1960's that these lessons were applied to the general population when J. D. "Deke" Farrington and others developed the first EMT-A program for civilians. Since the establishment of the first EMT training program in the Chicago fire department, over one million individuals have been trained to the EMT-A level with more than one quarter of that number going on to Advanced Life Support levels. Today, EMS remains one of the fastest growing components of medical care in the United States.

This textbook on emergency care represents a new generation of EMS knowledge. Every effort has been made to ensure that the instructional material contained in this text is based on sound medical practice. It incorporates material from the National Standard Curriculum for EMT-A as developed by the U.S. Department of Transportation, as well as

essential material from other courses including Prehospital Trauma Life Support, Basic Trauma Life Support, Advanced Cardiac Life Support, Pediatric Trauma Support, and Advanced Trauma Life Support. The skills and knowledge presented in this text provide the solid foundation needed to evaluate and manage the majority of emergencies encountered by the prehospital provider. Gaining this knowledge is not easy since it requires study, practice, and repetition.

The individual who becomes an EMT assumes responsibility for the life of the patient he agrees to manage. The EMT profession is like few other occupations in the world. Immediate critical decisions based on knowledge and judgment are required. EMTs do not have the opportunity to return to the textbook to determine appropriate patient care after arriving on the scene and before rendering care. They must have the knowledge and skill in their brain and hands before the patient is ever seen. Dedication to continuing education is required to keep knowledge current and patient management skills sharp. Individuals willing to accept the challenge of this demanding profession will find satisfaction if they are mentally prepared to provide the very best care possible.

*Norman E. McSwain, Jr., M.D., F.A.C.S.
William R. Roush, M.D., F.A.C.E.P.*

Preface

You are about to begin your training to become an emergency medical technician (EMT). EMT courses range from 100 to 130 hours in length, with the typical EMT course being 110 hours long. Regardless of the hours you spend in class, your course is most likely based on guidelines set by the Department of Transportation (DOT). This is not to say that there is one universal EMT course. Using the DOT guidelines as a foundation, physicians and instructors in your local Emergency Medical Services System have designed your course to meet specific needs of your community. The basic training is the same, but there are differences in each state as to what materials are presented.

This textbook takes into account some of the variations in emergency care procedures used in different states. That is why you will find alternative methods cited throughout the text. There are some procedures that vary so much that only the most common methods in use are discussed. For such cases, you will be directed to follow local protocols.

Why is there no one method of providing care for certain illnesses and injuries? First of all, there are cases where more than one procedure works. Your EMS System may have tested only one procedure and decided that it was efficient, easy to learn, and simple to use. A different EMS System may have tested a second method and had the same results. This means that you will be trained to use the methods in which your local EMS System has confidence based upon its own rigorous testing.

Methods change as studies are performed to find ways of improving care. Your EMS System may

be conducting research on injuries to the extremities, while another EMS System is concentrating on injuries to the soft tissues of the face. As you can see, your course might contain more new information on the emergency care for a patient with a fractured limb, while a course in another EMS System could contain more on injuries to the eye. With time, each system will present its findings nationally and have its methods evaluated. Since this is an ongoing process, it is doubtful that any two EMS Systems will have the same training program.

One thing is certain: not all the methods you learn in your training will stay the same during your career as an EMT. You must keep up-to-date with local procedures. Your instructor will tell you how continuing education programs for EMTs are presented in your locality, the prehospital emergency care journals recommended by your EMS System, and any state- or locally-produced newsletters that are available to help the EMT stay current.

Who is the authority for your course? Your instructor. As new information is gained and new procedures are developed, your instructor is kept informed. Even new textbooks may not be 100% up-to-date; and, as we have explained, no textbook can cover the specific protocols for all 50 states. Should you have any questions about sources saying different things, ask your instructor. If this text takes one approach to an emergency and your instructor takes a different one, follow your instructor. We ask you to do this, not to please your instructor, but because a textbook cannot be easily changed to reflect up-to-the-minute information on all emergency care procedures.

Objectives and Skills

At the start of each chapter or section, you will find a list of objectives. These objectives tell you specifically what you should be able to do by the end of the chapter. The objectives used in this text are called behavioral or performance objectives. They state the things you should be able to do that can be measured by you and others to determine if you are learning the materials.

Each chapter or section also has a list of skills to inform you of what procedures you must be able to do as an EMT. In addition to these lists, there is a complete list of EMT skills in Chapter 1. Before you can become an EMT, you will have to pass a practical examination. Keep a close check on your ability to perform a given procedure as it is covered in your course. If you find you cannot do one of the skills listed for a chapter, see your instructor for additional help.

Terms

To become an EMT, you will have to be able to read and understand many medical terms. As an EMT, you will have to use these terms when communicating with other professionals in the EMS System. Each chapter has its own list of new terms. In addition, there is a section in the appendix to help you learn medical terminology. A full glossary of terms is provided at the end of the text.

When a medical term is used for the first time, a pronunciation guide will be given. For example, the medical term for referring to the chest is “thoracic.” The first time this term is used, you will see the following:

thoracic (tho-RAS-ik)

The capital letters indicate the portion of the word that is to be emphasized. Since you will have to use medical terminology when speaking with other emergency care professionals, you should practice saying these words, and using them in conversations with your fellow students and your instructor.

Scansheets

There are many facts and procedures that are easier to learn if you can see them presented in one place, in a manner that allows for quick study. This is why we have developed scansheets for this textbook. A scansheet is a one- or multi-page method of covering a complete procedure of care, or reviewing essential information related to assessment and care. Many of the emergency care procedures covered

in this text are presented as scansheets. By looking at the illustrations and reading the text on a scansheet, you will be able to study most, if not all, of what you will need to know about the procedure being presented. Since all the information for a topic is usually shown on one or two pages, you will also be able to use a scansheet to help you with the practical training portions of your course.

Using This Textbook

As you read and study each chapter, you should:

1. Read the list of objectives found at the beginning of the chapter.
2. Be certain that you understand all the objectives before reading the chapter.
3. Read through the list of terms to familiarize yourself with the new terminology to be used in the chapter.
4. Read the chapter, keeping the list of objectives in mind. Pay close attention to the illustrations, charts, and lists.
5. Spend extra time on each scansheet. The information covered on a scansheet is very important.
6. Read through the summary at the end of the chapter.
7. After reading the chapter, go back over the list of objectives and see if you can accomplish each one. Use the list of objectives as a self-test.
8. Go back over the sections of the chapter that deal with the objectives you could not meet.
9. Read the list of skills and make certain that you can find all the procedures listed in the chapter or presented on scansheets that will allow you to practice during the laboratory portions of your course. Know what is required to carry out a procedure before you attend the lab.

How to Study

The responsibility for teaching is the teacher's and the responsibility for learning is that of the student. Since it is your responsibility to learn what your instructor teaches, you will have to study the materials presented in this text and in class. There is too much material presented in a short period of time to allow you to remember all that you hear, see, and read without well-organized periods of study.

Every person is unique. How a person studies is a very personal thing; different methods work for each individual. There are, however, some standard recommendations that you may find helpful:

- Always follow the directions given by your instructor and the objectives in this text. Otherwise, you may spend too much time on minor points and not enough on what is critical for the EMT to know.
- Take notes during your training. You should have lecture, reading, and practical laboratory notes.
- Have your own place to study, removed from other activities.
- Study by yourself until you are able to meet all the chapter objectives.
- After you have studied on your own, talk with fellow students and your instructor about what you have learned. These conversations will help you to retain what you have

learned and will give you practice using medical terminology.

- When you do not understand something, ask your instructor. Other students in the course may not understand any more than you do. They also lack the experience your instructor will have.

Improving Future Training

Not all the ideas for better methods of training come from physicians, committees, and instructors. Some of the best ideas come from students who can tell us what areas of study caused them the most trouble. Other good ideas come from practicing EMTs who let us know what problems they face in the field.

Any student, practicing EMT, or instructor who has an idea on how to improve EMT training, this textbook, or the emergency care provided to patients should write to the authors in care of The Brady Telemarketing Department, Prentice Hall, Inc., Englewood Cliffs, NJ 07632.

Acknowledgments

Production

This is the Fifth Edition of the “yellow book.” We would be amiss if we did not take the time to thank all those professionals who worked on each edition and give a special thanks to everyone who worked so hard on the Fourth Edition and the Fourth Edition, Revised. These individuals helped ensure a continuity of quality that is carried into the text’s fifth edition.

The task of developing and producing a fifth edition is a complex and time-consuming job. The task was made a lot easier because of Claire Merrick from Brady. Claire believes in us, the book, and most importantly of all—the EMS System. When we needed resources, she found them; if we needed materials, she looked for them; in cases when the reviewers did not agree, she helped to settle the issues. We thank Claire for all her hard work and her sense of humor.

Our Senior Production Editor at Prentice Hall was Tom Aloisi. Tom was with us on the Fourth Edition. His ability to edit and coordinate text, art, photography, design, and paste-up is remarkable. He impressed us again and we hope to have his expert help in the future.

The level of professionalism at Prentice Hall is the highest. These individuals helped us in so many ways that we do not have enough space to list all that was done. It is fair to say that no manuscript can become a textbook without these dedicated persons. We would like to thank Barbara Cassel, Senior Managing Editor; Mary Carnis, Associate Managing Editor; Judy-Matz Coniglio, Designer; Charles Pelletreau, Page Makeup Coor-

dinator; Karen Noferi, Page Makeup; Elaine Rusoff, Art Production Manager; Janet Schmid, Assistant Design Director; Joe DiDomenico, Art Director; and Bill Thomas, Copy Editor. Also, a special thanks to Claire Merrick’s assistant, Harriet Tellem. She kept track of many things, including Claire.

The new color art was done by Network Graphics of Hauppauge, New York. They have done a remarkable job, keeping the Brady tradition of excellence in art alive. The new color photography was done by George Dodson at the Lightworks Studio in Stevensville, Maryland. George has worked with us on several editions, always providing what we need in the most interesting and instructionally sound shots. He was helped by Lou Jordan and Ron Schaefer. These two EMS career professionals found equipment, models, and locations. They directed the photo sessions to ensure technical accuracy. We admire the work that they and George produced.

A special thanks to Ron Schaefer and Beverly Sopp of the Maryland Institute for Emergency Medical Services for their help in gathering information on Dr. R Adams Cowley. We wish to thank Jim Faulkner for the photography used in the Dedication.

Medical Advisors

Over the years, procedures used in pre-hospital emergency care have become more complex. When everyone agrees on a given procedure, our work is made easier; however, this is less of a fact than it

was in earlier editions. The three of us and Claire Merrick convinced Prentice-Hall that we needed physician-level help to settle some of the disagreements found in the field and to ensure accuracy in care procedures. Such expert help was given by Norman E. McSwain, Jr., M.D., F.A.C.S., Professor of Surgery, Department of Surgery, Tulane University Medical Center, New Orleans, Louisiana and William R. Roush, M.D., F.A.C.E.P., Department of Emergency Medicine, Akron City Hospital, Akron, Ohio and Associate Professor of Emergency Medicine, Northeast Ohio Universities, College of Medicine, Rootstown, Ohio. These two fine physicians went beyond the call of duty to help us with this project.

Reviewers

The reviewers for the Fifth Edition maintained the level of excellence we have experienced with reviews on the last five manuscripts. Their suggestions were most helpful and their ability to answer national and local questions on EMT-level care was of great importance in developing this edition. We thank each of them as individuals and collectively as a group of highly motivated EMS professionals.

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