Code of Ethics

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CDHO

- The mission of the College of Dental Hygienists of Ontario is to regulate the practice of dental hygiene in the interest of the overall health and safety of the public of Ontario. To this end, the CDHO had developed and implemented several programs to monitor whether or not its registrants are providing high quality care to the public.
- **The first CDHO Code of Ethics was developed in 1996.** As professions evolve so must their guiding principles. The current approach to the Code of Ethics is one that encourages problem-solving and critical thinking.

Beneficence

- **PRINCIPLE I: BENEFICENCE**
- ■ Involves caring about and promoting the good of another
- Dental hygienists use their knowledge and skills to assist clients to achieve and maintain optimal oral health and to promote fair and reasonable access to quality care.

Autonomy

- **PRINCIPLE II: AUTONOMY**
- ■ Pertains to the right to make one's own choices
- By communicating relevant information openly and truthfully, dental hygienists assist clients to make informed choices and to participate actively in achieving and maintaining optimal oral health.

Privacy and Confidentiality

- **PRINCIPLE III: PRIVACY AND CONFIDENTIALITY**
- ■ Privacy pertains to a person's right to control the collection, use and disclosure of personal information; the right to access and correct inaccurate information; and the right to expect that the information is kept secure.
- ■ Confidentiality is the duty to hold secret any information acquired in the professional relationship.
- Dental hygienists respect the privacy of clients and hold in confidence the information disclosed to them, subject to certain narrowly defined exceptions.

Accountability

- **PRINCIPLE IV: ACCOUNTABILITY**
- ■ Pertains to the acceptance of responsibility for one's actions and omissions in light of relevant principles, standards, laws, regulations and the potential to self-evaluate and to be evaluated accordingly.
- Dental hygienists practise competently in conformity with relevant principles, standards, laws, and then regulations under the RHPA, 1991 and DHA, 1991 and accept responsibility for their behaviour and decisions in the professional context.

Professionalism

- **PRINCIPLE V: PROFESSIONALISM**
- ■ Is the commitment to use and advance professional knowledge and skills to serve the client and the public good.
- Dental hygienists express their professional commitment individually in their practice and communally through the CDHO and their participation in the CDHO Quality Assurance Program.

Decision Making Model

- **STEP 1 IDENTIFY THE PROBLEM**
- Identify, in a preliminary way, the nature of the challenge or problem.
- **STEP 2 GATHER INFORMATION**
- Become suitably informed and gather relevant information including factual information, sequence of events; applicable policies, laws, and regulations and the views of stakeholders.
- **STEP 3 CLARIFY THE PROBLEM**
- Clarify and elaborate the problem based on the additional information obtained. Identify the ethical principles at stake.
- **STEP 4 IDENTIFY OPTIONS**
- Identify the various options for action.

Continued

- **STEP 5 ASSESS OPTIONS**
- Assess the various options.
- **STEP 6 CHOOSE A COURSE OF**
- ACTION Decide on and justify/defend a course of action.
- **STEP 7 IMPLEMENT THE ACTION**
- Implement one's decision as thoughtfully and sensitively as possible.
- **STEP 8 EVALUATE OUTCOMES**
- Assess the consequence of your decision and evaluate the outcomes.

Infection Control

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Transmission

- Diseases can be transmitted from the patient to the dental worker, from the dental worker to the patient, or from one patient to another.
- **direct contact** with blood, oral fluids, or other patient materials;
- **indirect contact** with contaminated objects (such as instruments, equipment, environmental surfaces, or a team member's contaminated hands);
- **droplet contact**, in which spray or spatter containing microorganisms travels a short distance before settling on the mucous membranes of the eyes, nose, or mouth; and
- **inhalation** of evaporated microorganisms ("droplet nuclei") that can remain airborne for extended periods of time as aerosols.

Chain of infection

- **A pathogen must be present in sufficient numbers to cause infection.** The disease-causing agent may be a virus or bacteria like *staphylococci*, *streptococci*, or *Legionella* species.
- **The pathogen must have a reservoir where it can reside and multiply.** The bloodstream, mucous membranes, a laboratory culture, and a dental unit waterline are all examples of potential reservoirs for microorganisms.
- **The pathogen must have a mode of transmission from a source host.** A needlestick, a splash to the mucous membranes of the eyes, nose, or mouth, or inhalation of contaminated aerosols are examples of various modes of transmission.
- **The pathogen must have a proper portal of entry into a new host.** For a bloodborne pathogen to cause infection in a new host, it must have a way to enter the bloodstream, such as through a break in the skin.
- **The new host must be susceptible to the pathogen.** If the individual is vaccinated against or has had prior exposure to the pathogen that resulted in immunity, exposure will not result in disease.

Standard Precautions

- The concept of standard precautions has been a cornerstone of dental infection control since the mid-1980s. Encompassing a set of infection control and safety procedures intended to protect against bloodborne disease transmission, universal precautions includes hand washing, the use of personal protective equipment (gloves, eyewear, face protection, protective apparel), controls to prevent injuries, and proper handling of patient-care items and contaminated surfaces.
- **As the word "universal" suggests, the precautions are applied when treating all patients, regardless of their health history or presumed risk of bloodborne disease.**

Exposure Prevention

- Dental team members work in close contact with blood and blood-contaminated saliva, putting them at risk of exposure to bloodborne pathogens such as **hepatitis B virus (HBV), hepatitis C virus (HCV), and the human immunodeficiency virus (HIV).**
- **CDC recommends the following** general precautions for preventing exposures to bloodborne pathogens:
  - Use standard/universal precautions for all patient encounters
  - Consider any sharp item that is contaminated with patient blood and saliva to be potentially infective, and establish engineering controls and work practices to prevent injuries

Post Exposure Management

- Although infection control precautions are highly effective when used routinely, accidents can happen. When sharps injuries or unexpected spills or splashes to nonintact skin or mucosa occur, tend to them ***immediately***. **When an exposure occurs:**
- **Follow CDC recommendations** after percutaneous, mucous membrane, or nonintact skin exposure to blood or other potentially infectious material
  - **First perform basic first aid** to cleanse the wound or affected area.
  - **Then report the injury to** the employer or infection control coordinator for the practice setting. Providing as much information as possible about the incident will help the physician or other qualified healthcare professional evaluate and manage the exposure.
  - Follow instructions for obtaining IMMEDIATE and APPROPRIATE **medical care from the healthcare professional** who handles the facility's occupational health program.

Hand Washing

- **The CDC recommends the following steps to properly wash hands:**

- Wet your hands with clean, running water and apply soap.
- Rub your hands together to make a lather and scrub them well; be sure to scrub the backs of your hands, between your fingers and under your nails using a nail stick.
- Continue rubbing your hands for at least 20 seconds. As a 20 second timer, sing "Happy Birthday"
- Rinse your hands well under running water.
- Dry hands using a clean towel or allow them to air dry.

PPE

- **To protect the mucous membranes of the eyes, nose, and mouth:**

- Wear a **surgical mask** and eye protection with solid side shields or a face shield to protect mucous membranes of the eyes, nose, and mouth during procedures likely to generate splashing or spattering of blood or other body fluids (IB, IC).
- **Change masks between patients** or during patient treatment if the mask becomes wet
- Clean reusable facial protective equipment (protective eyewear or face shields) with soap and water between patients. If visibly soiled, clean and disinfect

PPE

- **Protective garments are worn over street clothes to protect them from contamination.**
- Wear protective clothing that covers personal clothing and skin likely to be soiled with blood, saliva, or other potentially infectious materials. Protective clothing can include a reusable or disposable gown, laboratory coat, or uniform. For dental procedures that generate spatter, ensure that forearms are covered.
- OSHA does require employers to launder any reusable PPE such as employee uniforms. Contaminated laundry should be placed and transported in bags or containers labeled or color-coded as hazardous.
- Standard precautions must be followed while handling contaminated clothing, including the use of protective gloves and other appropriate PPE should be worn. If the office utilizes an off-site facility, the laundry must be placed in marked bags or containers so the laundry facility knows to use standard precautions.
- Change protective clothing if visibly soiled. Change the garment immediately (or as soon as feasible) if is penetrated by blood or other potentially infectious fluids

PPE

- **Patient-care, sterile surgical, and utility gloves are offered in a variety of sizes, colors, and materials.**
- Wear patient-care gloves when a potential exists for contacting blood, saliva, other potentially infectious materials, or mucous membranes (IB, IC).
- Wear a new pair of patient-care gloves for each patient, remove them promptly after use, and wash hands immediately to avoid transfer of microorganisms to other patients or environments (IB).
- Wear sterile surgeon's gloves when performing oral surgical procedures (IB).
- Remove gloves that are torn, cut, or punctured as soon as feasible. Wash hands before re-gloving
- **Never wash surgeon's or patient-care gloves before use. Never wash, disinfect, or sterilize gloves for reuse**
- Ensure that appropriate gloves in the correct sizes are readily accessible
- Use appropriate puncture, and chemical, resistant utility gloves when cleaning instruments and performing housekeeping tasks that involve contact with blood or other potentially infectious materials
- Consult with glove manufacturers regarding the chemical compatibility of glove material and dental materials used

Hypersensitivity

- A very common condition among dental workers, irritant contact dermatitis is caused by the physical irritation of the skin. It presents as dry, itchy, irritated skin around the area of contact with the offending agent. **Irritant contact dermatitis is not an allergic reaction.**
- Allergic contact dermatitis (also called type **IV hypersensitivity**). It often appears as a rash beginning several hours after contact. It usually is confined to the area of contact but can extend slightly beyond.

Sterilization

- **Critical items** cut bone or penetrate soft tissue. These instruments carry the highest risk of disease transmission.
- Clean and heat-sterilize critical dental instruments before each use
- **Semi-critical items** touch only mucous membranes. They have a lower risk of transmission than critical items.
- Clean and heat-sterilize semi-critical items before each use.
- Use heat-stable semi-critical items instead of those that are heat-sensitive whenever possible.
- For heat-sensitive critical and semi-critical instruments, reprocess using FDA-cleared sterilant/high-level disinfectants or an FDA-cleared low-temperature sterilization method (such as ethylene oxide). Follow the manufacturer's instructions for use of chemical sterilants/high-level disinfectants.
- Single-use disposable instruments are acceptable alternatives if they are used only once and disposed of correctly.

Continued

- **Noncritical items** only contact intact skin. As such, they have the lowest risk of disease transmission.
- Ensure that noncritical patient-care items are barrier-protected or cleaned (or if visibly soiled, cleaned and disinfected) after each use with an EPA-registered hospital disinfectant. If visibly contaminated with blood, use an EPA-registered hospital disinfectant with a tuberculocidal claim (i.e., an intermediate-level disinfectant).
- **With regard to heat sterilization:**
- Use only FDA-cleared medical devices for sterilization and follow the manufacturer's instructions for correct use.
- Allow packages to dry in the sterilizer before they are handled to avoid contamination .

Preparation or Packages

- Although the instruments have been cleaned to remove debris, they are not sterile. Wear puncture-resistant utility gloves when inspecting and packaging instruments.
- Use **an internal chemical indicator** in ***each*** package. If the internal indicator cannot be seen from outside the package, also use an external indicator.
- Use a container system or wrapping material that is compatible with the specific type of sterilization process (that is, steam autoclave, chemical vapor, dry heat, or ethylene oxide). Be sure that the packaging has received FDA clearance.
- Before sterilization of critical and semicritical items, inspect the instruments for cleanliness, then **wrap or place them in containers that will allow them to remain sterile during storage.** Cassettes and organizing trays are appropriate for this purpose.

Monitoring Sterilization

- Proper monitoring of sterilization processes involves the use of mechanical techniques, chemical indicators, and biological indicators (spore tests). While biological monitoring provides the best assurance that sterilization equipment and procedures are working as they should, mechanical or chemical monitoring may provide the first indications of a sterilizer malfunction.
- Use mechanical, chemical, and biological monitors according to the manufacturer's instructions to ensure the effectiveness of the sterilization process.
- **Monitor each load with mechanical (time, temperature, pressure) and chemical indicators.**
- Place a chemical indicator on the inside of each package. If the internal indicator is not visible from the outside, also place an exterior chemical indicator on the package.
- Place items/packages correctly and loosely into the sterilizer so as not to impede penetration of the sterilant.
- Do not use instrument packs if mechanical or chemical indicators indicate inadequate processing . **Monitor sterilizers at least weekly** by using a biological indicator with a matching control (i.e., biological indicator and control from same lot number).
- Use a biological indicator for every sterilizer load that contains an implantable device. Verify results before using the implantable device, whenever possible .
- Maintain sterilization records (mechanical, chemical, and biological) in compliance with state and local regulations.

Spore Testing

- In case of a positive spore test:

- Remove the sterilizer from service and review sterilization procedures (for example, work practices and use of mechanical and chemical indicators) to determine whether operator error could be responsible.
- **Retest** the sterilizer by using biological, mechanical, and chemical indicators after correcting any identified procedural problems.

    - If the repeat spore test is negative and mechanical and chemical indicators are within normal limits, put the sterilizer back in service (II).
    - If the repeat spore test is positive, do not use the sterilizer until it has been inspected or repaired, or until the exact reason for the positive test has been determined. Recall, to the extent possible, and reprocess all items that had been run through the sterilizer since the last negative spore test. Before placing the sterilizer back in service, rechallenge the sterilizer with biological indicator tests in three consecutive empty chamber sterilization cycles after the cause of the sterilizer failure has been determined and corrected (II).

Disinfectants

- **Low-level disinfectants** (designated by EPA as "hospital disinfectants") kill the test microorganisms*Salmonella choleraesuis*, *Staphylococcus aureus*, and *Pseudomonas aeruginosa*. For clinical contact surfaces, efficacy against hepatitis B virus (HBV) and HIV also is desirable. These disinfectants are used for cleaning and disinfecting clinical contact surfaces that are not visibly soiled with body fluids.
- **Intermediate-level disinfectants** kill the same test microorganisms as low-level (hospital) disinfectants but they also are tuberculocidal (that is, they inactivate Mycobacterium tuberculosis). These agents are used for cleaning and disinfecting clinical contact surfaces with or without visible blood or body fluids.

Manage Spills

- **Clean spills of blood or other potentially infectious materials** and decontaminate the surface with an EPA-registered hospital disinfectant with low – (i.e., HBV and HIV label claims) to intermediate-level (i.e., tuberculocidal claim) activity, depending on the size of spill and surface porosity.
- Carpet and cloth furnishings provide an ideal breeding ground for microorganisms. These surfaces also are more difficult to clean than nonporous surfaces. As such, CDC recommends that dental facilities:
  - Avoid using carpeting and cloth-upholstered furnishings in dental operatories, laboratories, and instrument processing areas.

Medical Waste

- Although any item that has been in contact with blood or body fluids may be infective, not all such waste requires special disposal. Federal, state, and local guidelines and regulations identify the specific categories of medical waste that are subject to regulation – that is, which categories of waste require special disposal by law. **They also outline any requirements associated with treatment and disposal.**
- Examples of regulated waste found in a dental office include **solid waste that is soaked or saturated with blood or body fluids (for example, gauze saturated with blood following surgery), extracted teeth as well as surgically removed hard and soft tissues, and contaminated sharp items such as needles, scalpel blades, and orthodontic wires.**
- Consult waste management regulations and develop a medical waste management program
  - Ensure that dental team members who handle and dispose of regulated medical waste are trained in appropriate handling and disposal methods. Make sure they understand the possible health and safety hazards

Water Lines

- Need to be run at the beginning of the day, between patients and end of day! This prevents dental unit biofilm.

Suctions

- REMEMBER -- Do not advise patients to close their lips tightly around the tip of the saliva ejector when evacuating oral fluids. This creates negative pressure.

Radiography

- Wear gloves when exposing radiographs and handling contaminated film packets. Use other PPE (e.g., protective eyewear, mask, and gown) as appropriate if spattering of blood or other body fluids is likely
- **Use barriers for sensors**
- Clean and heat-sterilize (or high-level disinfect) semi-critical items between patients, even if they were barrier-protected during use. If the item cannot tolerate heat or chemical immersion, at a minimum, use an FDA-cleared barrier during intraoral use, and clean and disinfect with an intermediate-level disinfectant (that is, an EPA-registered hospital disinfectant with tuberculocidal activity) between patients.

Single Use Items

- A single-use ("disposable") device should be **used on only one patient and then discarded, not cleaned, disinfected, or sterilized for use on another patient.** Single-use are usually not heat-tolerant and cannot be reliably cleaned.
- Some items such as **prophylaxis angles, saliva ejectors, high-volume evacuator tips, and air/water syringe tips** are now commonly available in disposable form; they should be appropriately discarded after each use. Single-use devices and items for use during oral surgical procedures (for example, cotton rolls, gauze, and irrigating syringes) should be sterile at the time of use.
- Use single-use devices for one patient only and dispose of them appropriately
- The physical construction of devices like burs, endodontic files, and broaches can make cleaning difficult. In addition, deterioration can occur on the cutting surfaces of some of these instruments during processing, raising the potential for instrument breaks during patient treatment.
- Because burs and endodontic instruments also exhibit signs of wear during normal use, **CDC suggests that these items might practically be considered single-use devices.**

Extracted Teeth

- **Extracted teeth that are being disposed of are regulated waste**, and they are subject to the containerization and labeling provisions outlined by OSHA's Bloodborne Pathogens Standard.[9] OSHA considers extracted teeth to be a potentially infectious material that should be disposed of in medical waste containers. **However, extracted teeth can be returned to patients on request**,
- Because high temperatures release mercury vapor from dental amalgam, extracted teeth containing this restorative material **should not be placed in a medical waste container** that uses incineration for final disposal (as sharps containers routinely are). Consult and comply with state and local regulations for proper disposal of the amalgam.
- For extracted teeth sent to an educational setting or to a dental laboratory for shade or size comparisons:
  - Clean surface using an intermediate-level disinfectant (that is, an EPA-registered hospital disinfectant with a tuberculocidal claim), and place extracted teeth in a leak proof container labeled with a biohazard symbol. Maintain hydration for transport to educational institutions or the dental laboratory.
  - Heat-sterilize teeth that do not contain amalgam before they are used for educational purposes.

The Lab

- Use personal protective equipment when handling items until they have been decontaminated.
- Before they are handled in the laboratory, **clean, disinfect with an EPA-registered hospital disinfectant with tuberculocidal activity, and rinse all impressions, bite registrations, occlusal rims, extracted teeth, and other dental prostheses and prosthodontic materials**.
- Impression trays (metal) must be heat sterilized

Tuberculosis

- Follow CDC recommendations for:
  - developing, maintaining, and implementing a written TB infection-control plan;
  - managing a patient with suspected or active TB;
  - completing a community risk-assessment to guide employee tuberculin skin tests and follow-up; and
  - managing dental team members with TB disease.
  - **IF the patient tests positive for TB, they need to also have a chest x-ray done to confirm if they have active TB or not***

Patients who have ACTIVE TB

- Evaluate the patient away from other patients and dental team members. When he or she is not being evaluated, the patient should wear a surgical mask or be instructed to cover his/her mouth and nose when coughing or sneezing
- Defer elective dental treatment **until the patient is non infectious as confirmed by a physician.**
- Refer patients requiring urgent dental treatment to a previously identified facility (such as a hospital) with TB engineering controls and a respiratory protection program

References

- http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5217a1.htm
- https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10051
- http://www.cdc.gov/oralhealth/Infectioncontrol/guidelines/index.htm
- http://www.ncbi.nlm.nih.gov/pubmed/16350459

Medical Emergencies

Provided by Dentalelle Tutoring

Charts

Essential Emergency Drugs

Drug	Indication	Initial Adult Dose
1. Oxygen	almost any medical emergency	100%: inhalation
2. Epinephrine	anaphylaxis	0.1 mg i.v., or 0.3–0.5 mg i.m.
	asthma unresponsive to albuterol/salbutamol	0.1 mg i.v., or 0.3–0.5 mg i.m.
	cardiac arrest	1 mg i.v.
3. Nitroglycerin	pain of angina	0.3–0.4 mg sublingual
4. Antihistamine	allergic reactions	
(diphenhydramine or		25–50 mg i.v., i.m.
chlorpheniramine)		10–20 mg i.v., i.m.
5. Albuterol/salbutamol	asthmatic bronchospasm	2 sprays: inhalation
6. Aspirin	myocardial infarction	160–325 mg

Additional Emergency Drugs

Drug	Indication	Initial Adult Dose
1. Glucagon	hypoglycemia in unconscious patient	1 mg i.m.
2. Atropine	clinically significant bradycardia	0.5 mg i.v. or i.m.
3. Ephedrine	clinically significant hypotension	5 mg i.v., or 10–25 mg i.m.
4. Hydrocortisone	adrenal insufficiency	100 mg i.v. or i.m.
	recurrent anaphylaxis	100 mg i.v. or i.m.
5. Morphine or	angina-like pain unresponsive to nitroglycerin	titrate 2 mg i.v., 5 mg i.m.
nitrous oxide	angina-like pain unresponsive to nitroglycerin	~35%, inhalation
6. Naloxone	reversal of opioid overdose	0.1 mg i.v.
7. Lorazepam or	status epilepticus	4 mg i.m. or i.v.
Midazolam	status epilepticus	5 mg i.m. or i.v.
8. Flumazenil	benzodiazepine overdose	0.1 mg i.v.

Medical Emergencies

- Medical emergencies were most likely to occur during and after local anesthesia, primarily during tooth extraction and endodontics. Over 60% of the emergencies were syncope, with hyperventilation the next most frequent at 7%.
- In the United States and Canada, studies have also shown that syncope is the most common medical emergency seen by dentists. Syncope represented approximately 50% of all emergencies reported in one particular study, with the next most common event, mild allergy, represented only 8% of all emergencies.
- In addition to syncope, other emergencies reported to have occurred include allergic reactions, angina pectoris/myocardial infarction, cardiac arrest, postural hypotension, seizures, bronchospasm and diabetic emergencies.

Essential Drug List

Oxygen

- Oxygen is indicated for every emergency except hyper-ventilation. This should be done with a clear full face mask for the spontaneously breathing patient and a bag-valve-mask device for the apneic patient. Therefore whenever possible, with the exception of the patient who is hyperventilating, oxygen should be administered.
- Oxygen should be available in a portable source, an "E"-size cylinder which holds over 600 liters. This should allow for more than enough oxygen to be available for the patient until resolution of the event or transfer to a hospital. If the patient is conscious, or unconscious yet spontaneously breathing, oxygen should be delivered by a full face mask, where a flow rate of 6 to 10 liters per minute is appropriate for most adults.
- If the patient is unconscious and apneic, use a bag-valve-mask device where a flow rate of 10 to 15 liters per minute is appropriate. A positive pressure device may be used in adults, provided that the flow rate does not exceed 35 liters per minute.

Epinephrine

- Epinephrine is the drug of choice for the emergency treatment of anaphylaxis and asthma which does not respond to its drug of first choice, albuterol or salbutamol.
- As a drug, epinephrine has a very rapid onset and short duration of action, usually 5 to 10 minutes when given intravenously. For emergency purposes, epinephrine is available in two formulations. Auto injector systems are also present for intramuscular use (such as the EpiPen) which provides one dose of 0.3 mg as 0.3 mL of 1 : 1,000, or the pediatric formulation which is 1 dose of 0.15 mg as 0.3 mL of 1 : 2,000.
- Initial doses for the management of anaphylaxis are 0.3 to 0.5 mg intramuscularly or 0.1 mg intravenously. These doses should be repeated as necessary until resolution of the event. Similar doses should be considered in asthmatic bronchospasm which is unresponsive to a beta-2 agonist, such as albuterol or salbutamol. The dose in cardiac arrest is 1 mg intravenously. Intramuscular administration during cardiac arrest has not been studied, but would appear to be unlikely to render significant effect.
- Epinephrine is clearly a highly beneficial drug in these emergencies. Concurrently, however, it can be a drug with a high risk if given to a patient with ischemic heart disease. Nevertheless, it is the primary drug needed to reverse the life-threatening signs and symptoms of anaphylaxis or persistent asthmatic bronchospasm.

Nitroglycerine

- This drug is indicated for acute angina or myocardial infarction. It is characterized by a rapid onset of action. For emergency purposes it is available as sublingual tablets or a sublingual spray. One important point to be aware of is that the tablets have a short shelf-life of approximately 3 months once the bottle has been opened and the tablets exposed to air or light.

- The spray has the advantage of having a shelf-life which corresponds to that listed on the bottle. Therefore, if a patient uses his/her own nitroglycerin, there is a possibility of the drug being inactive. This supports the need for the dentist to always having a fresh supply available. With signs of angina pectoris, one tablet or spray (0.3 or 0.4 mg) should be administered sublingually. Relief of pain should occur within minutes. If necessary, this dose can be repeated twice more in 5-minute intervals. Systolic blood pressures below 90 mmHg contraindicate the use of this drug.

Antihistamine

- An antihistamine is indicated for the management of allergic reactions. Whereas mild non-life threatening allergic reactions may be managed by oral administration, life-threatening reactions necessitate parenteral administration.
- Two injectable agents may be considered, either diphenhydramine or chlorpheniramine. They may be administered as part of the management of anaphylaxis or as the sole management of less severe allergic reactions, particularly those with primarily dermatologic signs and symptoms such as urticaria. Recommended doses for adults are 25 to 50 mg of diphenhydramine or 10 to 20 mg of chlorpheniramine.

Albuterol (Salbutamol)

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

Aspirin

- Aspirin (acetylsalicylic acid) is one of the more newly recognized life-saving drugs, as it has been shown to reduce overall mortality from acute myocardial infarction.
- The purpose of its administration during an acute myocardial infarction is to prevent the progression from cardiac ischemia to injury to infarction. There is a brief period of time early on during a myocardial infarction where aspirin can show this benefit. For emergency use there are relatively few contraindications. These would include known hypersensitivity to aspirin, severe asthma or history of significant gastric bleeding. The lowest effective dose is not known with certainty, but a minimum of 162 mg should be given immediately to any patient with pain suggestive of acute myocardial infarction.

Oral Carbohydrate (orange juice)

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

Additional Drug List

Glucagon

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

Atropine

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

Ephedrine

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

Corticosteroid

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

Morphine

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

Naloxone

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

Nitrous Oxide

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

Benzodiazepine

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

Flumazenil

- The benzodiazepine antagonist flumazenil should be part of the emergency kit when oral or parenteral sedation is used, as these techniques are usually based on effective use of benzodiazepines. Dosage is 0.1 to 0.2 mg intravenously, incrementally.
- In addition to having drugs available, a small amount of basic equipment should be readily available. This includes a stethoscope, blood pressure cuff, an oxygen delivery system, syringes and needles. Dentists should also consider having an automated external defibrillator (AED), as a means to treat cardiac arrest. Usage of this latter piece of equipment is easily learned and only requires strong knowledge of basic CPR with a small amount of additional training.

What Can Happen?

Examples

- A medical emergency is a stress induced, relatively sudden, acute, uncontrolled failure of physiologic adaptation capability (or decompensation in the face of stress).
- A. Stress induced: This implies that there is usually a more or less recognizable cause or identifiable stress that is driving the system toward failure. This could be the presence of an allergen, anxiety, drugs or foreign object in the airway that stresses the system maximally and beyond in such a manner that the system is no longer able to cope.
- B. Relatively sudden: While some emergencies occur rapidly, many take time to evolve. An identifiable, gradual chain of events often conspire to lead a patient to the point where they are maximally stressed and failure occurs as the last link in the chain. Prevention centers on breaking the chain of events prior to reaching failure.
- C. Acute: The central theme of all emergencies is that they are acute occurrences happening right now. From this perspective they require immediate recognition and attention.
- D. Uncontrolled failure: Emergencies rarely display intrinsic control by the patient. Clearly, the patient's system has lost the ability to respond to the stress and extrinsic help must be brought in. The key to management of emergencies is the resumption of control by the clinician.
- E. Decompensation: Loss of compensation implies that compensation was happening in the first place. In the normal healthy subject, this ability to compensate for stress or strategic reserve is maximal and much has to happen before the system is no longer able to adapt to rising levels of stress. In the medically compromised patient, some of this reserve has been lost as a function of the underlying illness and decompensation or failure occurs earlier and in the face of lower levels of stress.

Prevention

- The most successful way to manage an emergency is to prevent it form happening in the first place. This is based on:
- a) An assessment of relative risk: This is the 'product' of medical compromise multiplied by the complexity of the procedure. The more ill the patient and the more invasive the procedure, the greater the likelihood of an emergency. Careful medical assessment is the key to determining where the patient is sitting on the compensation curve, and therefore, their medical risk.
- b) Risk reduction and hazard avoidance: Having recognized increased risk (as a function of illness and procedural complexity), prevention revolves around risk reduction (medical tune up in order to ensure optimal control of medical compromise) and hazard avoidance (reduce anxiety, avoid allergens, avoid drug interactions, reduced pain, shorter procedures, avoid aspiration, refer, etc.).

Be Prepared

- a) Medical assessment: Careful medical assessment not only allows for identification of risk and thus avoidance, it should also give the practitioner an indication of the type of medical emergency that the patient may have, for example: bronchospasm in the asthmatic. Having this information readily at hand when dealing with an emerging problem will save on considerable guesswork and allow the practitioner to zero in on the most likely diagnosis.

- b) Emergency kit: An important aspect of preparation for emergencies is the purchase and careful maintenance of an emergency kit. This should include key drugs and equipment needed to manage emergencies. A key example of this is to ensure that there are syringes and needles for the delivery of emergency drugs when needed. A further point to stress is the need to monitor expiration dates and the condition of equipment such as airways or masks. The following is a short list of recommend drugs and equipment:

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- c) Assessment of severity: Determining the severity of a problem is a function of the interplay of a complex series of observations and then the performance of mental arithmetic in order to extrapolate ahead and try to predict just how bad things might get and how soon they might get there.
- If a patient was fine two minutes ago and is now swelling visibly and wheezing audibly following the administration of a local anesthetic, its a good bet that he going to continue getting worse in a hurry. This determination of how severe things are (and how severe they are going to get) directs management in terms of the intensity of response. The above noted patient needs epinephrine right now and an ambulance ride as soon as possible if he hopes to survive the day.
- On the other hand a simple episode of syncope from which the patient recovers quickly may only require repositioning and reassurance before resuming the treatment. Measurable parameters like heart rate, blood pressure and respiratory rate are much more objective guides to the ongoing status of the patient and as such will be very helpful in determining whether a patient is worsening or improving.

Continued

- d) Diagnosis and differential diagnosis: In some cases, the diagnosis will be obvious. Examples of this are epileptic convulsions or airway obstruction following loss of a crown down the patients' throat. In these cases, the obvious diagnosis leads to early appropriate management. In other situations, the diagnosis of the emergency situation may be obscure.
- An unconscious patient lying on the floor of your waiting room may have fainted, overdosed on drugs, hypoglycemic, dead, having a heart attack or simply be asleep. Having a working differential diagnosis will direct the early steps in managing this situation to supporting the basic ABC's and to determining the exact nature of the problem. Quick review of the medical history is often helpful at this point.
- In other circumstances, the results of early intervention may be diagnostic if applied appropriately. An excellent example of this is the patient with chest pain. If the nitroglycerine does not clear up the problem after three dosages, then a call to the ambulance and a trip to the local emergency room is indicated to rule out an MI.

Definitions

- Antisialagogue – drug used to decrease secretion of salivary glands
- Aphasia – inability to speak
- Apnea – not breathing
- Arrhythmias – irregularities or abnormal heart rhythms
- Ascites – fluid accumulation in the abdomen
- Aspiration – act of inhaling fluid or vomit into the lungs
- Atherosclerosis – build-up of fatty deposits in the arteries
- Benzodiazepines – class of drugs used to reduce anxiety
- Brachial artery – artery which can be palpated on the inside of the antecubital space
- Bradycardia – slow heart rate, less than 60 beats per minute

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- Bronchioles – small airway tubes within the lungs
- Bronchitis – inflammation of the bronchi caused by irritation
- Bronchodilator – drug capable of relaxing (dilating) the bronchioles
- Bronchospasm – constriction or narrowing of the bronchioles due to muscle constriction
- Carpopedal spasm – painful claw-like appearance of the hands seen in hyperventilation
- Cerebral cortex – outer layer of the brain controlling higher functions (motor function, consciousness, sensation)
- Circumoral – around the mouth
- Clonic – repetitive muscle contraction and relaxation phase of a seizure
- COPD – chronic obstructive pulmonary disease, a combination of emphysema and bronchitis

- Cyanotic – bluish discoloration of the skin caused by low oxygen levels in the blood
- Dehydration – condition caused by the abnormal loss of fluid from the body
- Diabetes – disorder of sugar metabolism due to a
- lack of insulin
- Diaphoresis – sweating
- Diastole – relaxation phase of the heart cycle
- Diastolic – the lower, or second, of the two pressures making up the blood pressure; the force of blood against the blood vessel walls during ventricular relaxation
- Dyspneia – shortness of breath
- Emphysema – chronic, progressive disease of the lung involving the smaller airways and air sacs
- Epigastric – the upper portion of the abdomen
- Epilepsy – neurological disorder associated with seizures

- Exhalation – movement of air out of the lungs
- Fibrinolysis – process when a clot or coagulation
- is broken down
- Gingival hyperplasia – an overgrowth of gingival
- tissue often requiring surgery to reduce
- Glaucoma – increased pressure in the anterior
- chamber of the eye which may lead to blindness
- Glucose – form of sugar preferred by the body as
- an energy source for metabolism
- HEPA respirator – High Efficiency Particulate
- Arresting; air respirator used for personal
- protection when working with patients with known
- or suspected tuberculosis
- Hepatomegaly – swelling or enlargement of the
- liver seen in right heart failure
- Histamine – potent chemical released by body
- cells in response to infection or allergy

- Hypertension – elevated blood pressure exceeding 140/90
- Hyperventilation – increased rate and/or depth of breathing leading to excessive excretion of carbon dioxide
- Hypoglycemia – low blood sugar
- Hypopharynx – lower portion of the pharynx (throat) at openings of trachea and esophagus
- Hypotension – lower than normal blood pressure
- Hypoxia – body is deprived of adequate oxygen supply
- IM – intramuscular; drug administration into a muscle
- Inhalation – movement of air into the lungs
- Ischemic – decreased or inadequate blood supply to an organ or tissue
- IV – intravenous; drug administration into a vein
- Jaundice – yellow discoloration of the skin and sclera due to liver disease

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- Kussmaul respirations – rapid deep ventilations seen in diabetic ketoacidosis
- Laryngoscope – instrument used to view the larynx
- Laryngospasm – spasm (constriction) of the vocal cords
- Larynx – the voice-box
- Magill forceps – instrument used for manipulation of structures or tubes in the pharynx
- Metabolic – relating to metabolism; chemical reactions that happen within the body to maintain life
- Myocardial infarction (MI) – heart attack; portion of heart muscle becomes ischemic and dies
- NTG – abbreviation for nitroglycerin; blood vessel dilator

- Orthopnea – difficulty breathing only when lying flat
- Orthostatic hypotension – decreased blood pressure caused by rapid movements from supine to standing posture, or loss of body fluids
- Osmotic – pressure on water exerted by dissolved substances in a fluid separated by a semipermeable membrane
- Pallor – pale appearance to the skin due to decreased blood flow in the skin
- Palpated – feeling a body part or structure
- Pharynx – the throat
- Pitting edema – swelling of the ankles and feet due to heart failure
- PO – by mouth; administration of drugs by mouth (per os)
- Polyuria – excessive urination
- Post-ictal – the time period immediately following a seizure

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- Prodromal – initial symptom or sign
- Pruritus – itching
- Pulmonary edema – fluid build-up in the lung due to left heart failure
- Rales – crackling or bubbling sounds heard in the chest with pulmonary edema
- Respiratory rate – number of respirations per minute
- Sphygmomanometer – inflatable blood pressure cuff with Velcro closure
- SQ – subcutaneous; injection of drugs into subcutaneous (fat) tissue
- Sternocleidomastoid – muscle of the side of the neck
- Stethoscope – instrument for listening to breath or heart sounds

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- Stridor – high pitched breathing sound caused by partial collapse or obstruction of the upper airway during inhalation
- Supine – lying on the back in a horizontal plane; subsupine positioning is when the head is slightly lower that the knees to return more blood flow to the brain
- Syncope – fainting
- Systole – contraction phase of the heart cycle
- Systolic – top, or first, of the two pressures making up the blood pressure; the force of blood against the blood vessel walls during ventricular contraction
- Tachycardia – a rapid heart rate, faster than 100
- beats per minute

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- Tonic – phase of seizure where all muscles of the body remain contracted
- Umbilicus – navel or belly button
- Urticaria – raised wheals (hives) of the skin seen in allergic reactions
- Ventricular fibrillation – disorganized heart rhythm that does not result in a pulse
- Xiphoid process – lower-most pointy part of sternum

Specific Attacks

Airway Obstruction

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

- If the patient is coughing let them do so but if they are having trouble breathing you must stand behind the patient, and place the thumb side of the fist into the abdomen above the umbilicus and below the rib cage. Administer slow, inward and upward thrusts until the object pops free or the patient loses consciousness.
- With loss of consciousness, help the patient to the floor, open the airway and sweep out any obstructions which can be reached with the finger. Attempt to ventilate. If the patient cannot be ventilated, the airway is still obstructed. Continue the steps for CPR - checking mouth and ventilating at the appropriate time.

Asthma

- Patients may respond to anxiety and aerosolized particulate matter with bronchospasm. Many cases can be prevented by pre-treatment with the patient's metered dose inhaler (puffer) of bronchodilator medication. The inhaler should also be readily available at chairside.
- The patient may abruptly develop bronchospasm as evidenced by wheezing, coughing, and difficulty breathing, and may also complain of chest tightness and develop cyanosis.
- The patient should be placed in an upright position with arms forward to facilitate breathing and oxygen should be administered by mask or nasal cannula. The patient should use their inhaler and self administer one puff with instructions to inhale and exhale slowly. If the patient recovers well, treatment can continue. If the patient does not improve within five minutes, a second dose should be administered and it is recommended that treatment be postponed to another date.

Cardiac Arrest

- Cardiac arrest may result from an abnormal heart rhythm or be secondary to respiratory arrest. In either case, time and immediate intervention is of the essence.
- Immediately upon assessing unconsciousness in a patient, call 911. The rescuer should open the airway, look, listen, and feel for respirations. Next, check the carotid pulse for five to ten seconds. If a pulse is absent, lay the patient flat with board beneath chest or move patient to floor. Begin CPR and when possible, use the two-rescuer technique.
- Attach AED if available and follow the instructions. Continue to monitor all vital signs and give that information to emergency personnel when they arrive.

Stroke

- This happens when not enough blood is getting to the brain. The signs and symptoms may be of short duration (TIA) which resolve spontaneously or persist for months or years. A transient ischemic attack is a forewarning of a major ischemic CVA; these patients must be evaluated by a physician to prevent such an occurrence.
- The patient may have an altered level of consciousness or periods of confusion. Weakness or paralysis in one half of the body (right or left side) may be obvious. The patient may also be unable to speak or understand speech. When these severe symptoms occur without warning, they are likely to alarm both the patient and staff.
- Call 911. Place the patient on their side to maintain their airway, and suction oral secretions to prevent aspiration. These are both necessary as the patient frequently loses control of the facial muscles. Calm and reassure the patient and monitor their vital signs. Can also give oxygen if needed.
- If an ischemic stroke is confirmed, and the onset of symptoms has been less than 3 hours, a medication will be administered to help remove the clot and restore blood flow to the affected brain areas.

Chest Pain

- The development of central chest discomfort frequently results from stressful situations in patients with coronary artery disease. In angina episodes, the coronary artery narrowed by atherosclerosis is unable to supply the heart muscle with adequate amounts of oxygenated blood, causing chest pain. The decreased oxygen supply to the heart muscle is usually of short duration (less than five minutes) and no permanent damage occurs.
- In myocardial infarction (MI or heart attack), a blood clot develops in one of the coronary arteries completely cutting off blood supply to a portion of the heart muscle. Without a blood supply, the heart muscle dies within a few hours. The ischemic heart is very irritable and susceptible to cardiac arrhythmias. This is the patient most susceptible to sudden death. Whenever and wherever a myocardial infarction is recognized, 911 must be called immediately. This is critical, as about 50 percent of patients experiencing a myocardial infarction will die in the first two hours!

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- In both cases the patient will complain of chest pain usually described as a pressure or weighty sensation. This pain or numbness may radiate into either of their shoulders, arm, the neck, jaw, straight through to the back or to the upper part of the abdomen. Complaints of shortness of breath, nausea or vomiting are common, and the patient's skin may be pale and sweaty. If the patient has experienced angina in the past, they will be able to determine if this pain is different in character.
- It is recommended that out-of hospital patients are administered a single, chewed dose of 162 mg to 325 mg of aspirin to begin fibrinolysis. When chewed, the clinical effects are realized more quickly. Administer oxygen and monitor vital signs. Nitroglycerin 0.4 mg may be administered sublingually every five minutes but is usually more effective in treating the pain associated with an angina episode. If the patient has not previously had nitroglycerin, it is advisable to administer it while the patient is in a supine position, as hypotension is frequently seen in first time users.
- Calm and reassure the patient. The experience can be extremely frightening, with some patients voicing feelings of impending doom or death.

Heart Failure

- Heart failure may involve either the left ventricle (left ventricular failure-LVF) or the right ventricle (right ventricular failure-RVF). Of the two, left ventricular failure is the more serious and occurs first. In LVF, blood backs up into the lungs causing pulmonary congestion and shortness of breath, particularly when the patient is lying flat. In RVF, the blood backs up into peripheral circulation causing swollen legs and ankles resulting in pitting edema.
- Left ventricular failure is frequently precipitated by an acute myocardial infarction. When this occurs, call the rescue squad (911) immediately and place the patient in whatever position is most comfortable for them, usually sitting bolt upright. Administer oxygen by mask and monitor vital signs. If the patient complains of chest pain, nitroglycerin may be given.

Hypoglycemia

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

Diabetic Ketoacidosis

- Diabetic ketoacidosis occurs when there is not enough insulin available to move glucose into cells. This causes the cells to use fats and proteins for energy, leaving behind waste products which build up in the blood. Over time, from hours to days to sometimes weeks, the blood sugar level continually increases.
- Frequently an underlying medical problem such as heart attack, infection, or stroke may precipitate diabetic ketoacidosis even in diabetics who are normally in good control.

- The signs and symptoms of diabetic ketoacidosis are related to the osmotic effects of the very high blood sugar, the cellular acidosis, and the body's attempt to compensate for the acidosis. Patients may hyperventilate and have a fruity odor to their breath; extreme thirst due to severe dehydration and polyuria are also common. Because of the loss of fluids, the skin is warm, red, and dry to the touch. As the dehydration and acidosis become more severe, blood sugar levels will exceed 300 mg/dl, and the patient finally may lose consciousness.
- Maintain airway and ventilations by placing the patient on their side to prevent aspiration. Treatment of hyperglycemia will require hospitalization of the patient.

Allergy

- In the dental office, the most likely culprits are exposures to latex, local anesthetics, or antibiotics, but foods the patient may have eaten prior to their visit such as nuts, shellfish, milk products, and strawberries can also trigger this syndrome.

- The treatment of allergic reactions and anaphylaxis is the same- provide supportive care and administer epinephrine. Maintain the patient's airway, administer oxygen, and monitor the vital signs. Administer epinephrine 1:1000 0.3-0.5 mg SQ, often into the upper arm or thigh. Every office should include at least 3 auto injector epinephrine pens in their office emergency kit. Twinject®and Epi-Pen®are the most common pens for kits. Epinephrine is the treatment of choice for allergic reactions, as it reverses all the histamine induced symptoms and blocks the further release of histamine. Benadryl®50 mg IM or PO may be administered to treat the hives and relieve itching of the skin. Call 911!

Overdose

- Rapid administration, excessive dosing, or inadvertent intravascular administration may all result in increased drug effects. Prevention is the key in avoiding adverse drug reactions. Question the patient before treatment about allergies and hypersensitivity.
- Narcan® can be used to reverse the hypotension, respiratory depression, and decreased level of consciousness caused by these narcotics. In the case of the benzodiazepines such as Valium®(diazepam) and Versed®(midazolam), a specific antidote-Romazicon (flumazenil)-is also available.
- Most drugs have a few specific antidotes available. There are two notable exceptions. Narcan® (naloxone) is the antidote for accidental overdose of narcotics given IV such as Demerol®(meperidine).

Continued

- The patient should be treated supportively until the effects of the drug wear off. Stop the administration of the drug, maintain the airway and ventilations, monitor vital signs, and contact 911 if the patient fails to show prompt improvement.
- All of the toxic effects of lidocaine are due to its effects on the central nervous system and the conduction of nerve impulses. The signs and symptoms of lidocaine toxicity are shown in Figure 22. As there is no specific antidote for lidocaine toxicity, provide supportive care. Maintain the airway, administer oxygen, and treat other problems as they arise.

Hyperventilation

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

Continued

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

Respiratory Arrest

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

Seizures

- Seizures are most commonly seen in patients with known seizure disorders such as epilepsy. Such patients may have stopped taking or missed a dose of their anti-seizure medication or they may experience a seizure as a result of exposure to a triggered or stressful situation. It is important to note that otherwise "normal" patients may seize if the conditions are right, particularly with hypoglycemia or hypoxia.
- Premonition, called an aura, may take the form of a strange smell, visual or auditory hallucination, or other strange sensation. This allows the patient some time-ranging from a few seconds to minutes-to prepare for the seizure. As a seizure begins, the patient typically loses consciousness and then becomes tonic as all the major skeletal muscles contract. The patient is apneic, becomes cyanotic, and may bite their tongue. This is followed by the clonic phase in which muscles contract and relax in waves. During this phase, these involuntary movements make the patient susceptible to injuries to the head, arms, or legs, and they may become incontinent of urine and stool.
- A seizure is followed by a period of drowsiness, confusion and extreme fatigue called the postictal phase.

Continued

- When observing a generalized motor seizure, knowing what not to do is as important as knowing what to do. Never attempt to place or force any object between the patient's teeth. Bite sticks are ineffective and may cause damage to oral structures. Do not attempt to restrain the patient's movements. Individuals experiencing a seizure exhibit incredible strength and attempts at restraint may result in fractures to the patient's bones. In addition, do not attempt to ventilate the patient during a seizure.
- Loosen any constrictive clothing and turn the patient on their side to protect their airway from vomiting and aspiration. Place padding beneath the patient's head to prevent injury and let the seizure run its course. While seizures invariably last only one to two minutes, the time seems much longer as the event is being witnessed.
- After the seizure, continue to monitor the airway, administer oxygen, and obtain vital signs.

Fainting

- Fainting or syncope results from either the psychologic response to fear, anxiety, stress, pain, or unpleasant situations or from poor autonomic adjustments to changes in the patient's posture. In some cases, syncope may be due to very rapid or slow cardiac arrhythmias. Syncope accounts for over 50% of reported emergencies in the dental office.
- The psychological reaction causes an abrupt slowing of the heart rate and pooling of blood in the extremities. Within seconds the patient may complain of a flushed sensation, followed rapidly by loss of consciousness.
- Syncope can be prevented by identifying the patient prone to anxiety or who is using anti-anxiety agents. Fearful patients can be prescribed a premedication to help them relax for the dental visit. Keep the patient supine if possible; with older patients, allow them time to slowly adjust to an upright posture after procedures are completed. In the elderly, rapid changes in posture can result in postural (orthostatic) hypotension.

Continued

- When faced with a fainting episode, help the patient to the floor or place them in a supine position in the dental chair with the legs elevated. Once supine, the patient will regain consciousness almost immediately. Administer oxygen and loosen any tight clothing. Do not allow the patient to sit up, as they will frequently faint again. Keep the patient supine for a few minutes while the team attempts to determine the cause of the episode. Monitor vital signs.

- Because the patient regains consciousness almost immediately, the use of ammonia inhalants is unnecessary. It is recommended that treatment be stopped and rescheduled for another date.