Medical Emergency Preparedness in Dental Practice

A Peer-Reviewed Publication
Written by Linda Lawson, RDH, BS

Abstract
While life-threatening medical emergencies are uncommon in the dental practice environment, most professionals will be responsible for managing multiple emergency events throughout their careers. By planning for the unexpected, dental teams hone their skills and build the necessary confidence to cope with these high pressure situations. Although some emergencies are unavoidable, participants in this course will be provided with information and tools to prepare for, prevent and definitively manage the most common medical emergencies that occur in general dental practice.

Educational Objectives
Following these units of instruction, the dental practitioner will be able to do the following:
1. Describe ten practices that prepare dental teams for the most common medical emergencies.
2. Define the potential roles of team members in a basic emergency action plan
3. Discuss how the American Society of Anesthesiologists physical status classification system can be used to identify "at risk" patients.

Author Profile
Linda Lawson, RDH, BS, is based in New York and has more than 17 years of experience in the dental profession. She received her associate’s degree in 1999 from New York City College of Technology. In 2014, she attained her bachelor of science in dental hygiene from Farmingdale State College and was subsequently inducted into the Sigma Phi Alpha Dental Hygiene Society. In addition to clinical practice, Linda has worked as an adjunct dental assistant instructor and is currently a professional educator on behalf of Waterpik Inc. Linda is thrilled to be on the National Cancer Network (NCN) Visionary Team where she works to raise awareness to prevent late-stage diagnosis of all cancers.

Author Disclosure
Linda Lawson, RDH, BS, has no commercial ties with the sponsors or the providers of the unrestricted educational grant for this course.
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The Effects of Optimism Bias
“For myself I am an optimist - it does not seem to be much use to be anything else.”
— Winston S. Churchill

Human brains naturally generate pervasive optimism. For most, the day does not begin with opening one’s eyes and being consumed with a feeling of impending doom. Instead, our emotional well-being combined with our past experiences promotes a positive outlook in healthy individuals. In the work environment, “optimism bias” is generally viewed in a positive light. When it comes to the management of medical emergencies, however, solely relying on blind optimism over sober reality will typically result in emergency situations ending badly.

Developing a Comprehensive Preparedness Program
Medical emergencies can be confusing and frightening; consequently, it is not uncommon for people to panic or become paralyzed with fear or indecision when faced with a crisis. Being ill-prepared often results in a delay in response time for the dental team, and an increase in the likelihood of mortality or serious morbidity for the victim. Thus, it is the obligation of the responsible dental practitioner to develop a clear medical emergency preparedness program to decrease the likelihood of unfavorable outcomes. Ten actions that will assist dental teams in becoming better prepared for emergency events are listed below.

Action #1: Accept That It Really Can Happen to You: Prevalence of Emergency Events
The first step in preparing for a medical emergency is to accept that the possibility is real: An acute medical emergency can happen in any dental office at any given moment in time. While some emergencies take place by chance, others are directly linked to dental treatment. A survey of 4,039 private dentists in the United States and seven Canadian provinces revealed that more than 30,000 medical emergencies had occurred in their offices over a period of 10 years.

While these statistics may seem high to some, advances in medicine and technology have resulted in a much older patient population in many practices. In the past, people were by and large edentulous by the time they reached old age. Today, seniors are much more likely to seek dental care as many continue to have all or most of their dentition. Advances in health care have contributed to increased life spans and an increase in the number of medically compromised patients. This factor further escalates the likelihood of an emergency event occurring.

Complications verses Life-Threatening Events
The majority of emergency events are not life-threatening and are better classified as systemic “complications”. Signs and symptoms of complications can occur instantaneously or may be delayed. It is therefore essential that dental personnel are well-versed in recognizing the clinical presentations of the most common complications and/or emergencies that occur in the practice of dentistry. The emergency event that is reported most frequently is syncope, accounting for roughly 50% of all medical emergencies. Other frequently cited emergencies include suspected cardiovascular events, complications related to local anesthesia, allergic reactions, hypoglycemia, seizures, bronchospasm, postural hypotension, diabetic emergencies, and swallowing of foreign bodies. Box I outlines some emergencies that might be encountered in the dental practice along with basic principles on how to safely and effectively manage them.

Action #2: Detail Your Basic Action Plan in Writing
Creating a basic action plan with a team approach should be one of the first steps in planning for an emergency event. Each team member should be trained to perform specific tasks and their assigned roles should be outlined in a written plan. The Occupational Health and Safety Administration (OSHA) requires all employers with eleven or more staff members to have a written emergency action plan detailing the steps to be taken in the event of an emergency. Ultimately, the goal of the basic action plan is to preserve life by managing the patient’s condition until he/she fully recovers or until emergency medical services (EMS) arrive. More specifically, the most principal role for the dental professional during an emergency situation is to prevent, or correct, inadequate oxygenation of the brain and heart.
<table>
<thead>
<tr>
<th>Condition</th>
<th>Risk Factors</th>
<th>Clinical Presentation</th>
<th>Drug, Dosage, and Route</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vasovagal Syncope</td>
<td>Anxiety (Common risk factor in dental practice)</td>
<td>Dizziness, pallor, cold sweat, slowing of pulse, nausea, vomiting, loss of consciousness</td>
<td>Place aromatic ammonia under the patient's nose</td>
<td>Place patient in a supine position; if consciousness is not regained in 30-60 seconds, consider a more complete differential diagnosis</td>
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<td></td>
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<td>Dosage: one to 2 vaporules</td>
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<td>Deliver 100% oxygen</td>
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<tr>
<td>Angina Pectoris</td>
<td>Reported history of coronary artery disease</td>
<td>Chest Pain that is significant but not severe (can last up to 20 minutes)</td>
<td>One sublingual (0.4 mg) tablet or one spray (0.4 mg) from nitroglycerin spray atomizer administered every 5 minutes (3 doses)</td>
<td>Stop the procedure; Allow the patient to rest; Continuously monitor vital signs; Place patient in a semi reclined position; Provide supplemental oxygen if necessary</td>
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<td></td>
<td>Stable angina can be triggered by stress, exposure to very cold or very hot temperatures, heavy meals, smoking</td>
<td>Chest fullness, burning, tightness, dyspnea diaphoresis</td>
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<td></td>
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<td>Typically not the patient’s first time experiencing this type of pain</td>
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<tr>
<td>Mild Allergic Reaction</td>
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<td>Itching, hives, rash</td>
<td>Administer a histamine blocker such as diphenhydramine (Benadryl)</td>
<td>Assist the patient into a comfortable position</td>
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<td></td>
<td></td>
<td>Patient is conscious with a verified airway that is patent</td>
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<tr>
<td>Seizure</td>
<td>Previous diagnosis of epilepsy</td>
<td>Signs and Symptoms vary depending on the type of seizure</td>
<td>Oxygen at a rate of 6-8L/minute</td>
<td>Remove foreign materials from the patient’s mouth; Place the patient on his side to minimize aspiration; Use passive restraint to minimize the chance of injury</td>
</tr>
<tr>
<td></td>
<td>Stress can be a trigger</td>
<td>Simple seizures - consciousness is not impaired</td>
<td></td>
<td>Call 911 if 1. the patient is unconscious for more than 5 minutes; 2. the patient becomes cyanotic; 3. it is the patient’s first seizure</td>
</tr>
<tr>
<td></td>
<td>Light can be a trigger</td>
<td>Complex seizures - consciousness is impaired</td>
<td></td>
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<tr>
<td></td>
<td>Offer patients dark colored safety glasses and do not direct the operator light into the patient’s eyes</td>
<td>Motor Seizure: the body stiffens and muscles will jerk</td>
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<td></td>
<td></td>
<td>Sensory Seizure: affects the senses (i.e., tingling, smell a bad odor, taste things not present in the mouth, ringing in the eyes, spinning feeling)</td>
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<td>Autonomic Seizure: affects the nervous system (i.e., sweating, change in heart rate)</td>
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<td>Psychic Seizure: manifests as strong, sudden emotions (i.e, anxiety, happiness)</td>
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<td></td>
<td></td>
<td>Tonic-Clonic (Grand mal) - Monotonous epileptic cry at onset; Convulsions that start as fast small amplitude movements and progress to slower larger movements</td>
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<tr>
<td></td>
<td></td>
<td>Atonic Seizure: manifests as a sudden loss in muscle strength</td>
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<tr>
<td></td>
<td></td>
<td>Patients typically have a strong pulse when having a seizure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condition</td>
<td>Risk Factors</td>
<td>Clinical Presentation</td>
<td>Drug, Dosage, and Route</td>
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</tr>
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<td>---------------------------------</td>
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<tr>
<td><strong>Asthmatic Attack</strong>&lt;br&gt;(Bronchospasm)</td>
<td></td>
<td>Respiratory distress</td>
<td>Bronchodilator via metered dose inhaler (i.e. Albuterol)¹²,²⁰,²⁵</td>
<td>Assist patient into an upright position⁰</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Administer epinephrine parenterally if the patient loses consciousness²⁰</td>
<td>Ensure that the patient has a patent airway⁰</td>
</tr>
<tr>
<td><strong>Hyperventilation</strong>&lt;br&gt;(Anxiety Associated)</td>
<td>Anxiety³³</td>
<td>Tingling in fingers or lips, involuntary spasm of peripheral musculature, dizziness²⁴</td>
<td></td>
<td>“DO NOT administer oxygen⁶</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unnaturally deep, fast breathing, weakness, feeling of a ‘tight’ chest, sweating, increased heart rate (tachycardia), palpitations³³</td>
<td></td>
<td>Methods to increase CO₂&lt;br&gt;1. Have patient hold breathe for as long as possible³³&lt;br&gt;2. Have patient breathe in and out while cupping his hands around his mouth³³&lt;br&gt;3. Use a non-re-breathing face mask. Cover holes with fingers and do not turn on O₂³³</td>
</tr>
<tr>
<td><strong>Hypoglycemia -Insulin Shock</strong></td>
<td>Patient took too much insulin or glucose lowering medication by mistake²⁵&lt;br&gt; Patient missed a meal after taking insulin or glucose lowering medication²⁰,²⁴</td>
<td>Feels faint, hungry, slurs speech³⁴&lt;br&gt;Experiences diaphoresis and tachycardia followed by confusion and eventual loss of consciousness²⁰&lt;br&gt;BP is typically normal²⁰</td>
<td>Conscious Patients: Administer glucose tablets, one tube of glucose gel or juice¹²,²⁵</td>
<td>Call 911 if patient becomes unconsciousality&lt;br&gt;*DO NOT place any substance in an unconscious person’s mouth that is liquid or can turn to liquid at body temperature²⁰</td>
</tr>
<tr>
<td><strong>Sudden Cardiac Arrest (SCA)</strong></td>
<td>Coronary heart disease²¹&lt;br&gt;History of arrhythmias²¹&lt;br&gt;Personal or family history of SCA²¹&lt;br&gt;Previous heart attack²¹&lt;br&gt;Inherited disorders that make you prone to arrhythmias²¹&lt;br&gt;Drug or alcohol abuse²¹</td>
<td>Unconscious and without a pulse²⁰</td>
<td>Call 911 immediately&lt;br&gt;Initiate rapid defibrillation of the heart using an Automated External Defibrillator (AED)¹³,¹⁶&lt;br&gt;Early application of effective CPR</td>
<td></td>
</tr>
<tr>
<td><strong>Myocardial Infarction</strong></td>
<td>Some risk factors include:&lt;br&gt;Age, smoking, high blood pressure, high cholesterol, high triglycerides, diabetes, family history, inactivity, obesity, stress³¹</td>
<td>Radiating chest pain down the left side of the body (mandible, neck, arm, shoulder)²⁰&lt;br&gt;Decrease in BP²⁰&lt;br&gt;Atypical pain often seen in women: 1. Shortness of breath²⁸&lt;br&gt;2. Unexplained elevated blood sugar²⁰&lt;br&gt;3. Cold sweat, nausea, jaw pain, lightheadedness³²</td>
<td>One 325 mg nonenteric, coated aspirin tablet, chewed and swallowed¹²,²⁵&lt;br&gt;Oxygen³&lt;br&gt;Morphine³&lt;br&gt;Nitroglycerine³&lt;br&gt;Nitrous oxide in a 50:50 concentration, ³¹ if morphine is unavailable³</td>
<td>Call 911³²</td>
</tr>
</tbody>
</table>
Anaphylactic Reaction

Previous anaphylaxis,22 Allergies or asthma,22 Certain other conditions: heart disease and mastocytosis22

Signs and symptoms typically occur in the following order:
1. Urticaria, itching, flushing, hives
2. Rash
3. Rhinitis
4. Bronchospasm
5. Laryngeal Edema
6. Weak Pulse-Syncope
7. Loss of Consciousness
8. Cardiac Arrest27

Epinephrine IM Auto-Injector
0.3 mg to 0.5 mg intramuscular25; Repeat every 5 minutes if no response20
Adjunct treatment:
- Bronchodilator,
- Antihistamine (50 mg intramuscular or intravenous),
- Corticosteroids (to prevent relapse),
- Supplemental oxygen27
Call 91120,27
Place patient in supine position20
Administer positive pressure oxygen via a bag-valve-mask device20

Stroke (CVA)

Longstanding hypertension,30 poor diet, smoking, diabetes, physical inactivity, obesity, high cholesterol, atrial fibrillation, carotid artery disease, peripheral artery disease, sickle cell disease23

Transient ischemic attacks (TIAs), or minor strokes: dizziness, diplopia, hemiplegia, and altered speech30
Severe stroke: sudden or temporary weakness or numbness of the face and other body parts, loss of speech or difficulty speaking or understanding speech, visual changes, and unexplained loss of balance or dizziness30

100% oxygen if patient is experiencing apnea20
Call 91130
Maintain the patient’s airway30

Action #3: Assign Roles to Your Emergency Team

The in-office emergency team should consist of at least three staff members where any properly trained staff member can lead the management of the crisis. In the event of a medical emergency, the leader would announce the emergency situation to the staff, assess the patient, direct another team member to call for emergency medical services (EMS), and manage the patient’s circulation, airway, and breathing, (CAB) until emergency assistance arrives. Team member 2 is typically required to assist the leader in basic life support (BLS) and/or monitor vital signs. Team member 3 (and 4 if available) is delegated to tasks that include bringing any and all necessary equipment to the team leader as instructed, calling 9-1-1, meeting EMS at the front entrance, and detailing a written chronological record of all events.7 Box 2 outlines potential roles for a dental team during an emergency situation. It is important to note that emergency preparedness is not licensed based; therefore, roles are interchangeable so long as clear communication is present.7

Action #4 Practice Using Effective Communication Methods

In the event of an emergency, the dental team should consider using a “closed-loop” method of communication.7 This means that when the leader sends a message, the team member acknowledges receiving the instruction, thereby confirming that the message was heard and understood. The team leader should only assign the next task after he has received a clear response from the team member that the first task was understood.7

Figure 1: Closed Loop Communication Model

“Lauren, go get the Epi-Pen.”

Team Leader identifies the team member by name and gives a clear, verbal message
Team member confirms that the message was heard and provides feedback

“Here it is, Dr. Jones. Do you need anything else?”

Team member completes the task and consults with the leader as needed
Team Leader acknowledges or corrects

“O.K. Dr. Jones, it’s in the emergency kit, right?”

“Yes, hurry up.”

Action #5: Take an Annual Basic Life Support Refresher Course

Basic Life Support (BLS), or Cardiopulmonary Resuscitation (CPR) at the healthcare provider level, is unequivocally the most important aspect in successfully managing medical emergencies in the dental setting. When performing CPR, it is recommended that chest compressions should match the
tempo of the song, "Staying Alive" and the CPR cycle should be initiated at a rate of 30 compressions to 2 rescue breaths in adults and 15 compressions to 2 rescue breaths in children when two rescuers are present. Due to space constraints in dental treatment rooms, it is generally not recommended to move a patient from a dental chair to perform CPR. Instead, a short inflexible cardiac board should be placed under the prone patient when chairs have softer padding in order to maximize the effectiveness of chest compressions. In addition, a dental stool can be adjusted and positioned under the head of the chair to minimize rocking when performing CPR.

In 2010, the American Heart Association (AHA) reoriented the guidelines for CPR and Emergency Cardiovascular Care (EEC) from A-B-C (Airway, Breathing, Compressions) to C-A-B (Compressions, Airway, Breathing) to reduce time to initiation of chest compressions. The 2010 Guidelines also changed the recommended compression rate from “approximately” 100/minute to a compression rate of “at least” 100/minute. The need for high quality chest compressions was stressed as rescuers were prompted to push hard and fast, minimize interruptions, allow full chest recoil, and avoid excessive ventilation.

In 2015, the AHA further refined its guidelines based on preliminary data implying that excessive compression rates and depths negatively affect outcomes. Healthcare providers (HCPs) were still advised to perform a minimum of 100 chest compressions/minute; however, the new recommendation placed limits on compressions to a maximum of 120 per minute. In addition, the suggested compression depth of 2 inches (5 cm) for the average adult was restated; however, the new 2015 Guidelines limit compression depth to no greater than 2.4 inches (6 cm).

Although there are some state dental boards that do not mandate refresher BLS for license renewal, BLS Healthcare Provider (BLS-HCP) is considered the level of training required for dentists and dental hygienists who administer local anesthesia. The supplementary drug package insert that accompanies all local anesthetic drugs clearly states: “Dental practitioners and/or clinicians who employ local anesthetic agents should be well versed in diagnosis and management of emergencies that may arise from their use. Resuscitative equipment, oxygen, and other resuscitative drugs should be available for immediate use.” Resuscitative equipment has been interpreted in court as integral to the ability to perform BLS. Training in the use of all resuscitative equipment is essential for proper utilization.

Moreover, although many states require dentists and hygienists to complete CPR recertification every two years, the AHA recommends that healthcare professionals complete BLS on an annual basis. This is necessary as the AHA consistent-
...ly assesses its CPR methods and procedures making modifications when needed. As a result, previously taught ideas could undergo minor to moderate variations that healthcare providers may be unaware of if refresher courses were taken biannually.

Action #6: Know the Location and Proper Utilization of Emergency Drugs and Equipment

Acquiring and maintaining emergency drugs and equipment for the dental practice is an essential component of emergency preparedness. Too often, dental teams make the mistake of storing emergency kits in locations that are difficult to access. Drugs and equipment should always be stored in a central location for quick and easy retrieval during urgent situations to minimize response time. In addition, it is plausible for an emergency event to occur outside of the dental operatory; as a result, storage cases or carts containing essential drugs and equipment must be portable so that teams can respond to any person in any room of the office.13

Oxygen

Oxygen (O₂) is used in almost all emergency situations with the exception of hyperventilation. If possible, O₂ saturation levels should be monitored with a pulse oximeter before, during and following oxygen therapy. In addition, high flow oxygen (15 liters per minute) should be administered and titrated accordingly based on O₂ saturation levels when managing a critically ill patient.14

Oxygen should always be available in a transportable unit, preferably an “E”-size cylinder which holds over 600 liters, so that it can be administered in any area of an office.5,18 Portable oxygen tanks enable the dental team to deliver oxygen under positive pressure to anyone who is unconscious or not ventilating properly. Bag-valve-mask devices (i.e., Ambu-Bag) with an oxygen reservoir connected to an oxygen supply is the most efficient technique of ventilating high concentrations of inspired oxygen in patients when respiration has ceased.

Automated External Defibrillator

The automated external defibrillator (AED) is an indispensible piece of equipment that has become the standard of care in oral health care settings. According to the American Heart Association, more than 350,000 cardiac arrests occur outside of the hospital setting in the United States each year.16 This life-threatening medical condition is typically caused by ventricular fibrillation (VF), an abnormal heart rhythm in which the electrical impulses in the heart’s lower chambers become rapid and erratic, often without warning.16 As the heart quivers uselessly, it loses its ability to pump blood to the body’s vital organs. Failure to immediately respond to cardiac arrest will result in loss of consciousness and respiratory activity followed by death.17

The dental team’s basic action plan for a Sudden Cardiac Event (SCA) must be designed so that an AED is deployed in a quick and efficient manner as the survival probability is near zero after eight to ten minutes. Successfully managing a SCA entails immediately recognizing the emergency, rapidly initiating a 911 call, and deploying an AED within 4-5 minutes.18

AED’s are voice-prompted, computer-driven, devices that work by analyzing the heart’s rhythm releasing an electrical shock to the heart via pads placed on the victim’s chest if needed. This shock, called defibrillation, is the only effective treatment to reestablish a normal sinus rhythm when a person is experiencing cardiac arrest.11 It is worth noting that excessive chest hair can interfere with the AED’s pad to skin contact. While some AED devices include razors, chest hair can be more quickly removed with a piece of duct tape to allow for better adherence of the pad to the victim’s chest. Other important AED considerations include placing pads at least one inch from pacemakers and not deploying the device when metal objects (i.e., jewelry, piercings, the metal underwire of a bra) are in close contact with the adhesive pads.

AED’s are extremely effective in restoring a normal heart rhythm when it is deployed immediately and operated properly. Statistics indicate that each minute without defibrillation results in a decrease in survival rate by approximately 10%.17 The AHA now includes defibrillation in its “chain of survival,” and since 1998, hands-on AED training is included in all AHA Healthcare Provider and Heartsaver® courses. Furthermore, some states, including Florida, Washington, and Illinois, mandate that dentists keep an AED on premises.13

Emergency preparedness is particularly central in saving the life of a SCA victim because it is impossible to predict when an event will occur. Most victims of SCA have never been labeled as “high risk,” roughly 20 percent have no prior history of heart disease, and 10 percent of SCA events occur in persons under the age of 40. What’s more, the overwhelming majority of SCA events do not occur in a hospital type setting.18

Emergency Drug Kit

The contents of the emergency kit should be packed in an appropriately labeled designated storage unit. Furthermore, contents should be checked periodically to ensure that no drugs in the kit have expired. According to Rosenberg (2010),15 the following drugs should be included in the basic drug kit for dental practice: epinephrine (for treating cardiovascular and respiratory manifestations of acute allergic reactions), diphenhydramine (for management of mild allergic reactions), nitroglycerin (for treatment of acute chest pain caused by angina pectoris), bronchodilators (to treat bronchospasm caused by an asthmatic attack or anaphylaxis), glucose (to treat hypoglycemia), and aspirin (to prevent further clot formation during an evolving myocardial infarction). Box 3 lists the basic emergency drugs and equipment for the general dental practice. Note that the kit would be more extensive for the dental provider who administers oral sedation or intravenous anesthesia.
Action #7: Identify Patient Specific Risk Factors by Acquiring a Comprehensive Health History

As stated earlier, prevention is key to successfully managing emergency events. This includes updating and verbally reviewing each patient’s health history at every dental visit; it is both mandatory and necessary. The health history form should consist of relevant and detailed questions in order to accurately document the patient’s condition while the health history interview acts to clarify the significance of any stated medical condition to the proposed dental treatment plan.19

While it is true that any person can experience medical complications while undergoing dental treatment, an updated and accurate health history provides the necessary information to help identify “at risk” patients. “Identification of at-risk patients will allow modifications to be made to treatment planning and may highlight those patients whose treatment may be more appropriately conducted at specific times or in specialist centres.”13 At minimum, health history forms should include questions related to the family medical history, known allergies, medication history, past and present illness, recent diagnoses of medical or mental health conditions, and previous surgeries/hospitalizations.

Step #8 Take Vital Signs Prior to Administering Treatment

Measuring and recording blood pressure prior to administering dental treatment is fundamental in preventing emergency events in the dental practice. Blood pressure readings aid in identifying patients with hypertension, a condition that contributes to a myriad of health conditions including heart attack and stroke.2 The American Society of Anesthesiologists physical status (ASA PS) classification system is currently in use as the standard for treating dental patients. After reviewing the pertinent medical history information, the dentist should assign the patient a classification based upon his or her present medical conditions.

ASA PS I patients would be considered normal and healthy. ASA PS II patients suffer from mild systemic disease while ASA PS III patients suffer from severe systemic disease. Patients that fall within the category of ASA PS IV have a severe systemic disease that constantly threatens their life. Patients that are placed in the category of ASA PS V are typically hospitalized and terminally ill.19 Dental treatment recommendations regarding ASA PS classifications and blood pressure readings are outlined in Box 4.

Step #9 Perform a Visual Inspection Prior to Initiating Dental Treatment

A simple visual inspection can provide useful information as to whether or not a dental patient is considered “at risk”. Diseases that can be identified by conducting a visual inspection include jaundice, Parkinson disease, obesity, a history of cerebrovascular accident (CVA), exophthalmos, orthopnea and heart failure.20 Furthermore, a visual inspection combined with open communication throughout the appointment can assist dental personnel in identifying a patient who is experiencing anxiety. Since stress is a major contributing factor to medical emergencies,2 the dental team should employ stress reduction tactics during treatment, thereby potentially reducing the risk to the patient. These protocols are grounded in the belief that stress reduction should start before initiating dental therapies, continue throughout the dental appointment, and if deemed necessary, continue into the postoperative phase of treatment.19 Dental personnel should be familiar with the signs and symptoms of anxiety which include stiff posture, cold or sweaty palms, “white knuckle” syndrome, excessive sweating, dilated pupils, and increased blood pressure and/or heart rate.2

Box 3: Emergency Drugs and Equipment Checklist for the General Dental Practice

<table>
<thead>
<tr>
<th>Equipment:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Automated External defibrillator (AED)12,13,15,25</td>
</tr>
<tr>
<td>• Supplemental Oxygen delivery devices- (Bag mouth mask device, positive pressure mask, nasal cannula, nasal hood)12,15</td>
</tr>
<tr>
<td>• Auxiliary supplies to effectively administer emergency drugs</td>
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<tr>
<td>• Oropharyngeal airways to maintain a patient’s airway in the event of an obstruction12</td>
</tr>
<tr>
<td>• Magill forceps to retrieve objects that have been lodged in the hypopharynx12,15</td>
</tr>
<tr>
<td>• Automated blood glucose monitoring device31</td>
</tr>
<tr>
<td>• Sphygmomanometer with adult small, medium and large cuff sizes15</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Emergency Drugs (adults):</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Oxygen12 (Portable E-Cylinder tank)13,15,25</td>
</tr>
<tr>
<td>• Epinephrine -Injectable- 1:1000(.03mg) - (2 Twinject® syringes)12,15,25</td>
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<tr>
<td>• Diphenhydramine (i.e., Benadryl)- 50mg/mL12,15,25</td>
</tr>
<tr>
<td>• Nitroglycerin (Nitrolingual Spray .04 mg recommended)12,15,25</td>
</tr>
<tr>
<td>• Bronchodilator in a metered-dose inhaler (i.e., Albuterol)12,15,25</td>
</tr>
<tr>
<td>• Nonenteric, coated aspirin 325mg (to be chewed and swallowed)12,15,25</td>
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Based on the American Society of Anesthesiologists physical status (ASA PS) classification system

‡BP: Blood pressure.
§mm Hg: Millimeters of mercury.
Step #10 Practice Makes Perfect: Perform Mock Emergency Drills

In the event of a crisis, knowing what to do versus actually practicing what to do are two very different things. This point was substantiated during the 2008 University of Michigan School of Dentistry study on the ability of dental students to manage a simulated angina attack. Of the subjects tested, 68 percent independently identified the need for oxygen and the correct location of the equipment in the dental school. Only 15 percent of the students completed the experiment within a predetermined optimal time frame, and 50 percent of all students did not successfully operate the tank regulator to administer oxygen correctly. Although most participants in the study were able to verbalize the proper protocol for managing medical emergencies, the chairside execution in this situation demonstrates room for improvement.

The results of the study highlight the potential disconnect between instruction in the classroom and actual clinical practice. Performing routine simulated emergency drills bridges the gap between this disconnect and improves confidence in dental practitioners when it comes to emergency management.

Conclusion

In conclusion, dental teams should be prepared to prevent what is preventable and effectively manage what is not. Although some medical emergencies can never be prevented, best practice dictates that teams receive the proper training and make the necessary preparations in order to increase the likelihood of a successful outcome during an urgent and emergent medical situation. In addition, regular audits should be carried out in the dental practice in order to ensure that the response to an emergency event is maximized. Emergency equipment and drug kits should be checked weekly, and response time of team members should be timed during mock drills. Preparing for emergency events in advance gives the dental team the ability to identify deficiencies and take the necessary steps to implement improvement.

References

15. Rosenberg, M. Preparing for Medical Emergencies- the Essential Drugs and Equipment for the Dental Practice. JADA. 2010; 141: 14s-19s.
1. Once an emergency is recognized, the emergency basic action plan is activated and team members should:
   a. React immediately
   b. Remain calm
   c. Perform their roles as outlined in the written emergency plan
   d. All of the above

2. Managing a medical emergency always begins with:
   a. Calling 911
   b. Prevention of the emergency in the first place
   c. Bringing the dentist the emergency drug kit
   d. Putting the patient/victim into supine position

3. The Occupational Safety and Health Administration (OSHA) requires offices to have a written emergency plan if the number of staff members meets or exceeds _______ employees.
   a. 9
   b. 10
   c. 11
   d. 12

4. The goal of the basic action plan is:
   a. Manage the situation until the patient recovers
   b. Manage the patient until emergency services arrive
   c. Prevent the patient from losing oxygen to the brain
   d. All of the above

5. The recommended minimum number of staff that is required to make up an in-office emergency team is:
   a. 2
   b. 3
   c. 4
   d. 5

6. In most cases, the dental team member who leads the emergency is:
   a. Dentist
   b. Dental hygienist
   c. Dental Assistant
   d. Office manager

7. During an emergency, the team leader typically takes on the following roles:
   a. Announces the emergency to the other team members
   b. Directs another team member to call 911
   c. Manages the victim’s airway, breathing, and circulation
   d. All of the above

8. The best method of communication during a medical emergency is:
   a. Open loop communication
   b. Closed loop communication
   c. Non-verbal communication
   d. Written communication

9. The recommended time frame for dental professionals to complete BLS recertification is every ______.
   a. 6 months
   b. Year
   c. Two years
   d. Three Years
10. The most effective method of delivering oxygen to a person who is unconscious and not ventilating properly is through the use of:
   a. Positive pressure provided by a centrally plumbed oxygen system and a single-use nasal hood
   b. Negative pressure provided by a centrally plumbed oxygen system and a single-use nasal hood
   c. Positive pressure provided by a portable oxygen system prefilled E-cylinder, demand valve, hose, and adult resuscitation mask
   d. Negative pressure provided by a portable oxygen system prefilled E-cylinder, demand valve, hose, and adult resuscitation mask

11. All of the following useful equipment are recommended to be included in a basic dental emergency kit except:
   a. Magill forceps
   b. Vital signs monitoring equipment
   c. Portable suction unit
   d. Intravenous fluids

12. Statistics suggest that each minute without defibrillation results in a decline in survival rate by approximately:
   a. 5%
   b. 10%
   c. 15%
   d. 20%

13. The only effective method of restoring a normal sinus rhythm in a person who is experiencing cardiac arrest is to:
   a. Administer rescue breaths followed by chest compressions
   b. Defibrillate the patient with an electrical charge delivered through self-adhesive pads
   c. Perform an endotracheal intubation
   d. Administer oxygen under pressure

14. All of the following are drugs that should be included in a dental office’s basic drug kit except:
   a. Epinephrine
   b. Bronchodilator
   c. Nitroglycerin
   d. Insulin

15. Dental office emergency equipment must be:
   a. Portable
   b. Stored in a common location
   c. Stored in a locked box or closet
   d. Both A and B

16. Unanticipated problems with the medical emergency protocol or medical equipment can be best identified and corrected by:
   a. Performing mock emergency drills
   b. Being flexible and open-minded as an emergency is in progress
   c. Keeping a log of the emergency events
   d. Researching the best emergency protocols

17. The health history interview and questionnaire should be taken:
   a. At the patient’s first visit and updated at every 6-month recare appointment
   b. At the patient’s first visit and updated at every appointment thereafter
   c. Only if major restorative or dental surgery is required
   d. On an annual basis

18. Maintaining an updated and accurate medical history:
   a. Helps identify at-risk patients
   b. Allows the dentist to make proper modifications to treatment planning
   c. Highlights which patients should have dental treatment performed in a specialist setting
   d. All of the above

19. The American Society of Anesthesiologists physical status classification system states that patients who suffer from mild systemic disease are classified as:
   a. ASA PS I
   b. ASA PS II
   c. ASA PS III
   d. ASA PS IV

20. The purpose of the health history interview is to:
   a. Accurately record the patient’s medical conditions
   b. Accurately detail the patient’s visual conditions such as weight and pallor
   c. Accurately document the patient’s vital signs
   d. None of the above

21. If a blood pressure reading of 163/102 is detected before initiating dental therapy, the dental professional should:
   a. Advise the patient and check it again in six months
   b. Advise the patient and recheck the reading over the next three appointments
   c. Reschedule the appointment and refer the patient to his/her physician
   d. Call 911 as immediate medical consultation is indicated

22. Which of the following is a condition that cannot be recognized by a simple visual inspection?
   a. Jaundice
   b. Orthopnea
   c. Rheumatoid arthritis
   d. Parkinson’s disease

23. Most victims of sudden cardiac arrest:
   a. Have a prior history of heart disease
   b. Are typically under the age of 40
   c. Are under general anesthesia in the hospital setting
   d. None of the above

24. Patients who fall within this category have a severe systemic disease that constantly threatens their life.
   a. ASA I
   b. ASA III
   c. ASA IV
   d. ASA V

25. Signs and symptoms of stress include all of the following except:
   a. Excessive sweating
   b. Dilated pupils
   c. Decreased heart rate
   d. Stiff posture

26. Methods of identifying deficiencies in the emergency action plan include:
   a. Time team members during mock drills
   b. Periodically check emergency drug kits to ensure its contents have not expired
   c. Getting CPR recertification on a biannual basis
   d. Both A & B

27. The most common medical emergency that arises in dental practice is:
   a. Syncope
   b. Hypoglycemia
   c. Choking
   d. Mild allergic reaction

28. Which of the following is the best method of managing a patient who is experiencing an acute angina attack?
   a. Administer epinephrine IM
   b. Administer a nitrate via transmucosal spray
   c. Administer 100% oxygen
   d. Administer nitrous oxide in a ratio of 50/50

29. All of the following are methods of managing hyperventilation except:
   a. Having the person breathe into a paper bag
   b. Having the person hold his/her breath for 10 seconds
   c. Initiating stress reduction techniques
   d. Administering oxygen via a face mask

30. The only effective means of managing sudden cardiac arrest is to:
   a. Utilize an automated external defibrillator within 4-5 minutes of the onset
   b. Perform rescue breaths and chest compressions
   c. Administer epinephrine 1:000 IM
   d. None of the above
Medical Emergency Preparedness in Dental Practice

Requirements for successful completion of the course and to obtain dental continuing education credits: 1) Read the entire course. 2) Complete all information above. 3) Complete answer sheets in either pen or pencil. 4) Mark only one answer for each question. 5) A score of 70% on this test will earn you 3 CE credits. 6) Complete the Course Evaluation below. 7) Make check payable to PennWell Corp. For Questions Call 800-633-1681

Educational Objectives

1. Describe ten practices that prepare dental teams for the most common medical emergencies.
2. Define the potential roles of team members in a basic emergency action plan.
3. Discuss how the American Society of Anesthesiologists physical status classification system can be used to identify “at risk” patients.

Course Evaluation

1. Were the individual course objectives met?
   Objective #1: Yes No
   Objective #2: Yes No
   Objective #3: Yes No
   Please evaluate this course by responding to the following statements, using a scale of Excellent = 5 to Poor = 0.

   2. To what extent were the course objectives accomplished overall? S 4 3 2 1 0
   3. Please rate your personal mastery of the course objectives S 4 3 2 1 0
   4. How would you rate the objectives and educational methods? S 4 3 2 1 0
   5. How do you rate the author’s grasp of the topic? S 4 3 2 1 0
   6. Please rate the instructor’s effectiveness. S 4 3 2 1 0
   7. Was the overall administration of the course effective? S 4 3 2 1 0
   8. Please rate the usefulness and clinical applicability of this course. S 4 3 2 1 0
   9. Please rate the usefulness of the supplemental webliography. S 4 3 2 1 0
   10. Do you feel that the references were adequate? Yes No
   11. Would you participate in a similar program on a different topic? Yes No
   12. If any of the continuing education questions were unclear or ambiguous, please list them.

   13. Was there any subject matter you found confusing? Please describe:

   14. How long did it take you to complete this course?

   15. What additional continuing dental education topics would you like to see?

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