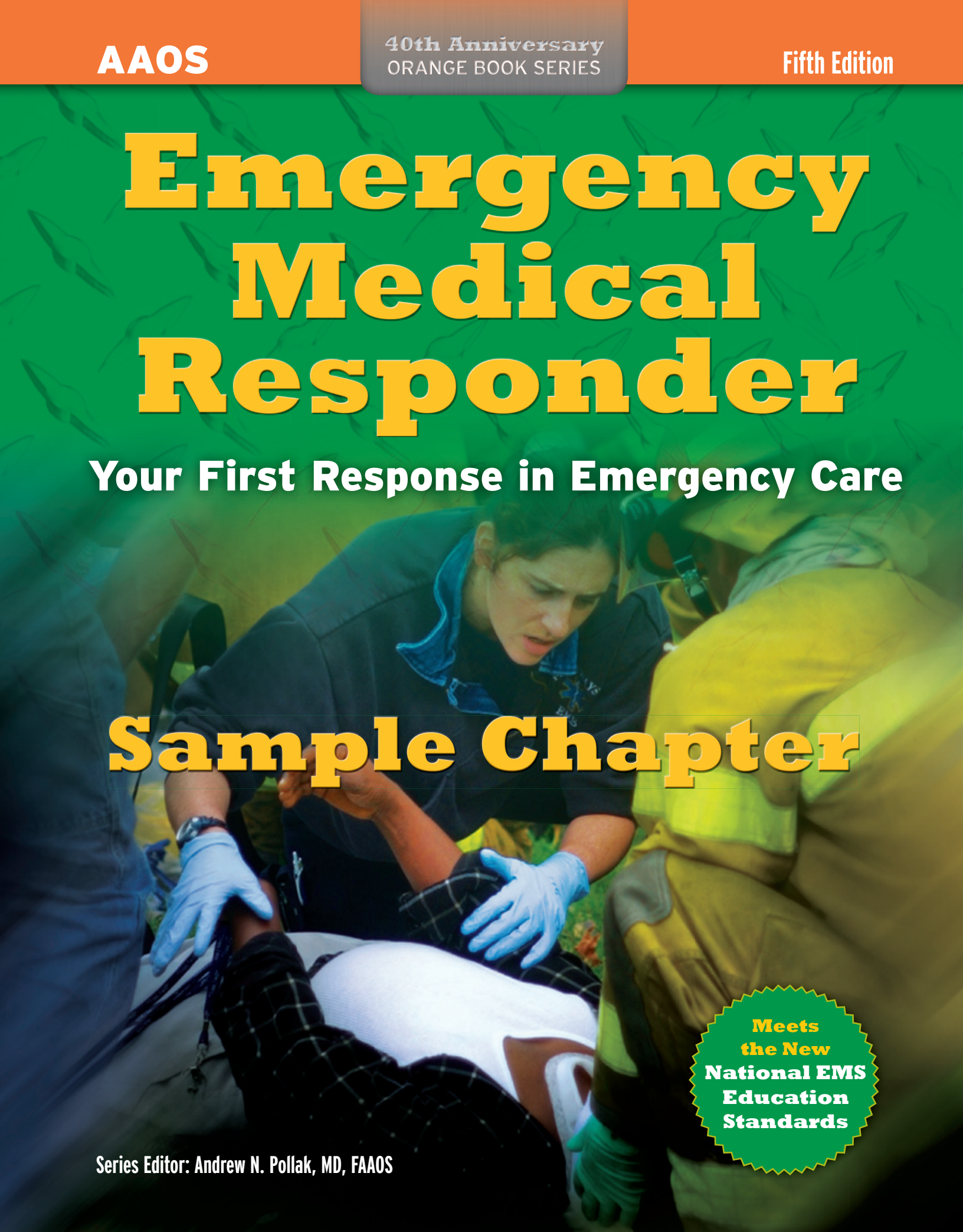
AAOS

40th Anniversary
ORANGE BOOK SERIES

Fifth Edition

Emergency Medical Responder

Your First Response in Emergency Care



Sample Chapter

Meets the New National EMS Education Standards

Series Editor: Andrew N. Pollak, MD, FAAOS

The Future of EMS Education Has Arrived!

Dear Educator,

As you know, the new *National EMS Education Standards* were approved last year by the National Highway Traffic Safety Administration. These Standards are part of a larger effort, based on the National *EMS Education Agenda for the Future,* published in 2000 at the request of National Association of State EMS Officials. The Agenda was a consensus vision of the future of EMS. It intended to promote quality and consistency among all EMS education programs and establish common entry-level requirements for the licensure of various levels of EMS providers throughout the country.

The *National EMS Education Standards* document is being used by publishers to develop new instructional materials and should guide EMS educators in designing their programs and in making decisions about the materials to use in their classrooms.

You may have noticed that the Standards are less prescriptive than the Department of Transportation's (DOT) *National Standard Curricula* that they replace. Instead of specific cognitive, affective, and psychomotor objectives, the *National EMS Education Standards* identify the depth and breadth of content and provide minimal terminal objectives for each EMS provider level. Ultimately, the new *National EMS Education Standards* allow for:

- **Increased program flexibility**—Educators can now choose to make certain modules in the Standards a prerequisite to their courses, and they may teach the material in whatever order and fashion they choose.
- **Greater creativity in program and material design**—Educators have the freedom to be more creative about how they cover content—for example, allowing students to follow a course of independent study for a particular module, rather than having the instructor lecture directly out of the training materials.
- **Better alternative delivery methods**—Alternative delivery methods will allow many options—from independent study to online learning resources.
- **Increased ability to respond to changes in medical knowledge**—Educators will have a greater ability to adapt their presentations to the latest medical information. Bleeding control and the emphasis on compressions instead of ventilations during CPR are excellent examples of where the *National Standard Curricula* was less nimble than the new *National EMS Education Standards*. As new breakthroughs in medicine occur, this knowledge can easily be incorporated into the classroom.

Many educators are trying to sort out what's really new in the *National EMS Education Standards*. First, the official names of the provider levels have changed:

- Emergency Medical Responder or EMR—formerly First Responder
- Emergency Medical Technician or EMT—no longer referred to as "Basic"
- Advanced Emergency Medical Technician or AEMT—replaces EMT-Intermediate.
- Paramedic

New patient assessment terminology is being introduced, although many educators will recognize the terms primary and secondary assessment. Some skills have been added or changed, and there is expanded cognitive material at every level, such as public health, life span development, pathophysiology, communication, medical terminology, and patients with special challenges.

Fifth Edition Table of Contents

Correlated to the *National EMS Education Standards*

Fifth Edition	National EMS Education Standards
Section 1. Preparatory	
1. EMS Systems	EMS Systems Research Public Health
2. Workforce Safety and Wellness	Workforce Safety and Wellness Infectious Diseases
3. Medical, Legal, and Ethical Issues	Medical/Legal and Ethics
4. Communication and Documentation	Documentation EMS System Communication Therapeutic Communication Medical Terminology
5. The Human Body	Anatomy and Physiology Life Span Development
Section 2. Airway	
6. Airway Management	Airway Management Respiration Artificial Ventilation Pathophysiology Respiratory
7. Professional Rescuer CPR	Shock and Resuscitation Primary Assessment Anatomy and Physiology Pathophysiology
Section 3: Patient Assessment	
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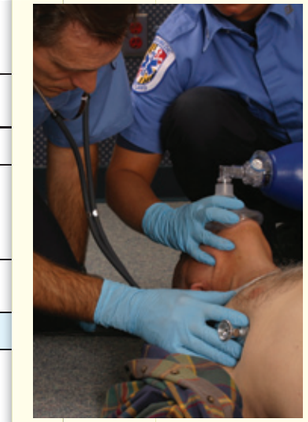
11. Behavioral Emergencies	Psychiatric Patients With Special Challenges
12. Environmental Emergencies	Environmental Emergencies



Section 5. Trauma	
13. Bleeding, Shock, and Soft-Tissue Injuries	Pathophysiology Shock and Resuscitation Bleeding Head, Facial, Neck, and Spine Trauma Chest Trauma Abdominal and Genitourinary Trauma Soft-Tissue Trauma Multi-System Trauma Immunology Diseases of the Eyes, Ears, Nose, and Throat
14. Injuries to Muscles and Bones	Orthopaedic Trauma Head, Facial, Neck, and Spine Trauma
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20. Vehicle Extrication and Special Rescue	Vehicle Extrication
21. Incident Management	Incident Management Multiple-Casualty Incidents Hazardous Materials Awareness Mass-Casualty Incidents due to Terrorism and Disaster

What Steps are the AAOS and J&B Taking to Implement the *National EMS Education Standards?*

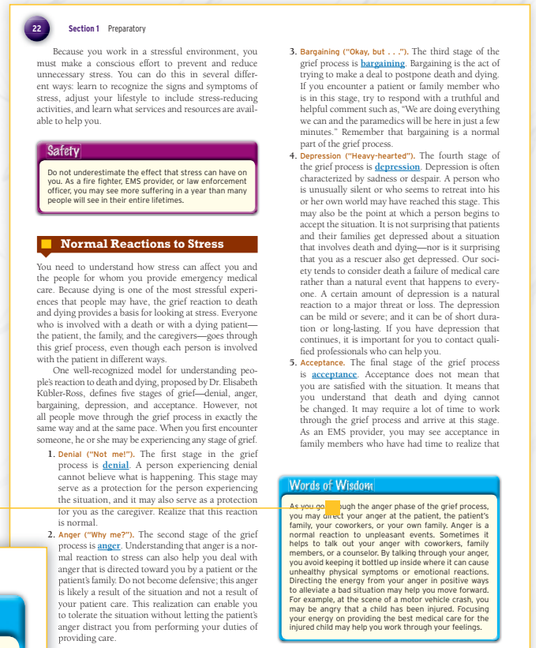
Because the Standards are less prescriptive than the DOT objectives, we have gathered a team of outstanding educators from across the country to help develop new materials for the classroom. This consensus approach to content development ensures that we publish only the best practices and nationally accepted training materials.

In addition to developing gold standard student textbooks, we are building a wide range of teaching and learning tools that will enable instructors to achieve one of the goals of the new Standards: greater individual creativity in course design. For the last several years, we have been developing technology-based products and innovative supplementary materials that allow student-directed learning and hybrid courses. Now we are taking these tools to the next level for the instructors.

The *Fifth Edition* of ***Emergency Medical Responder: Your First Response in Emergency Care*** offers instructors and students comprehensive coverage of every competency statement in the *National EMS Education Standards* in an engaging and accessible format.

Students Will Enjoy

- **A Relaxed, Readable Textbook**—When writing EMS textbooks, authors often forget who their audience really is. Some publishers may use "experts" who have little connection to the field. The *Fifth Edition* creates a learning environment in which students are comfortable with the material presented. That comfort level translates into better understanding and retention, and ultimately leads to better pass rates. This text talks *to* your students, not at them.


22 Section 1 Preparatory

Because you work in a stressful environment, you must make a conscious effort to prevent and reduce unnecessary stress. You can do this in several different ways: learn to recognize the signs and symptoms of stress, adjust your lifestyle to include stress-reducing activities, and learn what services and resources are available to help you.

Safety

Do not underestimate the effect that stress can have on you. As a fire fighter, EMS provider, or law enforcement officer, you may see more suffering in a year than many people will see in their entire lifetimes.

Normal Reactions to Stress

You need to understand how stress can affect you and the people for whom you provide emergency medical care. Because dying is one of the most stressful experiences that people may have, the grief reaction to death and dying provides a basis for looking at stress. Everyone who is involved with a death or with a dying patient—the patient, the family, and the caregivers—goes through this grief process, even though each person is involved with the patient in different ways.

One well-recognized model for understanding people's reaction to death and dying, proposed by Dr. Elisabeth Kübler-Ross, defines five stages of grief—denial, anger, bargaining, depression, and acceptance. However, not all people move through the grief process in exactly the same way and at the same pace. When you first encounter someone, he or she may be experiencing any stage of grief.

1. Denial ("Not me!"). The first stage in the grief process is denial. A person experiencing denial cannot believe what is happening. This stage may serve as a protection for the person experiencing the situation, and it may also serve as a protection for you as the caregiver. Realize that this reaction is normal.
2. Anger ("Why me?"). The second stage of the grief process is anger. Understanding that anger is a normal reaction to stress can also help you deal with anger that is directed toward you by a patient or the patient's family. Do not become defensive; this anger is likely a result of the situation and not a result of your patient care. This realization can enable you to tolerate the situation without letting the patient's anger distract you from performing your duties of providing care.
3. Bargaining ("Okay, but . . ."). The third stage of the grief process is bargaining. Bargaining is the act of trying to make a deal to postpone death and dying. If you encounter a patient or family member who is in this stage, try to respond with a truthful and helpful comment such as, "We are doing everything we can and the paramedics will be here in just a few minutes." Remember that bargaining is a normal part of the grief process.
4. Depression ("Heavy-hearted"). The fourth stage of the grief process is depression. Depression is often characterized by sadness or despair. A person who is unusually silent or who seems to retreat into his or her own world may have reached this stage. This may also be the point at which a person begins to accept the situation. It is not surprising that patients and their families get depressed about a situation that involves death and dying—nor is it surprising that you as a rescuer also get depressed. Our society tends to consider death a failure of medical care rather than a natural event that happens to everyone. A certain amount of depression is a natural reaction to a major threat or loss. The depression can be mild or severe; and it can be of short duration or long-lasting. If you have depression that continues, it is important for you to contact qualified professionals who can help you.
5. Acceptance. The final stage of the grief process is acceptance. Acceptance does not mean that you are satisfied with the situation. It means that you understand that death and dying cannot be changed. It may require a lot of time to work through the grief process and arrive at this stage. As an EMS provider, you may see acceptance in family members who have had time to realize that

Words of Wisdom

As you go through the anger phase of the grief process, you may direct your anger at the patient, the patient's family, your coworkers, or your own family. Anger is a normal reaction to unpleasant events. Sometimes it helps to talk out your anger with coworkers, family members, or a counselor. By talking through your anger, you avoid keeping it bottled up inside where it can cause unhealthy physical symptoms or emotional reactions. Directing the energy from your anger in positive ways to alleviate a bad situation may help you move forward. For example, at the scene of a motor vehicle crash, you may be angry that a child has been injured. Focusing your energy on providing the best medical care for the injured child may help you work through your feelings.

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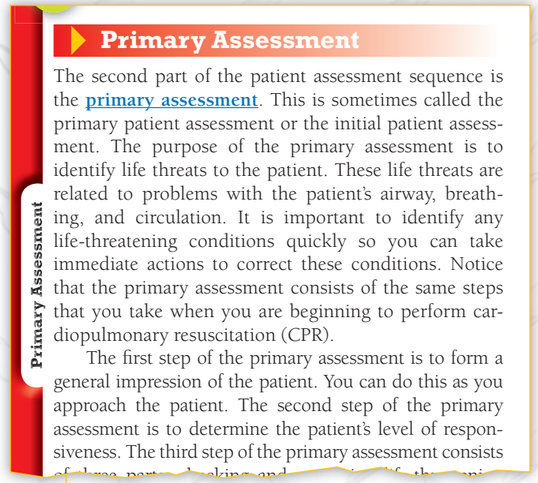
Primary Assessment

The second part of the patient assessment sequence is the primary assessment. This is sometimes called the primary patient assessment or the initial patient assessment. The purpose of the primary assessment is to identify life threats to the patient. These life threats are related to problems with the patient's airway, breathing, and circulation. It is important to identify any life-threatening conditions quickly so you can take immediate actions to correct these conditions. Notice that the primary assessment consists of the same steps that you take when you are beginning to perform cardiopulmonary resuscitation (CPR).

The first step of the primary assessment is to form a general impression of the patient. You can do this as you approach the patient. The second step of the primary assessment is to determine the patient's level of responsiveness. The third step of the primary assessment consists


168 Section 3 Patient Assessment

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Form a General Impression

As you approach the patient, form a general impression. Note the sex and the approximate age of the patient. Your scene size-up and general impressions may help determine whether the patient has experienced trauma or illness. (If you cannot determine whether the patient is experiencing an illness or has sustained an injury, treat the patient as a trauma patient.) The patient's position or the sounds he or she is making may also help indicate to you the nature of the problem. As you address the patient, you may gain some insight into the patient's level of consciousness. Although your first impression is valuable, do not let it block out later information that may lead you in another direction.

Assess the Level of Responsiveness

The first part of determining the patient's level of responsiveness is to introduce yourself. Many patients will be conscious and able to interact with you. As you approach the patient, tell the patient your name and function Figure 8-5 For example, say: "I'm Sandra Willis from the sheriff's department, and I'm here to help you." This simple introduction helps establish:

- Your reason for being at the scene
- The fact that you will be helping the patient
- The level of consciousness of the patient

The introduction is your first contact with the patient. It should put the patient at ease by conveying

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History Taking

Investigate the Chief Complaint

As you perform the primary assessment, you will often form an impression of the patient's chief complaint. It is important to acknowledge the patient's primary or chief complaint and provide reassurance Figure 8-9. A conscious patient will often report an injury that is causing him or her great pain or direct you to an injury that has obvious bleeding. However, keep in mind that this injury may not be the most serious injury the patient has sustained. Do not allow a conscious patient's comments to distract you from completing the patient assessment sequence. Acknowledge the patient's chief complaint by saying something like, "Yes, I can see that your arm appears to be broken, but let me finish checking you completely in case there are any other injuries. I will then treat your injured arm." In an unconscious patient, the primary "complaint" is unconsciousness.

The purpose of obtaining a medical history is to gather a systematic account of the patient's past medical conditions, illnesses, and injuries, to determine the events leading up to the present medical situation, and to determine the signs and symptoms of the current condition. Figure 8-10 It is important to question the patient in a clear and systematic manner to gain as much information as possible. Do not underestimate the importance of a good medical history. Physicians are taught that they can diagnose a patient's problem about 80% of the time after completing a thorough medical history. You are not expected to have the knowledge and training of a physician, but you should be able to obtain a thorough medical history from a patient. Performing a medical history is an important part of the patient assessment sequence for injured patients and for ill patients, and it will help tie together your findings from the primary assessment.

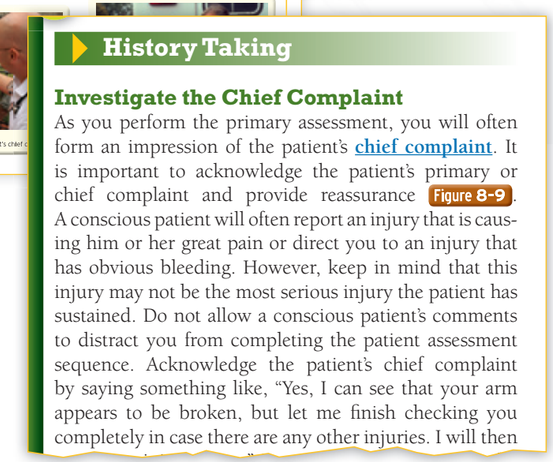
Learn the relevant facts about the patient's past medical history. Ask the patient about any serious injuries, illnesses, or surgeries. Ask the patient what prescription medicines they are currently taking. Ask them what over-the-counter medicines and herbal medicines they are taking. Find out if the patient is allergic to any medicines, foods, or seasonal allergens such as ragweed.

Obtain SAMPLE History

To obtain a patient medical history in a consistent and thorough manner, remember the acronym SAMPLE. By using this easy-to-remember acronym, you can gain the information you need about past medical history as well as the events leading to the current episode of illness or injury.

It is important to use a systematic approach when obtaining a patient's medical history. The SAMPLE history provides a framework to ask needed questions of the patient. Remember to ask the patient one question at a time. Give the patient time to answer before you ask the next question. Listen carefully and use good eye contact to let the patient know that you are listening to the response. One caregiver should be designated to ask questions to avoid confusing the patient.

- **S** Signs and symptoms. Ask the patient what signs and symptoms occurred at the beginning of the episode. Ask the patient what signs and symptoms he or she is experiencing now. Ask the patient if he or she is feeling any pain. If the patient is experiencing pain, ask him or her to describe the pain.
- **A** Allergies. Ask whether the patient is allergic to any medications or foods, or has seasonal allergies. Ask the patient to describe his or her reactions to any allergies. If the patient states that he or she has no allergies, communicate this to other EMS personnel.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- **Patient Assessment**—The *Fifth Edition* applies the unique approach of concept reinforcement to patient assessment. This critical topic is presented in a single, comprehensive chapter, ensuring that students understand patient assessment as a single, integrated process. This also allows instructors to teach patient assessment the way that students will actually practice it in the field. Recognizing the importance of assessment-based care, medical and trauma chapters revisit the patient assessment process, explaining how the process should be used with different kinds of emergencies.

Safety

It is extremely unlikely that you will contract human immunodeficiency virus/acquired immunodeficiency syndrome or hepatitis from a patient who is bleeding if you follow standard precautions.

Tourniquets

The use of tourniquets is indicated only in situations where extremity bleeding cannot be con pressure or elevation. High-velocity guns explosive devices can sever arteries in th These types of injuries result in rapid and

the military has developed and adopted several modern versions of tourniquets that use simple laws of physics to apply sufficient pressure quickly and easily to stop life-threatening bleeding. These updated tourniquets can be applied in less than 1 minute. Because the tourniquets multiply the force you place on them, they require you to use only one hand to apply.

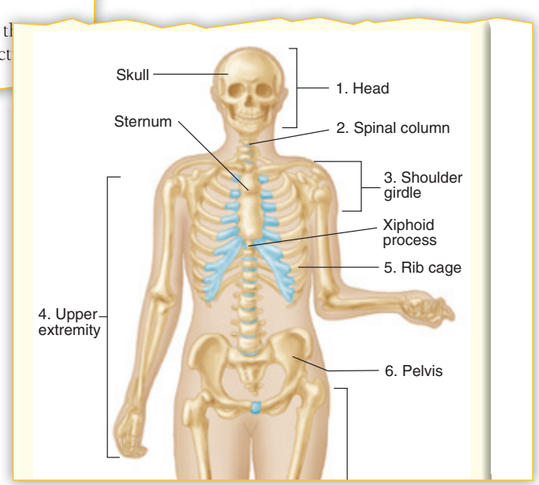
Recent medical research indicates that a tourniquet can be applied and left in place for up to 2 hours without causing significant damage to the affected limb. This means that the use of tourniquets seems to have great benefit to the patient without incurring a high risk of further damage to the limb.

The Anatomy and Function of the Musculoskeletal System

The musculoskeletal system has two parts: the skeletal system, which provides support and form for the body, and the muscular system, which provides both support and movement.

The Skeletal System

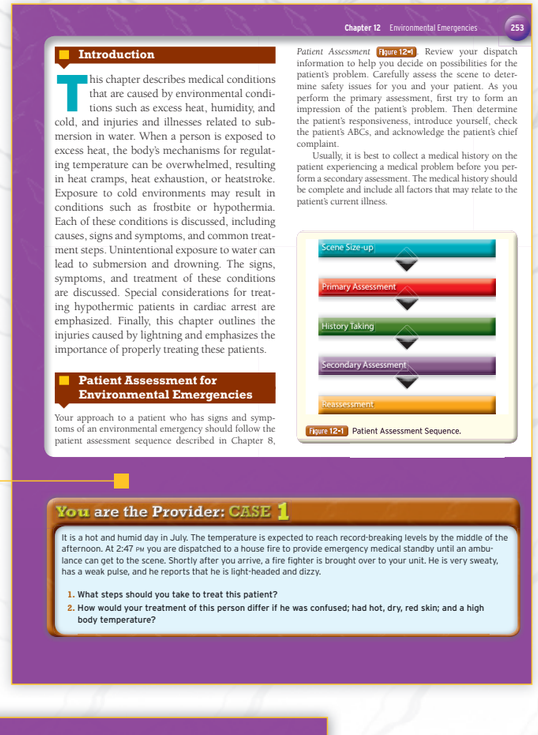
The skeletal system consists of 206 bones and is t porting framework for the body. The four funct the skeletal system are:



- **Current, State-of-the-Art Medical Content**—Medicine is constantly changing and prehospital medicine varies across states and regions. The content of the *Fifth Edition* reflects the guidance and recommendations of an extremely experienced, geographically diverse group of contributors and reviewers. Supporting the efforts of this outstanding group of authors is a team of Medical Editors from the American Academy of Orthopaedic Surgeons (AAOS). Educators in search of the gold standard in EMS education need look no further than the *Fifth Edition*.

- **Constant Reinforcement of Concepts**—Health care education can be complicated, and for many students, the EMR class is their first exposure to anatomy, physiology, medical terminology, and medical care. The *Fifth Edition* is built on the premise that students need a solid foundation in the basics and then appropriate reinforcement of that content. For example, Chapter 5, *The Human Body,* provides students with a solid understanding of the anatomy and physiology of the human body. In subsequent chapters, the text briefly revisits relevant anatomy and physiology, thus solidifying this knowledge in the students' minds and offering them a context when studying specific emergencies.

- **Clear Application of Material to Real-World EMS Situations**—Students who want to become EMRs are focused on learning to help people. They need to know why information is important to learn. "How will this help me in the field?" Through several patient case studies in each chapter, the *Fifth Edition* gives students a genuine context for the application of the knowledge presented in the chapter. This approach makes it clear how all of this new information will be used to help their patients in the field.



Introduction

This chapter describes medical conditions that are caused by environmental conditions such as excess heat, humidity, and cold, and injuries and illnesses related to submersion in water. When a person is exposed to excess heat, the body's mechanisms for regulating temperature can be overwhelmed, resulting in heat cramps, heat exhaustion, or heatstroke. Exposure to cold environments may result in conditions such as frostbite or hypothermia. Each of these conditions is discussed, including causes, signs and symptoms, and common treatment steps. Unintentional exposure to water can lead to submersion and drowning. The signs, symptoms, and treatment of these conditions are discussed. Special considerations for treating hypothermic patients in cardiac arrest are emphasized. Finally, this chapter outlines the injuries caused by lightning and emphasizes the importance of properly treating these patients.

Patient Assessment for Environmental Emergencies

Your approach to a patient who has signs and symptoms of an environmental emergency should follow the patient assessment sequence described in Chapter 8, *Patient Assessment* Figure 12-1 Review your dispatch information to help you decide on possibilities for the patient's problem. Carefully assess the scene to determine safety issues for you and your patient. As you perform the primary assessment, first try to form an impression of the patient's problem. Then determine the patient's responsiveness, introduce yourself, check the patient's ABCs, and acknowledge the patient's chief complaint.

Usually, it is best to collect a medical history on the patient experiencing a medical problem before you perform a secondary assessment. The medical history should be complete and include all factors that may relate to the patient's current illness.

Figure 12-1 Patient Assessment Sequence.

You are the Provider: CASE 1

It is a hot and humid day in July. The temperature is expected to reach record-breaking levels by the middle of the afternoon. At 2:47 PM you are dispatched to a house fire to provide emergency medical standby until an ambulance can get to the scene. Shortly after you arrive, a fire fighter is brought over to your unit. He is very sweaty, has a weak pulse, and he reports that he is light-headed and dizzy.

1. What steps should you take to treat this patient?
2. How would your treatment of this person differ if he was confused; had hot, dry, red skin; and a high body temperature?

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- ***Emergency Medical Responder, Fifth Edition*** sets the standard for quality, clarity, and flexibility in the delivery of EMR education. To learn more, visit www.jblearning.com.

Educators Will Enjoy

A Textbook That Reflects the Expertise of its Author Team—The *Fifth Edition* contributors and reviewers are seasoned EMS providers with decades of experience in both the care of prehospital patients and the education of future EMS providers. This textbook is clearly written by one of us, for all of us.

AAOS
American Academy of Orthopaedic Surgeons

Clear Application of Material to Real-World EMS Situations —Instructors will find countless opportunities to place their students "in the field" with case studies, video products that show providers in action, and case-based critical-thinking examination tools. Opportunities to apply knowledge ultimately make students better-equipped providers. And isn't that our goal: to teach students how to be great EMS providers?

You are the Provider: CASE 1

At 5:48 PM you are dispatched to a crash of two motor vehicles 2.5 miles from your location. The traffic is heavy and it takes you about 8 minutes to complete your response. As you are responding, your dispatcher informs you that the state police are on the scene and they report that one of the vehicles has rolled over multiple times. The officer requests that the medical helicopter be alerted.

1. Why is it important for you to understand the phases of an EMS call?
2. Explain the importance of learning and following helicopter safety guidelines.
3. Describe the safety considerations you need to follow when helping to load a patient into a helicopter.

Constant Reinforcement of Concepts—EMS educators are concerned about the *National EMS Education Standards* and its impact on their classrooms. The *Fifth Edition* eases any transition to the new *National EMS Education Standards*. The *Fifth Edition* is the cornerstone of a complete teaching and learning system consisting of ample resources for both student and faculty. With online resources, students and faculty are able to take practice tests, work on module assignments, and use JBTest Prep to ensure competency. Educators will enjoy the updated presentations, test banks, and Navigate. This system provides an outstanding platform for a dynamic learning environment for all students.

Technology Supplements:	Emergency Medical Responder Interactive eBook/eWorkbook CourseSmart Navigate (formerly known as JBCourse Manager) JBTest Prep Audio Book Companion Website
Instructor Supplements:	Instructor's ToolKit CD-ROM Test Bank CD-ROM
Student Supplements:	Student Workbook Patient Response Field Guide (both print and Mobile phone app)

Kidney Dialysis Patients

People with certain types of kidney disease are unable to filter waste products from their bloodstream. Many patients with chronic renal (kidney) failure must undergo a treatment called hemodialysis two or three times a week. During hemodialysis, the patient's blood passes through a machine that filters out the waste products and returns the cleansed blood to the patient. Most hemodialysis patients have a special device called a shunt implanted in their arm or leg. The shunt is a surgically created connection between an artery and a vein. The shunt is used to connect the patient to the hemodialysis machine. A shunt looks like a raised bump on the patient's arm or leg. If you have a patient who is on dialysis, find out if he or she has a shunt. If a shunt is in place, be sure to take the patient's blood pressure in the arm without the shunt to prevent damaging it.

Patients who are being treated by dialysis may experience medical emergencies related to their dialysis treatment. During or shortly after dialysis treatment, patients may experience a drop in blood pressure because of the

Current, State-of-the-Art Medical Content—EMS has long struggled to prove that the care delivered in the field has real impact on patients' lives. The *Fifth Edition* incorporates evidence-based medical concepts to ensure that students are taught assessment and treatment modalities that will help patients today—not simply recycle what has been taught year after year.

CHAPTER 6

Airway Management

National EMS Education Standard Competencies

Airway Management, Respiration, and Artificial Ventilation

Applies knowledge (fundamental depth, foundational breadth) of general anatomy and physiology to assure a patent airway, adequate mechanical ventilation, and respiration while awaiting additional EMS response for patients of all ages.

Airway Management

Within the scope of practice of the EMR:

- Airway anatomy (p 91)
- Airway assessment (pp 92–93)
- Techniques of ensuring

Respiration

- Anatomy of the respi
- Physiology and patho
  - Pulmonary ventila
  - Oxygenation (p 92)
  - Respiration (p 92)
    - External (p 91)
    - Internal (pp 91–
    - Cellular (p 92)
- Assessment and management of adequate and inadequate respiration (p 102)
- Supplemental oxygen therapy (p 119)

Artificial Ventilation

Assessment and management of adequate and inadequate ventilation

- Artificial ventilation (p 103)
- Minute ventilation (p 92)
- Alveolar ventilation (p 92)
- Effect of artificial ventilation on cardiac output (p 92)

Pathophysiology

Uses simple knowledge of shock and respiratory compromise to respond to life threats.

Medicine

Recognizes and manages life threats based on assessment findings of a patient with a medical emergency while awaiting additional emergency response.

Respiratory

Anatomy, signs, symptoms, and management of respiratory emergencies including those that affect the:

1. Upper airway (pp 102–109)
2. Lower airway (pp 102–109)

The *National EMS Education Standard Competencies* along with the chapter's Knowledge Objectives and Skills Objectives are listed at the beginning of each chapter with corresponding page references.

Knowledge Objectives

1. Identify the anatomic structures of the respiratory system and state the function of each structure. (pp 90–92)
2. State the differences in the respiratory systems of infants, children, and adults. (p 92)
3. Explain how to check a patient's level of responsiveness. (p 93)
4. Describe how to perform the head tilt-chin lift maneuver. (p 93)
5. Describe how to perform the jaw-thrust maneuver. (pp 93–95)
6. Explain how to check for fluids, solids, and dentures in a patient's mouth. (p 95)
7. List the steps needed to clear a patient's airway using finger sweeps and suction. (p 95)
8. Describe the steps required to maintain a patient's airway using the recovery position, oral airways, and nasal airways. (pp 97–102)
9. Describe how to check a patient for the presence of breathing. (p 103)
10. Describe the signs of adequate breathing, the signs of inadequate breathing, the causes of respiratory arrest, and the major signs of respiratory arrest. (p 102)
11. Describe how to perform rescue breathing using a mouth-to-mask device, a mouth-to-barrier device, mouth-to-mouth techniques, and a bag-mask device. (pp 103–109)
12. Describe, in order, the steps for recognizing respiratory arrest and performing rescue breathing in infants, children, and adults. (pp 109–112)
13. Describe the differences between the signs and symptoms of a mild airway obstruction and those of a severe or complete airway obstruction. (p 112)
14. List the steps in managing a foreign body airway obstruction in infants, children, and adults. (pp 113–117)
15. Describe the special considerations of airway care and rescue breathing in children and infants. (pp 109–110)
16. Describe the indications for using supplemental oxygen. (pp 117–118)
17. Describe the equipment used to administer oxygen. (pp 118–119)
18. Describe the safety considerations and hazards of oxygen administration. (p 119)
19. Explain the steps in administering supplemental oxygen to a patient. (p 119)
20. Describe the function and operation of a pulse oximeter. (pp 120–121)
21. List the special considerations needed to perform rescue breathing in patients with stomas. (p 121)
22. Describe the hazards that dental appliances present during the performance of airway skills. (p 123)
23. Describe the steps in providing airway care to a patient in a vehicle. (p 124)

Skills Objectives

1. Demonstrate how to check a patient's level of responsiveness. (p 93)
2. Demonstrate the head tilt-chin lift maneuver for opening blocked airways. (p 93)
3. Demonstrate the jaw-thrust maneuver for opening blocked airways. (pp 93–95)
4. Demonstrate how to check for fluids, solids, and dentures in a patient's airway. (p 95)
5. Demonstrate how to correct a blocked airway using finger sweeps and suction. (pp 95–97)
6. Demonstrate how to place a patient in the recovery position. (p 97)
7. Demonstrate the insertion of oral and nasal airways. (pp 100–101)
8. Demonstrate how to check for the presence of breathing. (p 103)
9. Demonstrate how to perform rescue breathing using a mouth-to-mask device, a mouth-to-barrier device, mouth-to-mouth, and a bag-mask device. (pp 103–109)
10. Demonstrate the steps in recognizing respiratory arrest and performing rescue breathing on an adult, a child, and an infant. (pp 109–111)
11. Demonstrate the steps needed to remove a foreign body airway obstruction in an infant, a child, and an adult. (pp 113–116)
12. Demonstrate administration of supplemental oxygen using a nasal cannula and a nonrebreathing mask. (p 120)
13. Demonstrate the operation of a pulse oximeter. (pp 120–121)
14. Demonstrate rescue breathing on a patient with a stoma. (p 121)
15. Demonstrate airway management on a patient in a vehicle. (p 124)

Introduction

This chapter introduces the two most important lifesaving skills: airway care and rescue breathing. Patients must have an open airway passage and must maintain adequate breathing to survive. By learning and practicing the simple skills in this chapter, you can often make the difference between life and death for a patient.

A review of the major structures of the respiratory system is needed before you practice airway care and rescue breathing skills. Once you learn the functions of these structures, you will have the base knowledge you need to become proficient in performing these skills.

The skills of airway care and rescue breathing are as easy as A and B—the "A" stands for airway, and the "B" stands for breathing. Because you must assess and correct the airway before you turn your attention to the patient's breathing status, it is helpful to remember the AB sequence. In Chapter 7, *Professional Rescuer CPR*, "C" will be added for the assessment and correction of the patient's circulation. As you learn the skills presented in this chapter and in Chapter 7, remember the ABC sequence. A second mnemonic that will be used throughout both this chapter and Chapter 7 is "check and correct." By using this two-step sequence for each of the ABCs, you will be able to remember the steps needed to check and correct problems involving the patient's airway, breathing, and circulation.

The "A," or airway, section presents airway skills, including how to check a patient's level of consciousness (responsiveness) and manually correct a blocked airway by using the head tilt–chin lift and jaw-thrust maneuvers. You must check the patient's airway for foreign objects. If you find a foreign object blocking the airway, you must correct the problem and remove the object by using either a manual technique or a suction device. You will learn when and how to use oral and nasal airways to keep the patient's airway open.

The "B," or breathing section, describes how to check patients to determine whether they are breathing adequately. You will learn how to correct breathing problems by using four rescue breathing techniques: mouth-to-mask, mouth-to-barrier device, bag-mask device, and mouth-to-mouth. You will learn the indications for using supplemental oxygen and how to administer supplemental oxygen using a nasal cannula and a nonrebreathing mask.

You will also learn how to check patients to determine whether they have an airway obstruction that can cause death in only a few minutes. You will learn how to correct this condition using manual techniques that require no special equipment.

Remember that patients with airway problems will likely be extremely anxious during the episode. It is your responsibility as an EMR to treat these patients and their families with compassion while you provide care.

As you study this chapter, remember the check-and-correct process for both airway and breathing skills. Do not forget that the A and B skills presented in this chapter will be followed by C (for circulation) skills in Chapter 7. After you have learned the airway, breathing, and circulation skills (the ABCs), you will be able to perform cardiopulmonary resuscitation (CPR). CPR is used to save the lives of people who are experiencing cardiac arrest.

Anatom… the Res…

To maintain life, …stant supply of certai… …basic life-sustaining su… …n.

Four independent case studies in each chapter capture the student's attention and offer an authentic context for students to apply their knowledge.

You are the Provider: CASE 1

At 7:43 PM you are dispatched to an apartment complex for the report of a 67-year-old woman who is sick. As you are responding to the scene, your dispatcher informs you that the patient's husband states that the woman is now unresponsive. When you arrive at the apartment, the patient's husband tells you that his wife became dizzy shortly after taking a new medicine ordered by her doctor. As you approach the woman you ask if she can hear you. She does not respond. You gently shake the patient's shoulder and get no response.

1. What is the next step you should take to assess and treat this patient?
2. How would your method of opening the patient's airway change if the patient had fallen or blacked out?
3. What techniques can you use to maintain an open airway?

A person can live several weeks without food because the body can use nutrients it has stored. Although the body does not store as much water, it is possible to live several days without fluid intake. However, lack of oxygen, even for a few minutes, can result in irreversible damage and death.

The most sensitive cells in the human body are in the brain. If brain cells are deprived of oxygen and nutrients for 4 to 6 minutes, they begin to die. Brain death is followed by the death of the entire body. Once brain cells have been destroyed, they cannot be replaced. This is why it is important for you to understand the anatomy and function of the respiratory system and the critical role it plays in supporting life.

The main purpose of the respiratory system is to provide oxygen and to remove carbon dioxide from the red blood cells as they pass through the lungs. This action forms the basis for your study of the lifesaving skill of CPR.

The parts of the body used in breathing are shown in Figure 6-1 and include the mouth (oropharynx), the nose (nasopharynx), the throat, the trachea (windpipe), the lungs, the diaphragm (the dome-shaped muscle between the chest and the abdomen), and numerous chest muscles (including the intercostal muscles). Air enters the body through the nose and mouth. In an unconscious patient lying on his or her back, the passage of air through both nose and mouth may be blocked by the tongue Figure 6-2.

The tongue is attached to the lower jaw (mandible). When a person loses consciousness, the jaw relaxes and the tongue falls backward into the rear of the mouth, effectively blocking the passage of air from both the nose and the mouth to the lungs. A partially blocked airway often produces a snoring sound. At the back of the throat are two passages: the esophagus (the tube through which food passes) and the trachea. The epiglottis is a thin flapper valve that allows air to enter the trachea but helps prevent food or water from entering the airway. Air passes from the throat to the larynx (voice box), which can be seen externally as the Adam's apple in the front of the neck. Below the trachea, the airway divides into the bronchi (two large tubes supported by cartilage). The bronchi branch… …n the

Reinforcement of the anatomy and physiology presented in Chapter 5, *The Human Body* occurs throughout the text.

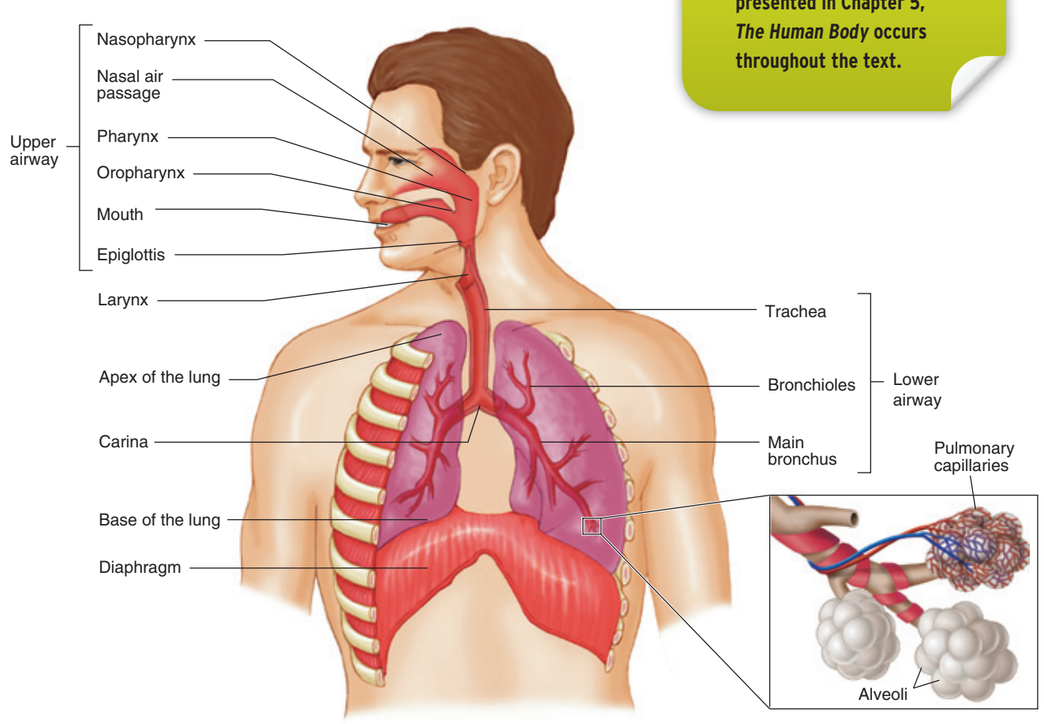


Figure 6-1 Anatomy of the respiratory system.

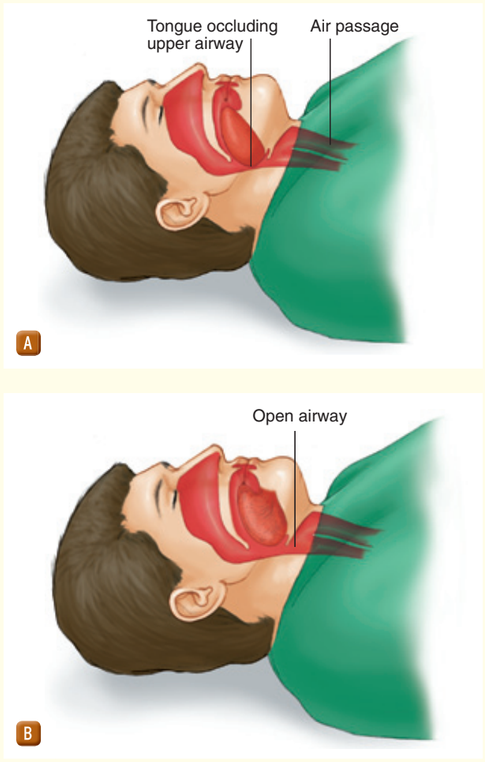


Figure 6-2 In an unconscious patient, the airway may be (**A**) blocked by the tongue or (**B**) an open airway.

lungs. The lungs a art and are protected b dy and by the rib cage

The smaller air are called bronchioles. acs called alveoli. The all blood vessels, the of gases takes place a tes the capillaries of ve- oli of the lungs Fig sses from the alveoli in g carbon dioxide passes from the blood into the alveoli. The exchange of oxygen and carbon dioxide that occurs in the alveoli is called alveolar ventilation. The amount of air pulled into the lungs and removed from the lungs in one minute is called minute ventilation.

When a patient is not breathing, artificial ventilation is necessary to supply oxygen to the heart and the rest of the body. During CPR, the blood flowing out of the heart (cardiac output) depends on the oxygen supplied by artificial ventilation.

Key terms are easily identified and defined within the text. A vocabulary list concludes each chapter, and a comprehensive glossary appears at the end of the textbook.

The lungs consist of soft, spongy tissue with no muscles. Therefore, movement of air into the lungs depends on movement of the rib cage and the diaphragm. As the rib cage expands, air is drawn into the lungs through the trachea. The diaphragm, a muscle that separates the abdominal cavity from the chest, is dome shaped when it is relaxed. When the diaphragm contracts during inhalation, it flattens and moves downward. This action increases the size draws air into the lungs th lation, the diaphragm rela dome shaped. In normal bre of the diaphragm and the ri adequate inhalation and exh

Discusses the specific needs and emergency care of pediatric patients, geriatric patients, and special needs patients.

Special Populations

- The structures of the respiratory systems in children and infants are smaller than they are in adults. Therefore, the air passages of children and infants may be more easily blocked by secretions or by foreign objects.
- In children and infants, the tongue is proportionally larger than it is in adults. Therefore, the tongue of these smaller patients is more likely to block the airway than it would in an adult patient.
- Because the trachea of an infant or child is more flexible than that of an adult, it is more likely to become narrowed or blocked than that of an adult.
- The head of a child or an infant is proportionally larger than the head of an adult. You will have to learn slightly different techniques for opening the airways of children.
- Children and infants have smaller lungs than adults. You need to give them smaller breaths when you perform rescue breathing.
- Most children and infants have healthy hearts. When a child or infant experiences cardiac arrest (stoppage of the heart), it is usually because the patient has a blocked airway or has stopped breathing, not because there is a problem with the heart.

"A" Is for Airway

The patient's airway is the pipeline that transports life-giving oxygen from the air to the lungs and transports the waste product, carbon dioxide, from the lungs to the air. In healthy people, the airway automatically stays open. An injured or seriously ill person, however, may not be able to protect the airway and it may become blocked.

If a patient cannot protect his or her airway, you must take certain steps to check the condition of the patient's airway and correct the problem to keep the patient alive.

Check for Responsiveness

The first step you will take in assessing a patient's airway is to check the patient's level of responsiveness.

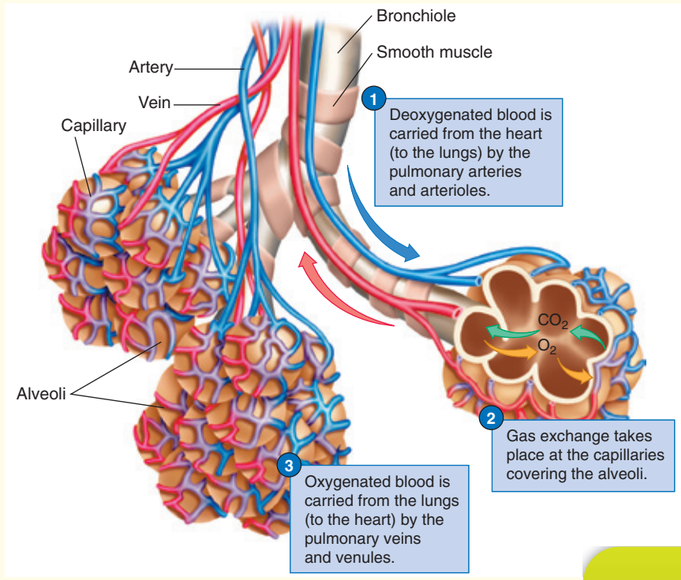


Figure 6-3 The exchange of gases occurs in the alveoli of the lungs.

Highly descriptive and detailed illustrations enable the student to clearly visualize human anatomy.

When you first approach a patient, you can immediately determine whether the patient is responsive (conscious) or unresponsive (unconscious) by asking, "Are you okay? Can you hear me?" Figure 6-5. If you get a response, you can assume that the patient is conscious and has an open airway.

If you do not get a response, grasp the patient's shoulder and gently shake the patient. Then repeat your questions. If the patient still does not respond, you can assume that the patient is unconscious and that you will need more help. Before doing anything for the patient, call 9-1-1 ("phone first") if the EMS system has not already been activated, especially if you are the only rescuer. Position the patient by supporting the patient's head and neck and placing the patient on his or her back.

Treatment

Steps in airway assessment:

- Check for responsiveness.
- Correct the blocked airway using the head tilt-chin lift or jaw-thrust maneuver.
- Check the airway for fluids, foreign bodies, or dentures.
- Correct the airway using finger sweeps or suction.
- Maintain the airway manually, with an oral or nasal airway, or place the patient in the recovery position (explained later in this chapter).

Correct the Blocked Airway

An unconscious patient's airway is often blocked (occluded) because the tongue has dropped back and is obstructing it. In this case, simply opening the airway with the head tilt–chin lift or jaw-thrust maneuver may enable the patient to breathe spontaneously.

Head Tilt–Chin Lift Maneuver

To open a patient's airway using the head tilt–chin lift maneuver, place one hand on the patient's forehead and place the fingers of your other hand under the bony part of the lower jaw near the chin. Push forehead and lift d on the chin rtain you are not he mouth closed is maneuver. head tilt–chin lift man

1. Place the patient on his or her back and kneel beside the patient.
2. Place one hand on the patient's forehead and apply firm pressure backward with your palm. Move the patient's head back as far as possible.
3. Place the tips of the fingers of your other hand under the bony part of the lower jaw near the chin.
4. Lift the chin forward to help tilt back the head.

Jaw-Thrust Maneuver

The jaw-thrust maneuver is another way to open a patient's airway. If a patient was injured in a fall, diving mishap, or automobile crash and has a suspected neck injury, tilting the head may cause permanent paralysis. If you suspect a neck injury, first try to open the airway using the jaw-thrust maneuver. Open the airway by placing your fingers under the angles of the jaw and pushing upward. At the same time, use your thumbs to open the mouth slightly. The jaw-thrust maneuver should open the airway without extending the neck Figure 6-7.

Safety

Use standard precautions whenever you may be in contact with body secretions that might contain blood.

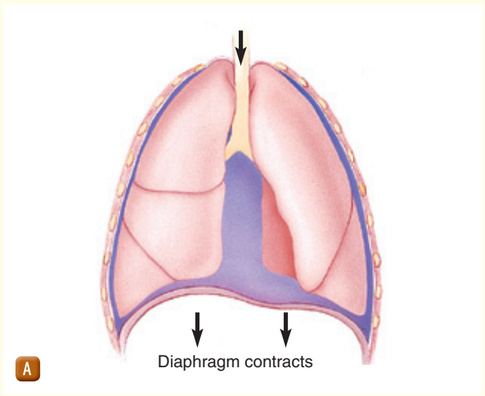


Figure 6-4 Normal mechanical act of breathing. **A.** Inhalation. **B.** Exhalation.

Figure 6-5 Establish the level of consciousness.

Figure 6-6 Open the patient's airway using the head tilt-chin lift maneuver.

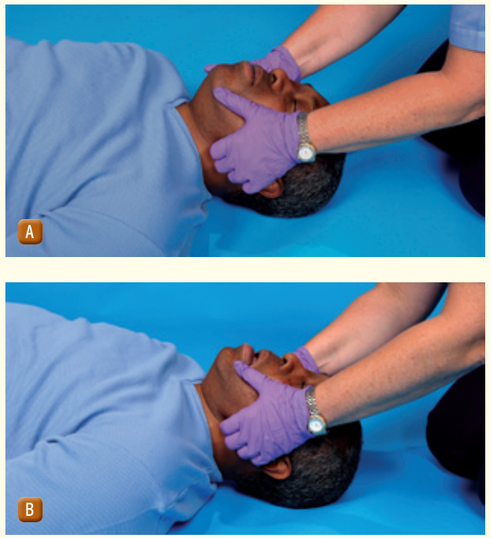


Figure 6-7 The jaw-thrust maneuver should open the patient's airway without extending the neck. **A.** Kneeling above the patient's head, place your fingers behind the angles of the lower jaw and move the jaw upward. Use your thumbs to help position the lower jaw. **B.** The completed maneuver should look like this.

Follow these steps to perform the jaw-thrust maneuver:

1. Place the patient on his or her back and kneel at the top of the patient's head. Place your fingers behind the angles of the patient's lower jaw and move the jaw forward with firm pressure.
2. Tilt the head backward to a neutral or slight sniffing position. Do not extend the cervical spine in a patient who has sustained an injury to the head or neck.
3. Use your thumbs to pull down the patient's lower jaw, opening the mouth enough to allow breathing through the mouth and nose.

If you are not able to open the patient's airway using the jaw-thrust maneuver, try the head tilt–chin lift maneuver as a secondary attempt to open the patient's airway.

Check for Fluids, Foreign Bodies, or Dentures

After you have opened the patient's airway by using either the head tilt–chin lift or the jaw-thrust maneuver, look in the patient's mouth to see if anything is blocking the patient's airway. Potential blocks include secretions, such as vomitus, mucus, or blood; foreign objects, such as candy, food, or dirt; and dentures or false teeth that may have become dislodged and are blocking the patient's airway. If you find anything in the patient's mouth, remove it by using one of the techniques noted in the following sections. If the patient's mouth is clear, consider using one of the devices described in the section on airway devices.

Correct the Airway Using Finger Sweeps or Suction

Vomitus, mucus, blood, and foreign objects must be cleared from the patient's airway. This can be done by using finger sweeps, suctioning, or by placing the patient in the recovery position.

Finger Sweeps

Finger sweeps can be done quickly and require no special equipment except a set of medical gloves. To perform a finger sweep, follow the steps in Skill Drill 6-1:

Skill Drill 6-1

1. Turn the patient onto his or her side (Step 1).
2. Insert your gloved fingers into the patient's mouth (Step 2).
3. Curve your fingers into a C-shape and sweep them from one side of the back of the mouth to the other side (Step 3). Scoop out as much of the material as possible. A gauze pad wrapped around your gloved fingers may help remove the obstructing materials. Repeat the finger sweeps until you have removed all the foreign material in the patient's mouth. Finger sweeps should be your first attempt at clearing the airway even if suction equipment is available.

Suctioning

Sometimes just sweeping out the mouth with your fingers is not enough to clear the materials completely from the patient's mouth and upper airway. Suction machines can be helpful in removing secretions such as vomitus, blood, and mucus from the patient's mouth. Two types of suction devices are available: manual and mechanical. Suctioning the airway (either manually or mechanically) is a lifesaving technique. Although a gauze pad and your gloved fingers can do most of the work, the use of supplementary suction devices enables you to remove a greater [illegible]m the patient's airway.

Reinforces safety for both the EMR and the patient.

Safety

If the possibility of a spinal cord injury exists, be sure to log roll the patient onto his or her side and keep the head, neck, and spine aligned. Open the mouth and use your gloved fingers in the same manner to clean out the mouth.

Manual Suction Devices Several manual suction devices are available to EMRs Figure 6-8. These devices are relatively inexpensive and are compact enough to fit into EMR life support kits. With most manual suction devices, you insert the end of the suction tip into the patient's mouth and squeeze or pump the hand-powered pump. Be sure that you do not insert the tip of the suction device farther than you can see. Manual suction devices are used in the same way as the mechanical suction devices described in the following section. The only difference is the power source. Be sure to follow local medical protocols on authorization to use suction devices in the field.

Figure 6-8 Manual suction device.

Mechanical Suction Devices A mechanical suction device uses either a battery-powered pump or an oxygen-powered aspirator to create a vacuum that will draw the

Skill Drill 6-1

Clearing the Airway Using Finger Sweeps

Step 1 Turn the patient onto his or her side.

Step 2 Insert your fingers into the patient's mouth.

Step 3 Curve your fingers into a C-shape and sweep them from one side of the back of the mouth to the other side.

obstructing materials from the patient's airway Figure 6-9. Usually, both a rigid suction tip and a flexible whistle-tip catheter can be used with mechanical suction devices. To use this type of suction machine, you must first learn how to operate the device and control the force of the suction. When using mechanical suction, first clear the patient's mouth of large pieces of material with your gloved fingers. After the mouth is clear, turn on the suction device and use the rigid tip to remove most of the remaining material Figure 6-10. Do not suction for more than 15 seconds at a time because the suction draws air out of the patient's airway, as well as any obstructing material. If the rigid tip has a suction control port (a small hole located close to the tip's handle), place a finger over the hole to create the suction. Do not keep your finger over this control port for longer than 15 seconds at a time because you may rob the patient of oxygen.

Figure 6-9 Battery-powered suction device.

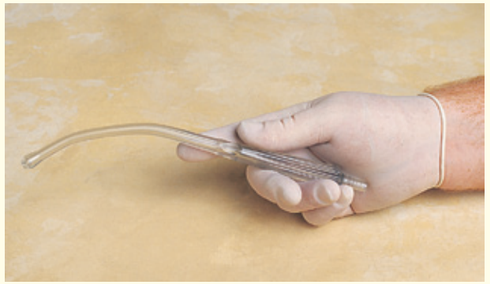


Figure 6-10 Rigid suction tip.

After you have cleared most of the obstructing material out of the patient's mouth and upper airway with the rigid tip, change to the flexible tip and clear out material from the deeper parts of the patient's throat Figure 6-11. Flexible whistle-tip catheters also have suction control ports, which are located close to the end of the catheter that attaches to the suction machine. Again, place a finger over the control port to achieve suction.

Safety

Do not suction any deeper than you can see into the patient's mouth.

Special Populations

- Do not suction a child's airway longer than 10 seconds at a time.
- Do not suction an infant's airway longer than 5 seconds at a time.

Maintain the Airway

If your patient is unable to keep his or her airway open, you must open the airway manually. You have learned how to do this by using the head tilt–chin lift or jaw-thrust maneuver to open the airway. Unconscious patients will not be able to keep their airway open. You can continue to keep the airway open by using the head tilt–chin lift or jaw-thrust maneuver. To accomplish this, you must continue holding the patient's head to maintain the head tilt–chin lift or the jaw-thrust position.

If the patient is breathing adequately, you can keep the airway open by placing the patient in the recovery position. You can also insert an oral or nasal airway to keep the patient's airway open. These two mechanical airway devices will maintain the patient's airway after you have opened it manually.

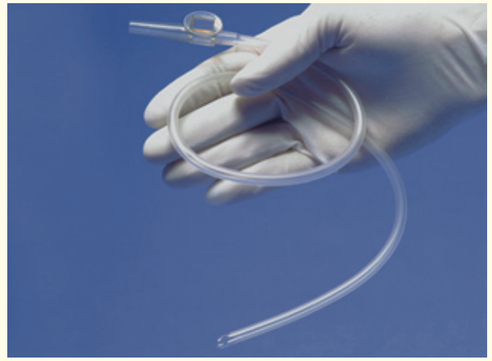


Figure 6-11 Flexible suction catheter.

Treatment

Do not forget to ventilate all patients who are not breathing.

Recovery Position

If an unconscious patient is breathing and has not sustained trauma, one way to keep the airway open is to place the patient in the recovery position Figure 6-12. The recovery position helps keep the patient's airway open by allowing secretions to drain out of the mouth instead of draining into the trachea. It also uses gravity to help keep the patient's tongue and lower jaw from blocking the airway.

To place a patient in the recovery position, carefully roll the patient onto one side, as you support the patient's head. Roll the patient as a unit without twisting the body. You can use the patient's hand to help hold his or her head in the proper position. Place the patient's face on its

Figure 6-12 Recovery position for an unconscious patient.

Voices of Experience

Often we forget that proper spinal immobilization is a critical part of airway control. Let me explain. I was nearly killed in a logging accident on December 13, 1983, while cutting large pine trees for a saw mill. I suffered multiple fractures and other injuries when a 65′ tall tree fell on me. I was transported by the ambulance being towed through the mud and snow with a log skidder, and then driven a few miles on icy roads to the ER. This was just a few years before I was to become a paramedic—in fact, this accident is what sparked my interest in becoming an emergency medical responder.

> **"The way I was immobilized on the spine board was actually making my injuries worse."**

To make a long story short, my chief complaint changed en route to the hospital from pain in my legs, arms, and chest to pain on the back of my head and difficulty breathing and swallowing. I couldn't keep the blood out of my airway. My face was badly lacerated and a couple of teeth had sheared off when the chainsaw came up into my face as the tree slammed me to the ground. Why did my head hurt so much after being put on a long backboard? Why was it so hard to breathe and swallow, making me feel like I was constantly choking? The way I was immobilized on the spine board was actually making my injuries worse.

Tape was placed over my head, pulling the back of my skull tightly against the hard surface of the spine board, each jar and bump driving my head harder into the board. Imagine how much worse this would be for a trauma patient with gravel or broken glass embedded in their hair pushing into their skull as well. Not only does this position hurt, it also makes it hard to breathe and to control your own airway.

The standard of care where I work now is to pad the back of the patient's head to align the "hole in the ear," called the external meatus, with the anterior shoulder. For pediatric patients we use the same alignment landmarks, but often the padding needs to be behind the body and not the head. Even then, some padding is added behind the head for comfort. When swallowing is easier, the patient's airway remains clear; breathing is easier and more effective. Pain and anxiety is decreased, lowering adrenaline release and decreasing both heart rate and oxygen demand. If ALS needs to install an advanced airway later, it will be much easier with the trachea aligned properly.

By being a patient, I learned this valuable lesson. Hopefully you won't have to be a patient to learn it too.

Kent Courtney, NREMT
EMS Instructor
Peabody Western Coal Company
Kayenta, Arizona

Veteran EMS providers share accounts of memorable incidents and offer advice and encouragement.

side so any secretions drain out of the mouth. The head should be in a position similar to the tilted back position of the head tilt–chin lift maneuver.

Safety

Use standard precautions when clearing the patient's airway.

Airway Adjuncts

This section discusses the indications for the use of oral airways and nasal airways and the steps required for the proper insertion of each.

Oral Airway

An oral airway has two primary purposes: It is used to maintain the patient's airway after you have manually opened the airway, and it functions as a pathway through which you can suction the patient Figure 6-13. Oral airways can be used for unconscious patients who are breathing or who are in respiratory arrest (sudden stoppage of breathing). An oral airway can be used in any unconscious patient who does not have a gag reflex. Oral airways cannot be used in conscious patients because they have a gag reflex. These airways are used with mechanical breathing devices such as a pocket mask or a bag-mask device.

List key signs and symptoms of the relevant illness or injury.

Signs and Symptoms

Signs and symptoms of respiratory arrest:
- No chest movement
- No breath sounds
- No air movement
- Blue skin (cyanosis), especially around the lips

There are two styles of oral airways: One style has an opening down the center, and the other has a slot along each side. The opening or slot permits the free flow of air and allows you to suction through the airway. Before you insert the oral airway, you need to select the proper size. Choose the proper size by measuring from the earlobe to the corner of the patient's mouth. When properly inserted, the airway will rest inside the mouth. The curve of the airway should follow the contour of the tongue. The flange should rest against the lips. The other end should be resting in the back of the throat.

Figure 6-13 Oral airways.

Follow these steps to insert an oral airway Skill Drill 6-2:

Skill Drill 6-2

1. Select the proper size airway by measuring from the patient's earlobe to the corner of the mouth Step 1.
2. Open the patient's mouth with one hand after manually opening the patient's airway with a head tilt–chin lift or jaw-thrust maneuver.
3. Hold the airway upside down with your other hand. Insert the airway into the patient's mouth and guide the tip of the airway along the roof of the patient's mouth, advancing it until you feel resistance Step 2.
4. Rotate the airway 180° until the flange comes to rest on the patient's teeth or lips Step 3.

Special Populations

The roof of a child's mouth is more fragile than that of an adult. This means you must be especially careful to avoid injuring it as you insert the oral airway. The technique for inserting an oral airway in a child is almost the same as for an adult patient. However, to make it easier to insert the airway, use two or three stacked tongue blades and depress the tongue. This will press the tongue forward and away from the roof of the mouth so you can insert the airway.

Be especially careful when you insert the airway. You could injure the roof of the patient's mouth by the rough insertion of an oral airway. Remember that an oral airway does not open the patient's airway. It will maintain the open airway after you have opened it with a manual technique.

Nasal Airway

A second type of device you can use to keep the patient's airway open is a nasal airway Figure 6-14. This device is inserted into the patient's nose. Nasal airways can be used in both unconscious and conscious patients who are not

Skill Drill 6-2

Inserting an Oral Airway

Step 1 Size the airway by measuring from the patient's earlobe to the corner of the mouth.

Step 2 Insert the oral airway upside down along the roof of the patient's mouth until you feel resistance.

Step 3 Rotate the airway 180° until the flange comes to rest on the patient's lips or teeth.

Figure 6-14 Nasal airways.

able to maintain an open airway. Usually a patient will tolerate a nasal airway better than an oral airway. It is not as likely to cause vomiting. One disadvantage of a nasal airway is that you cannot suction through it because the inside diameter of the airway is too small for the standard whistle-tip catheter suction tip.

You will have to select the proper size nasal airway for the patient. Measure from the earlobe to the tip of the patient's nose. Coat the airway with a water-soluble lubricant before inserting it. This makes it easier for you to insert the airway and reduces the chance of causing trauma to the patient's airway. Insert the airway in the larger nostril. As you insert the airway, follow the curvature of the floor of the nose. The airway is fully

inserted when the f…e patient's nostril. At t…y will reach the back …n airway for the patien…

- **Offer additional treatment information or reinforce treatment information provided in the text.**

Treatment

If a patient has sustained severe head trauma, there is a chance that a nasal airway may further damage the brain with insertion of the airway. You should check with your local medical control to determine the protocol for using a nasal airway in patients with head trauma.

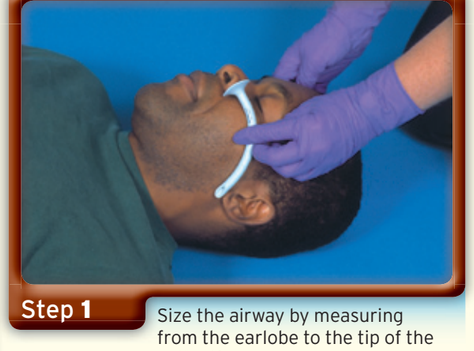
Follow these steps to insert a nasal airway (Skill Drill 6-3):

Skill Drill 6-3

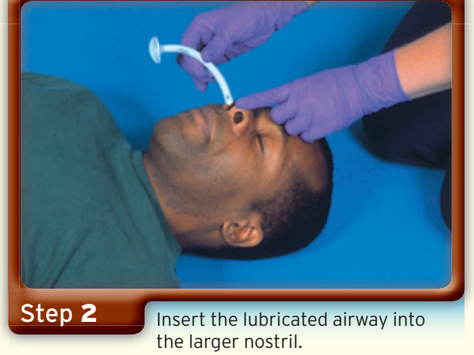
1. Select the proper size airway by measuring from the earlobe to the tip of the patient's nose (Step 1).
2. Coat the airway with a water-soluble lubricant.
3. Select the larger nostril.
4. Gently stretch the nostril open by using your thumb.

Skill Drill 6-3

Inserting a Nasal Airway



Step 1 Size the airway by measuring from the earlobe to the tip of the patient's nose.



Step 2 Insert the lubricated airway into the larger nostril.

Step 3 Advance the airway until the flange rests against the nose.

5. Gently insert the airway until the flange rests against the nose (Step 2) and (Step 3). Do not force the airway. If you feel any resistance, remove the airway and try to insert it in the other nostril.

Treatment

To open the patient's airway:

1. Perform the head tilt-chin lift maneuver, or
2. Perform the jaw-thrust maneuver.

To maintain the patient's airway:

1. Continue to apply the head tilt-chin lift or jaw-thrust maneuver, and
   A. Insert an oral airway, or
   B. Insert a nasal airway
2. Place the patient in the recovery position.

After you open and maintain the patient's airway, you need to continue to monitor the status of the patient's breathing.

"B" Is for Breathing

After you have checked and corrected the patient's airway, you will next check and correct the patient's breathing. To do this, you must understand the signs of adequate breathing, the signs of inadequate breathing, and the signs and causes of respiratory arrest.

Signs of Adequate Breathing

You will use the look, listen, and feel technique to assess if an unconscious patient is breathing adequately. In using this technique, you look for the rise and fall of the patient's chest, listen for the sounds of air passing into or out of the patient's nose and mouth, and feel the air moving on the side of your face. Place the side of your face close to the patient's nose and mouth and watch the patient's chest. By positioning yourself in this way, you can look for chest movements, listen for the sounds of air moving, and feel the air as it moves in and out of the patient's nose and mouth.

A normal adult has a resting breathing rate of approximately 12 to 20 breaths per minute. Remember that one breath includes both an inhalation and an exhalation.

Signs of Inadequate Breathing

If a patient is breathing inadequately, you will detect signs of abnormal respirations. Sounds such as noisy respirations, wheezing, or gurgling indicate a partial blockage or constriction somewhere along the respiratory tract. Rapid or gasping respirations may indicate that the patient is not receiving an adequate amount of oxygen as a result of illness or injury. The patient's skin may be pale or even blue, especially around the lips or fingernail beds.

The most critical sign of inadequate breathing is respiratory arrest (total lack of respirations). This critical state is characterized by a lack of chest movements, lack of breath sounds, and lack of air against the side of your face. In patients with severe hypothermia, respirations can be slowed (and/or shallow) to the point that the patient does not appear to be breathing.

There are many causes of respiratory arrest. A common cause is heart attack, which claims more than 500,000 lives each year in the United States. Other major causes of respiratory arrest include:

- Mechanical blockage or obstruction caused by the tongue
- Vomitus, particularly in a patient weakened by a condition such as a stroke
- Foreign objects such as broken teeth, dentures, balloons, marbles, pieces of food, or pieces of hard candy (especially in small children)
- Illness or disease
- Drug overdose
- Poisoning
- Severe loss of blood
- Electrocution by electrical current or lightning

You are the Provider: CASE 2

You are sent to the scene of a college fraternity party for a report of a 19-year-old boy who has suddenly stopped breathing. His friends frantically started CPR and continue to do so as you walk in the door. You take over CPR while your partner begins to unload your gear. After assessing the patient to make sure that he is not choking, you ask your partner for an oral airway. She hands you one from the medical kit.

1. What should you do before attempting to insert the airway?
2. What are the benefits of using an oral airway?
3. What should you do if the patient starts choking after the airway has been inserted?

Check for the Presence of Breathing

After establishing the loss of consciousness and opening the airway of the unconscious patient, check for breathing by looking, listening, and feeling (Figure 6-15):

- Look for the rising and falling of the patient's chest.
- Listen for the sound of air moving in and out of the patient's nose and mouth.
- Feel for the movement of air on the side of your face and ear. Continue to look, listen, and feel for at least 5 seconds; if you do not observe the patient for an adequate amount of time, you run the risk of checking between breaths and missing any signs of breathing that are present. Your breathing check should take no more than 10 seconds. If there are no signs of breathing, proceed to the next step and correct the lack of breathing by beginning rescue breathing. If the patient is breathing adequately (about 12 to 20 breaths per minute with adequate depth), you can continue to maintain the airway and monitor the rate and depth of respirations to ensure that adequate breathing continues.

Correct the Breathing

You must breathe for any patient who is not breathing. As you perform **rescue breathing**, keep the patient's airway open by using the head tilt–chin lift maneuver (or the jaw-thrust maneuver for patients with potential head or neck injuries). To perform rescue breathing, pinch the patient's nose with your thumb and forefinger, take a deep breath, and blow slowly into the patient's mouth for 1 second (Figure 6-16). Use slow, gentle, sustained breathing and just enough breath to make the patient's chest rise. This minimizes the amount of air blown into the stomach. Remove your mouth and allow the lungs to deflate. Breathe for the patient a second time. After these first two breaths, breathe once into the patient's mouth every 5 to 6 seconds. The rate of breaths should be 10 to 12 per minute for an adult.

Rescue breathing can be done by using a mouth-to-mask device, a barrier device, a bag-mask device, or just your mouth. The mouth-to-mask, barrier devices, and bag-mask devices prevent you from putting your mouth directly on the patient's mouth. These devices should be available to you as an EMR. If a rescue breathing device is not available, you must weigh the potential good to the patient against the limited chance that you will contract an infectious disease if you perform mouth-to-mouth rescue breathing.

Mouth-to-Mask Rescue Breathing

Your EMR life support kit should contain an artificial ventilation (breathing) device that enables you to perform rescue breathing without mouth-to-mouth contact with the patient. This simple piece of equipment is called a mouth-to-mask ventilation device. A mouth-to-mask ventilation device consists of a mask that fits over the patient's face, a one-way valve, and a mouthpiece through which the rescuer breathes (Figure 6-17). It may also have an inlet port for supplemental oxygen and a tube between the mouthpiece and the mask. Because mouth-to-mask devices prevent direct contact between you and the patient, they reduce the risk of transmitting infectious diseases.

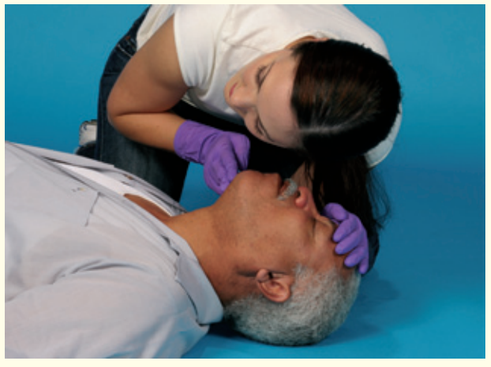


Figure 6-15 Check for breathing by looking, listening, and feeling.

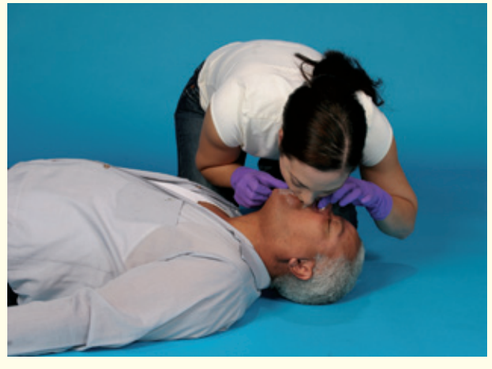


Figure 6-16 To perform rescue breathing, pinch the patient's nose with your thumb and forefinger.

Figure 6-17 Types of mouth-to-mask ventilation devices.

To use a mouth-to-mask ventilation device for rescue breathing, follow the steps in Skill Drill 6-4:

Skill Drill 6-4

1. Position yourself at the patient's head.
2. Use the head tilt–chin lift or jaw-thrust maneuver to open the patient's airway (Step 1) and (Step 2).
3. Place the mask over the patient's mouth and nose. Make sure the mask's nose notch is on the nose and not the chin.
4. Grasp the mask and the patient's jaw, using both hands. Use the thumb and forefinger of each hand to hold the mask tightly against the face. Hook the other three fingers of each hand under the patient's jaw and lift up to seal the mask tightly against the patient's face (Step 3).
5. Maintain an airtight seal as you pull up on the jaw to maintain the proper head position.
6. Take a deep breath and then seal your mouth over the mouthpiece.
7. Breathe slowly into the mouthpiece for 1 second (Step 4). Breathe until the patient's chest rises.
8. Monitor the patient for proper head position, air exchange, and vomiting.

Practice this technique frequently on a manikin until you can do it well.

Skill Drill 6-4

Performing Mouth-to-Mask Rescue Breathing

Step 1 Open the airway using the head tilt-chin lift maneuver.

Step 2 Or, open the airway using the jaw-thrust technique.

Step 3 Seal the mask against the patient's face.

Step 4 Breathe through the mouthpiece.

Mouth-to-Barrier Rescue Breathing

Mouth-to-barrier devices also provide a barrier between the rescuer and the patient Figure 6-18. Some of these devices are small enough to carry in your pocket. Although a wide variety of devices is available, most of them consist of a port or hole that you breathe into and a mask or plastic film that covers the patient's face. Some also have a one-way valve that prevents backflow of secretions and gases. These devices provide variable degrees of infection control.

To perform mouth-to-barrier rescue breathing, follow the steps in Skill Drill 6-5:

Skill Drill 6-5

1. Open the airway with the head tilt–chin lift maneuver. Press on the forehead to maintain the backward tilt of the head (Step 1).
2. Keep the patient's mouth open with the thumb of whichever hand you are using to lift the patient's chin.
3. Place the barrier device over the patient's mouth (Step 2).

Figure 6-18 Barrier devices.

4. Pinch the patient's nostrils together with your thumb and forefinger. Take a deep breath and then make a tight seal by placing your mouth on the barrier device around the patient's mouth.
5. Breathe slowly into the patient's mouth for 1 second. Breathe until the patient's chest rises (Step 3).
6. Remove your mouth and allow the patient to exhale passively. Check to see that the patient's chest falls after each exhalation.
7. Repeat this rescue breathing sequence 10 to 12 times per minute (one breath every 5 to 6 seconds) for an adult.

Mouth-to-Mouth Rescue Breathing

Mouth-to-mouth rescue breathing is an effective way of providing artificial ventilation for nonbreathing patients. It requires no equipment except you. However, because there is a somewhat higher risk of contracting a disease when using this method, you should use a mask or barrier breathing device if available. If a rescue breathing device is not available, you must weigh the potential good to the patient against the limited chance that you will contract an infectious disease from mouth-to-mouth breathing.

To perform mouth-to-mouth rescue breathing, follow these steps:

1. Open the airway with the head tilt–chin lift maneuver. Press on the forehead to maintain the backward tilt of the head.
2. Pinch the patient's nostrils together with your thumb and forefinger.
3. Keep the patient's mouth open with the thumb of whichever hand you are using to lift the patient's chin.
4. Take a deep breath and then make a tight seal by placing your mouth over the patient's mouth.
5. Breathe slowly into the patient's mouth for 1 second. Breathe until the patient's chest rises.
6. Remove your mouth and allow the patient to exhale passively. Check to see that the patient's chest falls after each exhalation.
7. Repeat this rescue breathing sequence 10 to 12 times per minute for adult patients and about 12 to 20 times per minute for children and infants.

Bag-Mask Device

The bag-mask device has three parts: a self-inflating bag, one-way valves, and a face mask Figure 6-19. To use this device, you place the mask over the face of the patient and make a tight seal. Squeezing the bag pushes

Skill Drill 6-5

Performing Mouth-to-Barrier Rescue Breathing

Step 1 Open the airway using the head tilt-chin lift maneuver.

Step 2 Place the barrier device over the patient's mouth.

Step 3 Pinch the patient's nostrils together and perform rescue breathing.

Figure 6-19 A bag-mask device.

Treatment

The three methods for performing rescue breathing are all potentially lifesaving. You should use a mouth-to-mask device, a mouth-to-barrier device, or a bag-mask device whenever possible. If a rescue breathing device is not available, you must weigh the potential good to the patient against the limited chance that you will contract an infectious disease from mouth-to-mouth breathing.

air through a one-way valve, through the mask, and into the patient's mouth and nose. As the patient passively exhales, a second one-way valve near the mask releases the air.

The self-inflating bag refills with air when you release the pressure on it. The bag-mask device delivers 21% oxygen (the percentage of oxygen in room air) without supplemental oxygen attached; however, supplemental oxygen is usually added to the bag-mask device. A bag-mask device can deliver up to 90% oxygen to a patient if 10 to 15 liters per minute of oxygen is supplied into the reservoir bag. Many bag-mask devices are designed to be discarded after a single use.

The bag-mask device is used for the same purpose as a mouth-to-mask device—to ventilate a nonbreathing patient. Although the bag-mask device can administer up to 90% oxygen when used with supplemental oxygen, there are two disadvantages to its use. A single rescuer may find it difficult to maintain a seal between the patient's face and the mask with one hand. Additionally, the bag-mask device may be difficult to use if the EMR has small hands because he or she may not be able to squeeze the bag hard enough to get an adequate volume of air into the patient.

Bag-Mask Technique The beginning steps for using a bag-mask device are the same steps you use for performing rescue breathing. Check to determine whether the patient is unresponsive. Open the patient's airway using the head tilt–chin lift maneuver or the jaw-thrust maneuver for patients with suspected neck or spinal injuries. Check to see if the patient is breathing by looking at the patient's chest, listening for the sound of air movement, and feeling for the movement of air on the s… ear. If the patient is not breathing, c… or nasal airway.

The specific steps for using a … shown in Skill Drill 6-6:

- Provides written step-by-step explanations of important psychomotor skills and procedures.

Skill Drill 6-6

1. Kneel above the patient's head. This position will enable you to keep the airway open, make a tight seal on the mask, and squeeze the bag. Maintain the patient's neck in an extended position. The bag-mask device does not maintain the patient's airway in an open position. You must continue to stabilize the head and maintain the head either in an extended position for the head tilt–chin lift maneuver or in a neutral position for the jaw-thrust maneuver.
2. Open the patient's mouth and check for fluids, foreign bodies, or dentures Step 1. Suction if needed. Consider the use of an oral or nasal airway.
3. Select the proper mask size Step 2. The mask should be large enough to seal over the bridge of the patient's nose and fit in the groove between the lower lip and the chin. A mask that is too small or too large may make it impossible to maintain a seal.
4. Place the mask over the patient's face. Start by putting the angled or grooved end of the mask over the bridge of the nose. Then bring the bottom of the mask against the groove between the lower lip and the chin Step 3.
5. Seal the mask. Place the middle, ring, and little fingers of one hand under the angle of the jaw. Lift up on the jaw. Make a "C" with the index finger and thumb of the same hand and place them over the mask. Clamp the mask by lifting the jaw and bringing the mask in contact with the jaw. Continue to hold the mask in position Step 4.
6. Using your other hand, squeeze the bag once every 5 seconds. Try to squeeze a large volume of air. Squeeze every 3 seconds for infants and children.
7. Check for chest rise Step 5. As you squeeze the bag, watch for a rise in the chest. If you do not see the chest rise, air is probably leaking around the mask or there is an obstruction in the airway. If air is leaking around the mask, try to make a better seal between the mask and the patient's jaw. If you suspect an airway obstruction, follow the steps already learned in this chapter regarding resolving airway obstructions.

…dd supplemental oxygen Step 6. Using a bag-…ask device without supplemental oxygen sup-…ies the patient with 21% oxygen. By adding …0 to 15 liters per minute of oxygen to the bag-mask device, you can increase the oxygen concentration to 90%. Adjust the liter flow on the pressure regulator/flowmeter to deliver between 10 and 15 liters per minute and connect the oxygen tubing from the flowmeter outlet to the inlet nipple on the bag-mask device. This higher percentage of oxygen is beneficial for a nonbreathing patient. The specific steps for using supplemental oxygen are explained later in this chapter.

With sufficient training and practice, a single rescuer can ventilate a patient using a bag-mask device; however, it can be difficult to maintain a good seal and squeeze the bag. Use of a bag-mask device is best accomplished as a two-person operation if additional rescuers are present Figure 6-20. With two rescuers, one person squeezes the bag and the other person uses both hands to seal the mask to the patient. Use the middle, ring, and little fingers of both hands under the angles of the jaw and use the index fingers and thumbs of both hands to form two "Cs" around the face mask. Most people can seal the mask much more easily using both hands.

Skill Drill 6-6

Provides a visual summary of important psychomotor skills and procedures.

Using a Bag-Mask Device With One Rescuer

Step 1 Kneel at the patient's head and maintain an open airway. Check the patient's mouth for fluids, foreign bodies, and dentures.

Step 2 Select the proper mask size.

Step 3 Place the mask over the patient's face.

Step 4 Seal the mask.

Step 5 Squeeze the bag with your other hand. Check for chest rise.

Step 6 Add supplemental oxygen.

Figure 6-20 Using a bag-mask device with two rescuers.

Using the bag-mask device requires proper training and practice. The bag-mask device can be a lifesaving tool. Your EMS service may use bag-mask devices for nonbreathing patients—or you may be asked to assist EMTs or paramedics in ventilating nonbreathing patients so they can perform other needed skills. Check with your supervisor or medical director to learn the protocols for your service.

Treatment

If paramedics have inserted an endotracheal tube down the patient's windpipe (trachea), the bag-mask device is connected directly to the end of the endotracheal tube. In this case, no face mask is needed. When you squeeze the bag-mask device, you force air directly into the patient's lungs. You should receive instruction in this type of ventilation if you will be performing it.

Airway and Breathing Review

You should assume that all patients may be in respiratory arrest until you can assess them and determine whether they are breathing adequately. A summary of the steps required to recognize respiratory arrest and perform rescue breathing in adults follows.

Airway

1. Check for responsiveness by shouting "Are you okay?" and gently shaking the patient's shoulder. If the patient is unresponsive and the EMS system has not been notified, activate the EMS system. Place the patient on his or her back.
2. Correct a blocked airway by using the head tilt–chin lift maneuver or, if the patient has sustained any injury to the head or neck, use the jaw-thrust maneuver.
3. Check the mouth for any secretions, vomitus, or solid objects. If found, clear the mouth.
4. Correct a blocked airway, if needed, by using finger sweeps or suction to remove foreign substances.
5. Maintain the airway by manually holding it open or by using an oral or nasal airway.

Breathing

1. Check for the presence of breathing:
   - Look for the rising and falling of the patient's chest.
   - Listen for the sound of air moving in and out of the patient's nose and mouth.
   - Feel for air moving on the side of your face and ear. Continue to look, listen, and feel for at least 5 seconds but no more than 10 seconds. If the patient is breathing adequately, place him or her in the recovery position. If the patient is not breathing, go to the next step.
2. Correct the lack of breathing by performing rescue breathing using a mouth-to-mask, or mouth-to-barrier device, if available. Blow slowly into the patient's mouth for 1 second, using slow, gentle, sustained breaths with enough force to make the chest rise. If using a bag-mask device, slowly squeeze the bag for 1 second. Remove your mouth and allow the lungs to deflate. Breathe for the patient a second time. After these first two breaths, breathe once into the patient's mouth about every 5 to 6 seconds.

Generally, when rescue breathing is necessary, **external cardiac compressions** are also required. External cardiac compressions, the "C" part of the ABCs, are explained in Chapter 7, *Professional Rescuer CPR*.

A skill performance sheet titled One-Rescuer Adult CPR is shown in Figure 6-21 for your review and practice.

Performing Rescue Breathing on Children and Infants

The "A" steps required to check and correct the patient's airway and the "B" steps needed to check and correct the patient's breathing are similar for adults, children, and infants. However, there are some differences. You must learn and practice the different airway and breathing sequences for children and infants.

One-Rescuer Adult CPR	
Steps	**Adequately Performed**
1. Establish unresponsiveness. Activate the EMS system.	
2. Open airway using the head tilt–chin lift maneuver. (If trauma is present, use the jaw-thrust maneuver.) Check breathing (look, listen, and feel).*	
3. Give two slow breaths at 1 second per breath. If chest does not rise, reposition head and try to ventilate again. Watch for chest rise; allow for exhalation between breaths.	
4. Check for signs of circulation. Check the carotid pulse and look for signs of coughing and movement. If breathing is absent but a pulse is present, provide rescue breathing (one breath every 5 to 6 seconds [10 to 12 breaths per minute]).	
5. If no pulse, give cycles of 30 chest compressions (rate, 100 compressions per minute) followed by two slow breaths.	
6. After five cycles of 30 to 2 (about 2 minutes), reassess the patient.*	

*If victim is unresponsive but breathing, place in the recovery position.

Figure 6-21 Skill performance sheet: One-Rescuer Adult CPR.

Rescue Breathing for Children

For purposes of performing rescue breathing, a child is a person between 1 year and the beginning of puberty (12 to 14 years). The steps for determining responsiveness, checking and correcting airways, and checking and correcting a child's breathing are essentially the same as for an adult patient, but you should keep the following differences in mind:

1. Children are smaller and you will not have to use as much force to open their airways and tilt their heads.
2. The rate of rescue breathing is slightly faster for children. Give 1 rescue breath every 3 to 5 seconds (about 12 to 20 rescue breaths per minute) instead of the adult rate of 1 rescue breath every 5 to 6 seconds (10 to 12 rescue breaths per minute).

A skill performance sheet titled One-Rescuer Child CPR is shown in **Figure 6-22** for your review and practice.

Rescue Breathing for Infants

If the patient is an infant (younger than 1 year), you must vary rescue breathing techniques slightly. Keep in mind that an infant is tiny and must be treated extremely gently. The steps in rescue breathing for an infant are shown in **Skill Drill 6-7**:

Skill Drill 6-7

Airway

1. Check for responsiveness by gently shaking the infant's shoulder or tapping the bottom of the foot (Step 1). If the infant is unresponsive, place the infant on his or her back and proceed to the next step.
2. Open the airway, if it is closed, by using the head tilt–chin lift maneuver. Do not tip the infant's head back too far because this may block the infant's airway. Tilt it only enough to open the airway (Step 2).
3. The rate of rescue breathing for infants is the same as for children. Give one rescue breath every 3 to 5 seconds (about 12 to 20 rescue breaths per minute).
4. Do not overinflate an infant's lungs. Use small puffs of air, enough to make the chest rise with each breath.

One-Rescuer Child CPR	
Steps	**Adequately Performed**
1. Establish unresponsiveness. If a second rescuer is available, have him or her activate the EMS system.	
2. Open airway using the head tilt–chin lift maneuver. (If trauma is present, use the jaw-thrust maneuver.) Check breathing (look, listen, and feel).*	
3. Give two effective breaths (1 second per breath); if airway is obstructed, reposition head and try to ventilate again. Watch for chest rise; allow for exhalation between breaths.	
4. Check for signs of circulation. Check the carotid pulse and look for signs of coughing or movement. If breathing is absent but a pulse is present, provide rescue breathing (one breath every 3 to 5 seconds [12 to 20 breaths per minute]).	
5. If no pulse, give 30 chest compressions (rate 100 compressions per minute), followed by two slow breaths.	
6. After five cycles of CPR (about 2 minutes), reassess the patient.* If rescuer is alone, activate the EMS system and return to the patient. Continue CPR.	

*If victim is unresponsive but breathing, place in the recovery position.

Figure 6-22 Skill performance sheet: One-Rescuer Child CPR.

Breathing

1. Check for the presence of breathing:
   - Look for the rising and falling of the infant's chest.
   - Listen for the sound of air moving in and out of the infant's mouth and nose.
   - Feel for the movement of air on the side of your face and ear (Step 3). Continue to look, listen, and feel for at least 5 seconds but no more than 10 seconds. If there is adequate breathing, place the patient in the recovery position. If there is no breathing, go to the next step.
2. Correct the lack of breathing by performing rescue breathing (Step 4). Cover the infant's mouth and nose with your mouth. Blow gently into the infant's mouth and nose for 1 second. Watch the chest rise with each breath. Remove your mouth and allow the lungs to deflate. Breathe for the infant a second time. After these first two breaths, breathe into the infant's mouth and nose every 3 to 5 seconds (12 to 20 rescue breaths per minute).

Often when rescue breathing is necessary, external cardiac compressions are also required. External cardiac compressions, the "C" part of the ABCs, are explained in Chapter 7, *Professional Rescuer CPR*. A skill performance sheet titled One-Rescuer Infant CPR is shown in **Figure 6-23** for your review and practice.

Foreign Body Airway Obstruction

The first part of this section discusses the causes and recognition of mild airway obstruction and severe airway obstruction. The second part of this section discusses the management of foreign body airway obstruction in adult, child, and infant patients.

Causes of Airway Obstruction

Your attempt to perform rescue breathing on a patient may not be effective because of an **airway obstruction**. The most common airway obstruction is the tongue. If the tongue is blocking the airway, the head tilt–chin lift maneuver or jaw-thrust maneuver should open the airway. However, if a foreign body is lodged in the air passage, you must use other techniques.

Food is the most common foreign object that causes an airway obstruction. An adult may choke on a large

One-Rescuer Infant CPR	
Steps	**Adequately Performed**
1. Establish unresponsiveness. If a second rescuer is available, have him or her activate the EMS system.	
2. Open airway using the head tilt–chin lift maneuver. (If trauma is present, use the jaw-thrust maneuver.) Check breathing (look, listen, and feel).*	
3. Give two effective breaths (1 second per breath); if chest does not rise, reposition head and try to ventilate again. Watch for chest rise; allow for exhalation between breaths.	
4. Check for signs of circulation. Check the brachial pulse and look for signs of coughing or movement. If breathing is absent but a pulse is present, provide rescue breathing (one breath every 3 to 5 seconds [12 to 20 breaths per minute]).	
5. If no pulse, give 30 chest compressions (rate of 100 compressions per minute) followed by two slow breaths.	
6. After five cycles of CPR (about 2 minutes), reassess the patient.* If rescuer is alone, activate the EMS system. Continue CPR.	

*If victim is unresponsive but breathing, place in the recovery position.

Figure 6-23 Skill performance sheet: One-Rescuer Infant CPR.

piece of meat; a child may inhale candy, a peanut, or a piece of a hot dog. Children may put small objects in their mouths and inhale such things as tiny toys or balloons. Vomitus may obstruct the airway of a child or an adult **Figure 6-24**.

Types of Airway Obstruction

Airway obstruction may be partial (a mild obstruction) or complete (a severe obstruction). The first step in caring for a conscious person who may have an obstructed airway is to ask, "Are you choking?" If the patient can reply to your question, the airway is not completely blocked. If the patient is unable to speak or cough, the airway is completely blocked.

Mild Airway Obstruction

In partial or mild airway obstruction, the patient coughs and gags. This indicates that some air is passing around the obstruction. The patient may even be able to speak, although with difficulty.

To treat a mildly obstructed airway, encourage the patient to cough. Coughing is the most effective way of expelling a foreign object. If the patient is unable to expel the object by coughing (if, for example, a bone is stuck in the throat), you should arrange for the patient's **prompt transport** to an appropriate medical facility. Such a patient must be monitored carefully while awaiting transport and during transport because a mild obstruction can become a severe (complete) obstruction at any moment.

Severe Airway Obstruction

A patient with a severe (complete) airway obstruction will have different signs and symptoms. With no fresh oxygen entering the lungs, the body quickly uses all the oxygen breathed in with the last breath. The patient is unable to breathe in or out and, because he or she cannot exhale air, speech is impossible. Other symptoms of a severe airway obstruction may include poor air exchange, increased breathing difficulty, and a silent cough. If the airway is completely obstructed, the patient will lose consciousness in 3 to 4 minutes.

The currently accepted treatment for a completely obstructed airway in an adult or child involves abdominal thrusts, also called the **Heimlich maneuver**. Abdominal thrusts compress the air that remains in the lungs, pushing it upward through the airway so that it exerts pressure against the foreign object. The pressure pops the object out, in much the same way that a cork pops out of a bottle after the bottle has been shaken to increase the

Skill Drill 6-7

Performing Infant Rescue Breathing

Step 1 Establish the patient's level of responsiveness.

Step 2 Open the infant's airway using the head tilt–chin lift maneuver.

Step 3 Check for breathing by looking, listening, and feeling.

Step 4 Perform infant rescue breathing.

pressure. Many rescuers report that abdominal thrusts can cause an obstructing piece of food to fly across the room. A person who has had an obstruction removed from their airway by the Heimlich maneuver should be transported to a hospital for examination by a physician.

Management of Foreign Body Airway Obstructions

Relieving a foreign body airway obstruction requires no special equipment. The following sections describe the steps that you need to learn to relieve foreign body airway obstructions in adults, children, and infants. Performing these steps can make the difference between life and death for these patients.

Airway Obstruction in an Adult

The steps to treat severe airway obstruction vary, depending on whether the patient is conscious or unconscious. If the patient is conscious, stand behind the patient and perform the abdominal thrusts while the patient is standing or seated in a chair.

Locate the xiphoid process (the bottom of the sternum) and the navel. Place one fist above the navel and well below the xiphoid process, thumb side against the patient's abdomen. Grasp your fist with your other hand. Then apply abdominal thrusts sharply and firmly, bringing your fist in and slightly upward. Do not give the patient a bear hug; rather, apply pressure at the point where your fist contacts the patient's abdomen. Each thrust should be distinct and forceful. Repeat these

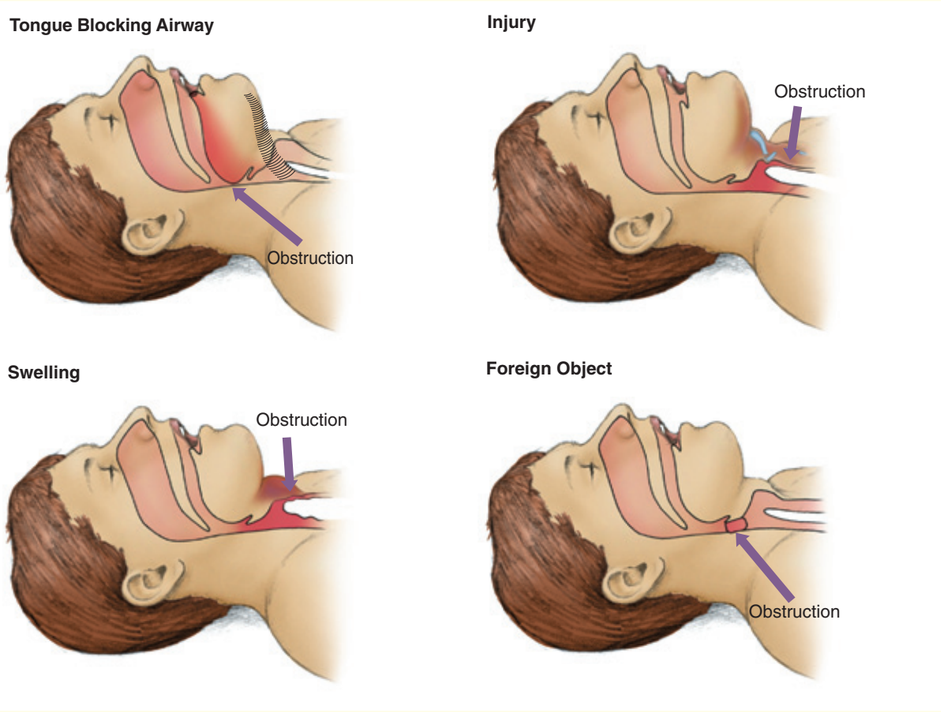


Figure 6-24 Common causes of airway obstruction.

abdominal thrusts until the foreign object is expelled or until the patient becomes unresponsive. Review the steps in Skill Drill 6-8 until you can carry them out automatically. To assist a conscious patient with a complete airway obstruction, you must:

Skill Drill 6-8

1. Ask, "Are you choking? Can you speak? Can I help you?" If there is no verbal response, assume that the airway obstruction is complete (Step 1).
2. Stand behind the patient and position the thumb side of your fist just above the patient's navel (Step 2).
3. Press into the patient's abdomen with a quick upward thrust (Step 3). Repeat the abdominal thrusts until either the foreign body is expelled or the patient becomes unresponsive.
4. If the patient is obese or in the late stages of pregnancy, use chest thrusts instead of abdominal thrusts. Chest thrusts are done by standing behind the patient and placing your arms under the patient's armpits to encircle the patient's chest. Press with quick backward thrusts.

   If the patient becomes unresponsive, continue with the following steps.
5. Ensure that the EMS system has been activated.
6. Begin CPR:
   - Open the airway by using the head tilt–chin lift maneuver.
   - Look into the mouth for any foreign object. Use finger sweeps only if you can see a foreign object.
   - Give two rescue breaths.
   - Begin chest compressions. (This part of the CPR sequence is covered in Chapter 7, *Professional Rescuer CPR*.)
7. Continue these steps of CPR until more advanced EMS personnel arrive.

Recent studies have shown that performing chest compressions on an unresponsive patient increases the pressure in the chest similar to performing abdominal

Skill Drill 6-8

Managing Airway Obstruction in a Conscious Patient

Step 1 Look for signs of choking.

Step 2 Place your fist with the thumb side against the patient's abdomen, just above the navel.

Step 3 Grasp the fist with your other hand and press into the abdomen with quick inward and upward thrusts.

You are the Provider: CASE 3

You are off duty and spending the day jogging in a local park. As you near the playground, you see a young girl collapse. The child is alone, and no adults are nearby. As you approach the child, you estimate that she is approximately 8 years old and you can see that she is turning blue. You call out for help, then tap the child's shoulders, and begin the steps of assessing for responsiveness. You decide CPR must begin.

1. When should you activate the EMS system?
2. How would your actions change if instead of a child, the person who collapsed was an elderly adult?
3. Do you have a duty to act?

thrusts and may relieve an airway obstruction. Therefore, performing CPR on a patient who has become unresponsive has the same effect as performing the Heimlich maneuver on a conscious patient.

A skill performance sheet titled Adult Foreign Body Airway Obstruction is shown in Figure 6-25 for your review and practice.

Airway Obstruction in a Child

The steps for relieving an airway obstruction in a conscious child (1 year to the onset of puberty) are the same as for an adult patient. The anatomic differences between adults and children/infants require that you make some adjustments in your technique. When opening the airway of a child or infant, tilt the head back just past the neutral position. Tilting the head too far back (hyperextending the neck) can actually obstruct the airway of a child or infant. If you are by yourself and a child with an airway obstruction becomes unresponsive, perform CPR for five cycles (about 2 minutes) before activating the EMS system.

A skill performance sheet titled Child Foreign Body Airway Obstruction is shown in Figure 6-26 for your review and practice.

Airway Obstruction in an Infant

The process for relieving an airway obstruction in an infant (younger than 1 year) must take into consideration that an infant is extremely fragile. An infant's airway structures are very small, and they are more easily injured than those of an adult. If you suspect an airway obstruction, assess the infant to determine whether there is any air exchange. If the infant has an audible cry, the airway is not completely obstructed. Ask the person who was with the infant what was happening when the episode began. This person may have seen the infant put a foreign body into his or her mouth.

If there is no movement of air from the infant's mouth and nose, a sudden onset of severe breathing difficulty, a silent cough, or a silent cry, suspect a severe airway obstruction. To relieve an airway obstruction in an infant, use a combination of back slaps and chest thrusts. You must have a good grasp of the infant to alternate the back slaps and the chest thrusts. Review the following sequence until you can carry it out automatically. To assist a conscious infant with a severe airway obstruction, you must:

1. Assess the infant's airway and breathing status. Determine that there is no air exchange.
2. Place the infant in a face-down position over one arm so that you can deliver five back slaps. Support the infant's head and neck with one hand and place the infant face down with the head lower than the trunk. Rest the infant on your forearm and support your forearm on your thigh. Use the heel of your hand and deliver up to five back slaps forcefully between the infant's shoulder blades.

Adult Foreign Body Airway Obstruction

Steps	Adequately Performed
1. Ask "Are you choking? Can I help?"	
2. Give abdominal thrusts (chest thrusts for pregnant or obese patient).	
3. Repeat thrusts until foreign body is dislodged or patient becomes unresponsive.	
If the patient becomes unresponsive:	
4. Ensure that the EMS system has been activated.	
5. Begin CPR: ▪ Open the airway by using the head tilt–chin lift maneuver. ▪ Look into the mouth for any foreign object. Use finger sweeps only if you can see a foreign object. ▪ Give two rescue breaths. ▪ Begin chest compressions. (This part of the CPR sequence is covered in Chapter 7.)	
6. Continue these CPR steps until more advanced EMS personnel arrive.	

Figure 6-25 Skill performance sheet: Adult Foreign Body Airway Obstruction.

Child Foreign Body Airway Obstruction

Steps	Adequately Performed
1. Ask "Are you choking?"	
2. Give abdominal thrusts.	
3. Repeat thrusts until foreign body is dislodged or until patient becomes unresponsive.	
If the patient becomes unresponsive:	
4. If a second rescuer is available, have him or her activate the EMS system.	
5. Begin CPR: ▪ Open the airway by using the head tilt–chin lift maneuver. ▪ Look into the mouth for any foreign object. Use finger sweeps only if you can see a foreign object. ▪ Give two rescue breaths. ▪ Begin chest compressions. (This part of the CPR sequence is covered in Chapter 7.)	
6. Continue CPR for five cycles (about 2 minutes) and then activate the EMS system if you are by yourself.	
7. Continue CPR until more advanced EMS personnel arrive.	

Figure 6-26 Skill performance sheet: Child Foreign Body Airway Obstruction.

3. Support the head and turn the infant face up by sandwiching the infant between your hands and arms. Rest the infant on his or her back with the head lower than the trunk.
4. Deliver five chest thrusts i… num. Use two fingers to d… a firm manner.
5. Repeat the series of back… until the foreign object … infant becomes unrespons…

If the infant becomes … with the following steps:

6. Ensure that the EMS system has been activated.
7. Begin CPR:
   - Open the airway by using the head tilt–chin lift maneuver.
   - Look into the mouth for any foreign object. Use finger sweeps only if you can see a foreign object.
   - Give two rescue breaths.
   - Begin chest compressions. (This part of the CPR sequence is covered in Chapter 7, *Professional Rescuer CPR*.)
8. Continue these CPR steps until more advanced EMS personnel arrive.

   NOTE: If you are by yourself, perform CPR for five cycles (about 2 minutes) and then activate the EMS system.

Current, state-of-the-art medical content is presented in an engaging and comprehensive writing style.

Recent studies have shown that performing chest compressions on an unresponsive patient increases the pressure in the chest similar to performing chest thrusts and may relieve an airway obstruction. Therefore per…ing CPR on an infant who has become unresponsive …the same effect as performing the chest thrusts on a …scious patient.

…A skill performance sheet titled Infant Foreign Body …ay Obstruction is shown in Figure 6-27 for your …iew and practice.

Oxygen Administration

Under normal conditions, the body can operate efficiently using the oxygen that is contained in the air, even though air contains only 21% oxygen. The amount of blood lost after a traumatic injury could mean that insufficient oxygen is delivered to the cells of the body. This results in shock. Administering supplemental oxygen to a patient showing signs and symptoms of shock increases the amount of oxygen delivered to the cells of the body and often makes a positive difference in the patient's outcome.

Patients who have experienced a heart attack or stroke or patients who have a chronic heart or lung disease may be unable to get sufficient oxygen from

Infant Foreign Body Airway Obstruction	
Steps	**Adequately Performed**
1. Confirm severe airway obstruction. Check for sudden onset of serious breathing difficulty, ineffective cough, silent cough or cry.	
2. Give up to five back slaps and up to five chest thrusts.	
3. Repeat Step 2 until the foreign body is dislodged or until the infant becomes unresponsive.	
If the infant becomes unresponsive:	
4. If a second rescuer is available, have him or her activate the EMS system.	
5. Begin CPR: ■ Open the airway by using the head tilt–chin lift maneuver. ■ Look into the mouth for any foreign object. Use finger sweeps only if you can see a foreign object. ■ Give two rescue breaths. ■ Begin chest compressions. (This part of the CPR sequence is covered in Chapter 7.)	
6. Continue CPR for five cycles (about 2 minutes) and then activate the EMS system if you are by yourself.	
7. Continue CPR until more advanced EMS personnel arrive.	

Figure 6-27 Skill performance sheet: Infant Foreign Body Airway Obstruction.

room air. These patients will also benefit from receiving supplemental oxygen.

Not all EMRs know how to administer oxygen; however, knowing this skill can help you when you are in a situation where EMS response may be delayed. By learning this skill, you will be able to assist other members of the EMS team. You should administer oxygen only after receiving proper training and with the approval of your medical director.

Oxygen Equipment

Several pieces of equipment are required to administer supplemental oxygen, including an oxygen cylinder, a pressure regulator/flowmeter, and a nasal cannula or face mask. The characteristics and operation of each piece of equipment is described in the following section.

Oxygen Cylinders

Oxygen is compressed to 2,000 pounds per square inch (psi) and stored in portable cylinders. The portable oxygen cylinders used by most EMS systems are either D or E size. D size cylinders hold 350 liters of oxygen, and E size cylinders hold 625 liters of oxygen. Oxygen cylinders must be marked with a green color and be labeled as medical oxygen. Depending on the flow rate, each cylinder lasts for at least 20 minutes. A valve at the top of the oxygen cylinder allows you to control the flow of oxygen from the cylinder. Oxygen administration equipment is shown in Figure 6-28.

Pressure Regulator/Flowmeter

Oxygen in the cylinder is stored at 2,000 psi, but it can be used only when that pressure is regulated down to about 50 psi. This is done by using a pressure regulator. The regulator and the flowmeter are a single unit attached to the outlet of the oxygen cylinder Figure 6-29. Once the pressure has been reduced, you can adjust the flowmeter to deliver oxygen at a rate of 2 to 15 liters per minute. Because patients with different medical conditions require different amounts of oxygen, the flowmeter lets you select the proper amount of oxygen to administer. A gasket between the cylinder and the pressure regulator/flowmeter ensures a tight seal and maintains the high pressure inside the cylinder. Always check for this gasket before attaching the regulator.

Figure 6-28 Oxygen administratio

Figure 6-29 The regulator/flowmeter attaches to the out- the oxygen cylinder.

Detailed photos of equipment and real emergencies prepare students for the field.

Nasal Cannulas and Face M

The third part of an oxygen-delivery system is a device that ensures the oxygen is delivered to the patient and is not lost in the air. A nasal cannula has two small holes, which fit into the patient's nostrils. Nasal cannulas are used to deliver medium concentrations of oxygen (35% to 50%). A face mask is placed over the patient's nose and mouth to deliver oxygen through the patient's mouth and nostrils. Nonrebreathing masks are most commonly used by EMRs. They deliver high concentrations of oxygen (up to 90%). These two oxygen-delivery devices are discussed more fully in the section on administering supplemental oxygen.

Safety Considerations

Oxygen does not burn or explode by itself. However, it actively supports combustion and can quickly turn a small spark or flame into a serious fire. Therefore, all sparks, heat, flames, and oily substances must be kept away from oxygen equipment. Smoking is never safe around oxygen equipment.

The pressurized cylinders are also hazardous because the high pressure in an oxygen cylinder can cause an explosion if the cylinder is damaged. Be sure the oxygen cylinder is secured so that it will not fall. If the shut-off valve at the top of the cylinder is damaged, the cylinder can take off like a rocket. Oxygen cylinders should be kept inside sturdy carrying cases that protect the cylinder and regulator/flowmeter. Handle the cylinder carefully to guard against damage.

Administering Supplemental Oxygen

To administer supplemental oxygen, place the regulator/flowmeter over the stem of the oxygen cylinder and

up the pins on the pin-indexing system correctly Figure 6-30. Be sure to check for the mandatory gasket. Tighten the securing screw firmly by hand. With the special key or wrench provided, turn the cylinder valve two turns counterclockwise to allow oxygen from the cylinder to enter the regulator/flowmeter.

Figure 6-30 A valve stem with pin-index holes.

Check the gauge on the pressure regulator/flowmeter to see how much oxygen pressure remains in the cylinder. If the cylinder contains less than 500 psi, the amount of oxygen in the cylinder is too low for emergency use and should be replaced with a full (2,000 psi) cylinder.

To administer oxygen, you will need to adjust the flowmeter to deliver the desired liter-per-minute flow of oxygen. The patient's condition and the type of oxygen delivery device you use (a mask or a nasal cannula) dictate the proper flow. When the oxygen flow begins, place the face mask or nasal cannula onto the patient's face.

Nasal Cannula

A nasal cannula is a simple oxygen-delivery device. It consists of two small prongs that fit into the patient's nostrils and a strap that holds the cannula on the patient's face Figure 6-31. A cannula delivers low-flow oxygen at 2 to 6 liters per minute and in concentrations of 35% to 50% oxygen. Low-flow oxygen can be used for fairly

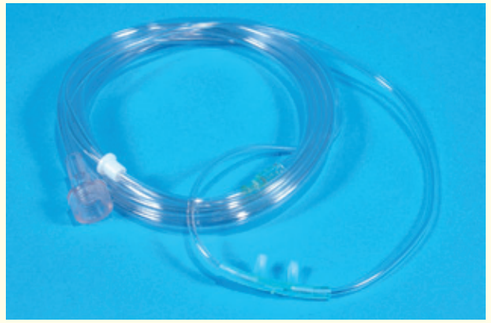


Figure 6-31 A nasal cannula.

stable patients such as those with slight chest pain or mild shortness of breath.

To use a nasal cannula, first adjust the liter flow to 2 to 6 liters per minute and then apply the cannula to the patient. The cannula should fit snugly but should not be tight.

Nonrebreathing Mask

A nonrebreathing mask consists of connecting tubing, a reservoir bag, one-way valves, and a face piece Figure 6-32. It is used to deliver a high flow of oxygen at 8 to 15 liters per minute. A nonrebreathing face mask can deliver concentrations of oxygen as high as 90%. The mask works by storing oxygen in the reservoir bag. When the patient inhales, oxygen is drawn from the reservoir bag. When the patient exhales, the air is exhausted through the one-way valves on the side of the mask.

Nonrebreathing face masks should be used for patients who require higher flows of oxygen. These include patients experiencing serious shortness of breath, severe chest pain, carbon monoxide poisoning, and congestive heart failure. Patients who are showing signs and symptoms of shock should also be treated with high-flow oxygen from a nonrebreathing face mask.

To use a nonrebreathing mask, first adjust the oxygen flow to 8 to 15 liters per minute to inflate the reservoir bag before putting it on the patient. After the bag inflates, place the mask over the patient's face. Adjust the straps to secure a snug fit. Adjust the liter flow to keep the bag at least partially inflated while the patient inhales.

Hazards of Supplemental Oxygen

Supplemental oxygen can be lifesaving, but it must be used carefully so that you, your team, and the patient remain safe. Although this chapter provides you a basic outline on setting up oxygen equipment, you will need additional class work and practical training before you administer oxygen in emergency situations.

Figure 6-32 A nonrebreathing oxygen mask.

Safety

Avoid using oxygen around fire or flames. Keep oxygen cylinders secured to minimize the danger of explosion.

Pulse Oximetry

Pulse oximetry is used to assess the amount of oxygen saturated in the red blood cells. It does this through the use of a photoelectric cell that measures the light that passes through a fingertip or an earlobe. The machine that performs this function is called a pulse oximeter. A pulse oximeter consists of a sensing probe and a monitor. The sensing probe attaches to the patient's fingertip or earlobe by means of a spring-loaded clip. The sensing probe contains a light source and a receiving chamber. The sensing probe attaches to the monitor of the pulse oximeter by means of a cable. The pulse oximeter monitor contains an on-and-off switch and a screen for displaying the percent of oxygen saturation Figure 6-33.

To operate the pulse oximeter, turn on the monitor. Most pulse oximeters perform a self-check to ensure that the machine is operating correctly. This self-check will vary depending on the brand of the oximeter. Once you know that the monitor is operating correctly, place the sensing probe over the patient's fingertip or earlobe. The monitor should then display the percent of saturation of the patient's blood. In a healthy patient, the oxygen saturation should be between 95% and 100% when breathing room air.

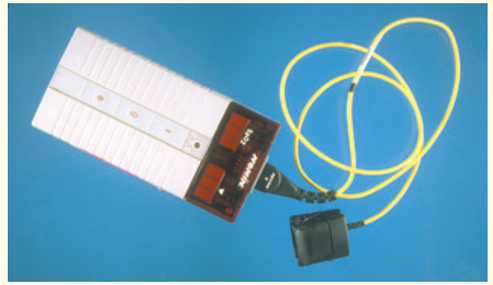


Figure 6-33 A pulse oximeter, which consists of a sensing probe and a monitor, is used to measure the percentage of oxygen saturation in the blood.

If a patient has difficulty breathing as a result of injury or a disease process, the percent of oxygen saturation may be much lower than 95%. The pulse oximeter cannot tell you what is wrong with the patient. You must perform a thorough patient assessment, including a good medical history. The pulse oximeter can help you to recognize that the patient is having a problem. It can also help you to determine whether your treatment is helping the patient. If the steps you are taking to treat the patient coincide with an increased percentage of oxygen saturation, you can take that as a positive sign.

Like any other device, a pulse oximeter has certain limitations. It will not give you an accurate reading if the patient is wearing nail polish or if the patient's fingers are very dirty. Also, if the patient is cold and the blood vessels in the fingertips or earlobes are constricted, the pulse oximeter reading will not be accurate. Patients who have lost a lot of blood will also have an inaccurate pulse oximetry reading. Patients who have experienced carbon monoxide poisoning will have false readings because their red blood cells are saturated with carbon monoxide instead of with oxygen. It is important to understand that the pulse oximeter is a valuable tool to help you assess a patient's condition. However, like any tool, it has certain limitations that you must consider. Remember, there is no machine that replaces you conducting a careful patient assessment, including a good medical history.

Special Considerations

As an EMR, you will encounter some situations that require a slight modification in your CPR technique. These include rescue breathing for patients with stomas, gastric distention, patients with dental appliances, and airway management in a vehicle. By adapting to these situations you can achieve effective CPR on these patients.

Rescue Breathing for Patients With Stomas

Some people have had surgery that removed part or all of the larynx. In these patients, the upper airway has been rerouted to open through a stoma (hole) in the neck. These patients are called neck breathers. Rescue breathing must therefore be given through the stoma in the patient's neck. The technique is called mouth-to-stoma breathing.

The steps in performing mouth-to-stoma breathing are as follows:

1. Check every patient for the presence of a stoma.
2. If you locate a stoma, keep the patient's neck straight; do not hyperextend the patient's head and neck.
3. Examine the stoma and clean away any mucus in it.
4. If there is a breathing tube in the opening, remove it to be sure it is clear. Clean it rapidly and replace it into the stoma. Moistening the tube will make it easier to insert the tube.
5. Place your mouth directly over the stoma and use the same procedures as in mouth-to-mouth breathing. It is not necessary to seal the mouth and nose of most people who have a stoma.
6. If the patient's chest does not rise, he or she may be a partial neck breather. In these patients, you must seal the mouth and nose with one hand and then breathe through the stoma. A bag-mask or pocket-mask device can also be used to ventilate a patient with a stoma Figure 6-34.

Figure 6-34 A bag-mask device can be used to ventilate a patient with a stoma.

Gastric Distention

Gastric distention occurs when air is forced into the stomach instead of the lungs. This makes it harder to get an adequate amount of air into the patient's lungs, and it increases the chance that the patient will vomit. Breathe slowly into the patient's mouth just enough to make the chest rise.

Remember that the lungs of children and infants are smaller and require smaller breaths during rescue breathing. The excess air may enter the stomach and cause gastric distention. Preventing gastric distention is much better than trying to correct it later after it has occurred.

Cricoid Pressure

You can reduce gastric distention and minimize the risk of vomiting by applying posterior pressure to the trachea at the level of the cricoid cartilage. The cricoid cartilage is located at the bottom of the larynx just below the Adam's apple Figure 6-35. Cricoid pressure compresses the esophagus between the spine and the trachea, and thereby reduces the amount of air getting into the stomach and minimizes the occurrence of gastric contents being regurgitated into the throat. Cricoid pressure is also called the Sellick maneuver.

Use cricoid pressure only when the patient is unresponsive and not breathing and you are performing rescue breathing with a positive pressure device such as a bag-valve mask unit. Proper application of the cricoid pressure requires that one rescuer be designated to apply this pressure. While performing CPR, you need one rescuer to perform compression, one rescuer to perform rescue breathing, and a third to maintain cricoid pressure. Once you apply cricoid pressure, you should continue to maintain it until the patient is intubated by a paramedic or a physician or until another rescuer relieves you. Because of the chance for further damage to the spinal cord, cricoid pressure should never be used when a patient has a potential spine or spinal cord injury.

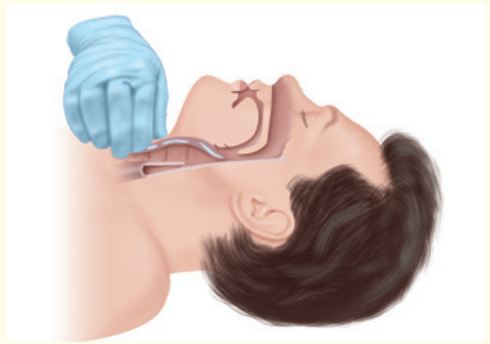


Figure 6-35 Cricoid pressure can be used to guard against regurgitation in the airway.

Skill Drill 6-9 shows for steps for performing cricoid pressure:

Skill Drill 6-9

1. Locate the Adam's apple (thyroid cartilage) Step 1.
2. Slide your index finger down to the bottom of the larynx and locate the first ring of cartilage below the larynx, which is the cricoid cartilage Step 2.
3. Use the tip of your thumb and the tip of your index finger to apply firm pressure on this ring (the cricoid cartilage) toward the patient's spine (posterior) Step 3.
4. Maintain this pressure until relieved by another rescuer or until the patient is intubated.

You are the Provider: CASE 4

It is 11 PM and you are dispatched to an unknown medical emergency at the home of a 54-year-old man. As you enter the home, the man's wife says he woke up out of a sound sleep complaining of crushing chest pains. The patient is in bed. The man has difficulty speaking in full sentences and he is gasping. Your partner returns to the ambulance to get the stretcher. Your primary assessment shows a pulse oximetry reading of 80%.

1. What would be the most effective way to deliver oxygen to the man?
2. Suddenly the man starts vomiting. What should you do?

Skill Drill 6-9

Performing Cricoid Pressure

Step 1 Locate the Adam's apple.

Step 2 Slide your index finger down to the bottom of the larynx and locate the first ring of cartilage below the larynx, which is the cricoid cartilage.

Step 3 Use the tip of your thumb and the tip of your index finger to apply firm pressure on this ring toward the patient's spine (posterior). Maintain this pressure until relieved by another rescuer or until the patient is intubated.

Dental Appliances

Do not remove dental appliances that are firmly attached. They may help keep the patient's mouth full so you can make a better seal between the patient's mouth and your mouth or a breathing device. Loose dental appliances, however, may cause problems. Partial dentures may become dislodged during trauma or while you are performing airway care and rescue breathing. If you discover loose dental appliances during your examination of the patient's airway, remove the dentures to prevent them from occluding the airway. Try to put them in a safe place so they will not get damaged or lost.

Airway Management in a Vehicle

If you arrive on the scene of an automobile crash and find that the patient has airway problems, how can you best assist the patient and maintain an open airway? If the patient is lying on the seat or floor of the car, you can apply the standard jaw-thrust maneuver. Use the jaw-thrust maneuver if there is any possibility that the crash could have caused a head or spine injury.

When the patient is in a sitting or semireclining position, approach him or her from the side by leaning in through the window or across the front seat. Grasp the patient's head with both hands. Put one hand under the patient's chin and the other hand on the back of the patient's head just above the neck, as shown in Figure 6-36. Maintain a slight upward pressure to support the head and cervical spine and to ensure that the airway remains open. This technique will often enable you to maintain an open airway without moving the patient. This technique has several advantages:

1. You do not have to enter the automobile.
2. You can easily monitor the patient's carotid pulse and breathing patterns by using your fingers.
3. It stabilizes the patient's cervical spine.
4. It opens the patient's airway.

Figure 6-36 Airway management in a vehicle. **A.** To open the airway, place o
back of the patient's head. **B.** Raise the head to a neutral position to open the

Case studies are followed by a summary of answers to the critical-thinking questions, as well as:
- **Additional signs and symptoms commonly associated with the patient's injury or condition**
- **Information and justification for each treatment modality**

You are the Provider: SUMMARY

You are the Provider: CASE 1

1. **What is the next step you should take to assess and treat this patient?**

   By asking the woman if she can hear you and by gently shaking her shoulder, you have checked for responsiveness. Because she is unresponsive, your next step is to open the woman's airway by using the head tilt-chin lift maneuver or the jaw-thrust maneuver.

2. **How would your method of opening the patient's airway change if the patient had fallen or blacked out?**

   The method for opening the patient's airway is dependent on the patient's condition. If the patient has fallen or may have sustained an injury to the head or neck, you should first use the jaw-thrust maneuver to try to open the airway. For patients who have not been injured, you should use the head tilt-chin lift maneuver to open the airway.

You are the Provider: SUMMARY, continued

3. **What techniques can you use to maintain an open airway?**

   After opening a patient's airway, you can use the head tilt-chin lift maneuver or the jaw-thrust maneuver to maintain the airway. Other ways of maintaining the patient's airway include inserting an oral airway, inserting a nasal airway, or placing the patient in the recovery position.

You are the Provider: CASE 2

1. **What should you do before attempting to insert the airway?**

   You will first need to check the sizing of the airway before trying to insert it. Do this by measuring from the patient's earlobe to the corner of his mouth.

2. **What are the benefits of using an oral airway?**

   Airways can help maintain a patent airway, allowing EMS personnel to perform rescue breathing with a pocket mask or a bag-mask device.

3. **What should you do if the patient starts choking after the airway has been inserted?**

   Oral airways can be used only in an unconscious patient without a gag reflex. If the person begins to choke, immediately remove the airway.

You are the Provider: CASE 3

1. **When should you activate the EMS system?**

   Because you are alone, you will go through five cycles of CPR before leaving the child to summon EMS. If someone else comes along, have them immediately contact EMS while you perform CPR.

2. **How would your actions change if instead of a child, the person who collapsed was an elderly adult?**

   You would alert EMS first, then perform CPR.

3. **Do you have a duty to act?**

   No, you do not have a duty to act. Duty to act requires those EMS personnel actually working at the time to engage in an emergency situation.

You are the Provider: CASE 4

1. **What would be the most effective way to deliver oxygen to the man?**

   Given the man's inability to speak in full sentences and obvious difficulty breathing, using a nonrebreathing mask would be the best choice. A nonrebreathing face mask can deliver oxygen concentrations as high as 90%.

2. **Suddenly the man starts vomiting. What should you do?**

   You should use either a manual or mechanical suctioning device to clear out the man's mouth, being careful not to suction for more than 15 seconds at a time.

Prep Kit

Ready for Review

- The main purpose of the respiratory system is to provide oxygen and to remove carbon dioxide from the red blood cells as they pass through the lungs. The... the respiratory system in children and infa... than they are in adults. Thus, the air passa... and infants may be more easily blocked b... by foreign objects.
- When a patient experiences possible respiratory arrest, check for responsiveness; open the blocked airway using the head tilt–chin lift or jaw-thrust maneuver; check for fluids, solids, or dentures in the mouth; and correct the airway, if needed, using finger sweeps or suction.
- Maintain the airway by continuing to manually hold the airway open, by placing the patient in the recovery position, or by inserting an oral or a nasal airway. Check for breathing by looking, listening, and feeling for air movement, and correct any problems by using mouth-to-mask or mouth-to-barrier device, bag-mask device, or by performing mouth-to-mouth rescue breathing. It is important to use the correct sequence for adults, children, and infants.
- If the airway is obstructed in a conscious adult or child, kneel or stand behind the patient and perform the Heimlich maneuver. Give abdominal thrusts until the obstruction is relieved or the patient becomes unconscious. For an unconscious adult or child with an airway obstruction, perform chest compressions. Move to the head, open the airway, and look in the patient's mouth. Do not perform a finger sweep—regardless of the patient's age—unless you can see the object. Attempt ...breathing again. If the airway is still obstructed, ...t compressions, visualization of the mouth, ...ion attempts until the obstruction is relieved.
- ...ng supplemental oxygen to patients showing ... symptoms of shock increases the amount of ... delivered to the cells of the body and often makes a positive difference in the patient's outcome. Patients who have experienced a heart attack or stroke or patients who have chronic heart or lung disease may also benefit from receiving supplemental oxygen.
- Pulse oximetry is used to assess the amount of oxygen saturated in the red blood cells.

Summarizes chapter content in a comprehensive bulleted list.

Vital Vocabulary

airway The passages from the openings of the mouth and nose to the air sacs in the lungs through which air enters and leaves the lungs.

airway obstruction Partial (mild) or complete (severe) obstruction of the respiratory passages resulting from blockage by food, small objects, or vomitus.

alveolar ventilation The exchange of oxygen and carbon dioxide that occurs in the alveoli.

Prep Kit, continued

alveoli The air sacs of the lungs where the exchange of oxygen and carbon dioxide takes place.

aspirator A suction device.

bag-mask device A patient ventilation device that consists of a bag, one-way valves, and a face mask.

bronchi The two main branches of the windpipe that lead into the right and left lungs. Within the lungs, they branch into smaller airways.

capillaries The smallest blood vessels that connect small arteries and small veins. Capillary walls serve as the membrane to exchange oxygen and carbon dioxide.

cardiopulmonary resuscitation (CPR) The artificial circulation of the blood and movement of air into and out of the lungs in a pulseless, nonbreathing patient.

cricoid pressure Posterior pressure applied to the cricoid cartilage to minimize gastric distention in a nonb... patient who is receiving positive pressure rescue... with a bag-mask device. This technique mini... tric distention and reduces the risk of vomiting... called the Sellick maneuver.

esophagus The tube through which food passes. It s... throat and ends at the stomach.

external cardiac compressions A means of applying artificial circulation by applying rhythmic pressure and relaxation on the lower half of the sternum.

gag reflex A strong involuntary effort to vomit caused by something being placed or caught in the throat.

face mask A clear plastic mask used for oxygen administration that covers the mouth and nose.

flowmeter A device on oxygen cylinders used to control and measure the flow of oxygen.

head tilt–chin lift maneuver Opening the airway by tilting the patient's head backward and lifting the chin forward, bringing the entire lower jaw with it.

Heimlich maneuver A series of manual thrusts to the abdomen to relieve an upper airway obstruction.

jaw-thrust maneuver Opening the airway by bringing the patient's jaw forward without extending the neck.

lungs The organs that supply the body with oxygen and eliminate carbon dioxide from the blood.

...jaw.

...vices Hand-powered devices used for ...r airway of mucus, blood, or vomitus.

...device A battery-powered pump or an ...ed aspirator device used for clearing the ...y of mucus, blood, or vomitus.

minute ventilation The amount of air pulled into the lungs and removed from the lungs in one minute.

Provide a list of key terms and definitions from the chapter.

Prep Kit, continued

mouth-to-mask ventilation device A piece of equipment that consists of a mask, a one-way valve, and a mouthpiece. Rescue breathing is performed by breathing into the mouthpiece after placing the mask over the patient's mouth and nose.

mouth-to-stoma breathing Rescue breathing for patients who, because of surgical removal of the larynx, have a stoma.

nasal airway An airway adjunct that is inserted into the nostril of a patient who is not able to maintain a natural airway. It is also called a nasopharyngeal airway.

nasal cannula A clear plastic tube, used to deliver oxygen, that fits onto the patient's nose.

nasopharynx The posterior part of the nose.

oral airway An airway adjunct that is inserted into the mouth to keep the tongue from blocking the upper airway. It is also called an oropharyngeal airway.

oropharynx The posterior part of the mouth.

oxygen A colorless, odorless gas that is essential for life.

pocket mask A mechanical breathing device used to administer mouth-to-mask rescue breathing.

pulse oximeter A machine that consists of a monitor and a sensor probe that measures the oxygen saturation in the capillary beds.

pulse oximetry An assessment tool that measures oxygen saturation in the capillary beds.

rescue breathing Artificial means of breathing for a patient.

respiratory arrest Sudden stoppage of breathing.

Sellick maneuver Posterior pressure applied to the cricoid cartilage to minimize gastric distention in a nonbreathing patient who is receiving positive pressure rescue breathing with a bag-mask device. This technique minimizes gastric distention and reduces the risk of vomiting. It is also called cricoid pressure.

stoma A surgical opening in the neck that connects the windpipe (trachea) to the skin.

trachea The windpipe.

Assessment in Action

You are dispatched to a local park for a report of a woman who ran into a tree while roller skating. She was wearing a helmet. You can see she is bleeding heavily from a laceration on her knee. She is unresponsive. A friend skating with her says she tried to wake the woman up, but she was unable to rouse her.

A short case study with both critical-thinking and multiple-choice questions allows students to synthesize and apply what they have learned in the chapter.

1. Your first step in assessing this patient should be to:
   - **A.** shake her shoulder.
   - **B.** check her pulse.
   - **C.** check for breathing.
   - **D.** establish her level of responsiveness.

2. If you are not able to get air into the woman the first time, what should be your next step?
   - **A.** Roll her onto her side.
   - **B.** Attempt the jaw-thrust maneuver again and try to ventilate.
   - **C.** Give a bigger rescue breath.
   - **D.** Give abdominal thrusts.

3. From what you have learned about the respiratory system, what is the normal breathing rate for an adult?
   - **A.** 4 to 10 times a minute
   - **B.** 12 to 20 times a minute
   - **C.** 22 to 30 times a minute
   - **D.** 31 to 50 times a minute

4. The woman starts to vomit. You now need to place her on her side to ensure she does not choke. How should you do that?
   - **A.** Grab her arms and pull her over.
   - **B.** Log roll her onto her side while making sure her head, neck, and spine are aligned.
   - **C.** Turn her head to the side.
   - **D.** Lift her to a semireclining position and start suctioning.

5. Supplemental oxygen is kept in cylinders and stored at 2,000 psi. What device reduces the pressure for use in the field?
   - **A.** A gas gauge
   - **B.** A nasopharynx airway
   - **C.** A pressure regulator and flowmeter
   - **D.** A nasal cannula

6. Given the t… …en the patient's air…

7. The woma… …. What should you…

8. Which parts of the body are used in breathing?

9. What signs would tell you the patient is not breathing adequately?

10. How would you treat the woman differently if she had a stoma?

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