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Safety in DENTISTRY

Perspectives and Directions

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DEPARTMENTS

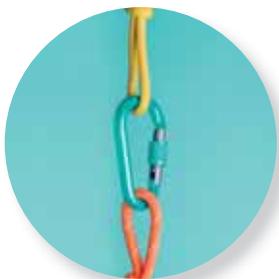
- 421 The Editor/Decorum
- 425 Impressions
- 465 RM Matters/Avoid Medication-Related Tragedies
With Comprehensive Health History Forms
- 469 Regulatory Compliance/Security Incident
Response Procedures
- 474 Tech Trends



425

FEATURES

- 431 Safety: It's Not Exciting but Sure Is Necessary
An introduction to the issue.
David L. Rothman, DDS
- 433 Introducing Safety in Dentistry: Perspectives and Directions
Safety conventions and initiatives have slowly begun to materialize in dentistry but have lagged behind their medical counterparts.
Alfa Yansane, PhD; Muhammad F. Walji, MS, PhD; and Elsbeth Kalenderian, DDS, MPH, PhD
- 439 Checklists as Tools for Improving Patient Safety in Dentistry
Checklists have emerged as practical and effective tools for realizing a safer health care environment.
Oluwabunmi Tokede, DDS, MPH, and Elsbeth Kalenderian, DDS, MPH, PhD
- 447 The Cost of Not Practicing Safely: Perspectives in the Legal Profession
This article elucidates the legal ramifications of the unsafe practice of dentistry.
Steven D. Barrabee, Esq.
- 455 Making Dentistry Even Safer: Understanding the Proper Choice and Use of
Emergency Medications
Oral health care practitioners and the entire office team must be vigilant in recognizing signs of patient distress and trained to take appropriate action when needed.
Mark Donaldson, BSP, ACPR, PharmD, and Jason H. Goodchild, DMD



Making Dentistry Even Safer: Understanding the Proper Choice and Use of Emergency Medications

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ABSTRACT It is vital that oral health care practitioners and the entire office team be vigilant in recognizing signs of patient distress and trained to take appropriate action when needed. This involves inculcating all staff on a culture of safety that includes training in the recognition and management of medical emergencies, basic life support training, mock drills, prescribed individual responsibilities and stocking of appropriate equipment and emergency medications.

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The American Dental Association (ADA) defines a medical emergency in the dental office as an “unexpected event that can include accidental or willful bodily injury, central nervous system stimulation and depression, respiratory and circulatory disturbances as well as allergic reactions.”¹ Although uncommon, medical emergencies in the dental setting can range from conditions that are not life threatening to fatal situations and oral health care professionals (OHCPs) must be capable of recognizing and managing them appropriately.² In an early survey by Fast and colleagues, 1,605 respondents reported 16,826 emergencies over a 10-year period, an average of

approximately one emergency per OHCP per year.³ Another survey by Malamed reported 13,776 medical emergencies by 2,704 OHCPs over the same time frame, in this case indicating an incidence of two emergencies per OHCP per year.⁴ A study by Laurent reported an incidence of 2.1 medical emergencies per OHCP per year among OHCPs in France and Belgium,⁵ and two other international studies found that two-thirds of OHCPs had encountered a medical emergency in the dental setting within the last year.^{6,7} The most encountered medical emergency among these studies was syncope, followed by orthostatic hypotension, asthmatic attack, hypoglycemia, allergy, cardiovascular-related emergencies, seizures and stroke.

TABLE 1

Recommended Basic Emergency Equipment^{2,15,18}

Stethoscope and blood pressure monitoring device (appropriate-sized cuffs)
Oxygen delivery system <ul style="list-style-type: none"> ■ Bag-valve mask device (appropriate sizes) with reservoir and connection to oxygen tank. ■ Portable oxygen system (E size cylinder) with both nasal hood and full face mask permitting positive pressure delivery. ■ Pocket mask (nonbreathing mask) that allows mouth-to-mask ventilation.
Automated external defibrillator
Disposable syringes and needles (e.g., 23 gauge, 1.5-inch needle for epinephrine administration)
Yankauer suction tips and portable handheld suction pump
Pulse oximeter
Glucometer and lancets
Spacer device for inhaled bronchodilator
Adult-sized and child-sized oropharyngeal airways
Magill forceps

It is important to note that this manuscript is specifically for adult patients and is not fully applicable to the pediatric patient. Some of the medications listed may be for adults who are accompanying the patient and have no indications for pediatric use. It is the choice of the practitioner to carry these medications if the practice only treats pediatric patients.

In 2017, a white paper by Sangrik for the American Academy of Dental Boards hypothesized that “medical emergencies during dental treatment are increasing in frequency, intensity and diversity” for reasons such as an aging and more medically complex patient population, more invasive dental treatment and an increasing trend of in-office sedation.⁸ Although medical emergency preparedness involves factors such as equipment, drugs, training and teamwork, the most important aspect involves a culture of safety within the dental office. The OHCP must inculcate and require that everyone in the office follow basic steps for safely treating dental patients including the collection of accurate and up-to-date medical and pharmacological history information, baseline vital statistics, consideration of the American Society of Anesthesiologists Physical Status Classification (last amended in 2014) and possible airway compromise.⁹⁻¹¹

Algorithms and mnemonics exist to describe a series of actions that if properly followed can improve outcomes during emergencies. For example, the American Heart Association’s Chain of Survival is intended to describe actions that can decrease mortality during sudden cardiac arrest.¹² Roberson and Rothman describe Six Links to Survival when preparing for medical emergencies in the dental office: doctor training, staff training, medical emergency plan, emergency drug kit, proper equipment and mock drills.¹³ Most important, the PABCD mnemonic describes the critical factors of patient management when urgencies or emergencies arise in a dental patient prior to a definitive diagnosis: P = positioning, A = airway, B = breathing, C = circulation and D = considering definitive treatment, differential diagnosis, drugs or defibrillation.^{14,15} In his article on pediatric medical emergencies, Rothman describes an additional P for prevention in his mnemonic PPABCD, perhaps the most important component to improving safety in the dental office.

Management of medical emergencies in the dental office includes all the strategies discussed thus far, but at its core involves early activation of emergency medical services (EMS/911).

TABLE 2

Seven Drugs Comprising the Minimal Dental Emergency Kit*

Epinephrine 1:1,000 (injectable)
Histamine blocker (injectable)
Nitroglycerin (sublingual tablet or aerosol spray)
Aspirin (oral tablet)
Bronchodilator, β 2-adrenergic receptor agonist (inhaled)
Glucose (oral)
Aromatic ammonia (inhaled)

* Other sources also commonly include oxygen as an emergency drug, together with equipment to deliver it under positive pressure for a nonbreathing patient.^{9,14,16}

It is also important to recognize that dialing 911 alone is not adequate emergency treatment. Additionally, using a cellphone to call EMS may actually delay treatment. If the call is made near a highway, it could be routed to a central call station that then must contact local EMS, costing precious minutes in the rescue of the compromised patient. Depending on the practice location and the amount of time required for help to arrive, the PABCD and Six Links to Survival must be used.^{8,14,16} When a medical emergency arises, OHCPs need to not only be familiar with the medications they have available in their emergency kit but know how to use them safely and correctly. The purpose of all emergency care is rescue or the ability to stabilize and maintain the patient until additional help and potential transport arrives.

In 2013, the California Dental Association posted an online article titled “Emergency kit basics for dental practices.”¹⁷ The article lists the basic equipment that dental offices should stock for patient and employee medical emergencies; additional items are listed in **TABLE 1**.^{2,16-19} The drugs that at a minimum should be included in the emergency kit are listed in **TABLE 2**.^{2,14,16,17}

Patient safety is the primary concern. This article reviews the proper use and delivery of the essential emergency medications included in a basic drug emergency kit that should be in every dental office, while providing new information and challenging historical dogma around the value of certain products (i.e., ammonia inhalants and autoinjectors). It is important to note that individual specialties (e.g., oral surgeons, pediatric dentists) and offices that provide sedation may require additional drugs (e.g., reversal agents) and advanced airway management equipment as well as additional training such as pediatric advanced life support or advanced cardiac life support and health care basic life support.^{9,16} OHCPs should also review and be compliant with the applicable regulations in their specific area of practice and in their individual states.

The Minimal Dental Emergency Kit

Medical emergency kits for the dental office can be purchased as a preassembled kit (often including the needed excipients) or the individual drugs and equipment can be purchased separately and stored together in an emergency box. There are advantages and disadvantages to each solution. The commercially available kits usually come with a concierge service that will monitor drug expiry dates and automatically send new medication when needed. However, they are often expensive and contain more equipment and additional medications than what is listed in **TABLES 1** and **2**. Cost notwithstanding, having only the most important equipment and medications can prevent confusion and inadvertent errors during an emergency. Kits assembled piecemeal can be more cost-effective, but the onus is on the OHCP

to ensure that the kit is adequately stocked with medication and excipients and to monitor and replace medications before their shelf life expires.

Whether the kit is purchased preassembled or created by collecting the individual parts, a drug emergency kit should only include medications for which the OHCP has knowledge and has had training to fully understand how and when to deliver the medication safely.¹⁴ However, according to the Sangrik white paper, when dental board executive directors or equivalents were

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asked if their board required dental offices to stock emergency medications, only six responded that the basic seven medications were required (one state's dental board responded that the seven medications were only recommended and another responded that a first aid kit chosen by the OHCP was required but no specific drugs were outlined). Only 38 of 53 dental boards from 50 states, the District of Columbia, Puerto Rico and the U.S. Virgin Islands responded to the survey.⁸

Regardless, there is consonance among many dental experts that the minimal dental emergency kit should be composed of at least seven medicines: epinephrine, an injectable antihistamine, nitroglycerin, aspirin, a β_2 -adrenergic receptor agonist,

glucose and aromatic ammonia.^{2,16,19} Other sources also commonly include oxygen as an emergency drug together with the equipment to deliver it under positive pressure for a nonbreathing patient using a self-inflating bag-valve-mask system.^{9,15,17}

The decision to include these medications is primarily based on the historical findings of the most common medical emergencies experienced as described above. Even if dental offices stock these agents, however, given the low overall incidence of medical emergencies, individuals may have limited experience accessing and delivering these medications appropriately. This results in a significant challenge because many of these medications require additional knowledge or manipulations to administer them safely and effectively, and in an emergency situation some critical steps may be unintentionally missed and result in further patient harm.

Epinephrine 1:1,000 (injectable)

Epinephrine is an endogenous catecholamine that stimulates both α - and β -adrenergic receptors and is the single most important injectable drug in the emergency kit.¹⁶ It is the drug of choice for treating respiratory and cardiovascular manifestations of acute, accelerated allergic reactions. Epinephrine causes bronchodilation and increased systemic vascular resistance, arterial blood pressure, heart rate, myocardial contractility and myocardial and cerebral blood flow when administered in resuscitative dosages.^{5,20} For treatment of life-threatening signs and symptoms of an acute allergic reaction, the clinician must administer epinephrine immediately, injecting the drug intramuscularly (0.3mg [0.3mL])

of a 1:1,000 epinephrine solution for adults or 0.15mg [0.15mL] of a 1:1,000 epinephrine solution for pediatric patients). A second dose should be administered within five to 15 minutes of the initial dose because of the short half-life of epinephrine (two minutes) and in the absence of clinical improvement. Epinephrine is also indicated for the treatment of acute asthmatic attacks that are unrelieved by β_2 -adrenergic receptor agonists such as albuterol.²¹ In either case and regardless if symptoms improve, emergency medical services (911) must be activated and the patient should have immediate medical follow-up.

Epinephrine is available in ampules and vials as well as in preloaded syringes or autoinjectors for immediate use.^{22,23} Caution should be exercised with autoinjectors, however, because there is a growing body of evidence that the currently supplied needle length may be too short to be effective in larger patients.^{24,25} With the geometric rise in the prevalence of Type 2 diabetes combined with the associated increase in obesity rates, several studies have shown that the standardly equipped, 28-gauge, 1.5 cm (0.5 inch) needle may be inadequate to deposit epinephrine into the rich capillary bed beneath the vastus lateralis muscle in order for systemic epinephrine levels to rise fast enough and high enough to save the patient's life.^{24,25} A 1.6 cm (0.63 inch), 2.5 cm (1 inch) and 2.5–3.8 cm (1–1.15 inch) needle has been suggested as being more appropriate for infants, children and adults and large adults, respectively.^{24–26}

Much has been published recently about the exorbitant price increases of the autoinjector, which may dissuade some practitioners from stocking the appropriate number of devices.²⁷ Given the very short half-life of epinephrine, most dental offices should stock two

adult and two pediatric autoinjectors if they treat both of these patient populations. Alternatively, ampules or multidose vials of epinephrine may be stocked, which have a longer shelf life and are relatively inexpensive. Training is needed in opening the ampules or multidose vials and drawing up the epinephrine into an appropriately sized syringe. If the dental office proximity to emergency medical help is more than 10 minutes, it has been further suggested that three of each autoinjector may be advisable.²³

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While autoinjector formulations have been designed for both the nonhealth care professional and the trained health care worker to inject, the delivery mechanism is not entirely intuitive and has led to inadvertent lacerations and self-injections.^{28–32} Once removed from the plastic case, the instructions are to first remove the cap that is covering a hole. Intuitively, the hole appears to be where the needle must come out while the opposite end of the autoinjector has the appearance of a button given its distinctly different color and over which you would naturally place your thumb in order to administer the injection. Unfortunately, because of this poor design, during a stressful event such as a life-threatening medical emergency, autoinjector self-injections still occur because the button

end is actually where the needle comes out. Every year there are multiple reports of these accidental self-injections in the primary literature, to include a meta-analysis on this topic, bringing the safety of this dosage formulation into question.^{33–35} For all of these reasons, it may be safer, less expensive and more efficacious to stock epinephrine 1:1,000 in the ampule or vial formulation for an intramuscular injection utilizing the appropriate-length needle.

Histamine blocker (injectable)

Histamine blockers are indicated for patients with mild or delayed-onset allergic reactions to reverse the actions of histamine by occupying H_1 -receptor sites on the effector cells.³⁶ Diphenhydramine is the most common representative of this general drug class and is typically administered as a 50 mg intramuscular (deltoid) injection followed by 25 to 50 mg orally every three to four hours for up to three days after such a reaction.¹⁵ It is important to note that oral antihistamines are not emergency medications and in most cases the OHCP should not provide them to the patient. If a patient has an allergic, histaminic reaction in which an injectable histamine blocker is administered in the dental office, the patient should follow up with a physician immediately. In the emergency department or urgent care clinic, the physician will determine whether additional treatment with glucocorticoids or oral antihistamines is indicated, but neither of these drugs should be considered part of the minimal dental emergency kit.

Nitroglycerin (sublingual tablet or aerosol spray)

Nitroglycerin for the dental office is available as sublingual tablets or translingual sprays.¹⁶ Nitroglycerin is the treatment of choice for the patient with angina who may experience acute chest pain. It acts primarily by dilating systemic venous and arterial vascular beds,

relaxing vascular smooth muscle, which leads to a reduction in venous return and systemic vascular resistance. These actions of reestablishing the balance between oxygen demand and oxygen supply in the coronary circulation result in the elimination of the chest pain. The clinician should be prepared to administer one tablet or metered dose spray (0.4 mg) if the patient does not bring his or her own nitroglycerin to self-administer. This dose can be repeated twice at five-minute intervals for a total of three doses and relief should occur within one to two minutes. If the discomfort is not relieved after three doses of nitroglycerin, the OHCP must consider a diagnosis of evolving myocardial infarction discussed below. Regardless, there are some very important considerations in administering nitroglycerin to patients whether the sublingual tablet or translingual spray is going to be used.

Before administering nitroglycerin to a patient suspected of experiencing anginal pain potentially brought on by the stress of the dental procedure, the OHCP must confirm that the patient has not received a phosphodiesterase inhibitor within the last 24 to 48 hours (i.e., 24 hours for sildenafil [Viagra, Revatio] and vardenafil [Levitra] and 48 hours for tadalafil [Cialis]).³⁷⁻⁴⁰ These medications are also potent vasodilators and the combination can result in a life-threatening precipitous reduction in blood pressure.^{37,41} If the patient has had one of these medications recently, the prudent OHCP should call 911 and the patient should be taken to the emergency room; nitroglycerin should not be administered by the OHCP. It is also important to remember that all patients, males

and females, with a history of angina need to confirm phosphodiesterase inhibitor usage prior to nitroglycerin administration because these drugs are used to treat pulmonary hypertension and not just erectile dysfunction.

If the patient experiencing anginal pain has brought their own oral tablets and does not receive relief after two doses, the OHCP could administer their own nitroglycerin as the third dose prior to considering a 911 call. Nitroglycerin tablets are hygroscopic and should be replaced with a fresh supply within

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30 days once opened. Many patients exceed this shelf-life and subsequently the potency and efficacy of their nitroglycerin tablets decreases. If the third dose of the medication from the OHCP's fresh supply resolves the angina pain, the patient should be counseled to replenish their prescription with a fresh supply of medication after the conclusion of the dental appointment. As an I-C recommendation*, the current American College of Cardiology and American Heart Association guidelines do recommend a call to 911 if no relief of chest pain or related symptomatology is achieved after even just one dose of nitroglycerine (sublingual or spray).⁴²

The aerosol spray of nitroglycerin also has some unique manipulation required prior to effective administration. Once the product is removed from the box and the cap is taken off, the actuator should be pressed several times to ensure a mist of medication is being delivered prior to administration. This dosage form is a pump that requires priming, especially if it is not used frequently. Without priming the pump, the OHCP is simply delivering air; after three attempts at reversing the anginal pain, a potentially unnecessary call to 911 could have been avoided simply by ensuring the patient received active medication.

If the patient has never received a diagnosis of angina pectoris and develops symptoms of a possible acute myocardial infarction, such as chest pain or chest pressure, or if the anginal pain does not respond to three doses of nitroglycerin as indicated in the angina patient, the clinician should call 911 and administer aspirin.

Aspirin (oral tablet)

Acetylsalicylic acid (ASA, aspirin) tablets reduce the risk of death from a myocardial infarction (MI) when administered as nonenteric, noncoated formulations of 162–325 mg. (This was confirmed by the 1988 landmark trial Second International Study of Infarct Survival (ISIS-2) in which more than 17,000 patients were enrolled. According to the study, the group receiving aspirin showed a 23% reduction in cardiovascular mortality in five weeks.⁴³) In the case of a suspected MI, the OHCP should first call 911 to initiate the emergency response team, followed by PABCD, which for a conscious patient primarily includes positioning and

* Medical evidence used in developing recommendations in these guidelines classifies an I-C recommendation as having evidence or general agreement that a specific procedure or treatment is useful and effective; procedure or treatment should be performed or administered ("I"). The weight of the evidence is then ranked according to the aggregate source or sources of that data, with "C" being the lowest weighting: C (lowest): The primary basis for the recommendation is a consensus of expert opinion, case studies or accepted standard of care.

administering aspirin. The aspirin should be chewed and swallowed. Timing is very important because many of these patients lose consciousness, in which case oral aspirin cannot be administered and therefore the antiplatelet benefit of aspirin will not be received. Patients should be kept comfortable until medical help arrives and OHCPs should be prepared to provide cardiopulmonary resuscitation (CPR) if required. Monitoring the patient's vital signs during this critical period is also advised.

Historically, the American Heart Association, educational videos, universities and websites have commonly used a mnemonic for morphine, oxygen, nitrates and aspirin (MONA) to refer to the adjuvant treatment used for the management of a suspected MI. Recent scientific data now refute this strategy and MONA should be viewed as an obsolete teaching and learning aid.⁴⁴ Morphine is associated with delayed activity of platelet inhibitor drugs in patients presenting with ST-elevation myocardial infarction (STEMI).^{45,46} In 2017, the Determination of the Role of Oxygen in Suspected Acute Myocardial Infarction (DETO2X-AMI) trial enrolled acute coronary syndrome patients with an oxygen saturation of $\geq 90\%$ to receive oxygen supplementation versus inhalation of ambient air.⁴⁷ There was no statistically significant difference in one-year, all-cause mortality observed between groups and supplemental oxygen is no longer a class IA recommendation in managing patients with a suspected MI.⁴⁸ Regarding nitrates, randomized-controlled trials have shown that their use in suspected MI could not provide a benefit in terms of improved mortality or adverse cardiovascular outcomes.^{49,50} Only aspirin has been shown to offer a consistent benefit in this patient population.

Bronchodilator, β 2-adrenergic receptor agonist (inhaled)

The most common β 2-adrenergic receptor agonist used to treat acute bronchospasm that may be experienced during an asthmatic attack or anaphylaxis is albuterol administered via inhalation.¹⁶ Albuterol relaxes bronchial smooth muscles and inhibits chemical mediators released during hypersensitivity reactions. Unlike other β 2-adrenergic receptor agonists, albuterol is an excellent choice because it is associated with fewer cardiovascular adverse effects than other bronchodilators.^{51,52} In the case of a patient experiencing acute asthma in the dental office, possibly in response to the stress of the dental procedure, it is important for the OHCP to be prepared by having the patient with a history of asthma bring in their own rescue inhaler or to have the office inhaler close by. The inhaler has three parts: a cap covering the mouthpiece, the canister of aerosolized medication and the boot (a plastic case in which the canister resides).

The challenge with inhalers is twofold once the mouthpiece cap is removed: The canister needs to be shaken several times prior to administration; if the patient is unable to self-administer the medication, the OHCP needs to coordinate actuation of the canister with the patient's inhalation while their lips are held tightly around the mouthpiece. Given the typical dose in this situation is four to eight inhalations every 20 minutes for up to four hours then every one to four hours as needed, the correct delivery of this medication is very difficult during a stressful situation.⁵³ In this case, it may be advisable for OHCPs to also have a spacer device on hand.

TABLE 3

Signs and Symptoms of Hypoglycemia

Feeling shaky
Being nervous or anxious
Sweating
Chills
Clamminess
Mood swings
Irritability
Impatience
Confusion
Increased heart rate
Feeling light-headed or dizzy
Hunger
Nausea
Pallor
Feeling sleepy
Feeling weak
Having no energy
Blurred/impaired vision
Headache
Coordination problems
Clumsiness
Seizures
Tingling or numbness in lips, tongue or cheeks

Once the cap over the mouthpiece is removed and the canister is shaken, the mouthpiece easily attaches to one end of the spacer device. Spacers come in different shapes and sizes, but the technology is essentially the same allowing for the actuation of the canister to deliver medication that is confined in the chamber of the spacer until the patient inhales through the one-way valve at the other end of the spacer. This removes the need to coordinate actuation of the device with the patient's inhalation and makes the delivery of medication easier and more effective.⁵⁴

Glucose (oral)

Hypoglycemia is one of the most common medical emergencies given the increasing prevalence of diabetes in the general population. The Centers for Disease Control and Prevention predicted in 2010 that as many as 1 in 3 U.S. adults could have diabetes by 2050.⁵⁵ More recently, the National Health and Nutrition Examination Survey (NHANES) data have predicted that 50% of the U.S. population will have either prediabetes or diabetes by the year 2050.⁵⁶

Hypoglycemia is defined as an episode of abnormally low plasma glucose levels (usually occurring when a patient's blood glucose drops below 70 mg/dL) with associated symptoms that resolve with administration of oral glucose and restoration of euglycemia. Historically, the treatment of choice was sugar in the form of cake frosting or orange juice, but more recently the American Diabetes Association has advocated for the oral delivery of a nondiet, carbonated beverage.^{57,58} The carbonation helps to open both the esophageal and gastric sphincters allowing the liquid sugar quick access to the small intestine where it is rapidly absorbed to reverse this condition.

OHCPs should have a high index of suspicion in known diabetics who typically come to the office just before lunch or as the last appointment of the day. The signs and symptoms of hypoglycemia are listed in **TABLE 3**.⁵⁸ For these reasons, OHCPs may benefit from having a glucometer in the office to accurately assess the glucose status of patients because many of these symptoms may simply mimic a well-sedated or even nervous patient. Using a glucometer, an accurate assessment can be made within 30 seconds. If the blood glucose is lower than 70 mg/dL, the patient should be administered 15 g of glucose (e.g., 4 ounces of a nondiet carbonated beverage or juice, three glucose tablets and one serving of glucose gel). After 15

minutes, the blood glucose should be tested again; additional glucose may be needed if it is still below 70 mg/dL or if symptoms of hypoglycemia persist. This treatment algorithm is typically described as the 15-15 rule.^{59,60} If the diabetic patient should lose consciousness, it is important to remember that nothing should be administered orally to an unconscious patient. If available, an intramuscular injection of glucagon can be administered to treat an unconscious diabetic patient suffering from severe hypoglycemia. If glucagon is not available, 911 should be called immediately.⁵⁹

If the diabetic patient should lose consciousness, it is important to remember that nothing should be administered orally to an unconscious patient.

Aromatic Ammonia (inhaled)

An example of an emergency medication that some OHCPs may currently be required to have available are smelling salts (ammonia inhalants) for the management of syncope. The use of ammonia inhalants is controversial due to the lack of safety and efficacy in addressing the underlying pathophysiology of the syncope.⁶¹ Regardless, ammonia inhalants remain part of many medical emergency kits in dental offices. The continued inclusion of aromatic ammonia in dental office medical emergency kits is an example of historical dogma that is changing in clinical and regulatory practice, and indeed there is a strong patient safety argument to be made for not exposing patients to this nonspecific respiratory

irritant, especially because no drugs are typically needed to manage syncope.

The use of aromatic ammonia during suspected syncope can worsen the condition of a patient by potentially causing airway edema or infection, triggering acute asthma and increasing intracranial pressure.⁶² According to the Material Safety Data Sheet (MSDS), inhaled ammonia can cause a "burning pain in the mouth and throat, constriction of the throat and coughing followed by nausea, vomiting or diarrhea when inhaled."⁶³ Physical positioning of the patient followed by assessment of the airway, breathing and circulation may be more advised with activation of EMS/911 also being a consideration.^{9,16}

Conclusions

All dental offices must have a basic medical emergency kit stocked with equipment and medications appropriate to the age and population that the office treats. The contents of this kit must be able to address common urgencies and emergencies that may arise as a part of dental treatment or occur concurrently and randomly. It is vital that the entire team be vigilant in recognizing signs of patient distress and trained to take appropriate action when needed. Office preparedness involves inculcating all members of the office on a culture of safety that includes training in the recognition and management of medical emergencies, basic life support training, mock drills, prescribed individual responsibilities and stocking of appropriate equipment and emergency medications. Whether the basic medical emergency kit is commercially prepared or assembled piecemeal, the seven medications discussed in this article plus oxygen capable of being delivered under positive pressure must be available. Additionally, OHCPs must always verify state dental

board requirements for emergency drugs and equipment, possibly based on practice type or procedures delivered, if they exist.

Finally, all members of the dental team must remember two essential tenets for managing emergent situations in the dental setting: Emergency medical services should be contacted as soon as possible and the basic algorithm of PABCD, which outlines the process of supporting patients' vital functions, should be followed until help arrives. Only after activating EMS and focusing on airway, breathing and circulation should the use of emergency drugs be considered based on a differential diagnosis. If needed, having the correct emergency drugs and knowing how and when to deliver them can further increase positive outcomes while continuing to make dentistry even safer. ■

NOTE

The views expressed in this manuscript are those of the authors and do not necessarily reflect those of Premier Dental Products Company, the Creighton University School of Dentistry or Vizient Inc.

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