

# PREHOSPITAL EMERGENCY CARE

10<sup>th</sup> Edition



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# PREHOSPITAL EMERGENCY CARE

10<sup>th</sup> Edition

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# Dedication

To my best friend and beautiful wife, Andrea, for her unconditional love and inspiration to pursue my dreams. To my daughters Katie, Kristyn, Chelsea, Morgan, and Kara, who are my never-ending sources of love, laughter, and adventure and remind me why life is so precious. I love you all! In memory of my father, Paul, who was a continuous source of encouragement and the epitome of perseverance. I have come to realize that he is my hero.

To Bill Brown, my EMS instructor, mentor, colleague, and most importantly my friend, an exemplary EMS educator, professional, and visionary, who instilled in me the meaning of commitment and a belief in excellence in emergency medical services.

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**JJM**

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**KJK**

---

Dr. Brent Hafen was a man of great conviction. He was dedicated to his church, his family, his values, his students, and to the field of EMS. Previous editions of this text and others coauthored by Dr. Hafen have had a tremendous influence on EMS training and education. He is deeply missed as a colleague and friend.

**KJK and JJM**

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# Preface

*Congratulations* on your decision to undertake an EMT education program. The field of emergency medical services is extremely rewarding and will provide you with experiences you will find both challenging and gratifying.

## Be Prepared

As an EMT student, you have a few pressing concerns. You want to be prepared:

- To pass your course exams
- To pass the credentialing exam that allows you to practice as an EMT
- To treat patients to the best of your ability
- To do well in all aspects of your job

As the authors, we want to assure you that *Prehospital Emergency Care*, 10th Edition, is written to help you achieve those goals.

## It All Makes Sense

The key to the above goals—passing your exams, providing excellent patient care, and doing well in your job—is understanding how everything fits together:

- A basic understanding of anatomy, physiology, and pathophysiology will allow you to better understand signs, symptoms, and emergency care.
- An anatomical and body systems approach to the physical exam will link conditions to assessment findings.
- Knowledge of the presentations of common medical conditions and traumatic injuries encountered in the prehospital environment will enable you to perform efficient and accurate assessments.
- A diagnostic-based approach to patient assessment will allow you to form a differential field impression of the condition or injury.
- An assessment-based approach to patient assessment will allow you to identify and provide immediate emergency care for life-threatening conditions or injuries.
- You will learn how to provide the most efficient and effective emergency care.

The good news is that—although what you have to learn may seem daunting in the beginning—it all makes sense. In fact, that is the philosophy behind this text book. Our purpose has been to show you at every step of your EMT education program how:

***It all makes sense!***

## Features

All of the features in this text book are designed to help you navigate through the anatomy, physiology, pathophysiology, assessment findings, medical conditions, traumatic injuries, and emergency care to best prepare you to provide excellent emergency medical services to the patient—beginning with the dispatch of the call, followed by assessment and management of the patient and delivery to the medical facility, through writing your prehospital care report. In addition to the 275 new photographs and 70 new illustrations, in the “clinical” chapters (on airway care, the medical chapters, and the trauma chapters) you will find:

- Assessment Tips
- Understanding Body Processes
- Drug Profiles
- Assessment Summaries
- Emergency Care Protocols
- Emergency Care Algorithms

And a special feature that appears throughout Chapter 13, “Patient Assessment”:

- Critical Findings,

which explains, at every step of the assessment, critical conditions/signs/symptoms you may find . . . what might be causing them . . . and specifically what you should do when your assessment of the patient reveals one of these critical findings.

EMTs are often taught **WHAT** signs and symptoms they should expect to see in certain conditions and **WHAT** should be done; however, the **WHY** of assessment and emergency care is often not well addressed. Two of the features, “Pathophysiology Pearls” and “Assessment Tips”—in addition to expanded discussion within the chapters—provide you with a basic understanding so that you can better comprehend **WHY** you are seeing signs and symptoms and **WHY** you are providing specific emergency care.

The Assessment Summaries, Emergency Care Protocols, Emergency Care Algorithms, and Critical Thinking features provide the most up-to-date strategies for providing competent care. These features and the entire text have been updated to conform to the latest American Heart Association guidelines.

## In Your EMS Career

In your EMS career, you will respond to a variety of calls in uncontrolled environments requiring confidence,



compassion, and a high degree of competence. As an EMT, you will be put to the test to think critically and respond instantaneously. The foundation for these skills will be provided in your education program; you will learn further and gain better clinical insight through patient contact, continuing education, and experience. Once you have read this text book and complete your EMT program, you will have only begun your educational experience as an EMT. Every day you should strive to learn something new that may enhance your emergency patient care. Due to the dynamic nature of emergency medical services, you will become a lifelong learner.

## Pathophysiology

As an EMT, you will be required to learn about many patient conditions and injuries that you will encounter in the prehospital environment. Identifying these conditions and injuries is most often based on the recognition of specific signs and symptoms and history findings. Not only is it difficult to memorize the myriad of signs and symptoms for each condition or injury, it is not desirable because not every patient presents with just one condition or injury or all of the same signs and symptoms. A good basic foundation of pathophysiology helps you to understand and explain the “why” behind the patient presentation. There is no need to memorize when you understand and can explain why each sign or symptom is occurring. Putting this together with a fundamental understanding of the pathophysiology of the conditions and a thorough approach to patient assessment will allow you to quickly recognize immediate life threats and provide excellent emergency care. Don’t memorize, but understand. This is the foundation to making “it all make sense!”

## The Importance of Patient Assessment

Patient assessment is one of the most important skills that an EMT performs, requiring good practical ability and also the capability to think critically. You must take each finding from the assessment, determine if an immediate lifesaving intervention is required, store the information learned in the back of your mind as you continue with the assessment, and finally put all the pieces of the assessment together to provide effective emergency medical care. The challenge is similar to putting a puzzle together. You start out with individual pieces of the puzzle that have to be connected together to form a meaningful picture. The pieces of the puzzle correlate to signs, symptoms, and other findings of the assessment. You must take the findings, consider them individually, and then put them together to form a whole picture of your patient. Specific findings are meaningless without fitting them into the entire picture.

*Prehospital Emergency Care*, 10th Edition, provides a strong, comprehensive approach to patient assessment, which is reinforced at several points in the chapters—in the Case Study, chapter text, Assessment-Based Approach, Assessment Summaries, and Algorithms. This approach reinforces assessment information and also provides an alternative learning method. You will find the necessary clinical information integrated into the assessment approach for each section, unlike other sources that integrate the assessment information into the clinical information.

This text book uses a two-tiered approach to teaching emergency medical care: assessment based and diagnostic based. An assessment-based approach to patient injuries and illnesses teaches you to identify life-threatening conditions and provide immediate interventions to reverse those problems. An assessment-based approach to acute patient care is followed no matter what level of care is provided. Once you have managed life-threatening conditions, you will then move to the next level of assessment, the diagnostic-based approach. The diagnostic-based approach entails putting the signs, symptoms, and other assessment findings together to come to a probability of what conditions the patient may be suffering from. Many EMS providers refer to this as their “differential field impression.” *Prehospital Emergency Care*, 10th Edition, presents the necessary information to move naturally, successfully, and effectively from the assessment-based approach to the diagnostic-based approach.

## Using Medical Terminology

As you progress through your education program, you will learn a new system of communication that involves the use of appropriate medical terminology. It is important to establish a basic understanding of medical terminology so that you may communicate effectively, by both written and oral means, with other members of the medical team. *Prehospital Emergency Care*, 10th Edition, addresses medical terminology within Chapter 7, “Anatomy, Physiology, and Medical Terminology,” and has integrated a basic foundation of medical terminology into each chapter (see the terms in bold type and the glossary at the end of the book) that will help you to enhance your professional image and communication skills. You should expand your medical terminology base as you continue your education.

## As You Begin Your EMS Career

We wish you the best of luck as you begin your career in emergency medical services. Our best piece of advice to you is to provide the best emergency care possible and always do what is right for the patient. This will allow you to contribute to the mission of emergency medical services.

Good luck and best wishes!

*Joseph J. Mistovich and Keith J. Karren*

# What's New in the 10th Edition?

*Prehospital Emergency Care*, 10th Edition, continues to meet the National EMS Education Standards published by the National Highway Traffic Safety Administration in 2009 and to reflect the latest and best medical knowledge and practices in emergency medical services in the United States. Recognizing, as well, that equipment, standards, and practices vary from one state and local EMS service to another, the statement “follow local protocols” appears in numerous places throughout the text.

The content of *Prehospital Emergency Care*, 10th Edition, is summarized here, with emphasis on “what’s new” in this edition. The text’s table of contents is organized to follow the National EMS Educational Standards.

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## Preparatory; Public Health

The chapters that fall under the first two standards, “Preparatory” and “Public Health,” set the foundation for the chapters that follow with such basic topics as EMS systems; research; public health; workforce safety and wellness; medical, legal, and ethical issues; documentation; communication; and lifting and moving patients.

### What's New?

- Chapter 1, “Emergency Medical Care Systems, Research, and Public Health,” includes updated information on **cell phone access to 911** as well as updated information on **Voice over Internet Protocol (VoIP) access to 911**. A section on **State EMS agency** roles and responsibilities has been added.
- Chapter 2, “Workforce Safety and Wellness of the EMT,” includes new information on **diseases that are infectious but not communicable, such as malaria** and added information on **severe acute respiratory distress syndrome (SARS)** transmission, incubation, and protective measures.
- Chapter 3, “Medical, Legal, and Ethical Issues,” contains a new section on **medical alert tattoos** and a new section on **baby safe haven laws** regarding infant abandonment.
- Chapter 5, “Communication,” has a new section on **advanced automatic collision notification (AACN) technology**.
- Chapter 6, “Lifting and Moving Patients,” offers new information on **power cots** with mechanisms that reduce repetitive motion and back strain for EMTs.

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## Anatomy and Physiology; Medical Terminology

These standards are covered in a single chapter, Chapter 7, “Anatomy, Physiology, and Medical Terminology.” This chapter is unchanged from the prior edition.

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## Pathophysiology

This standard is covered in one chapter, “Pathophysiology.”

### What's New?

- Chapter 8, “Pathophysiology,” includes new information about **respiratory centers in the brain** and **signs of hypoxia**, along with a revised table of **ventilation rates** and an updated section on **bag-valve ventilation**. There are new sections on **initiating and administering CPAP** and a new section titled **“Clinical Decision Making Regarding Oxygen Administration.”**

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## Life Span Development

This standard is covered in one chapter, Chapter 9, “Life Span Development.” This chapter is unchanged from the prior edition.

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## Airway Management, Artificial Ventilation, and Oxygenation

This standard is covered in one chapter, “Airway Management, Artificial Ventilation, and Oxygenation.”

### What's New?

- Chapter 10, “Airway Management, Artificial Ventilation, and Oxygenation,” includes a new section explaining **hypoxemia**.

---

## Assessment

The chapters that fall under the “Assessment” standard are those that detail baseline vital signs, monitoring devices, and history taking as well as scene size-up and the process of patient assessment.

### What's New?

- Chapter 13, “Patient Assessment,” includes an increased emphasis on assessing the patient’s **oxygenation status, signs of inadequate oxygenation, and administration of oxygen**.

---

## Pharmacology

This standard is covered in one chapter, “Pharmacology Medication and Administration.”

### What's New?

- Chapter 14, “Pharmacology Medication and Administration,”—as in Chapter 13, “Patient Assessment”—includes an increased emphasis on assessing the patient’s **oxygenation status, signs of inadequate oxygenation, and administration of oxygen**.

---

## Shock and Resuscitation

This standard is covered in one chapter, “Shock and Resuscitation.”

### What’s New?

- Chapter 15, “Shock and Resuscitation,” now includes information about the **Pediatric Chain of Survival** (along with the already-included adult Chain of Survival). A table concerning **“Physical Assessment Indicators of Hypovolemic Shock”** has been added.

---

## Medicine

The chapters within the “Medicine” standard are those on respiratory and cardiovascular emergencies; altered mental status, stroke, and headache; seizures and syncope; diabetic emergencies; anaphylactic reactions; toxicologic emergencies; abdominal, hematologic, gynecologic, genitourinary, and renal emergencies; and environmental, drowning and diving, and behavioral emergencies.

### What’s New?

- Chapter 16, “Respiratory Emergencies,” has been extensively revised and updated. Included are an expanded (more nuanced) explanation of **normal breathing**. Additionally, **hypoxemia** is newly defined as an SpO<sub>2</sub> reading of <94 % (throughout the text as well as in Chapter 16). There is additional emphasis and detail regarding **intervention when the patient complains of breathing difficulty**. An expanded discussion of and distinction between **emphysema and chronic bronchitis** has been added. New tables have been inserted: **“Signs of Improvement During the Administration of CPAP”** and **“Signs of Deterioration During the Administration of CPAP.”** The chapter includes expanded discussion of the signs, symptoms, assessment, and care for **asthma, pneumonia, pulmonary embolism, acute pulmonary edema, spontaneous pneumothorax, hyperventilation syndrome, and epiglottitis**.
- Chapter 17, “Cardiovascular Emergencies,” presents, throughout the chapter, expanded discussion of **guidelines for administration of supplemental oxygen** according to the 2010 AHA guidelines. A new section is included: **“The Dangers of Administering Too Much Oxygen in Acute Coronary Syndrome.”**
- Chapter 18, “Altered Mental Status, Stroke, and Headache,”—similarly to Chapter 17 “Cardiovascular Emergencies”—includes expanded discussion of **guidelines for administration of supplemental oxygen** according to the 2010 AHA guidelines and a new section: **“The Dangers of Administering Too Much Oxygen in Stroke.”**
- Chapter 20, “Acute Diabetic Emergencies,” includes an expanded discussion of **guidelines for administration of supplemental oxygen**.
- Chapter 21, “Anaphylactic Reactions,” clarifies, throughout the chapter, the **difference between IgE mediated (anaphylactic) and non-IgE mediated (anaphylactoid) reactions**. Expanded information is included on **causes, assessment, and management of anaphylactoid and anaphylactic reactions** as well as information on

**distinguishing and caring for local versus systemic allergic reactions**. Throughout the chapter, there is expanded discussion of **guidelines for administering supplemental oxygen**.

- Chapter 22, “Toxicologic Emergencies,” includes, throughout the chapter, expanded discussion of **guidelines for administering supplemental oxygen**. New sections are included on **“Suicide Bags”** (a method of committing suicide) and **“Bath Salts”** (an illegal psychoactive drug).
- Chapter 23, “Abdominal, Hematologic, Gynecologic, Genitourinary, and Renal Emergencies,” includes a new section, **“Hematologic Emergencies,”** that includes discussion of **anemia, hemophilia, and sickle cell anemia/sickle cell crisis**. Throughout the chapter, there is expanded discussion of **guidelines for administering supplemental oxygen**.
- Chapter 24, “Environmental Emergencies,” present a new table, **“Stages of Hypothermia and Associated Physiological Changes.”** Throughout the chapter, there is expanded discussion of **guidelines for administering supplemental oxygen**.
- Chapter 25, “Submersion Incidents: Drowning and Diving Emergencies,” includes, throughout the chapter, expanded discussion of **guidelines for administering supplemental oxygen**.
- Chapter 26, “Behavioral Emergencies,” has been extensively revised to include expanded definitions and discussion of behavior and psychiatric disorders, including these topics: **mood, affect, “word salad,” tardive dyskinesia, anxiety, phobias, depression, bipolar disorder, paranoia, psychosis, and schizophrenia**. There is also expanded discussion of assessment and care for **violence**, including **attempted suicide and violence to others**. The section **“Dealing with Behavioral Emergencies”** has been thoroughly revised and updated.

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## Trauma

The chapters within the “Trauma” standard include a trauma overview and chapters on bleeding and soft tissue trauma, burns, musculoskeletal trauma and nontraumatic fractures, trauma to the head, spinal column and spinal cord, eye, face, neck and chest, abdominal and genitourinary trauma, multisystem trauma, and trauma in special patient populations. Please note that chapters on “Environmental Emergencies” and “Submersion Incidents: Drowning and Diving Emergencies” were included in the “Medicine” standard due to the medical content.

### What’s New?

- Chapter 27, “Trauma Overview: The Trauma Patient and the Trauma System,” includes a **reconsideration of the relative importance of mechanism of injury in trauma assessment** (now emphasizing MOI as the third consideration behind **physiological and anatomical considerations**.)
- Chapter 28, “Bleeding and Soft Tissue Trauma,” provides expanded discussion of **guidelines for administration of supplemental oxygen** throughout the chapter. (The discussion of **hemophilia**, formerly included in this chapter, has been **moved to Chapter 23**, as noted earlier.

- Chapter 29, “Burns,” includes an increased emphasis on oxygenation in treatment of burns and toxic inhalations along with an expanded discussion of **guidelines for administration of supplemental oxygen** throughout the chapter.
- Chapter 30, “Musculoskeletal Trauma and Nontraumatic Fractures,” includes a new section on **nontraumatic fractures** (now included in the chapter title). Throughout the chapter, there is expanded discussion of **guidelines for administering supplemental oxygen**.
- Chapter 32, “Spinal Column and Spinal Cord Trauma,” includes a new section, “**Indications for Spinal Immobilization Based on Assessment Findings.**”
- Chapter 34, “Chest Trauma,” now **warns that stabilization of a flail segment or placing the patient on the injured side may compromise chest wall motion and promote collapse of lung tissue**. Newly emphasized is the recommendation of continuous positive air pressure (**CPAP**) with **supplemental oxygen for flail segment**. A new segment, “**Comotio Cordis**” has been added, and there is revised and updated information on treatment of **pericardial tamponade**.
- Chapter 35, “Abdominal and Genitourinary Trauma,” provides expanded discussion of **guidelines for administration of supplemental oxygen** throughout the chapter.
- Chapter 36, “Multisystem Trauma and Trauma in Special Patient Populations,” in the discussion of pediatric trauma assessment, now includes the **American Heart Association Pediatric Advanced Life Support (PALS) assessment** as an alternative to the American Academy of Pediatrics Pediatric Assessment Triangle (PAT), which is still included. Both assessment methods are now discussed.
- Chapter 38, “Pediatrics,” now includes the **American Heart Association Pediatric Advanced Life Support (PALS) assessment** as an alternative to the American Academy of Pediatrics Pediatric Assessment Triangle (PAT), which is still included. Both assessment methods are now discussed. A section on “**Child Abuse**” has been moved to this chapter (formerly in Chapter 40, “Patients with Special Challenges”).
- Chapter 39, “Geriatrics,” provides expanded discussion of **guidelines for administration of supplemental oxygen** throughout the chapter. A section on “**Elder/Geriatric Abuse**” has been moved to this chapter (formerly in Chapter 40, “Patients with Special Challenges”).
- Chapter 40, “Patients with Special Challenges,” no longer includes the sections on child abuse and elder abuse, which have now been moved to Chapters 38 and 39 on pediatrics and geriatrics, but continues to cover other special challenges.
- Chapter 41, “The Combat Veteran,” is a new chapter in this edition. Patients who are veterans of combat, whether they saw service recently or long ago, are likely to be suffering from the effects of post-traumatic stress disorder (PTSD) and possibly also from traumatic brain injury (TBI), which may be the cause of or an exacerbating factor in the present emergency. The chapter lists clues that may be present at the scene or in the patient’s demeanor or behavior that should alert the EMT to the patient’s status as a combat veteran. The chapter also presents advice about special considerations for assessment and treatment of this patient.

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## Special Patient Populations

The chapters that fall under the “Special Patient Populations” standard are chapters on obstetrics and newborn care, pediatrics, geriatrics, and patients with special challenges.

### What’s New?

- Chapter 37, “Obstetrics and Care of the Newborn,” now emphasizes **oxygenation of the pregnant patient** regardless of the SpO<sub>2</sub> reading. **Routine suctioning of the infant** is no longer recommended (suction only if necessary). Current **AHA guidelines for assessment and initial management of the newborn** are now included.

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## EMS Operations

The chapters within the “EMS Operations” standard are chapters on ambulance and air medical operations, gaining access and patient extrication, hazardous materials, multiple-casualty incidents and incident management, and EMS response to terrorism and weapons of mass destruction. There are no significant changes to these chapters from the prior edition.

### We Want to Hear from You

Many of the best ideas for improving our text books and training for future EMTs comes from the instructors and students who use our books and ancillary materials. If you have ideas to offer us or questions to ask, you can reach us at the addresses listed below.

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## Photo Acknowledgments

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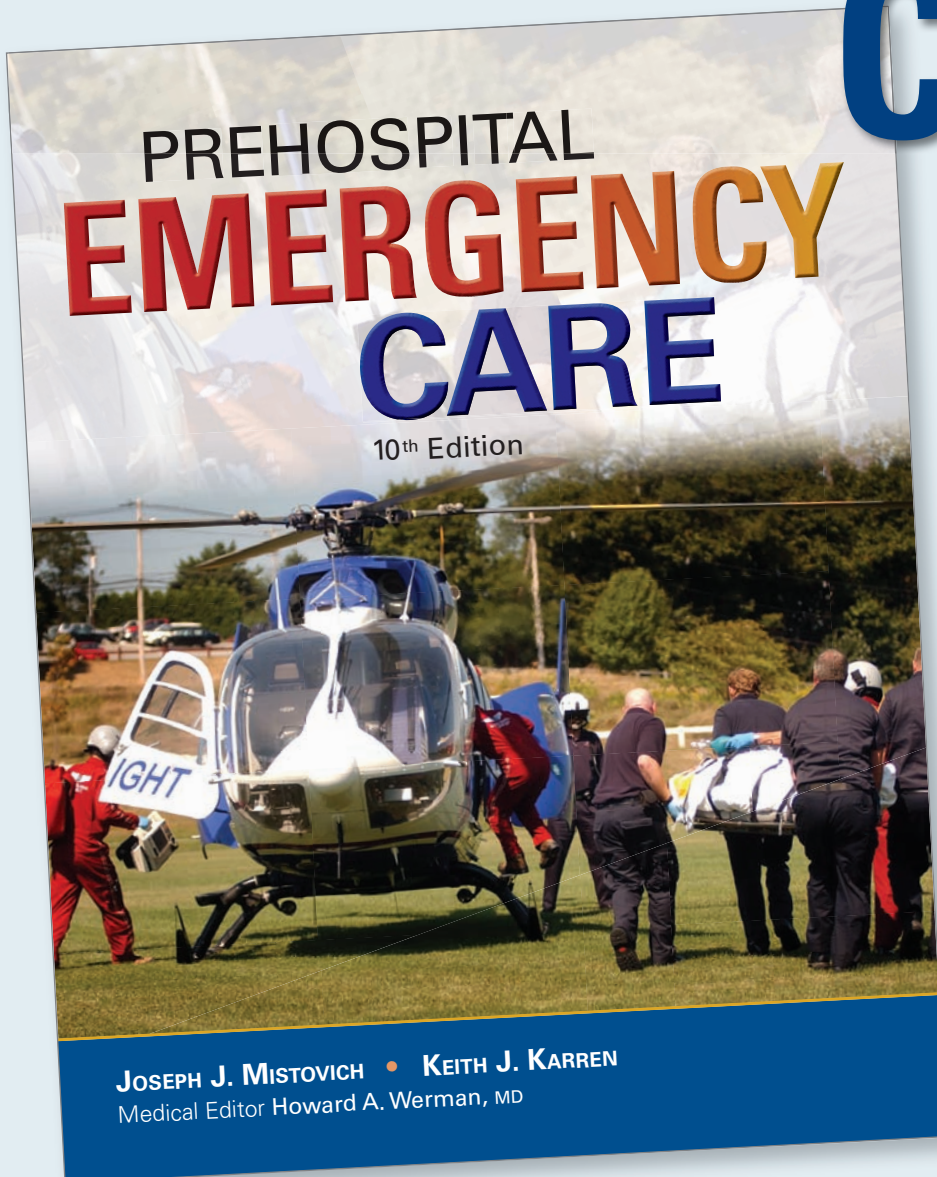
Welcome to

**PREHOSPITAL**

**EMERGENCY**

**CARE**

10th Edition



**JOSEPH J. MISTOVICH • KEITH J. KARREN**  
Medical Editor Howard A. Werman, MD

# A Guide to Key Features

## Standards and Competencies

Listed at the opening of each chapter is the Education Standard (or Standards) around which the chapter is written.

Also listed is the Competency (or Competencies) that identifies fundamental knowledge as well as patient assessment and management skills for the chapter.

## Objectives

Objectives form the basis of each chapter and were developed around the Education Standards and Instructional Guidelines.

## Key Terms

Page numbers identify where each key term first appears in the chapter.

## Case Study and Follow-up

Each chapter opens with a case study relevant to the chapter topic. The case draws students into the subject and creates a link between the text and real-life situations and experiences.

**CHAPTER**  
**12**

## Scene Size-up

The following items provide an overview to the purpose and content of this chapter. The Standard and Competency are from the National EMS Education Standards.

**STANDARD** • **Assessment** (Content Area: Scene Size-Up)

**COMPETENCY** • Applies scene information and patient assessment findings (scene size-up, primary and secondary assessment, patient history, and reassessment) to guide emergency management.

**OBJECTIVES** • After reading this chapter, you should be able to:

- 12-1. Define key terms introduced in this chapter.
- 12-2. Explain the purposes and goals of performing a scene size-up on every EMS call.
- 12-3. Given a scenario, identify key findings in the scene size-up related to:
  - a. Taking Standard Precautions
  - b. Identifying possible scene hazards
  - c. Identifying the mechanism of injury or nature of illness
  - d. Determining the number of patients
  - e. Determining the need for additional resources
- 12-4. Describe the dynamic nature of scenes and scene size-up.
- 12-5. Utilize dispatch information and information determined on arrival at the scene to assess scene safety.
- 12-6. Discuss types of situations that may require a call for additional or specialized resources.
- 12-7. Describe scenes you are likely to encounter and points to consider before entering such scenes, including crash scenes, other rescue scenes, crime scenes, and barroom scenes as well as potential hazards in approaching any vehicle and its passengers.
- 12-8. Discuss measures necessary to protect the patient, protect bystanders, control the scene, and maintain situation awareness.
- 12-9. Discuss factors involved in determining a mechanism of injury.
- 12-10. Discuss factors involved in determining the nature of the illness.
- 12-11. Discuss factors involved in determining the number of patients.

**KEY TERMS** • Page references indicate first major use in this chapter. For complete definitions, see the Glossary at the back of this book.

index of suspicion p. 304	mechanism of injury (MOI) p. 304	medical p. 304	nature of the illness (NOI) p. 307	personal protective equipment (PPE) p. 295	scene size-up p. 294	trauma p. 304
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**KEY TERMS** • Page references indicate first major use in this chapter. For complete definitions, see the Glossary at the back of this book.

- |                           |                                      |   |                          |                           |                                   |   |   |  |                       |   |
|---------------------------|--------------------------------------|---|--------------------------|---------------------------|-----------------------------------|---|---|--|-----------------------|---|
| anaphylactic shock p. 417 | asystole p. 429                      | automated external defibrillator (AED) p. 427 | burn shock p. 417        | cardiac arrest p. 424     | cardiogenic shock p. 416          | chain of survival p. 426                      | compensatory shock p. 419                     | decompensatory shock p. 421                | defibrillation p. 426 | distributive shock p. 414                       |
| downtime p. 425           | hemorrhagic hypovolemic shock p. 417 | hypoperfusion p. 410                          | hypovolemic shock p. 414 | irreversible shock p. 421 | neurogenic shock p. 418           | nonhemorrhagic hypovolemic shock p. 417       | obstructive shock p. 416                      | pulseless electrical activity (PEA) p. 429 | resuscitation p. 424  | return of spontaneous circulation (ROSC) p. 425 |
| septic shock p. 418       | shock p. 410                         | sudden death p. 425                           | survival p. 426          | total downtime p. 425     | unwitnessed cardiac arrest p. 426 | ventricular fibrillation (VF or V-Fib) p. 428 | ventricular tachycardia (VT or V-Tach) p. 428 | witnessed cardiac arrest p. 426            |                       |   |

### Case Study

#### The Dispatch

EMS Unit 102—respond to 46 Hillman Street. You have a 26-year-old male patient who has been stabbed in the leg and is bleeding profusely. Law enforcement is en route. Time out is 2102 hours.

#### Upon Arrival

You and your partner arrive at the scene and are directed into the house by a police officer. He leads you into the basement where you find the patient lying supine on the

floor with a large pool of blood around his right thigh. His pant leg is completely soaked in blood. The patient is not alert and doesn't respond when you call out to him. He appears to be extremely pale.

#### How would you proceed to assess and care for this patient?

*During this chapter, you will learn about assessment and emergency care for a patient suffering from shock and those needing resuscitation. Later, we will return to the case and apply the procedures learned.*

### Case Study Follow-up

#### Scene Size-up

You have been dispatched for a 26-year-old male patient who has been stabbed in the leg and is bleeding profusely. You are directed into the house by a police officer. You find the patient lying supine on the floor with a large pool of blood around his right thigh.

#### Primary Assessment

As you approach the patient, he is not alert and doesn't respond when you call his name. He also appears to be very pale. You instruct a police officer who is also an Emergency Medical Responder to take manual in-line spinal stabilization. The patient moans when you pinch and twist his trapezius muscle. You open the airway using a jaw thrust and inspect inside the oral cavity. The mouth is clear of any obstructions. You assess the rate and depth of breathing by listening for air movement and watching the chest rise. The respirations are rapid and the tidal volume is adequate. You instruct your partner to apply a nonrebreather mask at 15 lpm because shock and poor perfusion are suspected and to apply the pulse oximeter to attempt to get an SpO<sub>2</sub> reading. The radial pulse is barely palpable and the skin is pale, cool, and clammy. You quickly expose the leg and find a steady flow of blood coming from the wound. You apply direct pressure. You instruct your partner to cut the clothing to expose the remainder of the body.

#### Secondary Assessment

You recognize the signs the patient is exhibiting to be consistent with hypovolemic shock so you elect to do a rapid secondary assessment. You begin at the head and move systematically down to the toes inspecting and palpating for any other life-threatening injuries. You auscultate the breath sounds and find them to be equal

and clear bilaterally. You log roll the patient to place him on a backboard. As you do so, you quickly cut away the clothing to the back and inspect and palpate for any other injuries. You place the patient on the backboard. While your partner finishes applying the immobilization equipment, you obtain a set of vital signs. His blood pressure is 72/58 mmHg, heart rate is 152 bpm, respirations are 26/minute with a good tidal volume, and his skin is pale, cool, and clammy. Once the patient is completely immobilized, you quickly move him to the back of the ambulance and begin rapid transport to the level 1 trauma center.

There was no one at the scene from whom you could have gathered a history. You did not note any medical identification items on his body. The patient still remains only responsive to a painful stimulus; thus, he is not able to provide any history information.

#### Reassessment

En route to the hospital you reassess the mental status, airway, ventilation, oxygenation, and circulation. You check the pressure dressing on the leg to be sure there is no additional bleeding. You obtain another set of vital signs. You contact the trauma center and provide a radio report of the assessment findings, your emergency care, and the ETA. Upon arrival to the emergency department, the trauma surgeon meets you to bring the patient into the trauma bay. You provide an oral report and transfer the care of the patient. You then prepare your written report as your partner cleans and prepares the ambulance for another call.

 An author podcast is available by going to [www.bradbooks.com](http://www.bradbooks.com), Author Podcasts.

The Case Study Follow-up at the end of each chapter emphasizes key concepts learned and in-depth resolution. Many cases have accompanying online author podcasts, as noted by the headset icon and location information. The podcasts offer author insight and perspective into the case, based on many years of experience in the field and in the classroom.

### ASSESSMENT TIPS

Crackles (also called rales) are a sign of pulmonary edema. Be sure to auscultate the posterior lower lobes of the lungs to pick up early indications of crackles and pulmonary edema. If you only auscultate the upper lobes, you may easily miss the condition, since gravity pulls the fluid downward into the lower portions of the lungs. ■

**Emergency Medical Care.** It is necessary to carefully assess the patient with pulmonary edema. If there is any evidence of inadequate breathing, you need to begin positive pressure ventilation with supplemental oxygen. CPAP may be extremely beneficial in the acute pulmonary edema patient in respiratory distress or very early respiratory failure who is awake, alert, oriented, and able to obey commands (GCS  $\geq 10$ ), is breathing on his own, is able to maintain his own airway, and has an SpO<sub>2</sub> reading of  $<94\%$ . The positive pressure will force the oxygen across the alveoli and into the capillaries and improve lung compliance, which will increase oxygenation of the blood and reduce cellular hypoxia. Always explain the procedure to the patient, who is already anxious and likely agitated. (See Chapter 10, "Airway Management, Artificial Ventilation, and Oxygenation.")

If the patient doesn't fit the criteria for CPAP, deteriorates to respiratory failure or arrest, is not responding to CPAP administration, or has inadequate ventilation, you must perform bag-valve-mask ventilation with supplemental oxygen.

If the breathing is adequate but respiratory distress is evident, administer oxygen via nonrebreather mask at 15 lpm and closely monitor the breathing status. Keep the patient in an upright sitting position and transport without delay.

### Spontaneous Pneumothorax

A spontaneous pneumothorax is a sudden rupture of a portion of the visceral lining of the lung, not caused by trauma, that causes the lung to partially collapse. Males are five times more likely to suffer a spontaneous pneumothorax than females. Most of these males are tall, thin, lanky, and between the ages of 20 and 40. Many also have a history of cigarette smoking or a connective tissue disorder such as Marfan syndrome or Ehlers-Danlos syndrome. Patients with a history of COPD are more prone to spontaneous pneumothorax as a result of areas of weakened lung tissue called blebs.

**Pathophysiology.** In spontaneous pneumothorax, a portion of the visceral pleura ruptures without any trauma having been applied to the chest. This allows air to enter the pleural cavity, disrupting its normally negative pressure and causing the lung to collapse. The lung collapse causes a disturbance in gas exchange and

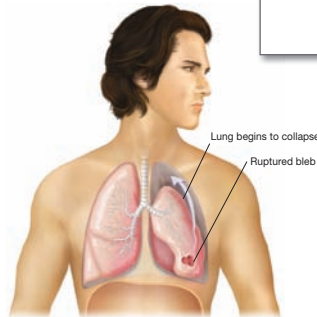
can lead to hypoxia. It is thought that the reason tall, thin, lanky males are more likely to suffer a spontaneous pneumothorax is that the visceral pleura is stretched within the chest cavity beyond its normal limit. Often the stretched and weakened area ruptures when the patient experiences an increase in intrathoracic pressure from an activity such as coughing, lifting a heavy object, or straining (Figure 16-8 ■).

**Assessment.** A key finding in spontaneous pneumothorax is a sudden onset of shortness of breath with any evidence of trauma to the chest and with decreased breath sounds upon assessment. The signs and symptoms of a spontaneous pneumothorax are as follows:

- Sudden onset of shortness of breath
- Sudden onset of sharp chest pain or shortness of breath
- Decreased breath sounds to one side of the chest (most often heard first at the apex, or top, of the lung)
- Subcutaneous emphysema (may be found on the neck)
- Tachypnea
- Diaphoresis
- Pallor
- Cyanosis (may be seen late and in a large pneumothorax)
- SpO<sub>2</sub>  $< 94\%$

### ASSESSMENT TIPS

If a patient presents with a sudden onset of shortness of breath with decreased breath sounds to one side of the chest and no evidence of trauma, you should suspect a spontaneous pneumothorax. ■



■ **FIGURE 16-8** A ruptured bleb, or weakened area of lung tissue, causes a spontaneous pneumothorax in which air enters the pleural cavity and travels upward, beginning collapse of the lung from the top.

### ASSESSMENT TIPS

*Respiratory distress* patients will have an adequate chest rise (tidal volume) and an adequate respiratory rate. Since both the tidal volume and respiratory rate are adequate, the patient has adequate breathing and is only in need of supplemental oxygen. A patient in *respiratory failure* will have inadequate chest rise (tidal volume) or an inadequate respiratory rate or both. If either tidal volume or respiratory rate is inadequate, the respiratory status is inadequate and the patient needs immediate ventilation. Respiratory failure and respiratory arrest are treated the same way, with positive pressure ventilation and supplemental oxygen. ■

### Assessment Tips

These suggestions offer clinical insights into patient assessment that EMTs learn over time through experience.

They enable the EMT to more accurately conduct an assessment and interpret the findings.

## Pathophysiology Pearls

This feature offers snapshots of pathology considerations students will encounter in the field. It highlights the body processes that lead to medical conditions found in patients. Understanding body processes aids in making the right treatment decisions for them.

### PATHOPHYSIOLOGY PEARLS

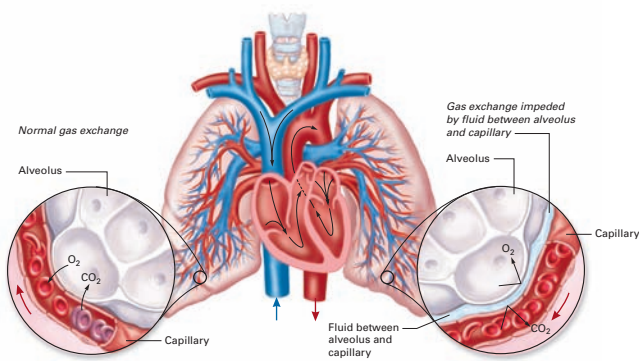
Hyperglycemic patients have too much glucose in the blood and not enough insulin. The cells in the body are starving, even though the blood glucose level may be extremely high, because there is not enough insulin to move the glucose into the cells. At the same time, however, the brain is getting more than an adequate amount of glucose. ■

# A Guide to Key Features

## Photos and Drawn Art

Over one hundred new photos were shot for this edition of *Prehospital Emergency Care*. Many others were carefully researched from EMS and medical sources.

The photos work in combination with a unique, beautifully drawn art program to reinforce content coverage and add to text explanations.



## Tables

A variety of tables highlight, summarize, and compare information.

**TABLE 16-6 Medications Commonly Used for Respiratory Problems**

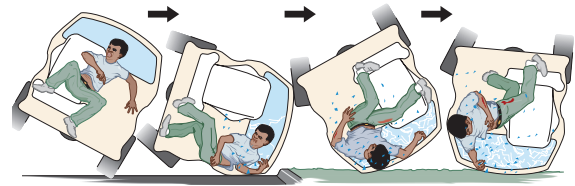
<b>Bronchodilators</b>	Albuterol (Proventil, Ventolin)	Potential side effects: increased heart rate, nervousness, shakiness, nausea, vomiting, sleeplessness, dry mouth, and allergic skin rash
	Bitolterol mesylate (Tornalate)	
	Ipratropium bromide (Atrovent)	
	Isoetharine (Bronkosol)	
	Metaproterenol (Metaprel, Alupent)	
	Salmeterol xinafoate (Serevent)	
	Montelukast (Singulair)	
<b>Mucolytics</b>	Levalbuterol (Xopenex)	Potential side effects: nausea, increased wheezing, and altered sense of taste
	Pirbuterol (Maxair)	
	Acetylcysteine (Mucomyst)	

## Critical Findings

Critical Findings tables are unique to Chapter 13, Patient Assessment. They highlight types of trauma injuries, suggest possible findings, present injury possibilities based on this information, and summarize emergency care needed.



■ FIGURE 27-16 Rollover impacts. (© Daniel Limmer)



■ FIGURE 27-17 In a rollover of an unrestrained occupant, impact to the body is difficult to predict and commonly results in multiple system injury.

ejection is common if the occupant was not restrained. Finally, crushing injuries to ejected occupants are common. Following the laws of motion, if you go straight through the windshield into the ditch, so does your vehicle, right into the ditch on top of you. Sometimes patients are thrown into other lanes of traffic too fast for oncoming vehicles to avoid.

### Vehicle-Pedestrian Collision

When a vehicle hits a pedestrian, the extent of injury depends on how fast the vehicle was going, what part of the pedestrian's body was hit, how far the pedestrian was thrown, the surface the pedestrian landed on, and the body part that first struck the ground. There are likely to be different patterns of injury in children than in adults. This is because adults are larger and have a different weight distribution. Also, children and adults react to an impending collision differently.

A child who is about to be hit by a vehicle—whether the child is walking or riding a bicycle—generally turns toward the oncoming vehicle, so injuries from the impact are generally to the front of the body. A common pattern in a child struck by an auto is the combination

of injuries to the femur, chest, abdomen, and head. Because a child is small and has a low center of gravity, a child struck by a vehicle is usually thrown in front of the vehicle, and is often subsequently run over by the same vehicle that hit him. A child struck by the bumper may be thrown onto the hood and then, when the vehicle stops, may be thrown off the car.

An adult, on the other hand, usually turns away from an oncoming vehicle, so the most common impact is to the side of the body. The bumper generally strikes the lower leg, typically causing fractures of the tibia and fibula. As the legs are propelled forward from the force of the vehicle, the adult generally falls backward and lands on the hood, resulting in injuries to the back, chest, shoulders, arms, and abdomen. If the adult continues across the hood and collides with the windshield, serious head and neck injuries are possible. Finally, the force of the moving vehicle throws the adult off the hood and to the ground.

### Restraints: A Cause of Hidden Injuries

Hidden injuries may occur from the use of restraints in motor vehicles, including air bags and seat belts (Figure 27-18 ■). Lap belts, when worn properly,

### Critical (Unstable) Findings: The Posterior Body

<b>Critical Finding:</b>	Open wound to the posterior thorax
<b>Possibility:</b>	Sucking chest wound Lung injury (pneumothorax)
<b>Emergency Care:</b>	Occlude the open wound immediately with a gloved hand and then with a nonporous dressing or occlusive dressing taped on three sides. Rapid transport upon recognition. Consider ALS intercept. Establish an airway, begin positive pressure ventilation at 10–12/minute if respiratory rate or tidal volume is inadequate, and administer oxygen. <i>Caution:</i> Aggressive PPV may worsen a lung injury.
<b>Critical Finding:</b>	Open wound with spurting or steadily flowing blood loss
<b>Possibility:</b>	Lacerated artery or vein
<b>Emergency Care:</b>	Apply direct pressure to the wound. Apply pressure dressing if possible. Rapid transport. Administer oxygen.

## Oral Glucose

### Medication Name

Oral glucose is the generic name. Two of the trade names of oral glucose are:

- Glucose
- Insta-Glucose

### Indications

Oral glucose should be administered to a patient who meets all three of the following criteria:

- An altered mental status
- A history of diabetes controlled by medication or a blood glucose level less than 60 mg/dL
- The ability to swallow the medication

### Contraindications

Oral glucose should not be administered to a patient who:

- Is either unresponsive or unable to swallow the medication
- Has a confirmed blood glucose level greater than 60 mg/dL

### Medication Form

Gel, in toothpaste-type tubes.

### Dosage

Oral glucose is a viscous gel typically packaged in toothpaste-type tubes. The typical dosage is one tube.

### Administration

To administer oral glucose:

1. Obtain an order from medical direction. Off-line medical direction would allow the EMT to administer the oral glucose without direct consultation with medical direction. An on-line order may be given by direct consultation with medical direction via phone or radio prior to the administration of the medication.
2. Ensure the signs and symptoms are consistent with hypoglycemia. If protocol permits, obtain a blood glucose reading.
3. Ensure that the patient is responsive and able to swallow the medication and protect his airway. Monitor the patient's airway closely during the administration to avoid accidental blockage by or aspiration of the oral glucose.
4. There are two ways to administer the medication. One way is to hold back the patient's cheek and



squeeze small portions of the contents of the tube into the mouth between the cheek and gum (Figure 20-4). The other way is to place small portions of the oral glucose on a tongue depressor, pull back the cheek, and slide the tongue depressor to deposit the medication between the cheek and gum (Figure 20-5). An alternative method is to have the patient squeeze the glucose himself into his mouth. This ensures he is alert enough to swallow it.

Whichever method you choose, do not squeeze a large amount of glucose into the patient's mouth at one time. This may cause the patient to choke or aspirate the contents. Also, lightly massage the area between the cheek and gum to disperse the gel and increase absorption.

### Actions

Increases blood glucose level. Increases glucose available to the brain.

### Side Effects

There are no side effects of oral glucose when administered properly. However, the thickness of the gel may cause an airway obstruction or the substance may be aspirated in the patient without a gag reflex.

### Reassessment

If the patient loses responsiveness or has a seizure, remove the tongue depressor from the mouth and be prepared to suction. Reassess the patient's mental status to determine if the medication has had an effect. Remember, it may take more than 20 minutes before you start seeing any improvement in the patient's mental status following the administration of oral glucose. Reassess the blood glucose level if protocol permits. If the patient's mental status continues to deteriorate, manage the airway and breathing. Make sure that oxygen is flowing to the patient at the highest possible concentration. Constantly monitor the patient's airway and breathing.

■ FIGURE 20-6 Oral glucose.

## Drug Profiles

Drug summaries provide medication name, indications, contraindications, medication form, dosage, administration, actions, side effects, and reassessment on medications that EMTs are permitted to administer.

## Assessment Summary

### RESPIRATORY DISTRESS

The following are findings that may be associated with breathing difficulty.

### Scene Size-Up

Is breathing difficulty due to a medical or a traumatic cause? Look for evidence of:

- Mechanism of injury—collision, fall, guns, knives, bruising on chest
- Home or portable oxygen tanks or concentrators indicating chronic respiratory problems
- Alcohol or food that may indicate choking

### Primary Assessment

#### General Impression

Position of patient:  
• Tripod  
• Lying flat

Facial expression:

• Agitated or confused

Speech:

• Patient may gasp for breath between words.

#### Mental Status

• Alert to unresponsive  
• Restlessness  
• Agitation  
• Disorientation

#### Airway

• Inspect for incomplete or partial obstruction  
• Crowing and stridor (indicate partial obstruction)  
• Gurgling (indicates fluid in the airway; suction required)

#### Breathing

• Signs of inadequate breathing, including poor chest rise and fall, poor volume heard and felt, diminished or absent breath sounds  
• Wheezing heard on auscultation

## Assessment Summary

Assessment Summaries reinforce assessment steps and processes as well as key assessment findings for specific medical and trauma emergencies.

# A Guide to Key Features

## Emergency Care Protocol

Emergency Care Protocols provide concise summaries of emergency care steps to be taken in medical and trauma emergencies.

### Emergency Care Protocol

#### STROKE

1. Establish and maintain an open airway. Insert a nasopharyngeal or oropharyngeal airway if the patient is unresponsive.
2. Suction secretions as necessary.
3. If breathing is inadequate, provide positive pressure ventilation with supplemental oxygen at a minimum rate of 10–12 ventilations/minute for an adult and 12–20 ventilations/minute for an infant or child.
4. According to the AHA 2010 guidelines, if the SpO<sub>2</sub> reading is less than 94% the patient complains of dyspnea, or signs and symptoms of hypoxia, heart failure, or shock are present, administer oxygen by nasal cannula at 2 to 4 lpm. High-concentration oxygen is no longer considered routine for the stroke patient unless severe signs of hypoxia are present. Always follow your local protocols.
5. Place the patient in a lateral recumbent position if unresponsive and if no spinal injury is suspected. If responsive and no spinal injury is suspected, elevate the head no greater than 30 degrees.
6. Obtain a blood glucose reading if your protocol permits.
7. Transport.
8. Perform a reassessment every 5 minutes.

FIGURE 18-10b Emergency care protocol: stroke.

### Emergency Care Algorithm RESPIRATORY DISTRESS/FAILURE/ARREST

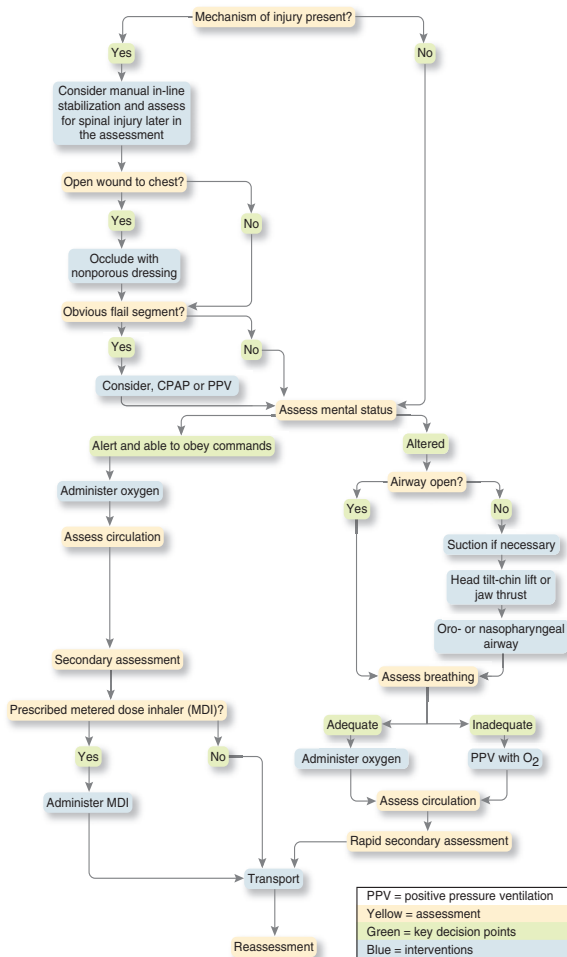


FIGURE 16-18 Emergency care algorithm: respiratory distress/failure/arrest.

## Emergency Care Algorithm

Emergency Care Algorithms are graphic pathways that visually summarize assessment and care steps for students.

**EMT SKILLS**  
**16-4**

**Administering Nebulized Medications**



■ **16-4A** Complete the primary assessment and assess the patient's pulse rate and breath sounds.



■ **16-4B** Select the correct medication and consult with medical direction for an order to administer the medication.



■ **16-4C** Add the medication to the nebulizer chamber.



■ **16-4E** Coach the patient to inhale the nebulized medication from the mouthpiece.

**EMT Skills**

Located at the end of chapters before review material, EMT Skills present step-by-step skill performance procedures for easy reference.

**EMT SKILLS**  
**32-10**

**Four-Rescuer Log Roll and Long Spine Board Immobilization**



■ **32-10A** Establish and maintain in-line stabilization. Apply a rigid cervical spine immobilization collar.



■ **32-10B** Place a long spine board parallel to the patient. If possible, pad the voids under the head and torso.



■ **32-10C** Three rescuers kneel at the patient's side opposite the board, leaving space to roll the patient toward them.



■ **32-10D** The EMT at the head directs the others to roll the patient as a unit onto his side. Assess the patient's posterior side.



■ **32-10E** The EMT at the waist reaches over, grasps the spine board, and pulls it into position against the patient. (This can also be done by a fifth rescuer.) The EMT at the head instructs the rescuers to roll the patient onto the spine board.



■ **32-10F** Secure the patient to the board with straps. Loosely tie the wrists together.



# A Guide to Key Features

## Chapter Review

### SUMMARY

Respiratory emergencies can range from a patient experiencing respiratory distress to a patient who is in respiratory arrest. It is imperative to effectively assess the patient to determine if the condition is respiratory distress, respiratory failure, or respiratory arrest. The patient with breathing difficulty who is in respiratory distress is still able to compensate for the disturbance and needs supplemental oxygen to improve his oxygenation status. The patient in respiratory failure, as the name implies, has failed to continue to meet the metabolic demands of the body, and the respiratory rate or tidal volume is no longer adequate. This patient needs immediate ventilation with a bag-valve mask or other ventilation device and supplemental oxygen. A patient in respiratory arrest is no

longer breathing and also needs immediate positive pressure ventilation.

A patient in respiratory distress who has a history of asthma, emphysema, or chronic bronchitis may have a metered-dose inhaler or home nebulizer unit that delivers a beta-specific drug. If so, you may assist the patient in using the device to relieve the bronchoconstriction that is impeding airflow into the alveoli.

Infants, children, and geriatric patients may present differently than adults when experiencing a respiratory emergency. Quick intervention is necessary since the most common cause of cardiac arrest in pediatric patients is from an airway or respiratory compromise, and geriatric patients may rapidly deteriorate because of poor compensatory mechanisms.

### Case Study Follow-up

#### Scene Size-Up

You have been dispatched to a 31-year-old female patient complaining of difficulty in breathing. A man nervously greets you at the curb as you gather your equipment. He indicates that the patient is his wife, Anna Sanders, who is having an extremely hard time breathing. You are led up to the third floor of an apartment complex. You do not note any possible hazards, but are looking at how difficult the extrication might be. Upon walking into the apartment you note a young female patient sitting in a tripod position next to the kitchen table.

#### Primary Assessment

As you start to introduce yourself, the patient begins to speak, gasping for her breath after each word. With great difficulty she states, "I—can't—breathe." Based on Mrs. Sanders's facial expression and posture, she appears to be in a great deal of distress. Her airway is open and her breathing is rapid and labored at a rate of 34 per minute. There are audible wheezes when she exhales. The SpO<sub>2</sub> is 78% on room air; thus, you decide to immediately apply oxygen via a nonrebreather mask at 15 lpm to maximize oxygenation of the patient. Her radial pulse is about 110 per minute. The skin is moist and slightly pale. You recognize the patient as a priority and signal your partner to get the stretcher while you continue with the secondary assessment.

#### Secondary Assessment

You begin to evaluate the difficulty in breathing using the OPQRST mnemonic. You ask Anna questions she can answer with a nod or a shake of her head to reduce her need to respond by speaking. Some questions you direct to her husband. You ascertain that the breathing difficulty began gradually about 2 hours ago and got progressively worse. She is unable to lie down because this causes her breathing to get much worse, although sitting up is not much better. She has had similar episodes in the past, but none seem to have been this severe. On a scale of 1 to 10, Mrs. Sanders indicates that her difficulty in breathing is about an 8 or 9.

You continue to obtain a history. The primary symptom is severe difficulty in breathing. Mrs. Sanders has an allergy to penicillin. When asked about medications that she takes, Mr. Sanders brings you a prescription of albuterol in a metered-dose inhaler. She is on no other medication. When asked if she has taken any of the albuterol, her husband says, "She took one puff about 15 minutes ago." She has a past medical history of asthma and suffers these attacks maybe once every four or five months. She has had nothing to eat for about 3 hours but drank a small glass of orange juice about an hour ago. She was cleaning the kitchen when the episode began.

You quickly perform a physical exam. You assess her neck for jugular vein distention. Inspection of her chest and abdomen reveals significant use of the abdominal muscles when exhaling. The breath sounds are diminished bilaterally and you hear wheezing even without using your stethoscope. Her fingertips are slightly cyanotic. You assess the baseline vital signs and find a blood pressure of 134/86; pulse of 118 per minute and regular; respirations at 32 per minute and labored with audible wheezing; the skin moist and slightly pale. Her SpO<sub>2</sub> reading is 78% prior to oxygen administration.

The patient meets the criteria for CPAP administration and does not present with any contraindications. You explain the procedure and equipment to the patient and initiate and increase the pressure to 5 cmH<sub>2</sub>O. You contact your medical director, Dr. Maxwell, for an order to administer the albuterol by a small-volume nebulizer in conjunction with the CPAP device. You check the medication to ensure it is prescribed to Mrs. Sanders, that it is the correct medication, and that it has not expired. You report your physical findings and history to Dr. Maxwell. He gives you an order to administer one dose. If there is no relief of the symptoms, he instructs you to contact him for further orders. You proceed with administration of albuterol with the CPAP.

#### Reassessment

You reassess the vital signs following administration of the albuterol. The blood pressure is 130/84, pulse rate decreases to 90 per minute, and respirations are now 18 per minute and much less labored. Her SpO<sub>2</sub> reading is 96%. The audible wheezes are minimal. The skin is not as moist and both skin and fingernails begin to return to a normal color. You secure Mrs. Sanders in a Fowler's position on a stair chair, and you and your partner transport her down to a stretcher your partner has placed on the first floor.

You reassess the difficulty in breathing. Mrs. Sanders is now able to talk in complete sentences and indicates that the shortness of breath is much less severe. She is now only slightly short of breath. As a result of the excellent response of the patient to the treatment, you switch the oxygen therapy to a nasal cannula at 2 lpm, document your findings and emergency care, and radio the hospital with a report.

Upon arrival at the hospital, you provide the nursing staff with an oral report. You write a prehospital care report form as your partner restocks the ambulance. Before leaving the hospital, you check in on Mrs. Sanders and find her to be relaxed and breathing well. She thanks you for your prompt response and emergency care. You then mark back in service and prepare for the next call.

 An author podcast is available by going to [www.mybradylab.com](http://www.mybradylab.com) or [www.bradybooks.com](http://www.bradybooks.com).

### IN REVIEW

1. List the major signs and symptoms of breathing difficulty.
2. List the signs of adequate breathing.
3. List the signs of inadequate breathing.
4. List the steps of emergency care for a patient who is exhibiting signs and symptoms of breathing difficulty but is breathing adequately (respiratory distress).
5. List the steps of emergency care for a patient who is in respiratory failure.
6. List the signs of adequate positive pressure ventilation and the steps to take if ventilation is inadequate.

7. Explain the steps to administer a medication by metered-dose inhaler and by small-volume nebulizer.
8. List the indications and contraindications for the use of a beta-agonist drug.
9. Describe the early signs of breathing difficulty in the infant or child; list the signs of inadequate breathing and respiratory failure in the infant or child.
10. Explain how to distinguish airway obstruction in the infant or child patient caused by disease, from airway obstruction caused by a foreign body; explain how treatment would differ for the two types of airway obstruction.

### CRITICAL THINKING

You arrive on the scene and find a 72-year-old female patient sitting up in her recliner in the living room of her home. She looks very fatigued and appears to be in severe respiratory distress. As you approach her, she appears extremely pale and diaphoretic with circumoral cyanosis. Her head is bobbing with each breath. As you ask her name, she can barely say it. She is gasping with each breath she takes. Her respiratory rate is 36 per minute with a shallow tidal volume. Her radial pulse is weak and rapid. Her skin is pale, very cool, and extremely moist. Her nail beds and fingertips are cyanotic. Her SpO<sub>2</sub> reading is 82%. Her blood pressure is 92/70 mmHg. She has a history of congestive heart failure, two previous heart attacks, and hypertension.

1. What would be the immediate emergency care provided during the primary assessment?
2. What is the respiratory status of the patient?
3. How would you manage the respiratory status of the patient?
4. What would you expect to find upon auscultation of the lungs?
5. What areas of the lungs would be most important to auscultate?
6. What would be the most effective method to increase oxygenation in the patient?

## Chapter Review

A Chapter Summary, Case Study Follow-up, In Review, and Critical Thinking questions comprise each chapter's review section, reinforcing the chapter's main points.

# A Guide to the Student Workbook

The Student Workbook (ISBN 0133371883) is a self-instructional guide, written to reinforce key concepts presented in the textbook. Every chapter includes five basic sections: Objectives, Key Ideas, Terms and Concepts, Content Review, and Case Study. Two additional sections appear as appropriate in many of the chapters. These special sections are Medical Terminology and Documentation Exercise. Medication Cards are also provided at the end of the Workbook.

## **Objectives**

Form the basis of each chapter.

## **Key Ideas**

Summarize the chapter's key concepts.

## **Terms and Concepts**

Review major terms that are introduced in bold type in the textbook chapter and are listed and defined at the end of the book.

## **Content Review**

Presents questions to review understanding of important information and concepts from the textbook chapter.

## **Case Study**

Presents one or more realistic scenarios and requires students to apply chapter information to solving patient management problems.

## **Medical Terminology**

Provides a chart of chapter-relevant medical terms that are frequently used in emergency care.

## **Documentation Exercise**

Presents a real-life emergency-call scenario that is longer and more detailed than the Case Study scenarios. This exercise includes detailed vital signs and other physical exam and patient history information that would be gathered on such a call.

## **Medication Cards**

Contain information about the medications that an EMT can administer or assist the patient in administering, with on-line or off-line approval from medical direction.

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# Emergency Medical Care Systems, Research, and Public Health

The following items provide an overview to the purpose and content of this chapter. The Standard and Competency are from the National EMS Education Standards.

**STANDARDS** • **Preparatory** (Content Areas: EMS Systems; Research); **Public Health**

**COMPETENCIES** • Applies fundamental knowledge of the EMS system, safety/well-being of the EMT, medical/legal and ethical issues to the provision of emergency care.

Uses simple knowledge of the principles of illness and injury prevention to the provision of emergency care.

**OBJECTIVES** • After reading this chapter, you should be able to:

- 1-1. Define key terms introduced in this chapter.
- 1-2. Describe the key historical events that have shaped the development of the emergency medical services (EMS) system, including:
  - a. Lessons learned in trauma care from experiences in the Korean and Vietnam conflicts
  - b. Publication of *Accidental Death and Disability: The Neglected Disease of Modern Society*
  - c. Highway Safety Act of 1966
  - d. Emergency Medical Services System Act of 1973
  - e. Public CPR courses
  - f. Publication of the *National Emergency Medical Services Education and Practice Blueprint*
  - g. Publication of *EMS Agenda for the Future* and *The EMS Education Agenda for the Future: A Systems Approach*
  - h. Development of *National EMS Core Content*, *National EMS Scope of Practice Model*, and *National EMS Education Standards*
  - i. The Institute of Medicine report *The Future of EMS Care: EMS at the Crossroads*
- 1-3. Briefly explain each of the components of the Technical Assistance Program Assessment Standards:
  - a. Regulation and policy
  - b. Resource management
  - c. Human resources and training
  - d. Transportation
  - e. Facilities
  - f. Communications
  - g. Public information and education
  - h. Medical direction
  - i. Trauma systems
  - j. Evaluation
- 1-4. Discuss the differences between 911 and non-911 EMS access systems, including the features and benefits of 911 systems.
- 1-5. Compare and contrast the scopes of practice of the following levels of EMS providers:
  - a. Emergency Medical Responder (EMR)
  - b. Emergency Medical Technician (EMT)
  - c. Advanced Emergency Medical Technician (AEMT)
  - d. Paramedic
- 1-6. Explain the importance of the EMT's understanding of the health care resources available in the community.
- 1-7. Give examples of how EMTs can carry out each of the following roles and responsibilities:
  - a. Personal safety and the safety of others
  - b. Patient assessment and emergency care
  - c. Safe lifting and moving
  - d. Transport and transfer of care
  - e. Record keeping and data collection
  - f. Patient advocacy
- 1-8. Describe the expectations of EMTs in terms of each of the following professional attributes:
  - a. Appearance
  - b. Knowledge and skills
  - c. Physical demands
  - d. Personal traits
  - e. Maintaining certification and licensure

*continued*