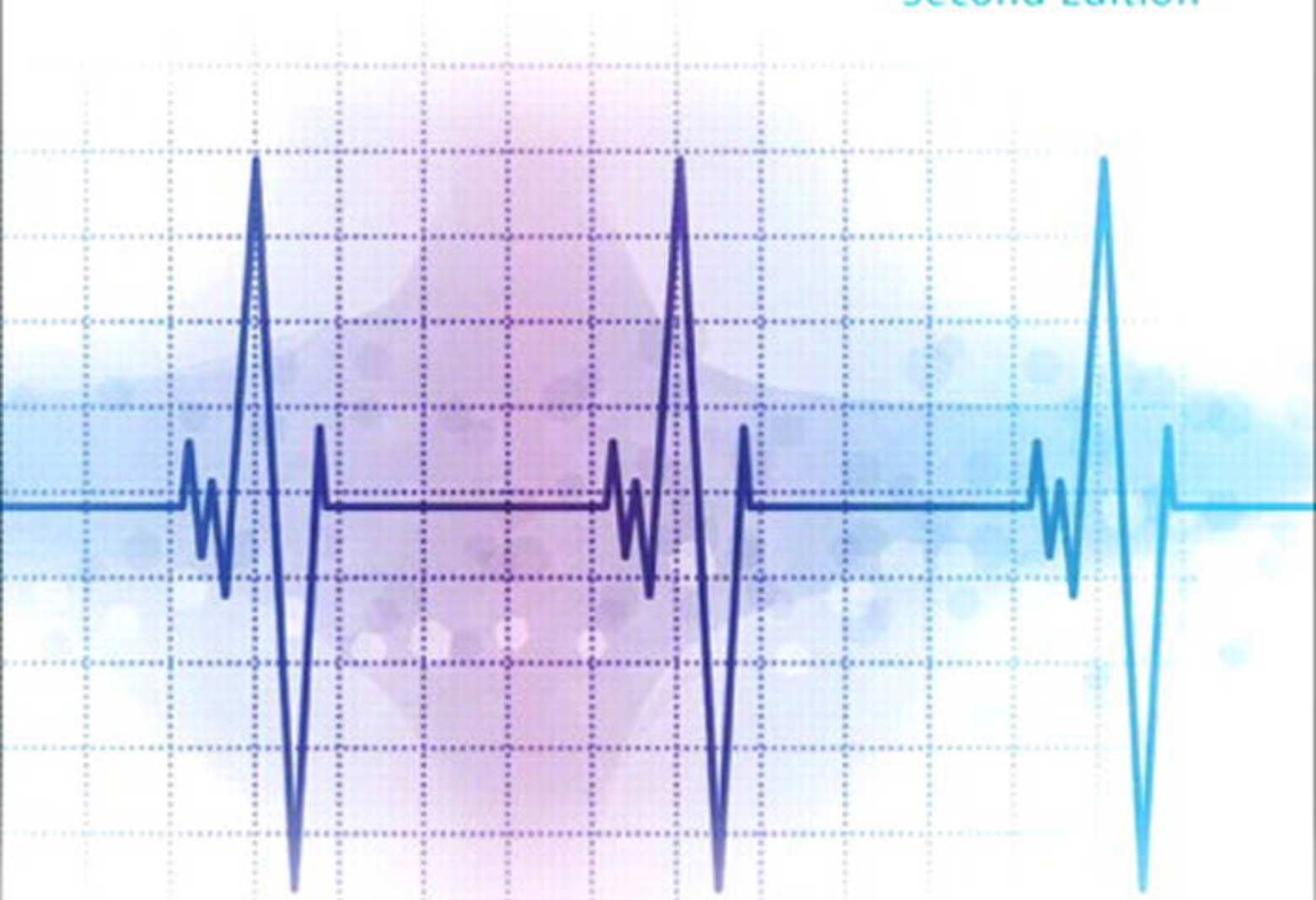
MEDICAL EMERGENCIES

Essentials for the Dental Professional

Second Edition



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Medical Emergencies

Essentials for the Dental Professional

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Dedication

This book is dedicated to my husband, Jeff, my family, friends, colleagues, and students for their support and encouragement during the writing of the first and second editions. I am so very fortunate to have you all in my life.

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Contents

Preface

I considered writing this book for some time as I saw a need for a concise yet complete textbook on medical emergencies for the dental professional and particularly for dental hygiene and dental assisting students. I knew that the writing must be easily understandable, practical, and readily applicable to the dental clinical setting. I hope readers will find the second edition of this text meets all of these criteria.

The purpose of this book is to present fundamental information regarding medical emergencies that may be encountered in the dental practice setting. Presently, there are few textbooks on medical emergencies. The ones that are available either tend to be extremely detailed or are so simplistic that they do not provide the essential knowledge that will enable dental professionals to adequately diagnose and treat patients in emergency situations.

Following an introductory chapter and chapters discussing vital signs and the emergency kit, the chapters are sequenced according to the body system affected by the emergency. Although almost all emergencies are potentially fatal, this text begins with the neurological emergencies and leads off with syncope, which is the most common and an often benign medical emergency. It then progresses to cardiac, respiratory, endocrine, and bleeding emergencies. Two of the three final chapters discuss emergencies that are particular to individuals in the dental profession (intraocular foreign object and broken instrument tip). The final chapter discusses drug toxicity, which is becoming more prevalent in dental offices because of increased drug use in U.S. society.

In this text, many chapters begin with a "Case Scenario" whose purpose is to allow readers to apply their critical thinking strategies to the signs and symptoms presented by the hypothetical patient and determine from which medical emergency the patient might be suffering. This section is followed by an "Introduction" to the emergency. For example, in the discussion of diabetes-related emergencies in Chapter 16, a thorough review of diabetes is presented so that the reader has the key information related to the disease. The next section reports the "Signs and Symptoms" that are usually exhibited by a patient experiencing this emergency. In addition, some differential diagnosis information is described in this section to help readers better determine other emergencies that exhibit similar symptoms. The appropriate "Treatment" for the emergency is presented in the next section. All chapters end with a "Conclusion" (and Case Resolution section, for chapters with case studies), which pulls together all the pertinent information presented in the chapter and related to the case studies scenario. In each chapter, there is a flowchart that uses the acronym R.E.P.A.I.R. to help the practitioner understand each step involved in a medical emergency. *R* represents *r*ecognizing the signs and symptoms; *E* represents *e*valuating the patient's level of consciousness and vital signs; *P* represents *p*lacing the patient in the appropriate position; *A* represents the CABs (*c*irculation, *a*irway, and *b*reathing) of cardiopulmonary resuscitation; *I* represents *i*mplementing the appropriate emergency treatment; and the second *R* represents *r*eferring the patient to the appropriate healthcare professional, if necessary. A "Review Question" section provides multiple-choice questions to ensure a thorough grasp of the material presented. Lastly, references used to develop the text are included in the "Bibliography" section.

The information presented in this text provides the reader with a working knowledge of medical emergencies and may help the dental practitioner prevent serious debilitation or save a patient's life.

New to This Edition

Medical Emergencies: Essentials for the Dental Professional has been revised so that it provides for an even more valuable teaching and learning experience. Here are the enhancements we have made:

- New full color design with color photos and illustrations to capture the attention of students and enhance their overall learning experience.
- Videos depicting several of the most common medical emergencies students may encounter when going into practice.
- New images have been included to help learners better visualize the concepts presented in the text.
- Additional information and clarification in the vital signs chapter (chapter 3) which will allow students to have better grasp of this important topic.

Acknowledgments

I would like to acknowledge several people for their support in the preparation of this textbook:

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My assisting editor, Nicole Ragonese, who assisted me through the second edition process.

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My parents, Norman and Shirley Briggs, who provided me with the education I needed to write this textbook.

My husband, Jeffrey Grimes, who has continuously supported all of my professional endeavors.

I would also like to thank the reviewers for this second edition. Their keen insights aided in strengthening the text.

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1

Introduction

Medical emergencies can and do occur in the dental setting. The most common emergency reported was **syncope** (50%), followed by mild allergic reaction (8%), **angina pectoris** (8%), and **orthostatic hypotension** (8%). Medical emergencies were most likely to occur after the administration of **local anesthetics** and during tooth extraction or endodontic treatment. Approximately one-third of all medical emergencies in the dental office are potentially life threatening. It is predicted that due to the increasing age of the patient population, as well as advances in healthcare (such as pharmaceuticals, surgery, and life-prolonging treatments), there will be an increase in the number of medical emergencies seen in the dental setting; therefore, it is essential that all dental office personnel be familiar with the prevention and management of medical emergency situations and can effectively manage such situations until the patient can be transported to a medical facility.

There are some procedures that may help in preventing emergencies, such as taking a thorough and accurate medical history and taking and recording vital signs. Preparation for a medical emergency in the dental office is essential. This chapter discusses procedures for medical emergency prevention and preparation.

Medical History

Taking a complete and accurate medical history is essential to the possible prevention of a medical emergency. Often a patient will report a medical condition that should signal the dental practitioner of the increased risk of a possible emergency. Examples of medical conditions for which the medical history provides important evidence include, but are not limited to, the following:

- **A heart condition**—Be alert to a myocardial infarction (MI), congestive heart failure, or cerebrovascular accident (CVA).
- **Asthma**—Be alert to a possible asthma attack.
- **A stroke, frequent headaches, or dizziness**—Be alert to a possible CVA.
- **Epilepsy**—Be alert to a seizure.
- **Thyroid problems**—Be alert to myxedema coma or thyroid storm.
- **Diabetes**—Be alert to hypoglycemia or diabetic coma.
- **Corticosteroid use**—Be alert to signs of adrenal insufficiency.
- **Allergy**—Be alert to an allergic reaction.
- **Bleeding disorders**—Be alert to signs of bruising, hemorrhage, or hemophilia.

If patients report any of these conditions on their medical history, the dental practitioner should dialogue with the patient further to gain information for the prevention of a medical emergency. The frequency, severity, and triggers of the condition should be assessed to determine the likelihood of an emergency and/or to postpone treatment until the patient has been examined by his or her medical physician or the treatment provided has been modified in light of the patient's condition.

Vital Signs

Another important aspect in the prevention and management of medical emergencies is the taking and recording of the patients' vital signs. Vital signs include pulse, respiration, blood pressure, and temperature. These topics will be discussed extensively in Chapter 3. Hypertensive or hypotensive patients are more likely to experience various medical emergencies. This is also true for patients who exhibit **tachycardia**, **bradycardia**, **tachypnea**, **bradypnea**, or **dyspnea**.

ASA Physical Status Classification

A classification system to determine a patient's physical status was developed by the American Society of Anesthesiologists (ASA) and was amended in 1962 at the ASA's House of Delegates. (See Table 1.1 ■) This system is still used today and is as follows:

Table 1.1 ASA PS Classifications

ASA PS Classification	Patient Characteristics	Examples of Conditions
ASA PS I	Normal healthy patient	
ASA PS II	Mild systemic disease	Controlled type 2 diabetes Controlled epilepsy Controlled hypertension (Stage 1) Allergies Fearful dental patient Pregnancy
ASA PS III	Severe systemic disease that limits activity but is not incapacitating	Stable angina Myocardial infarction (MI) longer than six months ago Controlled type 1 diabetes Renal failure Controlled heart failure Poorly controlled hypertension with BP > 160/100 (Stage 2) Morbid obesity
ASA PS IV	Incapacitating systemic disease that is a constant threat to life	MI or CVA within past six months Unstable angina Heart failure Uncontrolled diabetes Uncontrolled epilepsy Hypertension with blood pressure > 180/110 Uncontrolled thyroid conditions
ASA PS V	Moribund patient not expected to survive 24 hours with or without operation	Multiorgan failure Poorly controlled coagulopathy Sepsis with hemodynamic instability
ASA PS VI	A declared brain-dead patient whose organs are being harvested for donation	

ASA PS I: Normal, healthy patient. No organic, physiologic, or psychiatric disturbance; excludes the very young and very old; healthy with good exercise tolerance.

ASA PS II: Patients with a mild systemic disease or a risk factor for a systemic disease, for example, tobacco use, alcohol abuse, mild obesity. No functional limitations; has a well-controlled disease. Patients who may be categorized as ASA PS II are those with controlled hypertension or type 2 diabetes without systemic effect, cigarette smoking without **chronic obstructive pulmonary disease** (COPD), mild obesity, pregnancy.

ASA PS III: Patients with a severe systemic disease with some functional limitations; a controlled disease of more than one body system; no immediate danger of death. Patients who may be categorized as ASA PS III are those with controlled heart failure, stable angina, controlled type 1 diabetes, poorly controlled hypertension, morbid obesity, chronic renal failure, poorly controlled asthma, and those who have had an MI longer than six months ago, but who have no signs or symptoms.

ASA PS IV: A patient with an incapacitating systemic disease that is a constant threat to life. These patients have at least one severe disease that is poorly controlled or at end stage and have a possible risk of death. Patients who may be categorized as ASA PS IV are those who have had an MI within the past six months and those who have unstable angina, symptomatic heart failure, COPD, or **hepatorenal** failure.

ASA PS V: A moribund patient not expected to survive without operation. Patients who may be categorized as ASA PS V are patients with multiorgan failure, poorly controlled coagulopathy, or sepsis with hemodynamic instability.

In the event of an emergency operation, precede the number with an E (e.g., E III) (American Society of Anesthesiologists, 1963).

ASA PS VI: A declared brain-dead patient whose organs are being harvested for donation.

The dental professional will commonly see patients classified as ASA PS I, II, and III. ASA IV and V classified patients will most likely be hospitalized or bedridden. ASA PS III patients are more likely to experience a medical emergency, and therefore the dental healthcare provider needs to be more alert to possible emergency situations and be prepared with a team approach for emergency management. In all cases a thorough and accurate medical history is a necessity and is required legally.

Regardless of the patient's ASA PS classification, the dental practitioner should be cognizant of the patient's external presentation. Behavior changes are common in many emergencies. For example, patients suffering from severe hypoglycemia often present with aggressive behavior. In addition, skin color should be noted. Hypoxia often manifests as a bluish tone to the skin tissues, whereas hypertensive individuals may appear flushed or red.

Preparation for Medical Emergencies in the Dental Office

Dental professionals should be prepared for any emergency that might occur in their office. A well-equipped medical emergency kit, automated external defibrillator (AED) unit, and a portable oxygen tank are a necessity and will be discussed in subsequent chapters.

Current cardiopulmonary resuscitation (CPR) training for all dental professionals is imperative to appropriately treat any medical emergency in or out of the dental office and is required by many state dental and dental hygiene practice acts. As CPR guidelines change (new guidelines were released in 2010 by the American Heart Association), it is important that the dental practitioner continuously maintain a current healthcare provider CPR card and be familiar with CPR techniques for all age levels. In addition, clinicians should be trained on the proper use of the AED. Malamed (2010) states that CPR recertification every two years is not adequate to properly perform CPR. He recommends annual CPR training for dental office personnel.

Medical Emergency Simulations

Emergencies do not occur on a regular basis and can happen without warning, so practicing simulated medical emergencies within the office is an important preparatory step. These simulations ensure that each individual understands his or her role should an emergency arise and will reduce the anxiety associated with emergency situations when they do occur.

A recommended format for the emergency team structure is as follows: (See Table 1.2 ■)

Table 1.2 Emergency Team Structure

Person	P1, P2 , P3, OR	Responsibility
Person 1	P1	Stays with patient; performs appropriate emergency treatment
Person 2	P2	Assists P1; takes vital signs and administers oxygen, records events and time of medication delivery
Person 3	P3	Retrieves emergency kit; prepares emergency drugs
Office receptionist	OR	Makes necessary phone calls

The person in whose operatory the emergency is occurring is Person 1 (P1) and stays with the patient and performs the appropriate treatment. The next most available person is Person 2 (P2), who assists P1 directly and is responsible for taking vital signs and administering oxygen. In addition, P2 is responsible for recording events, such as time at which vital signs were taken and the results, amount of oxygen provided, medications administered, and dosages. P2 also informs P1 of time elapsed since any medications were administered. Other items that should be recorded are time Emergency Medical Services (EMS) is contacted if necessary and by whom. The date and time of the event should also be documented. A sample emergency treatment record is included as Figure 1.1 ■. The next available person (P3) retrieves the emergency kit, prepares emergency drugs, and does whatever else P1 decides. The office receptionist is responsible for making all necessary phone calls.

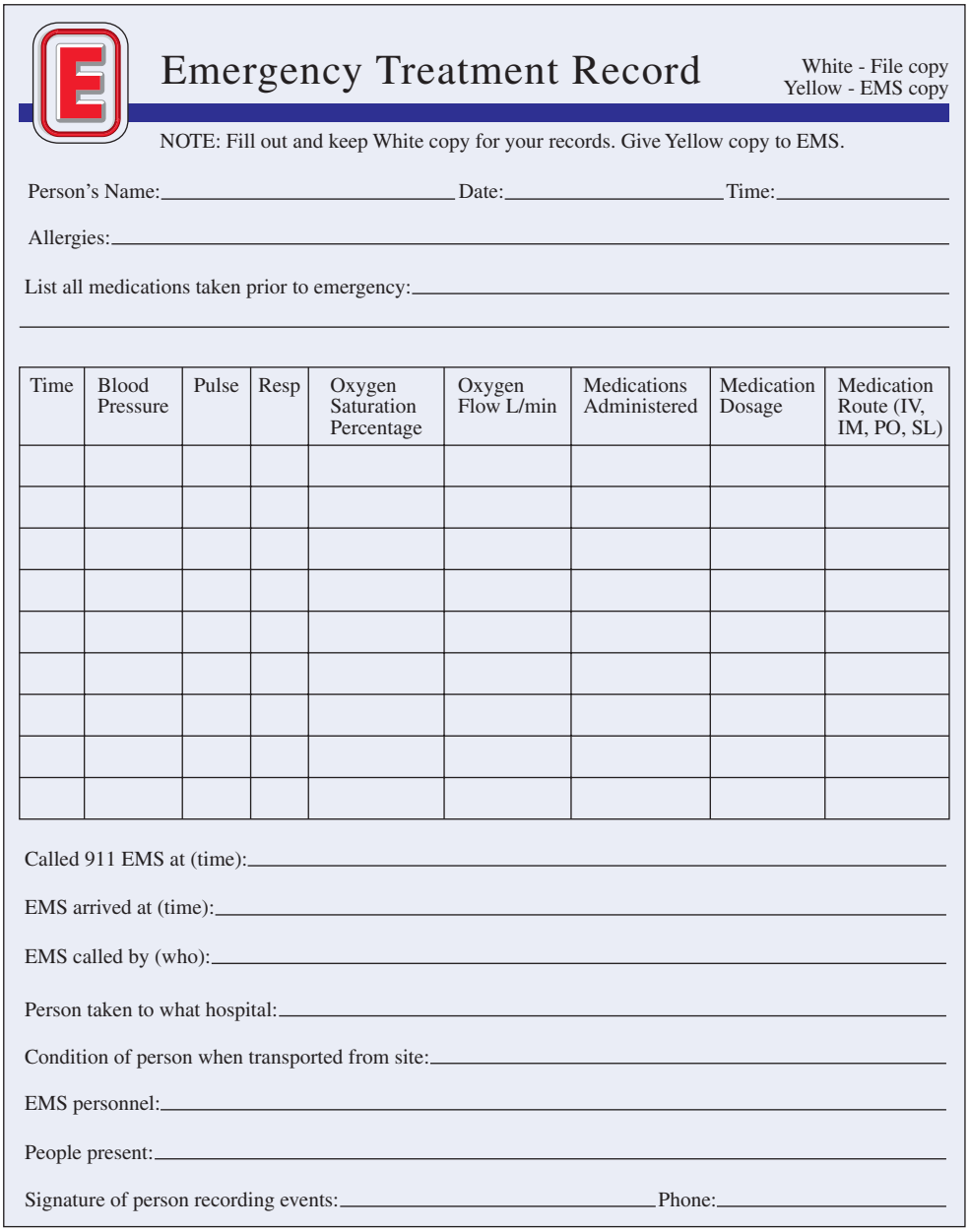
Accurate communication between personnel during a medical emergency situation is essential. The American Heart Association (2006) recommends using a closed-loop approach whereby P1 sends instruction to P2, P3, or the office receptionist and the recipient acknowledges that he or she has understood the message, thereby reducing ambiguity. For example, P1 would say to P3, "Please get the emergency kit." P3 would respond "I am getting the emergency kit." Remaining calm and working as a team is extremely important in managing medical emergencies.

Management of Medical Emergencies

This text will utilize the R.E.P.A.I.R. system for the management of medical emergencies: **R**, recognize the signs and symptoms of the emergency and stop all treatment; **E**, evaluate the patient's level of consciousness; **P**, place the patient in the appropriate position; **A**, activate the CABs of CPR by checking the circulation, airway, and breathing; **I**, implement the appropriate emergency protocol for the specific emergency; and **R**, refer the patient to the appropriate healthcare professional, if necessary. If dental healthcare providers are unsure if they are able to handle an emergency that is occurring, they should not hesitate to seek medical assistance by contacting EMS by calling 9-1-1. Essentially dental healthcare providers are responsible for keeping the patient alive until someone with more training arrives.

Continuing Education Courses

Attending continuing education courses that review proper treatment of medical emergencies will help the dental professional be better prepared to handle emergency situations. In addition, education will ensure that the practitioner has the most current information available regarding the prevention and management of medical emergencies.



Emergency Treatment Record

White - File copy
Yellow - EMS copy

NOTE: Fill out and keep White copy for your records. Give Yellow copy to EMS.

Person's Name:_____ Date:_____ Time:_____

Allergies:_____

List all medications taken prior to emergency:_____

_____

Time	Blood Pressure	Pulse	Resp	Oxygen Saturation Percentage	Oxygen Flow L/min	Medications Administered	Medication Dosage	Medication Route (IV, IM, PO, SL)

Called 911 EMS at (time):_____

EMS arrived at (time):_____

EMS called by (who):_____

Person taken to what hospital:_____

Condition of person when transported from site:_____

EMS personnel:_____

People present:_____

Signature of person recording events:_____ Phone:_____

FIGURE 1.1 Emergency treatment record. © Institute of Medical Emergency Preparedness.

Conclusion

Taking and recording an accurate medical history and checking and recording vital signs are critical steps in preventing medical emergencies in the dental office. All dental office staff need to be prepared in the event of an emergency; such preparation includes current CPR certification, practice in office emergency drills, and participation in didactic and clinical continuing education courses in medical emergencies. Skill in using the emergency kit and administering oxygen is essential for managing medical emergencies.

Review Questions

1. Your patient is a controlled type 2 diabetic. What ASA PS classification would you assign to this patient?

   A. I
   B. II
   C. III
   D. IV

2. The person who records all medications provided to the patient is

   A. P1
   B. P2
   C. P3
   D. office receptionist

3. The most common medical emergency that occurs in the dental office is

   A. angina pectoris
   B. myocardial infarction
   C. syncope
   D. obstructed airway

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2

The Emergency Kit

LEARNING OBJECTIVES

Upon reading the material in this chapter, the reader will be able to:

- ☑ Explain the essential components of an emergency kit in the dental office.
- ☑ List the nonessential components of an emergency kit in the dental office.
- ☑ Discuss adult and pediatric doses of essential emergency drugs.

Introduction

The emergency kit in a dental office should be custom designed and readily available for use. There are numerous commercial emergency kits available, and they do offer automatic shipping of drugs as they near their expiration date. In many instances they do not meet the individual needs and capabilities of every dental team; therefore, development of a self-designed emergency kit is the most desirable approach to meet these requirements. In addition, it is usually more cost-effective to purchase emergency equipment and drugs separately.

The emergency kit should be mobile or transportable with an easily accessible oxygen apparatus. It should include a manual with emergency telephone numbers, names of persons responsible for the emergency kit update and emergency drills, emergency protocol, and an emergency treatment record. (See Figure 2.1 ■)

The key to designing an emergency kit is simplification. The simpler the kit, the more likely the dental professional will remember how to use the material included in the kit in an emergency situation. This chapter explains the equipment and drugs that are recommended for inclusion in the kit; however, the dental team should choose only those materials with which they are most familiar and willing to use. Moreover, the location of the dental office should be considered. An office proximal to a hospital emergency room or close to the Emergency Rescue Service need not contain numerous injectable drugs. Conversely, an office located in a rural setting should contain a full complement of injectable drugs because it will take considerable time for an emergency rescue squad to arrive at the office.

Fortunately, the majority of dental office emergencies can be handled without the use of injectable drugs. First and foremost in the management of these situations is basic life support. It is only after life-support steps have been taken that the use of drugs should be considered. One exception to this is in the management of an acute allergic reaction. In this situation, immediate injection of epinephrine followed by a histamine blocker is required.

FIGURE 2.1 Emergency drug kit.