10th EDITION

EMERGENCY MEDICAL RESPONDER

FIRST ON SCENE

Le Baudour Bergeron

Medical Editor
Keith Wesley, MD

AMERICAN SAFETY & HEALTH INSTITUTE

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10th edition

EMERGENCY MEDICAL RESPONDER

First on Scene

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Notice on Care Procedures

It is the intent of the authors and publisher that this textbook be used as part of a formal Emergency Medical Responder education program taught by qualified instructors and supervised by a licensed physician. The procedures described in this textbook are based on consultation with first responder and medical authorities. The authors and publisher have taken care to make certain that these procedures reflect currently accepted clinical practice; however, they cannot be considered absolute recommendations.

The material in this textbook contains the most current information available at the time of publication. However, federal, state, and local guidelines concerning clinical practices, including, without limitation, those governing infection control and universal precautions, change rapidly. The reader should note, therefore, that new regulations may require changes in some procedures.

It is the responsibility of the reader to familiarize himself or herself with the policies and procedures set by federal, state, and local agencies as well as the institution or agency where the reader is employed. The authors and the publisher of this textbook and the supplements written to accompany it disclaim any liability, loss, or risk resulting directly or indirectly from the suggested procedures and theories, from any undetected errors, or from the reader's responsibility to stay informed of any new changes or recommendations made by any federal, state, or local agency as well as by his or her employing institution or agency.

Notice on Gender Usage

The English language has historically given preference to the male gender. Among many words, the pronouns *he* and *his* are commonly used to describe both genders. Society evolves faster than language, and the male pronouns still predominate our speech. The authors have made great effort to treat the two genders equally, recognizing that a significant percentage of Emergency Medical Responders are women. However, in some instances, male pronouns may be used to describe both men and women solely for the purpose of brevity. This is not intended to offend any readers.

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DEDICATION

It is with great humility and respect that I dedicate this 10th edition of *Emergency Medical Responder* to my coauthor, J. David Bergeron. David passed away on April 10, 2012. David was a dear friend, colleague, and most of all, mentor to me. David, I will be forever grateful for your kindness, mentorship, and the trust you placed in me to come alongside you on this textbook so many years ago. I know you are at peace now and free of the illness and pain that you so long endured here on Earth. I look forward to writing together again when we meet in heaven. Godspeed, my friend.

BRIEF CONTENTS

CONTENTS

PHOTO SCANS

Appendices

LETTER TO STUDENTS

As the coauthor of this textbook, I want to personally congratulate you on your decision to become an Emergency Medical Responder. Your decision to serve others, especially in times of great need, is one of the most rewarding opportunities anyone can experience.

This textbook has been an important component of thousands of training programs over the past 30 years and has contributed to the success of hundreds of thousands of students just like you. The new 10th edition retains many of the features found to be successful in previous editions and includes some new topics and concepts that have recently become part of most Emergency Medical Responder programs. The foundation of this text is the new National Emergency Medical Services Education Standards for Emergency Medical Responders and includes the 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and First Aid. This edition also represents the first Emergency Medical Responder textbook to be referenced with some of the most current medical literature.

Your decision to become an Emergency Medical Responder is significant. I believe strongly that being able to assess and care for patients requires much more than just technical skills. It requires you to be a good leader, and good leaders demonstrate characteristics such as integrity, compassion, accountability, respect, and empathy. My team and I have enhanced components in the 10th edition that we believe will help you become the best Emergency Medical Responder you can be. One such component is the "First on Scene" scenarios woven throughout each chapter. In these scenarios, we throw you right in the middle of a real-life emergency and offer you a perspective that you will not get with any other training resource. You will see firsthand how individuals just like you make decisions when faced with an emergency situation. You will feel the fear and anxiety that is such a normal part of being a new Emergency Medical Responder. Not everyone you meet will make the best decisions, so we want you to consider each scenario carefully and discuss it with your classmates and instructor. At the end of each chapter is the "First on Scene Run Review." Here you will have a chance to answer specific critical-thinking questions relating to the First on Scene scenario and consider how you might have done things differently.

One of the guiding themes that we used in the development of this textbook is "making connections." This theme inspired a feature that allows us to better connect you with our very own medical director for this textbook, Dr. Keith Wesley. This feature is called "From the Medical Director" and appears throughout each chapter. Through this feature, Dr. Wesley identifies key concepts and explains important details regarding everything from the role of the medical director to insights into the pathophysiology of specific medical conditions to the assessment and care of patients. We think you will find his perspective as a medical director both informative and insightful.

Becoming an Emergency Medical Responder is just the first step in what is likely to be a lifetime of service. Just a warning to you: The feeling you get when you are able to help those in need is contagious. I encounter students all across the country who have discovered that their passion is helping others. I hope that we can be part of helping you discover your passion. I welcome you to EMS and a life of service!

Improving patient care, one student at a time.

Chris Le Baudour

PREFACE

The publication of the 10th edition of *Emergency Medical Responder* marks the 33rd anniversary of the publication of the first edition back in 1982. This new edition is driven by the National Emergency Medical Services Education Standards. These standards represent the work of leading EMS educators across the nation as well as internationally. The majority of the changes are the result of evidence-based research conducted by many individuals and organizations.

The contents of the 10th edition are summarized below, followed by notes on what's new to each chapter.

Chapters 1–5

The first few chapters set the foundation for all that follow by introducing the basic concepts, information, and framework for someone entering the profession. The EMS system and the role of the Emergency Medical Responder within the system are introduced. Legal and ethical principles of emergency care are covered, as well as basic anatomy, physiology, and medical terminology.

What's New?

- *Chapter 1, Introduction to EMS Systems*, now includes the new list of 14 attributes of an EMS system as defined by NHTSA, plus expanded information on wireless enhancements to the 911 system and on various models of EMS delivery.
- *Chapter 2, Legal and Ethical Principles of Emergency Care*, adds a definition of the term *capacity* as it relates to competency and a patient's ability to provide consent and offers an introduction to the Physician's Orders for Life Sustaining Treatment (POLST) form.
- *Chapter 3, Wellness and Safety of the Emergency Medical Responder*, now includes a description of and information about the smartphone application for the *Emergency Response Guidebook*.
- *Chapter 4, Introduction to Medical Terminology, Human Anatomy, and Lifespan Development*, offers additional information on the autonomic nervous system, expanded detail on the layers of skin, and more information on respiratory physiology.
- *NEW! Chapter 5, Introduction to Pathophysiology*, is a new chapter added to this edition. It provides a basic overview of human pathophysiology and offers insight into how the body behaves when systems begin to fail.

Chapters 6–8

These three chapters introduce many of the fundamental skills necessary to be an effective Emergency Medical Responder, covering the proper techniques for lifting, moving, and positioning ill and injured patients. They also address important principles related to proper verbal and written communication and documentation.

What's New?

- *Chapter 6, Principles of Lifting, Moving, and Positioning of Patients*, offers a new discussion on the alternatives to the use of backboards for trauma patients and introduces the lift-and-slide technique.
- *Chapter 7, Principles of Effective Communication*, provides expanded information on the topics of cultural differences, translation services, and communication with the deaf and hard of hearing.
- *Chapter 8, Principles of Effective Documentation*, now includes a description of the narrative section of the patient care report, expands on subjective and objective patient information, and offers additional discussion on the use of abbreviations.

Chapters 9–11

Chapters 9 and 10 may be considered the most important. No patient will survive without an open and clear airway. Basic airway management techniques are covered in detail, as is proper ventilation and oxygen administration. Chapter 11 contains all the most recent updates related to cardiopulmonary resuscitation (CPR) and the use of the AED.

What's New?

- *Chapter 9, Principles of Airway Management and Ventilation*, clarifies the definitions of the terms *respiration* and *ventilation*, adds optional sizing of an NPA, and expands on information for measuring the suction catheter.
- *Chapter 10, Principles of Oxygen Therapy*, now offers the oxygen flow rate formula and expands the information on oxygen saturation (SpO_2) and oxygen delivery.

- *Chapter 11, Principles of Resuscitation*, retains the newest information on CPR as well as the use of the automated external defibrillator according to the American Heart Association's guidelines and recommendations.

Chapters 12–13

These two chapters are all about patient assessment, the foundation for the care Emergency Medical Responders will provide.

What's New?

- *Chapter 12, Obtaining a Medical History and Vital Signs*, includes new information on the alert-and-oriented assessment, updated averages for normal vital signs, and expanded information on mental status and pupil assessments.
- *Chapter 13, Principles of Patient Assessment*, offers a revised definition of "patient assessment," an updated discussion of the assessment of stable versus unstable patients, and new questions in the end-of-chapter review.

Chapters 14–17

These chapters cover many of the most common medical emergencies encountered in the field and the most up-to-date recommendations for patient care.

What's New?

- *Chapter 14, Caring for Cardiac Emergencies*, now addresses aspirin in the treatment of suspected cardiac chest pain, the use of a pulse oximeter for monitoring oxygen saturation, and the importance of maintaining an oxygen saturation between 94% and 99%.
- *Chapter 15, Caring for Respiratory Emergencies*, expands the list of causes of respiratory distress, adds new information on the use of the pulse oximeter, and offers a new table that shows causes and care for immediate airway compromise.
- *Chapter 16, Caring for Common Medical Emergencies*, offers new information on the Glasgow Coma Scale, a more detailed description of the Cincinnati Prehospital Stroke Scale, expanded information on the care for repeated or prolonged seizures and on delirium tremens, and updated information on care for ingested poisons and bites and stings.
- *Chapter 17, Caring for Environmental Emergencies*, now includes care for jellyfish stings. It also provides an updated description of the care for snakebites.

Chapters 18–22

These chapters address many of the more common emergencies related to trauma and bleeding.

What's New?

- *Chapter 18, Caring for Soft-Tissue Injuries and Bleeding*, expands on the discussion of multisystem trauma.
- *Chapter 19, Recognition and Care of Shock*, revises the explanation of the categories of shock and expands on the descriptions of major types of shock and the body's responses during shock.
- *Chapter 20, Caring for Muscle and Bone Injuries*, offers new photos of a variety of SAM® commercial splints and additional end-of-chapter questions.
- *Chapter 21, Caring for Head and Spine Injuries*, now includes a definition of the term *distracting injury*, a discussion on the limited use of long spine boards based on the position paper released by the NAEMSP, the technique of BEAM (body elevation and movement), and an emphasis on minimizing the use of log-rolling.
- *Chapter 22, Caring for Chest and Abdominal Emergencies*, now offers an introduction to the chest seal device for open chest wounds, delineation of the three areas of the abdominal assessment (epigastric, periumbilical, superpubic), new information on kidney stones and aortic dissection, and revised guidelines for the treatment of flail chest.

Chapter 23

This chapter covers normal pregnancy and childbirth. It also discusses many of the common emergencies related to pregnancy and childbirth.

- *Chapter 23, Care During Pregnancy and Childbirth*, retains all the most up-to-date information regarding Emergency Medical Responder care of the mother and child before, during, and after delivery.

Chapters 24–25

Chapters 24 and 25 cover the unique differences in the special populations of the pediatric and geriatric patients. They also introduce specific assessment strategies for each group.

What's New?

- *Chapter 24, Caring for Infants and Children*, offers a new description of Sudden Unexplained Infant Death (SUID).
- *Chapter 25, Special Considerations for the Geriatric Patient*, provides updated statistics on the aging population.

Chapters 26 and 27

These two chapters cover many of the topics related to EMS operations, such as the phases of an emergency response, responding to a hazardous materials incident, and responding to multiple-casualty incidents. The principles of the incident management system (IMS) and triage also are addressed. Both chapters retain information important to the roles Emergency Medical Responders take on during hazardous materials and multiple-casualty responses.

Appendixes

There are four appendixes in this new edition: "Patient Monitoring Devices," "Principles of Pharmacology," "Air Medical Transport Operations," and an "Introduction to Terrorism Response and Weapons of Mass Destruction." Each includes an overview of its topic relevant to the role of the Emergency Medical Responder.

ACKNOWLEDGMENTS

I constantly remind my students that responding effectively to the needs of others during an emergency requires a team effort. It takes the efforts of many to render care efficiently and appropriately when the stress is on. Assembling a project such as this is no exception. Without the coordinated efforts of many people spread throughout the United States, this project could not have been possible. I'd like to acknowledge the key players who helped create the end product that you see before you.

I'd like to begin with Audrey Le Baudour, my personal assistant, copy editor, travel coordinator, and last but not least my wife. She is the one who keeps me organized, focused, and most important on schedule.

I'd like to extend a special thank you to our photographer, Michal Heron, who has single-handedly raised the bar for the way EMS is depicted in textbooks across this country. Michal, you bring something no other artist brings when shooting for these books. Your work is clearly head and shoulders above the rest, and you really challenge authors to do it better.

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I'd like to say thank you to Julie Boddorf, our project manager. Julie, you are a true diplomat and used your skills to keep this crazy cast of characters all focused and on task. I would also like to thank our senior product manager, Sladjana Repic, and our program manager, Monica Moosang, for their time and effort on this edition. A special thanks to the entire sales team at Pearson Education, who provide the support and infrastructure to make these projects happen and get them to those who need them. The skill and teamwork it takes to choreograph a project such as this is truly amazing.

A special shout-out to Janssen Todd, my research assistant, for his work in helping make this the first referenced Emergency Medical Responder book on the market. I am certain others will surely follow, but we did it first. Thank you. We all wish you luck in PA school.

Medical Director

Keith Wesley, MD, FACEP

Our special thanks to Dr. Keith Wesley. His reviews were carefully prepared, and we appreciate the thoughtful advice and keen insight offered.

Dr. Keith Wesley is board certified in emergency medicine with subspecialty board certification in emergency medical services. Dr. Wesley is the EMS medical director for HealthEast Medical Transportation in St. Paul, Minnesota. He has served as the state EMS medical director for both Minnesota and Wisconsin and chair of the National Council of State EMS Medical Directors. Dr. Wesley is the author of many articles and EMS textbooks and a frequent speaker at EMS conferences across the nation.

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We would like to extend our sincere appreciation and thanks to the following individuals who contributed to the completion of the 10th edition, as well as previous editions. Thank you for your ideas, feedback, and contributions.

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We wish to thank the following EMS professionals who reviewed material for the 10th edition of *Emergency Medical Responder*. The quality of their reviews has been outstanding, and their assistance is deeply appreciated.

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Photo Coordinators/Subject Matter Experts

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Models

Thanks to the following people who portrayed patients and EMS providers in our photographs:

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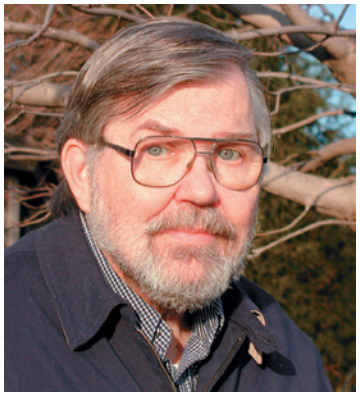
Chris Le Baudour

Chris Le Baudour has been working in the EMS field since 1978. In 1984, Chris began his teaching career in the Department of Public Safety—EMS Division at Santa Rosa Junior College in Santa Rosa, California.

Chris holds a master's degree in education with an emphasis in online teaching and learning as well as numerous EMS and instructional certifications. Chris has spent the past 30 years mastering the art of experiential learning in EMS and is well known for his innovative classroom techniques and his passion for both teaching and learning in both traditional and online classrooms.

Chris is very involved in EMS education at the national level and served six years as a board member of the National Association of EMS Educators and advises many organizations throughout the country. Chris is a frequent presenter at both state and national conferences and a prolific EMS writer. Along with numerous articles, he is the author of *Emergency Care for First Responders* and coauthor of *EMT Complete: A Basic Worktext*, and an Emergency Medical Responder Workbook and Active Learning Manual for the EMT-Basic. Chris and his wife, Audrey, have two children and reside in northern California.



David Bergeron

David Bergeron was very active in the development of instructional and training programs for the emergency medical services (EMS) for more than 35 years. His early work included a front-row seat to the development of modern patient assessment and care inspired by the studies of Dr. R. Adams Cowley, Maryland Shock Trauma Center, Maryland Institute of EMS Systems, and Maryland Fire and Rescue Institute (MFRI).

David's work in instructional development for emergency medicine has included EMT-Basic, Emergency Medical Responder (First Responder), EMT-Intermediate, and EMT-Paramedic student and instructor programs. He is credited with writing the first comprehensive textbook for the first responder, for establishing the first behavioral objectives for EMTs, and for being the first to develop a full-course glossary for EMT instruction.

As well as having served as an instructional technologist on leading textbooks in emergency medicine, David was on the teaching faculty of the University of Maryland, Longwood University, and numerous community colleges and schools of nursing. His publications include textbooks that have been translated into Spanish, Portuguese, French, German, Italian, Lithuanian, and Japanese. David passed away on April 10, 2012, after a long illness.

Emergency Medical Response Certification Program

American Safety & Health Institute (ASHI) is a member of the Health & Safety Institute (HSI) family of brands. HSI's mission is to make protecting and saving lives easy. ASHI authorizes qualified individuals to offer Emergency Medical Response training and certification programs for corporate America, government agencies, and emergency responders. To learn more about ASHI, visit **www.hsi.com/ashi**.

In the early 1970s, officials at the U.S. Department of Transportation National Highway Traffic Safety Administration (NHTSA) recognized a gap between basic first aid training and the training of Emergency Medical Technicians (EMTs). Their solution was to create "Crash Injury Management: Emergency Medical Services for Traffic Law Enforcement Officers," an emergency medical care course for "patrolling law enforcement, officers." As it evolved, the course expanded to include other "First Responders"—public and private safety and service personnel who, in the course of performing other duties, are likely to respond to emergencies (firefighters, highway department personnel, etc.). The Crash Injury Management course provided the basic knowledge and skills necessary to perform lifesaving interventions while waiting for EMTs to arrive. The original program was never intended for training EMS personnel. Because the Crash Injury Management course was designed to fill the gap between basic first aid training and EMT, it was considered "advanced first aid training." In 1978, the Crash Injury Management course was renamed *Emergency Medical Services First Responder Training Course* and was specifically targeted at "public service law enforcement, fire, and EMS rescue agencies that did not necessarily have the ability to transport patients or carry sophisticated medical equipment." Then in 1995, the course went through a major revision and its name was changed to *First Responder: National Standard Curriculum*. At that time, the First Responder was described as "an integral part of the Emergency Medical Services System." Later in 2006, a FEMA EMS Working Group recommended a new job title for first responders working within the EMS system-the **Emergency Medical Responder** (**EMR**). This title is meant to specify a state-licensed and credentialed individual responding within an EMS-providing entity, organization, or agency. Specifically, the use of the word "medical" in the EMR title is intended to help distinguish those persons who have successfully completed a state-approved EMR program from other first responders such as law enforcement officers, public health workers, and search & rescue personnel (to name a few).

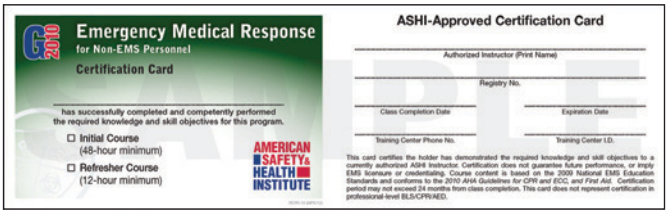
ASHI Emergency Medical Response for non-EMS Personnel

The gap between basic first aid training and the training of EMS professionals that was recognized more than 30 years ago remains. There is still a need for an "advanced first aid course" for the original "first responder" target audience—non-EMS providers who, in the course of performing other duties, are likely (or expected) to respond to emergencies. These individuals, law enforcement officers, fire fighters, and other public and private safety and service personnel, are indeed an integral part of the overall EMS System. That is to say, part of a network of resources—people, communications, and equipment—prepared to provide emergency care to victims of sudden illness or injury. On the other hand, these individuals are not, and in most cases do not wish to be, state-licensed and credentialed EMS professionals. The original first responder program was intended to provide these "pre-EMS" responders with the basic knowledge and skills necessary for lifesaving interventions while waiting for the EMS professionals to arrive. That original intent–filling the knowledge and skill gap between basic first aid training and EMS—is the intent of ASHI's Emergency Medical Response for non-EMS Personnel program. Additionally, because this program uses the same textbooks and related instructional tools as those used to train EMRs, it serves to encourage a continuum in care for the ill or injured person as he or she is transitioned from care provided by the first responder to care provided by the EMS professional.

Certification in ASHI Emergency Medical Response

Evaluation of knowledge and skill competence is required for certification in ASHI Emergency Medical Response. The learner must successfully complete the 50-question ASHI Emergency Medical Response for non-EMS Personnel Exam and demonstrate the ability to work as

a lead first responder in a scenario-based team setting, adequately directing the initial assessment and care of a responsive and unresponsive medical and trauma patient.



State Licensure and Credentialing

State EMS agencies have the legal authority and responsibility to license, regulate, and determine the scope of practice of EMS providers within the state EMS system. ASHI's Emergency Medical Response program is designed to allow properly authorized Instructors to train and certify individuals as a first responder consistent with the National EMS Education Standards and Instructional Guidelines. It is not the intent of ASHI's Emergency Medical Response program to cross the EMS scope of practice threshold. An individual that has been trained and certified in ASHI Emergency Medical Response is NOT licensed and credentialed to practice emergency medical care as an EMS provider within an organized state EMS system. EMS provider licensing and credentialing are legal activities performed by the state, not ASHI. Individuals who require or desire licensure and credentialing within the state EMS system must complete specific requirements established by the regulating authority.

International Use of ASHI Emergency Medical Response for non-EMS Personnel

Given the current state of globalization and the increasing international reach of ASHI-authorized Instructors, the ASHI Emergency Medical Response program has expanded outside of the United States. As appropriate actions by first responders alleviate suffering, prevent disability and save lives, ASHI encourages this international expansion, particularly in areas with emerging but undeveloped EMS systems. However, as in the United States, the scope of practice for medically trained persons is often subject to federal, state, provincial or regional laws and regulations. It is not the intent of ASHI's Emergency Medical Response program to cross the EMS (or medical) scope of practice threshold in any country.

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Health & Safety Institute (HSI) unites the recognition and expertise of the American Safety & Health Institute (ASHI), MEDIC First Aid International, 24-7 EMS, 24-7 Fire, EMP Canada, and Summit Training Source to create the largest privately held emergency care and response training organization in the industry. For more than 35 years, in partnership with 20,000 approved training centers and 200,000 professional emergency care, safety and health educators, HSI authorized instructors have certified more than 26 million emergency care providers in the US and over 100 countries worldwide. HSI is an accredited organization of the Continuing Education Board for Emergency Medical Services (CECBEMS), the national accreditation body for Emergency Medical Service Continuing Education programs and a member of the American National Standards Institute and ASTM International, two of the largest voluntary standards development and conformity assessment organizations in the world. ASHI and MEDIC First Aid training programs are used to teach and certify first aid and emergency care providers in health care, business, industry, and the general public. ASHI and MEDIC First Aid training programs are nationally recognized and are endorsed, accepted, or approved by thousands of state and provincial regulatory agencies, occupational licensing boards, national associations, commissions, and councils.

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CHAPTER 1

Introduction to EMS Systems

EDUCATION STANDARDS: COMPETENCIES:

- Preparatory—EMS Systems, Research, Public Health
- Uses simple knowledge of the EMS system, safety/well-being of the Emergency Medical Responder, medical/legal issues at the scene of an emergency while awaiting a higher level of care.
- Demonstrates an awareness of local public health resources and the role EMS personnel play in public health emergencies.

CHAPTER OVERVIEW:

You have made a great choice in deciding to become a member of the EMS team and become trained as an Emergency Medical Responder. An estimated 240 million calls are made to 911 in the United States each year.[1]

Thousands of people become ill or are injured every day, and many of them are far from a hospital at the time of their emergency. Emergency medical services (EMS) systems have been developed for this very reason. The purpose is to get trained medical personnel to the patient as quickly as possible and to provide emergency care at the scene of the emergency. Emergency Medical Responders are an essential part of a community and the EMS team.

Realizing that people will depend on you to provide assistance during an emergency can be overwhelming. To gain confidence in your knowledge and skills, it is very important that you learn and understand what is expected of you in this new role. When you do, you can act more quickly to provide efficient and effective emergency care.

This chapter will introduce you to EMS systems, the components that make up an EMS system, and how those components work together to provide care to the ill and injured. It also discusses the roles and responsibilities you will be expected to embrace as an Emergency Medical Responder.

OBJECTIVES

Upon successful completion of this chapter, the student should be able to:

COGNITIVE

1. Define the following terms:
   - a. Advanced Emergency Medical Technician (AEMT) *(p. 7)*
   - b. continuous quality improvement (CQI) *(p. 15)*
   - c. Disaster Medical Assistance Team (DMAT) *(p. 16)*
   - d. emergency care *(p. 2)*
   - e. Emergency Medical Dispatcher (EMD) *(p. 7)*
   - f. Emergency Medical Responder (EMR) *(p. 6)*
   - g. emergency medical services (EMS) system *(p. 3)*
   - h. Emergency Medical Technician (EMT) *(p. 7)*
   - i. medical director *(p. 4)*
   - j. medical oversight *(p. 4)*
   - k. National EMS Education Standards *(p. 6)*
   - l. off-line medical direction *(p. 9)*
   - m. on-line medical direction *(p. 9)*
   - n. Paramedic *(p. 7)*
   - o. protocols *(p. 8)*
   - p. public health system *(p. 15)*
   - q. public safety answering point (PSAP) *(p. 7)*
   - r. research *(p. 16)*
   - s. scope of practice *(p. 6)*
   - t. Scope of Practice Model *(p. 6)*
   - u. specialty hospital *(p. 8)*
   - v. standing order *(p. 8)*
2. Explain the role of the National Highway Traffic Safety Administration (NHTSA) and its relationship to EMS. *(p. 4)*
3. Explain the role that the National EMS Education Standards and the National Scope of Practice Model play in shaping EMS around the country. *(p. 6)*

4. Differentiate the various EMS models in practice around the United States. *(p. 6)*
5. Differentiate the various attributes of an EMS system and describe the function of each. *(p. 4)*
6. Explain the role that state and local EMS offices, medical oversight, and local credentialing play in an EMS system. *(p. 6)*
7. Differentiate the four nationally recognized levels of EMS provider. *(p. 6)*
8. Explain the various methods used to access the EMS system. *(p. 6)*
9. Explain the various types of medical direction and how the Emergency Medical Responder might interact with each. *(p. 8)*
10. Differentiate the roles and responsibilities of the Emergency Medical Responder from other EMS providers. *(p. 6)*
11. Describe the characteristics of professionalism as they relate to the Emergency Medical Responder. *(p. 14)*
12. Explain the role of the Emergency Medical Responder with regard to continuous quality improvement (CQI). *(p. 15)*
13. Explain how state and local statutes and regulations affect how an Emergency Medical Responder might function. *(p. 6)*
14. Explain the role of public health systems and their relationship to EMS, disease surveillance, and injury prevention. *(p. 15)*
15. Explain the role that Disaster Medical Assistance Teams (DMAT) play and how they integrate with EMS systems. *(p. 15)*
16. Explain the role that research plays in EMS and the ways that an Emergency Medical Responder might seek out and support research. *(p. 15)*

PSYCHOMOTOR

17. Participate in simple research activities facilitated by the instructor.

AFFECTIVE

18. Value the importance of accepting and upholding the responsibilities of an Emergency Medical Responder.
19. Support the rationale for always maintaining a high degree of professionalism when performing the duties of an Emergency Medical Responder.
20. Value the importance of providing the best possible care for all patients regardless of culture, gender, age, or socioeconomic status.
21. Model a desire for continuous quality improvement (CQI) both personally and professionally.
22. Value the importance of quality research and its connection to good patient care.

FIRST ON SCENE

It's a bright, sunny spring day, and you have just left what you feel was one of your best interviews yet. All that time invested in becoming an Eagle Scout is starting to pay off. If all goes well, you will soon be working as a senior camp counselor for the largest summer camp in the state.

Things are looking up, and there is a noticeable bounce in your step as you descend the stairs to the visitor parking lot. Just as you reach the sidewalk, you hear a yell for help from across the lot. You hesitate for a moment and look around to see if anyone else hears what you hear. Again you hear a female voice yelling for help, but you cannot see anyone. You decide to investigate and go toward the direction of the call.

Two rows over, you see a middle-aged woman leaning over a young boy on the ground. He appears to be shaking, and there is a white, foamy substance coming from his mouth. The woman sees you and yells in a panicked voice for you to go call an ambulance.

"Yes, okay." You reach for your cell phone but realize you left it in the car before going into the interview. "I'll go back to the lobby and call for help. I'll be right back!" You make it back to the lobby in record time and in short bursts of words advise the receptionist that someone is down in the parking lot and to call 911. She does and alerts the building's Medical Emergency Response Team as well. With some hesitation, you return to the scene in the parking lot.

The EMS System

emergency care ► the prehospital assessment and basic care for the ill or injured patient.

It is likely that people have been providing **emergency care** for one another since humans first walked the earth. While many of those early treatments would seem primitive by today's standards, what has not changed is the awareness that care of some kind is often needed at the scene of the emergency. A formal system for responding to emergencies has existed for only a relatively short time (Table 1.1). It was during the American Civil War that the Union Army first began training soldiers to provide first aid to the wounded in the battlefield. These *corpsmen*, as they were known, were trained to provide care for the

TABLE 1.1 | EMS Time Line

1790s	Napoleon's chief physician, Dominique Jean Larrey, develops a system designed to triage and transport the injured soldiers from the battlefield to established aid stations.
1805–1815	Dominique Jean Larrey formed the Ambulance Volante (flying ambulance). It consisted of a covered horse-drawn cart designed to bring medical care closer to the injured on the battlefields of Europe.
1861–1865	Clara Barton coordinates the care of sick and injured soldiers during the American Civil War.
1869	New York City Health Department Ambulance Service begins operation out of what was then known as the Free Hospital of New York, now Bellevue Hospital.
1915	First recorded air medical transport occurs during the retreat of the Serbian army from Albania.
1928	The concept of "on-scene care" is first initiated, when Julian Stanley Wise started the Roanoke Life Saving and First Aid Crew in Roanoke, Virginia.
1950–1973	The first use of helicopters to evacuate injured soldiers and deliver them to waiting field hospitals occurs in the Korean and Vietnam wars.
1966	The report entitled "Accidental Death and Disability: The Neglected Disease of Modern Society," commonly referred to as the "White Paper," is published. The study concludes that many of the deaths occurring every day were unnecessary and could be prevented through better prehospital treatments. The report resulted in Congress's passing the National Highway Safety Act.
1973	Congress passes the Emergency Medical Services Act, which provides funding for a series of projects related to trauma care.
1988	The National Highway Transportation and Safety Administration (NHTSA) defines elements necessary for all EMS systems.
1990	The Trauma Care Systems and Development Act encourages development of improved trauma systems.
1995	An update to the EMT Basic and First Responder National Standard Curricula is released.
1996	The EMS Agenda for the Future outlines the most important directions for the future of EMS development.
1998	A recent update to the EMT Paramedic National Standard Curricula is released.
1999	The most recent update to the EMT Intermediate National Standard Curricula is released.
2000	NHTSA publishes the EMS Education Agenda for the Future—A Systems Approach.
2005	NHTSA publishes the National EMS Core Content.
2007	NHTSA publishes the National EMS Scope of Practice Model, redefining the four levels of EMS certification and licensure.
2009	NHTSA publishes the new EMS Education Standards.

most immediate life threats, such as bleeding. After their initial care, the injured were transported by horse-drawn carriage to waiting physicians (Figure 1.1). Thus, the first formal ambulance system in the United States had begun.

The first civilian ambulance services began in the late 1800s with the sole purpose of transporting injured and ill patients to the hospital for care. It was not until 1928 that the concept of civilian on-scene care was first implemented, with the organization of the Roanoke Life Saving and First Aid Crew in Roanoke, Virginia.

In 1966, the National Academy of Sciences released a report called "Accidental Death and Disability: The Neglected Disease of Modern Society." That report revealed for the first time the inadequacies of prehospital care. It also provided suggestions for the development of formal EMS systems.

Fortunately, it has become possible to extend lifesaving care through a chain of resources known as the **emergency medical services (EMS) system** (Scan 1.1). Once the

emergency medical services (EMS) system ► the chain of human resources and services linked together to provide continuous emergency care at the scene and during transport to a medical facility.

Figure 1.1 Examples of early ambulances used to transport ill and injured patients.
(© AP Images)

OBJECTIVES

2. Explain the role of the National Highway Traffic Safety Administration (NHTSA) and its relationship to EMS.
5. Differentiate the various attributes of an EMS system and describe the function of each.

system is activated, care begins at the emergency scene and continues during transport to a medical facility. At the hospital, a formal transfer of care to the emergency department staff ensures a smooth continuation of care. (Note that the emergency department may still be referred to as the emergency room or ER in some areas.)

The National Highway Traffic Safety Administration (NHTSA) has identified 14 key attributes of an integrated EMS system and assists states in developing and assessing those components.[2] They are:

- *Integration of health services*. Historically, EMS has always focused on only the care provided in the prehospital setting. By integrating with other health system components, EMS can improve health care for the entire community. The future of EMS includes EMTs and Paramedics working closely with public health departments and health care networks to identify health needs in the community and to assist in the delivery of those needs.
- *EMS research*. EMS has evolved relatively fast over the past 40 years despite the slow progress of EMS-related research. Only in recent years has the importance of EMS-related research gained the attention of the federal government. The National Institutes of Health are more committed than ever to EMS research. EMS systems are placing a greater emphasis on evidence-based practice when developing policies and protocols.
- *Legislation and regulation*. To provide a quality, effective system of emergency medical care, each state must have in place legislation and regulations that identify and support a lead EMS agency. This agency has the authority to plan and implement an effective EMS system. It also can create appropriate rules and regulations for each recognized component of the EMS system.
- *System finance*. Emergency medical services systems must be financially stable to provide services for the community and continue to improve those services. EMS systems must develop new and creative relationships with health care insurance companies and other health care providers to become more financially efficient.
- *Human resources*. The ability to provide high-quality EMS care depends heavily on the availability of qualified, competent, and compassionate personnel. To attract and retain these people, EMS must strive to develop a strong career ladder like other health and growing professions.
- *Medical direction*. Each state must ensure that physicians are involved in all aspects of the patient care system. The role of the state EMS **medical director** must be clearly defined. It should have legislative authority and responsibility for EMS system standards, protocols, and evaluation of patient care. **Medical oversight** for all EMS providers must be used to evaluate medical care as it relates to patient outcome, training programs, and medical direction.
- *Education systems*. Quality training and education of the EMS workforce is the foundation for excellent patient care. The future of EMS education must maximize the use of technology. Technology will allow those in rural areas more convenient access to quality EMS education resources.
- *Public education*. EMS can play an important role in the education of the community on topics such as system function, access, bystander care, and prevention.
- *Prevention*. In addition to education about how to prevent injuries, EMS systems can collect data to identify trends related to illness and injury rates in a community. Education programs and other systems can then be developed to target those prevention needs.
- *Public access*. The 911 number has been in service since 1968 and today serves approximately 78% of the population of the United States.[3] Barriers to accessing prompt EMS care still exist in many areas in the United States. EMS systems must continue to expand the reach of the 911 system in the communities they serve.

medical director ► a physician who assumes the ultimate responsibility for medical oversight of the patient care aspects of the EMS system.

medical oversight ► the supervision related to patient care provided for an EMS system or one of its components by a licensed physician.

EMS is made up of a highly specialized chain of resources.

1.1.1 A person becomes injured in a vehicle collision.

1.1.2 A witness to the incident calls 911.

1.1.3 The Emergency Medical Dispatcher sends the appropriate resources.

1.1.4 Emergency Medical Responders arrive to assist the patient.

1.1.5 EMTs continue care and transport the patient to the hospital.

1.1.6 Once at the hospital, care is transferred to the emergency department personnel.

OBJECTIVES

3. Explain the role that the National EMS Education Standards and the National Scope of Practice Model play in shaping EMS around the country.
7. Differentiate the four nationally recognized levels of EMS provider.
10. Differentiate the roles and responsibilities of the Emergency Medical Responder from other EMS providers.

Scope of Practice Model ► a national model that defines the scope of care for the four nationally recognized levels of EMS provider.

National EMS Education Standards ► the education and training standards developed by the National Highway Traffic Safety Administration (NHTSA) for the four nationally recognized levels of EMS training.

Emergency Medical Responder (EMR) ► a member of the EMS system who has been trained to render first-aid care for a patient and to assist higher-level providers at the emergency scene.

OBJECTIVES

4. Differentiate the various EMS models in practice around the United States.
6. Explain the role that state and local EMS offices, medical oversight, and local credentialing play in an EMS system.
8. Explain the various methods used to access the EMS system.
13. Explain how state and local statutes and regulations affect how an Emergency Medical Responder might function.

scope of practice ► the care that an Emergency Medical Responder, an Emergency Medical Technician, or Paramedic is allowed and supposed to provide according to local, state, or regional regulations or statutes. Also called *scope of care*.

- *Communication systems*. As you are well aware, effective and efficient communication is an essential component of any high-performing system or process. As more and more agencies and institutions become integrated in an overall health care delivery model, the need for efficient communications becomes more important. All components of the health care system must be able to communicate and share information to ensure the best patient care possible.
- *Clinical care*. The care provided by EMS professionals has evolved significantly over the past 30 years and must continue to do so. The care the EMS professionals provide must continue to be driven by evidence and maximize the use of technology and advances in science.
- *Information systems*. The federal government has mandated that EMS systems collect data on many aspects of their performance within the communities they serve. The ability to collect, link, and analyze this data will allow EMS systems to respond more quickly to the needs of the community.
- *Evaluation*. Each state EMS system is responsible for evaluating the effectiveness of its services. A uniform, statewide data-collection system must exist to capture the minimum data necessary to measure compliance with standards. It also must ensure that all EMS providers consistently and routinely provide data to the lead agency. The lead agency performs routine analysis of that data. Your participation in the evaluation process will help drive the improvement of the EMS system and the care that patients receive.

The events that occurred on September 11, 2001, increased public awareness of the EMS system. They also brought to the public's attention rescue personnel who are called *first responders*. The public did not always understand the difference between a rescuer who appears first on scene and an EMS first responder, a trained medical care provider. Serving as the lead coordinating agency for EMS on a national level, the National Highway Traffic Safety Administration (NHTSA) in late 2009 redefined and renamed all levels of EMS providers. These changes were included in two documents called the **Scope of Practice Model** and the **National EMS Education Standards**. In support of the changes established in these two documents, this text addresses the level of training now known as **Emergency Medical Responder (EMR)**.

Refer to Table 1.2 to see the new titles and to compare their roles and responsibilities. All are based on NHTSA's National Scope of Practice Model but may vary slightly from state to state and region to region. Your instructor will explain variations in your area. The framework for this text and all EMS education and training is guided by the National EMS Education Standards for Emergency Medical Responders. Those standards are the culmination of many years of work and will serve as the basis for EMS education at all levels for many years to come.

EMS Models

The broad nature of the Scope of Practice Model and the National EMS Education Standards allow for a variety of EMS models. One model is called the *fire-based EMS model*. In a fire-based system, much of the EMS service and infrastructure are operated by a local fire department or group of organized fire departments within a city or region. Another is referred to as the "third-service" or "public utility" model, which is typically operated by non-fire-based government entities within cities or counties. In this model, the EMS agency reports directly to governmental authorities. Another common system around the country is the hospital-based EMS system. Typically, it is operated by a large hospital or group of hospitals serving a particular region. Another model is the private EMS model and consists of the delivery of EMS services by a privately owned company. The private entity often contracts with a municipality to provide services for a specific area.

Regardless of the model, all EMS systems are designed to deliver the best care possible in the shortest amount of time.

Scope of Practice

The **scope of practice** identifies the duties and skills an EMS provider is legally allowed to perform. Quite often the scope of practice of any given level of EMS provider is defined

TABLE 1.2 | Levels of EMS Education

Emergency Medical Responder (EMR). This level of EMS education and training is designed specifically for the person who is often first to arrive at the scene. Many police officers, firefighters, industrial workers, and other public service providers are trained as Emergency Medical Responders. This training emphasizes scene safety and how to provide immediate care for life-threatening injuries and illnesses as well as how to assist ambulance personnel when they arrive.

Emergency Medical Technician (EMT). In most areas of the United States, an EMT is considered the minimum level of education and certification for ambulance personnel. The training emphasizes assessment, care, and transportation of the ill or injured patient. The EMT may also assist with the administration of certain common medications. (This was previously called the *EMT-Basic* level of training.)

Advanced Emergency Medical Technician (AEMT). An Advanced EMT is a basic-level EMT who has received additional education and training in specific areas, allowing a minimal level of advanced life support. Some of the additional skills an Advanced EMT may be able to perform are starting IV (intravenous) lines, inserting certain advanced airways, and administering certain medications. (This was previously called the *EMT-Intermediate* level of training.)

Paramedic. Paramedics are trained to perform what is commonly referred to as advanced life support care, such as inserting advanced airways and starting IV lines. They also administer a large list of medications, interpret electrocardiograms, monitor cardiac rhythms, and perform cardiac defibrillation. (This was previously called the *EMT-Paramedic* level of training.)

IS IT SAFE?

Many people are injured and even killed each year when they rush into an unsafe scene to help an injured victim. Take the time to stop and observe the scene before rushing in. Do your best to identify any obvious hazards that could endanger you or others arriving at the scene.

by state and/or regional statutes and regulations. Those statutes and regulations will also define any related licensing, credentialing, and certification that may be needed. While a scope of practice typically is defined at the state level, quite often local counties and/or EMS agencies may further define the scope of practice for a particular level of provider based on local needs. Most EMS providers are licensed or certified by a state or local EMS agency to practice in the EMS system.

Activating the EMS System

Once those individuals at the scene recognize an emergency, the EMS system must be activated. Most citizens activate it by way of a 911 phone call to an emergency dispatcher, who then sends available responders—Emergency Medical Responders (EMRs), **Emergency Medical Technicians (EMTs)**, **Advanced Emergency Medical Technicians (AEMTs)**, and **Paramedics**—to the scene. Some areas of the country may not have a 911 system. In those areas, the caller may need to dial a seven-digit number for the ambulance, fire, police, or rescue personnel.

Most 911 calls are automatically directed to a **public safety answering point (PSAP)**. Most primary PSAPs are operated by city or county agencies with specially trained dispatchers. Many 911 dispatch centers are staffed with **Emergency Medical Dispatchers (EMDs)**, who receive special training. EMDs provide prearrival instructions to callers, thereby helping to initiate lifesaving care before EMS personnel arrive.

Once the EMS system is activated, resources such as personnel and vehicles are dispatched. EMS personnel then will provide care at the scene and during transport. They also deliver the patient to the most appropriate medical facility.

The most desirable 911 service is referred to as an *enhanced* 911 (E911) system. An enhanced 911 system enables the call to be selectively routed to the most appropriate dispatch center (PSAP) for the caller's location. In addition, the E911 system enables the communications center to automatically receive caller information, such as phone number and address, making it easier to confirm location and reconnect should the call be lost.

As of June 2011, it is estimated that nearly 30% of all U.S. households currently rely on cellular service as their primary telephone service.[4] The widespread use of cellular phones has had a huge impact on how people access the 911 system. Recent developments in technology and wireless communications have required that 911 systems be enhanced to accommodate cellular access. The Federal Communications Commission (FCC) has

Emergency Medical Technician (EMT) ► a member of the EMS system whose training emphasizes assessment, care, and transportation of the ill or injured patient. Depending on the level of training, emergency care may include starting IV (intravenous) lines, inserting certain advanced airways, and administering some medications.

Advanced Emergency Medical Technician (AEMT) ► a member of the EMS system whose training includes basic-level EMT training plus responsibility for a minimal level of advanced life support. Additional skills include starting IV (intravenous) lines, inserting certain advanced airways, and administering certain medications.

Paramedic ► a member of the EMS system whose training includes advanced life support care, such as inserting advanced airways and starting IV lines. Paramedics also administer medications, interpret electrocardiograms, monitor cardiac rhythms, and perform cardiac defibrillation.

public safety answering point (PSAP) ► a designated 911 emergency dispatch center.

Emergency Medical Dispatcher (EMD) ► a member of the EMS system who provides prearrival instructions to callers, thereby helping to initiate lifesaving care before EMS personnel arrive.

developed a two-phase plan for how E911 systems must accommodate cellular phone users: Phase I requires that wireless carriers deliver to the appropriate PSAP, the phone number of the cellular caller, and the location of the cell site/sector receiving the 911 call. In addition to the requirements for phase I, phase II requires that wireless providers deliver the latitude and longitude of the caller.

In-Hospital Care System

Most patients who are seen by EMS are taken to a hospital emergency department. There personnel stabilize all immediate life threats. Then the patient's care is transferred to the most appropriate in-hospital resources, such as the medical/surgical or intensive care units, or the patient is transferred to a more specialized hospital.

Some hospitals handle all routine and emergency cases and have a medical specialty that sets them apart from other hospitals. One type of **specialty hospital** is a trauma center. A trauma center is where specific trauma services and surgery teams are available 24 hours a day. Some hospitals specialize in the care of certain conditions such as burns (Burn Center), cardiac problems (Cardiac [STEMI] Receiving Hospital), or strokes (Stroke Receiving Hospital). Other hospitals may specialize in a particular type of patient, such as pediatric and neonatal patients.

specialty hospital ► a hospital that is capable of providing specialized services such as trauma care, pediatric care, cardiac care, stroke care, or burn care.

FIRST ON SCENE

continued

By the time you return to the scene, you can tell that the young boy has stopped shaking. Within seconds, two women arrive and introduce themselves as Elizabeth and Nora, members of the company's Medical Emergency Response Team. They have equipment with them and seem to know what they are doing. Elizabeth kneels beside the patient and appears to be listening for something. Nora takes the woman aside and asks questions about the boy.

OBJECTIVE

9. Explain the various types of medical direction and how the Emergency Medical Responder might interact with each.

Medical Direction

Each EMS system has a medical director. He or she is a licensed physician who assumes the ultimate responsibility for direction and oversight of all patient care delivered by personnel in an EMS system. The medical director also oversees training and assists in the development of treatment **protocols**. Most EMS systems have clearly defined, written protocols that describe how to manage the most common types of conditions, such as patients with chest pain, cardiac arrest, difficulty breathing, and severe allergic reaction. The medical director authorizes the performance of skills and care within the scope of practice of each level of EMS provider. Because the medical director cannot physically be present at every emergency, he or she develops and approves **standing orders** for the EMS provider. These written orders are in the form of protocols, which authorize rescuers to perform specific skills in specific situations. For instance, the protocol for how to care for

protocols ► written guidelines that direct the care EMS personnel provide for patients.

standing orders ► the medical director's specific instructions for specific medical conditions or injuries.

From the Medical Director

Though it may appear that EMS is a relatively new profession, it is older than the emergency medicine specialty practiced by most EMS medical directors. The American Board of Medical Specialties formally recognized emergency medicine as a specialty in 1979. However, it was not until 1989 that emergency medicine was recognized as a primary *specialty. Since then, eight areas of subspecialties were approved, the most recent being EMS, which was approved in 2010. In 2013, the first test was offered and a little more than 150 physicians board certified in emergency medicine became the first to hold a subspecialty certification in emergency medical services.*

a patient who has chest pain may include a standing order for oxygen. Thus, the Emergency Medical Responder may provide oxygen to any patient who has chest pain based on that standing order. This is one component of medical direction known as **off-line medical direction** (or *indirect medical direction*).

off-line medical direction ► an EMS system's written standing orders and protocols, which authorize personnel to perform particular skills in certain situations without actually speaking to the medical director or her designated agent. Also called *indirect medical direction*.

While quite rare, procedures not covered by standing orders or protocols require the Emergency Medical Responder to contact medical direction by radio or telephone prior to performing a particular skill or administering care. Orders from medical direction given in this manner—by radio or phone—are called **on-line medical direction** (or *direct medical direction*). The primary role of medical direction is to ensure that the quality of care is standardized and consistent throughout the local EMS system.

on-line medical direction ► orders to perform a skill or administer care from the on-duty physician, given to the rescuer in person by radio or by phone. Also called *direct medical direction*.

As an Emergency Medical Responder at the scene of an emergency, you may have limited access to the medical director. It will be necessary for you to adhere to the training you receive or to follow the orders of on-scene EMS providers who have a higher level of training or certification.

Like all EMS personnel, you must provide only the care that is within your scope of practice. The scope of practice is defined as the care an Emergency Medical Responder is allowed and expected to provide according to local, state, or regional regulations or statutes. The scope of practice is outlined in protocols and guidelines approved by your medical director.

The scope of practice may vary from state to state and region to region. Your instructor will inform you of any local protocols and policies that may define your scope of practice. Always follow your local protocols.

The Emergency Medical Responder

The lack of people with enough training to provide care before more highly skilled EMS providers arrive at a scene is the weakest link in the chain of any EMS system. Training Emergency Medical Responders will help overcome this challenge.

Emergency Medical Responders are trained to reach patients, find out what is wrong, and provide emergency care while at the scene. They are also trained to move patients when necessary and without causing further injury (Scan 1.2). They are usually the first medically trained personnel to reach the patient. In all cases, an Emergency Medical Responder has successfully completed an Emergency Medical Responder course. Many police officers and firefighters are trained to this level. Industrial companies are beginning to train employees as Emergency Medical Responders as well. The more individuals who become trained as Emergency Medical Responders, the stronger the EMS system becomes.

Since the beginning of Emergency Medical Responder training programs, hundreds of thousands of people have completed formal training courses, with many going on to provide essential emergency care. The care that Emergency Medical Responders provide reduces suffering, prevents additional injuries, and saves many lives.

From the Medical Director — Welcome to the World of EMS

Congratulations on choosing to expand your knowledge and become a part of the prehospital patient care team called EMS. Depending on where you live, you may or may not be required to have a medical director to authorize your actions. Regardless, it is important to understand the role medical directors play in allowing Emergency Medical Responders to function.

Medical directors are a committed group of physicians who review and approve your curriculum, patient care protocols, and evaluations of your performance. Throughout this text you will find notes "From the Medical Director" that have the goal of helping you better understand important points about EMS and your new profession. Welcome to the world of EMS!