

What's in Your Emergency Kit and Why

What is an Emergency? Any condition which if left untreated may lead to patient morbidity or mortality.

Why Should You Care About Emergencies?

- In a survey of 2,704 dentists throughout North America, a total of 13,836 emergencies occurring within a 10-year period was reported.
- None of these emergencies were truly dental emergencies. They were potentially life-threatening medical problems that patients developed while they were in a dental office.
- Almost all medical emergencies that occur in a dental office are fear-related.
- If fear and apprehension are reduced, the chances of having a medical emergency are also reduced.
- Three-quarters of all of these medical emergencies developed as sequelae of pain (i.e., inadequate local anesthesia), the dentist's failure to recognize and treat a patient's fear of dental care, or both.

Malamed SF. Managing medical emergencies. JADA 1993;124(8):40-53.

Medical emergencies reported by 2,704 dentists.*	
EMERGENCY SITUATION	NO. (%) OF EMERGENCIES REPORTED†
Syncope‡	4,161 (30.1)
Mild Allergic Reaction	2,583 (18.7)
Postural Hypotension	2,475 (17.9)
Hyperventilation‡	1,326 (9.6)
Insulin Shock (Hypoglycemia)	709 (5.1)
Angina Pectoris‡	644 (4.6)
Seizures‡	644 (4.6)
Asthmatic Attack (Bronchospasm)‡	385 (2.8)
Local Anesthetic Overdose	204 (1.5)
Myocardial Infarction	187 (1.4)
Anaphylactic Reaction	169 (1.2)
Cardiac Arrest	148 (1.1)

* Source: Malamed.¹
† A few emergencies with low numbers were omitted from the table.
‡ Emergencies that potentially are stress related.

How Do You Manage Emergencies?

The Best Preparation is Prevention:

- Know your patient: get a complete medical and pharmacological history.
- Review any problem areas.
- Take training.
 - Practice
 - Practice
 - Practice
- Manual - Simple with flow charts.
- Emergency Kit.
- Equipment - Less is better.
- Phone – Cell.
- Medication - Only what you will use and are comfortable using . . .

Other Notes or Questions to Ask:

Stress-Reduction Protocol

- ✓ Recognize medical risk.
- ✓ Consult patient's physician(s).
- ✓ Pharmacosedation, as indicated.
- ✓ Short appointments.
- ✓ Morning appointments.
- ✓ Excellent intraoperative pain control.
- ✓ Minimize waiting room time.
- ✓ Excellent post-operative pain control.

Rosenberg, M. *Preparing for Medical Emergencies: Essential Drugs and Equipment for the Dental Office.* J Am Dent Assoc 2010; 141;14S-19S.

Suggested basic emergency drugs for the general dental office.			
INDICATION	DRUG	ACTION	ADMINISTRATION
Bronchospasm (Severe Allergic Reaction)	Epinephrine	α - and β -adrenergic receptor agonist	Autoinjectors or preloaded syringes, ampules; 1:1,000 solution subcutaneously, intramuscularly or sublingually; adults, 0.3 milligram; children, 0.15 mg
Mild Allergic Reaction	Diphenhydramine	Histamine blocker	50 mg intramuscularly; 25 to 50 mg orally every three to four hours
Angina	Nitroglycerin	Vasodilator	Sublingual tablet: one every five minutes up to three doses; translingual spray: one spray every five minutes up to three times
Bronchospasm (Mild Asthma)	Bronchodilator such as albuterol	Selective β_2 - adrenergic receptor agonist	Two or three inhalations every one to two minutes, up to three times if needed
Bronchospasm (Severe Asthma)	Epinephrine	α - and β -adrenergic receptor agonist (bronchodilator)	Autoinjectors or preloaded syringes, ampules; 1:1,000 solution subcutaneously, intramuscularly or sublingually; adults, 0.3 mg; children, 0.15 mg
Hypoglycemia	Glucose, as in orange juice	Antihypoglycemic	If the patient is conscious, ingest
Myocardial Infarction	Aspirin	Antiplatelet	One full-strength tablet (165-325 mg) chewed and swallowed
Almost Anything	Oxygen	Respiratory Support	Ad Lib

#1: Epinephrine 1:1,000 Injection

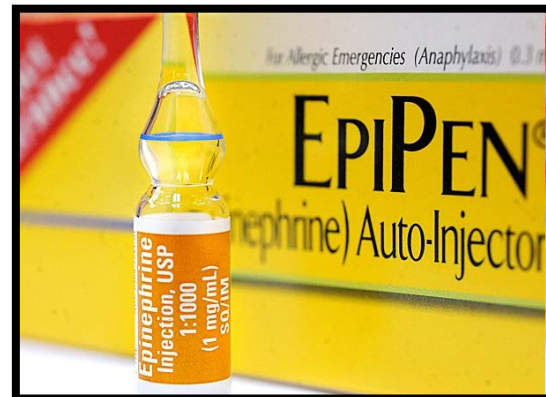
- ✓ Uses: to reverse hypotension, bronchospasm, and laryngeal edema that result from an acute anaphylactoid type reaction. Also used to reduce bronchospasm resulting from an acute asthmatic episode that is refractory to inhaler therapy.
- ✓ Pharmacology: Causes vasoconstriction that in turn increases blood pressure, heart rate, and force of contraction. Also causes bronchial dilatation. Reduces the release of histamine. Can be ineffective if the patient is taking beta-blocker.
- ✓ Adverse Effects:
 - a) Cardiovascular: Tachycardia, Tachyarrhythmia's, and hypertension.
 - b) Central Nervous System: Agitation, headache, and tremors.
 - c) Endocrine System: Increased blood glucose.
 - d) Pregnant Female: Can decrease placental blood flow.
- ✓ Dose: Supplied in vials, ampules, or pre-loaded syringes in concentration of 1:1000 (1mg/mL); 0.3mg for adults, 0.15mg for children. IV give 0.5-2.0mg (0.5mL-2.0mL) depending on severity of hypotension, titrate to effect repeat in 2 minutes if needed.

Other Notes or Questions to Ask:

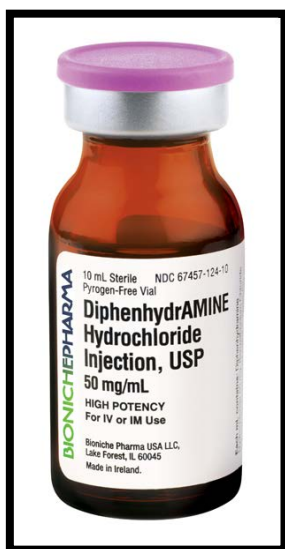
#1: EpiPen Instead??

Stecher D, Bulloch B, Sales J, et al. Epinephrine Auto-injectors: Is Needle Length Adequate for Delivery of Epinephrine Intramuscularly? *Pediatrics* 2009;124:65-70

CONCLUSION: The needle on epinephrine auto-injectors is not long enough to reach the muscle in a significant number of children. Increasing the needle length on the auto-injectors would increase the likelihood that more children receive epinephrine by the recommended intramuscular route.



#2: Diphenhydramine (Benadryl) 50mg Injection



- ✓ **Uses:** To reduce the affects of histamine release that is associated with allergic reactions, anaphylaxis, and acute asthma attack precipitated by exogenous causes.
- ✓ **Pharmacology:** An antihistamine that blocks the release of histamine in the body. It does not prevent the action of the histamine once released and thus must be given quickly. Prevents histamine responses such as bronchospasm, hypotension, rash, and edema.
- ✓ **Adverse Effects:**
 1. Cardiovascular: Tachycardia.
 2. Central Nervous System: CNS depression (sedative effects including drowsiness, lethargy, and mental confusion).
 3. Gastrointestinal: Xerostomia.
- ✓ **Dose:** 50-100mg IM or IV. For mild cases of pruritis, urticaria, or erythema an oral dose of 50mg every 6 hours can be used.

#3: Nitroglycerin

If patients have a history of angina and you are considering giving them their nitro or yours (from the EMG kit), what MUST you know?

- For *Viagra* and *Levitra*, at least 24 hours should have elapsed since the last dose of a PDE5 inhibitor.
- For *Cialis*, allow at least 48 hours before using nitrates.

J Am Coll Cardiol 1999; 33:273-82
J Am Coll Cardiol 2003; 42:1855-60



- ✓ **Uses:** Used to relieve or eliminate chest pain associated with angina pectoris, to differentiate between angina and a myocardial infarction.
- ✓ **Pharmacology:** A coronary and peripheral vasodilator and as such helps increase the flow of oxygenated blood to the heart muscle.

Other Notes or Questions to Ask:

- ✓ It also causes venous pooling of blood decreasing venous return to the heart thus improving the pumping efficiency of the heart. Because of this improved efficiency myocardial oxygen demand is decreased.
- ✓ Adverse Effects:
 - a) Cardiovascular: Rapid heart rate, facial flushing, and orthostatic (Postural) hypotension.
 - b) Central Nervous System: Dizziness and headache.
- ✓ Dose:
 - a) Tablet: 1 tablet sublingually repeat after 2 minutes if no relief up to 3 doses.
 - b) Metered Dose Spray: 1 spray sublingually repeat after 2 minutes if no relief up to 3 doses.

Angina

Symptoms/Signs: chest pain

Position **comfortable**

Airway **N/A**

Breathing **N/A**

Circulation **check pulse, monitor BP**

Definitive Treatment

1. Let patient take their nitro
2. Administer O₂ or O₂ with N₂O
3. Chew one aspirin tablet (81mg or 325mg)
4. Call 911
5. Terminate appointment

M.I. "Heart Attack"

Symptoms/Signs: Crushing sensation in chest, tingling or numbness of left arm or hand, rapid breathing, sweating, ashen color, may be nauseated and vomit. Clenched fist on chest is 80% predictive! **Call 911!**

Position Comfortable

Airway Monitor

Breathing Assist if they stop breathing

Circulation Check pulse, monitor BP

Definitive Treatment:

1. Call 911
2. Administer O₂
3. Chew one aspirin tablet 81 or 325mg
4. Monitor and record vital signs
5. Be prepared to administer CPR

Called "remote ischemic preconditioning," the procedure developed by Toronto's Hospital for Sick Children was found to significantly limit the amount of damage to the heart muscle caused by a blockage in a cardiac blood vessel.

Ischemic preconditioning involves using the device to interrupt blood flow in the arm, off and on over a period of 35 to 40 minutes: the cuff is inflated for five minutes, then deflated for five minutes, with the procedure being repeated consecutively four times.

<http://www.cbc.ca/health/story/2010/02/26/heart-attack-blood-pressure-cuff.html#ixzzOgflLoHNbP>

#4: Oxygen

Bag-Valve Concentrations:

- Without oxygen - 21%
- With oxygen, no reservoir - 60%
- With oxygen and reservoir - 90 to 95%
- With demand valve attachment - 100%

Other Notes or Questions to Ask:

M.I. "Heart Attack"



Women are different !

Most frequent symptoms:

Prodromal	During Acute MI
71% unusual fatigue	58% short of breath
48% sleep disturbance	55% weakness
42% shortness of breath	43% unusual fatigue
39% indigestion	39% cold sweat
35% anxiety	39% dizziness
> 30% had chest pain	

43% did not have chest pain during Acute MI
95% knew their symptoms were new and different a month or more prior to the Acute MI.

M.I. "Heart Attack"



1. **Call 911**
2. **M.O.N.A**

Morphine for pain control

O₂ Administration

Nitroglycerine 1 dose q5min to max of 3.

Ask both men and women if they have had Viagra in the last 24 hr. No nitro if yes as it can lead to dangerously low BP.

ASA Chew one tablet (81mg or 325mg).

This is as important as nitroglycerin.

3. **Be prepared to administer CPR.**
4. **The sooner they get to the hospital the better for dilation of vessels or fibrinolysis.**

#5: Aspirin (for Acute Coronary Syndromes)

- ✓ **Pharmacology:** Irreversibly inhibits cyclooxygenase-1 and 2 (COX-1 and 2) enzymes, via acetylation, which results in decreased formation of prostaglandin precursors; irreversibly inhibits formation of prostaglandin derivative, thromboxane A₂, via acetylation of platelet cyclooxygenase, thus inhibiting platelet aggregation; has antipyretic, analgesic, and anti-inflammatory properties.
- ✓ **Uses:** Treatment of mild-to-moderate pain, inflammation, and fever; prevention and treatment of myocardial infarction (MI), acute ischemic stroke, and transient ischemic episodes; management of rheumatoid arthritis, rheumatic fever, osteoarthritis, and gout (high dose); adjunctive therapy in revascularization procedures (coronary artery bypass graft [CABG], percutaneous transluminal coronary angioplasty [PTCA], carotid endarterectomy), stent implantation.
- ✓ **Precautions:**
 - Bleeding disorders: Use with caution in patients with platelet and bleeding disorders.
 - Dehydration: Use with caution in patients with dehydration.
 - Ethanol use: Heavy ethanol use (>3 drinks/day) can increase bleeding risks.
 - Gastrointestinal disease: Use with caution in patients with erosive gastritis or peptic ulcer disease.
 - Hepatic impairment: Avoid use in severe hepatic failure.
 - Renal impairment: Use with caution in patients with mild-to-moderate renal impairment (only at high dosages); avoid in severe impairment.



#6: Albuterol Inhaler (bronchodilator)

- ✓ **Uses:** Used during acute asthma or Anaphylaxis to reduce or control bronchospasm.
- ✓ **Pharmacology:** A β_2 -adrenergic drug that relaxes the bronchial smooth muscle. It has rapid onset and duration of action of up to 6 hours. Also reduces the stimulation of mucous production.



Other Notes or Questions to Ask:

- ✓ Albuterol and Beta-Blockers tend to inhibit each other.
- ✓ Adverse Effects:
Should be used with caution in patients with cardiovascular disorders especially coronary artery disease, arrhythmias, and hypertension.
- ✓ Dose:
2 puffs every 2 minutes to a maximum of 20 puffs. Hold inhaler about 2 inches from mouth. Have patient take two deep breaths and then exhale forcefully. Dispense one puff on slow deep inhalation. Hold breath for 10 seconds and repeat.



#7: Glucose (for hypoglycemia)

- ✓ Symptoms:
 - Appears confused
 - Cool, moist skin
 - May be hungry
 - May seem “drunk” but not alcohol breath odor
 - Slurred speech
- If patient becomes unconscious or does not respond readily after sugar/carbohydrate administration, activate EMS. They will give IV treatment.
- Never give unconscious patient anything orally!



Should I Have Other Drugs?



- Flumazenil (Romazicon®) – YES, if office uses sedation
- Naloxone (Narcan®) – YES, if office uses sedation
- Nitrous Oxide?
- Midazolam (Versed®)?
- Corticosteroids?
- Aromatic Ammonia?

Do Not Get Yourself Locked Into A Serious Drug Collection!

Other Notes or Questions to Ask:



#8: Flumazenil (Romazicon®) for Benzodiazepine Sedation Reversal

- ✓ **Uses:** Selectively blocks benzodiazepine receptors, reversing sedation and respiratory depression
- ✓ **Preparation:** 0.1 mg/ml, in 5 ml and 10 ml MDV
- ✓ **Dose:** IV or sublingual, 0.2 mg every 1 minutes up to 5 doses

- ✓ “Respiratory depression mediated by benzodiazepines can be reversed using the specific antagonist flumazenil (Romazicon). It can be titrated intravenously or injected sublingually in 0.2 mg increments every 2-3 minutes, up to 1 mg. Flumazenil should not be administered to patients with a history of seizure disorder or dependence on benzodiazepines.”

Dionne R, Phero J, Becker D; Management of Pain and Anxiety in the Dental Office. WB Saunders 2002;18:289

- ✓ “Intraoral submucosal injection of flumazenil appears to be a viable concept based upon the following findings. The drug is rapidly and complete absorbed into the systemic circulation, as evidenced by comparable serum concentrations to those obtained by IV administration.”

Oliver F, Sweatman W, Unkel J, et al. Comparative pharmacokinetics of submucosal vs. intravenous flumazenil (Romazicon) in an animal model. American Academy of Pediatric Dentistry; 2002:26

#9 Naloxone (Narcan®) – Narcotic Antagonist

Indications:

- Reversal of narcotic depression including respiratory depression induced by opioids, (both natural and synthetic narcotics), propoxyphene, and narcotic-antagonist analgesics
- Diagnosis of suspected acute narcotic overdose
- Not effective in counter-acting depression due to barbiturates, tranquilizers or other non- narcotic anesthetics or sedatives

Routes of Administration:

- IM, SC - when IV route not feasible; onset of action not as prompt as with IV and may be delayed in patients who are hypotensive and have impaired peripheral circulation
- IV direct - slowly over at least 1 minute



Rando J, et al. Intranasal naloxone administration by police first responders is associated with decreased opioid overdose deaths. Am J Emerg Med. 2015 Sep;33(9):1201-4.

Dosage, Adults:

- Known or suspected overdose: 0.4-2 mg IV; if no response, repeat 2-4 mg in minutes; in cases of large narcotic overdoses, or methadone, pentazocine, propoxyphene overdose, higher doses may

Other Notes or Questions to Ask:

- be required; if no response after 10 mg, reassess diagnosis; effective dose may be repeated every 20-60 minutes
- Post-operative respiratory depression: 0.1-0.2 mg at 2-3 minute intervals until desired response is obtained; repeat doses may be required at 1-2 hour intervals
- Partial reversal of opioid-associated respiratory depression in palliative patient: if respiratory rate < 6/minute, administer 0.1-0.2mg IV q2-3 minutes or 0.1-0.2mg SC q5-10minutes until respiratory rate > 10/minute. Continue to monitor respiratory rate q15minutes until no naloxone given x 1 hour.

Dosage, Children:

- Known or suspected overdose:
- Birth to 5 yrs or 20 kg: 0.1 mg/kg/dose; repeat at 2-3 minute intervals until desired response obtained
- > 5 yrs or > 20 kg: 2 mg; repeat as above
- Post-operative respiratory depression: 0.005-0.01 mg/kg IV repeated if necessary at 2-3 minutes intervals
- Onset of effect: within 1-2 minutes following IV, within 2-5 minutes following IM or SC
- Duration of effect: 45 minutes to 3-4 hours
- Since duration of action of narcotic agent may exceed that of naloxone, repeated doses or administration of naloxone via IV infusion may be required



Edwards ET, et al. Comparative Usability Study of a Novel Auto-Injector and an Intranasal System for Naloxone Delivery. *Pain Ther.* 2015 Jun;4(1):89-105.

Midazolam (Versed®) for Seizures

- ✓ **Uses:** For seizures, since it can be injected IM or subcutaneously or swallowed (orally). Realistically you want to call 911 if the seizure lasts more than a minute or if it is the first seizure for a patient.
- ✓ **Pharmacology:** A short-acting hypnotic-sedative drug with anxiolytic and amnesic properties. It is used in dentistry, cardiac surgery, endoscopic procedures, as preanesthetic medication, and as an adjunct to local anesthesia. The short duration and cardiorespiratory stability makes it useful in poor-risk, elderly, and cardiac patients.
- ✓ **Dose:** Inject 1-1.5mg (1-1.5mL) into buccal fold and repeat after a minute or two if the seizure has not stopped. If buccal fold is too difficult due to patient clenching inject IM on upper arm.
- ✓ **Beware:** Midazolam is also available as a 5mg/mL vial in which case 5mL would be 25mg; too much!!



Corticosteroids for Acute Adrenal Insufficiency

The adrenal cortex produces over 25 different steroids. These steroids are broken into three groups: sex steroids, mineralocorticoids, and glucocorticoids. Of primary concern in dentistry are the glucocorticoids. A physiologic dose of approximately 20mg/day of cortisol is produced. This plays a key role in the body's

Other Notes or Questions to Ask:

ability to adapt to stress. Cortisol provides a chemical link within the cells of the body allowing regulation of vital functions including blood pressure and glucose utilization.

Cortisol production is triggered by real or threatened “stress” such as trauma, illness, fright, and anesthesia. In a patient with suppressed adrenal function a failure of this cortisol production eliminates the chemical link to regulate vital functions resulting in sudden shock and possibly death. Suppressed adrenal function or Adrenal Failure is classified as either Primary (Addison’s disease caused by Disease states such as TB, Bacteremia, Carcinoma, and Amyloidosis.) or Secondary (caused by Pituitary disorders, Hypothalamic disorders, or Steroid Therapy).

Steroid therapy suppresses the function of the adrenal cortex reducing the production of natural cortisol. Because of this suppression patient’s who have been on long term steroid therapy lose their ability to respond to stress. If these patients are stressed symptoms of acute adrenal insufficiency may result.

Signs and Symptoms of Acute Adrenal Insufficiency:

- | | |
|-------------------------|---|
| 1. Mental confusion. | 6. Intense pains in abdomen, lower back, and/or legs. |
| 2. Muscle weakness. | 7. Mucocutaneous pigmentation. |
| 3. Fatigue. | 8. Hypoglycemia. |
| 4. Nausea and vomiting. | 9. Hyperkalemia. |
| 5. Hypotension. | 10. Increase heart rate, decreased blood pressure. |

Dental Treatment Considerations

For patients with a history of glucocorticoid therapy use stress reduction protocols. The following guidelines can be used to determine if replacement therapy is indicated but it is always a good idea to get a medical consult in such cases.

If the patient has undergone supraphysiologic (more than 20mg/day) glucocorticoid therapy that was discontinued more than 30 days prior to the planned dental treatment no supplementation is required.

If the patients has undergone supraphysiologic glucocorticoid therapy within 30 days of the planned dental procedure considered the patients suppressed and provide steroid supplementation equivalent to 100mg of cortisol.

If the patient has undergone or is undergoing alternate day dosing schedule glucocorticoid therapy no supplementation is required but it is best to provide dental treatment on the off day of the patient’s dose schedule.

If the patient is currently receiving daily glucocorticoid therapy at a supraphysiologic level (more than 20mg) supplementation is required. If the daily dose is subphysiologic supplementation is not required.

Equivalent Doses of Corticosteroids

Cortisone	25mg
Hydrocortisone	20mg
Prednisolone	5mg
Prednisone	5mg
Methylprednisolone	4mg
Triamcinolone	4mg
Dexamethasone	0.75mg
Betamethasone	0.6mg

Fundamentals of Emergency Preparation

- Training (BLS, ILS, ACLS, PALS).
- Development and implementation of an emergency plan.
- Purchase and maintenance of emergency equipment and drugs.
- Periodic mock emergency drills.
- Training new staff members.
- Monitoring and Patient Assessment.

Other Notes or Questions to Ask:
