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Preparing dental office staff members for emergencies

Developing a basic action plan

Daniel A. Haas, DDS, PhD

The dentist's role in managing any medical emergency begins with prevention. This requires that all staff members, including dentists, dental hygienists, dental assistants and receptionists, be prepared for such emergencies. A team approach should be used,¹ and each staff member can play an important role. Appropriate preparation makes this teamwork effective and should improve the patient's chance of achieving a good result.^{2,3}

How does one develop a basic action plan for an unforeseen event? There are numerous potential medical emergencies and numerous protocols to follow. Ideally, the dentist and support staff members should be knowledgeable about all of them. However, when an emergency first develops, the precise diagnosis may not be clear. Without a diagnosis, how can one formulate a treatment plan? This problem can be circumvented by following a key principle: the most important objective of nearly all medical emergencies in the dental office is to prevent or correct insufficient oxygenation of the brain or heart.

On a simple level, if a patient has lost consciousness, it is a result of a lack of oxygenated blood in the brain. If a patient is experiencing an episode of acute angina pectoris, it is a result of a relative lack of oxygenated blood to specific sites in the cardiac muscle. The management of all medical emergencies in a dental office should include

ABSTRACT

Background and Overview. A medical emergency can occur in any dental office, and managing it successfully requires preparation. The dentist should develop a basic action plan that is understood by all staff members. The goal is to manage the patient's care until he or she recovers fully or until help arrives. The most important aspect of almost all medical emergencies in dentistry is to prevent or correct insufficient oxygenation of the brain or heart. The dentist or a staff member needs to position (P) the patient appropriately. He or she then needs to assess and, if needed, manage the airway (A), breathing (B) and circulation (C). The dentist and staff members then can consider "D," which stands for definitive treatment, differential diagnosis, drugs or defibrillation. A team approach should be used, with each staff member trained in basic life support and understanding the role expected of him or her ahead of time. Clear and effective communication is essential during any emergency.

Conclusions. All staff members should understand the basic action plan so that they can put it into effect should any emergency arise in the dental office.

Clinical Implications. Preparing staff members is integral to the successful management of a medical emergency in the dental office.

Key Words. Medical emergencies; basic life support. *JADA 2010;141(5 suppl):8S-13S.*

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ensuring that oxygenated blood is being delivered to the brain and heart. If the dentist and team members remember this principle, then everything else should make sense. If this approach makes sense to each member of the office staff, knowing what to do becomes straightforward.

In fact, this principle is the basis of the training in basic life support (BLS), also known as cardiopulmonary resuscitation (CPR).⁴ The goal of BLS is to keep the brain oxygenated and, therefore, protected until something more definitive can be done. Clinicians always should begin with the “PABC” approach, particularly if the diagnosis is not clear.¹ The dentist or a staff member needs to position (P) the patient appropriately. He or she then needs to assess and, if necessary, manage the airway (A), breathing (B) and circulation (C). After the dentist and staff members have addressed the PABCs, they can consider “D,” which stands for definitive treatment, differential diagnosis, drugs or defibrillation. Therefore, all team members should be trained and competent in BLS/CPR.

BASIC ACTION FOR EVERY EMERGENCY

What should be done in every medical emergency? The goal is to manage the care of the patient until he or she recovers fully or help arrives. Team members should position the patient and initiate the ABCs. Assess and, if needed, manage each one of A, then B and then C. This orderly approach will help staff members avoid missing a step.

P: Position. If conscious, the patient should sit in any position that is comfortable. If unconscious, the patient should be supine with the legs elevated slightly to about 10° to 15° (Figure 1). This position facilitates blood flow to the brain, thus helping to correct any deficient oxygen delivery.

A: Airway. Practitioners must consider airway assessment. If the patient is conscious, this should not be an issue, and one typically can move quickly to breathing. If the patient is talking, then the airway is patent, but the clinician should look at the throat in cases of allergy to rule out airway compression from laryngeal edema, which is a sign of anaphylaxis. He or she should remove any foreign objects, such as cotton rolls, to eliminate the potential for airway blockage or aspiration.

If the patient is unconscious, assessing and managing the airway becomes crucial. Practi-

tioners and staff members must ensure patency by tilting the patient’s head and lifting his or her chin immediately (Figure 2). By itself, this maneuver may prevent brain damage, as it moves the tongue away from the back of the pharynx, thereby eliminating the obstruction (the tongue). In turn, this permits oxygenation. If the airway is not patent after this maneuver, the clinician should reposition the patient’s head once more. If the airway still is not opened, the clinician should perform a jaw-thrust maneuver by placing his or her thumbs posterior to the angle of the patient’s mandible and advancing them (and the mandible) anteriorly.

B: Breathing. The dentist and staff members should consider the second step—breathing—immediately after taking care of the patient’s airway. If he or she is conscious, this usually is not a problem, and the team can move on quickly to circulation. If the patient is talking, then he or she is breathing, but in cases of asthma or allergy, the dentist must rule out wheezing (bronchospasm). He or she also needs to consider whether the patient is breathing too slowly or rapidly. Any team member can monitor the respiratory rate and adequacy of respiration. In adults, the normal respiratory rate is 12 to 15 breaths per minute. In children, the rate is higher, with an 8-year-old averaging 18 breaths per minute and a 3-year-old averaging 22 breaths per minute.⁵

Bradypnea is any respiratory rate significantly below the normal rate; it may result in hypoventilation and inadequate oxygenation. Tachypnea, often a sign of anxiety, is any respiratory rate significantly above the normal rate; it may lead to hyperventilation syndrome. For offices in which the clinician induces moderate or deep sedation or administers a general anesthetic, a pulse oximeter should be available and can be used to assess the adequacy of oxyhemoglobin saturation. Monitoring the adequacy of respiration also includes observing the color of the mucosa, skin and blood to rule out signs of cyanosis.

If the patient is unconscious, dealing with breathing becomes crucial. As taught in BLS, “look, listen and feel.”⁴ If the patient is not breathing, administer two slow deep breaths, with each breath lasting one second. The clinician

ABBREVIATION KEY. **BLS:** Basic life support.

BP: Blood pressure. **BPM:** Beats per minute.

CPR: Cardiopulmonary resuscitation. **D:** Definitive treatment. **EMS:** Emergency medical services.

PABC: Position, airway, breathing, circulation.

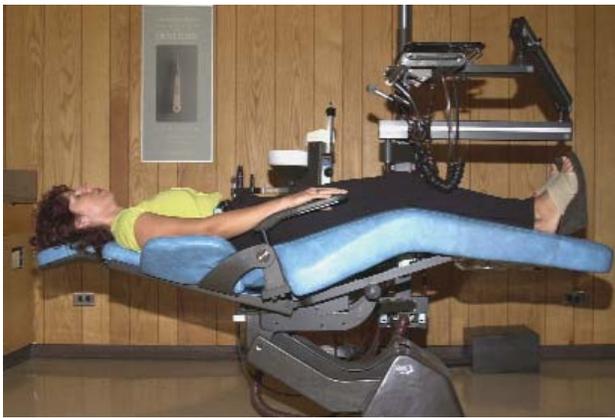


Figure 1. The correct position for an unconscious patient.



Figure 2. The head-tilt chin-lift maneuver.

or staff member should use a barrier device, such as a pocket mask or the mask from a bag-valve-mask device, if available. He or she should see the chest rise with each ventilation. However, he or she should not ventilate too rapidly or administer excessive volumes. The clinician should administer rescue breaths at a rate of 10 to 12 per minute for an adult. In children younger than the age of adolescence—defined as the age just before the onset of puberty, as determined by the presence of secondary sex characteristics—the rate should be 12 to 20 breaths per minute.⁶

C: Circulation. The dental team should assess the patient's circulation immediately after the breathing step. If the patient is conscious, a team member should check the pulse by using the radial, brachial or carotid artery. The team member can palpate the radial artery by placing the ends of two fingers on the lateral and ventral aspects of the patient's wrist. The brachial artery can be palpated on the medial aspect of the antecubital fossa. To locate the carotid pulse, the team member palpates the patient's thyroid cartilage

and moves his or her fingers laterally into the groove formed by the sternocleidomastoid muscle (Figure 3).

Pulse. In an unconscious patient, the carotid is the best artery for assessing the pulse. BLS training for laypeople recommends skipping the pulse check, but that rule does not apply to health care providers, including those of us in dentistry. Health care professionals are expected to be able to detect a pulse. If no pulse can be palpated after 10 seconds, the dentist or a staff member should assume that the patient has experienced cardiac arrest and begin chest compressions at a rate of 100 per minute, consistent with current BLS training.⁶

Chest compressions. The health care professional should place his or her hands over the lower half of the patient's sternum between the nipples. He or she should push down by using the heel of one hand with the other hand on top. Each compression should depress the chest 1½ to 2 inches. It is important that the clinician push hard and fast and allow full chest recoil. The compression to ventilation ratio for adults is 30:2. For children older than 1 year but younger than the age of adolescence, the compressions should depress the chest by one-third to one-half its depth. The compression to ventilation ratio for one-person CPR in children is the same as that in adults, but for two-person CPR in children, the ratio should be 15:2.⁶

Heart rate. In addition to noting the presence or absence of a pulse, a team member should record the heart rate (in beats per minute [BPM]), its quality (weak or strong) and its rhythm (regular or irregular). A tachycardia is a rapid rate, defined in an adult as anything above 100 BPM. A bradycardia is a slow rate, defined as anything below 60 BPM. Not all bradycardias need management. For example, the well-trained athlete or the patient receiving treatment with a β -blocker could have a rate below 60 BPM and not require treatment. Only when a bradycardia is accompanied by symptoms such as lightheadedness, nausea or chest pain should health care professionals act to manage it. Heart rates typically are higher in children and decrease with increasing age. For example, the normal ranges are from 80 to 130 BPM in a 2-year-old and 70 to 110 BPM in a 10-year-old.^{5,7} A full or bounding pulse often is associated with high blood pressure (BP). A weak and thready pulse is associated with hypotension. The team member should record an irregular rhythm as an abnormality.

It is important to note that assessing circulation involves more than just a pulse check. Health care professionals should check BP for a better indication of the adequacy of the patient's circulation.

Measuring BP. Blood pressure can be measured in a number of ways; I describe the auscultatory method here. A standard BP cuff, also called a sphygmomanometer, can be used along with a stethoscope. Alternatively, a team member can use an automated device. Even if an automated device is in the office, a standard cuff and stethoscope should be available to confirm any readings that the dentist may question. An automated device also may not be as accurate as a standard cuff in the event of an irregular heart rate, such as that found in atrial fibrillation.

To measure BP, a team member wraps the deflated BP cuff evenly and firmly around the patient's upper arm, about one inch above the antecubital fossa with the artery indicator resting on the patient's brachial artery, which should be palpated. With the earpieces of the stethoscope facing forward, the team member places the diaphragm firmly over the brachial artery, being careful not to touch the BP cuff. With the other hand, he or she closes the valve on the inflating bulb of the BP cuff by turning it fully clockwise. He or she inflates the cuff to about 20 to 30 millimeters of mercury above the point at which pulsations disappear from the palpated radial pulse. The staff member then reduces the pressure slowly at a rate of 2 to 3 mm Hg per second by turning the valve on the inflating BP cuff counterclockwise until he or she hears the first sound through the stethoscope. This first sound indicates the systolic BP produced by turbulent blood flow through the partially collapsed underlying artery. These are known as "Korotkoff sounds." The team member continues to deflate the cuff slowly until the sounds become muffled and disappear; this is the diastolic BP. The blood flow through the artery returns to a smooth (laminar) flow and, thus, no sounds are produced. At this stage, the staff member deflates the cuff fully and records the measurements obtained.

The accuracy of BP readings can depend on a few factors. Proper BP cuff size is important. The cuff's bladder should extend at least halfway around the arm, with the width of the cuff being at least 25 percent greater than the diameter of the arm. Another means of determining the appropriate size is that the bladder length is 80 percent of the arm's circumference and the width

is 40 percent of the circumference.⁸ A cuff that is too narrow may result in a large overestimation of systolic BP. Conversely, a cuff that is too wide may lead to underestimation of systolic BP. Firm placement is important because a cuff that is too loose results in falsely elevated readings.

The accuracy of BP readings can be affected by what is known as the "auscultatory gap." This is defined as Korotkoff sounds that cannot be heard through part of the range from systolic to diastolic pressure.⁸ It is most common in patients with hypertension and can lead to an inaccurate diastolic measurement. Fear and anxiety also can cause transient elevations in BP, primarily with systolic BP. Normal BP in an adult approximates 120/80 mm Hg. Blood pressures typically are lower in children and increase with age. These approximate from 100/60 mm Hg in a 4-year-old to 110/60 mm Hg in a 10-year-old.^{5,7}

One sign of circulation adequacy is the color of the mucosa, with pink and red indicating good peripheral circulation and pale or blue (cyanosis) indicating inadequate circulation. Capillary filling is another indicator, which can be determined by depressing the nail bed and noting whether or not it blanches and then quickly regains color. To assess central perfusion, the dentist or a staff member notes the patient's orientation to person, place and time.

TEAM MEMBERS' ROLES

The dental office should have a written plan that describes the expected roles of team members. These roles should be reviewed regularly during staff meetings. The dentist should arrange emergency simulations or drills to enable team members to practice their roles periodically. The emer-



Figure 3. Palpation of the carotid artery. Reprinted with permission of Elsevier from Malamed.⁵ Copyright © 2007 Elsevier.

BOX 1**Emergency duties of a four-member dental team.*****TEAM MEMBER 1: LEADER**

- Directs team members
- Positions the patient and stays with him or her
- Performs "ABCs"[†] of cardiopulmonary resuscitation (CPR)
- Takes command and appears calm
- States instructions directly and clearly
- Requests acknowledgment from team members that instructions are understood
- Fosters open exchange among team members
- Concentrates on what is right for the patient, not who is right[‡]

TEAM MEMBER 2

- Brings emergency kit
- Brings oxygen tank and attaches appropriate delivery system
- Brings automated external defibrillator
- Assists with ABCs of CPR, including monitoring vital signs
- Checks oxygen tank regularly
- Checks emergency kit regularly
- Prepares drugs for administration

TEAM MEMBER 3

- Telephones emergency medical services (9-1-1)
- Meets paramedics at building entrance
- Keeps chronological log of events
- Assists with ABCs of CPR

TEAM MEMBER 4

- Assists with ABCs of CPR
- Assists with other duties as needed

* Source: Malamed.¹

† ABC: Airway, breathing, circulation. Source: American Heart Association.⁴

‡ Source: Gaba and colleagues.³

gency medical services (EMS) telephone number should be posted if it is other than 9-1-1.

The specific roles of team members will depend, in part, on the number of people on the team. Most dental offices have at least three team members: a dentist, a dental assistant and a receptionist. As the size of the staff increases, duties can be shared among more members. Team member 1 is the leader, but the other roles often are interchangeable. Box 1 provides suggestions for the roles of a four-member team.^{1,3,4}

Leader. Team member 1 is the leader and usually is the patient's dentist. However, depending on individual circumstances, another team member may be the leader. The leader's role is to be in charge and lead the management of the crisis. The leader decides when to announce an emergency situation. If in doubt, it is better to call an emergency early rather than late; however, bear in mind that calling for help unnecessarily too often may be detrimental when help truly is needed. The leader assigns a team member to telephone for outside assistance, posi-

tions the patient and initiates the ABCs until assistance arrives. The leader should remain with the patient throughout the emergency until he or she has recovered or until EMS has arrived and takes the patient to a hospital.

Being the leader requires leadership skills that include knowing how to prioritize actions by determining what is most important at any time relative to the actions that can be deferred. Leadership skills include the ability to appear calm and in control. Although the leader may be worried about the events unfolding, a calm demeanor must prevail. Panic can be infectious. If team members see the leader panicking, they may follow suit. Remaining calm and collected will help the leader and team members think and act rationally during a stressful time.

Team member 2. Team member 2 knows the location of the emergency kit, portable oxygen and automated external defibrillator and brings them as instructed. He or she also can be assigned to check the emergency kit on a regular basis to ensure that all contents are present and within the expiration date. This team member ensures that sufficient oxygen remains in the tank and assists the team leader with BLS, including monitoring vital signs. He or she also can prepare emergency drugs for administration.

Team member 3. Team member 3, or team member 4 if present, can fulfill various functions, including telephoning EMS (9-1-1) and walking to the building's main entrance to meet the paramedics and lead them to the patient. One of these team members keeps a written chronological record of all events, including the patient's vital signs, timing and amount of drug administered, and the patient's response to treatment.

Additional team members may be other dentists or support staff in the office. All of them should be able to relieve other team members as required.

TEAM COMMUNICATION

In addition to understanding each other's roles, members of an effective team need to communicate effectively. The team leader should consider using a "closed-loop" approach.^{2,3} This means that when the leader sends a message, the team member acknowledges receiving the instruction, thereby confirming that he or she heard and understood the message. Pilots and air traffic controllers use this model successfully, and many gourmet coffee shops use it as customers place their orders. Consequently, this model should work easily in a dental office.

The team leader should state clearly the next task to be assigned only after he or she has received a clear response from the team member that the first task was understood. This approach reduces the likelihood of key steps being missed through oversight, such as shouting “call 9-1-1” to no one in particular; everyone assumes that someone else has made the telephone call, when in fact no one has acted on this command.

An example of a correct scenario is as follows. The leader states, “Mary, call 9-1-1.” Mary then replies, “I am going to call 9-1-1.” The team leader then listens for confirmation that the task has been performed. Mary returns and says, “I’ve called 9-1-1 and the paramedics are on their way.” In another example of a correct scenario, the leader states, “John, bring the oxygen tank.” John acknowledges having received the instruction by replying, “I am going to get the oxygen tank.” When he returns, John says, “Oxygen tank is here.” The team leader responds, “Good. Now attach the bag-valve-mask device.” This communication continues in a similar way with all team members.

Effective communication requires each team member to speak clearly and directly. Good eye contact should be maintained when giving instructions. It is not appropriate to let the stress of the situation result in yelling or shouting. If any instruction is unclear, the recipient should ask for clarification. The best teams are composed of members who respect each other and work together in a supportive and collegial way.² There should be an open exchange such that any team member can speak freely to any other team member without fear or embarrassment. No one should feel patronized and any perceived dental office hierarchy should be ignored for this purpose. For example, any team member should feel comfortable making a suggestion to the team leader, in particular if he or she believes that something important has been missed or is being performed incorrectly. The team leader should welcome any comment that might benefit the patient. The team must concentrate on what is right for the patient, not who is right, during management of the medical emergency.³

It is useful to have a planned protocol regarding what to say when calling EMS (9-1-1).¹ Box 2 summarizes the information that should be communicated clearly when talking with the dispatcher.¹ This protocol should be documented in writing, and team members should review it periodically.

BOX 2

Information to provide when calling emergency medical services (9-1-1).*

- Preliminary diagnosis (for example, “possible myocardial infarction”)
- Information about the patient (for example, “58-year-old man with chest pain; conscious; blood pressure of 152 over 90; heart rate of 84 beats per minute”)
- What is being done for the patient (for example, “The patient is being given 6 liters of oxygen per minute by face mask”)
- Provide exact street address with office number and names of cross streets, if possible (for example, “Dr. Jones’s dental office at 123 Main St., Suite 202, one block east of the intersection at Pine and Oak streets”)
- Telephone number from which the call is being made

* Source: Malamed.¹

CONCLUSION

Each team member should understand the basic action plan described above to permit its effective implementation in emergencies that may arise in the dental office. Differences exist in the level of training that dentists receive in the management of medical emergencies.⁹ The final decision regarding the exact roles of each team member will be determined by a number of factors, including the dentist’s and staff members’ training and ability. Clearly, dentists need to do what they can to prevent emergencies in the dental office but, unfortunately, they still may arise despite dentists’ best efforts. However, taking the time to prepare staff members and develop a basic action plan for all emergencies may save a life. ■

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