Medical Emergencies Management and Risk Management: Medical Error Prevention

The Academy of Dental Learning and OSHA Training, LLC, designates this activity for 6 continuing education credits (6 CEs).

MaryLou Austin, RDH, MS
Michelle Jameson, RN, MS

Health Science Editor: Megan Wright, RDH, MS

Publication Date: August 2013
Updated Date: May 2017
Expiration Date: June 2020

The Academy of Dental Learning and OSHA Training, LLC is an ADA CERP Recognized Provider. ADA CERP is a service of the American Dental Association to assist dental professionals in identifying quality providers of continuing dental education. ADA CERP does not approve or endorse individual courses or instructors, nor does it imply acceptance of credit hours by boards of dentistry. Concerns or complaints about a CE provider may be directed to the provider or to the Commission for Continuing Education Provider Recognition at ADA.org/CERP.

Conflict of Interest Disclosure: ADL does not accept promotional or commercial funding in association with its courses. In order to promote quality and scientific integrity, ADL’s evidence-based course content is developed independent of commercial interests. Refund Policy: If you are dissatisfied with the course for any reason, prior to taking the test and receiving your certificate, return the printed materials within 15 days of purchase and we will refund your full tuition. Shipping charges are nonrefundable.

California Registered Provider Number RP5631
Answer Sheet: Medical Emergencies Management and Risk Management: Medical Error Prevention

2. _____   7. _____   12. _____   17. _____   22. _____
5. _____   10. _____   15. _____   20. _____   25. _____

Name: ____________________________________________ Profession: ________________________________

License State: _________ License Number: _______________ Expiration Date __________

Address ____________________________________________

City: ___________________________ State: _______ Zip Code: ________________

Telephone: ___________________________ Fax: ________________________________

E-mail: ____________________________________________

If you have downloaded the course and printed the answer sheet from the Internet please enter payment information below.

Card type: _______________ Card Number: ________________________________

Exp. Date: _____________ Name as it appears on card: __________________________

*To enter your answers online you MUST return to our website www.dentallearning.org.

Return answer sheet:

- Via fax: 518.514.1103
- Via email: CESupport@dentallearning.com
- Postal Mail: ADL, PO Box 14585, Albany, NY 12212

***PLEASE PRINT CLEARLY; ILLEGIBLE ANSWER SHEETS WILL NOT BE PROCESSED.

Notes:
# Course Evaluation

<table>
<thead>
<tr>
<th>Please place an X in the box to rate these statements:</th>
<th>Poor</th>
<th>Fair</th>
<th>Good</th>
<th>Very Good</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>The content fulfills the overall purpose of the course.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The content fulfills each of the course objectives.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The course subject matter is accurate.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The material presented is understandable.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The teaching/learning method is effective.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The answers to the test questions are appropriately covered in the course.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How would you rate this course overall?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time to complete the entire course and the test?</td>
<td>Hours: _________</td>
<td>Minutes: ________</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Google</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Search Engine</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Friend/Coworker</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Do you have any suggestions about how we can improve this course? If so please note them on a separate sheet of paper and send it in with your answer sheet.

If you studied the course online, did all the links work? If not please note the page and link on a separate sheet of paper and send it in with your answer sheet so we can fix it.
Instructions

1. Review the Objectives: Objectives provide an overview of the entire course.
2. Read the course material.
3. Complete the test:
   a. Return to our website: www.dentallearning.org, click on Take the Exam, enter your answers, register, if you are new customer (existing customers login), pay for the course, click Grade Test. Your test will be graded immediately. If required, complete the course evaluation. Your certificate will display for you to print.
   b. If you would rather, you may return your completed answer sheet and course evaluation to us via the options listed below.

To successfully complete the course you must score 80% or above on the test. If you do not score 80% you may retake the test one more time free of charge. If you fail a second time you must purchase a new course and test.

If you’ve downloaded this coursebook off the Internet you can:
   • Return to our website (www.dentallearning.org) to take the test online (only if you have not purchased the coursebook separately). You will need to provide credit card information at the time you submit your test online for scoring.
   • Write your answers on the one-page answer sheet included in this book, complete the credit card payment information, and return the form to the address below, fax, or email address below. Or, you may send a check or money order to the address below with your answer sheet.
     Academy of Dental Learning and OSHA Training, LLC (ADL)
     P.O. Box 14585
     Albany, NY  12212
     Fax:  518-514-1103
     Email: CESupport@dentallearning.org

Answer sheets received without payment will not be processed.

We grade all tests in a timely manner; if you do not receive your certificate within five days, please email (CESupport@dentallearning.org) or call us: 518-209-9540.

There is no time limit for return of your answer sheet. Completion dates are taken from the envelope postmark or the finish date recorded in the computer when you do an online exam. Tests MUST be completed in the licensing cycle you wish to use the credits.

If you are dissatisfied with the course for any reason, prior to taking the test and receiving your certificate, return the printed materials within 15 days of purchase and we will refund your full tuition. Shipping charges are nonrefundable.
If someone else would like to use this material after you are done, he or she may register with us and take advantage of a “sharing discount”. Courses downloaded from the Internet can be shared at the same tuition rate as currently available on our website. Please call us if you need an extra answer sheet or download one from our website. There is no “sharing discount” for online exams.

The author and ADL have made every effort to include information in this course that is factual and conforms to accepted standards of care. This course is not to be used as a sole reference for treatment decisions. It is your responsibility to understand your legal obligations and license requirements when treating patients. ADL is not responsible for the misuse of information presented in this course. The material in this course cannot be reproduced or transmitted in any way without the written consent of ADL.
# Table of Contents

Answer Sheet ........................................ 1  
Evaluation ........................................... 2  
Instructions ......................................... 3  
Table of Contents ..................................... 5  
Educational Objectives ............................... 6  
Introduction ......................................... 6  
Preparation for Emergencies ....................... 8  
Health Assessment ................................... 9  
Vital Signs ........................................... 10  
Emergency Training .................................. 13  
Office Emergency Plan ............................... 15  
Anxiety Reduction .................................... 16  
Recognition of an Emergency and Initial Emergency Procedures 16  
Handling Specific Medical Emergencies ........ 17  
Emergency Kit ....................................... 24  
Emergency Treatment Records and Evaluation 30  
Legal Aspects ......................................... 31  
Medical Errors as Related to Dental Treatment 32  
Definition of Medical Errors and Commonly Used Terms 33  
The Medical Error Crisis ............................ 34  
The Process of Care: Best Diagnosis and the Treatment Plan 36  
Medical History ..................................... 38  
Medication Errors .................................... 40  
Legal and Ethical Considerations ................ 51  
Conclusion .......................................... 56  
References .......................................... 57  
Glossary ............................................. 58  
Course Exam ......................................... 63  

5
Educational Objectives

Upon completion of this course, the student will:

- Understand the steps to prepare the dental office for a medical emergency.
- Know the role of the current medical history and patient vitals.
- Identify the most common dental office medical emergencies & the protocols for management.
- Review steps in administering CPR.
- Know the office emergency plan.
- Know the contents of a basic emergency kit.
- Understand the legal aspects of management of office emergencies.
- Define the following terms:
  - Errors of commission
  - Errors of omission
  - Errors of execution
  - Adverse events
  - Near misses
  - Diagnostic errors
  - Surgical/treatment errors
  - Medication errors
  - Malpractice
- Know the responsibilities of a dentist or dental health care attendant when an adverse event or error occurs.
- List proximal factors contributing to medical errors.
- List nine safety goals for dental practice.
- List the four elements of negligence.
- Understand why vicarious liability is an important legal issue in dental practice.

Introduction

This continuing education course is designed for all members of the dental staff as a comprehensive review of management of basic medical emergencies in the dental office—in order to fulfill requirements for license renewal. Many state dental boards require a course in medical emergency management and it is up to individual licensees to know their state board requirements.

Medical emergencies can occur at any time in the dental office. In a survey of 4,000 dental offices, 75 percent said they had treated medical emergencies in the last ten years. According to Dr. Anthony Feck, author of Preparing for Medical Emergencies in the Dental Office, a peer-reviewed publication written in 2012, “statistics tell us that
medical emergencies are 5.8 times more likely to occur in dental offices than in medical offices. This should not come as a surprise, given the number of patients dentists treat who have significant medical conditions that are not under good control, with invasive procedures complicated by a stressful environment where drugs are administered. Among the medical emergencies that do occur in dental offices, the 'just another day at the office' scenario, can, first and foremost, turn into a horrific life and death scenario, but, also, change the course of one’s career, if not prepared."

It is now estimated that the average dentist will have to deal with ten to twelve life-threatening medical emergencies in their office during their career. Knowing how to handle medical emergencies will make the dentist and office staff more confident in his or her ability to handle all aspects of the job.

Staff should be trained and frequently updated in first aid and cardiopulmonary resuscitation procedures. A written emergency plan should be available, and all staff members should be thoroughly familiar with it and their responsibilities in an emergency. This includes training of office personnel in handling emergencies, development and posting of office emergency guidelines, and maintenance of an emergency kit or “crash cart,” fully equipped and ready for immediate use.

Dental healthcare professionals have a responsibility to be aware of the risk of medical errors and to be proactive with strategies to prevent or minimize potential risk. The dental professional must be proactive in every controllable area to minimize risk of liability to the practice and more importantly, the absolute safety of the dental patient. In 1999 the Institute of Medicine (IOM) published an influential article entitled, To Err Is Human: Building a Safer Health System, which focused attention on the issue of medical errors and patient safety. The report indicated that as many as 44,000 to 98,000 people die in hospitals each year as the result of medical errors. Even using the lowest estimate, this would make medical errors the eighth leading cause of death in this country—a higher death rate than motor vehicle accidents (43,458), breast cancer (42,297) or AIDS (16,516). An estimated 7,000 people per year die from medication errors alone—about 16 % more deaths than the number attributable to work-related injuries. **Patient safety is the number one priority throughout healthcare today.**

American Dental Association studies show that in 2005, one third of reporting, adult patients experienced medical errors during dental treatment. This compares with 25% medical errors reported by patients in other countries. In 2006, in response to increasing incidences of medical errors, the American Dental Association’s House of Delegates adopted a resolution calling for pay-for-performance or other third-party financial incentive programs to compel the dental profession to adhere to high quality standards and best practices for patient safety (Made-to-Measure Dentistry).
Legal risks for doctors and dentists require that they carry malpractice insurance. However, preventing legal problems is primarily avoided by accident prevention. Medical errors are costly for healthcare professionals and for patients as well. And the overriding strategy is prevention.

Errors occur in hospitals and in other health care settings such as physicians’ offices, dental offices, nursing homes, pharmacies, urgent care centers, and care delivered in the home. Unfortunately, very little data exists on the extent of the problem outside of hospitals. The IOM report indicated many errors are likely to occur outside the hospital.

Dental professionals routinely perform procedures and administer medications that affect a patient’s health and safety. As we see from the IOM report, dentistry is not immune from accidents, errors, and patient injuries. As a dental healthcare professional, you are responsible to be aware of the risk of medical errors and learn strategies to minimize them. Medical errors may occur at any point in treatment, including preventive care.

Risk management and patient safety have always been a concern in dental practice. In our litigious society, exposure to liability seemingly increases every year. In routine dental care, patient injury or death is less frequent compared to our medical counterparts. Yet patient safety is as important in the dental operatory as it is in a hospital operating room. While dental practitioners do not perform life and death surgery, they perform procedures and administer medications that affect a patient’s total health and safety.

**Preparation for Emergencies**

Most emergencies can be prevented by adequate preparation of the patient and staff. The following are suggested guidelines:

1. Obtain a medical history on every patient and update it at each visit. Obtain physician consultation where necessary.
2. When confirming appointments, remind patients to take their normal medications on the day of their appointment. Procedures should be scheduled around meal times for diabetics. Patients using inhalers or nitroglycerin should have these with them in the event an asthma or angina attack is precipitated by the stress of dental treatment.
3. Staff members should be trained to monitor and interpret vital signs. These should be taken at the initial visit as a “baseline reading” and at each subsequent visit for those patients whose medical history indicates they may be “at risk.”
4. All staff members should be trained in basic first aid procedures and basic life support (CPR).
5. The office should have a written emergency plan. Each staff member should know and practice their particular function in an emergency, and emergency telephone numbers should be posted at each phone.

6. Staff members should be aware of the signs of stress and ways these can be alleviated.

7. Office personnel should be aware of the signs and symptoms indicating an emergency. Each office should have an emergency kit readily available and each staff member should know where it is located.

8. All staff should be aware of their legal responsibilities when responding to an office emergency.

**Health Assessment**

The increasing numbers of older patients with significant medical problems requiring dental care, longer dental appointments, and the increasing use of new medications with complex interactions all increase the risk of a life-threatening problem occurring in the dental office. The majority of medical emergencies in the dental office, however, can be anticipated and avoided with appropriate risk reduction. One key to reducing risk is to take a health history and vital signs to identify the “at risk” patient. In some cases, extensive procedures on “at risk” patients might be best performed in a hospital setting.

**Health History**

Prevention and preparation are often the best antidotes for an emergency. Begin by obtaining a good health history at the patient’s first visit. Sample forms can be obtained from the American Dental Association, from dental office supply companies, the Internet, and may even be included with computer software designed for the dental office. Each office may choose to review a number of forms or develop a health history form which works best for the practice.

The health history should include information regarding the patient’s past and present health status. It should also include questions indicating problems the patient may not be aware of, but which may alter treatment. The health history form should be completed in its entirety, and the assistant should obtain additional information on questions answered in the affirmative to a health concern. The completed questionnaire should then be reviewed and signed by the dentist prior to treatment.

A list of medication names and dosages that are currently prescribed to the patient should be ascertained. Additional questions should be asked regarding the use of herbal or street medicines.

Every staff member who may be involved with the treatment of a particular patient should be familiar with that patient’s health history and should review it before each
appointment.

To keep the health history current, the patient should be questioned about any changes in their general health since their last visit. This information may be obtained while they are seated in the operatory. The form should be signed or initialed by both the patient and the dentist.

**Vital Signs**

Obtaining vital signs provides a baseline measurement from which alterations in the patient’s condition can be determined. This is a practice not frequently seen in dental offices. Vital signs—blood pressure, pulse, respirations, and temperature—should be measured prior to each treatment.

**Temperature**

Taking a temperature as part of the vitals check will often indicate if the patient has an infection. An oral temperature in excess of 99.6°F Fahrenheit (37.5°C Centigrade) is a good indicator of the presence of a viral or bacterial infection.

The other vitals: pulse, blood pressure, and respirations—can be taken while the thermometer is in the patient's mouth, thus using little additional chair time.

Body temperature varies with location, and may be measured where most convenient. In the dental office, the oral reading is most frequently used. The four most common types of thermometers include:

1. Digital oral thermometer, used with plastic probe covers.
2. Tympanic (ear) thermometers give a reading to the oral temperature.
3. Disposable thermometer tapes.
4. Standard glass thermometer with a mercury column inside, used with plastic probe covers.

**Digital thermometers** are popular due to their convenience and fast reading. The battery must be checked regularly for proper use and accurate readings. The digital reading is displayed on a small LCD screen after approximately 30 seconds.

**A tympanic thermometer** registers the body's temperature by bouncing an infrared signal off the eardrum. The reading is accurate and received within a few seconds. One drawback is the initial price, ranging from $40 to $100 and higher.

**Disposable thermometer** tapes or strips can be used orally or axially. The strips are convenient but will give inaccurate readings if improperly stored near a heat source. To receive a reading, the strip is placed in the mouth or against the forehead and the liquid
crystals change color to indicate temperature.

The standard glass thermometer is the least expensive and may be calibrated in either degrees Fahrenheit or degrees Centigrade. These thermometers use mercury inside the glass cylinder to measure the temperature. Many states have banned their use because if broken, exposure to toxic mercury vapors can occur. If a glass thermometer is accidentally broken, a mercury clean-up kit should be used to prevent contamination. For this reason many offices are choosing to use thermometers without mercury.

Whenever the temperature is taken, the reading is recorded in the patient chart on the date of service. If the temperature is significantly elevated (>100°F), circle it in red to draw the dentist’s attention to it. A typical chart entry might read: 98.6°F oral 11-5-XX.

Pulse

The pulse is the pressure wave that can be felt as the heart contracts and propels a volume of blood forward in the arterial system. For routine measurement, the pulse in the radial artery in the wrist is most commonly used. The radial artery can be palpated on the thumb side of the anterior aspect of the wrist. Apply gentle pressure to the artery until the pulsations can be felt. Two or three fingers should be used to assess the pulse. Avoid using your thumb; you may be feeling (and counting) your own pulse rate and not that of the patient.

Three assessments can be made concerning the pulse:

1. rate
2. strength
3. regularity

The number of pulsations in fifteen seconds is counted and then multiplied by four to obtain the pulse rate. For adults, the pulse is usually in the 60-100 range. In adults, a pulse exceeding 100 beats per minute is termed tachycardia and bradycardia if less than 60 beats per minute. Variations from this range are common. A person who exercises or runs regularly may normally have a resting heart rate less than 60, while a patient anxious about dental treatment may have a rapid pulse. Retaking the pulse in a few minutes often results in a more accurate value.

The strength of the pulse is a rough measurement of the amount of blood ejected by the heart and the amount of constriction in blood vessels. A “weak, thready (small)” pulse is an indication of shock and low blood pressure, while a “bounding (strong)” pulse is an indication of anxiety or high blood pressure. Regularity is indicated by even spacing between the beats. An irregular pulse, which indicates a rhythm disturbance of the
heart, is seen in some patients and is usually not severe.

The patient’s pulse rate, strength, and regularity should be recorded on the patient’s chart, for example: 86 strong and regular.

In hypotensive or unresponsive patients, the carotid artery should be used to check for the presence of a pulse. To find the carotid artery, palpate the larynx in the midline and slide your fingers toward you into the groove formed by the border of the sternocleidomastoid muscle.

**Blood Pressure**

The circulatory system is a closed system. When the heart contracts, a volume of blood is propelled into the arterial system and is measured as the systolic blood pressure (systole means cardiac contraction). During relaxation of the heart, the amount of constriction (or squeeze) applied to the arteries and the volume of blood in them is measured as the diastolic pressure.

An instrument called a sphygmomanometer (blood pressure cuff) is used to measure blood pressure. The aneroid gauge (or mercury column) is calibrated in even numbers. When measuring blood pressure, it is important to select the proper cuff, as cuffs come in various sizes, including obese adult, adult, child and infant. Cuffs that are too small for the patient may give falsely high readings. In addition, remember that cuffs should not be placed over heavy or tight clothing.

With the patient seated, and their arm resting comfortably on a level surface (the cuff should be at the same level as the heart), apply the cuff to the upper arm about one inch above the flexion crease at the elbow. Center the bladder of the cuff over the brachial artery (usually an arrow marked “artery” can be found on the cuff label). Palpate the medial aspect of the antecubital space to detect the pulsation in the brachial artery. Place the stethoscope in your ears with the earpieces pointing toward the front of your head.

Next, place the diaphragm side of the stethoscope over the spot you have located and inflate the cuff rapidly until sounds are no longer heard in the artery. Inflate the cuff 20 mm Hg beyond this point, then gradually deflate the cuff while listening for “tapping” sounds in the artery. When the sounds are first heard regularly, this level is the systolic blood pressure. Note the reading on the gauge. Continue to deflate the cuff slowly.

The blood pressure is recorded on the patient’s chart as the systolic pressure over the diastolic pressure and also indicates the arm in which it was taken. A slight variation in blood pressure can occur between the arms; this is normal.
Systolic pressures less than 20 mm Hg of the patient’s normal reading may indicate hypotension. Since the diastolic pressure is the “resting” pressure of the heart, it is closely monitored for the development of hypertension. Several factors, including stress and anxiety, can raise the blood pressure and variations in blood pressure can be noted throughout the day. Before a diagnosis of hypertension is made, blood pressure should be taken on different days at different times.

Lowering blood pressure to less than 120/80 may help prevent other serious health problems as well.

**Respirations**

The respiratory rate is determined by the number of breaths in six or fifteen seconds. One breath or respiratory cycle consists of one inhalation and one exhalation. In many cases, if a patient knows someone is counting their respirations, he or she will unconsciously alter them. One easy method to measure the respiratory rate is to begin counting the rise and fall of the patient’s chest immediately after taking their blood pressure or pulse. With the stethoscope still in your ears, glance at the clock, shift your gaze toward the patient’s chest and begin counting. To obtain the respiratory rate, multiply the number of breaths in six seconds times ten (or the number of breaths in fifteen seconds times four).

A normal respiratory rate for an adult at rest is between twelve and twenty times per minute. Factors that can increase the respiratory rate include anxiety, fever, and hypoxia. Respiratory rates can increase with age due to decreasing lung elasticity. The respiratory rate will decrease with the use of narcotics, including Demerol® and morphine, as well as with the use of the benzodiazepines such as Valium® and Versed®. Note the rate, depth, and regularity of respirations on the patient’s chart; for example: 16 normal and regular.

**Emergency Training**

Every member of the dental team should have completed a basic first aid course and have annual training in cardiopulmonary resuscitation from the American Heart Association or American Red Cross. The CPR course for health care providers is recommended because it includes two-person CPR, child and infant CPR, and the use of a mask. Although in some states CPR refresher courses are required only every two years, they should be taken on an annual basis. Retention studies have shown that if CPR skills are not used regularly, they are soon forgotten.

Ideally, the entire staff should take the CPR refresher course together, so they will feel comfortable working with each other if the need arises. Masks with one-way valves should be used in training and supplied to office personnel for actual patient use as
specified by OSHA regulations. Bag-valve-mask devices are more difficult for the occasional user to actually ventilate a patient with such a device. Pocket masks are much easier to use, provide effective ventilations, and have ports for the addition of supplemental oxygen.

A basic first aid course provides the staff with information on emergency care in common injury situations. Topics such as the control of bleeding, treatment of burns, and the handling of sprains and fractures are covered in the course.

An automatic external defibrillator (AED) is an adjunct piece of equipment every office should consider having available as part of the office emergency kit. Some states require all dental facilities to have one, be sure to check your state law. The AED is a computerized defibrillator that recognizes the presence of ventricular fibrillation or rapid ventricular tachycardia and then allows the operator to administer “shocks” to convert the patient’s heart rhythm back to normal. For every minute that lapses before defibrillation, the survival rate decreases by 10%. The AED is equipped with a voice prompt to lead the operator through its usage and requires no special training. Other more advanced emergency courses (such as those for first responders and emergency medical technicians) are available and, depending on the type of practice and location, may be advisable for the dentist and staff. Oral surgeons should be encouraged to take the Advanced Cardiac Life Support Provider course (ACLS) offered through the American Heart Association.

The 2010 AHA Guidelines for Cardiopulmonary Resuscitation (CPR) recommend a change in the Basic Life Support (BLS) sequence of steps from A-B-C (Airway, Breathing, Chest compressions) to C-A-B (Chest compressions, Airway, Breathing) for adults, children, and infants (excludes newborns). This fundamental change in the CPR sequence will require re-education of everyone who has ever learned CPR, but the consensus of the experts is that the benefit will justify the effort.

Here is a step-by-step guide for the new CPR:

1. Call 911 or ask someone else to do so.
2. Try to get the person to respond; if he doesn’t, roll the person on his or her back. Tilt the head back slightly to lift the chin.
3. Check for breathing. Listen carefully, for no more than 10 seconds, for sounds of breathing. (Occasional gasping sounds do not equate to breathing.) If there is no breathing begin CPR.
4. Start chest compressions. Place the heel of your hand on the center of the victim’s chest. Put your other hand on top of the first with your fingers interlaced.
5. Push hard, push fast. Press down so you compress the chest at least 2 inches in adults and children and 1.5 inches in infants. “One hundred times a minute or
even a little faster is optimal,” Sayre says. (That’s about the same rhythm as the beat of the Bee Gee’s song “Stayin’ Alive.”)

6. If you’ve been trained in CPR, you can now open the airway with a head tilt and chin lift.
7. Pinch closed the nose of the victim. Take a normal breath, cover the victim’s mouth with yours to create an airtight seal, and then give two, one-second breaths as you watch for the chest to rise.

   *Note: If the chest does not rise with the initial rescue breath, re-tilt the head before delivering the second breath. If the chest doesn’t rise with the second breath, the person may be choking. After each subsequent set of 100 chest compressions, and before attempting breaths, look for an object and, if seen, remove it.*


**Office Emergency Plan**

It is important that every dental office have an established, written, and practiced routine for handling emergencies.

Emergency numbers such as 911, or a seven digit ambulance or rescue squad number in those areas without 911 services, should be posted conspicuously at every phone in the office. Other phone numbers for emergencies might include the hospital emergency department, an oral surgeon, a physician, a Registered Nurse, etc.

A code word or phrase indicating an emergency should be determined. This will alert other staff to the existence of an emergency and avoid possible upset to patients in nearby operatories or in the reception area. Every member of the dental staff should have a specific assignment in an emergency. To compensate for staffing variations, such as occurrences with part-time staff or during employee vacations, assignments should be doubled--up to assure all areas are covered. The number of assignments and specific functions will be determined by staff size and training. Large offices may have several people manning an area, while smaller staffs may have multiple areas to cover.

The office emergency plan should be updated and practiced regularly at periodic staff meetings or following annual CPR training sessions. Mock scenarios of various emergency situations can be developed which will allow each staff member to act out their assigned roles; some samples are given in Figure 30. Later, staff members can evaluate their performance and develop modifications to the office emergency plan as needed.
Additions to the office staff should be included in the emergency plan, and their role should be covered as part of their orientation to the office.

New staff should:

1. review the written office emergency manual
2. be given a specific emergency assignment
3. be shown the location of all emergency equipment
4. participate in practice situations

Careful planning and frequent practice of the office emergency plan will make confusion and panic significantly reduced during an actual emergency.

Anxiety Reduction

Stress is the major factor causing medical emergencies in the dental office. Syncope, hyperventilation, seizures, asthma attacks, and angina are some of the more common emergencies and they share one common thread— all can be precipitated by stress and anxiety.

Anxiety related problems are fairly easy to prevent. The first step is to identify the patient likely to experience anxiety. Anxious patients tend to startle easily, have a rapid heart rate, exhibit pale and clammy skin, and appear apprehensive. In pre-treatment conversations, they may relate worry about the appointment or indicate a fear of pain.

Once identified, steps can be taken to manage the anxiety proactively. A first step is to minimize the amount of waiting prior to any procedure. The procedure should be explained to the patient in a thorough and detailed manner, so that he or she experiences no surprise in the operatory. In more extreme cases, patients may need to be premedicated with anti-anxiety agents. Adequate pain control should be used and longer procedures should be divided into shorter dental appointments.

Recognition of an Emergency and Initial Emergency Procedures

Physical signs and symptoms that may indicate an incipient medical emergency include chest pain, pale skin, sweating, vomiting, irregular respiratory rate, altered or unusual sensations, hemorrhage, and changes in pulse and blood pressure.

When an emergency situation is recognized, dental treatment should be stopped immediately and assistance summoned. If the patient was receiving nitrous oxide, it should be discontinued. 100% oxygen should be given in its place in every case but hyperventilation. Establish patient responsiveness by shaking and asking in a loud voice “Are you okay?” Lay the patient in a supine position. If the situation appears serious, call 911 immediately.
Check for the presence of a carotid pulse for 5–10 seconds. If no pulse is present, lay the patient flat in the chair with a board behind the chest. If this is not possible move the patient to the floor and begin chest compressions on a bared chest. Leaving the patient in the chair with a board behind the chest lessens the chance of injury that may happen by moving the patient to the floor. If the pulse is present, check the rate and strength. Begin fast chest compressions according to the new CPR guidelines. Apply the defibrillator pads of the AED as soon as it arrives, turn the unit “on” and follow the voice prompt directions. In a pulseless patient, defibrillation takes precedence over chest compressions.

Open the patient’s airway using the head-tilt chin-lift, remove any dental materials from the patient’s mouth, and suction as necessary. Assess for spontaneous breathing for three to five seconds. If the patient is not breathing, give two slow breaths via a pocket mask.

**Handling Specific Medical Emergencies**

In over 30,000 medical emergencies reported by private practice dentists in a ten year period, the major problem seen was syncope (fainting). Over half of the problems occurred during or immediately after the administration of local anesthesia and were most commonly seen in the settings of tooth extractions or root canal therapy. This underscores the need to remain with and closely monitor patients in the operatory after administration of an anesthetic.

**Airway Obstruction**

Foreign bodies falling into the hypopharynx can lead to partial or complete airway obstruction. The patient may complain of a foreign body sensation in the throat, be coughing and dyspneic, exhibit stridor, or become apneic and cyanotic. They may grasp their throat with their hand (universal choking symbol) and, in the case of complete airway obstruction, will be unable to speak. If not corrected immediately, respiratory arrest will lead to cardiac arrest within minutes.

Dental materials should be eliminated as potential airway obstructions by appropriately securing the operative area.

If the patient is coughing forcefully, allow them to continue to cough, as this is their best chance for clearing their airway. If the patient is conscious, but continues to choke and is unable to breathe, abdominal thrusts should be used. Stand behind the patient, and place the thumb side of the fist into the abdomen above the umbilicus and below the rib cage. Administer slow, inward and upward thrusts until the object pops free or the patient loses consciousness.
With loss of consciousness, help the patient to the floor, open the airway and sweep out any obstructions which can be reached with the finger. Attempt to ventilate. If the patient cannot be ventilated, the airway is still obstructed. Continue the steps for CPR—even if unconscious with a pulse - checking mouth and ventilating at the appropriate time.

With persistent airway obstruction, a laryngoscope and Magill forceps can be used to visualize the lower airway and under direct visualization, remove the obstruction.

**Asthma/Bronchospasm/COPD**

Asthma is an allergic response of the small airways (bronchioles). Asthma affects people of all ages, but is more common in younger people.

Chronic obstructive pulmonary disease (COPD) is a mixture of emphysema and bronchitis seen in older adults. Common to both is the propensity of the small airways to spasm (bronchospasm). In patients with COPD, the retention of carbon dioxide (CO2) is a complicating factor.

In both cases, patients may respond to anxiety and aerosolized particulate matter with bronchospasm. Many cases can be prevented by pretreatment with the patient’s metered dose inhaler (puffer) of bronchodilator medication. The inhaler should also be readily available at chairside.

The patient may abruptly develop bronchospasm as evidenced by wheezing, coughing, and difficulty breathing, and may also complain of chest tightness and develop cyanosis.

The patient should be placed in an upright position with arms forward to facilitate breathing and oxygen should be administered by mask or nasal cannula. The patient should use their inhaler and self-administer one puff with instructions to inhale and exhale slowly. If the patient recovers well, treatment can continue. If the patient does not improve within five minutes, a second dose should be administered and it is recommended that treatment be postponed to another date.

**Cardiac Arrest**

Of all the emergencies which may occur in the dental office cardiac arrest is certainly the most serious. Cardiac arrest may result from an abnormal heart rhythm or be secondary to respiratory arrest. In either case, time and immediate intervention is of the essence.

Immediately upon assessing unconsciousness in a patient, call 911. The rescuer should open the airway, look, listen, and feel for respirations. Next, check the carotid pulse for five to ten seconds. If a pulse is absent, lay the patient flat with board beneath chest or
move patient to floor.

Begin the fast compressions for CPR as outlined earlier. Open the patient’s airway using the head-tilt chin-lift, remove any dental materials from the patient’s mouth, and suction as necessary. Assess for spontaneous breathing for three to five seconds. If the patient is not breathing, give two slow breaths via a pocket mask.

When possible, use the two-rescuer technique. Attach AED if available and follow the instructions. Continue to monitor all vital signs and give that information to emergency personnel when they arrive.

**Cerebrovascular Accidents/Transient Ischemic Attacks**

A cerebrovascular accident (CVA or stroke) or a transient ischemic attack (TIA) is caused by an interruption of blood flow to the brain. These episodes are usually seen in older patients as a consequence of atherosclerosis or untreated hypertension. The interruption in flow may be due to a blood clot, spasm of the arteries, or even to rupture of a blood vessel in the brain. Blood flow to the cerebral cortex is insufficient and the patient will exhibit symptoms within seconds. The signs and symptoms may be of short duration (TIA) which resolve spontaneously or persist for months or years. A transient ischemic attack is a forewarning of a major ischemic CVA; these patients must be evaluated by a physician to prevent such an occurrence.

**F.A.S.T.** signs can be used quickly to determine if a patient may be experiencing a CVA. The patient may have an altered level of consciousness or periods of confusion. Weakness or paralysis in one half of the body (right or left side) may be obvious. The patient may also be unable to speak or understand speech. When these severe symptoms occur without warning, they are likely to alarm both the patient and staff.

When faced with a TIA or CVA, 911 should be called immediately. Place the patient on their side to maintain their airway, and suction oral secretions to prevent aspiration. These are both necessary as the patient frequently loses control of the facial muscles. Calm and reassure the patient and monitor their vital signs. Oxygen may also be administered if the patient is having trouble breathing.

If an ischemic stroke is confirmed, and the onset of symptoms has been less than 3 hours, a medication will be administered to help remove the clot and restore blood flow to the affected brain areas.

**Chest Pain/Angina/Acute Myocardial Infarction**

The development of central chest discomfort frequently results from stressful situations in patients with coronary artery disease. In angina episodes, the coronary artery narrowed by atherosclerosis is unable to supply the heart muscle with adequate
amounts of oxygenated blood, causing chest pain. The onset of anginal chest pain is usually directly related to exercise, stress, and anxiety. The decreased oxygen supply to the heart muscle is usually of short duration (less than five minutes) and no permanent damage occurs.

In myocardial infarction (MI or heart attack), a blood clot develops in one of the coronary arteries completely cutting off blood supply to a portion of the heart muscle. Without a blood supply, the heart muscle dies within a few hours. The ischemic heart is very irritable and susceptible to cardiac arrhythmias. This is the patient most susceptible to sudden death. Whenever and wherever a myocardial infarction is recognized, 911 must be called immediately. This is critical, as about 50 percent of patients experiencing a myocardial infarction will die in the first two hours.

In both cases the patient will complain of chest pain usually described as a pressure or weighty sensation. This pain or numbness may radiate into either of their shoulders, arm, the neck, jaw, straight through to the back or to the upper part of the abdomen. Complaints of shortness of breath, nausea or vomiting are common, and the patient’s skin may be pale and sweaty. If the patient has experienced angina in the past, they will be able to determine if this pain is different in character.

Place the patient in whatever position is most comfortable. It is recommended that out-of-hospital patients are administered a single, chewed dose of 162 mg to 325 mg of aspirin to begin fibrinolysis. When chewed, the clinical effects are realized more quickly. Administer oxygen and monitor vital signs. Nitroglycerin 0.4 mg may be administered sublingually every five minutes but is usually more effective in treating the pain associated with an angina episode. If the patient has not previously had nitroglycerin, it is advisable to administer it while the patient is in a supine position, as hypotension is frequently seen in first time users. Calm and reassure the patient. The experience can be extremely frightening, with some patients voicing feelings of impending doom or death.

Heart Failure/Pulmonary Edema

Heart failure results when one of the ventricles is unable to completely pump all of the blood filling the chamber forward into the arteries. Heart failure may involve either the left ventricle (left ventricular failure-LVF) or the right ventricle (right ventricular failure-RVF). Of the two, left ventricular failure is the more serious and occurs first. In LVF, blood backs up into the lungs causing pulmonary congestion and shortness of breath, particularly when the patient is lying flat. In RVF, the blood backs up into peripheral circulation causing swollen legs and ankles resulting in pitting edema.

Left ventricular failure is frequently precipitated by an acute myocardial infarction. When this occurs, call the rescue squad (911) immediately and place the patient in whatever
position is most comfortable for them, usually sitting bolt upright. Administer oxygen by mask and monitor vital signs. If the patient complains of chest pain, nitroglycerin may be given.

**Hypoglycemia**

Hypoglycemia occurs when there is insufficient glucose in the bloodstream to meet the metabolic demands of cells. True hypoglycemia is seen only in insulin dependent diabetics (Type I) or in Type II diabetics using oral hypoglycemic agents such as Diabeta®, Orinase®, or Glucotrol®. The lack of glucose in the neurons of the central nervous system results in immediate dysfunction, causing the patient to appear confused and restless. Patients may also complain of a headache or exhibit bizarre behavior. Their skin becomes pale, cool and clammy, and their heart rate increases. On occasion, a patient may exhibit seizure activity or transient stroke-like symptoms. If a source of glucose is not administered immediately, permanent damage may result.

Hypoglycemia occurs when blood sugar levels drop below 80 mg/dl and typically becomes more acute in the 20-30 mg/dl range. Hypoglycemia can be prevented by making sure the insulin dependent diabetic has eaten before treatment, by scheduling appointments in the morning, and by having a glucose source readily available at chairside. If the patient exhibits signs and symptoms of hypoglycemia, administer an oral carbohydrate such as regular cola, table sugar, or even a spoonful of honey or icing to raise blood glucose levels. For a patient who becomes unconscious, maintain their airway, turn the patient on their side to prevent aspiration and administer glucose in the dependent cheek. This will usually provide sufficient glucose to allow the patient to regain consciousness. The patient should then drink a liquid high in sugar to increase their blood glucose level. Following a hypoglycemic reaction, advise the patient to eat a meal to maintain blood sugar levels and prevent a recurrence of the hypoglycemic episode.

**Diabetic Ketoacidosis**

Diabetic ketoacidosis occurs when there is not enough insulin available to move glucose into cells. This causes the cells to use fats and proteins for energy, leaving behind waste as anaphylaxis may be a life-threatening emergency.

**Accidental Overdose**

Rapid administration, excessive dosing, or inadvertent intravascular administration may all result in increased drug effects. Prevention is the key in avoiding adverse drug reactions. Question the patient before treatment about allergies and hypersensitivity.

If the drug is to be injected IV, administer it slowly, and use the minimum amount
required to achieve the desired effect. When administering blocks, use an aspirating syringe. A child’s body size and weight should be considered during dosing and anesthetic administration.

Most drugs have a few specific antidotes available. There are two notable exceptions. Narcan® (naloxone) is the antidote for accidental overdose of narcotics given IV such as Demerol® (meperidine).

Narcan® can be used to reverse the hypotension, respiratory depression, and decreased level of consciousness caused by these narcotics. In the case of the benzodiazepines such as Valium® (diazepam) and Versed® (midazolam), a specific antidote-Romazicon® (flumazenil)-is also available.

The patient should be treated supportively until the effects of the drug wear off. Stop the administration of the drug, maintain the airway and ventilations, monitor vital signs, and contact 911 if the patient fails to show prompt improvement.

All of the toxic effects of lidocaine are due to its effects on the central nervous system and the conduction of nerve impulses. The signs and symptoms of lidocaine toxicity are shown in Figure 22. As there is no specific antidote for lidocaine toxicity, provide supportive care. Maintain the airway, administer oxygen, and treat other problems as they arise.

**Hyperventilation Syndrome**

Anxiety, fear, and pain in susceptible individuals can result in a conscious overdrive of ventilation called hyperventilation. The excessive excretion of carbon dioxide that occurs due to the greatly increased respiratory rate can cause unpleasant symptoms which exacerbate the situation. Apprehension, air hunger (a sense that they “can’t catch their breath”) coupled with numbness and tingling in the arms and legs, give the patient the sensation (although erroneous) that something is seriously wrong. The hyperventilation may progress to the point where the patient develops painful carpopedal spasm and may even have a syncopal episode. As soon as the patient faints, however, the respiratory rate immediately returns to normal.

Hyperventilation is the only emergency when oxygen administration is not called for in the treatment plan. The old treatment which involved use of a paper bag should be avoided, as it may increase carbon dioxide to dangerously high levels in patients with a metabolic cause for their hyperventilation, such as diabetic ketoacidosis. Instead, make the patient aware of how fast they are breathing and assure them that all of their symptoms are related to their fast respiratory rate. Coach the patient to take slow, regular breaths on a breath by breath basis. If necessary, use a detached oxygen mask which has holes for the release of excessive carbon dioxide to help reassure and calm
the patient.

**Respiratory Arrest**

The end result of bronchospasm, hypoxia, airway obstruction, aspiration, and laryngospasm may be respiratory arrest. Patients who stop breathing will be unresponsive. Instruct someone to call 911 immediately. Open the patient’s airway, and look, listen, and feel for airflow over the mouth and nose. If the patient is not breathing, place a pocket mask over the patient’s mouth and nose, maintain the head tilt, and deliver a slow ventilation until the patient’s chest rises. Repeat this ventilation and check the patient’s pulse. If the pulse is present, ventilate an adult twelve times per minute (one breath every five seconds); for children or infants, ventilate twenty times per minute (one every three seconds). Be careful to ventilate only until the patient’s chest rises, as over ventilation will distend the stomach with air and cause vomiting. Continue ventilations with periodic checks of the pulse until the rescue squad arrives.

**Seizures**

Convulsions or seizures are caused by waves of abnormal electrical activity in the brain. As these waves spread across the surface of the brain, they stimulate other cells which are responsible for motor activity, sensation, or consciousness.

Seizures are most commonly seen in patients with known seizure disorders such as epilepsy. Such patients may have stopped taking or missed a dose of their anti-seizure medication or they may experience a seizure as a result of exposure to a triggered or stressful situation. It is important to note that otherwise “normal” patients may seize if the conditions are right, particularly with hypoglycemia or hypoxia.

In some cases, the patient may have a premonition they are about to have a seizure. This premonition, called an aura, may take the form of a strange smell, visual or auditory hallucination, or other strange sensation. This allows the patient some time-ranging from a few seconds to minutes-to prepare for the seizure. As a seizure begins, the patient typically loses consciousness and then becomes tonic as all the major skeletal muscles contract. The patient is apneic, becomes cyanotic, and may bite their tongue. This is followed by the clonic phase in which muscles contract and relax in waves. During this phase, these involuntary movements make the patient susceptible to injuries to the head, arms, or legs, and they may become incontinent of urine and stool. A seizure is followed by a period of drowsiness, confusion and extreme fatigue called the postictal phase.

When observing a generalized motor seizure, knowing what not to do is as important as knowing what to do. Never attempt to place or force any object between the patient’s teeth. Bite sticks are ineffective and may cause damage to oral structures. Do not
attempt to restrain the patient’s movements. Individuals experiencing a seizure exhibit incredible strength and attempts at restraint may result in fractures to the patient’s bones. In addition, do not attempt to ventilate the patient during a seizure.

Loosen any constrictive clothing and turn the patient on their side to protect their airway from vomiting and aspiration. Place padding beneath the patient’s head to prevent injury and let the seizure run its course. While seizures invariably last only one to two minutes, the time seems much longer as the event is being witnessed. After the seizure, continue to monitor the airway, administer oxygen, and obtain vital signs.

**Syncope**

Fainting or syncope results from either the psychologic response to fear, anxiety, stress, pain, or unpleasant situations or from poor autonomic adjustments to changes in the patient’s posture. In some cases, syncope may be due to very rapid or slow cardiac arrhythmias. Syncope accounts for over 50% of reported emergencies in the dental office. The psychologic reaction causes an abrupt slowing of the heart rate and pooling of blood in the extremities. Within seconds the patient may complain of a flushed sensation, followed rapidly by loss of consciousness.

Syncope can be prevented by identifying the patient prone to anxiety or who is using anti-anxiety agents. Fearful patients can be prescribed a premedication to help them relax for the dental visit. Keep the patient supine if possible; with older patients, allow them time to slowly adjust to an upright posture after procedures are completed. In the elderly, rapid changes in posture can result in postural (orthostatic) hypotension.

When faced with a fainting episode, help the patient to the floor or place them in a supine position in the dental chair with the legs elevated. Once supine, the patient will regain consciousness almost immediately. Administer oxygen and loosen any tight clothing. Do not allow the patient to sit up, as they will frequently faint again. Keep the patient supine for a few minutes while the team attempts to determine the cause of the episode. Monitor vital signs. Because the patient regains consciousness almost immediately, the use of ammonia inhalants is unnecessary. It is recommended that treatment be stopped and rescheduled for another date.

**Emergency Kit**

Every dental office should have an emergency kit. Commercially available kits are expensive and contain drugs and equipment that will never be used; in fact, some of these kits contain drugs that have not been used in general medicine for twenty years. A kit can very easily-and inexpensively be assembled, although the actual drugs in the kit should be selected by the dentist. Never include drugs or equipment that the dentist is not trained to use or comfortable in administering. Drugs can be purchased from a
hospital pharmacy and the other supplies obtained from a local medical equipment company. Another general rule to kit supplies relates to how close the office is to emergency help. Rural offices may need to have more medicines in their kit to administer until help can arrive. Urban and suburban offices may be able to just have the basic supplies as help will reach them more quickly.

All of the materials (except the oxygen cylinder and AED) can be stored in a large tackle box for portability. The kit should be kept in a prominent, easily accessible location known to everyone in the office. Someone on the dental team should be responsible to periodically check all items to ensure that none of the drugs have passed their expiration date and all equipment is operational.

A card which clearly states the indication, dosage, and administration of the drugs in the kit should be taped inside the lid. In an emergency situation, infrequently used doses can easily be forgotten. Each of the drugs listed is available in prefilled syringes so that no time will be lost drawing drugs up in syringes. A sample emergency drug card is shown in Figure 28. The drugs in the kit should be kept simple, as their purpose is only to handle life threatening problems until the rescue squad arrives.

**Essential Drugs for Emergency Kit**

The following will summarize the drugs which should be part of a dentist's emergency kit. There are 6 drugs which should be considered essential for all dentists.

1. **Oxygen**

Oxygen is indicated for every emergency except hyper-ventilation. This should be done with a clear full face mask for the spontaneously breathing patient and a bag-valve-mask device for the apneic patient. Therefore whenever possible, with the exception of the patient who is hyperventilating, oxygen should be administered. For the management of a medical emergency it should not be withheld for the patient with chronic obstructive lung disease, even though they may be dependent on low oxygen levels to breathe if they are chronic carbon dioxide retainers. Short term administration of oxygen to get them through the emergency should not depress their drive to breathe.

Oxygen should be available in a portable source, ideally in an "E"-size cylinder which holds over 600 liters. This should allow for more than enough oxygen to be available for the patient until resolution of the event or transfer to a hospital. If the typical adult has a minute volume of 6 liters per minute, then this flow rate should be given as a minimum. If the patient is conscious, or unconscious yet spontaneously breathing, oxygen should be delivered by a full face mask, where a flow rate of 6 to 10 liters per minute is appropriate for most adults. If the patient is unconscious and apneic, it should be delivered by a bag-valve-mask device where a flow rate of 10 to 15 liters per minute is
appropriate. A positive pressure device may be used in adults, provided that the flow rate does not exceed 35 liters per minute.

2. **Epinephrine**

Epinephrine is the drug of choice for the emergency treatment of anaphylaxis and asthma which does not respond to its drug of first choice, albuterol or salbutamol. Epinephrine is also indicated for the management of cardiac arrest, but in the dental office setting, it may not be as likely to be given, since intravenous access may not be available. Its administration intramuscularly is not as likely to be very effective in this latter emergency, where adequate oxygenation and early defibrillation is most important for the cardiac arrest dysrhythmias with the relatively best prognoses, namely ventricular fibrillation or pulseless ventricular tachycardia.

As a drug, epinephrine has a very rapid onset and short duration of action, usually 5 to 10 minutes when given intravenously. For emergency purposes, epinephrine is available in two formulations. It is prepared as 1 : 1,000, which equals 1 mg per ml, for intramuscular, including intralingual, injections. More than one ampule or pre-filled syringe should be present as multiple administrations may be necessary. It is also available as 1 : 10,000, which equals 1 mg per 10 mL for intravenous injection. Autoinjector systems are also present for intramuscular use (such as the EpiPen) which provides one dose of 0.3 mg as 0.3 mL of 1 : 1,000, or the pediatric formulation which is 1 dose of 0.15 mg as 0.3 mL of 1 : 2,000.

Initial doses for the management of anaphylaxis are 0.3 to 0.5 mg intramuscularly or 0.1 mg intravenously. These doses should be repeated as necessary until resolution of the event. Similar doses should be considered in asthmatic bronchospasm which is unresponsive to a beta-2 agonist, such as albuterol or salbutamol. The dose in cardiac arrest is 1 mg intravenously. Intramuscular administration during cardiac arrest has not been studied, but would appear to be unlikely to render significant effect.

Epinephrine is clearly a highly beneficial drug in these emergencies. Concurrently, however, it can be a drug with a high risk if given to a patient with ischemic heart disease. Nevertheless, it is the primary drug needed to reverse the life-threatening signs and symptoms of anaphylaxis or persistent asthmatic bronchospasm.

3. **Nitroglycerin**

This drug is indicated for acute angina or myocardial infarction. It is characterized by a rapid onset of action. For emergency purposes it is available as sublingual tablets or a sublingual spray. One important point to be aware of is that the tablets have a short shelf-life of approximately 3 months once the bottle has been opened and the tablets exposed to air or light. The spray has the advantage of having a shelf-life which
corresponds to that listed on the bottle. Therefore, if a patient uses his/her own nitroglycerin, there is a possibility of the drug being inactive. This supports the need for the dentist to always having a fresh supply available. With signs of angina pectoris, one tablet or spray (0.3 or 0.4 mg) should be administered sublingually. Relief of pain should occur within minutes. If necessary, this dose can be repeated twice more in 5-minute intervals. Systolic blood pressures below 90 mmHg contraindicate the use of this drug.

In a 2010 JADA article Morton Rosenberg, DMD explains, “Contraindications to the administration of nitroglycerin are chest pain and hypotension or treatment with drugs prescribed for erectile dysfunction, such as sildenafil (Viagra, Pfizer, New York City), tadalafil (Cialis, Lilly USA, Indianapolis) or vardenafil (Levitra, Bayer HealthCare, Leverkusen, Germany). The combination of nitroglycerin and these compounds may lead to profound hypotension and unconsciousness. (Rosenberg 17S)

4. Injectable Antihistamine

An antihistamine is indicated for the management of allergic reactions. Whereas mild non-life threatening allergic reactions may be managed by oral administration, life-threatening reactions necessitate parenteral administration.

Two injectable agents may be considered, either diphenhydramine or chlorpheniramine. They may be administered as part of the management of anaphylaxis or as the sole management of less severe allergic reactions, particularly those with primarily dermatologic signs and symptoms such as urticaria. Recommended doses for adults are 25 to 50 mg of diphenhydramine or 10 to 20 mg of chlorpheniramine.

5. Albuterol (Salbutamol)

A selective beta-2 agonist such as albuterol (salbutamol) is the first choice for management of bronchospasm. When administered by means of an inhaler, it provides selective bronchodilation with minimal systemic cardiovascular effects. It has a peak effect in 30 to 60 minutes, with a duration of effect of 4 to 6 hours. Adult dose is 2 sprays, to be repeated as necessary. Pediatric dose is 1 spray, repeated as necessary.

6. Aspirin

Aspirin (acetylsalicylic acid) has been shown to reduce overall mortality from acute myocardial infarction.

The purpose of its administration during an acute myocardial infarction is to prevent the progression from cardiac ischemia to injury to infarction. There is a brief period of time early on during a myocardial infarction where aspirin can show this benefit. For emergency use there are relatively few contraindications. These would include known hypersensitivity to aspirin, severe asthma or history of significant gastric bleeding. The
lowest effective dose is not known with certainty, but a minimum of 162 mg should be
given immediately to any patient with pain suggestive of acute myocardial infarction.

7. Oral Carbohydrate

An oral carbohydrate source, such as fruit juice or non-diet soft-drink, should be readily
available. Whereas this is not a drug, and perhaps should not be included in this list, it
should be considered essential. If this sugar source is kept in a refrigerator it may not be
appreciated that it is a key part of the emergency equipment. Therefore, consideration
should be given to making this part of the emergency kit. Its use is indicated in the
management of hypoglycemia in conscious patients.

Additional Drugs

1. Glucagon

The presence of this drug allows intramuscular management of hypoglycemia in an
unconscious patient. The ideal management of severe hypoglycemia in a diabetic
emergency is the intravenous administration of 50% dextrose. Glucagon is indicated if
an intravenous line is not in place and venipuncture is not expected to be accomplished,
as may often be the case in a dental office. The dose for an adult is 1 mg. If the patient
is less than 20 kg, the recommended dose is 0.5 mg. Glucagon is available as 1 mg
formulation, which requires reconstitution with its diluent immediately prior to use.

2. Atropine

This anti-muscarinic, anti-cholinergic drug is indicated for the management of
hypotension, which is accompanied by bradycardia. The dose recommended is 0.5 mg
initially, followed by increments as necessary until one reaches a maximum of 3 mg.
Paradoxically, doses of less than 0.4 mg have been associated with induction of a
bradycardia, likely due to atropine's central nervous system's actions.

3. Ephedrine

This drug is a vassopressor which may be used to manage significant hypotension. It
has similar cardiovascular actions compared with epinephrine, except that ephedrine is
less potent and has a prolonged duration of action, lasting from 60 to 90 minutes.
Similar precautions as noted with epinephrine administration should be considered
when given to a patient with ischemic heart disease. For the treatment of severe
hypotension, it is ideally administered in 5 mg increments intravenously. Intramuscularly
it should be given in a dose of 10 to 25 mg.

4. Corticosteroid

Administration of a corticosteroid such as hydrocortisone may be indicated for the
prevention of recurrent anaphylaxis. Hydrocortisone may also play a role in the management of an adrenal crisis. The notable drawback in their use in emergencies is their relatively slow onset of action, which approaches one hour even when administered intravenously. This is the reason why these drugs are not considered essential, as they are of minimal benefit in the acute phase of the emergency. There is low likelihood of an adverse response with one dose. The prototype for this group is hydrocortisone, which may be administered in a dose of 100 mg as part of the management of these emergencies.

5. Morphine

Morphine is indicated for the management of severe pain which occurs with a myocardial infarction. Advanced Cardiac Life support recommendations list morphine as the analgesic of choice for this purpose. The dose involves titration in one to three mg increments intravenously until pain relief is accomplished. This should be guided by a decrease in blood pressure and respiratory depression. Extreme caution should be used in the elderly. If an intravenous is not in place, consideration can be given to administering morphine in a dose of approximately 5 mg intramuscularly. Again, lower doses need to be considered for the older patient.

6. Naloxone

If either morphine is included in the emergency kit, or opioids are used as part of a sedation regimen, then naloxene should also be present for the emergency management of inadvertent overdose. Doses should ideally be titrated slowly in 0.1 mg increments to effect.

7. Nitrous Oxide

Nitrous oxide is a reasonable second choice if morphine is not available to manage pain from a myocardial infarction. For management of pain associated with a myocardial infarction, it should be administered with oxygen, in a concentration approximating 35%, or titrated to effect.

8. Injectable Benzodiazepine

The management of seizures which are prolonged or recurrent, also known as status epilepticus, may require administration of a benzodiazepine. In most dental practices, it would not be realistic to assume that the dentist could achieve venipuncture in a patient having an active seizure. This leads to the need for a water-soluble agent such as midazolam or lorazepam. Lorazepam has been reported as the drug of choice for status epilepticus and can be administered intramuscularly. Midazolam, however, is another alternative which is water soluble and could be considered. Sedation would be an
expected side effect and patients should be appropriately monitored. Adult doses to consider for lorazepam are 4 mg intramuscularly, or midazolam 5 mg intramuscularly. If an intravenous is in place, these drugs should be slowly titrated to effect.

9. Flumazenil

The benzodiazepine antagonist flumazenil should be part of the emergency kit when oral or parenteral sedation is used, as these techniques are usually based on effective use of benzodiazepines. Dosage is 0.1 to 0.2 mg intravenously, incrementally.

In addition to having drugs available, a small amount of basic equipment should be readily available. This includes a stethoscope, blood pressure cuff, an oxygen delivery system, syringes and needles. Dentists should also consider having an automated external defibrillator (AED), as a means to treat cardiac arrest. Usage of this latter piece of equipment is easily learned and only requires strong knowledge of basic CPR with a small amount of additional training.

Emergency Treatment Records and Evaluation

A record of an office emergency should be included in the patient’s records. When an emergency occurs in the office be sure to note all details in the patient’s chart.

Following the emergency event, a post-emergency assessment of the situation should be done with all those involved evaluating each other’s performance. In this way, problems can be identified and corrections made to the office emergency plan as required.

When reviewing the emergency, the first part of the evaluation should consider the situation and address the following:

• How early was the emergency detected?
• Did the patient’s history or chart indicate a problem might occur?
• Were any warning stickers or alerts messages posted within the patient’s record?
• What preventive measures might have been taken?
• Were treatment recommendations followed?
• What could be done next time to avoid the situation?
• The second part of the evaluation looks at the performance of the “team.”
• How did the office staff respond?
• Did staff members complete their assignments efficiently or was there panic and confusion?
• Did any members of the team experience difficulties?
• Was the staff emotionally prepared to handle the emergency?
• Do the role assignments need to be modified?
• The final part of the evaluation considers equipment and supplies.
• Was the equipment (emergency kit/cart) stored in the designated location?
• Was all equipment present and functional?
• Were drugs unexpired and correctly prepared?
• If CPR was performed, did the team follow the most recent accepted protocols?

The main goal of the evaluation is to define strategies to either avoid a crisis or if unforeseeable to provide appropriate patient care.

**Legal Aspects**

The legal obligations in the dental office rest principally with the dentist. However, assistants must be aware of state dental practice acts and any rulings which could involve the assistant. In many states current CPR status for auxiliaries is required. Always remember—ignorance of the law does not constitute immunity from liability.

In addition to familiarity with state dental practice acts, the dentist should also be aware of accepted treatments and protocols for medical emergencies which often become the basis for a legal standard of care. The standard of care can be defined as “what the reasonable, prudent person with the same level of training and experience would have done in the same or similar circumstances.”

The first component is a duty to act. There is no doubt that a health care provider is required to render necessary emergency care to an individual in an office, whether that individual is a patient, family member, or an employee. The expectation of the general public is that they are in a health care facility and that its employees should be trained for such emergencies.

The second part is an act of omission or commission. An act of omission would be failing to carry out some task that the “reasonable, prudent person” would have performed under the circumstances. An act of commission would be an attempt to provide care beyond what was normally accepted under the circumstances or by failing to have taken an action that would have prevented an emergency.

The third point that would have to be proven is that the patient was actually injured in some way. In most cases, this would be some type of physical injury, but it could also include emotional or economic damages.

The fourth point—that the assistant’s failure to act as a reasonable, prudent person was the proximate cause of the patient’s injuries—ties everything together.

This cycle of potential malpractice can be avoided by safeguarding the patient’s
interests, performing as expected in an emergency, and acting within the scope of your practice.

Taking into consideration these legal aspects concerning emergency treatment, always keep in mind the following points:

1. When an emergency arises call for EMS (911) immediately. There are cases on record in which dentists have been sued for not calling an ambulance in a timely manner. In handling an office emergency, the goal should always be to maintain the patient and provide appropriate treatment until the rescue squad arrives. Rescue squad personnel will not mind if they arrive at the scene only to find a patient not requiring further treatment or transport. Once the rescue squad arrives, however, they and their medical control physician (via radio) are in charge of the patient’s medical treatment.
2. If there is a problem, such as a dental dam clamp falling into a patient’s throat, be honest with patients as to the nature of the problem.
3. Refer patients to medical professionals when necessary. Never attempt to treat situations which require physician or hospital management.
4. Be knowledgeable about state dental practice acts and your requirements for dealing with emergencies.
5. Take a complete health history for new patients and update it at each visit. Maintain adequate records. Document emergency treatment rendered; generally, courts have maintained that if it wasn’t written down, it wasn’t done.
6. Take vital signs, especially if an anesthetic is to be administered.
7. Having an emergency kit in the office does not prevent liability unless you know how to use it properly.

Medical Errors as Related to Dental Treatment

Patient safety encompasses three complementary activities:

- Prevention of medical errors
- Making medical errors visible
- Mitigation of the effects of medical errors by a RCA (root cause analysis)

Not all undesirable outcomes for patients are due to medical errors. Patients may not be cured of their disease or disability despite the fact that they are provided the best standard of care. Conversely, not all adverse events as a result of medical care are errors.

Unpreventable Adverse Events

An adverse event may be defined as:
Some adverse events, termed unpreventable adverse events, result from a complication that cannot be prevented given the current state of knowledge. Many drugs which are used appropriately may have undesirable side effects. For example, the occurrence of nausea is considered an adverse event. But it is not considered to be a medical error to have given the antibiotic if the patient had an infection which was expected to respond to a specific antibiotic (The Nature of Adverse Events, 1991).

**Preventable Medical Errors**

Medical errors are adverse events that are preventable given our current state of medical knowledge. Some adverse events are not preventable and reflect the risk associated with treatment. An example of an unpreventable error is a life-threatening allergic reaction to a drug when the patient had no known allergies to this drug.

However, the patient who receives an antibiotic to which an allergy is known goes into anaphylactic shock and dies represents a preventable adverse event.

**Definition of Medical Errors and Commonly Used Terms**

Healthcare errors fall into these major categories:

- Errors of commission
- Errors of omission
- Errors of execution

Definition of Medical Error:

An unintended healthcare outcome caused by a defect in the delivery of care to a patient. Healthcare errors may be errors of commission, omission, or execution. Errors may be made by any member of the health care team in any health care setting (National Patient Safety Foundation).

**Errors of Commission**

Errors of commission occur when the wrong thing is done, such as prescribing a medication for a patient with a documented allergy to that medication or taking x-rays on the wrong patient.

**Errors of Omission**

Errors of omission occur when a medication with proven benefits is not prescribed for an eligible patient. Not taking the necessary x-rays indicated by the patient’s oral condition is another example of omission.
Errors of Execution

Errors of execution occur when the right thing is done incorrectly. Taking horizontal bitewings when vertical bitewings are clinically indicated is an example of an error of execution. Not properly washing one’s hands is another example of doing the right thing but doing it incorrectly.

Adverse Events

An adverse event is a common term used to describe any event or situation that is not consistent with the routine delivery of care. Unexpected outcomes, deviations in practice patterns, or not following known standards are examples of adverse advents.

Near Misses

Deviations or unexpected outcomes not resulting in patient harm are called near misses. Certain adverse events are not entirely preventable, such as those associated with high-risk yet life-saving treatments.

The Medical Error Crisis

The IOM defines medical error as “…the failure of a planned action to be completed as intended or the use of a wrong plan to achieve an aim.” Research clearly shows that the majority of medical errors can be prevented. A landmark study on medical errors indicated 70% of adverse events found in a review of 1,133 medical records were preventable, 6% were potentially preventable, and 24% were not preventable. A study released last year, based on a chart review of 15,000 medical records in Colorado and Utah, found that 54% of surgical errors were preventable. The lack of standardized nomenclature and a universal taxonomy for medical errors complicates the development of a response to the issues outlined in the IOM report.

Medical errors can occur at any point along the continuum of care—pre-treatment, treatment, and post treatment. Mistakes affecting quality of care and safety may occur before the patient arrives at your office, during an office visit, or after the patient has left.

Consider these office scenarios and medical error prevention:

• Pre-treatment:

When pulling charts for the next day, the receptionist pulls the wrong chart because there are two patients with the same name. If this error is not noticed in time, treatment and / or medication could be provided to the wrong patient resulting in possible harm.
• Treatment:

During a difficult extraction, a bur tip breaks off and the dental treatment team is not aware a foreign body is in the surgical site. As a result, the patient develops a post-operative infection.

• Post-treatment:

The pharmacy calls to verify information about a prescription for a patient of record. Again, the wrong chart is pulled because of duplicate patient names which results in the wrong information being given to the pharmacist.

Diagnostic Errors

Not performing appropriate diagnostic tests or performing them incorrectly may result in an incorrect diagnosis. An improper diagnosis can then lead to incorrect or ineffective treatment or additional unnecessary testing. In addition, inexperience with a technically difficult diagnostic procedure can affect the accuracy of the results. Optimal dental care starts with trustworthy test results.

Diagnostic errors are defined as:

• Errors or delay in diagnosis
• Failure to employ indicated tests
• Use of outmoded tests or therapy
• Failure to act on results of monitoring or testing

Surgical / Treatment Errors

Extracting the wrong tooth is the most common surgical error. Yet, other mistakes can affect surgical outcome such as retained roots tips, breakage of surgical burs, improperly sterilized instruments, or biopsy of the wrong area. Adverse surgical events accounted for two thirds of all adverse events in a recent retrospective study conducted by the Agency for Healthcare Research and Quality.

Surgery / treatment errors are defined as:

• Errors in the performance of an operation, procedure, or test.
• Errors in administering the treatment.
• Errors in the dose or method of using a drug.
• Avoidable delays in treatment or in response to an abnormal test.
• Inappropriate care.
Medication Errors

The IOM estimates that as many as 7,000 patients die each year as a result of medication errors. Medication errors in the dental office include prescription errors as well as mishaps involving dental medicaments prescribed, dispensed, or otherwise used in patient care. Understanding the proper use and contraindications of the medications dispensed or prescribed in your office is critical for patient safety.

Medication errors are defined as:

Any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the healthcare professional, patient or consumer. Such events may be related to professional practice, healthcare products, procedures, or systems including prescribing, order communication, product labeling, packaging and nomenclature, compounding, dispensing, distribution, administration, education, monitoring, and use (IOM, 2017).

Medication errors can occur at any stage of medication administration. These stages include (IOM, 2017):

- Prescribing the wrong dose or wrong choice of drug.
- Prescribing the wrong frequency of drug administration.
- Wrong drug, wrong dose.
- Not monitoring and noting the effects of the given medication.

The Process of Care: Best Diagnosis and the Treatment Plan

Diagnostic Processes / Medical History

Diagnostic errors are the second most prevalent type of error and one of the most difficult claims to defend in court. 63.5% of claims are paid with average indemnity of over $67,000. Common resultant injuries involve tooth loss, infection, fractured jaws, facial scarring, nerve damage, and temporomandibular joint injury (Common Dental Errors and Effective Solutions, 2017).

A diagnostic error often involves faulty diagnosis of these oral conditions:

- Gingivitis and periodontal disease
- Disorders of the hard tissues of the teeth
- Disorders of the dental pulp and periapical tissues
- Malignant neoplasms or cancer of the mouth
An example of failure to diagnose is when a patient has periodontal disease and the dentist fails to diagnose or advise the patient of treatment options. If the dentist fails to treat the condition, this is error in diagnosis. If a patient’s untreated periodontal disease causes the patient to lose teeth, this represents error in diagnosis.

Best practices rely on an analysis of the assessment data which is collected during an initial or routine examination of a patient. A reasoned diagnosis identifies patient treatment needs for which the dentist and team will provide the best intervention plan. The dentist is responsible for direction to staff and delivery of appropriate treatment based on the best diagnosis. A dental hygienists recall assessments may also reflect behavioral aspects and deviations from normal oral health. Charting, radiographs, medical and dental histories, and all recorded patient data are analyzed together to form an opinion based on an aggregate of the data.

An important component of the process is to develop an appropriate written treatment plan for patient care. The plan should be one which can be explained in plain language to a patient. A good treatment plan is integrated and considers the whole patient. The overall clinical objectives of the dental healthcare team focuses on the oral health of the patient while treating the whole person.

**Basis for Diagnosis**

- Patient interview data (chief complaint, identification of oral problems and comprehensive personal/social, medical and dental health histories)
- Physical assessment data (vital signs, extraoral and intraoral tissue examination, and dental and periodontal chartings)
- Treatment or education needs that may be addressed by providing oral care services.
- Treatment needs that may be addressed by consultation with another licensed healthcare professional.
- Diagnostic Statements
- Provide the basis for planning dental interventions and reflect expected outcomes.
- Identify treatable conditions that are changeable by dental treatment interventions.
- Exclude diagnoses that require treatments legally defined as dental practice.

**A Diagnostic Model**

Medical and dental models of diagnosis classify diagnostic statements according to disease processes. A diagnostic model:

- Addresses health functioning and behaviors.
• Describes actual or potential problems that a dentist and staff are educated and licensed to treat.

A sample diagnostic model has these six steps (Dental Hygiene Diagnosis, 2017):

1. Initial interview
2. Hypothesis formation
3. Inquiry strategy
4. Problem synthesis
5. Diagnostic decision making
6. Learning from the process

**Medical History**

The first line of defense for all medical and dental risk management is a thorough and current medical history. This tool is essential to use with each patient no matter how familiar the practitioner might be with a particular patient. The written form that is used should be carefully designed to elicit specific information.

In spite of HIPAA law and ethics regarding patient confidentiality, many patients are reluctant to report sensitive information. Some patients may not inform the dental staff of important data regarding STDs or their HIV/AIDS status, or recreational drug use; because they may feel their health information may be disclosed. Absolute confidentiality of charts and medical/dental information should be routine and inviolate. Patients will answer questions more thoroughly and honestly if they feel that their records are confidential. It is good practice to tell patients that all information is strictly confidential.

Following the written medical/dental history, the dental clinician should interview each patient and review each question. During this discussion, the patient may remember specifics that were not entered on the written form.

The interview is a good time to observe the patient and determine overall characteristics of health such as:

• speech
• skin color
• movements
• evidence of pain

Keep thorough documentation of any additional information from the interview. Reassure the patient all information is confidential. The next step is to take vital signs and to document this information carefully. Temperature, respiration, pulse, and blood pressure are basic data for record keeping. Vital signs are routinely taken with medical
exams and are now the norm in most dental offices.

Vital Signs with Normal Ranges

- Temperature: 97.8 - 99.1 degrees Fahrenheit
- Pulse: 60 - 80 beats per minute (at rest)
- Respiration: 12 - 18 breaths per minute
- Blood Pressure: 120/80 mm/Hg

ASA Physical Status Classification System

The American Society of Anesthesiologists has set up a system that can easily be followed and is utilized in many dental practices (Malamed, 2008).

ASA I

Patients are considered to be normal and healthy. Patients are able to walk up one flight of stairs or two level city blocks without distress. Little or no anxiety. Little or no risk.

ASA II

Patients have mild to moderate systemic disease or are healthy ASA I patients who demonstrate a more extreme anxiety and fear toward dentistry. Patients are able to walk up one flight of stairs or two level city blocks but will have to stop after completion of the exercise because of distress. Minimal risk during treatment.

Examples: History of well-controlled disease states including non-insulin dependent diabetes, pre-hypertension, epilepsy, asthma, or thyroid conditions.

Note: Patients who demonstrate a more extreme anxiety and fear toward dentistry have a baseline of ASA II even before their medical history is considered.

ASA III

Patients have severe systemic disease that limits activity but is not incapacitating. Patients are able to walk up one flight of stairs or two level city blocks but will have to stop enroute because of distress. If dental care is indicated, stress reduction protocols, and other treatment modifications are indicated.

Examples: History of angina pectoris, myocardial infarction or cerebrovascular accident, congestive heart failure diagnosis over six months ago, slight chronic obstructive pulmonary disease, and controlled insulin dependent diabetes or hypertension. Requires medical consultation.
ASA IV

Patients have severe systemic disease that limits activity and is a constant threat to life. Patients are unable to walk up one flight of stairs or two level city blocks. Distress is present even at rest. Patients pose significant risk, since patients in this category have a severe medical problem of greater importance to the patient than the planned dental treatment. Whenever possible, elective dental care should be postponed until such time as the patient's medical condition has improved to at least an ASA III classification.

Examples: History of unstable angina pectoris, myocardial infarction or cerebrovascular accident within the last six months, severe congestive heart failure, moderate to severe chronic obstructive pulmonary disease and uncontrolled diabetes, hypertension, epilepsy or thyroid condition. If emergency treatment is needed, medical consultation is indicated.

ASA V

Patients are moribund and are not expected to survive more than 24 hours with or without an operation. These patients are almost always hospitalized, terminally ill patients. Elective dental treatment is definitely contraindicated; however, emergency care in the realm of palliative treatment may be necessary.

ASA VI

Clinically dead patients being maintained for harvesting of organs (Malamed, Mosby.2008.)

Medication Errors

Every year Americans take more prescription medicines. According to the Kaiser Family Foundation, the average number of retail prescriptions per person increased from 8.9 in 1997 to 12.6 in 2007.

Since Americans take more medications, the occurrence of adverse drug events and medication errors is on the rise and the trend is clear. Dental professionals today need regular review and education about prescription medications. Vigilance by staff is required to detect possible harmful drug interactions and to effectively manage patient safety. Online programs that include dental-specific, drug-interaction screening tools are available to dentists, and programs such as Crew Resource Management have been developed that reduce human error by as much as forty-six percent (Medical Errors, 2017).

Although deaths caused by medication errors are infrequent, the importance of accuracy with patient medications cannot be underestimated. Medication errors can
occur in the following processes:

- Prescribing
- Dispensing
- Administering
- Monitoring

Types of medication errors include:

- Wrong drug
- Wrong dose or quantity of the drug
- Wrong method of drug preparation
- Wrong patient
- Wrong administration technique
- Wrong time of administration

There are many factors that can contribute to medication errors that are often preventable. These include:

- Poor staff communication
- Incorrect abbreviations or directions for use
- Poor administrative technique
- Similarities in medication names
- Staff fatigue or distraction
- Inadequate experience or knowledge
- Failure to monitor the patient adequately
- Poor handwriting on prescription pads or patient charts leading to misinterpretation

Several studies have demonstrated that up to 18% of serious adverse medication errors occur because the practitioner lacks sufficient knowledge of the medical history of the patient before prescribing, dispensing, and administering drug therapy. The responsibility lies with the practitioner to assess the need for a drug before prescribing one. Once the need is assessed, the next step is to select the correct drug.

One study suggests the most common cause of medication errors is inadequate knowledge of new drug therapies. This lack of knowledge could result in a patient receiving the wrong drug or wrong dosage inadvertently resulting in serious injury or death.

Resources for healthcare providers to obtain up-to-date drug information:

- Texts, medical journals, and monthly prescribing references
• Computerized software programs that integrate patient information for screening purposes
• Frequent contact with pharmacists
• Seminars and continuing education courses
• Drug protocols
• Controlled drug formularies
• FDA-sponsored e-mail updates or internet websites
• Drug.com

The practitioner must establish, in each individual, factors that may affect drug therapy including the following:

• Previous medication allergies or sensitivities
• Contraindications to a particular drug
• Possible adverse reactions with other medication the patient may be taking including over-the-counter medicine, supplements, food or drink.

Age, weight, diagnoses, pregnancy status, vital signs, and lab results are also important considerations. Before prescribing any drug, the indications, contraindications, drug interactions, warnings, side effects, complications, and laboratory tests required before or during the drug therapy need to be fully understood. The desired therapeutic response must be clearly designated before drug therapy is administered.

Prescriptions need to be written clearly and carefully, with intent to be well-understood by the pharmacist. Mistakes occur when prescriptions are written with:

• Poor penmanship
• Incorrect abbreviations
• Vague directions for use

Be aware of look-alike and sound-alike drugs. The following is a partial list of frequently confused drugs.

• Lanoxin and Levoxine Tobrex and Tobradex
• Alustraand Lustra Donnagel and Donnatal
• Elavil and Eldepryllsomil and Esimil
• Accupril and Accutane Perdiem and Pyridium
• Prazepine and Prazepam Prednisone and Prednisolone
• Restoril and Zestril Septa and Septra
• Xanax and Zantac Slo-Bid and Dolobid
• Uracid and Urised and Urocit and Uracel
Additional recommendations:

• Medications should never be abbreviated. Extra care should be taken to write clearly and in a manner that is not ambiguous.
• Verbal orders should be spelled out clearly to avoid being misunderstood.
• A telephone order protocol should be established by clearly restating the patient’s name, spelling the drug name, and pronouncing the dose in single digits such as—one-five to indicate 15. Saying fifteen can result in someone hearing fifty as both can sound alike during fast conversation, transcription, or telephone conversation.
• Ask that the prescription be repeated back to make certain the instructions were heard correctly.
• Carefully dictate patient notes to avoid inaccurate transcriptions into the patient’s chart.

Another leading cause of medication errors is incorrect decimal point placement. Important rules to remember when using decimal points are:

• A zero should always precede the decimal if the dose is less than 1 mg. For example, 0.5 mg is equal to a half of 1 mg. Writing this dosage without the zero preceding the decimal may result in the administration of an overdose of 5 mg if the decimal were to be overlooked.
• Never place a decimal and a zero after a whole number. This may result in a tenfold overdose of the medication. For example, 5.0 mg might easily be mistaken for 50 mg. The correct way to write the dosage would be 5 mg.

Occasionally, drugs with similar names and packaging are confused so every attempt should be made not to store such drugs near one another. Standardize and restrict drug storage, stock and distribution to help identify discrepancies. Before dispensing the drug, check that the expiration date has not passed. Warning labels should be affixed to certain drugs when appropriate. To reduce the risk of serious medication error or death, pre-filled and pre-labeled syringes should be dispensed whenever possible. Bulk supplies and unit stock can potentially be dangerous.

Protocols when an Error Occurs

The first few minutes after an error occurs are the most critical. A patient’s emergency medical needs take first priority. Once the patient is cared for, follow these steps as soon as possible.

1. Apologize and disclose. Poor communication, arrogance or an unwillingness to be open with the patient results in a breakdown of the patient/provider relationship and invites lawsuits.
2. Document the incident and the disclosure in the patient’s record. Determine if the event is reportable to state authorities and/or your malpractice carrier.

3. Analyze the event in order to prevent recurrence. Patients always want assurance the same mistake is not going to happen to someone else. The best way to prevent recurrence is to analyze the event.

Dental professionals have an ethical, moral and legal obligation to disclose medical or treatment errors. Disclosing errors can strengthen your relationship with the patient and foster a culture of safety in your practice. Patients are more likely to be understanding if you are truthful.

**Disclosing an Error**

Take time to prepare before disclosing an error to a patient. Be sensitive to the HIPAA Privacy Rule by conducting the conversation in a private area. Treat the patient with respect and compassion while focusing on the patient’s situation. Begin with a statement of apology. Using the words, “I’m sorry” conveys your sincerity. It also opens the door for continued communication with the goal of maintaining the patient relationship. In addition to a clear conveyance of apology, include the following items in your discussion:

- Statement of what happened disclosing the facts you currently know. If you do not know all the facts, then be honest and say so. Avoid opinions or assumptions.
- Changes, if any, which will be made in subsequent care as a result of the error.
- Steps you will take to prevent recurrence of this situation in the future. In other words, what changes do you plan to make to improve patient safety in your office.

Inform the patient who will be the point of contact while the situation is being remedied (the dentist, office manager, etc.) and when the patient can expect to be contacted next. Use good communication techniques, and maintain a calm and caring demeanor.

**Documenting Errors**

The patient record or chart is the single, most important document in your practice. Records must be accurate, factual, and complete. Missing documentation or poorly written entries detracts from the credibility of the record. Faulty records jeopardize patient safety and could hinder a legal defense.
Guidelines for documentation:

- Be factual.
- Use objective words and descriptions when explaining the error.
- Avoid subjective statements.
- Omit personal opinions, judgments, or rationalizations.
- Refrain from blaming staff or a product.
- Refrain from blaming the patient.
- Document the disclosure of the error to the patient.

Reporting Errors to Proper Authorities

Adverse outcomes resulting from dental treatment may be reportable to state licensing Boards and malpractice carriers. Be familiar with the definition of reportable events and reporting requirements. Failure to notify the proper authorities may jeopardize your license or certification.

Analyzing Errors Using Root Cause Analysis

Root Cause Analysis (RCA) is a process that identifies the basic factors or root cause which produced the error. Examples of root causes are variations in:

- Clinical performance
- Business practices
- System failure

A Root Cause Analysis should focus on systems and processes rather than individual performance. Avoid blaming individuals for errors. The goal of RCA is process improvement. To avoid future errors, all staff must feel safe in reporting errors as well as near misses.

Steps to Conduct a RCA:

1. Describe the details of the error. Write a narrative description or a step-by-step outline which details the situation, including all events which preceded the error. Obtain input from everyone involved to ensure the facts are correct and complete.
2. Identify the step(s) where deviation occurred.
3. Identify the proximate factors. Identify contributing factors that influenced the deviation of behavior or process. This may include human action, equipment issues, or communication.
Factors Contributing to Errors

Areas of Potential Causal Factors:

- Training and Education
- People factors
- Task factors
- Patient factors
- Equipment problems
- Personal factors
- Office processes
- Team factors

Errors in healthcare are frequently compared to those in aviation. Research shows factors which impact flight crew errors include:

- Fatigue
- Distractions
- Procedural errors
- Communication

Similar factors affect the practice of dentistry. Fatigue alone does not cause loss of skill when performing a dental procedure. Yet fatigue is known to have a negative effect on judgment and decision-making. Distractions, procedural errors, and miscommunication may also impact judgment and decision-making abilities. To maintain a culture of safety, the dental team must avoid complacency and continually focus on prevention of errors.

Safety Goals in Dentistry (adapted from the Joint Commission)

Patients and healthcare professionals must work together to maintain patient safety. Patient Safety Goals for Dentistry (PSG-D) as adapted from the Joint Commission’s National Patient Safety Goals are listed below. These goals encourage a team approach to patient safety and the delivery of quality care. Error-prone situations exist at any point along the continuum of care.

1. Improve the accuracy of patient identification in dental settings.
2. Improve the effectiveness of communication among all dental providers.
3. Improve the safety of medication use in dental settings.
4. Eliminate wrong-site, wrong-patient, wrong-procedure, treatment, or surgery.
5. Reduce the risk of healthcare-acquired infections in dentistry.
6. Improve the safety of using dental equipment.
7. Accurately and completely reconcile medications with other dental and medical providers as needed.
8. Encourage patients to participate in the decision-making process of dental care.
9. Identify safety risks inherent to the client population treated.

Goal 1: Patient Identification

Proper patient identification is critical. Before treatment, confirm that the right patient and the right patient-related information is at hand. Confirm that chart and radiographs are the correct patient and most current version. Progress notes, radiographs, or documents attached to the wrong chart can easily lead to errors. When using electronic data capture, remember to complete all check boxes, pop-up screens, and data fields to ensure proper patient identification.

Patient Safety Tips:

- Verify the patient’s identity before providing treatment or services. Confirm additional information such as date of birth, address, middle name, etc.
- Use good verbal and listening skills when confirming the patient’s identity to minimize opportunity for error.
- Confirm patient identity with another dental team member before treatment.

Goal 2: Effective Communication

Research shows the majority of errors in medical and dental offices are attributed to miscommunication. When referring a patient to another professional, provide all the important information and give the other person the opportunity to ask and respond to questions. Referrals, test results, and post-op instructions require documentation and attention to detail. Effective written communication is also vital. Develop a set of standard abbreviations so all staff members understand the intended meaning in the documentation process.

Patient Safety Tips:

- Confirm that important patient information is understood by others.
- Develop a list of acceptable abbreviations and symbols to be used throughout the office.
- Standardize communication about critical patient information to other members of the team.

Goal 3: Medication Safety

Medication errors can be deadly. In 2006, the IOM reported that medication errors injure 1.5 million people annually. Care and attention must be given when ordering, transcribing, dispensing, administering, or monitoring medications. Another prudent
safety tip is to follow what is known in nursing as the “Five Rights”:

- Right patient
- Right drug
- Right dose
- Right route
- Right time

Patient education about any drug administered or prescribed is also important. An informed patient is a safe patient.

**Patient Safety Tips:**

- Limit the types of drugs used in your office.
- Prevent confusion of look-alike or sound-alike drugs.
- Label all unmarked medications and medication containers.

**Medication Safety Tips:**

Accurate prescription writing is one of the most important ways to prevent medical errors. For written or electronic prescriptions, write or type the following (Teichman, PG and Caffee. 2002):

- Quantity to be dispensed in both text and numerals (10/ten).
- Date of the prescription in text (April 9, 2009 not 4/9/09).
- Full name and strength of the drug prescribed (Erythromycin, not EES).
- Clear directions for using the drug rather than saying “use as directed.”
- Limit to one medication per prescription to avoid confusion.
- Add the patient’s age (or weight) to protect against age-related errors.
- Use leading zeros not trailing zeros (for fractions write 0.5mg and for whole numbers write 5 mg not 5.0mg)
- Circle the dispensing practitioner’s name when using preprinted forms with more than one practitioner listed.

**Goal 4: Surgical Errors**

Surgical errors can be devastating and irreversible. Extraction of the wrong tooth is a typical surgical error in dentistry. Administration of local anesthesia in the wrong site is another type of procedural error. Consider use of a version of the Joint Commission’s Universal Protocol for preventing wrong site, wrong procedure, and wrong person surgery. The Joint Commission’s steps include:
• Conduct a pre-procedure verification with the patient—verbally. At the time of check-in and again when the patient is being seated, confirm the procedure or treatment scheduled.
• Mark the procedure site. Intraoral site marking in dentistry is not always possible; however, it is possible to mark x-rays or dental charts using a sticker or marker. Digital x-rays and records can be verbally confirmed.
• Perform a time-out. All members of the team should pause prior to starting the procedure, or administering anesthetics to confirm the correct patient, procedure and equipment.
• Document the time-out in the chart.

Goal 5: Healthcare Acquired Infections

In 2002, the CDC estimated there were approximately 1.7 million healthcare acquired infections in U.S. hospitals. Two simple methods to reduce disease transmission are:

1. Hand Hygiene

   Research shows proper hand hygiene is the single most important way of preventing the spread of infections. Using effective products and washing your hands for the recommended amount of time (> 15 seconds) are two important elements of hand hygiene. For optimal efficacy, use healthcare grade soaps and sanitizers.

2. Disinfection and Sterilization

   The best practices for the prevention of healthcare acquired infections in dentistry are to follow the CDC’s guidelines for disinfection and sterilization in dental settings.

Patient Safety Tips:

• Follow the current Centers for Disease Control and Prevention (CDC) or World Health Organization (WHO) hand-hygiene guidelines.
• Follow OSHA and CDC guidelines for proper disinfection and sterilization.

Goal 6: Equipment Safety

Rapidly changing technology continues to bring new and advanced equipment into modern dental practices. Digital radiography, lasers, oral cancer screening tools, biomedical products, and tele-dentistry are examples of emerging technology in dentistry. Patient safety directly relates to the proper use and maintenance of dental equipment. Follow the manufacturer’s guide and operating instructions to ensure reliable equipment performance. Conduct initial and ongoing training for all staff who
use the equipment.

**Patient Safety Tips:**

- Ensure all equipment is regularly checked and maintained in proper working order.
- Ensure the materials and workspace where equipment is utilized are hazard free.
- Provide adequate training for staff who utilize or maintain equipment.
- Notify the dentist or supervisor of unsafe or potential hazardous conditions.

**Goal 7: Reconcile Medications**

All medications have side effects. In rare cases, drug interactions can be deadly. Before prescribing or dispensing, conduct a thorough review of the patient’s medical history including over-the-counter, nutritional, and herbal supplements.

**Patient Safety Tips:**

- Compare the patient’s current medications with those prescribed or recommended during the course of dental treatment.
- When referring patients to another dental or medical facility, provide subsequent treating providers with a complete list of the patient’s medications.

**Goal 8: Patient Participation**

Engaging patients in meaningful dialogue ensures active participation in oral care decisions. Communication must be patient-centered. Avoid idle chit-chat at the expense of obtaining and conveying critical information. Cite these steps for effective patient communication:

1. Talk to patients. Explain to patients why it’s important to fully disclose their health status, including medication changes, medical appointments or tests and over-the-counter medications, nutritional supplements or herbs.
2. Ask questions. Encourage patients to ask questions, so they are fully informed. Let the patient know they are an important part of the team.
3. Learn. Encourage the patient to learn something new at each appointment. Have current information or resources readily available to share.
4. Keep scheduled appointments. Explain the importance of following treatment recommendations, especially as related to total body health.
Patient Safety Tip:

- Distribute dental health and patient safety information as appropriate for each patient.

Goal 9: Patient Population Risks

Each patient is unique. Clinicians need to understand the individual healthcare needs of each patient. All patient populations are diverse and may include:

- Special needs due to a physical or mental condition
- Medical status
- Health literacy needs
- Age-related needs

Some special needs are more obvious, such as physical conditions. Level of health literacy is less obvious yet requires careful clinical evaluation.

Patient Safety Tips:

- Identify safety risks inherent for various cohorts of patients.
- Develop safeguards for special needs patients. Make appropriate referrals.

Legal and Ethical Considerations

Malpractice

The careless conduct of an oral healthcare provider may result in malpractice. Dental malpractice is defined as the "...failure of an oral health care provider to exercise the degree of care, skill and learning expected of a reasonably prudent oral health care provider in the class to which they belong within the state, acting in the same or similar circumstances."

Malpractice is evident when the standard of care is altered or violated by the oral healthcare provider. There are many reasons for the increased numbers of malpractice lawsuits in dentistry. More people are increasingly informed about their own healthcare by their independent investigation of signs, symptoms, treatment choices of illnesses, and related conditions. Patients’ use of the Internet may contribute to an erosion of the relationship between the healthcare provider and the patient. Misdiagnosis or delayed treatment are common causes for initiation of a malpractice suit (Legal Issues in Dental Hygiene, 2017).

Negligence

Negligence lies under a tort action where a social or personal wrong is apparent. It is
the unintentional commission or omission of an act that a reasonably practical person would not or would do, respectively, under given circumstances. Negligence constitutes a departure from the recognized standard of care, which is then imposed on society. Four elements of negligence must be present for a person to be rewarded damages:

1. **Duty to care**: This is an obligation to conform to an accepted standard of care.
2. **Breach of duty**: A deviation from the accepted standard of care must be present, as well as a failure to adhere to an obligation.
3. **Injury**: Actual harm must be established.
4. **Causation**: The act or conduct or deviating from the accepted standard of care must be the cause of the person's injury.

If all four elements of negligence are proven, the injured party may be rewarded:

- Compensatory damages
- Punitive damages

**Vicarious Liability**

Vicarious liability is an important aspect of legal issues concerning dental practitioners. This type of liability holds employers accountable for the actions and torts of employees. In the dental office, the dentist is liable for the actions of the dental hygienist and assistant as well as office staff. In order for liability to be attributed to the dentist, the wrongful or negligent act of the dental hygienist must have occurred within the scope of the profession. If the dental hygienist commits a negligent act, the injured party may file suit against both the dentist and the dental hygienist. Since the dentist is held liable for the negligent act of employees under vicarious liability, the dentist may then file suit against the dental hygienist for compensation of the financial loss that was a result of the negligent act.

**Domestic Violence and Child Abuse Training**

Most states require dental practitioners to complete a course in identification and reporting domestic abuse and child abuse prior to licensure. Any oral healthcare provider or institution that is mandated to report a case of alleged abuse or maltreatment, and deliberately or intentionally fails to do so will be civilly liable for the damages caused by failure to report.

**Legal Issues and Dental Records**

The purpose of dental records is to provide a system for members of the dental team to communicate with one another and to ensure continuity of patient care. Oral healthcare providers are required to maintain complete, accurate, and timely records. Patient
dental records are considered a legal document. Records may be subpoenaed for various investigations, workers compensation, and personal injury cases. In the legal sense, a patient's dental record establishes the facts about whether the healthcare provider carried out professional obligations to the patient.

Medical histories should be updated and accurate at all times. The dental practitioner should ask questions when reviewing the medical history with the patient. The actual medical history and treatment rendered forms belong to the office that provided care for the patient. The patient owns the information on the treatment rendered forms. In accordance with Federal Law and HIPPA Act, dental records must be absolutely confidential and protected against unauthorized use. Good record keeping has been cited as crucial element in defending lawsuits filed against dentists.

**Computerized Dental Records**

Computerized dental records have revolutionized record-keeping many dental offices. The trend is moving toward paperless record-keeping. According to Pozgar (2004), there are many advantages and disadvantages of computerized dental records also known as EDRs (electronic dental records).

Some advantages include:

- Consistently legible entries on the treatment rendered form.
- Immediate access to patient information.
- Assistance in the identification of drug interactions.
- Increase in productivity due to decreasing paperwork and charting.

Although computers are becoming essential in dental offices, some disadvantages include:

- Potential loss of confidentiality and unauthorized disclosure of patient information.
- Potential modification or destruction of patient records.
- Entry of inaccurate patient information.
- Ineffective use of computer software due to inadequate training for staff.

As computerized records become more widely used in dental practices, the potential for computer-related liability will continue to increase. Computer-generated records are often entered as evidence in malpractice suits.

**Radiographs**

Radiographs are a crucial component of patient treatment. Poor quality radiographs can have serious treatment and legal consequences. Radiographs which fail to disclose
existing diseases or pathology are a liability to both the dentist and patient. If a patient brings legal action against an oral healthcare provider and the radiographs used as evidence, and are of poor diagnostic quality, the dentist may face legal consequences.

Most dental offices consider a full-mouth series to consist of 18 to 20 radiographs. This may not be sufficient depending on the number of teeth present in the oral cavity. The radiographs taken must allow for a complete diagnosis of dental conditions. Edentulous patients need the maxilla and mandible evaluated by radiographs of appropriate anatomical areas. The patient may have an underlying pathological condition or retained roots.

Edentulous or partially edentulous patients should be evaluated with a panoramic or periapical radiograph of the remaining teeth and edentulous areas for a complete radiographic examination. If a panoramic radiograph machine is not available, take periapical radiographs of all areas of both the maxilla and mandible to meet legal standards of care. Exposing the "correct" number of radiographs does not fulfill the legal obligation of the oral health care provider. The standard of care requires the patient dental chart to be completed with the correct number of adequate quality radiographs.

**Legal Ramifications and Oral Cancer**

The standard of care for dental professionals includes a thorough head-and-neck examination on each patient. The standard of care is a review of the patient's medical history and includes asocial assessment and physical examination. A comprehensive head-and-neck exam includes the palpation of the floor of the mouth and lateral borders of the tongue.

Dental malpractice claims alleging failure to diagnose oral cancer are the second most common types of claim and often result in the highest amounts paid. With these claims on the rise, they can be divided into four categories:

1. Failure to follow up or relying solely on a negative biopsy report instead of repeating a biopsy if clinical abnormalities persist.
2. Failure to screen patients appropriately or failure to provide screening examinations on patients in high-risk groups.
3. Evaluation delays are a frequent cause of litigation, because of delayed diagnosis of oral cancer. This involves repeated patient visits with progressive clinical abnormalities without proper testing or referrals.
4. Accurate record keeping, documentation, and quality radiographs are crucial to avoid malpractice litigation.
2017 Pediatric Anesthesia & Caleb’s Bill

As of November 2016,”Caleb’s Bill,” officially titled Assembly Bill No. 2235, was approved by the Governor and is in its final stages of revision, to better protect patients undergoing general anesthesia during dental procedures. The bill is named after a 6 year old child who was declared brain dead after his organs shut down, from an oral surgery mishap while being sedated under general anesthesia. It sets out to better document unfortunate cases when patients require medical intervention due to complications and/or death arising from a dental procedure while under general anesthesia. This mandatory and collected data from the Practitioner, by way of the Dental Board, or Dental Hygiene Committee, will help decide if it would be safer to have separate Licensed Practitioners performing the general anesthesia and the other performing the dental procedure. There is grave concern that by having a single Practitioner perform both, that it is NOT ideal nor safe for any age patient, as hospitals routinely have separate Licensed Practitioners working together on patients undergoing general anesthesia.

Assembly Bill No. 2235

CHAPTER 519

An act to amend Sections 1680 and 1682 of, and to add Section 1601.4 to, the Business and Professions Code, relating to healing arts.

[ Approved by Governor September 23, 2016. Filed with Secretary of State September 23, 2016.]

LEGISLATIVE COUNSEL’S DIGEST


The Dental Practice Act provides for the licensure and regulation of dentists by the Dental Board of California. That act authorizes a committee of the board to evaluate all suggestions or requests for regulatory changes related to the committee and to hold informational hearings in order to report and make appropriate recommendations to the board, after consultation with departmental legal counsel and the board’s chief executive officer. The act requires a committee to include in any report regarding a proposed regulatory change, at a minimum, the specific language or the proposed change or changes and the reasons therefor, and any facts supporting the need for the change.

The act makes it unprofessional conduct for a licensee to fail to report the death of a patient, or removal of a patient to a hospital or emergency center for medical treatment, that is related to a dental procedure, as specified. The act also makes it unprofessional
conduct for any dentist to fail to obtain the written informed consent of a patient prior to administering general anesthesia or conscious sedation. In the case of a minor, the act requires that the consent be obtained from the child’s parent or guardian.

This bill, which would be known as “Caleb’s Law,” would require the board, on or before January 1, 2017, to provide to the Legislature a report on whether current statutes and regulations for the administration and monitoring of pediatric anesthesia in dentistry provide adequate protection for pediatric dental patients and would require the board to make the report publicly available on the board’s Internet Web site. The bill also would require the board to provide a report on pediatric deaths related to general anesthesia in dentistry at the time of its sunset review by the appropriate policy committees of the Legislature.

This bill would require that the report of the death of a patient, or removal of a patient to a hospital or emergency center for medical treatment, be on a form or forms approved by the board and that the report include specified information. The bill authorizes the board to assess a penalty on any licensee who fails to make the required report. This bill, with regard to obtaining written informed consent for general anesthesia or conscious sedation in the case of a minor, would require that the written informed consent include specified information regarding anesthesia, as provided (The Dental Board of California, 2017).

**Conclusion**

It has been estimated that an average of 10 -12 threatening emergencies will occur in the lifetime practice of a general dentist. With the aging of the population generally and the more frequent appearance in the dental office of individuals with underlying medical conditions, the possibility of problems occurring will only increase. Obtaining a health history and a set of vital signs is the first step in identifying the patient likely to develop a medical emergency. With proper training, thorough preparation, and regular practice, the staff of the dental office will be able to provide appropriate medical care should the need arise.

Dental practice is a state-regulated profession. It is the obligation and responsibility of dental practitioners to become familiar with the dental practice act in the state(s) in which they practice. Dental practitioners can avoid medical errors and subsequent legal liability with the use of best practices while delivering clinical care. Dental team members must be professional and ethical, and treat patients within their scope of practice or licensed duties. Care must be provided care with consistent protocols, thorough treatment plans, complete assessments, and strict infection control. Dental professionals have an ethical and legal duty to provide quality care in a safe environment. And it is the right thing to do.
References


Malamed, S.F. Managing medical emergencies. *J. of the Amer. Dental Ass’n* 124


Glossary

Acetone – waste product of cellular metabolism
Acidosis – acid condition in the blood or body fluids
AED – automatic external defibrillator
Agitation – mental confusion caused by hypoxia
Allergen – substance capable of causing an allergic reaction
Anaphylaxis – severe allergic reaction affecting respiration and heart function
Aneroid gauge – gauge or dial on a blood pressure cuff
Angina – chest pain related to exertion, emotion or exercise
Angioneurotic edema – allergic swelling of the pharyngeal structures
Antecubital space – elbow space
Antibody – body chemical produced on exposure to germs or allergens
Antigen – substance capable of stimulating antibody formation
Antisialagogue – drug used to decrease secretion of salivary glands
Aphasia – inability to speak
Apnea – not breathing
Arrhythmias – irregularities or abnormal heart rhythms
Ascites – fluid accumulation in the abdomen
Aspiration – act of inhaling fluid or vomit into the lungs
Atherosclerosis – build-up of fatty deposits in the arteries
Benzodiazepines – class of drugs used to reduce anxiety
Brachial artery – artery which can be palpated on the inside of the antecubital space
Bradycardia – slow heart rate, less than 60 beats per minute
Bronchioles – small airway tubes within the lungs
Bronchitis – inflammation of the bronchi caused by irritation
Bronchodilator – drug capable of relaxing (dilating) the bronchioles
Bronchospasm – constriction or narrowing of the bronchioles due to muscle constriction
Carpopedal spasm – painful claw-like appearance of the hands seen in hyperventilation
Cerebral cortex – outer layer of the brain controlling higher functions (motor function, consciousness, sensation)
Circumoral – around the mouth
Clonic – repetitive muscle contraction and relaxation phase of a seizure
COPD – chronic obstructive pulmonary disease, a combination of emphysema and bronchitis
Cyanotic – bluish discoloration of the skin caused by low oxygen levels in the blood
Dehydration – condition caused by the abnormal loss of fluid from the body
**Diabetes** – disorder of sugar metabolism due to a lack of insulin

**Diaphoresis** – sweating

**Diastole** – relaxation phase of the heart cycle

**Diastolic** – the lower, or second, of the two pressures making up the blood pressure; the force of blood against the blood vessel walls during ventricular relaxation

**Dyspnea** – shortness of breath

**Emphysema** – chronic, progressive disease of the lung involving the smaller airways and air sacs

**Epigastric** – the upper portion of the abdomen

**Epilepsy** – neurological disorder associated with seizures

**Exhalation** – movement of air out of the lungs

**Fibrinolysis** – process when a clot or coagulation is broken down

**Gingival hyperplasia** – an overgrowth of gingival tissue often requiring surgery to reduce

**Glaucoma** – increased pressure in the anterior chamber of the eye which may lead to blindness

**Glucose** – form of sugar preferred by the body as an energy source for metabolism

**HEPA respirator** – High Efficiency Particulate Arresting; air respirator used for personal protection when working with patients with known or suspected tuberculosis

**Hepatomegaly** – swelling or enlargement of the liver seen in right heart failure

**Histamine** – potent chemical released by body cells in response to infection or allergy

**Hypertension** – elevated blood pressure exceeding 140/90

**Hyperventilation** – increased rate and/or depth of breathing leading to excessive excretion of carbon dioxide

**Hypoglycemia** – low blood sugar

**Hypopharynx** – lower portion of the pharynx (throat) at openings of trachea and esophagus

**Hypotension** – lower than normal blood pressure
Hypoxia – body is deprived of adequate oxygen supply
IM – intramuscular; drug administration into a muscle
Inhalation – movement of air into the lungs
Ischemic – decreased or inadequate blood supply to an organ or tissue
IV – intravenous; drug administration into a vein
Jaundice – yellow discoloration of the skin and sclera due to liver disease
Kussmaul respirations – rapid deep ventilations seen in diabetic ketoacidosis
Laryngoscope – instrument used to view the larynx
Laryngospasm – spasm (constriction) of the vocal cords
Larynx – the voice-box
Magill forceps – instrument used for manipulation of structures or tubes in the pharynx
Metabolic – relating to metabolism; chemical reactions that happen within the body to maintain life
Myocardial infarction (MI) – heart attack; portion of heart muscle becomes ischemic and dies
NTG – abbreviation for nitroglycerin; blood vessel dilator
Orthopnea – difficulty breathing only when lying flat
Orthostatic hypotension – decreased blood pressure caused by rapid movements from supine to standing posture, or loss of body fluids
Osmotic – pressure on water exerted by dissolved substances in a fluid separated by a semipermeable membrane
Pallor – pale appearance to the skin due to decreased blood flow in the skin
Palpated – feeling a body part or structure
Pharynx – the throat
Pitting edema – swelling of the ankles and feet due to heart failure
PO – by mouth; administration of drugs by mouth
Polyuria – excessive urination
Post-ictal – the time period immediately following a seizure
Prodromal – initial symptom or sign
Pruritus – itching
Pulmonary edema – fluid build-up in the lung due to left heart failure
Rales – crackling or bubbling sounds heard in the chest with pulmonary edema
Respiratory rate – number of respirations per minute
Sphygmomanometer – inflatable blood pressure cuff with Velcro closure
SQ – subcutaneous; injection of drugs into subcutaneous (fat) tissue
Sternocleidomastoid – muscle of the side of the neck
Stethoscope – instrument for listening to breath or heart sounds
Stridor – high pitched breathing sound caused by partial collapse or obstruction of the upper airway during inhalation
Supine – lying on the back in a horizontal plane; sub-supine positioning is when the head is slightly lower than the knees to return more blood flow to the brain
Syncope – fainting
Systole – contraction phase of the heart cycle
Systolic – top, or first, of the two pressures making up the blood pressure; the force of blood against the blood vessel walls during ventricular contraction
Tachycardia – a rapid heart rate, faster than 100 beats per minute
Tonic – phase of seizure where all muscles of the body remain contracted
Umbilicus – navel or belly button
Urticaria – raised wheals (hives) of the skin seen in allergic reactions
Ventricular fibrillation – disorganized heart rhythm that does not result in a pulse
Xiphoid process – lower-most pointy part of sternum
Course Exam: Medical Emergencies Management and Risk Management: Medical Error Prevention

1. The most frequent medical emergency in the dental office is:
   a. Myocardial infarction.
   b. Syncope.
   c. Respiratory arrest.
   d. Allergic reactions

2. In an emergency, the best place to check the pulse is the:
   a. Carotid artery.
   b. Brachial artery.
   c. Radial artery.
   d. Femoral artery.

3. The best position in which to place a syncopal patient is:
   a. Seated with the patient's head between their legs.
   b. Supine with the legs elevated.
   c. On their side.
   d. In a seated position.

4. Which best illustrates the “normal” vitals for an adult?
   a. Pulse 108, BP 160/90, respirations 22, temperature 101°F.
   b. Pulse 50, BP 88/40, respirations 28, temperature 98.6°F.
   c. Pulse 80, BP 118/70, respirations 16, temperature 98.6°F.
   d. Pulse 98, BP 208/110, respirations 18, temperature 97.2°F.

5. Most emergencies occur:
   a. In the reception room.
   b. After treatment is completed.
   c. While under nitrous oxide sedation.
   d. During or immediately following local anesthesia administration.

6. A conscious patient is unable to breathe or talk. When you ask if they are choking, they nod their head. You should administer:
   a. Oxygen.
   b. Four back blows.
   c. Fifteen chest compressions.
   d. Abdominal thrusts.
7. Immediately upon recognizing cardiac arrest in the office you should:
   a. Call 911.
   b. Ventilate with a bag-valve-mask.
   c. Begin chest compressions.
   d. Administer oxygen.

8. While administering lidocaine anesthesia to a 21-year-old male, he becomes pale, pushes the dentist’s hand away and passes out. You suspect:
   a. lidocaine toxicity.
   b. allergic reaction.
   c. epinephrine reaction.
   d. syncope

9. A severe allergic reaction involving several body systems is called:
   a. Convulsions.
   b. Syncope.
   c. Anaphylaxis.
   d. Angina pectoris.

10. An older patient becomes restless during treatment. He seems unable to move one arm and his speech is slurred. He may be having:
    a. Cerebrovascular accident/transient ischemia attack.
    b. Acute myocardial infarction.
    c. Angina pectoris.
    d. Epileptic seizure.

11. Anxiety hyperventilation is best treated using:
    a. A paper bag.
    b. High flow oxygen.
    c. Coaching techniques to slow breathing.
    d. Anti-anxiety agents

12. The medication most often used to relieve anginal pain is:
    a. Nitroglycerin.
    b. Dilantin®.
    c. Epinephrine.
    d. Insulin.
13. Nitroglycerin is administered:
   a. Intravenously.
   b. Intramuscularly.
   c. Sublingually.
   d. By inhalation.

14. A heart rate greater than 100 is called:
   a. Tachycardia.
   b. Arrhythmia.
   c. Hypertension.
   d. Bradycardia.

15. A patient health history should be taken:
   a. At the patient’s first visit and an update at each visit.
   b. In ink at the end of each treatment.
   c. Only if surgery is required.
   d. At the patient’s first visit and again if the patient mentions a medical problem.

16. Medical errors always result in patient injury or death.
   a. True.
   b. False.

17. The key to reducing medical errors is to focus on improving the systems of delivering care and not to blame individuals.
   a. True.
   b. False.

18. Research clearly shows that the majority of medical errors cannot be prevented.
   a. True.
   b. False.

19. Near-misses are occurrences that could have resulted in an adverse event but the event was averted and the patient was not harmed.
   a. True.
   b. False.
20. Root-cause analysis is the failure of a planned action to be completed as intended or the use of a wrong plan to achieve an aim.
   a. True.
   b. False.

21. When an error occurs it is important to disclose the error because:
   a. It may leave you vulnerable to a lawsuit.
   b. In some states it is mandatory.
   c. Ethically and morally, it’s the right thing to do.
   d. You may be obligated to report the incident to the authorities.
   e. All of the above

22. When documenting the error, it is important to:
   b. Only document what you want the authorities to know.
   c. Be accurate and factual.

23. When analyzing an error, the most important finding relates to:
   a. What the root cause is so the process can be improved.
   b. Who did something wrong.
   c. Who needs to be disciplined.
   d. Why someone didn’t do their job.

24. Factors influencing an error might include:
   a. Training and Education
   b. Task Factors
   c. Equipment Problems
   d. All of the above

25. As you seek to improve patient safety in your practice, remember that:
   a. Change takes more time than you will ever have available.
   b. It’s important to develop a culture of safety throughout your practice.
   c. Safety matters more to the referring offices than it will to your office.
   d. It might be too expensive to promote safety.