

# KEY FACTORS TO EFFECTIVELY MANAGE MEDICAL EMERGENCIES IN THE DENTAL OFFICE (PART ONE)

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## Medical Emergencies can and do happen in the Dental Office

Medical emergencies occur in dental offices every 2 to 4 years on average, with 50-70% of practitioners witnessing at least one event annually. If quickly recognized and effectively managed most emergencies (90.5%) are resolved on-site without hospitalization.

It is **Estimated** that the **Average Dental Office** will have to deal with at least one or two **Life-Threatening Medical Emergencies** in their office during their career.

Whether a Medical Emergency occurs years in the future or this afternoon; **Prevention, Preparation, and Practice** are key to your patients safety.



## Famous Last Words

*"In all the years I have practiced, I have never had a medical emergency and if it does happen, I will just call "911".*



## Medical Emergencies



Natalie is a 15 year old teenager who presented to her dentist's office for routine dental treatment (MOD composite restoration on tooth #19). Her medical history was negative. No Medications, No Allergies, No Social History (- Tob, - Etoh, - Drugs) and a Past Surgical History of tonsillectomy w/o complications. Natalie is the "Star-forward" on her high school soccer team.

During her routine dental appointment, immediately after her local anesthesia injection, she complained of not feeling well, dizzy and nauseous. She then slumped in the chair and became unresponsive.....

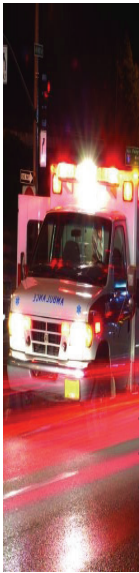
## Medical Emergencies

What happened next changed  
Natalie's Life "FOREVER".....

## Medical Emergencies

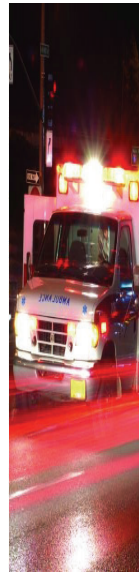
Natalie Parker suffered a irreversible Hypoxia  
Brain Injury. This is her life today.





## Key Factors to Effectively Manage Medical Emergencies:

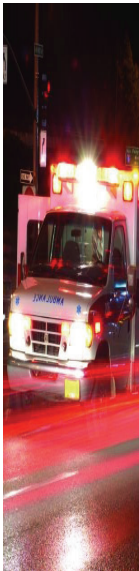
- Strategies to Prevent Medical Emergencies
  - Medical History
  - Patient Assessment
- Essential Medical Equipment & Medications
  - Oxygen
  - Airway Devices
- Emergency Plan & Emergency Training
- Familiarization & Utilization of Medical Equipment
- Team Approach & Effective Communication
- Mock Drills & Simulations



## Medical Emergencies

### Strategies to prevent Medical Emergencies

- Medical History (HPI/PMH)
- Review of Systems (ROS)
- ASA Risk Assessment
- Basic Vitals



## Medical History

The purpose of a Medical History is to screen for medical risk factors such as;

- Abnormalities of major organ systems (heart, lungs, liver, kidneys, immune system, bleeding disorders).
- Allergies to Medications.
- Previous Adverse Reactions.
- Medications & Drug interactions.
- Drug, Alcohol and/or Recreation Drug Abuse.



## Review of Systems

“Review Of Systems (ROS)” is a verbal inquiry of a list of questions, arranged by organ systems, designed to uncover dysfunction and disease.



## ASA Risk Classification

The American Society of Anesthesiologists (ASA) Physical Status Classification System is a standardized, 6-level scale (I-VI) used to assess a patient’s pre-treatment health and co-morbidities, helping to predict perioperative risks, such as morbidity and mortality.

- Guides clinical decision-making
- Improves communication among medical staff
- Documents a patient’s baseline status



## ASA Risk Classification

ASA Classification	Description	Examples	Stability
1	A normal healthy patient with good exercise	Unremarkable medical history	Excellent
2	A patient with mild systemic disease with no functional limitations	Controlled: Asthma, Diabetes, Seizures, HTN, anemia	Generally Good
3	A patient with severe systemic disease and clearly defined functional limitations	Poorly controlled: Asthma, Diabetes, Seizures. Morbid Obesity	Intermediate to poor
4	A patient with severe systemic disease that is a constant threat to life	Advanced degrees of pulmonary, cardiac, hepatic, renal and/or endocrine insufficiency	Poor

Source: New England Journal of Medicine 2000; 342:913

## Baseline Vitals

- Obtaining Vital signs provides a baseline measurement from which alterations in treatment can be tailored to the patients condition.
- This is a practice more frequently seen today in dental offices. Vital signs - Blood Pressure, Pulse, Respiratory Rate and Temperature should be measured prior to treatment.
- Knowing Normal from Abnormal is Key

## Baseline Vitals - Heart Rate

The pulse is a pressure wave that can be felt as the heart contracts and propels a volume of blood forward in the arterial system.

Three assessments can be made concerning the pulse; rate, strength, and regularity. The number of pulsations in fifteen seconds is counted and then multiplied by four to obtain the pulse rate.

Figure 6. Location of Pulse Points

Artery (Pulse Point)	Location
Carotid artery	Neck
Brachial artery	Medial aspect of antecubital fossa
Radial artery	Thumb side of anterior wrist
Ulnar artery	Little finger side of anterior wrist
Femoral artery	Medial aspect of thigh in groin area
Dorsalis pedis artery	Top of foot
Posterior tibial artery	Behind inside of ankle bone

## Baseline Vitals - Heart Rate

### Normal Pulse Rates

Age or Fitness Level	Beats per Minute
Babies to age 1	100-160
Children ages 1 – 10	60-140
Children ages 10+ and adults	60-100
Well-conditioned athletes	40-60

## Baseline Vitals - Respiratory Rate

[The respiratory rate is determined by the number of breaths in fifteen seconds then times by four. One breath or respiratory cycle consists of one inhalation and one exhalation.

- Factors that can increase the respiratory rate include anxiety, fever, and hypoxia.
- Respiratory rates can increase with age due to decreasing lung elasticity.
- The respiratory rate will decrease with the use of narcotics and benzodiazepines
- The rate, depth, and regularity of respirations are indicators of emergencies.

### Normal Respiratory Rates

Age Group	Respiratory Rate
Adults	12-20
Teenagers	15-25
Toddlers	20-30
Infants	25-40

## Baseline Vitals - Blood Pressure

- Blood Pressure is all about *perfusion*.
- Getting oxygenated blood to the end organs and the tips of your fingers & toes

Figure 8. Blood Pressure Classifications

Normal	120/80 or lower
Pre-hypertension	Between 120-139 systolic and/or 80-89 diastolic
Hypertension	Anything over 140 systolic and/or 90 diastolic

## Baseline Vitals - Temperature

- Temperature will often indicate if the patient has an infection.
- An oral temperature in excess of 99.6° F (37.5° C) is an indicator of the presence of a viral or bacterial infection.

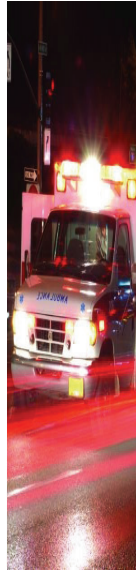
### Body Temperature by Location

Location	Normal Reading
Oral	98.6°F
Tympanic (ear)	98.6°F (oral equivalent)
Rectal	99.6°F
Auxiliary	97.6°F

# Emergency Preparedness



# Emergency Preparedness



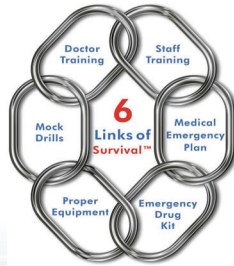
## Key Principles:

- Doctors & Staff should be able to **recognize the signs and symptoms** of medical emergencies.
- The office **should have a written and rehearsed Emergency Plan.**
- **Everyone** in the office should know **where** the Emergency Kit and Oxygen are **located.**
- **Everyone** in the office should be **familiar** with the **medications AND equipment** in the Emergency Kit.



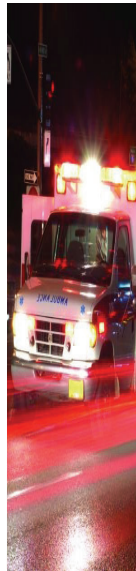
# Emergency Preparedness

- \* Emergency Equipment
- \* Emergency Medications
- \* Emergency Plan
- \* Emergency Training
- \* Mock Drills/Simulations



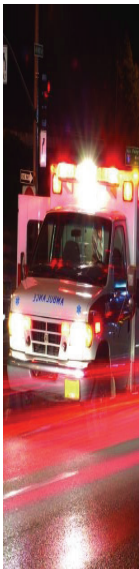
## EMERGENCY EQUIPMENT

- An operating dental chair or table which allows the TEAM to maintain the patients airway, alter the position of the patient (i.e. trendelenberg), and to provide a firm platform for the management of cardiopulmonary resuscitation.



## EMERGENCY EQUIPMENT LIGHTING SYSTEM

- A lighting system which is adequate to permit the evaluation of the patients skin and mucosal color.
- A backup lighting system which is powered by batteries and of sufficient intensity to permit completion or closure of operation at the time of a power failure.



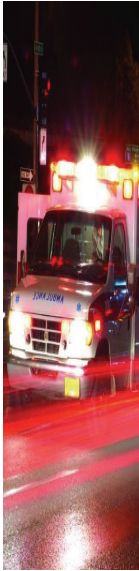
## EMERGENCY EQUIPMENT SUCTION EQUIPMENT

- Suction equipment which permits aspiration of oral and pharyngeal materials.
- A battery powered backup suction device which can operate during a power failure.



## EMERGENCY EQUIPMENT OXYGEN DELIVERY SYSTEM

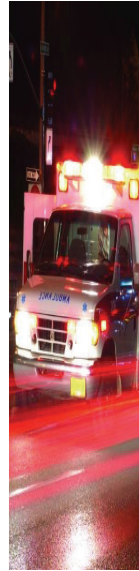
- An Oxygen delivery system with adequate full face masks and appropriate connectors that is capable of administering >90% oxygen at a flow rate of 10 liters/minute for at least one hour.
- A backup oxygen delivery system [660 liter E cylinder oxygen tank - green] with adequate full face masks and appropriate connectors that is capable of administering >90% oxygen at a flow rate of 10L/minute for at least one hour.



## EMERGENCY EQUIPMENT AND MONITORS



- Blood Pressure
- Temperature
- Pulse Oximeter
- ECG
- Capnography
- Pre-Cordial Stethoscope
- Multi-Purpose Patient Monitor

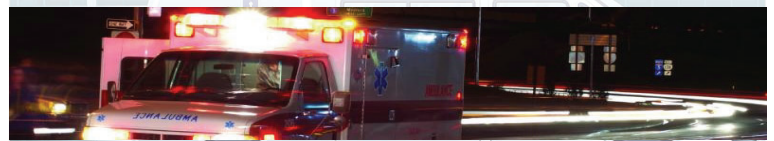


## Emergency Equipment

- Every office should have immediate access to an Automatic External Defibrillator (AED).
- The AED recognizes pulseless ventricular fibrillation or rapid ventricular tachycardia, and then allows the operator to administer "shocks" to convert the patient's rhythm back to normal.
- The AED is equipped with a voice prompt that leads the user through its usage and requires no specialized training.
- *Note: For every minute that lapses before defibrillation, the survival rate decreases by 10%.*



## EMERGENCY EQUIPMENT EMERGENCY KITS



## Medical Emergencies can and do happen in the Dental Office

Every Dental Office should have at least a **Basic Emergency Kit** that contains;

- ✓ oxygen
- ✓ automated external defibrillator (AED)
- ✓ albuterol (rescue inhaler)
- ✓ aspirin
- ✓ diphenhydramine (antihistamine)
- ✓ epinephrine auto-injectors
- ✓ nitroglycerin
- ✓ glucose.



## EMERGENCY KITS

- Having well-equipped emergency kits **readily available** in the dental office is essential for **effectively managing medical emergencies** that may arise during patient care.
- Emergency kits should be **easily accessible, regularly maintained,** and include **essential supplies and medications necessary** for various emergency situations.



## EMERGENCY KITS

- Emergency Kits organize their medications and contents into sections, compartments and trays.
- Are clearly labeled and categorized into key areas of care thus allowing the responder to quickly assess & treat the patient without searching for devices and medications.



## EMERGENCY KITS

- Allow for **Rapid Response** to those needing life-saving care.
- They can provide **Medications and Devices** to sustain **Basic Life Support (BLS)**, **Advanced Cardiac Life (ACL)** or **Pediatric Advanced Life Support (PALS)**.
- **Mobile kits** allows healthcare provider to bring the kit to patient.



## EMERGENCY KITS

- The emergency kit should be kept in a prominent, easily accessible location known to **everyone** in the office.
- On a monthly basis, a designated member of the dental team should be responsible for checking **all** items to ensure that none of the drugs have passed their expiration date **and** all equipment is operational.
- Make index cards which clearly state the indication, dosage, and administration of the drugs in the kit.



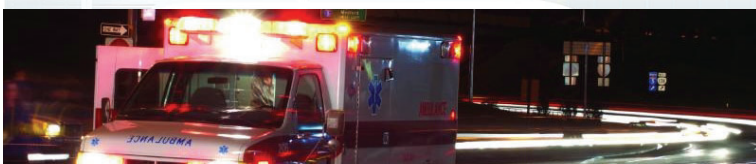
## EMERGENCY KITS

- It is important for dental staff to be trained in the use of emergency equipment and medications contained in the emergency kit
- Regular inspection and maintenance of the kit, including checking expiration dates of medications and supplies, are crucial to ensure readiness in managing medical emergencies effectively
- Regular drills and training sessions on emergency protocols are also recommended to enhance staff preparedness.



## EMERGENCY KITS

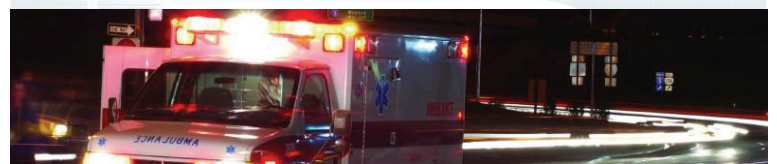
- Every dental office should have an emergency kit.
- There are commercially available kits or you can easily & inexpensively self-assemble your own kit.
- Personally, I recommend a commercially available kit.



## EMERGENCY KITS

### Basic Supplies:

- Latex-free gloves
- Scissors
- Adhesive tape
- Bandages (various sizes)
- Sterile gauze pads
- Splinting materials (e.g., tongue depressors)
- CPR face shield or mask



## EMERGENCY KITS

### Monitoring Devices:

- Blood pressure cuff
- Stethoscope
- Pulse oximeter for measuring oxygen saturation levels



## EMERGENCY KITS

### Airway Management:

- Oropharyngeal airways (various sizes)
- Nasopharyngeal airways (various sizes)
- Pocket mask or bag-valve-mask device for ventilation



## EMERGENCY KITS

### Oxygen Delivery:

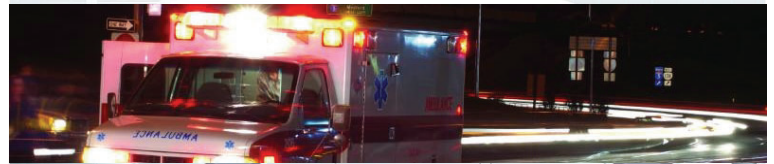
- Portable oxygen tank with regulator and tubing
- Oxygen mask or nasal cannula
- Oxygen key/wrench for tank adjustment



## EMERGENCY KITS

### Medications:

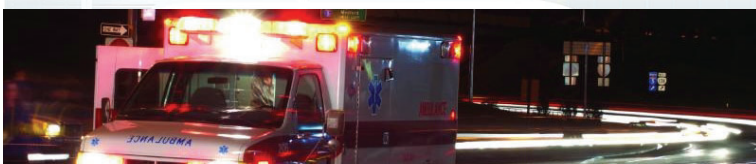
- Epinephrine auto-injectors (e.g., EpiPen) for anaphylaxis
- Nitroglycerin tablets or spray for angina
- Aspirin (chewable) for suspected heart attack
- Bronchodilator inhaler (e.g., albuterol) for respiratory distress
- Oral glucose gel or tablets for hypoglycemia



## EMERGENCY KITS

### Emergency Drugs:

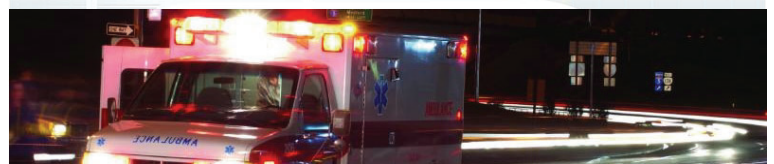
- Injectable epinephrine (1:1000) for severe allergic reactions
- Injectable glucagon for severe hypoglycemia in diabetic patients
- Bronchodilator solution (e.g., albuterol) for severe respiratory distress
- Antihistamines (e.g., diphenhydramine) for allergic reactions



## EMERGENCY KITS

### Emergency Protocols and Contact Information:

- Printed copies of emergency protocols and algorithms for common medical emergencies
- Emergency contact numbers for local emergency services and medical facilities
- Patient medical history and contact information for reference



## EMERGENCY KITS Basic

### Triage and Assessment

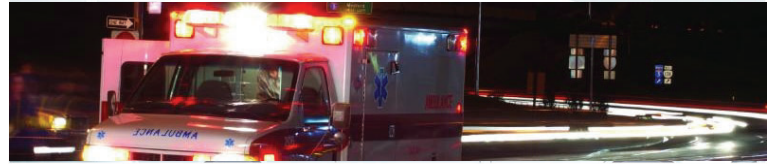
- Nitrile Gloves
- Protective Eyewear
- Face Shield
- Stethoscope
- Sphygmomanometer



## EMERGENCY KITS Basic (Airway)

### Airway Management

- Nasal canula
- Non-rebreather mask
- Oropharyngeal Airways
- Yankauer Suction
- Magill Forceps
- Ambu-Bag, Masks (diff sizes)



## EMERGENCY KITS Basic (Medications)

Quantity	Item
2	• Diphenhydramine 50mg/mL SDV
2	• Epinephrine 1:1000 1mL amples
1	• Albuterol Inhaler MDI
1	• Nitroglycerin tablets 0.4mg 25 tabs
1	• Oral Glucose Gel
2	• Ammonia Inhalants
4	• Aspirin 81mg chewable tablets
2 ea	• 1mL, 5mL 10mL Syringes



## EMERGENCY AIRWAY RESCUE DEVICES



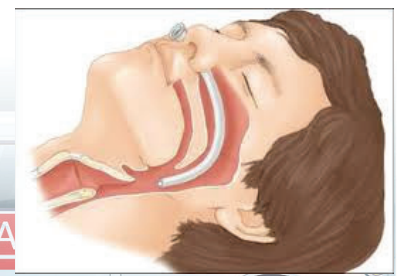
## Devices for Airway Rescue

- ❖ Oral airways
  - Effective in displacing the tongue from the posterior pharynx and opening the airway
  - Airway inserted with the point towards the roof of the mouth and then inverted as the pharynx is reached
  - Size selected by measuring the corner of the mouth to the earlobe



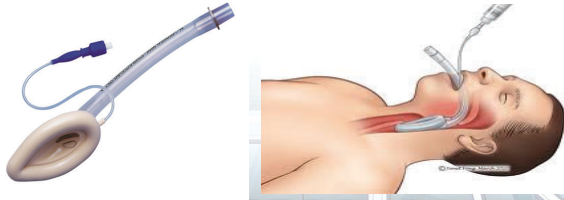
## Devices for Airway Rescue

- ❖ Nasopharyngeal airways
  - May be more tolerated by a conscious patient than the oral airway
  - Size selected by measuring the tip of the nose to the earlobe
  - Apply lubrication and insert into nostril



## Devices for Airway Rescue

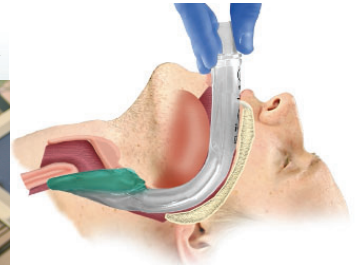
- ❖ Laryngeal mask airway (LMA)
  - Soft and can be placed “blindly” and without the need for laryngoscopy
  - Wide range of pediatric sizes
  - Technique sensitive with respect to placement



AMBU LANCE

## Devices for Airway Rescue

- The I-Gel is a second generation *supraglottic* airway with a non-inflatable cuff for use in anesthesia;
  - ◇ Easy insertion
  - ◇ Minimal risk of tissue compression
  - ◇ Stability after insertion
  - ◇ Latex free
  - ◇ Reduced risk of aspiration



## Devices for Airway Rescue

### Direct Video Laryngoscope



## Emergency Plan



## Emergency Plan

- It is important that every dental office **have an established and written Emergency Plan** for handling emergencies.
- The **Office Emergency Plan** should be updated and practiced regularly at periodic staff meetings.
- A specific **Code Word or Phrase** should be used to indicate an emergency for the Staff so as not to alarm/upset other patients or family members.



## Emergency Plan

- Emergency numbers such as 911 should be **posted** conspicuously at every phone in the office.
- **Additional emergencies phone numbers** can also be posted. For example - hospital emergency department, fire department, dentist anesthesiologist, oral surgeon, physician.



## Emergency Plan

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

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

What to say during an emergency call?



## Emergency Plan

- Every member of the dental staff should have a **Specific Assignment** in an emergency.
- In order to compensate for variations in staffing, **assignments should be rotated** so that all staff are familiar with all tasks.
- **Mock scenarios** of various emergency situations can be developed which will allow each staff member to act out their assigned roles.



## Emergency Plan

### Office emergency team

Team member	Responsibilities
Member #1 (first person on scene of emergency)	<ol style="list-style-type: none"> <li>1. Remain with victim</li> <li>2. Activate office emergency system</li> <li>3. Basic life support as necessary</li> </ol>
Member #2	<ol style="list-style-type: none"> <li>1. Bring emergency equipment* to scene</li> </ol>
Member #3 (and other members of the dental office staff)	<ol style="list-style-type: none"> <li>1. Assist as necessary                             <ol style="list-style-type: none"> <li>a. Activate emergency medical services</li> <li>b. Meet and escort EMS to office</li> <li>c. Assist with basic life support</li> <li>d. Prepare emergency drugs for administration</li> <li>e. Monitor and record vital signs</li> </ol> </li> </ol>

\*Emergency equipment includes oxygen supply, emergency drugs, and, when appropriate, an automated external defibrillator



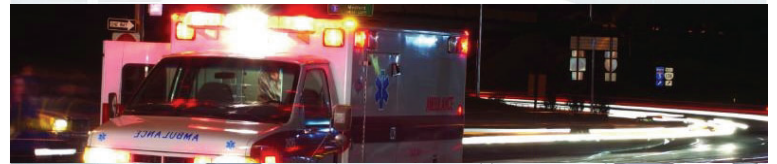
## Emergency Plan

New staff should:

- (1) review the written office emergency manual.
- (2) be given a specific emergency assignment.
- (3) be shown the location of all emergency equipment and how to use it.
- (4) participate in practice situations.

### Emergency TEAM Task(s)

<b>Receptionist</b>	<ul style="list-style-type: none"> <li>• Call EMS (911) or local emergency number</li> <li>• Calm persons in reception area</li> <li>• Direct rescue squad to patient</li> </ul>
<b>Dental Assistant 1</b>	<ul style="list-style-type: none"> <li>• Maintain C-A-B of CPR</li> <li>• Place patient in appropriate rescue position</li> <li>• Assess and record vital signs; relay to emergency personnel</li> </ul>
<b>Dental Assistant 2 or Hygienist</b>	<ul style="list-style-type: none"> <li>• Bring emergency kit/oxygen to chairside</li> <li>• Prepare medications for dentist</li> <li>• Turn to appropriate page in emergency reference</li> </ul>
<b>Dentist</b>	<ul style="list-style-type: none"> <li>• Direct other team members and overall treatment</li> <li>• Administer emergency medications</li> </ul>



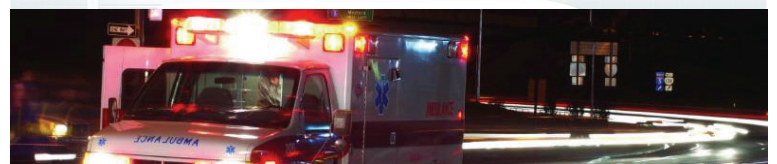
### Emergency preparedness checklist.\*

- All staff members have specific assigned duties.
- Contingency plans are in place in case a staff member is absent.
- All staff members have received appropriate training in the management of medical emergencies.
- All clinical staff members are trained in basic life support for health care providers.
- The dental office is equipped with emergency equipment and supplies that are appropriate for that practice.
- Unannounced emergency drills are conducted at least quarterly.
- Appropriate emergency telephone numbers are placed prominently near each telephone.
- Oxygen tanks and oxygen delivery systems are checked regularly. Other emergency respiratory support equipment is present, in good working order and located according to the emergency plan.
- All emergency medications are checked monthly and replacements are ordered for specific drugs before their expiration dates have passed.
- All emergency supplies are restocked immediately after use.
- One staff member is assigned the task of ensuring that the above procedures have been completed and to document this checklist review.



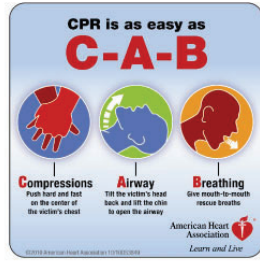
## Emergency Training

- Each year, the entire dental team should certify in Basic Life Support (BLS) and Cardiopulmonary Resuscitation (CPR) for healthcare providers.
  - Also, I highly recommend a Basic First Aid Course which would provide the staff with information on Emergency Care in common injury situations such as the control of bleeding, treatment of burns, and the handling of sprains and fractures.
- Ideally, the entire staff should take the CPR refresher course together – TEAM. Learning how to work effectively together.



## Emergency Training

- It is highly recommended that offices that provide Oral Conscious Sedation, IV Conscious Sedation, and/or General Anesthesia take ACLS and PALS once a year.



## MOCK DRILLS and SIMULATIONS

- Regular, hands-on mock drills for dental office are crucial for ensuring team readiness and improving patient safety
- Monthly sessions **are recommended** to practice role delegation, 911 activation, and equipment handling.
- Key scenarios include syncope, anaphylaxis, cardiac arrest, seizures, and drug overdoses, using BLS protocols and simulated high-fidelity mannequins.

A background image showing a medical professional in a pink shirt performing a procedure on a patient lying on a table. A large red ECG waveform is overlaid on the left side of the image.

**The End**

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